Soil erosion and conservation in Zimbabwe: political economy and the environment

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ABSTRACT.

This thesis concerns soil erosion and conservation in Zimbabwe. It is framed in the light of the contemporary heightened concern for the environment generally in Africa and the recent publication of the National Conservation Strategy for Zimbabwe (1987).

Soil erosion is an archetypal interdisciplinary problem. This thesis complements and extends understanding of soil erosion and conservation in Zimbabwe via a methodological approach and a scale of analysis which have been under-represented in the literature to date. The research adopts a pluralist, regional political ecology approach (after Blaikie and Brookfield 1987) to soil erosion and conservation in Svosve communal area, combining political-economic understanding with case study analysis of changing social-environmental relationships.

Plural problem definitions are constructed through interview and survey techniques, historical analysis of archival sources and oral testimonies, assessment of contemporary policy and planning documents and via sequential air photograph analysis.

The research challenges aspects of the colonial conservationist literature to date for southern Africa and national level modelling of human-environment relationships in Zimbabwe. It presents a quantitative assessment of the change in symptoms of deterioration and in the nature and extent of soil erosion for the case study area. It operationalises the concept of multiple problem definitions with implications for the contemporary model for conservation extension and for improving the role of local development institutions.
ACKNOWLEDGMENTS.

Four years ago, Robert Chambers said to me that he would not recommend embarking on a PhD thesis to his worst enemy. I would recommend it to anyone; it has been a privilege, the full value of which I will undoubtedly only realise in later years. Numerous people have enabled, nurtured and cursed this thesis, to whom I am indebted for their persistence and to whom I would like to extend my thanks here.

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CHAPTER ONE. INTRODUCTION.

The environment is receiving renewed concern in the industrialised countries and an unprecedented prominence amongst governments in the developing nations. This thesis focuses on one symptom of environmental decline, that of accelerated soil erosion in Zimbabwe. Although the accurate measurement of erosion is notoriously difficult and complex, there is little doubt that "problems are getting worse and need attention" (Stocking 1987 p.1). A national erosion survey effected in Zimbabwe in 1988 concluded that 21% of the country was experiencing erosion levels described as 'moderate' to 'very severe' (Whitlow 1988). Maintenance of a balance between environment and development is one of six major policy objectives within the First Five Year National Development Plan for Zimbabwe (Republic of Zimbabwe 1986), and the prevention of soil erosion is a central element of the National Conservation Strategy (Ministry of Natural Resources and Tourism 1987).

This thesis aims to complement and extend understanding of soil erosion and conservation in Zimbabwe through a methodological approach and a scale of analysis which have been restricted in the general and the Zimbabwe-specific literature to date. Data is drawn from a variety of sources and spatial and temporal scales. The main focus of the research is Svosve communal area, Mashonaland East.

Soil erosion is an archetypal interdisciplinary issue. Two sets of 'specificity' (Blaikie 1985) need to be understood and integrated; the place-based concern for the immediate causal variables of the physical system and the non-location specific concern of the social system. To date, these have tended to be addressed separately within distinct disciplinary boundaries. The complexity associated with varying spatial and temporal scales and epistemological domains, can, however, be theorised. Regional political ecology (Blaikie and Brookfield 1987) is a pluralist approach to the environment which "aims to unify but through an appreciation of plurality of purpose and flexibility in explanation" (Blaikie and Brookfield 1987 p.25). The theoretical insights of regional political ecology are drawn from the populist critique articulated in the 1970s within development theory, and from political economy.

Adherents to the populist mode of thought are critical of the "inhuman, monolithic and bureaucratic nature of the development process" (Adams 1988 p.3). Their work focuses on local peoples, local environments and systems of knowledge complementary to that of western science. Political economy offers the methodological basis from which the political, economic and social forces influencing, both directly and indirectly, the relationship between people and their environments, can
be theorised. "Anything other than a political treatment of the environment lacks credibility" (Redclift 1987 p.2). Regional political ecology combines the strengths of both bodies of knowledge through the integration of national, regional and local data and crosses the physical/human science divide. It is an approach designed to

"encompass interactive effects, the contribution of different geographical scales and hierarchies of socio-economic organisations (e.g person, household, village, region, state, world) and the contradictions between social and environmental changes through time" (Blaikie and Brookfield 1987 p.17),

This chapter overviews the main recent theoretical developments in the soil erosion and rural development literature and the primary insights from conservation practice. Soil erosion is socially defined, yet to date, a single technocentric conception of the problem, inspired by western science, has dominated research and development. A regional political ecology approach accommodates plural problem definitions through an analysis of both the physical and social factors shaping the conception of soil erosion held by land managers and those with power to influence resource-use behaviour. This thesis examines the conceptions of soil erosion held by communal farmers, extension workers and government officials at various levels of the administrative hierarchy, and highlights the potential forces moulding these views. Sustained participation in conservation programmes is essential for the prevention of soil erosion in Zimbabwe. Understanding individuals' conceptions of the problem and its solutions will enhance the likelihood of this being achieved.

The regional political ecology approach can be conceived as following a chain of explanation as shown in figure 1.1. The regional political ecology approach effected within the course of this thesis is not exhaustive. Particular elements and levels of analysis are emphasised on the basis of the weaknesses identified above in the general soil erosion literature and the bias evident within understanding of soil erosion and conservation in Zimbabwe to date.

The primary objectives of the research are as follows;

1. To incorporate the environment in to political-economic analysis through an examination of the various conceptions of soil erosion forwarded by different interest groups at the national, regional and local levels in the past and those held currently.

2. To examine the insights to understanding of the spatial distribution of soil erosion in Svosve elicited by the various methodological techniques and scales of analysis.
Figure 1.1 The 'Chain of Explanation' (after Blaikie and Brookfield 1987).
3. To generate quantitative information on the historical change in 'environmental deterioration' and soil erosion at the local level which has not been established to date in Zimbabwe.

**The African environment and interdisciplinary study.**

Periods of heightened awareness and distinct conservationist ideologies, 'environmentalism' as termed by Pepper (1984), have tended in the past to coincide with periods of economic prosperity. This may partially explain the restored concern for the environment in the developed world. The forces contributing to the contemporary urgency in the developing nations are more varied. Undoubtedly, the persistent pressure by the industrialised nations over the last fifteen years for moves towards the global management of resources, has been influential. Experiences of drought, famine and 'environmental bankruptcy' (Timberlake 1985) have also highlighted the need for environmental policy to many governments in the developing world. This research effects a critical analysis of contemporary concern for the environment expressed by the national government in Zimbabwe. Perhaps, the most important factor in stimulating concern for the environment has been the realisation on the part of all governments, that environmental issues are regularly and centrally, development issues.

Recent studies such as the World Conservation Strategy (1980) produced by IUCN and WWF and the WCED (Brundtland) report on 'Our Common Future' (1987), have raised awareness of global futures and the need for sustainable development in both developing and developed nations. Environmental issues now incorporate the life-threatening environmental concerns of the poorest groups as well as the traditional, middle class western concerns of environmentalist movements (Pepper 1984, Sunkel 1990). However, although the natural limits to sustainability have been widely debated within global future studies (Meadows et al 1972), the structural origins to sustainable development are less well rehearsed. Redclift (1987) argues that many environmental problems originate in the economic relationships and social institutions which exist between nations, regions, communities and even households. Despite the marked increase during the 1970s to environmental issues in the developing countries, the tendency was to "characterise environmental conflict in the South as anything but environmental" (Redclift 1987 p.1). Simultaneously, despite the growing critical, marxist literature in development studies in the 1970s, the environment was rarely part of the political dialogue about development and underdevelopment. The need is to make the "environmental crisis a central concern of political economy and its structural causes a central concern of environmentalism" (Redclift 1984 p.2).
Redcliff's plea to integrate the environment within political-economic analysis is one of many recent protestations within the development literature calling for both research and development which straddles the natural/social science divide and addresses real world problems. Richards (1975) for example, in his work on agrarian change in west Africa, urges that "there is much to be gained by both sides in ignoring the boundary between biological and social sciences" (p.6). He suggests that political economists, economic historians and human geographers tend to overlook the technical and environmental realities in their explanations of agrarian changes. Simultaneously, overconcentration on the techniques of farming system research have tended to neglect the major debates concerning the political economy of agriculture. Chambers (1983) similarly calls for a pluralist approach to rural development with a wide span in both political economy and physical ecology. He suggests that to date, research and development has been approached by two 'cultures of outsiders'; negative academics and positive practitioners with distinct preferences in explanation;

"The negative social science pole attracts and sustains those who explain poverty in social, economic and political terms, while the positive practitioner pole attracts and sustains those who explain it in physical and ecological terms" (Chambers 1983 p.35).

The consequent partiality in explanation by both sides is unacceptable in the light of continued poverty and underdevelopment; "a balanced pluralist approach...is more likely to fit the reality and reveal what best to do" (Chambers 1983 p.44). Increasingly within rural development generally and agriculture in particular, the search for sustainable processes of change is bringing academics and practitioners into interdisciplinary dialogue and effort.

**Soil erosion: An interdisciplinary issue.**

"If the problems of land degradation could have been solved by research and reports alone, they would have disappeared long ago" (Blaikie and Brookfield 1987 p.xvii). Classic texts such as that of Jacks and Whyte (1939) documented horrific rates of soil loss and consequent desertification fifty years ago. Despite all the investments in 'development' and the burgeoning research in the area of environmental degradation; the numerous conferences, symposia and institutions established, it has been argued that little substantive progress has been made in terms of problem identification nor solutions offered; "recent literature has not dated these classics" (Blaikie 1985 p.40).

Soil erosion is the process of detachment and transportation of soil particles by the erosive agents of water and wind. Soil is lost 'naturally' through erosion in response to geomorphological conditions; the rate being determined by characteristics of rainfall,
runoff, wind, soil, slope and plant cover. All can be substantially modified by human activity and therefore a distinction is made between 'geologic' and 'accelerated' soil erosion; the latter being due to anthropogeomorphological factors.

Running water causes three main erosion forms; sheet, rill and gully erosion. Sheet erosion is the least spectacular in that it refers to the gradual removal of a thin layer of soil over a large surface area. Rill erosion takes place in narrow channels formed by water flowing down minor depressions in the land surface with erosion occurring throughout the length of the channel. Clearly, the high rates of runoff associated with sheet erosion may lead to rill formation and where large volumes of water flow down continuous depressions, gully erosion may result further down the catchment. Although the three erosion forms are in consequence related, the processes of gully formation are quite different to that of rill formation. Erosion in the former is concentrated at the gully head, for instance. It is now being increasingly realised that despite gully erosion being the most dramatic and visible form of erosion by water, it is sheet erosion which has the potential to do most damage (Stocking 1987).

Soil erosion can be controlled through a variety of soil conservation techniques. Strategies for erosion control may be directed at protecting the soil from raindrop impact, increasing the infiltration capacity of the soil, improving the aggregate stability of the soil or reducing runoff through increasing the surface roughness (Morgan 1980). Conservation measures are therefore conventionally split into 'mechanical' methods; those which control the movement of water or wind over the soil surface and 'biological' which include various agronomic measures based on the role of plant cover in reducing erosion. The selection of an appropriate conservation practice and the success of a conservation programme clearly depends on an understanding of the soil erosion process. The most significant recent development has been the recognition that "conservation is as much about social processes as physical ones, and that the major constraints are not technical, but social" (Blaikie 1985 p.50). Full understanding of soil erosion is dependent on the integration of the two sets of specificity outlined above; omission of the physical processes in explanation leads to a lack of understanding of the immediate causal variables, whereas omission of the specificity of the social/economic system leads to a purely technocratic study of soil erosion with no appreciation of the political-economic relationships operating at any level.

Natural science, technocentrism and soil conservation.

To date, natural scientists in their study of soil erosion have concerned themselves largely with the interaction between the erosive forces and the land use, natural characteristics and vegetation. Much of their work was based on techniques to predict
soil losses or erosion hazard. For example, the Universal Soil Loss Equation (Wischmeier and Smith 1962), where soil losses are calculated from indices representing soil erodibility, rainfall erosivity, slope and vegetation characteristics, is exemplary of the work of natural scientists. In contrast to the contribution by natural science, social scientists have been slow to incorporate the environment explicitly into their work and their subscription to soil erosion research has been small; the social factors involved in soil erosion have not generally been subjected to the same type of systematic analysis that the technical ones have and tend to remain "unconnected, irksome and somehow immovable under prevailing analytical frameworks" (Blaikie 1985 p.51). Some natural scientists started to include references to factors of human causation, but these remained appendages to their main work, often verged on determinism and eventually they had to concede to the complexity of the problem; "It is virtually hopeless to attempt to introduce any order or rational universal scheme into man's activities on the land" (Stocking and Elwell 1973 p.101).

The dominance of the activities of natural scientists within the explanation of soil erosion has had a profound effect not only on the conception of the problem promoted, but also on the range and nature of conservation policy options forwarded in practice. It is in the prescriptive conservation solutions proposed that the limitations of natural scientific endeavour become clear. Natural scientists confine their conception of soil erosion to physical parameters; their perception is of an environmental problem for which the available policy options are restricted, in consequence, to the technical sphere. Any failure in the conservation response forwarded via this 'technocentric' approach is attributed to what Baker terms "the old portmanteau of social factors" (1986 p.18); tradition, irrationality, conservatism and the 'unscientific' nature of indigenous techniques and lifestyles. In consequence, social, economic and technical factors are given as explanations of the continuing environmental problem within the technocentric approach and used to justify policies ranging from education programmes to removal of access to the majority of users; there is no recognition of environmental stress as symptomatic of a social, economic or political dilemma.

In the light of the failure of natural scientists to consider the environmental problem as symptomatic of a malaise within the broader political economy, Baker also refers to this approach as 'neutralism', expressing the tendency for the status quo to be reinforced within such analyses. He suggests that such an approach and the continued attribution of conservation failures to ignorance or resistance to change on the part of the cultivator,

"confirms a degree of irrationality which is unacceptable, flies in the face of historical evidence of change and, in short tells us
more about the people who offer these explanations than the behaviour they are trying to explain" (Baker 1986 p.18).

In excluding political economic concerns from their analyses, symptoms are elevated to the status of cause, the prevailing model for change is preserved and therefore ideology is stressed by default. The environment may be preserved, but peoples' political-economic and social predicament is ignored. The dominance and persistence of the technocentric approach to soil erosion despite its self-evident ineffectiveness even today, stems predominantly from the arrogance associated with western science. Within the technocentric approach, there is an assumed mastery over nature which is effected via the repeated application of rational management techniques onto a neutral environment. Optimism and arrogance feature strongly in the technocentric ideology in which scientific knowledge gives technical mastery over nature and change can be predicted through recourse to the laws of physical science. A summary of the technocentric approach to environmental degradation problems in general, the policy options available and the consequences of such actions is shown in figure 1.2.

Much of the current controversy surrounding soil erosion and its control stems from the confinement of soil erosion research into traditional disciplinary distinctions, the lack of communication between practitioners and ultimately, the 'uncertainty' which exists in data collection.

"The facts, reunited with the uncertainties now tell us that, if the most pessimistic estimates are correct, the Himalaya will become as bald as a coot overnight and that, if the most optimistic estimates are correct, they will shortly sink beneath the greatest accumulation of biomass the world has ever seen" (p.6).

The degree of 'uncertainty' involved in 'the problem' of soil erosion as identified by natural scientists is exemplified in the range of statistics available for rates of soil loss in Africa calculated on the basis of erosion plot experiments;

"A selection of erosion rates from Africa gives a range from 0.25 to 165 tonnes/hectare/year, most of the variation being accounted for by differences in the measurement technique rather than the erosion process itself" (Stocking 1987 p.1)

In addition, it is being realised increasingly that there is a need to refrain from talking about the problem of soil erosion and concentrate future research on understanding "the rich plurality of existing problem definitions" (Thompson and Warburton 1985 p.115).

"The approach of many scientists and technical advisers advocating the 'rational use of natural resources' tends to limit the environment to physical elements and structures, excluding all consideration of social, economic and political structures...is
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Figure 1.2. Technocentric modelling of environmental degradation in Kenya (after Baker 1986).
Multiple, rather than single conservation solutions also need to be forwarded which can accommodate the political-economic, physical, ecological, social and cultural heterogeneity which exists in Africa.

The weaknesses to date in the understanding of soil erosion can be summarised as follows;

1. Understanding has suffered from work being done within the confines of distinct disciplines when by definition soil erosion is a multi-disciplinary problem. The dominance of the natural scientists within soil erosion research has led to the restricted conception, measurement and understanding of the problem. Soil conservation programmes designed on the basis of such work have often failed due to being socially inappropriate, economically unfeasible or culturally unacceptable. At times, conservation programmes have also been technically lacking. There has been a general failure to theorize adequately the social factors operating, but more particularly, research has failed to accommodate the fact that soil erosion itself is socially-defined.

2. The work to date has tended to be ahistorical and apolitical. The value of assessing the present in terms of the past is given and is essential with reference to soil erosion, since so often the consequences of degradation are temporally (and frequently spatially) removed from the cause. An historical dimension would illuminate how physical and social factors combined in the past, would put contemporary problems in perspective and would aid future understanding. The heavy reliance in the literature on scientific techniques for explanation, has contributed to the tendency to omit political factors in the analysis.

Theoretical developments in the study of the African environment.

Political economy, the environment and soil erosion.

Political economy as outlined in the eighteenth century was by definition interdisciplinary; politics and economics were deemed inseparable and all 'disciplines' were entwined. A revival of marxist scholarship within development theory emerged in the 1950s, fueled in part by the rapid increase in indigenous African works at the time and a rising disillusionment with mainstream development theory. The diffusionist 'modernisation' theory of the 1950s based on neo-classical economic theory, was heavily criticised by the emerging radical critique ('dependency school') of the 1960s.
Within this 'return to Marx', dependency theorists (such as Andre Gunder Frank) placed development in a structuralist framework and put forward capitalist development on a world scale as the cause of underdevelopment. The emphasis, however, was on the sphere of exchange rather than production; within such thinking, "social classes, states, politics appear in the perspective as derivatives of economic forces and mechanisms" (Fitzgerald 1983 p.17). By the 1970s, analyses were extended to the sphere of production; notions of class, the state, international relations and culture became central to the political economy approach to development as advocated by, among others, Gutkind and Wallerstein (1977), Ake (1981) and Cohen and Daniel (1981). Within such work, economic analysis is located within specific social formations and development processes explained in terms of the benefits and costs they carry for different social classes.

The absence of the environment within such political-economic analysis is perhaps surprising considering the origins of the approach and the marxist belief that the material conditions of production were determining factors in the development of society. Redclift (1984) suggests that the emphasis within early political economy on the liberating aspects of economic growth served to force a separation between development theory and environmentalism; the environment performed an enabling function in capitalist development, but all value was derived from the exploitation of labour power. Property relations and legal obligations prevented the full realisation of resource potential rather than resource endowments; "from an historical materialist perspective it was society, not science, which placed restrictions on human potential" (Redclift 1984 p.8).

Making the environment a central concern of political-economic analysis is now essential within both research and development activities if the true causes and sustainable solutions are to be forged with respect to both the most pressing environmental and development problems. In much of Africa, the most fundamental future development challenges and the primary environmental concerns are located in the rural areas in which the majority of their populations reside and who depend directly on the land and primary resources for their subsistence production. Rural development and the stimulation of sustainable agricultural production have therefore commanded heightened attention over the last fifteen years while development approaches have been subject to substantial modification. Isolating the environmental as well as the structural limits to rural development have become fundamental.

Blakie in 1985 advocated political economy as the theoretical framework within which social scientists could raise their contribution to the soil erosion debate. Analysis of the
'social factors' in the explanation of soil erosion has to include both a 'place-based' concern (Blaikie 1985) as well as a non-location specific understanding. The former would concentrate on land use patterns or the spatial distribution of agricultural technologies, whereas the latter on the economic, social and political relations between people and the environment and between individuals.

Reference has already been made to the need to consider conservation as explicitly political. Conservation policies inevitably affect the relations of production and the economic and political interests of individuals to differing degrees. "It is because the state becomes involved in soil conservation that soil erosion has already become a political-economic issue" (Blaikie 1985 p.2). Intervention by the state is effected at all levels in the hierarchy, from international adviser to village headman. Such intervention "cannot avoid enmeshing itself in the contradictions within society" (Blaikie 1985 p.2). It is only through unraveling these political and economic relationships and interests that understanding of why individual land managers fail to adopt soil conservation measures and practices can be gained.

A political-economic analysis of soil erosion and conservation involves understanding not only of the social factors which constrain the conservation activities of the land users themselves, but also those social factors which shape the conception of the problem of soil erosion by those who intervene in land use decisions. These agents include aid donors, technical advisers, governments, bureaucrats, extension officers, natural resource inspectorate and village representatives. As debated above, the conception of soil erosion dictates the range of conservation policy options likely to be promoted, but also determines related assumptions concerning the cause of any failures and about the "way in which society does and should operate" (Blaikie 1985 p.51). A political-economic analysis of soil erosion therefore depends on asking those with political power "embarrassing questions about their own view of the problem and from where it derived" (Blaikie 1985 p.51). Clearly, power differences exist and operate at many levels; from those between nations at a global level, to those according to age or gender which operate at the household level. A political-economic approach to soil erosion incorporates understanding of the conception of the problem and their origins across these various levels.

The international context is a central concern of a political-economic approach to soil erosion, since foreign aid is a major influence on conservation policy making in the developing nations. Many soil conservation programmes are initiated, financed and often staffed by foreign aid institutions, and therefore the political-economic relationships between these agencies and recipient countries need to be dissected. The
conception of soil erosion as a problem promoted and the normative assumptions concerning society held by these agents need to be made explicit.

Many developing countries either had no official conservation organisation prior to independence, or had experienced the colonial 'model'. Although there was no single set of assumptions on which colonial conservation policy was formulated and implemented, a 'model' encapsulating a "syndrome of implicit assumptions" (Blaikie 1985 p.53) can be identified for the period. Contemporary international institutions as well as many independent national governments, perpetuate many of the characteristics of this model within current approaches to soil erosion and conservation.

"The implicit assumptions on which policies are based have only slowly evolved from a colonial, Euro-centric and messianic intellectual frame of reference which has endured the waning of empire and the regaining of political independence of most former colonies" (Blaikie 1985 p.53).

Anderson and Grove (1987) suggest that despite the advent of independence in much of Africa, the African environment still serves a psychological function in the European mind;

"Europe no longer exerts direct political control over Africa, but the mythology of the African environment and the symbol of Africa as yet unspoilt Eden continues to stimulate many of those who wish to intervene in the way the environment is managed in Africa" (Anderson and Grove 1987 p.4).

Escalating desertification and recent famine threaten the Eden in which Europeans have long sought a lost harmony with nature. Anderson and Grove suggest that the current international concern for the African environment "has been based in perceptions and values of the environment that are closely connected with the functioning and dynamics of western society" (Anderson and Grove 1987 p.7).

Colonialism led to a sudden incursion of European values, attitudes and technology into Africa. In the process, new relationships were introduced;

"Man to man through cultural superiority; one part of the world to another unequally through the imperial economic system; one part of society to another through unequal control of, and access to, the factor of production, especially land; and man to nature through the universality of science" (Baker 1984 p.54).

The faith in the modernising influence of western culture, science and technology was a powerful justification for colonialism in general and European interference in the African environment in particular. In addition, moral, spiritual and cultural superiority conveyed through the Christian ethic, ensured European mastery in Africa. The cultural
superiority which was promoted and reinforced throughout the colonial period, had its roots in missionary activities. Salvation for indigenous societies was based on replacement rather than reciprocity. Baker (1986) argues that the missionaries were the "shock troops of the colonial dichotomy, wresting people away from their own history, consigning their belief systems and activities to the level of 'ritual', inculcating the dependent mentality and belief in the superiority of the new God, the work ethic, the money market and obedience to the new order...missionary Christianity eliminated the need for any reciprocity of values, ideas or practices" (Baker 1984 p.54/5).

Darwinism, Baker suggests, merely strengthened the tendency for paternalism and trusteeship, forwarding a "scientific justification for regarding people of other races in other places as basically inferior" (1984 p.54).

The derivation of the contemporary assumptions made by decision-makers within independent governments concerning the way in which society does and should operate is clearly complex. The persistence of western conceptions of the environment and of environmental problems must, however, be attributed partly to the commonalities in conservation staff across the pre- and post-independence periods and the continued role of international organisations in interventions in the African environment. In Chapter Six, the contemporary conception of soil erosion and conservation held at the national level in Zimbabwe is compared and contrasted with that isolated for the colonial period. The conception of the problem of soil erosion held at the national level is clearly important in directing intervention and influencing land use decisions at the local level and an essential element in a political-economic analysis. It is at the national level that the overall orientation of the economy and the financial resources released to conservation generally are determined. Political-economic structures also determine policies regarding land tenure and resettlement; formulate legislation concerning resource use; and control the decentralisation of educational and administrative operations throughout the hierarchy. All such policies shape individuals' perceptions of soil erosion and conservation and their decision-making behaviour.

The role of understanding not only agricultural and ecological, but history and politics encapsulated in government policy, is clearly stated by Dove (1984). In a study contrasting peasant and government beliefs concerning two of Indonesia's most common plants and their role in agrarian ecology, the political and economic imperatives which coloured the latters' perception of agricultural reality were highlighted. Dove refers to government agrarian policy as 'agricultural mythology'; "the Government's view that peasants do not manage and utilise Imperata grasslands is,
in a structural sense, far more fantastic than the peasant view that *Imperata* grasslands are created and utilised by volcanic spirits" (p.33).

Power differences at the community level also affect individual land use decision-making behaviour and represent another scale of analysis in the political economy of soil erosion and conservation. Community level institutions, both traditional and introduced, inform and constrain individuals' conceptions of environmental problems and their conservation responses. Traditional institutions may regulate resource use through a variety of formal and informal ties; through controlling access to land directly or through perpetuating the role of spiritual and religious practices within the community, for example. In Zimbabwe, new village level institutions created since 1982, now have the power to formulate and enforce local by-laws covering farming practices, stocking levels or conservation practices, presenting new determinants of individuals decision-making regarding resource use at this level.

At the household level, as suggested above, age and gender are two major dimensions along which freedom of action and control over land-use decisions are differentiated in many developing societies. For example, Blaut et al (1959) found that the sexual division of labour within a community in the Blue Mountains of Jamaica, influenced crop selection within the farming system and worked against soil conservation. It was found that women's primary economic function in the community was in marketing, but in practice, they exerted some measure of influence in favour of planting those crops which they can take to market as against crops which are marketed by men. This raised the proportion of the family income under the control of women favourably, but the crops marketed by women are ground crops, those by men, tree crops. The implication for conservation status was that the latter were "what appears to be the most valuable anti-erosion measure of all" (p.149).

Farming systems research focusing on the ways in which social, economic, biological and environmental elements are combined within agricultural production, has raised understanding of the complexity of forces constraining individual decision-making generally at this level. Kayongo-male and Mbithi (1979) for example, in a study of conservation attitudes and practices in Kenya, concluded that,

"what may often appear to be total ignorance and apathy about conservation may in fact be based on previous negative experiences or lack of resources to adopt specific practices" (p.300).

Farming systems research has done much to highlight the political-economic factors which serve to modify established societal-resource relationships and introduce new
constraints upon individuals' decision-making (see for example, Ellen 1982, Richards 1975, 1985).

A political-economic approach to soil erosion and conservation is extensive. Blaikie (1985), in outlining the methodology for a political-economic approach, recommends developing a "journalistic facility for finding and talking to knowledgeable people, reading the right reports and informal commentaries, plus a number of more academic and analytical papers" (p.96). He concedes that his final methodology seemed to verge on "the political economy of the whole world in every instance of soil erosion" (Blaikie 1985 p.95). The political-economic approach to soil erosion is better suited to explanation than policy making, although 'short-cut' approaches such as Rapid Rural Appraisal (Carruthers and Chambers 1981) and replicable field methods designed by those undertaking farming systems research, are being continually refined (Collinson 1981). Such techniques have the added advantage of bringing together practitioners and academics and amalgamating information drawn from several disciplines.

"Academics would often benefit from the discipline and responsibility of operating more in the real, time-bound world and practitioners, for their part, would often benefit from insights into what is less obvious and from the challenges which would emerge from a deeper and broader understanding of change" (Carruthers and Chambers 1981 p.408).

One of the problems of political-economic analysis is that the environmental limitations may be underestimated. In addition, the emphasis on political-economic structures in the explanation of environmental problems, may tend towards determinism and breed the pessimism that Chambers (1983) warns of; "the awfulness can then appear inevitable" (p.191).

The populist development critique, the environment and soil erosion.

One of the major inputs into current thinking regarding rural development has come from the populist development critique developed over the last fifteen years and articulated by such authors as Chambers (1983) and Richards (1985). Adherents to the populist mode of thought strive to reaffirm the individual as the centre of analysis through 'reversals' (Chambers) in thinking and learning, about indigenous societies and in planning the most appropriate ways of responding to their problems. Within this approach, welfare and survival replace profit, exploitation and 'progress' as criteria in the evaluation of the effectiveness of rural development programmes and policies. In addition, rather than the environment constituting the passive background in which agricultural activities take place, it is now considered as a dynamic, highly differentiated
and central element in research and development, which is ultimately socially defined and appropriated.

The scale of analysis within the populist development critique has moved away from the large scale modernist visions exemplary of the first United Nations Development Decade of the 1960s, to communities and the individual scale. On the basis of a great deal of work in Africa and Asia focusing on indigenous skills, institutions and knowledge, proponents have argued that the rural populations themselves are the most precious, and as yet largely untapped, resource for development. Richards, for example, asserts that despite widespread poverty in Africa, much of the population is "inventively self-reliant" (1985 p.16). Proponents of the populist critique also argue that to date, environmental management problems have been pursued at too high a level of abstraction and generalisation; "many environmental problems are in fact, localised and specific and require local, ecologically particular, responses" (Richards 1986 p.12).

The tendency within rural development thinking and practice in the past, to search for unifying theory within explanation and to formulate generalised solutions, stems directly from the particular view of the natural world held by intellectuals, development agencies and governments. Richards (1975) argues that this view of nature has been predominantly materialistic; "the terms we use - habitat, resources, environment - are indicative both of the alienation we feel and the sense of ownership we wish to assert in regard to the world about us" (p.102). This materialistic view of nature has produced three entrenched assumptions. Firstly, that there is a single 'best' or 'right' way to make use of a given environment; secondly, that the search for this 'right' way requires the same kind of education, science and technology employed in the industrialised world; and thirdly that traditional attitudes to the environment and management practices inhibit progress.

Work within the populist development critique effected by anthropologists, ecologists and geographers, (particularly within their expanding work on human ecology and systems research) (Ellen 1982), has enhanced understanding of the value of and potential for cosmologies alternative to the western scientific world view in directing sustainable rural development. The orientation of indigenous societies towards welfare and survival, far from being barriers to development, "serve to protect the community and its lands from the deprivations of the individual and so act in the long term interests of environmental conservation" (Richards 1975 p.105). This critique is not based on simple romantic ideals that indigenous is somehow best,

"the weight of evidence for the notion that much ethnoscience is 'good science' is now sufficiently great to suggest the need for a considerable reorientation of the way in which scientific
It is now appreciated that "there are two different systems of knowledge, differentiated mainly by method and information analysis and sharing many common aims" (Brokensha 1980 p.1). The distinction, however, between the two 'world views' has become less clear in the light of colonisation and the increased incorporation of non-western societies into the predominantly urban, industrialised world economy. Traditional institutions and means of communication and education have been modified. Wilson (1986), for example, has shown how the legitimacy and power of indigenous institutions in southern Zimbabwe, which had previously regulated the use of resources and prevented their overexploitation, became eroded during the colonial period. The pressure caused by such change inevitably led people to "circumvent the old rules" (Jungerius 1985 p.6). The holistic conception of the environment held within traditional communities, in which life was a series of "interrelated and synergistic activities" (Ngulube 1985 p.18), became divided up into clear cut divisions each associated with a particular aspect of survival. "Thus, one now goes to school to learn, to the cinema to be entertained and to church to pray. Life has ceased to be a long winding robe but a series of hops, steps and jumps" (Makina 1983 p.2). As a result of such change it is now acknowledged that indigenous technical knowledge is unlikely to consist solely of that knowledge which is 'created by' a particular society, but more commonly comprises a mixture of knowledge created indigenously and knowledge acquired from outside.

With the increased understanding not only of the stock of indigenous knowledge which exists through the work of anthropologists such as Conklin (1954), but of the flexibility, adaptability and innovativeness of indigenous communities through the work of geographers such as Richards, research is now focused on ways of eliciting such knowledge, understanding its reproduction and on mobilising such skills for rural development planning, design and implementation. Chambers summarises the basis of the populist case; "Rural people's knowledge and scientific knowledge are complementary in their strength and weaknesses. Combined they may achieve what neither would alone" (Chambers 1983 p.75).

Clearly, much of the research within the populist development critique focusing on the relationship between indigenous communities and the environment has concerned processes of environmental degradation including soil erosion, both directly and indirectly. Several examples of this work at the community and household levels were highlighted above in stressing the value of the political-economic approach. The main insights to soil erosion presented by work within the populist development critique and
which go beyond the work of political-economists, can be summarised along two main dimensions. Firstly, it has raised awareness of the ecological differentiation which exists and underpins individuals' conceptions of the environment and land use decisions. Secondly, it has enhanced understanding of the flexibility and inventiveness of traditional modes of understanding which constitutes a considerable potential resource for change and suggests that individual behaviour is far from ultimately constrained.

The regional political ecology approach, as highlighted in the opening section of this chapter represents the 'state of the art' in the explanation of soil erosion in theory through combining the insights of the populist case with those of political economy. Within the regional political ecology approach, individuals are put at the centre of the analysis in the light of multiple competing interpretations of the issue itself. In addition, these vary temporally and spatially in response to the continually shifting societal-resource relationships. The spatial variability in environmental conditions are accommodated within the regional dimension of the approach and the concerns of ecology explicitly incorporated into the political-economic analysis. The methodology inevitably focuses on case study analysis since degradation at any one place and time is highly conjectural and complex. The challenge in practice of the regional political ecology approach to soil erosion is in amalgamating different data types, elicited by various methodologies, across several scales of analysis and varying time periods. Geographers are ideally suited to effect such an analysis, drawing on a traditionally broad training with a span in the physical and human sciences. Bell and Roberts (1986) highlighted the potential for human and physical geographers to contribute within development studies, suggesting that the problems of integrating theory, establishing methods and communicating between separate epistemologies within the discipline may be reduced in comparison to those experienced by interdisciplinary research teams.

Developments in practice: Popular participation and soil conservation.

"It is rare these days to find a document on development strategy or approaches which does not refer to participation...apart from the notion of actually participating in rural activities, we have been introduced to participatory evaluation, participatory action-research, participatory field-action and more generally, participatory research" (Oakley and Marsden 1984 p.1).

The concept of participation, however, is not new. Within modernisation development strategies, community participation was pursued via educational and development programmes in order that the rural areas should not lag behind the national development
effort. In turn, the dependency critique dismissed the concept of unified communities all operating in the national interest and focused on the struggle of particular groups. The concept of participation as a fundamental pre-condition for and a tool of any successful development strategy, rather than simply an end in itself, took shape within the philosophy of 'people-centred' development in the 1970s.

United Nations agencies have been central in engendering, operationalising and extending the participation of the poor in rural development; one of the pioneering conferences was sponsored by the International Labour Office, the World Employment Conference, in which the issue of 'basic needs' was identified as a strategy and the centrality of participation within this. In addition, non-governmental organisations have been active in promoting participation in their increasing efforts to tackle the fundamental problems of access and control in addition to relief and improvement activities within rural areas.

Although substantial debate exists over the nature and content of participation in all sectors, consensus does, however, confirm that participation is about giving the rural poor a voice in development decisions, access to productive resources and a share in development. As such, the concept of participation reflects and informs the aims of the populist development critique; "Meaningful participation of the rural poor in development is concerned with direct access to the resources necessary for development and some active involvement and influence in the decisions affecting those resources" (Oakley and Marsden 1984 p.89). Too often, development strategies have actually served to remove control of resources further and further from the hands of those who interact directly with the environment. Whereas within many traditional societies, individuals were able to respond to the specificities of the physical environment, changes in the mode and relations of production have forced them to respond to changes in their social, political and economic circumstances often quite independently of the physical environment, with inevitable negative implications for the state of the resource.

Promoting successful participation through giving the rural poor a voice, depends on valuing what these groups have to say. As suggested above, this in turn depends on substantial reversals in both rural development thinking and practice which to date, have prioritised a western scientific view of the world. Work within the populist development critique has raised understanding of the skills and strengths of alternative modes of understanding, particularly with respect to the environment. It has also shown, however, that the nature and reproduction of this knowledge is under rapid change. Incorporating the environment into political-economic analysis will raise
understanding of these processes of change and also of the constraints on individual
decision-making. Although this requirement has been recognised in the theoretical
literature, the interdisciplinary nature of the endeavour also demands substantial
changes in practice.

In 1986, the IFAD report on soil and water conservation in southern Africa stated that
"unless land and water users can be convinced that conservation
is in every sense their enterprise, in their interest - rather than an
enterprise of the state - the soil and water resources of sub-Saharan Africa cannot successfully be conserved" (1986 p.32).

Clearly, the message is that the environment must be put back in the control of the
people who use it directly through the promotion of effective participation in
conservation. A SADCC report in the following year on peoples' participation in soil
and water conservation (1987) however, concluded that,

"Whereas there is widespread commitment to the notion of
participation in conservation projects, this commitment has yet
to be widely translated into a participation in which local people
are given the opportunity to define the issues, determine the
approach and influence the outcome. All too often,
'participation' becomes persuasion to undertake a particular
conservation activity and the 'participation' becomes an exercise
in making the project more cost-effective and an
organisational convenience" (SADCC 1987 p.38/9).

Both reports review extensively past conservation programmes and outline the basic
requisites of future policy. The limited success of past programmes is closely tied to
the conception of nature, environmental problems and indigenous peoples encapsulated
in the development approach of the time. The main limitations of past conservation
programmes are outlined below.

1. A top-down approach to conservation has been adopted in most regions to date; "a
lot of lip service is paid to participation, but it often means no more than getting farmers
to agree to do what the experts consider necessary" (IFAD 1986 p.17). Many
programmes have been compressed into short term projects with very little consultation
with or training of farmers. In consequence, sustained commitment or replicability of
such programmes has been low. In addition, within top down approaches,
conservation is artificially presented as a finite process and is not flexible enough to
fulfil the varying needs of various environments and people.

2. Conservation programmes have been dominated by technical solutions often
designed outside the community and even the country; "the application of imported soil
and water conservation strategies, without duly considering locally variable conditions, has been the rule rather than the exception in sub-Saharan Africa" (IFAD 1986 p.12). In particular, there has been an over-emphasis on mechanical protection via contour bunds and bench terraces. Although these techniques have been shown to give substantial short term benefits particularly in high rainfall areas, in more arid regions, these structures are less well suited to moisture conservation and the water harvesting needs of the farmer. It is now recognised through greater understanding of indigenous techniques and increased research into agronomic and agroforestry research, that a much closer integration of soil with water conservation is likely to enhance the benefits to both farmer and resource base.

There has also been a conflict within past programmes between the technological conservation solutions and the non-technical basis of the process of participation; "It is very difficult to talk of meaningful participation in project activities designed and directed by others" (SADCC 1987 p.37). The SADCC report stresses the need to develop more balanced conservation programmes through collaboration with local farmers and the combination of technical and agronomic measures within conservation programmes.

3. Conservation policy has been designed typically at the catchment or community level, causing problems of joint action, responsibility and management. Such approaches have had two major implications which have restricted the success of conservation programmes. Firstly, the natural unit of perception and action for the farmer is his/her individual holding rather than a catchment of whatever size. Secondly, catchment planning often involves a top down approach which tends to,

"bypass local peoples' motives and skills...it does not adequately take into account their environmental knowledge, preferences and priorities...ways must be found of reducing the scale of intervention to that which land users are themselves familiar and concerned" (IFAD 1986 p.22).

4. Conservation programmes have relied too heavily on legislation and regulation. National policy makers, in line with many colonial powers, impose legislation which may protect the environment but ignores the plight of the people. Local disrespect for environmental legislation is further compounded where extension advice is insufficient, where the legislation is technically or economically inappropriate within the local farming system or where enforcement procedures are unpopular. The IFAD report stresses that the principle role of government authorities should be to help local communities in managing the environment themselves; "the first principle is that land using communities monitor and regulate their own environmental behaviour" (p.15)
In the light of past failures and drawing heavily on research within the populist development critique, the IFAD report urges three new directions in conservation practice which centre firmly on the concept of participation and its role in determining programme sustainability, both ecologically and temporally. 'Participation' in rural development generally or soil conservation in particular, is not new as highlighted above, but "it is simply not possible to add 'participation' to an existing project and argue that its approach is now fundamentally different" (SADCC 1987 p.36). Real changes in conservation practice are urged by IFAD as follows;

a. Indigenous communities are not themselves static; conservation planners need to identify opportunities for increasing the local capacity for innovation and reduce the role of externally induced innovations.

b. A 'reversal' in attitudes of government officials and experts is needed which at present over-values the relevance of their knowledge and skills above indigenous and "may make them incapable of engaging in a real dialogue with villagers" (IFAD 1986 p.17).

c. A process or programme approach to future soil and water conservation rather than a project approach is required. A process approach would be long term and open ended in that constant adjustments would be made to "realities as perceived and expressed by the local population" (IFAD 1986 p.23) rather than determined precisely at the outset. Programmes would start on a small scale and gradually expand in the light of experience gained during implementation.

Inevitably, substantial obstacles exist for a switch to 'bottom-up', process approaches to soil and water conservation and to implementing many of the proposals highlighted by the IFAD report. Long term commitments are often difficult in the light of financial shortages and competition for monies with other sectors within African governments. In addition, aid and donor agencies demand advance planning for budget periods which are often less than five years, need identifiable targets (projects) for support and require tangible results over the short term. Attitudes need to be changed amongst consultant and high level officials as much as they do amongst field staff.

Perceived self-interest by farmers in conservation programmes is clearly essential for a process of participation, yet "cultural data on behaviour and motivation vis-a-vis nature are rarely used, though they often condition the success or failure of conservation projects" (McNeely and Pitt 1985 p.5). New models of environmental management built on traditional conservation knowledge and experience within local cultures are to date, largely untried in practice. At the International Union for Conservation of Nature and natural resources (IUCN) conference on Culture and Conservation, various methods were forwarded for future research and development (reported in McNeely and Pitt 1985). For example, Pitt (1985) recommended 'Ethno-conservation' combining elements of anthropology and ecological science, whilst Leff (1985) articulated an 'Eco-
development' approach incorporating ethnobotanics, ethnolinguistics and ethnotechnology (to 'rescue' the traditional practices) with modern science and technology. Little is still known however, regarding the perception of farmers of issues of degradation and conservation programmes, yet this understanding is fundamental to efforts designed to increase peoples more effective participation in soil conservation efforts.

The main work to date incorporating perceptual material in the understanding of soil erosion has included that by Kayongo-Male and Mbithi in Kenya (1979) and by Millington (1982) in Sierra Leone. The former assessed peoples' perceptions of conservation programmes through questions relating to what individuals considered necessary to alleviate erosion. Millington's study focused on farmers' perceptions of soil erosion hazard and particularly their response in terms of 44 'indigenous conservation practices'. Other studies have been done on attitudes to erosion in relation to other farming problems (for example, Gay 1984). All have stressed the differences in the conceptualisation of reality and models of the environment which exist between people from different cultures (for a review see Jungerius 1985). An understanding of individuals' conceptions of the environment are essential both for understanding why people fail to respond to a problem of soil erosion (for example as defined in the technocentric mode of thought) and to enable more appropriate conservation programmes to be formulated, in which peoples more effective participation can be ensured. Clearly, there is a substantial need for further research in this area.

Outline of thesis.

Soil erosion and conservation in Zimbabwe has a long history. Today, as in the colonial past, the prevention of soil erosion and conservation of soil resources are strongly associated with issues such as access to land and land tenure. In turn, these are related to the politicization of the land question in the country and the spatial differentiation of resource quality. Soil erosion as a problem emerged early in the colonial history of Zimbabwe and Chapter Two examines the major events and processes at national level which form the context of current societal-resource relationships. The main characteristics of the physical and socio-cultural environments are outlined and the history of land apportionment in terms of important events and dates are overviewed.

The political-economic structures operative within the colonial period at the national level are strengthened subsequently in Chapter Three. Although the 'land question' remains the broader context of the discussion in this chapter, the land question is very adequately developed elsewhere by authors such as Riddell (1978). The focus of this
section of the research is the particular conception of soil erosion and conservation which was forwarded by the colonial administration at this level through a critical analysis of the nature and content of the erosion control model promoted and aspects of change therein. The organisation for conservation and associated legislative and administrative details are presented in the process of constructing the dominant conception of 'the soil erosion problem' held at the national level during the colonial period.

In Chapter Four, the conception of soil erosion as a problem at the local level during the colonial period is assessed critically through recourse to district and local level analysis combining archival and oral material. Continuities with and divergences from the conception identified at the national level are emphasised. In particular, the influence of the local environment, both physical and socio-cultural, within the dominant conception of soil erosion in the case study are subject to critical analyses.

In Chapter Five, sequential air photo analysis is used to elicit quantitative information concerning the changing resource situation in the case study area. Changes in land use, the spatial distribution and density of population, and the degree and nature of soil erosion problems, as evident through this approach are identified. In the light of the dominance of unicausal explanations of soil erosion within the general and Zimbabwe-specific literature, the relationship between population pressure and a deteriorating resource base is subject to critical analysis. The data presented in Chapter Five enables an assessment of both the objective environmental conditions on which the colonial conception of soil erosion was based and the impact of conservation policies in practice at the local level. By combining this data with archival and oral evidence, further critical assessment of colonial conservation is made within Chapter Five.

In Chapter Six, the analysis is extended to the post-independence period and focuses on the conservation framework at both national and local levels. The contemporary rhetorical commitment to conservation by senior government officers is assessed critically in terms of qualitative and quantitative changes in the administrative framework, conservation related legislation and programmes for spatial reorganisation within the country. The nature and content of current conservation programmes are also dissected and the dominant conception of soil erosion as a problem in Zimbabwe debated. Continuities with and divergences from colonial conceptions are discussed. In addition, informal interviewing techniques are used to construct the conceptions of soil erosion held by particular officers at the local, district and provincial levels, and potential forces shaping such frameworks isolated.
In Chapter Seven, various techniques are used to establish the conceptions of soil erosion held by individual farmers in the case study area. These conceptions are interpreted in the light of information regarding political-economic structures and environmental factors drawn from previous sections of the research. In addition, by means of household survey techniques, access to resources and particular land use practices were identified. Secondary material relating to the farming system and household organisation is also used. The multiple conceptions of the problem of soil erosion held at this level are compared and potential problems of, and targets for extension, postulated. In Chapter Eight, the contribution of the thesis to understanding of soil erosion and conservation in Zimbabwe is discussed in terms of the three objectives of the research. Limitations of the thesis are discussed and pointers for future research offered.
CHAPTER TWO. LAND AND SOIL EROSION IN ZIMBABWE.

Soil erosion, as with many of the major environmental and developmental issues, has a distinct spatial pattern at the national level in Zimbabwe. The national erosion survey (Whitlow 1988) reported that the most severe levels of actual erosion in the country were confined largely to the African farming areas. Current societal-resource relationships in these areas cannot, however, be understood outside the context of the spatial differentiation in the quality of the resource base and the appropriation of lands by the settler community from 1890 forwards.

This chapter presents the regional political ecology of soil erosion at the national level in Zimbabwe. The main characteristics of the physical environment are outlined prior to a discussion of the current patterns of land ownership and their historical origins. Reference is made to the political economy of the land question during the colonial period and the centrality of this issue within the nationalist struggle. In post-colonial Zimbabwe the continued primacy of land resources in the country’s socialist development is discussed.

The physical environment.

Zimbabwe is a land-locked country situated between 16 and 12 degrees South and 25 and 33 degrees East, bordered by Mozambique, Botswana, Zambia and South Africa (see figure 2.1). The land area of Zimbabwe is approximately 39 million hectares and the country is characterised by a T-shaped plateau, the 'highveld' (1200 to 1700 metres), centred on Harare and extending south-west to Bulawayo, north-west towards Kariba and south-east to Mutare. The plateau forms the main watershed which drains in the north into the Zambezi and in the south into the Limpopo and Sabi rivers. The 'Middleveld' (900-1200m) comprises approximately 40% of the country including large plateaus in the west and areas of extensive granitic dwala terrain in the East. The third main physiographic region is the 'Lowveld' (land up to 900m), which consists largely of gently undulating terrain between widely spaced rivers. Slopes in the Eastern Highlands and Zambezi escarpment are as high as 14 degrees, with 10 degree slopes widespread in the Middleveld.

Most of Zimbabwe experiences a subtropical climate with a distinct wet and dry season. Characteristics of both seasons vary considerably over the country in response to differentiation in relief and altitude. Much of the rainfall occurs in a few, high intensity storms between November and March, with the following dry, cool season between May and August (figure 2.2). Temperatures often rise in excess of 40 degrees Celsius
Figure 2.1 Zimbabwe, Southern Africa.
in the summer and frosts are not uncommon at the higher altitudes in the dry season (see figure 2.3).

The country has been classified into five main 'agro-ecological' or Natural Regions by Vincent and Thomas (1960) on the basis of rainfall amount and variability (see figure 2.4). These regions are:

I. Specialised and diversified farming region, located on the Highveld and constituting less than 2% of the land area of the country. Rainfall is over 900mm and there is an absence of frosts. The area is suited to intensive production of fruit, livestock, tea, coffee and other plantation crops.

II. Intensive farming region, located mainly on the Highveld (15% of the land area). Summer rainfall is reliable and is between 750 and 1000mm annually. The area is suitable for staple crop and intensive livestock production, although crop yields in certain years may be affected by a relatively short rainy season or dry spells.

III. Semi-intensive farming region, constituting 19% of the country and located on the High and Middleveld. Total rainfall is 650-800mm, but intensity and variability differ. Conditions are well-suited to livestock production although production of maize, tobacco and cotton are marginal.

IV. Semi-extensive farming region (38% of the country), located on the Middle and Lowveld. Rainfall is low (50-650mm annually) with periodic drought and severe dry spells common. Production is suited to drought resistant crops and livestock only.

V. Extensive farming region constituting 27% of the land area of the country and confined to the Lowveld. Rainfall is both low and erratic with extensive livestock production being the only viable farming system without irrigation.

There are no natural lakes in Zimbabwe and few perennial rivers; water storage development is often dependent therefore on run-off accumulated during the year. There are currently over 8,000 dams in Zimbabwe with a storage capacity of over 5,000 cubic metres. Recent work, however, has also highlighted the importance in many parts of Zimbabwe of shallow, seasonally waterlogged depressions (dambos) as a source of irrigation for household and horticultural uses (Bell et al 1987).

The majority of Zimbabwean soils (60-65%) derive from igneous granite. These are a mixture of younger intrusive granite and older Gneiss complexes located in a broad band stretching North-East to South-West across the country, tend to produce kaolinitic soils of the fersiallitic type, which are all moderately to strongly leached and weathered.
Figure 2.2 Mean annual rainfall, Zimbabwe. (mm)

Figure 2.3 Mean annual temperature, Zimbabwe. (°C)
Figure 2.4  Zimbabwe: Natural Regions/agro-ecological zones (after Vincent and Thomas 1960).
and of mediocre natural fertility. The soils vary widely under local conditions, but generally tend to be light, sandy and shallow (due to the limited activity of soil forming processes in the semi-arid conditions of the Lowveld), making them susceptible to erosion under poor management.

Deep sands originating from aeolian Kalahari deposits, and to a lesser extent similar sands derived from sandstones of Karoo and Cretaceous age, account for a further 35% of the total area of Zimbabwe. The Kalahari sands cover an extensive area in the north-west corner of the country and give rise to amorphic soils. These include the deep sands in the regosol group which show very feeble horizon development and little reserves of free-draining soils. The latter have an extremely low natural fertility and respond very poorly to any attempts at improvement, due to the very low clay and silt contents and their susceptibility to leaching.

The remaining small proportion of the country is based on argillaceous sediments. The better soils occur on various metamorphosed basaltic lavas (greenstones), for example around Harare. These soils are characterised by a deep red colour due to considerable ferric oxide content and have good natural fertility. These soils are deeper, have higher clay content and are more receptive to improvements. Much of the vegetation of Zimbabwe, in continuity with the geology and soils of the country, is characterised by savannah woodland (miombo woodland) interspersed with open grassed drainage lines (dambos). Sub-tropical forest is limited to relic patches in the well-watered Eastern Highlands.

Agricultural potential in much of the country is quite low. Whitlow in 1980 effected a factorised survey of agricultural potential building on the original agro-ecological survey outlined above. He distinguished five classes of agricultural potential accommodating factors of climate, soils, slope and secondary terrain such as occurrence of granitic domes. On this basis, he reported that 52% of the country exhibited 'very poor' or 'poor' agricultural potential; the majority of this area occurring in the middle and lowveld regions of the country (see figure 2.5). The best potential lands are confined primarily to the highveld and the Harare/Bulawayo axis of the country.

On independence in 1980, there were two primary subsectors to the agricultural economy each with distinct systems of farming, levels of agricultural production and land tenure. As in other colonial territories, these sectors could also be distinguished on the basis of race; the settler farming and African farming sectors. The current spatial distribution of these sectors are shown in figure 2.6 alongside resettlement lands which have been created since independence. Settler farming areas are now termed commercial lands (or large scale commercial farming areas) and the African farming
Figure 2.5 Agricultural potential in Zimbabwe (after Whitlow 1982).
areas known as communal areas. As seen, the majority of commercial farmlands are concentrated on the highveld axis extending northeast/southwest across the country. The Communal Areas are, in contrast, confined largely to the middle and lowveld regions. Within Whitlow's analysis of agricultural potential, 74% of the commercial lands lie in areas of fair to very good potential on the basis of soils, slope, climate and secondary terrain factors.

Similarly, as shown in table 2.1, 51% of lands within this sector were located in Natural Regions I, II or III in 1982; areas of the country in which intensive production of a range of crops is confined on the basis of rainfall amount and variability (see figure 2.4). In 1980, 90% of the total value of marketed agricultural output originated from the European commercial sector. As well as being located in the prime agricultural locations of the country, the high yielding farming systems operative within this sector were supported by advanced agricultural support services, mechanisation and access to chemical inputs.

<table>
<thead>
<tr>
<th>Distribution of land</th>
<th>Regions I-III</th>
<th>Regions IV-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communal</td>
<td>26%</td>
<td>74%</td>
</tr>
<tr>
<td>Large scale commercial</td>
<td>51%</td>
<td>49%</td>
</tr>
<tr>
<td>Small scale commercial</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>All land</td>
<td>35%</td>
<td>65%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sector</th>
<th>Percentage of land in region I-III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communal</td>
<td>30%</td>
</tr>
<tr>
<td>Large scale commercial</td>
<td>58%</td>
</tr>
<tr>
<td>Small scale commercial</td>
<td>6%</td>
</tr>
<tr>
<td>National parks and others</td>
<td>6%</td>
</tr>
</tbody>
</table>

Table 2.1 Distribution of land by sector and Natural Region in 1982.

In 1982, 45% of the land are of the country was under small scale African production in the communal land sector. 74% of these lands were located in Natural Regions IV and V, in which only drought resistant crops or extensive cattle production was suited to the climatic conditions (see table 2.1). Whitlow in 1980, calculated that only 12% of communal lands were in areas of good or very good agricultural potential. In the same year, the communal sector accounted for only 8% of the total marketed maize to the Grain Marketing Board, although this proportion has been rising over the independence period. This agricultural transformation and the spatial and socio-economic limitations to it, are discussed in subsequent sections. The spatial pattern of land holding in Zimbabwe on independence is a product of both the physical environment already overviewed and the process of appropriation of the better lands by the European settlers during the colonial period.
Figure 2.6 Land tenure in Zimbabwe

- Resettlement area
- Communal Land
- Commercial land
- Parks, Safari areas, Forest
Land Apportionment.

In 1889, the pioneer column of Europeans crossed the Limpopo river from the South. The scramble for African territory by European powers had been gaining momentum and diamond and gold discoveries had raised hopes of a 'Second Rand' North of the Limpopo. At the same time, the seemingly inexhaustible supply of land in the Cape had begun to run out. Having acquired concessions from Lobengula in 1888 (the 'Rudd Concession') and having been granted the Royal Charter for his British South Africa Company in 1889, Cecil Rhodes recruited 200 volunteers to his pioneer column and set off to occupy the territory to be known as Rhodesia.

The original residents of Rhodesia were tribal peoples. Although anthropologists have recognised up to forty different tribes in the region, two main groups are distinguished; the Shona-speaking people (the Mashona) and the Nguni-speaking people (the Matabele). The Shona tribes are larger and more widespread and can be divided into seven constituent tribes; the Kalanga, Karanga, Zezuru, Korekore, Manyika and the Ndua, each having their own distinctive dialect of the Shona language as well as differing ethnic, cultural and historical characteristics.

The Shona culture is thought to originate from Bantu settlements established around the end of the second century, on the fertile plateau between the Limpopo and Zambezi rivers. These settlers formed the 'Early Iron Age culture' (Bourdillon 1976), but were superseded about a thousand years later by the ancestors of the present Shona peoples, the 'Later Iron Age peoples'. By the end of the twelfth century, a 'state' had emerged centred on Great Zimbabwe, a sophisticated settlement built of granite near what is now Masvingo (see figure 2.7). Large stock holdings were kept, advanced mining techniques used and gold and copper traded with Muslims at the coast. Several factors can be postulated in the explanation of the early preference for areas of granitic terrain by the original inhabitants of Zimbabwe. Such locations undoubtedly provided places of refuge used in times of conflict, but also produced an ample supply of exfoliated granitic slabs used for construction purposes as evident amongst the extensive remains of enclosures, pits, religious buildings and fortresses at Great Zimbabwe. In addition, such terrain would have supported a variety of habitats and soil/drainage conditions for both natural and cultivated produce.

By the middle of the fifteenth century, however, the pressure of a large settled population on the surrounding resources led to the decline of the state, cessation of trading and movement of groups of people into other parts of the country.
Figure 2.7  Pre-colonial population distribution
(after Zinyama and Whitlow 1986).
"By the beginning of the nineteenth century, the central plateau was becoming settled and most of the modern chiefdoms had been established. By this time, they comprised a hotch-potch of chiefly dynasties with a variety of histories, united by a geographical propinquity and a common culture" (Bourdillon 1976 p.27).

The Ndebele have a much shorter history in Zimbabwe, coming North from the Zulu state in Natal in the early nineteenth century and settling in the South-West of the country. The historical relationship between the Shona and the Ndebele is portrayed typically as one of constant antagonism and cattle raiding. Palmer (1977), in contrast to many, suggests that the Ndebele were basically agriculturalists just like the Mashona and actually recruited Mashona members to assist them in their agricultural endeavours. Both tribes grew a variety of crops, mined local minerals, were skilled in basketry, pottery, woodcarving and cloth making and participated in extensive trading. Transactions between the two neighbours, however, seems to have been confined to periods of intense drought when the Matabele exchanged cattle, goats and beads with the Mashona.

With the entrance of the pioneers into the southern parts of the country, there were inevitable clashes between the indigenous population and the settlers, particularly as hopes of a 'Second Rand' declined and an agricultural future for the European community became the primary objective. Immediately on entry into the region, the Europeans helped themselves liberally to land. The nature and impact of the early colonial occupation of Rhodesia was undoubtedly influenced by the attitudes and expectations of the pioneers, which were largely shaped by their experiences in the Cape. Just as it had been customary in the Cape that a man could possess all the land within half an hours' ride at walking pace radiating from his homestead, this soon became the accepted land unit for the pioneers in Rhodesia. Palmer (1977) suggests that 6.4 million hectares of land were passed nominally into European hands with a total disregard for existing African land rights during this time. Much of this land was merely acquired rather than occupied, but a high proportion of it was on the best land in the country in the highveld and was to form the basis of European farming in the future.

It soon became necessary to organise a more formal system of compensation for loss of land on behalf of indigenous peoples. The solution was one already in operation in the Cape; the concept of 'Native Reserves'. A Lands Commission led to two reserve areas, the Gwaii and Shangani reserves being set aside in 1894 for the exclusive use of the defeated indigenous Matabele peoples. These reserves constituted over 800,000 hectares of land in the middleveld to the North and North-West of Bulawayo. The two reserves however, were described as being "more like graves than places to live"
(Bannerman 1982 p.102). The 'land question' (Riddell 1978) which was to dominate Zimbabwe's colonial history had been initiated; the seeds for the racial division of land in the country had been sown, even if they had not, as yet, legally taken root.

The inadequacy of the first reserves and the subsequent discontent expressed in the 1896-7 Shona rebellions, led to the first 'Native Reserves' proper being assigned in 1898. A coordinated decision on behalf of a Southern Rhodesia Order-in-Council and the Imperial Government, placed the legal responsibility of the future provision of sufficient land for all Africans according to their needs with the BSAC. The Company, however, simply directed it's Native Commissioners in each District to see that this was effected. In consequence, these first reserves were allocated on an ad hoc basis; Native Commissioners had differing ideas as to what constituted African 'needs' and how and where reserves should be located. By 1920, a further Order-in-Council, working in accordance with recommendations of an earlier commission of enquiry, led to some consolidation of existing reserves but no further land was allocated. The 83 reserves covering a total area of 8.5 million hectares were considered adequate for the needs of the estimated 800,000 Africans for the foreseeable future. Floyd (1962), however, suggests that 1.2 million hectares of this area were thought to be totally unsuitable for human habitation.

Palmer refers to a growing "clamour for segregation" arising during the decade 1915-25 (1977 p.235). Since the Order-in-Council of 1894, Africans were allowed to acquire, hold, encumber and dispose of land on the same conditions as Europeans. The 'clamour for segregation' on behalf of the European farmers stemmed from two concerns. Firstly under such Orders, African land owners would have to be treated legally as equals and secondly, if Africans were tilling equally good soils and enjoying equal access to the markets, the future expansion of European farming could be in jeopardy. The European farmers therefore wanted the law changed before this happened, despite that fact that in practice, many Africans were prevented from buying up land by European farmers refusing to sell to them.

In 1925, the Morris Carter Land Commission was appointed to enquire into the possibility of establishing areas within which only Europeans could acquire ownership and separate areas outside the Native Reserves within which Natives only should be able to purchase land. The Commission's recommendations were accepted and implemented in the Land Apportionment Act (LAA) which became effective in 1931. The seeds for the dualist development of Zimbabwe along racial lines had germinated and were now taking root. Access to land was henceforth on the basis of skin colour, with the division of land in the country along racial lines institutionalised in law.
"It is quite possible that the Land Apportionment Act became much more important in later years when it became the cornerstone of Government Policy, but in fact it really did little at the time to change the allocation of land between White and Black....the division of land had already taken place in Rhodesia as far as the more preferred and agriculturally suitable areas of the country were concerned which were, on the whole, already in European hands by 1925" (Bannerman 1982 p.104).

Land in Zimbabwe under the Land Apportionment Act became divided into six categories as shown in table 2.2

<table>
<thead>
<tr>
<th>Sector</th>
<th>Percentage of total area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native Reserves</td>
<td>22.4%</td>
</tr>
<tr>
<td>Native Purchase Areas</td>
<td>7.4%</td>
</tr>
<tr>
<td>European Area</td>
<td>50.8%</td>
</tr>
<tr>
<td>Undetermined Area</td>
<td>0.1%</td>
</tr>
<tr>
<td>Forest Area</td>
<td>0.6%</td>
</tr>
<tr>
<td>Unassigned Area</td>
<td>18.4%</td>
</tr>
</tbody>
</table>

Table 2.2 Land apportionment in 1931 (after Kay 1970 p.51).

The Native Reserves were those outlined in the constitution and within which land was held under customary law. The Native Purchase Areas were reserved for acquisition as farms by individual Africans. All urban areas lay within European land, none of which could now be owned or occupied by Africans. The Undetermined area was European owned land, but could be transferred to African ownership if the current owners so wished and the Unassigned area was very poor land which could potentially be redistributed at a later date.

Although numerous amendments to the LAA were made in subsequent years, the reserves created at the turn of the century, with few alterations, were maintained throughout the colonial period. Amendments tended to affect mainly the Native Purchase Areas and Unassigned areas; "reclassification of occupied Tribal Trust Land (reserves) and European Farming Areas has been minimal" (Christopher 1971 p.51). The response of the colonial administration to the increasingly vociferous demands of the African population in the mid twentieth century particularly, were piecemeal and essentially cosmetic with respect to the very real problems of mounting population numbers and land shortage in the reserves.

The Native Land Husbandry Act (NLHA) of 1951 heralded substantial changes in the pattern of landholding within the African sector, but no change in the quantitative distribution of land between sectors. Segregation of land along racial lines became even more entrenched in the 1960s, despite several committees and commissions which tried
to persuade the government and the electorate that the law constituted the fundamental source of many of the problems at that time. Parity was introduced into the land law in 1969 as part of the Land Tenure Act of that year, such that at independence land was divided more or less evenly between blacks and whites. As suggested, however, although the Land Tenure Act did much to modify the quantitative disparity between the settler and African sectors in respect to the national designation of lands, the qualitative differences in land across the sectors by this stage were entrenched and deep-rooted. Furthermore, the density of population resident within the two sectors were polarised. At the first official census on independence in 1982, population densities in the communal areas were in excess of 25 persons per square kilometre. In contrast 16% of the population, largely Europeans, were resident on 40% of the land area at densities of under 8 persons per square kilometre (CSO 1984).

**Human-resource pressure.**

On the basis of both human and stock populations in 1975, the Whitsun Foundation (1980) classified lands in Zimbabwe according to the degree of pressure above assessed carrying capacities. The spatial distribution of such pressures are again very distinct and not unexpected as shown in figure 2.8. Whitlow (1980b) calculated that although 33% of the Communal Areas were 'in balance' with respect to assessed carrying capacities, 38% experienced 'great', 'extreme' or 'desperate' pressure. Carrying capacities in the Communal Areas are a function of the nature and quality of the resource base and the farming system operative, neither of which can be extracted from the history of land apportionment and the colonial endeavour in the country. The physical confinement per se of rising African populations within a static reserve area, undermined existing farming systems and created the conditions for resource deterioration. Further dualist policies, for example, regarding pricing, marketing and transportation services, prevented the emergence of an entrepreneurial class of African farmer and largely put a seal on the development of production amongst the peasantry. The colonial conception of resource deterioration, the subsequent conservation programmes forwarded and associated legislative and planning tools implemented by the administration are subject to critical analysis in the following chapter.

One of the main outcomes of excessive human and stock populations over the capacity of the resource base, is soil erosion. Many of the physiographic and climatic factors discussed above, serve to render Zimbabwe naturally susceptible to high rates of soil loss by erosion. Research into soil erosion in Zimbabwe has been extensive and quite unrivalled in any other African country. The first runoff plots, (bounded, experimental blocks of known area, soils and slope) were established in Zimbabwe in 1934, with
Degree of pressure in relation to carrying capacity (1975)

- 5 times - desperate
- 4 times - extreme
- 3 times - great
- 2 times - some
- Balanced or none

Figure 2.8 Human and livestock population pressure in the communal areas (after Whitsun foundation 1980).
long-term field experiments being initiated in 1953. Much of the early work concentrated on understanding the processes of soil erosion under the peculiar conditions of sub-tropical rainfall and were effected at government research stations. The emphasis within such research, however, was largely on the conditions and practices applicable to the settler farming sector and was focused towards tobacco farming in particular (see for example, Hudson 1957).

The detailed studies effected at these institutions into the mechanics of erosion and of rainfall erosivity culminated in the soil erosion hazard prediction model developed by Michael Stocking and Henry Elwell in 1973. These authors constructed a model of potential erosion hazard in Zimbabwe on the basis of five factors; rainfall erosivity, soil erodibility, slope, cover and human influences. Each factor was assigned a value according to its potential to influence erosion and a factor analysis performed. Seven categories of erosion hazard were isolated on the basis of this computation and a map of potential erosion produced (see figure 2.9). Large tracts of the country were seen to have above average risks of erosion, particularly in the Middleveld where many Communal Areas and large sections of the African population were located.

Whitlow (1988), in an analysis of Stocking and Elwell's original data for the purposes of discussion within the report on the national erosion survey, found the communal lands had the greatest share of the high to very high risk areas. 54% of areas with high potential erosion hazard were under communal land use and 54% of those areas with very high potential erosion hazard were under similar use (see table 2.3). The communal lands also, however, contain a large portion of areas of lower erosion risk as well; 25% of the African farming areas were mapped by Stocking and Elwell as having low or very low potential erosion hazard on the basis of physical parameters. In contrast, (53%) of 'General Lands', which comprises largely the commercial farming sector, are subject to 'moderate' potential erosion hazard. Whitlow concludes that "on this basis it seems that conditions are slightly more conducive to degradation in the communal lands" (1988 p.31).
Figure 2.9 Soil erosion hazard in Zimbabwe (after Stocking and Elwell 1973).
Table 2.3 Potential erosion hazards in Zimbabwe between tenure types (after Whitlow 1988).

In 1986, the Department of Natural Resources commissioned a national erosion survey to be carried out by the Department of Geography at the University of Zimbabwe. This was the first study of actual erosion status in the country. The aim was to generate statistical information on the types and extent of erosion on croplands and grazing areas throughout Zimbabwe and to provide a basis for monitoring future changes in erosion patterns. On the basis of a sample of 1:25,000 panchromatic serial photos for the country (dated between 1979 and 1984), the presence or absence of gullyng, sheetwash, rilling and streambank degradation were recorded on croplands, non-croplands and wetland areas. The extent of actual erosion in Zimbabwe as elicited by this method is shown in table 2.4a and b, and the resultant national erosion map in figure 2.10. 'General' lands are dominated by the former large scale commercial farmlands and 'other' lands to national parks, game and forest reserves. Clearly, the most serious problems of erosion are found in the communal lands. 26.9% of these areas are subject to very severe or severe erosion levels in comparison to 86.5% of the general lands experiencing negligible to very limited erosion. 96.4% of the area nationally exhibiting very severe erosion levels all within the communal land area.

Table 2.4a. Erosion class within tenure (after Whitlow 1988).
Proportion of area affected by erosion

- Over 16%
- 12.1 - 16.0%
- 8.1 - 12.0%
- 4.1 - 8.0%
- 0.1 - 4.0%
- Not present

Figure 2.10 Land degradation in Zimbabwe (after Whitlow 1988).
Table 2.4b Erosion class between tenure type (after Whitlow 1988).

<table>
<thead>
<tr>
<th>Erosion class</th>
<th>Communal</th>
<th>General</th>
<th>Non-agric</th>
<th>Zimbabwe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible</td>
<td>21.9</td>
<td>48.6</td>
<td>29.5</td>
<td>100%</td>
</tr>
<tr>
<td>Very limited</td>
<td>38.0</td>
<td>53.6</td>
<td>8.4</td>
<td>100%</td>
</tr>
<tr>
<td>Limited</td>
<td>67.8</td>
<td>28.3</td>
<td>3.4</td>
<td>100%</td>
</tr>
<tr>
<td>Moderate</td>
<td>81.7</td>
<td>17.0</td>
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<td>100%</td>
</tr>
<tr>
<td>Severe</td>
<td>91.8</td>
<td>7.5</td>
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</tr>
<tr>
<td>Very severe</td>
<td>96.4</td>
<td>3.0</td>
<td>0.6</td>
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</table>

When levels of actual erosion were cross-tabulated by Natural Region, Whitlow found that Natural Region III was most affected by serious erosion; "the eroded land in this region was estimated at 417,200 hectares, approaching one quarter of the degraded terrain in the country, yet the region only comprises 18.1% of the national land" (Whitlow 1988 p.24). In addition, it was found that Natural Region IV and V contained 1,102,400 hectares of degraded lands which was equivalent to approximately 60% of the eroded terrain in the country.

The spatial distribution of actual erosion levels in Zimbabwe produced via Whitlow's methodology is substantially different from the national pattern of potential erosion hazard forwarded by Stocking and Elwell. Even cursory visual comparison of figures 2.9 and 2.10, suggests this. In effecting a statistical comparison of potential and actual erosion in Zimbabwe within the national erosion survey, Whitlow indicates that indeed, there is a wide range of actual erosion levels which exist even within a particular hazard class; "for Zimbabwe as a whole, there is no clear increase in the percentage of eroded land from areas of very low risks through to areas of very high risks" (1988 p.31). The disparities between actual and potential erosion across all tenure types leads Whitlow to conclude that,

"Physical factors alone are inadequate to determine erosion hazards. The human factor obviously has to be considered as well...The fact that there was very little erosion in areas of high to very high risks within the non-agricultural lands suggests that human-population density might be an important influence on erosion" (1988 p.31).

Although he found a positive relationship between population density and actual erosion within the communal lands, "the same analysis in the general lands revealed no obvious pattern so it seems that land use and management factors are also important determinants of erosion" (1988 p.31).

It is these 'social' factors which to date, have not been subject to the same degree of critical analysis in Zimbabwe as those within the domain of natural science. Single hypothesis models of land degradation at a national level have been forwarded, for
example, by Kay (1970) and Whitlow (1977), within their versions of a 'subsistence
land-use scenario', but such models oversimplify the true complexity of human-
resource relationships at the local level as will be debated in Chapter Five. The analysis
presented here confirms the importance of an historical dimension within a regional
political ecology approach, in order to understand how 'human' and 'physical' factors
have combined in the past to influence contemporary societal-resource relationships. In
particular, the process of appropriation of the most agriculturally suited areas of the
country by the settler community, and the subsequent legal segregation of lands
according to race, led to the confinement of rising numbers of people in areas which
were naturally susceptible to high potential erosion hazards. In the following chapter,
the specifics of colonial conservation policy and the effects on African farming systems
are highlighted.

The land question and the nationalist struggle.

Environmental deterioration and rising land hunger in the reserves were critical elements
in the broadening of political support for the guerilla movements and the nationalist
struggle amongst the peasantry in Zimbabwe. Organised forms of African nationalist
politics first emerged in the 1920s although the embryonic political parties did not take
form until the late 1940s. The roots of the political struggle in Zimbabwe inevitably go
back to the resistance to settlerdom expressed in the Chimurenga wars of the late
nineteenth century. The crushing and total defeat experienced by both the Shona and
Ndebele peoples during these wars, has been forwarded as an explanatory factor in the
absence of a continuous tradition of resistance by the African peoples in Zimbabwe
(Ranger 1967). Mandaza (1986), however, highlights three stages in the development
of the nationalist movement in Zimbabwe which he terms, 'early', 'conventional' and
'revolutionary' nationalism;

"The early but not fully-fledged nationalist expression of the
1940s...conventional nationalism that began with the African
National Congress (1957-59), the National Zimbabwe African
People's Union (1961-1962), and ZAPU and ZANU from
1963 onwards...the first stage of revolutionary nationalism,
beginning with ZANU's decision, in 1963, on a policy of
'confrontation' and continuing into the 1970s when ZANLA
and ZIPRA" (Mandaza 1986 p.28/9).

Original nationalist initiatives came from a small group of educated people, including
trade union officials, and were expressed through the first significant nationalist
political party, the African National Congress in 1957. It was not originally based on
broad, popular support. From these origins, the movement then went through "several
formal existences and labels in the late 1950s and early 1960s" (Stoneman and Cliffe
The Zimbabwe African Peoples Union (ZAPU) was formed in 1962 with Joshua Nkomo, a trade unionist from Bulawayo, as president. A year later, several other leaders broke away from ZAPU and formed an alternative party, the Zimbabwe African National Union (ZANU). In 1964, both parties were banned and were forced into exile.

The NLHA, promulgated in 1952 and implemented with increasing rigour and compulsion throughout the decade, brought discontent to a head and extended support for the nationalist movement from its minority origins to a broader populist base. Increasing landlessness via the individualisation of tenure under the Act, the underwriting of the authority of traditional chiefs and headmen to allocate lands and the enforcement of conservation provisions in the reserves, all fueled the discontent felt by different sections of the rural class structure in the reserves.

Simultaneously, with the Unilateral Declaration of Independence in 1965 and the subsequent political and economic isolation of Rhodesia imposed by sanctions, the state was forced to promote the diversification of the economy. Settler farmers were encouraged into maize, cattle and cotton production through "subsidies and loans estimated at $8,000 per settler-farmer compared to 60 cents each for black cultivators in the early 1970s" (Phimister 1988 p.8). As a result, African production for both subsistence and external markets suffered and poverty in the reserves was exacerbated. The sharp fall in the African share of the agricultural market persuaded many African farmers to abandon efforts to scratch a living from their often inadequate land areas, and coupled with those left totally landless under the NLHA, served to swell the ranks of the unemployed, many of whom joined the stream of guerilla volunteers leaving Rhodesia.

In 1975, the two parties of ZAPU and ZANU united to form a common 'Patriotic Front' (PF). The mid-1970s, also marked the period in which international forces became more prominent in the resolution of the nationalist struggle and the eventual settlement in Zimbabwe. Since 1923, the policy of the British government had been one of non-interference in the internal administration of the country, and this continued even after the illegal declaration of independence. However, with the independence of Mozambique and Angola in 1974 and the emergence of radical regimes in those countries with the backing of the Soviet Union and Cuba, the events in southern Africa were brought onto the agendas of western powers. The concern with respect to Zimbabwe, was to avoid armed conflict which would "seriously lessen the chances of bringing about a moderate regime in Rhodesia and would open the way for more radical solutions" (Crosland quoted in Stoneman and Cliffe 1989 p.29).
Subsequent Anglo-American attempts to forge a peaceful solution through talks in Geneva in 1976 proved inconclusive, and proposals by Smith for an internal solution which excluded the Patriotic Front, had been unacceptable internationally and failed to find support amongst the masses. In consequence, the war escalated during the latter part of the decade. By the time of the Lancaster House conference, all forces and parties involved in the conflict in Zimbabwe were in need of a settlement. The political and economic stability of the frontline states, in particular of Zambia and Mozambique, were seriously disrupted by the cross-border raids and wanted an end to the war; the Smith-Muzorewa group feared that they could not stop a war which was about to engulf them; the South Africa government could not support the Rhodesian war indefinitely and welcomed an internal settlement which might also buy time for their own apartheid system; and the Patriotic Front needed the opportunity to isolate the Smith-Muzorewa regime and emerge as the legitimate African nationalist force.

The Lancaster House Conference was convened to settle the issues of provision for ceasefire, elections and the transition to independence, and for a new constitution. Inevitably, the agreements encapsulated some compromise on all sides. In particular, for the Patriotic Front, several of their original objectives were eroded; the white settler state was not to be dismantled, the PF was to be deprived of the possibility of winning total political power through the reservation of twenty seats in parliament for whites, and fundamental socio-economic structures would remain in tact through the ten year guarantee on the inviolability of private property. It was this latter provision which ensured that the 'land question' was passed, unresolved, into the hands of the new government.

"The cost of buying the estimated 40-60% of European land not being fully utilised would be so high that even if a new government of Zimbabwe we committed to implementing a comprehensive land resettlement it would find it well nigh impossible to carry it out" (Astrow 1983 p.155).

International interest in the 'land question' in Zimbabwe also burgeoned during the period of the settlement negotiations. Bodies such as the United States Agency for International Development (USAID), the World Bank and the Whitsun Foundation, all funded technical reports debating the merits and demerits of the redistribution of land in the country, and these deliberations found expression in the arrangements of the Lancaster House Agreements.

Much against the preferences of the majority of the interest groups represented at the Lancaster House conference, it was Robert Mugabe's ZANU (PF) party which won the majority of seats in the independence elections of March 1980. 57 seats were won by
ZANU, twenty by ZAPU who fought the elections separately once the PF had been split after the conference, three seats were won by the United African National Council and the Rhodesia Front commanded the twenty white seats reserved under the terms of the Lancaster House agreement. In 1988, ZAPU and ZANU were once again reunited through a unity agreement in which Mr. Mugabe became the Executive President of Zimbabwe and first secretary of the new merged party, with Mr. Nkomo being one of two vice-presidents. There was also a pro-rata increase in the number of posts in government to accommodate the new ZAPU candidates.

The essence of the 'land question' in Zimbabwe, the qualitative and quantitative redistribution of arable lands, remain a pivotal and a continuing challenge to this government. Indeed, over the nine year period of independence, there have been significant changes in emphasis and commitment towards these issues. On independence, the new government was quick to state their prime objective as to expropriate alienated land for the benefits of a hitherto marginalised peasantry and to develop land through socialist forms of production and social relations of production. Although, Marxist-Leninist rhetoric had increased during the final years of the war, it has since been argued by both external observers and those from inside the nationalist movements, that there was no coherent ideology for social change at this time. Rather, mounting commitment to the guerilla movements during this period was a product of the united concern for political change; for democratic political structures and the elimination of racism. "Such a democratisation process was not a challenge to capitalism, but a challenge only to the privileges enjoyed by the settler community" (Phimister 1988 p.13). Despite rising inequalities between rural classes during the UDI period, all Africans were disadvantaged in some way by settler policies and were thus mobilized behind the struggle. "The alliance of rural class forces underpinning the guerilla struggle ...was united in opposition to colonialism but little else. There was no shared vision of the future beyond the recovery of land lost to whites" (Phimister 1988 p.8). The problem of the resolution of class interests in country was therefore carried forward into independent Zimbabwe.

Moyo argued in 1986, that the 'land question' was now substantially different to that articulated, however hazily, by the liberation movement. Objectives for transformation have been stated more cautiously or implemented more 'pragmatically', resulting in a "much more complex configuration of issues, realities and determinations of the 'land question'" (Moyo 1986 p.165). The following sections isolate some of the major political-economic structures at the national level which have served to temper the relationship between state and peasantry since independence.
Political-economic priorities since independence.

Economic policy

On independence, Zimbabwe inherited one of the most unequal economies in the world;

"The 3% of the population who were white earned about 60% of total wages and salaries, representing about 36% of gross domestic income; a further 28% of GDI was gross operating profits of incorporated enterprises (all white owned)" (Stoneman and Cliffe 1989 p.42).

In contrast, the real incomes from African farming in the reserves fell by 40% over the period 1948 to 1970 (Riddell 1970).

Macro economic policy in Zimbabwe since independence has focussed on the twin objectives of growth and equity in order to break down inherited structures and spread the benefits and costs of development more equitably. Although as stated above, the motivation of the nationalist movements were primarily for political rather than social change, in the run up to the elections, "the Zimbabwe liberation movements were generally perceived - both by themselves and by more objective observers - as becoming increasingly socialist" (Davies 1988 p.18). Since election to government, ZANU continued to proclaim itself as a party committed to scientific, Marxist-Leninist socialism. After eight years in power, debating the nature and degree of such a transformation has become a popular concern (see for example, Davies 1988, Stoneman and Cliffe 1989).

Promptly on gaining power, Mr. Mugabe gave assurances to the white minority that there was a place for everyone in Zimbabwe. In what has become known as his 'reconciliatory speech' (Mandaza 1986), the Prime Minister declared that Zimbabwe would be non-aligned. The attainment of socialism in the country was to be transitional rather than revolutionary; existing structures would be transformed rather than replaced. Indeed, reconciliation was as essential for the new government as it was for European and international interests. Aside from the constraints set by the Lancaster House agreement, the range of manoeuvres open to the government were further limited by external and international forces; the promises of international aid and the market-strings attached to these, the threat from South Africa both as a direct force and through control over trade routes, and the problems of drought in the first few years of independence, all served to work against the immediate adoption of more radical macro-economic policies. The international dimension is summarised by Stoneman;

"If Zimbabwe were to retain its economic links, including economic aid, with the capitalist world, its policy would have to
remain acceptable...whites and foreign investors would continue owning half or more of the economy - most of the productive land, nearly all the mines, and nearly all the manufacturing industry and other businesses" (Stoneman 1988 p.45).

The basic tension of trying to maintain local European and international confidence whilst satisfying the expectations of the masses, underscores the early economic policy documents for Zimbabwe. The Growth with Equity document (Ministry of Economic Planning and Development 1981) and the Transitional National Development Plan (TNDP) (Republic of Zimbabwe 1982) have been referred to as 'statements of intent' rather than 'plans', performing political rather than economic functions (Stoneman and Cliffe 1989). The central elements of these documents covered the restoration of per capita consumption levels amongst the African population, programmes to improve access to basic social services, expansion of input and extension services to stimulate peasant agricultural production, and programmes to generate wage employment. Rather than radical restructuring of the economy in the direction of greater equality, the strategy adopted was to look to foreign aid to promote growth, particularly in the communal areas "in some vague hope that a 'leveling up' of the incomes of the poorest might occur without any serious impact on those of the richest" (Stoneman and Cliffe 1989 p.45).

Mobilisation of international support for selected programmes in Zimbabwe was first sought at the Zimbabwe Conference on Reconstruction and Development (ZIMCORD) in 1981. Approximately, $1.2 billion was pledged by individual countries and international organisations. In the main, these came from the west, from the United Kingdom, the United States and EEC member countries. Only Yugoslavia and China from the soviet bloc participated in the conference. These pledges were to contribute about one-third of the financial requirements of the TNDP.

Subsequently, the government has continued to encourage and welcome both foreign and local, private, bilateral and multilateral investment, arguing that such a climate, "can and should be consistent with the aspiration of creating an egalitarian, socialist and democratic society" (Chimombo 1986 p.128). On Zimbabwe's ninth independence anniversary, Mr. Mugabe announced measures to further relax the code for private investment;

"It has become clear that the country cannot sustain growth and ease its huge unemployment problem without local and foreign investment. This is why the government decided to review the investment regime with a view to making it more conducive to investors...The government recognises the need for a more rational and market-orientated method of determining price and incomes" (Mugabe 1989).
The period 1980-1982 witnessed huge upturns in the Zimbabwean economy with GDP growing by 15% in 1981 (Kadhani 1986 p.107). Exceptionally good rains, the stimulation of internal demand by wage increases and renewed access to aid and borrowing from foreign sources led to record crops, increased manufacturing capacity utilisation and improvements in the terms of trade. The supporting factors of such growth were largely transient, however. For example, the lifting of sanctions led to one-off gains in terms-of-trade and the reactivation of resources underutilised during the war, led to a subsequent short term expansion in production. The period 1982-1984, in contrast, was one of decline. GDP fell by 2% in real terms in 1982 and by 3.5% in 1983; a recession which was exacerbated by three successive drought years and by the very high population growth rate (3.5% per annum). Inflation eroded the effects of earlier wage rises, employment levels stagnated, falling world mineral prices and foreign exchange difficulties hit the mining and manufacturing industries, and external debt servicing rose. Despite aid flows under the ZIMCORD agreements, by the second half of 1981, Zimbabwe was experiencing both internal budget deficits and external payments deficits, frustrated by worsening world trade climates. The pressure to turn to the IMF increased and in 1983, a loan of $375 million was agreed. This was promptly suspended in 1984, when the Zimbabwean government froze dividends and profit remittances in an attempt to restore the balance of payments which were showing no signs of improvement under the IMF package. There was partial recovery in 1984 and 1985 with GDP rising by 3% and 9% respectively, although the capacity to earn foreign exchange needed for importation of industrial raw materials, remained limited. Growth in 1986 fell back to 1%.

The role of foreign capital in the development plans of Zimbabwe continues to be debated. Many authors argue that the persistence of foreign capital and the government's widening efforts to attract such investment, are fundamental contradictions in the socialist transformation of Zimbabwe; "At times, the juxtaposition of socialist aims and the need for investment produces the bizarre implications that foreign capital may be attracted to help achieve such as revolution" (Stoneman 1988 p.55). Chimombe (1986), is particularly critical;

"After such a bitter war of liberation, it is inconceivable that Zimbabwe would opt for a non-socialist path of development - which would clearly negate the gains of the masses. But Zimbabwe's approach to its socialist development is contradictory. Instead of carrying out fundamental reforms in the inherited economy (such as land reform), the short-cut to development was to get aid. The result has been dismal" (p.139).
The trap in which Zimbabwe is caught is circular; it is not earning enough foreign exchange both to service its debts and to invest for expanded exports. While a massive expansion of exports remains one option, such external demand is uncertain. By contrast, greater internal demand will only arise from a radical structural transformation; "at present only talked about" (Stoneman 1988 p.59).

By the end of the period of the TNDP, there were such divergences between the development plan and actual performances, particularly in the economic sphere, that Kadhani suggests by 1982, the TNDP had,

"ceased to serve as a significant reference point excepting in the case of social programmes, which were kept on the planned course more by virtue of the political momentum they generated than as components of a consistent development framework" (Kadhani 1986 p.110).

The First Five Year Development Plan (FFYDP) for Zimbabwe (Republic of Zimbabwe 1986), constitutes the government's official framework for managing socio-economic development over the period 1986-1990. It includes a retrospective assessment of the achievements and failures registered in the first five years of independence. The divergence between plan and performance with respect to the TNDP are attributed in the FFYDP to drought, world recession and the progressive deterioration in investment activity. Kadhani (1986), in contrast, explains the divergence in terms of the failure to interpret the constraints upon the TNDP arising from the basic "structural and functional relationships of the economy to external (viz. South African and OECD) systems" (1986 p.101). Furthermore, he stresses that the absence of a mechanism for creating access to resources for the implementation of the plan, and the difficulty of 'planning' an economy in which ownership and control of production rests largely in private hands, constrained the success of the TNDP. "If the TNDP may be excused for not taking account of these factors, the FFYNDP cannot, however" (Stoneman and Cliffe 1989 p.124).

The major economic objective of the FFYNDP was an average annual GDP growth rate of 5.1% (in contrast to the 8% per annum in the TNDP) and the creation of 28,000 jobs a year. The emphasis on employment generation within the most recent plan reflects both the success of the education system which is turning 100,000 school leavers annually onto the job market, (the majority with secondary school qualifications), and the failures in the productive sectors to create job opportunities for the full mobilisation of human resources in the country. Despite the good intentions of the FFYNDP, the targets set for job creation, threaten to be proven woefully low.
In other respects, the FFYNDP shows substantial continuities with past plans; the essential aims to restructure the economy to increase state ownership and control of resources, to raise agricultural productivity and standards of living amongst the population and to improve the efficiency of land use, all remained primary objectives for the plan period. The six major development objectives of the Five Year National Development Plan are outlined below.

1. Transformation and control of the economy and economic expansion;
2. Land reform and efficient use of land;
3. Raising the standards of living of the entire population, in particular, the peasant population;
4. Enlargement of employment opportunities and manpower development;
5. Development of science and technology; and,
6. Maintenance of a correct balance between the environment and development

(Republic of Zimbabwe 1986 p.10).

In contrast to past plans, the details of these objectives indicate a heightened emphasis on individual participation, the realities of increasing unemployment, moderation of expectations and policies aimed at sustained improvements. It is argued that the attainment of all six objectives will be determined substantially by the involvement and participation of the people in both the planning and implementation of the development programmes. This relies on an effective, broadly based planning machinery being in operation; a process which was initiated through administrative reform soon after independence but which is anticipated to come to fruition during the Five Year Plan period.

**Administrative reorganisation.**

At independence, the new Ministry of Local Government and Town Planning had two main directives; to integrate the Communal Areas into the political system for the first time and to establish new democratic institutions through which the majority of the people could participate in the development of their communities. To these ends, each ministry became responsible for its subject matter throughout the country regardless of the designation of the land. The District Councils Act amendment of 1982 also initiated the process of delineation of new District Council areas upon which the future administrative restructuring of the country would occur, "The greatest institutional innovation since independence occurred at the local level" (Stoneman and Cliffe 1989 p.97).

On the ground, the dominantly white, commercial farming areas remained largely unaffected by the new legislation and retained their Rural Councils. In contrast, impact
in the Communal Areas was much more widespread. The African Councils Act of 1957 had led to the establishment of African Councils in most communal areas (known as 'Tribal Trust Lands' at that time), but the effectiveness and purpose of these had been very variable. In most areas, "the writ of the District Commissioner and his subordinates was absolute" (Hodder-Williams 1986 p.20). In 1982, as a result of the implementation of the District Councils Act, however, over 250 former African Councils became consolidated into 55 District Councils and thereby formed a more manageable and potentially efficient local administrative structure.

In 1984, the appointment of Provincial Governors to each of the eight provinces further altered the relationship between local authorities and the higher echelons of central government. The authoritarian and interventionist character of the inherited colonial administrative system was replaced by one in which governors replaced commissioners, but rather than a single, chain of command from the ministry of Internal Affairs to the kraal, "they had to liaise; setting up development committees, and to 'oversee' as with district councils, but no longer simply to 'command'" (Stoneman and Cliffe 1989 p.102). A hierarchy of development committees and councils was to be established from Provincial level, down through District and Ward tiers to the Village Development Committee (VIDCO) level, which was the starting point and lowest tier in the structure. "The ordinary peasant has to be our object and if he is our object then we must have machinery which will affect him" (Mugabe 1984). The new structure was deemed essential to ensuring the correct identification of the aspirations of the people, for encouraging the maximum participation of these people in the development process and for allowing effective planning and coordination of development projects. The new administrative structure is shown in figure 2.11. By the end of 1984, 6,049 villages and 1048 wards had been delineated (Ministry of Local Government and Town Planning 1985 p.3). District summaries for all provinces were published without any omissions, suggesting that the physical exercise of defining 'families' and delineating 'villages' had been successful.

At each level, a committee would be formed charged with identifying the needs at that level and with articulating these upwards to the next tier. For example, Village Development Committees were to comprise six members; four members democratically elected by all adults in the village, one member elected by the Women's Mass organisation in the village and one by the Youth Mass organisation. Ward Development committees would constitute elected members from the village level. Committees at District level would comprise nominated members of the Zimbabwe National police, the Zimbabwe National Army and Central Intelligence Office, as well as District heads of Departments and representatives of commerce and industry operating in the District.
Figure 2.11 Administrative structure (Ministry of Local Government, Rural and Urban Development undated).
To date, details of the functions of such committees appear only in a training document produced by the Promotion and Training section of the Ministry of Local Government, Rural and Urban Development. The recommended functions of the committees at village level were as follows:

1. To identify and articulate village needs.
2. To coordinate and forward village needs to the ward development committee.
3. To facilitate decentralised planning and ensure effective consultation and participation of villagers in development planning.
4. To run all activities at the Village Development Centre (VIDEC).
5. To coordinate and cooperate with government extension workers in the operation of a cooperative shop, pre-school, market stall, income-generating activities, health post, adult literacy classes, craft and technology centre etc.
6. To facilitate improved communication within the village.
7. They are the link between the Ward Development Committee and the people.

(Ministry of Local Government, Rural and Urban Development, undated p.2).

Similarly, the functions of the Ward Development Committees according to the same document were to;

1. Coordinate village plans submitted by Vidcos and forward them to the council.
2. To receive planning guidelines from the District Council and to ensure better planning throughout the district.
3. To produce ward plans.
4. To facilitate decentralisation, improve communication and to ensure better planning throughout the district.

Further consolidation of the local structure is foreseen within the proposed Rural District Councils Act. Some Rural Councils are no longer viable having lost land and taxes to resettlement schemes, and some District Councils are dissected by large scale commercial farming areas preventing the provision of a standardised and uniform service to rural communities. Rural District Councils will consist of elected members from ward level, together with any members specially nominated in terms of the Rural District Councils Act. In broad development terms, the functions of these Councils will be to examine rural district development plans, review and monitor the implementation of these, participate in the formulation of regional plans and to implement their own projects contained in the provincial plan.

The establishment of this new, decentralised administrative structure in Zimbabwe is clearly essential for the removal of dualist colonial structures and for stimulating and effecting development in the communal areas rather than simply extending 'control'. It is also essential for achieving the six specific but interrelated objectives of the FFYNDP, in particular those relating to rural and agricultural development. The commitment to sustainable development of resources through the maintenance of a
balance between environment and development and the continued emphasis is on the efficient use of land via land reform, both depend on the successful operations of these newly created local level institutions.

**Land reform and agricultural transformation.**

The dualist agrarian structure inherited on independence in which two distinct subsectors, the European, 'commercial' and African, 'communal' sectors were identified, were outlined in the early sections of this chapter. In particular, the spatial distribution, the qualitative and quantitative differentiation of the resource base and the major differences in the systems of organisation and production across the two subsectors were highlighted. In addition, the significance of the 'land question' during the independence build up was debated. This section focuses on the attempts made, by the government since independence to break down such inequalities and differences. In particular, the new political economy of land in Zimbabwe and novel emergent class interests are discussed.

In 1981, the first programme of land redistribution was initiated in which the resettlement of 162,000 families over three years was targeted. Under the restrictions of the Lancaster House agreement, the acquisition of lands for this programme by the government was constrained by the guarantees on the inviolability of private property which restricted purchases to a 'willing seller-willing buyer' basis. In this way, limits were set on the quantity, quality and location of land to be redistributed. In addition, there was substantial concern expressed within international reports, that due to the importance of agriculture as a source of vital foreign exchange in the country and the dominance of European commercial production in securing such terms, any major land transfer from one sector to another would have severe repercussions for the economy. This tension for the government, between fulfilling their commitment to the masses through the redistribution of control over access to land and environmental resources, and that of maintaining growth and an even balance of payments situation, has attracted substantial academic and practical concern.

In the event, the pace of resettlement was slow. By mid 1984, the government had acquired approximately 2.5 million hectares of land at a total cost of Z$52 million, but only 36,000 families had been resettled by the end of the following year. The persons resettled were largely ex-combatants, war-displaced families and the landless. In the light of the annual increment to the communal land population of 180,000 due to population increase, the effect of the programme on overcrowding in these areas was minimal.
Land redistribution is still on the political agenda and features as a primary objective in the FFYNDP, but targets, the procedures for land acquisition and the relative emphasis on resettlement with respect to other agrarian reform options within the communal areas, are all undergoing substantial and continuing change. Securing foreign exchange via agricultural production and land redistribution are no longer framed as polarised aims, in the light of the increases both absolute and relative, in the contribution by communal farmers to marketing boards.

The burgeoning research since independence into peasant production in the communal areas and the success of agricultural restructuring in that sector in terms of extending credit, extension, marketing and transportation services to communal farmers, have modified the inherited assumption that production potential in this sector was necessarily limited. Yield levels are now confirmed to be more a reflection of spatial and temporal environmental variation than of farming system (see Weiner 1988). Between the 1980/1 and 1985/6 seasons, there was a twelve fold increase in the amount of maize and sorghum offered for sale from the communal areas to the marketing boards (Cliffe 1988b). The communal area producers share of marketed grains and cotton as a whole increased from less than 10% prior to independence to approximately 50% in 1985/6. It is these successes and the careful research into production according to agro-ecological region, which have dismissed what Moyo (1986) refers to as part of the 'folklore of Rhodesia'; that Africans did not understand land husbandry and inherently could not, and were not motivated to, achieve levels of productivity equitable to the whites. "It is now said that land redistribution is therefore unnecessary" (Cliffe 1988c p.313).

The production performance of the communal sector over the independence period has been referred to widely as Zimbabwe's, and even Africa's 'agricultural success story' (Weiner 1988, Cliffe 1988b). Overall production levels disguise spatial and socio-economic limitations to these improvements, however. Furthermore, it is not clear if these results are the short term, once-for-all effects of the removal of barriers and the provision of services, or part of a long term trend. Recent research has tended to confirm the former scenario, and in addition, the benefits have been confined to a minority of regions and household; "the success story is not a national phenomenon" (Weiner 1988 p.69). In the 1983-4 season, 63% of the communal areas marketed maize came from Natural Regions I and I where only 15% of the communal area population live. Communal areas in Natural Regions IV and V which make up 87% of the area and have two thirds of the population had only small marketed surpluses.
As well as the agro-ecological differentiation, there is large variation socially in terms of access to productive assets and productive ability between households which cuts across Natural Regions. Access to land, animal draught power, off-farm income and agricultural credit, have been found to be major dimensions along which a community-level process of differentiation is enhanced. Access to all these assets are highly skewed in the communal areas giving rise to "unequal, dependent and clientelist relationships" (Cliffe 1988b) over the exchange of cattle, labour or credit. It is the wealthiest households in the communal areas which are benefiting the most from agricultural change in the country. The rising contribution by communal farmers to marketing boards should therefore be viewed cautiously. A 'partial' success has been registered in enhancing the productive potential of some of the better watered communal areas and the minority of better off households. Further measures, however, are required if production is to continue to expand and the benefits are to be spread more evenly.

Lionel Cliffe has been central in articulating various scenarios for agrarian reform in Zimbabwe, both in the international literature (1988b, 1988c) and in Zimbabwe (1985). The basic premise to several different options, is that simple expansion of scale within the present structure of smallholder farming will not achieve either growth nor equity. Although he identifies several encouraging reformist programmes, the basic structural problems remain and will limit the impact of any such programmes;

"In particular, most of the communal areas do not have enough land to meet even the subsistence needs of all their people within the present boundaries and given the present farming systems; one or both will have to give" (Cliffe 1988b p.314).

Cliffe deems the continued redistribution of land in Zimbabwe as an essential element in the agricultural future of the country.

There are recent trends, however, which suggest that the government does not attribute the same urgency to the 'land question'. In particular, as will be more fully discussed in Chapter Six, there is a new emphasis on internal causes and solutions to problems in the communal areas, which is diverting attention away from the resettlement programme. Currently, communal land reorganisation (often referred to as 'villagisation') is dominating rural development thinking in the communal areas in which resource consolidation, reorganisation of settlement and rational patterns and processes of resource use and husbandry are proposed.

Land availability is no longer a major constraint on the resettlement programme. The 1986 Land Acquisition Bill gives the state first refusal on all land sales and therefore the
power to influence the land market. In addition, the constitutional changes due in 1990 will enable property rights to be revoked, both of which should widen the government's options regarding land transfer. Political forces are also fundamental determinants of agrarian strategy in Zimbabwe, however, today as in the past. The difference in independent Zimbabwe is that race is no longer the basis for political division in the country. The present social formation is shaped by much realignment and realignment of class forces subsequent to the achievement of independence.

Prior to independence, it was the settler farmers who were the dominant influence on the state and its agricultural policies. Their role is still very prominent, particularly, in influencing crop prices and wage levels. This position is reinforced by the view, perpetuated by international reports and the clout of aid agencies, that resettlement on a large scale would cause a decline in output and in numbers gainfully employed in agriculture. Such arguments against resettlement, despite evidence of underuse and under production in three-quarters of the Large Scale Commercial Farming Sector (Weiner 1988), serve to reinforce the strength of the Commercial Farmers Union (CFU) and the power of this group in determining agrarian strategy.

Commercialisation of the peasant sector is now accommodated by the commercial sector rather than perceived as a threat, and there has been some Africanisation of the bourgeoisie class. "The exact extent of this is a matter of speculation" (Stoneman and Cliffe 1989 p.57) in the light of official dislike for the process, but it has undoubtedly occurred.

Although the formation of a black petty bourgeoisies class was severely truncated by the colonial administration, particularly in urban based managerial, technical and supervisory spheres, the creation of the Small Scale Commercial Farming sector enabled a small group of black farmers to achieve a certain amount of accumulation. At independence, this group of 10,000 farmers were responsible for a third of marketed produce from black farmers. Moyo (1986) argues that these farmers failed to emerge as a significant sector "having been peasantised by accommodating extended family members from communal areas, and due to the continued existence of unequal access to state support services" (p.193). Although they are represented through their own Zimbabwe National Farmers Union (ZNFU), their power base, resources and bargaining power remain well below those of the CFU. It is significant, however, that a number of Zimbabwe black bourgeoisies emerged from households in this sector (Moyo 1986).

The peasantry represent the second major influence on agrarian policy in independent Zimbabwe. Despite the early concessions made to this class within the independence
negotiations, many of the democratic and liberating aspirations of the nationalist struggle have since been progressively compromised. Cliffe (1988b) suggests that the interests of the peasant class are represented currently only by a minority of politicians and civil servants. A major factor operating against a unified peasant 'voice' which might push for further land redistribution and greater change in the communal farming system, is that the peasant class is itself, highly differentiated today as in the past. It is the resolution of these novel class interests and conflicts which will determine the direction of agrarian reform in the second decade of independence in Zimbabwe.

The analysis above has confirmed the importance of access to land both currently and in the past in Zimbabwe. The deterioration of that resource base through soil erosion is clearly a political-economic as well as an environmental issue. Details of the nature and content of contemporary conservation concern are the subject of subsequent chapters. As suggested above, environmental resources and the current political response to them, have an historical dimension in Zimbabwe. The following chapter overviews soil erosion and conservation programmes in the context of the colonial history of Zimbabwe.

This chapter focuses on the construction of the problem of soil erosion throughout the colonial period at the national level through analysis of political-economic structures, the content and nature of soil erosion research effected and the promotion of particular conservation solutions. The analysis is based on interpretation of archival and secondary sources housed at the National Archives of Zimbabwe in Harare. Annual and monthly reports of those ministries and departments responsible for African development, European agriculture and soil and water conservation; legislative details; planning documents and reports of commissions of inquiry, are all used to isolate the particular conceptions of the problem of soil erosion held over time. Aspects of and change in, general 'development policy' are also constructed to provide insights into the motivation for conservation.

Interpretations are made carefully in respect to the nature of the sources used; the aim was to establish the conception of the problem of soil erosion held at a particular level by particular interest groups. As will be shown, however, it was often issues within the international community and the colonial encounter in general which shaped conceptions held. The scope for national definition existed post 1923 with the granting of self-government. The resultant political autonomy enabled Europeans to establish the appropriate political and administrative structures to advance their own interests in the country. Appointed officials and experts worked within these structures such as at Government Research Institutions on projects consistent with the colonial endeavour and which further reinforced their own position in the colony as well as that of fellow Europeans. The capacity for local definition of environmental problems and the influence of the motivations of individual field officers during this period, however, are addressed in Chapter Four. This chapter provides the national framework for subsequent analysis in the case study area.

Various chronologies have been presented for the periodisation of soil conservation in Africa generally (Anderson and Grove (1987), Anderson (1984) and Anderson and Millington (1986), for native development policies in Zimbabwe (Howman 1969) and for soil conservation in Zimbabwe (Whitlow 1988). This chapter divides colonial conservation concern in Zimbabwe into three time periods distinguished in terms of the nature of the conservation response and the associated legislation and land use planning programmes (the 'conservation framework'); the organisation of the conservation effort; and the particular conception of the problem of soil erosion and content of conservation solutions promoted within each period. These periods are; pre-1930, the 1930s and
1940s, and 1950-1980. The political economy of soil erosion and conservation in each of these three time periods is constructed in the following sections. The primary concern of this thesis is the African farming sector. Although native development in Zimbabwe was for the majority of the colonial period, planned and implemented via separate ministries and departments to those dealing with the commercial farmers, the two sectors were strongly interrelated in operation. Significant events or developments in the commercial farming sector are therefore included in the analysis.

Conservation pre-1930. 'Rapacious settler farming'.

The conservation framework.

The earliest published reference to soil erosion in Zimbabwe appeared in 1909 in the Rhodesia Agricultural Journal in which Sir Lionel Cripps put forward a "few timely reminders to furnish thought and discussion" (p.669) regarding the loss of top soil in the country. Torrential rains were presented as the primary cause of soil erosion but the potentially destructive impact of destocking, herding, kraaling and improper tillage were also referenced in the early literature. By 1913, there were reports of nearly every settler farmer experiencing the evils of gully formation and loss of soil on their farms (Watt 1913). Agricultural yields were reported to be suffering accordingly, with maize yields in some areas falling from twenty bags per acre to four over the twenty year period of colonisation (Haviland 1928 p.1220). Settler farming in Zimbabwe was rapidly recreating the situation in the Cape as concluded by the interim report of the Drought Investigation Commission.

"As a result of conditions created by the white civilization in South Africa, the power of the surface of the land as a whole to hold up and absorb water has been diminished.....caused by the deterioration of its protecting vegetal cover and by soil erosion" (Haviland 1927 p.332).

The conservation solutions advocated by these 'informed experts' within these early writings were to be echoed many times in the future. Cripps referred to a practice "customary on some farms" (1909 p.670) of cutting a trench on the upper side of cultivated lands to carry off storm water and the cultivation of narrow strips separated by six foot widths of virgin veld to slow the movement of water. Watt, an agricultural engineer, recommended the preservation of timber within ten yards of the margins of public streams, the control of grass burning, the provision of bores and wells, the control of stocking levels, contour ploughing and the minimisation of cattle tracking as essential measures in controlling future erosion. The response of the government to the problem of soil erosion in terms of conservation policy during this period, was minimal and essentially cosmetic. The advice of early contributors within the agricultural
journals was largely ignored by the government at the time. Ordinances covering Water Use and Herbage Preservation were passed in 1913, but they were rarely enforced and paid only lip service to the problem of erosion.

Organisation of the conservation effort.

The Department of Water Irrigation in the Ministry of Agriculture was responsible for all soil and water conservation in the early period of colonial occupation. At the time of the granting of Responsible Government in 1923, the Ministry of Agriculture had thirteen branches and comprised thirty-six staff. There was no formal structure for the promotion of conservation at this stage and as already suggested, the concern for soil erosion at the Ministerial level was minimal, despite that of 'informed experts' in the Department.

The construction of the problem of soil erosion.

Clearly, the identification of soil erosion as a problem occurred very early on in Rhodesia. Within twenty years of European colonisation, the negative impact of settler farming on the soil was being reported. However, although settler practices such as kraaling of stock were noted to aggravate soil erosion, they were not presented as the primary causes of the problem as it was initially perceived and constructed within the framework of settler agriculture. The inherently poor soils and the torrential rains of the country were documented as the major factors and any incidence of bad farming in the European areas was attributed to lack of extension staff rather than wilful neglect on the part of the farmer. Indeed, the first forty years of settler agriculture are documented as being testing times in the light of poor communications and lack of markets for European production; "it was not surprising that under such adverse conditions the land should be subjected to the hazards of erosion" (NRB annual report 1962 p.13).

In 1929, the Department of Agriculture started recommending the control of soil erosion via a mechanical model for conservation drawn from America. This model had been developed and adopted by the United States Department of Agriculture from 1907 forwards. It consisted of a series of mechanical barriers (contours) which would control the passage of water across the surface of the land, collect runoff in storm drains and redirect it at safe velocities out of the cultivated area via grass waterways (see figure 3.1). It was the model for conservation which was to be promoted throughout the colonial period in Rhodesia in both the European and African areas, and was to change significantly both the physical and socio-cultural landscapes in the country.
Figure 3.1 A typical mechanical conservation lay out (after Elwell 1986).
The 1930s and 1940s. 'Ignorance and apathy amongst the indigenous population.

The conservation framework.

In the early 1930s, there was a marked transfer of concern from settler to indigenous farmers regarding the careless and dangerous use of the environment. Erosion and conservation in the commercial farming sector took a secondary place in the literature to the burgeoning of articles stressing indigenous malpractices. There were some authors, however, who stressed the conservation value of indigenous methods. In 1927, the Rhodesia Agricultural Journal published a running debate between officers of the Irrigation Department on the relative impact of European and Native agriculture on the soil;

"Three white men in every five, and every black man on the land, have much to do with the constant change of the soil...whatever the damage done by whites, it is infitesimal compared with that done by native agriculturalists, who, by paying £1 hut tax - can pick the eyes out of a four mile radius, and when, later on, the ground is required for ordered European occupation, the river bottoms are found to be mud puddles with armless stumps standing round about them. When, then, some unfortunate settler tries to patch up these wounds on God's good soil, which he seldom succeeds in, he is debited with being the cause of them by those who know no better" ("A.G" 1927 p.329).

A representative of the Irrigation Department, in reply, suggested that "the proportion of white settlers responsible for erosion in this country is nearer twenty-five in twenty-six....it is a very significant fact that there was no pronounced evidence of erosion in this country previous to the European occupation" (Haviland 1927b p.332). Such reports, however, soon became subsumed in the 1930s, beneath those stressing the need to contour plough, cease kraaling and prevent cultivation of water courses in order to stem erosion in the native reserves; virtually every criticism regarding settler malpractices were subsequently repeated with respect to native methods in the 1930s and 1940s.

Prior to the 1930s, colonial intervention into African agriculture had been small. Native policy to date, had focused on the programme of 'Demonstration' initiated from 1927 onwards, with the appointment of an 'Agriculturalist for the Instruction of Natives' (E.D Alvord) to the Division of Native Affairs in 1926. This position was later renamed the 'Director of Native Agriculture' in 1944. With the assistance of government-trained Agricultural Demonstrators, Alvord was responsible for establishing farming plots in the reserve areas on which Africans could see new
practices and techniques demonstrated. In 1927, there were nine fully trained
demonstrators working in the native reserves. By 1928, the number had increased to
sixteen and by 1936 with the appointment of the first Soil Conservation Officer to the
Department of Water Irrigation for secondment to work in the native reserves, there
were sixty-four native agricultural demonstrators posted. The Native Commissioner for
Marandellas praised the work of Alvord in his report of 1943;

"He, by his methods, has managed to instil sparks of interest
into the dead fire of ignorance and apathy of native
agriculturalists. That spark will become a roaring flame in the
not far distant future" (Native Commissioner Marandellas
annual report p.3).

In 1935, however, Alvord was forced to acknowledge that the 'improved' methods
being demonstrated were in fact having harmful effects on the soil;

"Soil erosion is also showing a decided effect on our
demonstration plots and we have decided that a change in
demonstration methods must be made. The usual square or
rectangular plot must be changed to plots laid out on contours
with terracing, strip cropping and vegetative control" (Agriculturalist for the Instruction of Natives annual report 1935
p.30).

Contour construction in the reserves started in the same year, with 215,002 yards of
contour banks being constructed in the first year by the Soil Conservation officer with
the help of the Agricultural Demonstrators. A tractor unit was purchased by the
Department of Water Irrigation for assistance with construction in the reserves.

The programme of Demonstration was a voluntary operation in which local farmers
could become 'plot holders' on whose land the demonstrator would supervise the new
techniques, or 'coopters' "under the advice of the demonstrators" (Director of Native
Agriculture annual report 1945 p.3). The effects of the programme in practice remained
quite localised. Staff shortages prevented the posting of demonstrators to all areas and
there were problems in the organisation. The Director of Native Agriculture in 1945
reported that demonstrators were competing with each other to sign up as many
plotholders as possible, when in practice, the number of farmers being effectively
supervised were much fewer than stated.

Several Native Commissioners were dubious about the demonstration programme from
the outset. The Native Commissioner for Mrewa in 1929 suggested that it would be
several years before the plough could be considered an "improvement on the natives
own method of preparing soils for crops" (CNC annual report 1929 p.4). He compared
the standard of two adjacent plots on granite soils in his district; one cultivated by the plough and the other by traditional hoe cultivation.

"In the one done with the hoe, the contour of the ground has been studied, and the ridges made with a view to draining the lands from heavy floods, but still more to prevent soil erosion; the crop stands high and dry in the heaviest of rains, and gets all the benefits of the humus turned under between the sods which form the ridge" (CNC annual report 1929 p.4 my emphasis).

Such sensitivity was not evident in the plot under cultivation by the plough. In 1930, the Native Commissioner for Marandellas reported that "the best tilled fields are the small gardens of old women using the hoes" (CNC annual report 1930 p.4). There were clearly problems with the demonstration policy. Apart from the staffing and supervisory difficulties, the content of the message being promoted was questioned by the Agriculturalist for the Instruction of Natives himself and Native Commissioners, with better local understanding, were hesitant about the environmental implications of the policy.

Phimister (1986) suggests that the demonstration policy remained voluntary since government was in no hurry to force the pace of change in the African areas; the 'logic of white survival in the countryside' dominated the concerns of the colonial government. The primary objective of the demonstration policy was to teach Africans to get good returns from their own labour and therefore to release men for work on European farms. In this way, indigenous agriculture became the supplier of labour for the capitalist economy and in return, the peasant economy acquired all the problems associated with male absenteeism. In practice, few African farmers had the motivation to invest in the extra inputs required of the programme in the light of the already discriminatory marketing arrangements which existed at the time.

Despite the limited uptake of the 'improved' methods, in many areas of the country indigenous agriculture is reported to have fared better than European production during the years of the depression. Ranger (1985), for example, identifies the beginnings of an entrepreneurial class emerging in the reserves during this period. In his 1932 annual report, the CNC referred to the natives "ability to cope with adversity in these times of financial dislocation" (CNC annual report 1932 p.1). Very quickly however, it was these very farmers who were to become the central culprits in the increasingly popular portrayal of a black crisis in conservation in the 1930s. Criticisms mounted in the early 1930s, regarding the haphazard use of the plough in the reserves and the opening up of larger and larger areas for cultivation by Africans; the problems of soil erosion became the order of the day in the reports from Native Commissioners. Meanwhile, settler
agriculture became increasingly propped up by the protectionist policies despite failings in their own camp. The competitiveness of the latter was thereby reduced with the survival of the former simultaneously ensured.

The Land Apportionment Act of 1931 was the final blow to the entrepreneurial African. The weaknesses of the settler economy in Rhodesia had been exposed during the depression such that there was pressure on the government to legally establish inalienable rights to land in the future for Europeans. The LAA established these and served to confine African farmers in the future into totally inadequate portions of the country as discussed in Chapter Two.

The burgeoning of reports concerning the careless use of the plough in the reserves and the mounting problems of resource degradation, not only served to divert attention away from settler inadequacies, but were used explicitly to serve the segregationist ends of the colonial powers. By continually emphasising the destructive use of resources by Africans in the existing reserves, colonial officials felt justified in refusing African demands for more land. The 1939 report of the Commission to enquire into the Preservation of the Natural Resources of the Colony, epitomised the way emphasis on native malpractices was used to justify refusals of more land;

"It may be that with the present rate of increase of the native population, difficulty will be experienced in finding enough suitable land for their requirements, but as it would not only be futile but also highly undesirable to attempt to meet these needs by allocating further areas for uncontrolled exploitation, the obvious course is to adopt measures designed for making the best use of land already assigned to them" (Southern Rhodesia 1939 p.14).

Organising the occupation of existing reserves so that they could support more people therefore became an essential operation after the promulgation of the LAA. The policy of 'centralisation' was heralded as the means through which the reserves could be organised more 'rationally' and carrying capacities increased; "for the regeneration of the Reserves there are two essentials - organisation and control: organisation to ensure the best use being made of the natural resources; and control to prevent abuses by the individual" (S.Rhodesia 1939 p.57). The centralisation policy consolidated all arable and grazing blocks in the reserves and reorganised settlement sites along 'improved lines'. Any danger of a few expanding their farms at the expense of others in the reserves was removed. Alvord, was clear about the benefits of the centralisation programme;

"The benefits of this work are becoming more evident year by year in the definite and visible results in putting a check to destructive shifting tillage, permanantising native agriculture,
improving livestock, better grazing, decrease in soil erosion, better crops, decrease in area under tillage, a decided increase in natural timber, and the stabilisation of native life on a higher economic and social status through the work of our community
and agricultural demonstrators." (Agriculturalist for the Instruction of Natives annual report 1941 p.38).

Although the policy was originally introduced on a voluntary basis, persuasion gradually gave way to compulsion. The urgency of raising the carrying capacities of the reserves heightened with the expulsion of Africans living on European land under the new terms of the LAA.

Despite the number of reports and articles published, it was not soil erosion per se which were stimulating concern for the state of the resources in the reserves in the 1930s. Politicisation of the question of African land use was much more important at this stage than the actual cause of degradation. Beinart suggests that the concept of African 'development' in general and resource conservation in particular, became accepted as justification for many colonial policies during the 1930s; "The welfare of the soil often emerges as the cutting edge of justification for intervention in peasant agriculture" (1984 p.53).

Many of the policies implemented in practice, however, did little to address the real causes of environmental degradation. Although the LAA for example was framed in the name of resource trusteeship, the underlying rationale of the dominant group was segregationist and protectionist.

"The logic of white survival in the countryside....compelled the state to implement land management and conservation policies which would underwrite the racial division of land" (Phimister 1986 p.270).

Events external to the colony were also important in stimulating intervention into African agriculture in the 1930s. By 1935, the devastation in the Dust Bowl of North America had reached its peak and was well-publicised in colonial Africa. Concurrently in Rhodesia by the end of the 1930s, "it had become universal wisdom that the reserves were in a full blown ecological crisis" (Ranger 1985 p.69). Undoubtedly there was deep concern in the colonial offices at Whitehall that the North American experience should not be repeated in Africa and a coordinated conservation programme was formed despite the lack of real information regarding the problem in the colonies. From 1938, all colonies were required to submit an annual account of conservation work undertaken by their departments. From this base, individual offices formed their own conservationist ideologies and the administration in Rhodesia lost no time in publishing
the plight of North Americans to justify policies which arguably did more for settler agriculture than they did for African 'development' or the conservation of the soil.

The government continued to portray the problem of soil erosion in terms of African malpractices into the 1940s. Increased legislation concerning resource use was passed during this period with growing compulsion associated with the implementation of the policies. The Report of the Commission of Inquiry into the State of Natural Resources in the Colony published in 1939, led directly to the promulgation of the Natural Resources Act in 1941. This Commission reported that "as was to be expected, rarely is the native alive to the importance of conserving the soil" (Southern Rhodesia 1939 p.12) and it recommended positive remedial and preventative action to combat the problems of soil erosion. The Natural Resources Act laid down procedures for ensuring reasonable standards of husbandry and for protecting natural resources. The Natural Resources Board was also established under this Act to oversee the use of all resources; an inspectorate service created to 'police' this use and a Natural Resources Court through which offenders could be prosecuted, formed.

By the middle of the decade, the need for more authoritarian action in the reserves was universally favoured in government circles. The Native Trade and Production Commission (Godlonton Commission) in 1944 recommended compulsory planned production in the reserves, the enforcement of good husbandry conditions and the control of markets; "At the very least, good husbandry conditions are essential and should be imposed on the natives" (Southern Rhodesia 1944 p.36). Any vestiges of 'education by persuasion' were removed during this period;

"The policy of improving the natives' methods by example and cajoling has been practised for several years and although much good has been done, the rate of progress is far too slow for the economic needs of the colony and the conservation of the soil. I say this reluctantly, but sterner measures are needed to bring the disinterested natives into line" (Native Commissioner, Marandellas annual report 1948 p.5).

In response to the report of the Native Production and Trade Commission, centralisation was speeded up and state control over peasant production increased through the Natural Resources Act, under which Native Commissioners had the power to remove stock, control water and determine methods of cultivation.

In 1944, compulsory destocking became operative in forty-nine reserves and some areas were forcibly withdrawn from cultivation. These were considered the only means to arrest the "degraded conditions which were fast overtaking much of the reserves" (NRB annual report 1945 p.4). The forty-nine reserves were declared overstocked on
the basis of assessed carrying capacities and underwent compulsory destocking
schemes over five year periods. Individuals were forced to remove stated numbers of
stock either through private sales or through the additional regular government sales
established in the districts. There was much criticism of the 'miserly' attitudes of native
stock holders during this period and their desire for 'quantity irrespective of quality'. In
1949, the Director of Native Agriculture remained concerned about the state of the veld
in the native reserves despite the continued destocking. New regulations were under
consideration regarding the limitation of stock ownership, the fixing of the number and
kind of stock owned, assessment of the economic need of each owner prior to
registration and the culling of inferior stock.

Organisation of the conservation effort.

Prior to 1924, all African 'development' including agricultural development was
administered and effected through the Native Commissioners posted in each district. In
1924, a separate Agricultural organisation was established within the Department of
Native Affairs. In 1929, a new Department of Native Development was created to be
responsible for the furtherance of all agricultural, physical, social and educational
advancement of Africans. Alvord was moved to this Department, although agriculture
was returned to the Department of Native Affairs four years later in 1933. In 1944 with
the formation of a separate Department of Native Agriculture, soil conservation in the
reserves became the responsibility of this new Department, although water conservation
remained under the authority of the Department of Water Irrigation, to date had been
concerned with all forms of conservation in both the European and African areas. From
1948 forwards, European farmers had the services of a separate Department of
Conservation and Extension in their Ministry of Agriculture, which was to remain
responsible for soil and water conservation in these areas throughout the colonial
period.

The conservation message was disseminated in the reserves via the agricultural
demonstrators (where posted), the Soil Conservation Officer and assistants involved in
the demonstration and centralisation policies. European farmers received information
from Local Technical Assistants, although demand outpaced supply in this respect in the
early 1940s. From 1944 onwards, provisions were made for the establishment of
Intensive Conservation Area committees in the European sector to serve as means of
communication, education and action between technical departments and European
farmers. Loans were also made available through ICA committees to cover the
construction of conservation works, the purchase of implements and even to "enable
farmers to maintain standards of living during times when it was essential to cease
cultivation to restore fertility" (NRB annual report 1948 p.11). The primary legislative and organisational changes with respect to European and African areas during the colonial period are summarised in figure 3.2.

In the reserves, construction of contour works was by local gangs recruited by the Soil Conservation Officer. By 1943, there were 38 gangs in operation employing 1,147 labourers at 22s 6d a month. Recruitment in many areas was slow, however, and deemed unsatisfactory, but a proposed amendment in 1949 to the Natural Resources Act relating to the compulsory requisitioning of labour in the reserves, was upheld. Although there was nominal extension of the ICA movement into the Native Purchase Areas, there was no similar means of communication between African farmers, the NRB and the government to that which existed for European farmers. There were no similar incentives or loan systems in operation in the reserves and funding allocations for conservation in this sector actually declined throughout the 1940s. In 1948, the Department of Native Agriculture announced that all conservation programmes in future in the reserves would be focused on the partial protection of arable areas via grass buffer strips, until such time as additional funds became available for the full protection of these lands.

The construction of the soil erosion problem.

As already stressed, there was a sharp change in the way the problem of soil erosion was constructed during the early 1930s. Whereas prior to this period, the problem had been framed in terms of settler agriculture, there was a marked switch to concern for African methods in the period post-1930. Early reports of successful indigenous agricultural production in accordance with the environmental challenges in the reserves gave way to reports of ignorance and apathy on the part of Africans and their resistance to the changes being introduced by the colonial government in the 1930s.

The emphasis was dominantly on the African sector despite evidence of continued problems in the European sector as highlighted in the annual reports of the Department of Water Irrigation. The problem in the European sector was framed in terms of staff shortages and a lack of information, rather than wilful neglect and indifference as it was framed with regard to the African sector. For example, the 1939 Commission of Enquiry referred to the practice of European tobacco farmers utilising a ridge and furrow system but ploughing and planting downslope to promote drainage. The report called on the Tobacco Research Station to develop alternatives to contour banking which tobacco farmers found unacceptable in that they concentrated water and aggravated the problem of eelworms. In this light, "hesitation on the part of many to spend money on a programme which might, after all, be found to be disadvantageous in another
EUROPEAN

1923 Ministry of Agriculture, Department of Water Irrigation responsible for all soil and water conservation.
1948 Department of Conservation and Extension (CONEX) formed as a separate department within the Ministry of Agriculture.
1953 Federation of Rhodesia and Nyasaland formed. Federal Department of Conservation and Extension became responsible for all soil and water conservation in the European sector.
1964 Dissolution of the Federation led to soil and water conservation being returned to CONEX in the Southern Rhodesia Ministry of Agriculture.
1981 Conex amalgamated with the Department of Agricultural Development (DEVAG), Ministry of Lands, Natural Resources and Rural Development, to form AGRITEX (Department of Agricultural, Technical and Extension Services), in the Zimbabwe Ministry of Lands, Agriculture and Rural Resettlement.

AFRICAN

1894 Establishment of the Department of Native Affairs. All African 'development' was the responsibility of Native Commissioners.
1927 Alvord appointed 'Agriculturalist for the Instruction of Natives'. All soil and water conservation responsibility of the Rhodesia Department of Water Irrigation.
1936 The first Soil Conservation Officer and three Erosion Control Demonstrators appointed to the Department of Water Irrigation for secondment to the Division of Native Affairs.
1944 Department of Native Agriculture formed and soil conservation in the reserves became the responsibility of this department. Water conservation remained in the Southern Rhodesia Department of Water Irrigation.
1953 Federation established but Native Affairs remained a territorial responsibility.
1963 All soil and water conservation in the native areas came under CONEX in the Southern Rhodesia Ministry of Agriculture.
1969 Conservation in the Tribal Trust Lands transferred to the Ministry of Internal Affairs.
1978 Conservation of all natural resources in the Tribal Trust Lands transferred to the newly established Department of Agricultural Development (DEVAG), in the Ministry of Lands, Natural Resources and Rural Development.

Figure 3.2 Changes in agricultural and extension provision in European and African areas 1923-1981.
direction" was understood and condoned (Southern Rhodesia 1939 p.16). Similarly the annual report of the NRB in 1947, stated that bad farming in European areas "is considered to be due more to the fact that there is insufficient staff to assist farmers, both on the conservation and extension sides, than to wilful neglect" (NRB annual report p.9).

Early reports of the problem of soil erosion in the reserves were accompanied by recommendations to control sheet and donga (gully) erosion via a combination of both mechanical and biological measures including contours, strip cropping and vegetative control. By the 1940s the priority in the European areas, was considered to be biological measures for erosion control;

"In most areas, the initial mechanical stage of conservation involving earthworks and structures, must now be linked with good husbandry practices" (NRB annual report 1947 p.3)

In the following year, the newly formed Department of Conservation and Extension outlined its approach in the European areas. Whereas in previous years soil conservation as promoted by the Department of Water Irrigation had been dominantly 'mechanical'. However,

"during recent years, the outlook towards erosion control has changed very considerably and the problem of soil and water conservation is now considered essentially a biological one" (Conex annual report 1948 p.2)

The Natural Resources Board stressed that it was the duty of ICA committees,

"to educate their members to the need for good husbandry and to establish the fact that conservation by no means ends when the mechanical side has been completed" (NRB annual report 1948 p.9).

In 1949, the Assistant Chief of the US Conservation Service visiting Rhodesia congratulated the European farmers on their early steps to combat soil erosion, but stressed that "permanent value of such measures will only be ensured through focusing attention now on improving soil fertility" (NRB annual report 1949 p.3). Despite such formal statements, the content of conservation programmes during the 1930s and 1940s remained on the mechanical control of erosion, both in the African and European sectors.

In the European farming areas, the promotion of the mechanical model for erosion control was the most politically 'neutral' stance. In the 1930s and 1940s, government policy towards the European sector was basically non-interventionist. Tobacco accounted for a third of all exports from the country and tobacco farmers represented an important
section of the voting community. Despite the post-war problems in maize and cattle production, the government was wary of imposing too much direction on settler farmers for fear of losing votes. Biological conservation methods involving the integration of pastoral and arable elements would have raised "precisely those questions about the relationship between tobacco planting and other branches of agriculture which the state was in no hurry to resolve" (Phimister 1986 p.267); mechanical conservation represented the policy of 'least resistance'. The government also smoothed the passage of the new measures in the European areas through making tractor units available where needed, and as already stressed, through the inclusion of an element for conservation in all commodity prices from 1946 onwards.

The promotion and enforcement of the mechanical model for conservation within the reserves was, in contrast, far from politically neutral. The construction of contours and associated storm drains took valuable areas of land out of cultivation and required substantial labour inputs in the absence of tractors, at difficult times in the agricultural year. By adopting a technocentric approach to conservation through the promotion of the mechanical model drawn from America, any potential failure of such a technical solution could then be attributed directly to the land user. Greater enforcement and increased legislative procedures used in implementation of the conservation model in the African sector in the latter part of the period, served to confine attention to African practices rather than those of European settlers.

The conception of soil erosion as a problem in the African farming areas held by the colonial administration during this period reflected and reinforced the broader ideals of the colonial endeavour. The conception was heavily technocentric in that the symptoms (environmental degradation) were identified; social and technical factors were forwarded as the cause of these problems; and the environment was prioritised above the social and political-economic realities of the land users. The construction of contours, the destocking of cattle and the removal of people from severely eroded areas, were all piecemeal attempts to soothe the symptoms of the underlying problem of the inequitable distribution of land in the colony.

The 'protective phase' (annual report CNC 1961) within colonial agrarian policy ended with the LAA. Subsequently, a 'technical development phase' was embarked upon in which agrarian policy became focused on modernisation and a technological rationality. Agricultural extension, centralisation and the destocking programmes were all elements of this technical development phase through which the technocentric ideology embedded in the colonial state's modernist vision was extended into the African areas. In the process, the colonial state redefined Africans' true needs and justified increasing force
and restrictive legislation to effect the desired change. Although white farmers did not want black producers competing with them, "in terms of the technocratic rationality embodied in the colonial state's ideology, the justification was still required that reserve agriculture needed modernising" (Drinkwater 1989 p.15). Indigenous production systems were technically classed as primitive; persistence with such techniques showed ignorance and therefore according to the technocentric rationality, the colonial state was justified in intervening. "There could be no admitting that anything other than modernisation (the extension of technocratic rationality and control) was desirable, as the white political economy that was being developed depended on this belief for its maintenance and growth" (Drinkwater 1989 p.16). Ultimately, in addition, modernisation of African agriculture was required so that demands for more land subsequent to the LAA could be resisted.

The nature and content of the conservation model promoted throughout this technical development phase, reinforced the modernisation ideals through extending the number of people under the influence and control of western science. The mechanical model of erosion control drawn from America was a technical solution formulated on the basis of the laws of physical science and the problem conceived as one of imbalance of physical parameters. Such an approach to an environmental problem epitomises the technocentric rationality in which the organisation of means to achieve desired ends, is directed by technical rules based on empirical knowledge. Any failures in the conservation programme based on the model were attributed to the land users themselves; within the technocentric rationality, people were incapable of 'progressing' because of their ignorance and therefore needed to be compelled to change.

As suggested in Chapter One, a further characteristic of technocentrism is the total disrespect and disinterest in existing knowledge, skills or management institutions/practices. Indeed, the technocentric rationality attempts to remove all barriers to the dominance of scientific thought and its technical utilisation. Throughout the entire colonial period in Rhodesia, "there is the theme of rejection, a general denial that there was anything good in the former system of native cultivation and resultant ways of life" (Floyd 1959 p.290). Undoubtedly at the local level, some open-minded Native Commissioners saw the potential problems of this failure. The NC for Marandellas in 1929, for example, referred to the widespread desire to 'educate, christianise and civilize' the Africa;

"Surely one would think the first attempts at education would be directed towards the European, to teach him the fundamental principles underlying native life and society. Is it not our ignorance in such matters the root of many difficulties and troubles?...Is it necessary that the whole of native institutions
and all cultures be destroyed to make room for the implanting of ideas, our learning and our civilisation? Surely the stock could remain and some twig be grafted on which would bring forth good fruit in due season" (NC Marandellas annual report 1929 p.6/7).

With the increasingly interventionist, centrally-determined national development policies of the late 1940s, such sentiments were rare.

The subjugation of one form of knowledge over another is equally true in the specific case of the nature and content of soil conservation programmes in the colonial period. With respect to the content of conservation policy in the reserves, the annual report of the Natural Resources Board in 1945 suggested that "perhaps it might be advisable to consult the Africans themselves" (p.7), but in practice there was little such dialogue. The imposition of the mechanical model for conservation served to separate soil from water conservation within African farming systems which had traditionally been intertwined. The major benefits of the introduced conservation layouts were to prevent the accumulation of runoff at sufficient volumes and velocities to cause rill and gully erosion, by breaking up the slope via a system of parallel barriers. They do little to prevent sheet erosion which is in fact the most serious form of soil loss. Gullies often contribute as little as 13% to the overall removal of soil; sheet erosion providing the majority (Stocking 1987 p.6). They also do little to promote moisture conservation through the infiltration of water. The promotion of monocropping within colonial agrarian policy rather than intercropping also served to undermine traditional practices which had positive effects on both soil and water conservation. There was not attempt within colonial conservation policy during the technical development phase, to understand or build on indigenous conservation knowledge or practices.

The model for conservation advocated during this period did not go unquestioned however. Many prominent people at the time suggested that promoting such a restricted conception of the problem of soil erosion and the associated technocentric model for conservation threatened to worsen the situation. For example, the Agriculturalist for the Instruction of Natives questioned the content of the conservation programmes being advocated as early as 1944;

"The methods of soil conservation at present being used in these reserves are those evolved by the Department of Irrigation.....a more or less standard technique has been applied whether the soil is a heavy clay loam or a loose coarse sand, whether the land is nearly flat or steeply sloping; in high or low rainfall areas" (Alvord, memo to CNC).

He considered that many of the conservation layouts in the reserves were actually causing more erosion than they would ever stop. The spatial and temporal limits to the
conservation advantages of the American-inspired model were also recognised by the NRB;

"Much information on conservation of 'European' farmland has been obtained from America, printed matter, correspondence and visits, but the conditions peculiar to the Native Reserves pertain only to Africa" (NRB annual report 1945 p.13).

Despite the knowledge regarding alternative means of erosion control, namely 'biological' methods, being available, and despite clear understanding of the peculiar environmental conditions of the native reserves, the colonial government persisted with the mechanical model for erosion control.

In summary, the technocentric conception of soil erosion as a problem and the technical conservation solution promoted during the period of the 1930s and 1940s denied both the environmental variability which existed within the communal areas (and between the African and European sectors) and the sensitivities and realities of indigenous farming systems. Colonial conservation policy, in line with more general agricultural policy, therefore served to protect white settler interests whilst simultaneously heightening environmental, economic and social vulnerability within the communal areas. Concern for the environment was illusory in that underlying causal factors were not addressed, the status quo and the commitment to the modernist view were preserved, and political-economic and cultural hegemonic interests prioritised above those of the environment or the African land user.

There was certainly dissenting voices concerning the appropriateness of conservation policy in the reserves, significantly from within the colonial administration. As with respect to any aspect of the colonial encounter, generalisations are unrealistic. The CNC in his final report from the Division of Native Affairs in 1961, reflected on the activities of his department over the years;

"Naturally there is paternalism; but the most enlightened criticism of paternalism will be found within the ranks of the department. Naturally there is regimentation and imposition: but few there are who did not strive to soften and blunt the sharp edges of technically perfect schemes" (CNC annual report 1961 p.29)

The analysis here has shown, however, that although the conception of soil erosion held at the national level changed during the period (from ignorance and apathy on the part of native cultivators, to overstocking and overpopulation), it remained heavily technocentric and the model for erosion control promoted throughout, remained static. Further discussion of the flexibility, in the colonial conception of the environment and conservation response at the local level will be effected in Chapter Four. The assertion
here is that there was little deviation in these aspects at the national level during this stage of the colonial period. Settler interests were not uniformly expressed in entirety, but with respect to colonial conservationism, there were no such 'populist intervals' as identified for example by Richards (1986) for colonial agricultural development in West Africa.

The contradictory and selective thinking which characterised the technocratic rationality of the time is illustrated clearly in a comparisons of the remit and recommendations of the Godlonton Commission (Southern Rhodesia 1944). This commission sought explicitly the views of African farmers and identified the authoritarian approach to date as the primary source of suspicion amongst African farmers. As highlighted above, however, the commission recommended subsequently in their final report, that the very same approach should be intensified. The procedures for the establishment of stocking levels in the communal areas forwarded by the commission, epitomised the confidence of the technocratic rationality in the ability of authoritarian technical actions to produce results. The need for destocking in an area was established on the basis of whether the area was in a high (>28"), medium (20-24") or low (<20") rainfall area. On an arbitrary technical basis outlined by the Director of Native Agriculture (annual report 1946), the carrying capacities of these areas were designated as; 10, 13.5, and approximately 17 acres per animal respectively. Once again, the environment was prioritised (although no account was taken of differential resource quality save that according to rainfall), but individuals' economic and social predicament were ignored. Even where Native Commissioners reported cases of destocking causing a decline in the rural economy, African farmers were criticised for their inability to see beyond their own individual interests and the official response was typically 'more of the same'.


The conservation framework.

The 1950s represented a phase of 'second colonial occupation' in many parts of Africa characterised by increased enforcement of agricultural change by colonial governments and a heightened political consciousness on the part of the African people. Although the precise content of policy varied, Tanzania, Kenya, Zambia and Rhodesia all embarked on large scale reforms aimed at developing and intensifying native agriculture during the 1950s.

In Rhodesia, intervention during this second phase of colonial occupation was in the form of the Native Land Husbandry Act (NLHA) of 1951. The Secretary for Native
Affairs described this Act as the "most important Bill affecting native communal life ever passed in Southern Rhodesia and possibly in Africa" (Secretary for Native Affairs annual report 1951 p.3). Whereas the Secretary referred to the success of much of the activity of the staff of the Native Agriculture Department in the past,

"The reason for the compulsion made possible by this new Act is the increasing pressure on the land caused by the rapidly growing native population...The provisions of this Act gives us the opportunity of changing for the good of themselves, and the colony and of Africa as a whole, the social and economic structure of the Africans of Southern Rhodesia" (Secretary for Native Affairs annual report 1951 p.4).

The NLHA was clearly the 'ultimate intervention' into African agriculture in Rhodesia. It was felt increasingly by officials, that measures such as destocking aimed at changing specific aspects of peasant agriculture, were inadequate and that the only solution was to change the whole system of African land use and associated settlement. Although over 240,000 hectares of the reserves had been protected by contour ridges between 1936 and 1955 and a further 20,000 hectares were being protected each year, another 800,000 hectares remained unprotected (CNC annual report 1955 p.55). At that rate, it would therefore have taken forty years to complete the mechanical conservation works in the reserves. The Department of Native Agriculture envisaged two 'solutions' to the problem of speeding up work in the reserves; to move in with heavy machinery themselves at great expense or to make individuals do it themselves. "The second option is the policy of this Department. By implementing the NLHA, we complete the essential mechanical conservation work in a fraction of the time and at a greatly reduced cost" (CNC annual report 1955 p.55).

The NLHA removed the traditional concept of land as a resource which 'belonged' to the chief and was for the free use of all members of the tribe according to their needs and replaced it with an alien one of individual ownership. In this way, control over access to the means of production in the African areas was transferred to the state (the dominant groups). With individual tenure and the increased legislation under the NLHA, individuals could be made accountable for their plots and undesirable practices punished by law if necessary.

The introduction of individual rights to cultivation were considered the key to the whole of future native agricultural policy; "It alone can halt the grave menace of fragmentation and remove the squatter problem" (Southern Rhodesia 1955 p.5). Without such change;

"the other provisions...are little better than holding action, preventing catastrophic deterioration, but making little headway
against a mass of inertia and ignorance rooted in tribal custom and systems" (Southern Rhodesia 1955 p.5).

Through the introduction of these alien concepts of land tenure, the NLHA sought to destroy the vestiges of the traditional, holistic way of life and relationship with natural resources in particular; land and labour became commodities and society divorced from the environment. Under the NLHA,

"A native will either become a peasant farmer only, adopting proper agricultural and soil conservation methods, or become an industrialised worker, with his tentacles pulled out of the soil" (CNC quoted in Phimister 1986 p.273).

In the process, control over the African population was heightened whilst simultaneously serving the needs of an expanding industrial sector;

"A settled and thriving agricultural population is probably one of the best sheet-anchors of political stability...By discontinuing a system which allows the Native to vacillate between spells of work in the European area and spells of semi-loafting in the reserves, it will do much to stabilize also the industrial working population" (S.Rhodesia 1955 p.14).

Prior to the implementation of the NLHA in an area, the carrying capacity of the reserve would be assessed to enable the number and size of individual rights to be calculated. On the basis of these assessments, individual rights to arable and stock holdings were distributed on implementation of the Act. To qualify for arable rights, the applicant had to be a cultivator of land in the area at the time when the Act was applied. Allocation of holdings too small to constitute an 'economic unit' was considered an inevitable consequence of over-population in the area (Southern Rhodesia 1955 p.5). Fragmentation or aggregation of individual holdings were strictly prevented by regulations on the sale and purchase of holdings under the Act. Although the parceling out of communal grazing areas as individual holdings was deemed impractical in the initial stages of the NLHA, quotas were set limiting the number of stock held by each individual. Inevitably, this allocation process left people without any land at all; with less than they formerly had access to; and with orders to cull their stock holdings. By 1959, Garbett suggests that 102,000 families had been left landless as a result of the allocation process (quoted in Kay 1970 p.88).

All arable holdings were to be protected prior to cultivation through a layout of mechanical barriers and storm drains. Government tractors constructed the initial top contour in each arable block, but thereafter the responsibility for conservation lay with the individual. The NLHA also laid down a set of 'Good Farming Practices' covering
the prevention of soil erosion, the protection of natural resources, livestock control and farming practice generally, which individuals had the responsibility of operating.

"Penalties are provided for non-compliance with any regulations made under this section but it was not intended to enforce the penalties where failure in the first instance was due to ignorance or inability......The machinery for vast improvement contained in the first part of the Act (the Good Farming Practices) must remain largely ineffective until conditions are created in which it can be made to work" (Southern Rhodesia 1955 p.4).

Organisation of the conservation effort.

Clearly, the implementation of such a comprehensive policy as the NLHA nationally required unprecedented levels of staffing and funding being applied; "The NLHA is the first step in the attempt to solve an extremely complex social, economic and agricultural problem" (Pendered and von Memerty 1954 p.1). From 1955, the whole staff of the Department of Native Agriculture was assigned to implementation of the Act. The initial assessments were made by committees constituting the Native Commissioner, Provincial Agriculturalists, Land Development Officers, officers from the NRB and technical staff from all relevant departments.

On the formation of the Federation of 1953, Native Affairs remained a territorial responsibility and the Department of Native Agriculture retained responsibility for soil conservation in the reserves. In 1962, the new Southern Rhodesia Ministry of Agriculture came into being. African agriculture and soil and water conservation in both sectors, became the responsibility of the Department of Conservation and Extension in this ministry (see figure 3.2).

"The objective of the Ministry is to provide an agricultural development and extension service to the African farmers in Southern Rhodesia which is in all respects complementary to the agricultural service provided for the European farmers by the Federal Ministry of Agriculture" (Southern Rhodesia Ministry of Agriculture annual report 1962 p.7).

This reorganisation was a product of the reports of several commissions relating to agriculture published in 1961. The Robinson Commission for example, established by the Secretary for Native Affairs recommended the discontinuation of the Department of Native Affairs. The Phillips report on the Development of the Economic Resources of Southern Rhodesia with particular reference to the role of African agriculture, had urged an enhanced agricultural extension service to African farmers. In 1963, with the dissolution of the Federation, there was further internal reorganisation and loss of staff. Additional pressures on remaining staff were experienced as a result of extensive retraining of field staff,
"after many years of loss of orientation and objectivity brought about by almost full-time occupation on matters relating to the implementation of the NLHA" (Southern Rhodesia Ministry of Agriculture annual report 1963 p.28).

In November 1965, the newly-elected Prime Minister of Rhodesia, Ian Smith signed the Unilateral Declaration of Independence from Britain. In the light of the subsequent increasing political and economic isolation of Rhodesia from the rest of the world, policy during the period necessarily became very inward looking. Stimulating growth in agricultural output and attaining self-sufficiency in food production became two of the major objectives pursued by the dominant groups during the UDI period. Political and legislative discrimination was used to instil white farmers' confidence in the regime and pricing policies served to maintain the economic viability of the commercial farming sector.

Elsewhere in the Africa, the process of decolonisation was starting. In Tanzania for example, mounting tension between the British Administering Authority and the indigenous peoples was exhibited by the hostile reaction to the compulsory socio-agronomic change within the Uluguru Land Utilization Scheme, which had led to pitch-battles between Africans and field officers. In 1955, implementation of the NLHA in Rhodesia was stepped up in the attempt to maintain control in the reserves and white supremacy generally. In the first decade of UDI, the policies served their purpose and agricultural output rose mainly through an extension of the cultivated area in the commercial sector. The period from the late 1950s through to independence, however, was one of mounting tension between black and white and increased activity of nationalist organisations within the reserves. Coupled with the economic problems caused by the world recession in the last five years of UDI, problems for European agriculture and for the colonial encounter itself increased.

As a result of the intensification of the liberation war, there were problems in continuing an extension service to the reserves such that enforced maintenance of existing conservation works became difficult and the construction of new ones slowed. By the early 1960s, the NLHA had been partially suspended; there was some relaxation of controls on livestock holdings and Native Commissioners were allowed to open up areas of grazing land for 'temporary' arable cultivation where they considered it necessary. These developments were the result of the findings of the working parties set up after the report of the Robinson Commission. It was realised that the large number of people who remained landless as a result of the NLHA, were not being absorbed into urban and industrial areas and, as a group, constituted a hostile political influence. If this threat was to be defused, land had to be made available to them. Working party 'D' investigating land problems and traditional authorities, had also
reported that in some areas, the danger of erosion from stock was not as serious as had hitherto been thought. Amendments were therefore made to the NLHA to enable chiefs to make available land in the grazing areas for arable cultivation.

The construction of the soil erosion problem.

During the period 1950-1980, the conception of the problem of soil erosion held by the dominant groups in the country and portrayed through conservation programmes, legislative changes and the model for erosion control, changed substantially from the previous period of the 1930s and 1940s. Whereas initial conservation interventions had been conceived primarily in technical terms and had addressed particular aspects of African production, "they now became bound up with more far-reaching attempts to restructure rural society" (Beinart 1984 p.76). Legislative and land use planning procedures adopted during the period became increasingly interventionist, more centrally defined and inflexible at the local level. Although such policies continued to be framed in terms of resource conservation, environmental concerns were increasingly subsumed by the hegemonic political and cultural concerns of the settler community and of the colonial encounter generally.

Although the original conservation aims of the NLHA included elements of both mechanical and biological conservation, the former were clearly perceived as the priority. The 'good farming practices' were to be implemented once 'suitable conditions' had been created; "it is necessary first to show the African what can be done and how to do it" (Southern Rhodesia 1955 p.4). In practice mechanical conservation soon absorbed the majority of extension staff and funds and the success of the Act became measured in terms of yards of contour banks and storm drains constructed. It became illegal under the NLHA to cultivate without the prior construction of contour ridges and storm drains. A great deal of physical conservation work was carried out under the Act during the 1950s; by 1959, 231,500 hectares of arable land in the native areas alone had been fully protected by contour ridges (CNC annual report 1959 p.67).

In continuity with the previous period, it was not a lack of knowledge regarding alternative models for erosion control which restricted the nature and the content of the conservation programmes implemented in the reserves during this time. The value of biological conservation methods were well appreciated amongst the experts;

"Mechanical conservation out of perspective is bad conservation and, in some circumstances, worse than no conservation at all" (Elwell 196- p.5)

Research into soil erosion at government-backed stations focused on the experience of large scale tobacco farmers and the merit of the techniques developed on the basis of
this research went virtually unquestioned. It was not until 1974, that any assessment of
the problem of soil erosion on the ground was made, and then it was confined to a
subjective survey of Native purchase Areas and European Farming Areas. This survey
revealed that 41% of the area surveyed was considered to be slightly damaged with
visible sheet and rill erosion, a further 9.5% was moderately damaged such that crop
yields and cost of operations were affected and 2.5% of the area was seriously damaged
in that it has been or was in danger of being put out of cultivation. Again, the fallibility
of conservation techniques were questioned;

"In spite of many changes in the nature and pattern of
agriculture over the past ten years, we have not improved our
knowledge of the causes of or solutions to soil erosion, nor
have we developed new methods to meet changing conditions"
(Elwell 1974 p.3).

In the latter years of the colonial period, research into the constraints to conservation in
the communal areas increased. There were regular references to the 'problematic' of the
communal areas; the obstruction to conservation presented by communal land tenure,
the social significance of cattle and the inherent conservatism of the indigenous
population; the 'non-technical' constraints on soil conservation referenced by Hudson in
1981. Structural constraints such as poor infrastructure, lack of adequate market
opportunities or the denial of access to the means of production, were not addressed,
however. Such research reflected and reinforced the shape of conservation programmes
in the field. In both research and development, investigation remained confined to the
collection of social factors identified by Baker (1986) and were used to justify
increasing enforcement and compulsion to bring about change, whilst continuing to
ignore the real constraints on indigenous production.

In summary, the specific model for erosion control in the period 1950-1980 remained
the technocentric one first introduced into the reserves in 1937. The associated new
legislative measures of the NLHA during this period were designed to increase the pace
of change in the reserves. In eventuality, the enormous staff demands of the Act,
coupled with the mounting resistance on the part of Africans to the colonial endeavour,
served to restrict both the extent and the speed of change.

In 1961, the CNC stated that,

"It is now obvious that imposed technical planning has had its
day....basic changes in Administration are overdue, and above
all, technical desiderata must cease to dominate administrative
planning" (annual report 1961 p.26).
In concluding, the CNC welcomed the imminent move of all technical personnel to the specialist department with the removal of the Division of Native Affairs, but warned of the increasing fragmentation of extension, funds and plans for the African farming areas; "Conservation of the community must become as important a goal as conservation of the soil has been in the past" (CNC annual report 1961 p.30).

In the event, this perceptive, if belated, appeal by the CNC was to fall on stony ground. UDI forcibly sharpened the need to raise production in the short term in both European and African sector in the light of sanctions. African communities united around the desire for political change whilst the European administration focused on maintaining control of the territory. This control was gradually lost in the latter part of the 1970s and was formally relinquished in April 1980. This chapter has portrayed the political-economic framework at national level during the colonial period constructed on the basis of historical ministerial, departmental and legislative materials. It has also incorporated ideas on conservationism compiled at the international level. The following chapter constructs a similar framework throughout the same period, at the district and local levels.
CHAPTER FOUR. SOIL EROSION AND CONSERVATION IN THE CASE STUDY AREA PRIOR TO INDEPENDENCE.

This chapter uses archival material and information gained through informal interviewing in the field, to construct the local political-economic framework throughout the colonial period in one area of Zimbabwe, namely Svosve Communal Area in Mashonaland East province. In the process, significant areas of divergence between programmes implemented in Svosve and the national priorities and policies identified in the previous chapter are highlighted. The conceptions of the problem of soil erosion at this level during the colonial period are constructed on the basis of this material and the response assessed in terms of conservation programmes implemented.

Svosve was selected for this study for several reasons. It is situated in Natural Region IIIB and receives on average in excess of 750mm rainfall annually. It was therefore assumed that the problem of controlling excess water and soil erosion would be familiar to the resident population of Svosve. In the drier parts of the country, problems of drought and associated hardships would very likely dominate people's concerns. It is a small reserve, currently covering approximately 110 square kilometres with a population of 5,590. The logistics of covering the case study area in terms of areal extent and sample population within financial and time constraints were therefore manageable. Preliminary historical analysis had also shown that Svosve had been perceived as a problem reserve virtually from its delineation, particularly with respect to its population numbers in relation to its resource base. Since these are fundamental elements in the conventional discussion of soil erosion, it was felt that Svosve would represent a good case study area to investigate the nature of the relationship between population, resources and land degradation. Detailed case study research would also elucidate the premises upon which the perception of Svosve as a problematic reserve were based.

Svosve was designated as a reserve in 1900 when it was known as the Soswe Mission Reserve, and was intended for Mangwendi's people who were living in the district. The approximate acreage at the time was 20,000 acres (90 square kilometres) and the population was estimated to be 2,000. The location of the early reserve and its boundaries are shown in figure 4.1. Currently, Svosve communal area lies within Marondera Administrative District and together with Chiota communal area, constitutes Rhudaka District Council (see figure 4.2). This administrative association has historical roots and therefore references to and comparisons with Chiota communal area are included in the local analysis. Although rainfall is moderately high (750mm-1000mm), crop yields in certain years may be adversely affected by the susceptibility of the region.
Figure 4.1 The location of the early Svosve reserve.
Figure 4.2 Rhudaka District Council, Mashonaland East.
to severe dry spells in the summer and by shortened rainy seasons. Svosve contains extensive areas of broken granitic dwala terrain, relief varies from 1400m to 1660m above sea level and slopes are regularly above 10% (see figure 4.3). Soils in consequence are shallow and granite-derived, and the climax vegetation would be open savanna woodland dominated by Msasa (Brachystegia spiciformis) interspersed by narrow vleis. Mahobohobo (Uapaca spp) and Mfuti (Brachystegia boehmii) also occur.

By the end of 1898, the Native Commissioner (NC) for Marandellas was able to report that native hostilities against European occupation had ceased and that he was fully involved in registering huts in the area and settling disputes between natives. By 1900, the reserve was formally delineated for chief Soswe's people, but already some of these people were housed outside the designated area. The reserve area as it was designated was found to be too small for all of Soswe's people, with the result that a number of his kraals were placed temporarily in Chiota reserve under Chief Chiota. Others had been located by the Native Commissioner at individuals requests, on private farms adjoining the reserve which were as yet unoccupied by Europeans.

Much of the early history of Svosve has this 'transitionary' feel to it; as well as people living outside the official boundaries of the reserve, it became an established practice to graze cattle in neighbouring European areas, and requests for more land for native inhabitants were common. At the time of the Morris Carter Commission of 1925 (Southern Rhodesia 1925), the NC for Marandellas had suggested the abolition of the reserve altogether since it was such a wretched place. The problems went unresolved, however, and in his report of 1944, the Native Commissioner for Marandellas reasserted his doubts;

"The reserve consists of rocky hills and very little arable ground and still less grazing. It is really useless for the advancement of the native today" (NC Marandellas annual report 1944 p.6).

In summary, the physical capabilities of the area were low and the prospects for settlement poor. Reports from the District Native Commissioner's office contained few mentions of Svosve in these early years; the larger reserves in the district such as Chiota and Wedza occupied their attention and the Svosve case tended to get shelved in the hope that perhaps it would be forgotten.

Interventions 1900-1945.

In continuity with the national level, there were very few interventions into African agriculture in the district prior to the 1930s. The Native Commissioner concentrated on maintaining control, collecting taxes and acquiring enough native labour for the mining
Figure 4.3 Svosve relief.
and construction concerns of the area. During this period, European farmers and government employers had continual difficulty in recruiting labour in the area. The inability to satisfy demand for labour was first attributed to the inherent laziness of the Mashona; "they are capricious and have a great dislike for steady work" (NC Marandellas annual report 1898 p.111). From the outset, the Rhodesian Native Labour Bureau had to employ workers from other areas of the country as well as from Malawi and Zambia, in order to construct roads, operate the mines and establish the railway network in the district. The situation soon became so bad that tobacco farmers suggested that they would have to give up farming on such a scale if the native labour situation did not improve. Even the mission schools were criticised for concentrating their teaching on "reading, writing and singing hymns, when they should be spending the time instilling into the native minds the dignity of labour" (NC Marandellas annual report 1918 p.5).

In 1935 the NC reported that aliens and indigenous natives from other areas were now favoured for employment since it was found that the local native rarely entered into long periods of service. The persistent problem of labour recruitment in the area is potentially indicative of the successful, stable agricultural base which the people from the district had in the reserves and therefore were unwilling to give up. For example, Africans were growing vegetables and selling them to neighbours and in the town;

"It is pleasing to note the quality and quantity of vegetables grown by the natives in the reserves. All kinds of vegetables are grown and the inhabitants of Marandellas practically rely on the natives for their supply of vegetables" (NC Marandellas annual report 1925 p.2).

Clearly, the quality of the produce was good and production was exceeding the subsistence demands of the community at the time. By 1909, the NC had recognised that the shortage of labour was compounded by the influx of new settlers who were paying the natives good cash prices for this produce. He suggested that Africans needed to be taught to aspire materially beyond their means, such that they would be forced into employment. The problem of labour recruitment isolated in the previous chapter for the native reserves in general, clearly emerged very quickly in Svosve. The Native Commissioner's views on the subject were supported by the Chief Native Commissioner at the time;

"There seems little doubt that if only natives could be taught more practical things, such as proper cultivation of the soil, adequate housing of themselves and their families, wants would gradually arise, which would necessitate working in order to earn the necessary purchasing power, and so throw on to the labour market a far greater number of keen and intelligent
workers than any increased taxation or amplified legislation could produce" (CNC annual report 1907 p.12).

Interventions into African agriculture generally were therefore justified by the colonial administrators in terms of the need to release native labour. The initial Demonstration policy implemented in the country from the late 1920s, however, remained very localised in Marandellas district. The first demonstrator was posted to Chiota in 1929. Svosve, however, had no permanent demonstrator until the early 1940s. Even the Land Development Officer posted for work in Chiota and Svosve in 1944, was resident in Chiota and confined his work to this reserve. The shortage of staff, the distance between the reserves and the inaccessibility of Svosve served to minimise the contact of Chief Soswe's people with the demonstration policy.

The national policy of centralisation initiated from 1929 onwards was the second main thrust towards 'African development' in the 1930s and built on the earlier demonstration policy. As discussed in the previous chapter, the policy of centralisation at national level, was framed in the context of resource trusteeship and raising the carrying capacities of the reserves. The NC for Marandellas had a different perception of the need for action;

"Growing congestion, increased disorganisation in reserves and increased holdings of stock, mean the time is more than ripe for active measures to organise the settlement of reserves for the existing machinery will not permit effective control and supervision" (NC Marandellas annual report 1930 p.1 my emphasis).

Agricultural demonstrators nationally became redeployed within soil surveys and pegging exercises associated with the centralisation policy. This in consequence, compounded the problem of shortage of staff for demonstration purposes such as existed in Svosve.

In 1936 a soil survey and classification of arable and pastoral areas with a view to centralisation was initiated in Chiota and was completed in the following year. During one year alone, 21 villages, 115 pise huts, 55 brick huts, 22 one-roomed houses, 9 latrines and 15 water holes were laid out, built or sunk; "The advantages of centralisation are apparent everywhere in Chiota" (NC Marandellas annual report 1940 p.68). Arable land was consolidated and allocated on the higher ground and grazing lands were confined to the lower valleys where the grass was often swampy and sour (dambos), and where ten to twenty acres per beast were required. However a similar soil survey conducted in Svosve reserve was abandoned before completion;

"A soil survey of the Soswe reserve was carried out but it was found impossible, owing to the rocky nature of that reserve, to
attempt to classify it into arable and pastoral areas. There is insufficient arable land for the use of the inhabitants and what land would be left available in the event of centralisation would only be suitable for mountain goats" (NC Marandellas annual report 1936 p.1/2).

The national policy of centralisation was too inflexible to accommodate the environmental conditions of Svosve and therefore the associated programmes of continued agricultural demonstration, community demonstration and conservation projects were not fully implemented in Svosve. The extension message received in Svosve by farmers during the 1930s and 1940s was in consequence very patchy and confused. There was still the feeling that an alternative arrangement for Soswe's people would be found.

**Environmental problems in Svosve.**

As already highlighted, criticisms at the national level over African methods of production increased during the 1930s and were used to justify increasingly interventionist 'development' policies in the reserves. Indigenous techniques were described as inherently destructive and the Africans themselves criticised for being unaware of the detrimental effects of the practices or of being insensitive to the future interests of the people and the country. At the local level, shifting cultivation was widespread and heavily criticised, but settled cultivation was by no means alien to the native population of the district and was carried out prior to, and independently of, any advice from government personnel. For example in 1930, the Native Commissioner referred to a family in Chiota who had cultivated the same area for over twenty years;

"This was entirely due to careful cultivation and weeding, and the rotation of crops, and that the method he followed was merely what he had learnt from his forefathers" (NC Marandellas annual report 1930 p.3).

Other characteristics of the early farming system in the area included the preference for rapoko over maize (the former being easier to grind) and the Chibhakera system of turning the soil into low ridges (harwa) and planting the crops on these. This system was to come under increasing criticism and change, particularly on wetlands in the subsequent years of colonial intervention.

Early reports from the Native Commissioner commented favourably on both agricultural and pastoral practices in the reserve. By 1926, the perception of the state of affairs had changed;

"Undoubtedly there is an increased area under cultivation, but this does not ensure a correspondingly relative increase of food, owing to the indifferent ploughing and weeding of the lands."
Inquiries made have elicited that in the opinion of competent observers the natives produce relatively less now than two decades ago, in spite of the increased use of the plough" (NC Marandellas annual report 1926 p.2).

The first explicit reference to soil erosion within Svosve did not appear until as late as 1944, in relation to gully erosion around a dip tank. Once identified, in continuity with reports and actions at the national level, soil erosion in Svosve was to be portrayed and responded to in dogmatic style.

Elsewhere in the district, contour ploughing and planting, construction of composts and other measures for the prevention of erosion, had been established much earlier. Chiota, for example, had received the services of a specially trained soil conservation officer in 1940. This reserve, having been centralised, had a history of demonstration work and an established hierarchy of plotolders and cooperators. The centralisation programme in Chiota had not been without problems, however. Soon after completion of the allocation process, the Native Commissioner for Marandellas referred to problems of soil erosion in the arable areas and environmental decline in the grazing lands. It convinced him of the urgent land situation in Chiota; "There is very little land to spare and sooner or later, the question of acquiring more land for native use will have to be faced" (NC Marandellas annual report 1940 p.68).

In 1945, the NC reported on the extent of soil erosion in Svosve;

"There is a certain amount of sheet erosion on gentler slopes, but in the fairly steeply falling area draining into the Nyagomole river - an area of two or three square miles - the gully erosion is alarming. The gullies form a herring bone pattern in some parts, and some of them are big enough to hide a train in them" (NC Marandellas annual report 1945 p.8).

He also prescribed the form of response which should be adopted;

"To prevent further rapid erosion a big effort will have to be made - not the mere placing of a gang of 20 to 30 natives on to shovel and pick work with an occasional 'look-see' by the LDO, but the employment of a gang of 60 to 100 natives under the direct whole-time supervision of an expert provided with modern facilities" (NC Marandellas annual report 1945 p.6).

The problems of recruiting native labour from Svosve to form conservation gangs had already been encountered; "soil conservation gangs are in operation but the present gang is only six men when sixty are needed" (Native Commissioner Marandellas annual report 1944 p.7). The labour supply in the district was still significantly short of the demand, such that wages had increased to 25 shillings per month and Africans found themselves able to ask for advances of £4 to £10 when taking work with neighbouring
farmers. The Native Commissioner reported in 1940 that many employers in the district were employing up to 25% more labourers than they required in order to cover absences; "The indigenous native labourer is still reported to need three days off to recuperate for every day he works" (NC Marandellas annual report 1940 p.79).

In 1947, the Native Commissioner reiterated his concern for gully erosion;

"Erosion in Svosve is found on a large scale especially on the land between the west side of the reserve and the Wenimbi river. Sheet erosion is bad but gully erosion is on a tremendous scale" (NC Marandellas annual report 1947 p.17).

Individual farmers in Svosve at this time had little contact with agricultural demonstrators or the conservation techniques which were being promoted in the reserves generally. In fact, the visit to Svosve of the Agriculturalist for the Instruction of Natives to demonstrate contour ridging as late as 1944, stimulated an illuminating level of concern in the Native Commissioner's monthly report (November 1944). The Native Commissioner noted in 1947, however, that demonstrators in the district generally, had confirmed that natives were very ready to practice and profit by the best methods of raising crops, but that they were not so ready to take steps to preserve their soil (join the conservation gangs).

The conception of the problem of soil erosion in Svosve in the 1940s, was very much in line with that at the national level. The alarming gully erosion prompted a typically technocentric response; it was thought that the immediate recruitment of a large gang of native labour with the right technical expertise and machinery, would halt the problem. In contrast to the conception at the national level, the very poor environmental conditions in the district generally and particularly in Svosve, were noted. The Native Commissioner for example reported repeatedly in the early 1940s, that the question of acquiring more land for Chief Soswe's people was still unresolved and was becoming more urgent.

The nature of the response to the problem of soil erosion in Svosve showed no such sensitivity to local conditions or needs. The environmental challenges of Svosve had already discounted the implementation of centralisation in the reserves and in consequence it had remained a 'problem reserve' which fell outside the 'top-down' colonial development programmes. The period of voluntary participation in government programmes had also passed Svosve by. Soil erosion in Svosve quickly became conceived, in continuity with the national level, in terms of overpopulation and overstocking. The conservation programmes implemented as will be discussed, in the main reflected national thinking rather than local demands.
Overpopulation.

In 1945, the Native Commissioner for Marandellas reported that Svosve was heavily overpopulated in relation to the amount of fertile land available in the reserve. There were problems elsewhere in the district too. The average amount of land available per head (excluding Wedza reserve area) was estimated by the Native Commissioner to be less than seven acres (2.8 hectares). Those families located since 1900 within the Chiota reserve had been clamouring to return to Chief Soswe's area throughout the intervening period. The Native Commissioner suggested that a larger Svosve reserve would enable these families to be accommodated within the jurisdiction of Chief Soswe and simultaneously ease the congestion being experienced in the Chiota reserve;

"The natives in Svosve continue to ask for more land to relieve congestion. The unoccupied land north and west of the reserve has better soils and is a possibility" (NC Marandellas annual report 1943 p.3).

This suggestion was not however put into practice.

In 1946, the removal of 50% of the adult male population and their families from Svosve was planned. In 1947, movement to Mangwendi reserve in the Mrewa district and to Wedza started (see figure 4.2). A careful population census conducted in Svosve in 1946 had shown that actual population levels were significantly over the estimates they had been working on, based on the taxable males in the reserve. They had found the population to be four and a half times the number of taxable males, whereas the estimate that they had previously worked to had been 1600 less than this figure. 256 taxable units and their families were moved in the first year of the programme, although these included people who were actually residing on European land north of Macheke rather than solely within Svosve. The effects of this programme on the population situation in Svosve were therefore not as great in operation as was heralded.

The Native Commissioner suggested that with respect to the problem of soil erosion, the resettlement of these families was a "palliative, not a cure" (NC Marandellas annual report 1946 p.13). The cure was still framed in terms of large gangs, bulldozers and civil engineers being involved in arresting gully erosion. By 1947, the Native Commissioner reported that "the comparatively few numbers of natives in the reserve compounds the difficulties of recruiting voluntary labour for conservation works" (NC Marandellas annual report 1947 p.18) and suggests that legislation is now needed to force natives to do work in their reserves of 'national importance'. It seems therefore, that the Native Commissioner's perception of the population situation in Svosve could
change dramatically within the space of a year, depending on the subject of interest. Potentially, there could have been a change in officer across this period accounting for the difference in perception, although presumably the objective situation remained fairly stable. The chiefs in the district also came under criticism for not inviting more support for the 'conservation' programmes;

"They exert very little beneficial influence over their people where influences would really count, viz, in destocking and other anti-soil erosion measures. They do not reduce their cattle voluntarily nor are they able to obtain voluntary labour for soil conservation work" (Native Commissioner Marandellas annual report 1946 p.17 my emphasis).

**Overstocking.**

The first explicit reference to overstocking in Marandellas district was in the Native Commissioner's report of 1929 when both Chiota and Svosve were declared overstocked. The subsequent message regarding animal husbandry in this district as elsewhere, was to be decidedly confused. Initially, the concern of the colonial government had been with the quality of native stock and their associated attempts to introduce improved bulls to raise the standard of the cattle. In 1919, only one native in Marandellas district held a bull of registered brand, but this number had increased to twenty-one by 1921.

"I think it is slowly dawning on the minds of the natives that it is most important that they should improve the stamp of their cattle if they wish to command any price for their stock in the future" (NC Marandellas annual report 1921 p.5)

In 1924, twenty-one Africander bulls were brought with the proceeds of the Reserve Dipping Fund for use in the reserves and this was increased to a total of 142 in 1932 with the inclusion of Devon and Sussex bulls. However, by 1930, the NC reported that,

"The interest given by the natives generally to the improvement or even care of their cattle is disappointing. Their own object is to own numbers irrespective of quality" (NC Marandellas annual report 1930 p.6).

By this time, the perception of the stock situation nationally in the reserves was undergoing reassessment on the part of the colonial administration. The Chief Native Commissioner was forced to write in his report that;

"Regarding the improvement of native cattle we are gradually arriving at the conviction that it is unwise to attempt to breed up from bulls of imported breeds. The Afrikander and cross-Afrikander stand up to the conditions obtaining in the native
reserves but a good deal also is being done in the selection of native bulls and the castration of weedy animals. The natives gladly seek the services of the dip supervisors with their burdizzios" (CNC annual report 1924 p.4).

By 1938 the Native Commissioner for Marandellas conceded that neither the introduced bulls nor their progeny could stand up against the natural conditions in the reserves as well as native stock could. By 1942, no native in the district owned any bulls of registered breeds. In the early 1940s, Sanga bulls were put forward as the latest breed to improve native blood without detracting from their hardiness. A breeding station was to be established in Wedza in 1945, but this never materialised, potentially due to another change in thinking.

Interpretation of the relationship between numbers of stock held and resources in Svosve, has to be made in the light of the practice of grazing animals outside the reserve boundaries. The first reference to this practice appeared in the Native Commissioner's report of 1928. By 1942, 75% of Svosve-owned cattle were grazing outside the reserve boundaries (NC Marandellas annual report p.4). In 1946, the NC stated that "the cattle could not survive if they did not graze on adjoining land in the European area" (NC Marandellas annual report p.15). The gradual occupation of adjacent European lands however served successively to restrict this practice throughout the middle of the century. In 1944, government controlled destocking programmes were started in 49 reserves throughout Rhodesia. Svosve, with 4077 head, was calculated to be 68% overstocked and therefore 1,655 animals were to be removed over the next five years. The arbitrary basis on which such calculations were made were discussed in the previous chapter.

Permanent scales and sale pens were established in each of the reserves for the purposes of destocking, but enthusiasm for their use was small:

"In spite of the strongest arguments being put before them at meetings large and small, as to why they should reduce their holdings of cattle the natives have not responded. They have adopted a passive attitude of non-cooperation. They are the most grasping and miserly people where cattle are concerned" (Native Commissioner Marandellas annual report 1945 p.11).

Eight cattle sales were held in Marandellas district during 1945, at which 1530 cattle were offered for sale, but of these 742 were withdrawn through dissatisfaction with the price offered (NC Marandellas annual report 1945 p.11). If stock were not sold voluntarily through these controlled sales, the practice was that marked cattle would be seized by government officers at the next dipping to be sold on the owner's behalf at inevitably reduced prices. In consequence, many Africans either avoided dipping their
cattle or found alternative markets. In 1948, however, the Native Cattle Marketing Act made it illegal for Europeans to buy cattle from natives without a permit, and similarly for natives without a permit to sell stock via outlets other than through government sales. The need for this Act seems to suggest that the quality of African-owned stock at this time was good enough for local European markets and hence the resistance to sell to the government at low prices.

In 1945, Svosve was still deemed to be 40% overstocked. The Native Commissioner in 1946 stated that Africans in Chiota and Svosve continued to be uncooperative with respect to the destocking scheme; "their attitude is not merely apathetic but savouring of passive resistance" (NC Marandellas annual report 1946 p.17). In 1947, he reported that there was still no voluntary reduction of stock numbers in these reserves such that it was all by means of compulsion. Most stock holders even preferred to slaughter animals for home consumption rather than to sell them to the government, giving further indication of the poor prices on offer. However, by 1947, Svosve was reported to be "well under-stocked" (NC Marandellas annual report 1947 p.18).

In summary, the conception of the problem of soil erosion in Svosve in the 1940s, although identified relatively late on, reflected quite closely the conception isolated at the national level in Chapter Three. This was a very restricted conception of the problem which focused almost exclusively on the problem of gully erosion. Soil erosion in Svosve was linked explicitly with overstocking and overpopulation and measures were introduced to tackle each, in continuity with the national level. There was also substantial concern expressed during this period over the future land requirements of Africans in the district. The 'land question' was never however linked with soil erosion in the area. 256 families were moved from Svosve to relieve overpopulation but the Native Commissioner explicitly referred to this being a palliative not a cure with respect to soil erosion. The cure lay in changing the Africans' attitude towards both stock holdings and animal husbandry practices. Soil erosion as a symptom of the fundamental problem of inadequate land for viable indigenous production was not conceived at either the national or the local level.

The only divergence from the national conception of the problem of soil erosion at this time was the sensitivity to the environmental constraints in Svosve. The steeply sloping terrain and poor availability of suitable arable and grazing lands in the area, were mentioned regularly by the Native Commissioner as restricting development in the reserve. Any response to such local needs were inevitably constrained by the persistence of the colonial administration with centralised policies determined from 'above'.

Unfortunately, annual reports of the Native Commissioner for Marandellas during this period are very patchy. However, some quarterly and monthly reports are available and it is clear that government intervention into African agriculture in Svosve in the late 1940s remained fragmented. With respect to conservation in particular, the Chiota-Svosve Reserve Native Council was established in 1948 to coordinate development concerns in the reserves. In 1949, the Council purchased a tractor for the purpose of constructing contours. In 1952, another tractor was brought and this speeded up conservation work considerably;

"The Chiota-Soswe council continues to function steadily and whilst nothing of a spectacular nature has been accomplished, the meetings are of great interest to the hundreds of people who attend" (NC Marandellas annual report 1952 p.18).

In subsequent years the Council became less interested in conservation issues as political concerns started to dominate in the reserves; "At least three of the elected members of the Chiota-Soswe council are leaders of the district African National Congress and their tactics are obstructive" (NC Marandellas annual report 1957 p.13).

By 1951, the government had made provision for intervention into African agriculture at a hitherto unprecedented level. The problem of soil erosion was now perceived to be more than overpopulation and overstocking; environmental decline had its roots in the whole system of African settlement and land use. Implementation of the Native Land Husbandry Act was completed in Svosve by the end of October 1956. The District Survey of Land, Population and Stock for Marandellas under working party 'D' of the Robinson Commission, referred to Svosve as a "critical conservation area" at the time of implementation of the NLHA (Southern Rhodesia 1969 p.4). However, the commission reported that as a result of the application of the Act, considerable reclamation work had been done and "there had been a remarkable improvement in the area; erosion has been halted and the condition of the grazing is very satisfactory" (Southern Rhodesia 1969 p.5).

The Native Commissioner at the time of implementation of the NLHA was not as optimistic;

"Following allocation this year's ploughing took place and it is regrettable the extent to which boundaries of lands, road strips and drain strips were ignored and how many people cultivated land not allocated to them" (NC Marandellas annual report 1956 p.14).
A check of half the reserve area had revealed that 44 people had contravened the NLHA (demarcation) regulations (NC Marandellas annual report 1956 p.14). The Native Commissioner was seriously concerned about the provision under the Act for follow-up work;

"The writer spent two whole days in Soswe reserve sorting out the tangles of two kraals only where cultivation had contravened the regulations. One has to emphasise that Soswe is a small reserve. What it will be like when follow-up has to be done in large reserves is best left to the imagination" (NC Marandellas annual report 1956 p.15)

By the following year however, the Native Commissioner was in contrast, very happy with the state of affairs regarding the NLHA in Svosve;

"The Act is in full operation in Svosve reserve. It is a small area under efficient supervisory control and the results are entirely satisfactory. Until an understanding of the working of the Act, including the knowledge that offences would be promptly dealt with, and many were, there were some administrative misgivings, but it is now running smoothly and the recovery of what was, until recently, a badly eroded reserve, is most pleasing. The area is only 25,000 acres with 2,500 acres under cultivation so the follow up is comparatively easy and effective" (NC Marandellas annual report 1957 p.7).

Apart from the reorganisation of lands and the compulsory construction of contours, conservation work at this time revolved mainly around removing areas of seriously degraded land from use by the majority of people. 160 hectares in the north of the reserve were removed from cultivation totally and a vlei area was also fenced off to prevent trampling near the new Horora dip established in 1956. It was anticipated that it could then also be used for rotational grazing, using the enclosed part in the latter half of the winter and the outside part for the rest of the year. Two new dip tanks were also constructed in 1956 and £28,000 was made available by the Natural Resources Board for use in Svosve during the following year. £2,000 of this was used during 1957 for the rough (partial) contouring of two large arable blocks. Some limited pasture experiments were also established.

In 1957, both Chiota and Svosve were reported to be slightly understocked in relation to their assessed carrying capacities. The stocking assessment for the reserve was 1800 Large Stock Equivalent (LSE), whereas the stock held at the time was only 1409. By 1961, the stock position in Svosve was such that grass was over head height and veld fires constituted a real problem (NC Marandellas annual report 1961 p.2). With respect to arable production, the Native Commissioner was able to report that standards had improved markedly since the allocation under the NLHA; "extension work is
progressing most satisfactorily and cooperation and interest in agriculture by the people is most heartening” (NC Marandellas annual report 1961 p.1).

In 1961, the District survey for Marandellas under the Robinson Commission was published. The objective of the commission was to review the whole policy on which the NLHA was based and to effect a detailed examination of the problems of landlessness in the reserves. In their report for Svosve, the commission established that 93% of the land area was 'usable' but that the topography was so severe that only 30% of the total acreage was potentially arable (with slopes of less than twelve degrees, soils of greater depth than ten inches and not classified as 'permanently wet'). A summary of the assessments made under this survey is presented in table 4.1. Further comparisons of this data with that obtained from air photographs is effected in Chapter Five.

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<table>
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<tr>
<td>Acreage</td>
<td>26,147</td>
</tr>
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<td>Usable acreage</td>
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<td>Potential acreage</td>
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</tr>
<tr>
<td>Total taxpayers</td>
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<td>Net arable required for persons with rights</td>
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<td>No. of standard areas</td>
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Table 4.1 Summary findings of the District Survey of Land, Population and Stock in Svosve (working party 'D' of the Robinson Commission 1969).

The assessed annual cropping acreage in Svosve determined by the Robinson Commission on the basis of potential arable acreage but allowing for land lost to conservation works, access roads and rock outcrops, was 3,992 acres (1600 hectares). It was suggested that "unless more land is made available for cultivation, pressures from landless persons is likely to become apparent" (Southern Rhodesia 1969 p.5). At the time of the report, there were no recorded demands for land (see table 4.1) but only 38% of the taxpayers had been allocated land under the initial assessments and it was therefore considered that this situation was unlikely to persist. Reference was also made to the Native Commissioner's desire that those people under Chief Soswe who were still living in the Wedza area, be allowed to move permanently into Svosve if they...
so wished. The report noted however, that "the opinion of the District and Provincial officials is that once further arable land is made available in Svosve, there will be no lack of applicants from the present taxpayers without land" (Southern Rhodesia 1969 p.6). The report recommended that those people wanting to move from Wedza and who were "acceptable according to the tribal laws and customs to the people of Svosve" be allowed to do so (Southern Rhodesia 1969 p.10). It was proposed that a further 299 standard areas be allocated for these joint purposes.

The district survey of Land, Population and Stock also reported that the stocking situation in Svosve was well below the gazetted carrying capacity of 1800 units at 1,378 head. The report concluded that the reserve was actually 33% understocked in that it was deemed capable of carrying 2,053 LSE. Stock rights were therefore issued for 1,793 animal units which was approximately equivalent to the new LSE recommendations. The change in stock numbers in Svosve compiled on the basis of Native Commissioner reports and findings of surveys such as the Robinson Commission are shown in table 4.2. In addition, the documented, perceived or assessed, levels of under/overstocking are highlighted.

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<tr>
<th>Date</th>
<th>Number of cattle</th>
<th>Percentage stocked</th>
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<tbody>
<tr>
<td>1929</td>
<td>2772</td>
<td>'overstocked'</td>
</tr>
<tr>
<td>1932</td>
<td>2517</td>
<td>'overstocked'</td>
</tr>
<tr>
<td>1944</td>
<td>4077</td>
<td>'68% overstocked'</td>
</tr>
<tr>
<td>1945</td>
<td>3885</td>
<td>'40% overstocked'</td>
</tr>
<tr>
<td>1947</td>
<td>1850</td>
<td>'well understocked'</td>
</tr>
<tr>
<td>1956</td>
<td>1616</td>
<td>'understocked'</td>
</tr>
<tr>
<td>1957</td>
<td>1409</td>
<td>'slightly understocked'</td>
</tr>
<tr>
<td>1961</td>
<td>1378</td>
<td>'33% understocked'</td>
</tr>
</tbody>
</table>

Table 4.2 The perception of relative under/over-stocking in Svosve on behalf of the Native Commissioner.

The assessment of carrying capacities of an area and the subsequent delimitation of stocking rates is currently under substantial debate (see for example, Abel and Blaikie 1988). The technical as well as the human presumptions of the conventional land management viewpoint encapsulated within the concept of carrying capacity itself are being reevaluated. Communal systems of grazing rights and management and the complementary role of pastoral with arable production through provision of draught power and manure within traditional societies, frustrate technical management options such as for the rationalisation of resources and efficiency. An area may be 'overstocked' from a conventional point of view but severely 'understocked' in terms of ploughing needs.

Although the top down specification of ideal stocking rates were prescribed at several junctures during the colonial period, the process did come under some debate at the
time, particularly through the evaluation of the NLHA by the Robinson Commission in 1961. The practice of establishing stock levels on the basis of assessed carrying capacities was criticised heavily in this report:

"This is the most difficult figure to be satisfied about and the one which has caused the acutest controversy....Some of the gazetted numbers are as much as six to eight years old, and many of them are what are known as 'blanket' assessments over large areas....This recommended number must be regarded purely as a guideline because (a) the number of stock is constantly changing, (b) the carrying capacity differs from one year to another and (c) the actual number of stock may be more or less at any one time than the number of grazing rights that have been granted in terms of the NLHA" (Southern Rhodesia 1969 p.5/6).

Many initial assessments were found to be either far higher or far lower than the carrying capacities as reassessed by the commission's district teams.

In summary, the conception of the problem of Soil erosion at the local level during the period 1945-80 was wholly consistent with the conception at the national level. The problem of soil erosion in Svosve as in other reserves, became bound up with the broader 'problematic' of African society generally. The NLHA dominated the conservation response in Svosve during this period and the particular conservation model continued to focus on mechanical measures for erosion control and the removal of selected resources from general use. The allocation of pre-determined arable rights and grazing permits were seen as central to solving the erosion problems in the area. Remedial measures such as gully reclamation and fencing of degraded areas were also elements in the conception of erosion portrayed by the local administration. The compulsion associated with implementation of the Act was justified on the account of the 'passive resistance' of the Svosve residents. Despite contrasting views of the NLHA expressed by the Native Commissioner at different times during the period, the socio-economic or cultural appropriateness of the Act for the problems and needs of the local population was never questioned. In fact, the technical value of the NLHA also went unaddressed; the Native Commissioner attributed the initial problems to 'administrative teething problems' and shortage of staff, for example.

The relative consistency between the conception of the problem of soil erosion and conservation response at the local level in the period 1945-80 is in contrast to the divergences identified for the earlier period prior to 1945. This reflects the subordination of local concerns to national during the latter period. Prior to 1945, the policies of demonstration and centralisation had some element of voluntarism within them, although this was to be gradually ended as legislation became tighter and
administration more centrally controlled. The 1944 report of the Godlonton Commission marks the subsequent trend for national determination and the undermining of local environments, both physical and human.

Colonial conservationism: a national / local comparison.

The major aspects of a comparison between the national and local levels in terms of the framework for conservation, the organisation of the conservation effort and the conceptions of soil erosion portrayed, are seen in table 4.3. References to levels of human and stock population, land shortage, problems of labour recruitment and environmental degradation are highlighted at each scale of analysis due to the primacy of these factors within the conception of soil erosion at both national and local levels.

<table>
<thead>
<tr>
<th>National</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>1898 First Native Reserves established.</td>
<td>1900 Delineation of Svosve Reserve. Approx. acreage 20,000; Population 2,000 persons.</td>
</tr>
<tr>
<td>1925 Morris Carter Commission leads to promulgation of Land Apportionment Act and legal segregation of land according to race.</td>
<td>1926 Morris Carter Commission recommends abolition of Svosve on the basis of its unsuitability for human advancement.</td>
</tr>
<tr>
<td>1927 Alvord appointed Agriculturalist for the Instruction of Natives. Demonstration programme started</td>
<td>1936 Soil survey in Svosve for purpose of centralisation attempted. Classification into arable and pastoral found to be impossible due to rocky nature. Inadequate arable area and pastoral ground fit for only mountain goats.</td>
</tr>
<tr>
<td>1929 National policy of centralisation introduced to raise carrying capacities, conserve resources and release labour to the European sector.</td>
<td>1937 Contour ridging introduced into African areas for first time.</td>
</tr>
<tr>
<td>1936 Soil Conservation Officer and three Erosion Control Demonstrators appointed to Department of Water Irrigation for secondment to Department of Native Affairs.</td>
<td>1940 Amendments to LAA in response to African demands for more land largely cosmetic.</td>
</tr>
<tr>
<td>1937 Contour ridging introduced into African areas for first time.</td>
<td>1940 Recruitment of native labour gangs for conservation work in reserves.</td>
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<td>1943 38 gangs in operation employing 1,147 labourers at 22s 6d a month.</td>
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<td>1944 Alvord questions the appropriateness of the American model for erosion control for the environmental conditions of the majority of reserves.</td>
</tr>
<tr>
<td>1944 Alvord visits Svosve to demonstrate contour ridging.</td>
<td>1944 First Land Development Officer posted for work in Svosve but resident in Chiota.</td>
</tr>
<tr>
<td>75% cattle grazing out of Svosve.</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
</tr>
<tr>
<td>------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1944</td>
<td>Compulsory destocking implemented in 49 reserves.</td>
</tr>
<tr>
<td></td>
<td>1944 Svosve '68% overstocked'. 1,655 head to be removed over next five years.</td>
</tr>
<tr>
<td>1945</td>
<td>Svosve '40% overstocked'. Farmers accused of being miserly, apathetic and uncooperative. All reductions were by means of compulsion.</td>
</tr>
<tr>
<td>1948</td>
<td>Dept. of Native Agriculture announces that due to funding, conservation in the reserves to be focused on partial protection via grass buffer strips.</td>
</tr>
<tr>
<td>1950</td>
<td>1.7m ha assigned as Special Native Areas.</td>
</tr>
<tr>
<td>1951</td>
<td>NLHA promulgated. Emphasis to be on individual cultivators as only cost-effective option for conserving resources in future. Biological and mechanical elements planned, although latter were first priority.</td>
</tr>
<tr>
<td>1959</td>
<td>231,000 ha of arable land fully protected by contours under the NLHA. 102,000 families left landless.</td>
</tr>
<tr>
<td>1969</td>
<td>Parity introduced within land law via Land Tenure Act. Average population density in native reserves, 17.7 persons per square kilometre; commercial farming sector 7.3 persons.</td>
</tr>
<tr>
<td>1982</td>
<td>Population density Svosve, 50 persons per square kilometre.</td>
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</tbody>
</table>

Table 4.3 A comparison of colonial conservation at the national and local levels.

Conservation policy in the country post 1923 was determined centrally in Salisbury. The previous chapter, however, stressed the importance of events elsewhere in the colonies in shaping conservation concern. The eurocentric training and orientation of serving colonial officers undoubtedly further perpetuated links between the continents. The case study analysis of this chapter has shown that the potential for local definition of needs and programmes during the colonial period were very limited even when the Native Commissioner, as in Svosve, seemed particularly aware of the problems of
centralised decision-making. The effect of the central definition of policies is illustrated in the commonalities between national and local programmes evident in table 4.3.

The comparison in this table does, however, show that the timing of conservation policy at the local level varied significantly from the national. The perceived challenge of the physical environment in Svosve (which was by no means unique amongst the reserve areas), frustrated colonial attempts to apply the desired rigid assessment techniques and management principles aimed at universal application. For example, the centralisation programme successfully experimented with by Alvord, was adopted by the colonial administrators as a model for raising carrying capacities and releasing native labour in the reserves generally. In Svosve, it was found impossible to effect even the preliminary resource assessments required by the programme. Indeed, rather than the 1930s being the period of heightened conservation concern as it has been suggested at the national level (for example, by Beinart), in Svosve, it was the mid-1940s which saw the major activities; the 'identification' of the problem of soil erosion, the initiation of mechanical conservation, the introduction of destocking and the implementation of a large scale resettlement programme.

The national demonstration policy from 1927 forwards, had a delayed and limited effect in Svosve for two reasons. Firstly, there was no Agricultural Demonstrator resident in the district until 1944, when such staff were known as Land Development Officers; the relatively small size of the reserve and the spatial position of the area within the district delayed the incorporation of residents into the scheme of 'plotholders' and 'coopters'. Secondly, the successful nature of indigenous production in Svosve and other reserves of the district at the time, undoubtedly restricted the ready uptake of introduced techniques. By 1944, both the demonstration and centralisation policies, as well as the nature and content of the erosion control model, were under question by Alvord himself. It was in the same year that Alvord visited Svosve to demonstrate contour ridging for the first time. Rather than government policy such as centralisation enhancing production and releasing native labour from the reserves for work in the European agricultural, mining and construction sectors as anticipated at the national level, in Svosve, the success and stability of African agriculture kept wages high and labour supply short, as evidenced by the problems of recruiting for conservation gangs.

The total population of Svosve in the 1940s was undoubtedly expanding as it was in the reserves generally. At the national level, the issue of land shortage within the Native Reserves with the rigid enforcement of the LAA, was not addressed again until 1950. In that year, 1.7m hectares were reassigned as Special Native Areas (in fact mainly unsold European land and unassigned areas). The prospects for these additional lands,
large parts of which were tsetse infested, enhancing the overall position for African farmers is discussed elsewhere (Floyd 1962). In 1969, parity was introduced into the land law, by which time, the land issue was embedded in the aspirations of the African populace and the ideals of the nationalist movement as identified in Chapter One. At the local level, the problem of incorporating all of Chief Soswe's people within the reserve area was a continual and unresolved issue, compounded by the limited physical potential of the delineated area. In 1947, large scale movement of people out of Svosve further segregated kinship groups, disrupted production and social relations and undoubtedly aggravated discontent.

As shown in table 4.3, Svosve was subject to the destocking regulations applied nationally to 49 reserves in 1944. The experience at the local level in terms of the substantial uncertainty which existed amongst colonial administrators at all levels concerning other aspects of animal husbandry and pastoral production, is typical of the national level in terms of both content and timing. Ideal stocking levels, stock breeding programmes and grazing schemes were all subject to introduction, modification and removal in Svosve during this period. The long-established and widespread practice of grazing cattle outside reserve boundaries by Svosve stockholders is potentially less exemplary of the national situation, but adds complexity to any assessment or perception of prospective carrying capacities of the resource base.

Although soil erosion was recognised as a problem in Svosve relatively late in comparison to the national level, the conception of the problem and the nature of the perceived conservation responses were very similar across the scales of analysis. Destocking, resettlement and contouring were all successive and/or interlinked elements of the technocentric conservation responses in the Communal Areas including Svosve. Gully erosion dominated the conception and large scale remedial measures incorporating labour gangs alongside preventative measures based on contouring, dominated the response. The mechanical control of erosion via contours was first introduced nationally into the communal areas in 1937. In Svosve it was not until after 1944. By 1948, the policy nationally had switched to partial protection due to funding and staffing shortages. In 1951, the NLHA was introduced to make individuals responsible for constructing contours as the only perceived cost and time-effective way of ensuring national coverage of all cultivated lands. The Act was introduced in Svosve in 1956, the relative success of which was subsequently under significant debate locally as it was nationally.

In summary, the differing scales of analysis presented here and in the previous chapter, has confirmed the primacy of political-economic concern over environmental during the
colonial period. The local level analysis has shown clearly how the known challenges and requirements of the physical environment in Svosve were dismissed. The centralisation programme was not implemented due to the problem of identification and delineation of arable and grazing blocks, whilst the NLHA based on precisely the same technical assessments went ahead. This challenges the assertion that the conservation of resources were the primary motivation for either programme in continuity with critical assessments of the national level made here and by others (for example, Phimister 1986). The technocentric conception of soil erosion held and responded to at the national level during the colonial period enabled the primary cause of soil erosion to be obscured and remain unaddressed. At the local level, the Native Commissioner recognised that the resettlement of 50% of the adult male population of Svosve was only a palliative rather than a cure with respect to soil erosion, yet it went ahead. This illustrates both the primacy of central decision-making during the period and the subordination of environmental concerns to political-economic and cultural. The 'technocentric tinkering' of the colonial administration with respect to environmental degradation was transferred to the local level through rigid universal schemes, exalting western scientific solutions, irrespective of the specific demands at the local level or the adequacy of the Native Reserves for viable production.

The following chapter assesses the impact on the ground of colonial conservation policy on the physical environment in Svosve through the use of sequential air photo analysis.

The problem of soil erosion in Svosve was conceptualised in the past in terms of excessive stock and human population pressure on the available resources. The declining resource base exhibited by soil erosion was used to justify quite drastic programmes of destocking and resettlement in the area. This chapter provides a quantitative assessment of the changing human-environment relationship in Svosve on the basis of sequential air photograph analysis for the period 1947-1981. Quantitative information on the historical change in conventional indicators of environmental degradation, such as man-land ratios, has been restricted at both national and local levels to date in Zimbabwe. This chapter also provides a framework for interpreting the 'official' perceptions of the problem of soil erosion during the colonial period as well as those currently held at Provincial and District levels and of individual farmers in Svosve presented in the following two chapters. In addition, it enables analysis of the impact on the environment of past conservation and land use planning policies implemented in Svosve and the assessment of the current nature and status of soil erosion in the area.

Too often, human-environment relationships are presented within generalised, national-level models such as Whitlow's 'subsistence land use scenario' (1979 after Kay 1975). Within this model, an increase in population without compensating improvements in the way resources are used, is purported to initiate a cycle of degenerative changes in the resource base. These processes of decline start in the grazing lands as areas under cultivation are extended to compensate for declining yields from progressively exhausted resources and to accommodate the expanding population (see figure 5.1).

Although an expressed intention of such national level models is that they should not be ubiquitously applied to individual areas, they are nevertheless influential in shaping decision-makers' perceptions of resource problems in communal areas and in forming development priorities. Whitlow's models appear repeatedly within government documents such as the Communal Land Development Plan (Ministry of Lands, Agriculture and Rural Resettlement 1986) and the National Conservation Strategy (Ministry of Natural Resources and Tourism 1988) without the limitations or assumptions of such modelling being made explicit. The models are used to reinforce the message of the communal areas on a downward spiral of environmental decline and worsening man-land ratios. Through recourse to generalisation, despite the good intentions of the original authors, these models perpetuate the 'negative social science' as defined by Chambers (1983), in that the 'awfulness' does indeed, seem inevitable.
Figure 5.1 A subsistence land use scenario (after Whitlow 1979 and Kay 1975).
This chapter offers unique local level analysis which illustrates the complexity of the human-environment relationship and the sensitivity of the problem which cannot be accommodated within such models.

**Air photography in Zimbabwe.**

In 1963, the Rhodesian Department of the Surveyor General initiated a policy aimed at providing systematic air photo coverage of the entire country at least every five years. In actuality, the coverage for some areas has been considerably less frequent. Nevertheless, for many parts of the country, three or four sets of air photos now exist and coupled with the sporadic coverage before 1963, form a permanent and comprehensive chronological landscape record.

Panchromatic air photos at the 1:25,000 scale were available for the Svosve study area for the years 1947, 1965, 1975 and 1981. Using the 1947 set to provide a baseline for subsequent change, data concerning land use in general and the location and extent of resource degradation in particular, could be extracted, mapped and quantified. Interpretation of this data in the light of the information already accessed through archival research, enabled the changes in the landscape which have occurred due to the implementation of specific policies in the area to be inferred. For example, the Native Land Husbandry Act had been fully implemented in Svosve by 1956. Comparison of the 1965 photography with the baseline 1947 set, therefore illustrates the changes in settlement and landscape that can be partly attributed to the implementation of this Act in the area.

One of the main problems associated with using sequential air photo analysis is that the air photos literally represent 'snapshots' in time. Systematic comparative mapping across several different dates of photography assumes that such snapshots lie on the general trend and implies an even, progressive rate of change. Degradation processes are in fact extremely variable temporally as well as spatially. By recognising this limitation however, useful assessments can still be made, so long as they are not used as a basis for generalising from the particular instance which they represent to make broader temporal conclusions. This is clearly an area in which supplementary data sources as available within this research, can be extremely useful in enhancing understanding.

Interpretation of air photographs relies in part on tonal variations. The tonal range of features, in turn, are influenced by a number of factors which have to be borne in mind when mapping and interpreting features from air photos. One such factor is the timing of photography. In Zimbabwe, the photography is done in the winter when cloud
Cover is minimal, but this is also when crops have been harvested and natural vegetation tends to have died back and in consequence, assessments of actual land use are more difficult. Knowledge of climatic oscillations for the area under study is also essential. A recent period of drought will have adverse effects on vegetation cover and will influence the interpretation of tonal differences on the air photographs.

Unfortunately, the nearest official rainfall guaging station to the case study area is located at Grasslands Research Station (Ministry of Lands, Agriculture and Rural Resettlement, Marondera), 25 kms to the northwest of the top of Svosve communal area. Data from this recording station is presented in figure 5.2. The absence of any more spatially specific data is unfortunate, but the general regional trend, which may be as important as individual years in stimulating vegetational changes, is clear. In dry years, natural vegetation is likely to die back considerably and tonal differences on the air photographs due to vegetation differences will consequently be less distinct. In wet years, interpretation may be hindered by additional elements such as the presence of reeds in saturated pools.

The actual time of the day when photos are taken can also be important. Disparities of a few hours between different sets of photography can affect tonal variations, particularly the amount of shade associated with vegetation. A larger shadow caused by a lower sun (or even a slightly oblique camera angle), can easily be mistaken for evidence of plant regeneration if care is not taken. The quality of the contact also inevitably varies and can influence interpretation. Small portions of the 1947 Svosve set for instance are damaged and unfit for use and the 1981 series has a slightly blurred finish to it, whereas the 1975 set is very good.

Although air photos themselves constitute attractive sources of essentially objective data, extraction of information involves subjective elements associated with interpretation. Every effort was made in this study to maximise objectivity through familiarisation with the area on the ground, observance of guidelines already established for air photo analysis and via continual reassessment of techniques. Obviously, the degree of subjectivity involved varies according to the technique being used. For example, extraction of settlement location and density is relatively straightforward and inter-person subjectivity is minimal. Hut sites are easily detected at the 1:25,000 scale with the naked eye, and careful analysis under magnification enables the differentiation between living quarters and granary stores. The erosion mapping, however, utilised techniques involving more subjective interpretations. Air photos are well-suited to this type of study since "most erosion features are visible in direct stereoscopic image, and those that are not can be readily inferred from tonal variations"
Figure 5.2 Total annual rainfall recorded at Grasslands Research Station (Ministry of Lands, Agriculture and Rural Resettlement), Marondera.
used carefully, and in conjunction with other sources, particularly maps and ground observations, a great deal of information regarding soil erosion and land use can be generated.

On the basis of sequential air photo interpretation, this chapter examines the historical development in Svosve of the elements identified within Whitlow's scenario as being indicative of a society 'under pressure'. The changing human-environment relationships are quantified and the change in the nature and location of soil erosion are presented.

The physical environment in Svosve.

Figure 5.3 is a composite map showing the dominant constraints on agricultural land use in Svosve. In 1980, Whitlow calculated 15% of Zimbabwe to be occupied by granitic dwala terrain. Svosve, on the basis of interpretation of 1:25,000 air photography has 27.3% of its total area occupied by such features and is therefore significantly above the national average. The steep slopes and shallow soils associated with dwala terrain render cultivation extremely marginal and should be taken into account in any estimate of potential resource use. The bare, often steep slopes also promote rapid surface run off and thereby exacerbate soil erosion hazards at the base of the features.

A further 14.5% of the area is classified as vleiland and is therefore formally prohibited from cultivation under the terms of the Natural Resources Act of 1941. On this basis, 5,203 hectares of Svosve (47.3%) are classified as unsuited to cultivation leaving an effective, 'cultivable' area in Svosve of 5,797 hectares. This area in practice has to satisfy both the total arable and the major grazing demands of the community since the granitic terrain maintains only coppice-type vegetation and the vleilands constitute a relatively minor resource. The challenging nature of the physical environment displayed via this method, confirms earlier reports from historical sources referenced in the previous chapter.

Critical characteristics of the human-environment relationship in the case study area are presented in table 5.1, in which Svosve is compared with Chiota communal area. Although the two reserves do not border each other, they are within the same agro-ecological zone and are currently linked administratively as they were in the past. Clearly, Svosve has a much larger percentage of the available land area discounted from cultivation due to slopes and bornhardt terrain than Chiota does. The large source of low lying, water retaining dambo (vlei) areas in Chiota present a very significant resource for local people. There has been a long history of vegetable cultivation on
Figure 5.3 The physical environment in Svosve.
dambo margins in Chiota, and restrictive legislation concerning use of these resources has not been forcefully implemented in the area. In 1984, there were 2,500 hectares of irrigated dambo gardens in Chiota, many individual gardens constituting less than half of one hectare alone (Bell et al 1987). Legislation concerning such use of the more limited dambo resources in Svosve has been more rigid than in Chiota and consequently this does not form a major viable cultivatable resource in Svosve.

<table>
<thead>
<tr>
<th></th>
<th>Svosve</th>
<th>Chiota</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land area (ha)</td>
<td>11,000</td>
<td>659,000</td>
</tr>
<tr>
<td>Popn density (/ha)</td>
<td>50.5</td>
<td>65.1</td>
</tr>
<tr>
<td>Granitic/slopes &gt;10% (ha)</td>
<td>3,608 (33%)</td>
<td>3,295 (5%)</td>
</tr>
<tr>
<td>Vleiland (ha)</td>
<td>1,595 (14%)</td>
<td>19,770 (30%)</td>
</tr>
<tr>
<td>Total suited to agricultural use</td>
<td>5,797 (53%)</td>
<td>42,873 (65%)</td>
</tr>
</tbody>
</table>

Table 5.1 Physical constraints on agricultural land use (data for Chiota after Bell et al 1987).

In summary, Svosve is a small reserve located on the edge of the highveld in an area climatically suited to intensive farming. The main lines of communication, the primary settlements and the six constituent Village Development Committee areas in Svosve are shown in figure 5.4. Several factors serve to hamper and restrict agricultural production in Svosve, most notably the granitic nature of the terrain which contributes to the steep slopes and shallow, sandy soils which dominate the area. The broken nature of the terrain effectively confines arable production to small pockets of lower lying areas and better soils, some of which are relatively inaccessible. Population also tends to be concentrated in such areas, often removed from the main roads, and as a result, perceptions of population density on the part of the cursory observer can be obscured. In addition, the steep granitic slopes support quite dense woody vegetation in places and this contributes to the positive sense gained concerning forestation when in Svosve. In consequence, the same factors outlined which serve to disperse settlement and agricultural use and may give the impression that pressure on resources is by no means severe, also serve to restrict the potential carrying capacity of the area.

Population change in Svosve.

Figure 5.5 summarises the growth in the indigenous African population in Zimbabwe over this century. Since the African population has never constituted less than 95% of the total population, figure 5.5 also closely reflects total population change. Clearly, the population of Zimbabwe as a whole is expanding exponentially, currently at an annual average growth rate of 2.9% (Ministry of Natural Resources and Tourism 1987 p.19). Between 1962 and 1982, the population nearly doubled and will double again within the next twenty years if current growth rates are maintained. 75% of the growth
Figure 5.4 Village Development Committee areas in Svosve.
Figure 5.5 African population change.

Figure 5.6 Population change in Svosve Communal Area.
which occurred between 1962 and 1969, some 900,000 people, were absorbed within the communal areas in regions already supporting high population densities (Zinyama and Whitlow 1986). Clearly, the pressure on resources in the communal areas in general, has increased progressively since colonisation as a result of political and environmental constraints, compounded by declining death rates and continuing high fertility rates amongst the indigenous populations.

Information regarding population levels in Svosve was available from three sources; Native Commissioner reports, official census (1969, 1982) and indirectly from the air photographs (through identification of households and secondary information regarding average size of households). Figure 5.6 shows the population changes based on the first two of these sources. From the initial estimate of 2,000 persons on delineation of the reserve in 1900, population appeared to fall until around 1912. Whilst acknowledging the problems of accommodating all of Chief Soswe's people within the reserve already referred to, it seems probable that this period represented one of 'settling down' with population movement between Svosve and Chiota until it was clear which kraals were to fall within whose jurisdiction. As the Native Commissioner from the outset was involved in the registration of all huts in the area, the accuracy of the figures between 1910 and 1920 are likely to be fairly good. Later on, as employment on European farms and in towns became viable options for members of African households and restrictions under the Land Apportionment Act became tighter, problems of accurate enumeration in the reserves undoubtedly increased and this should be recognised when interpreting data obtained from Native Commissioner reports. The under-enumeration during the 1940s in Svosve was highlighted in the previous chapter, for example.

By the early 1940s, the population of Svosve had increased to exceed 5,000. The first reference to 'overpopulation' on the part of the Native Commissioner appeared in his annual report of 1940. The degree to which the reserve was perceived as overpopulated was evidently considerable as indicated by the subsequent decision to move 50% of the male population and their families from the area. By the end of 1947, 256 taxable units and their families had been moved into the Wedza reserve from Svosve and alienated land north of Machete. Two hundred others away at work were also to be transferred as soon as they were traced.

Care needs to be taken when interpreting all census data, but particularly when making intercensal comparisons. The first full enumeration of the African population in Zimbabwe was taken in 1962 (although figures for Svosve from this census are not available). Security difficulties in the country at the time and the inexperience of the
enumerators cast doubt as to the accuracy of this census. The 1969 census is considered more accurate, utilising a better educated enumeration force and based on a three week enumeration period. Discussion of inter-censal change, however, is still problematic. The geographical frame within which data were aggregated differed between all the censuses and therefore analysis of district trends is difficult. For instance, the reorganisation of the local government system after independence was not completed by the time of the 1982 census. Comparison between districts is also limited because of variation in reliability of the data collection. For example in 1982, delimitation was done by the District Administrators who were often unfamiliar with their areas and were using outdated maps which did not even include current village names on them;

"Even had the maps been perfect, not all team leaders and enumerators could use them. There were numerous cases of inadvertant boundary crossing and misunderstanding" (CSO 1984 p.4).

Another problem with inter-censal comparison is in accommodating seasonal influences on the data. 1969 for example, was an exceptionally good agricultural season, such that the census conducted in April coincided with a period of considerable movement of people between households, fields and markets. The 1982 census in contrast, was conducted in the agriculturally-slack period of August, but the season had been so poor, that many people had moved into urban areas to avoid the effects of drought. Interpretation of the censuses should be cautious in recognition of these weaknesses.

The population in Svosve at the 1969 census was 3380, indicating a sharp decline over the 1943 Native Commissioner assessment of 5090. As already discussed, there are problems in comparing census data, but the fact that the Native Commissioner had instigated a special census within Svosve in 1946 to assess the accuracy of their estimation procedure, improves the reliability of this early data. Between 1969 and 1982, the population of Svosve increased rapidly at an average annual growth rate of 3.9%, with the population in 1982 standing at 5558 (CSO 1982). Although this is below the average annual growth rate for the province as a whole (Mashonaland East has the highest annual growth rate in the country at 4.2%), this period represents the fastest stage of population growth within the study area. This latter period of population increase coincides with the trends isolated by Zinyama and Whitlow (1986) at the national level. Figure 5.6, however, indicates that Svosve has not experienced a smooth, progressive increase in population throughout the entire period since its delineation in 1900. Incorporation of archival information aids understanding of periods of increase and periods of decline as discussed above. There is certainly no
simple, exponential growth of population within Svosve as indicated by national trends and which is central to Whitlow's subsistence land use scenario.

The change in location and density of households on the basis of air photo interpretation is shown in figure 5.7. For the purposes of this study, each small cluster of huts identified under stereoscopic magnification was taken to constitute one 'household' and each is represented in figure 5.7 as one point. Clearly such mapping can elucidate significant information on the change in distribution and relative density of population in Svosve.

The population in Svosve in 1947 was concentrated in the northern portion of the reserve surrounding the Masikana school and Horora dip areas. There were also secondary concentrations along the line of communication in the northeastern corner and on the dambo margins in the central-southern portion of the reserve. By 1965, the aforementioned concentrations were reinforced by population increase, excepting the concentration in the south which had declined significantly, probably due to removal under the restrictions of the Natural Resources Act. The central Drihorì location also emerged as a primary area of population concentration. The new road running north-south through the southern section of the reserve was also a focus for settlement in 1965. By 1975, population had spread throughout the reserve more evenly than at any previous stage. Substantial settlement followed all lines of communication, dambo margin and border of granitic bornhardt terrain in the reserve. In 1981, additional households had been accommodated throughout the study area, but the original prominence of the Masikana and northeastern sections of the reserve had been particularly reinforced.

The average population density in Svosve in 1982 was significantly above the provincial and national averages; 50.5 persons per square kilometre as compared with 35.2 for Mashonaland East (CSO 1982) and 25.5 persons per square kilometre as a national average for the communal areas (Zinyama and Whitlow 1986 p.371). However, the danger of using population density as a measure of population pressure on resources is epitomised by the Svosve case. The extent and variety of environmental constraints on agricultural land use summarised in figure 5.3, significantly affects the spatial differentiation of the quality of resource. Granitic dwala terrain, for instance, excludes agricultural use and to a certain extent settlement, from large sections of the area. Analyses based on population density therefore seriously obscures the true pressure on resources which exist in Svosve if consideration is given to the quality of those resources. "Population density assumes resource homogeneity" (Millington 1982 p.141).
Figure 5.7a The location of settlement in Svosve, 1947. (Pre-NLHA)

Each point represents one household.
Figure 5.7b The location of settlement in Svosve, 1965. (Post-NLHA)

Each point represents one household.
Figure 5.7c The location of settlement in Svosve, 1975.
Figure 5.7d  The location of settlement in Svosve, 1981.

Each point represents one household.
In summary, the pattern of population change in Svosve has not been one of simple expansion. Although inter-censal comparisons are problematic, supporting historical evidence can improve the reliability of judgements concerning change. For example, it is known that 350 families (constituting 50% of the adult population) were moved out of Svosve from 1946 onwards, in response to the heavy overpopulation in the judgement of the Native Commissioner. National, (or even 'universal') models such as Whitlow's oversimplify the population-environment relationship on two counts; firstly, through portraying an image of straightforward, exponential growth in numbers, and secondly by failing to accommodate the heterogeneity of the resource base identified in the previous section. These criticisms apply at both the national and local levels.

Stock pressure.

Native-owned stock constituted a problem to administrators throughout the colonial period. The centrality of cattle within the indigenous social system for lobola exchanges in particular, the apparent preference for their own breeds over imported stock and their purported concern for quantity at the neglect of quality were all perceived as characteristics of native cattle holdings which were detrimental to future development efforts. As discussed, compulsory destocking in 1944 and the restricted rights to grazing with regulated stock holdings as part of the Native Land Husbandry Act, were two of the attempts to control native cattle numbers on the part of the colonial government.

Within Whitlow's subsistence scenario, the detrimental effects of overpopulation and overstocking are first seen in the grazing areas in terms of a decline in wildlife species and a replacement of perennial plant species with annual species. In terms of livestock, increased malnutrition, starvation and mortalities and a gradual switch to goats in preference to cattle indicate a decline to a lower level of productivity. The change in livestock held in the communal areas as a whole over the period 1956-1984 is shown in figure 5.8. As stressed in the previous chapters, the colonial extension advice and actions concerning indigenous cattle and grazing resources were substantially confused. Overstocking in the reserves began to be portrayed as a problem within national level documentation in the early 1940s and stock numbers were altered dramatically in forty-nine reserves in the latter part of the decade as a result of rigid government-controlled destocking schemes.

Care needs to be taken in interpreting stock figures in recognition of the real problems of enumeration involved. As indicated in figure 5.8, the gradual increase in native stock held over the period 1956-1984 is interrupted by significant increases in cattle
Figure 5.8 Change in cattle held in the Communal Areas.

Figure 5.9 Change in cattle held in Svosve 1921-1987.
held in 1975 and a sharp decrease in numbers over the following three years. In the early 1970s, problems of enforcing controls regarding individual stock holdings under the NLHA increased, such that African farmers expanded their holdings. Enumeration of holdings probably improved also, as people were less afraid of destocking measures being enforced and were therefore more willing to have all their stock counted. After the mid 1970s, the escalation of the war led to a deterioration in cattle holdings within the communal areas but also increased problems of enumeration. For example, disease control over much of Zimbabwe collapsed during this period causing many cattle deaths through tick-borne diseases (CSO 1985). Although there was some increase in the national herd up to independence, the subsequent drought years in the 1981/82 and 1983/4 seasons led to a sharp contraction in stock numbers.

Undoubtedly, some areas may be currently experiencing rapid rates of cattle increase, serving to compound problems associated with high stock densities in those areas. The overall national pattern, however, is of quite slow increase. Whitlow (1979) suggests that this is characteristic of a system under pressure as change occurs in the composition of the herd, with replacement of cattle on degraded pastures by smaller animals. Enumeration of small stock is even more problematic than for cattle in the absence of formal dipping or marketing channels. Whitlow cites figures for the period 1964 to 1977 in which there were 87% increases in cattle, 16% increases in sheep and 209% increases in goats held in the communal areas (see table 5.2). As already discussed however, the late 1970s was an exceptional period, and a very different pattern is gained from the period 1977-1984; cattle experienced a 14% decline, sheep a decline of 50% and goats a decline of 44% (CSO 1985 p.151), most occurring as a result of the drought. In addition, in terms of the relative importance of each stock type to the overall herd held, rather than the smaller ruminants becoming increasingly important as Whitlow suggested on the basis of earlier data, the composition is very similar between 1964 and 1984 as shown in table 5.2.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle</th>
<th>Sheep</th>
<th>Goats</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>1,916 (71%)</td>
<td>186 (7%)</td>
<td>579 (22%)</td>
</tr>
<tr>
<td>1977</td>
<td>3,592 (61%)</td>
<td>486 (9%)</td>
<td>1,787 (30%)</td>
</tr>
<tr>
<td>1984</td>
<td>3,100 (72%)</td>
<td>241 (6%)</td>
<td>1,000 (30%)</td>
</tr>
</tbody>
</table>

Table 5.2. Changes in herd size and composition in the communal areas of Zimbabwe (Figures in '000 head). (Source: Whitlow 1979 and CSO 1985).

In summary, recent data concerning stock held in the communal areas at the national level has not confirmed the pattern projected by Whitlow in 1979. All livestock increased up to 1977 with cattle accounting for a reduced proportion of the total herd in that year. This pattern was not however consolidated in 1984 as shown in table 5.2.
Cattle continue to constitute a large proportion of the total herd with goats and sheep being only locally important stock.

The change in cattle held in Svosve is shown in figure 5.9. Unfortunately the available data do not include the period of the 1970s, such that any fluctuations in numbers held are unknown. In 1961, however, the Native Commissioner reported that Svosve was so understocked that grass was often over head height in places and veld fires were a real nuisance. The general trend was clearly a substantial increase in the number of stock held in Svosve over this period. Since independence there has been a drop off in the numbers held which has not yet reversed. Data collection for the purposes of the Zimbabwe National Household Capability Programme in 1984, revealed that 55% of households surveyed in Mashonaland East owned no cattle, suggesting either an extremely low level of cattle in the area or a high differentiation in ownership. 83% of Svosve farmers in a sample of 100 taken for analysis discussed in Chapter Seven, owned cattle. The numbers held ranged from 1 to 44 however. Data concerning small livestock held in Svosve are scant. In 1948, there were 276 goats, one sheep and sixteen donkeys reported by the Native Commissioner to be in the reserve. In the aforementioned survey, 24% of farmers in Svosve kept goats but with an average of only 4.6 head. Goat rearing for wool and milk is not practised in Svosve on any significant level as it is in other communal areas (e.g Bikita) and holdings of sheep or donkeys remains minimal. Poultry are the main animals kept in addition to cattle.

In summary, the pattern of livestock held at both national and local level has been shown to be more complex than tends to be appreciated. Marketing opportunities, disease and drought have all affected cattle numbers to various degrees at different times. There has been no significant switch to lower order ruminants and stock, identified at either national or local levels as was the scenario projected. At the local level, the general trend has been towards increased cattle holdings but has been subject to fluctuations as at the national level.

Identification by administrators of a 'grazing problem' in Svosve occurred very early on. Simplistic connections between cattle numbers and 'pressure' were frustrated as they are currently, by grazing arrangements between communal farmers and neighbours. Svosve residents for example, presently negotiate over grazing with resettled ex-combatants at the Shandisai Pfungwe Cooperative Project adjacent to Svosve in the North. It is not to deny that access to suitably large areas of unbroken pastoral areas in Svosve is not very limited, but the variety of response of local communities to resource constraints cannot be accommodated into restrictive models.

The third major and probably the most critical element highlighted in the literature as characterising a subsistence society under pressure is the extension of the cultivated area into grazing lands. This is believed firstly to be a response to the expanding population and secondly to compensate for declining yields gained from increasingly impoverished soils. The change in total area under cultivation in Zimbabwe's communal areas 1900-1977 is shown in figure 5.10. There was an approximate 50% increase in the area under cultivation in the communal areas over this period. Whitlow (1979) explains this expansion in terms of population increase, declining productivity of croplands and the introduction of cash crops into the African farming systems. As well as opening up new areas to cultivation, this also exposes further areas to the hazards of soil erosion. The increase in area of land cropped per person is noted as further evidence of a system under pressure.

Land use changes in Svosve were quantified from the air photography using a 15% sample, to examine how far the Svosve case study area confirmed or contrasted these changes promoted for the national level. The study area was divided up into grid squares of one square kilometre, and seventeen squares were randomly selected to constitute a 15% sample from which projections regarding land use changes in Svosve as a whole could be inferred. The locations of the sample areas are shown in figure 5.11. Each of the sample squares was further classified into four groups according to the presence or absence of erosion, and population density (less than/more than the Svosve average). These were both identified from the 1981 photography and would be used for future sampling for analysis at the household level. The weaknesses of using population density for the purpose of assessing resource pressure are recognised, but its use in identifying sample areas was considered justified by the dominance of this factor in the perception of local concerned parties. The four categories were:

Category 1: > average population density/presence of erosion.
Category 2: < average population density/presence of erosion.
Category 3: > average population density/absence of erosion.
Category 4: < average population density/absence of erosion.

From the four sets of air photography, the land use change for each study area was mapped using a five-fold classification as follows. Land used for:

1. Settlement/administrative/communications.
2. Cultivation.
Figure 5.10 Area under cultivation in the Communal Areas.
Each grid square represents 1 square kilometre

Greater than average population density/presence of erosion.

Less than average population density/presence of erosion.

Greater than average population density/absence of erosion.

Less than average population density/absence of erosion.

Figure 5.11 Sample sites in the study area.
4. Sparse woodland/granite.
5. Dense woody vegetation.

Land which appeared to have been under fallow for some time was classified as 'sparse woodland/grass', as it was thought that this would represent a more accurate reflection of actual use since such land is commonly used for grazing purposes. Vleiland was also included within this category since cultivation on vleiland in Svosve is fairly minimal and they are dominantly used as a grazing resource. When assessing the amount of land used for settlement purposes, an estimate of 0.25 hectares per household was used, based on work done in Save North Communal Area by Zinyama (1988). Land used for administrative and social purposes was also included within the 'settlement' category.

The sixty-eight land use maps obtained via direct tracing from the 1:25,000 photography are contained in Appendix 1. Using a grid overlay, the land use changes for each sequence could then be quantified, and these are contained in Appendix 2. The change in total hectareage under different land use for the seventeen sample areas is shown in table 5.3 and the consequent projections for Svosve in table 5.4. The direction and magnitude of land use change in Svosve is also summarised in figure 5.12.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultivation</td>
<td>641</td>
<td>326</td>
<td>447</td>
<td>419</td>
</tr>
<tr>
<td>Dense woody</td>
<td>332</td>
<td>375</td>
<td>333</td>
<td>333</td>
</tr>
<tr>
<td>Sparse w'land/granite</td>
<td>295</td>
<td>259</td>
<td>304</td>
<td>272</td>
</tr>
<tr>
<td>Sparse w'land/grazing</td>
<td>409</td>
<td>652</td>
<td>570</td>
<td>622</td>
</tr>
<tr>
<td>Settlement</td>
<td>12</td>
<td>21</td>
<td>36</td>
<td>44</td>
</tr>
</tbody>
</table>

Table 5.3. Hectares under various land use - sample areas.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultivation</td>
<td>4149</td>
<td>2110</td>
<td>2896</td>
<td>2712</td>
</tr>
<tr>
<td>Dense woody</td>
<td>2149</td>
<td>2427</td>
<td>2155</td>
<td>2155</td>
</tr>
<tr>
<td>Sparse w'land/granite</td>
<td>1909</td>
<td>1676</td>
<td>1968</td>
<td>1761</td>
</tr>
<tr>
<td>Sparse w'land/grazing</td>
<td>2647</td>
<td>4220</td>
<td>3689</td>
<td>4026</td>
</tr>
<tr>
<td>Settlement</td>
<td>74</td>
<td>136</td>
<td>235</td>
<td>284</td>
</tr>
</tbody>
</table>

Table 5.4 Hectares under various uses - Svosve projections based on 15% sample.

The Chi-square test was applied to the projected totals to assess whether the differences in the relative contribution of each land use type between the years were significant. The most unexpected results were the changes between 1947 and 1965 in areas under cultivation and sparse woodland/grass. These are the factors isolated in Whitlow's
Figure 5.12 Land use change in Svosve 1947-1981.
subsistence land use scenario and of central interest to this study and therefore are the aspects of total land use on which further discussion will be concentrated.

In contrast again to Whitlow's scenario of an increase in area under cultivation over time, the only recorded period in Svosve in which there was an increase in area under cultivation was between 1965 and 1975 (see figure 5.12). The latter part of this period was one of substantial population increase (see figure 5.6) and this inevitably resulted in some adjustments in the relative proportion of land within each land use category as indicated in table 5.4. The response, however, was not as simple as has been suggested elsewhere. There were problems in accommodating new inhabitants forced off European farms via the tightening of the Land Apportionment Act regulations, as well as those people who found themselves ineligible for arable and/or stock holdings under the NLHA. In the late 1960s, rising dissatisfaction and the growth of the nationalist movement in the reserves, plus staff discontent and problems of maintaining personnel levels within the colonial administration, resulted in difficulties in enforcing legislation regarding resource use. There were undoubtedly cases of illegal settlement and cultivation in the grazing areas at the cost of that resource during this time (see grid 96 in appendix 1 for example). In other areas however, the response was to extend cultivation into areas of sparse woodland/granite (see grid 92 for example).

Also in contrast to the national scenario, there has been no gradual increase in area cultivated per person in Svosve (see table 5.5) as Whitlow proposed and attributed to declining soil productivity. The overall trend in Svosve between 1947 and the 1980s has been a decline in the area cultivated per person over time.

<table>
<thead>
<tr>
<th>Year</th>
<th>Households</th>
<th>Area under cultivation</th>
<th>Area cultivated per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
<td>246</td>
<td>4149</td>
<td>16.9</td>
</tr>
<tr>
<td>1965</td>
<td>312</td>
<td>2110</td>
<td>6.8</td>
</tr>
<tr>
<td>1975</td>
<td>450</td>
<td>2896</td>
<td>6.4</td>
</tr>
<tr>
<td>1981</td>
<td>630</td>
<td>2712</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Table 5.5 Change in cultivated area per household (ha) in Svosve calculated from air photography.

The restrictive land use policies in operation within African farming areas, particularly under the NLHA, no doubt contributed to the decline in average area cultivated per household between 1947 and 1965. The fall in cultivated area per household between 1975 and 1981 was probably due to the difficulties experienced by the local people in continuing normal farming practices during the period of the war of independence. Their biggest problem would have been in maintaining labour supply since many men, women and children were absent from their homes at this time and in response many fields were left to fallow which is reflected in the increase of sparse woodland/grass
over this period. Clearly, greater understanding is required regarding the system of household production in Svosve, the intensity of resource use and production figures, for conclusive statements on the causes and consequences of this decline in the man-land ratio. Further differentiation would undoubtedly occur between households. Once again, such complexity is not accommodated with the standard models of societal-resource relationships popular in Zimbabwe amongst both academics and planners, which do not incorporate the role of external policy initiatives on internal resource use.

By differentiating further between the sample areas in terms of population density (between categories 1 and 3 and 2 and 4), more specific suggestions can be made as to the role of population pressure in land-use change, in line with the work to date at the national level. The data on land use change obtained for the sample areas were amalgamated according to the original sampling categories and average figures were produced representing the land use histories of an average one square kilometre in those areas exhibiting higher than average population densities and in those that had lower than average densities. The averages for the two categories are shown in table 5.6. Spearman's Rank Correlation was used to confirm that those areas ranked high in terms of population densities in 1981 were also ranked highly in 1947, 1965 and 1975. Any potential effects of high population densities on land use change should therefore be operational throughout the entire study period. Figures 5.13a-d illustrate the land use histories of each category.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cultivation</th>
<th>Dense woody</th>
<th>W'land/ granite</th>
<th>W'land/ grass</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cat 1/3</td>
<td>30</td>
<td>19.9</td>
<td>7.7</td>
<td>38.9</td>
</tr>
<tr>
<td>Cat 2/4</td>
<td>21.8</td>
<td>21.9</td>
<td>22.1</td>
<td>29.1</td>
</tr>
<tr>
<td>1975</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cat 1/3</td>
<td>26.4</td>
<td>19.9</td>
<td>11.5</td>
<td>39.3</td>
</tr>
<tr>
<td>Cat 2/4</td>
<td>27.1</td>
<td>21.9</td>
<td>21.5</td>
<td>26.6</td>
</tr>
<tr>
<td>1965</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cat 1/3</td>
<td>20.9</td>
<td>21.3</td>
<td>11.9</td>
<td>44.2</td>
</tr>
<tr>
<td>Cat 2/4</td>
<td>16.9</td>
<td>26</td>
<td>22.6</td>
<td>33.9</td>
</tr>
<tr>
<td>1947</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cat 1/3</td>
<td>55</td>
<td>15.2</td>
<td>13.8</td>
<td>16.6</td>
</tr>
<tr>
<td>Cat 2/4</td>
<td>24.3</td>
<td>27</td>
<td>18.8</td>
<td>29.1</td>
</tr>
</tbody>
</table>

Table 5.6. Average land use histories according to category (hectares).

Application of the Chi-square test to the data indicated that the only significant difference between the categories in terms of their land use histories, occurred in 1947 when those areas experiencing greater than average population densities (classified in
Figure 5.13 a & b. Land use change in categories 1 & 2.
Figure 5.13 c & d. Land use change in categories 3 and 4.
1981) had a significantly higher proportion of area under cultivation than those with less than average population densities. This is a simple confirmation that in those areas where more people settled initially, they also brought larger areas into cultivation. By 1965, however, with the implementation of the NLHA, this pattern was no longer observed as all areas were reassigned and redistributed. There is therefore no evidence from the sample areas that population pressure alone stimulated any significant changes in land use. It may be that distinguishing between the categories using the 1981 average population density as a benchmark did not adequately differentiate between areas under pressure and those which were not. This requires further research. Most probably, land use change in Svosve has been the result of a combination of environmental and political factors rather than a simple response to population pressure. The impact of major policy initiatives such as the NLHA for example may be much more considerable than population pressure per se.

In the attempt to assess the applicability of theoretical models such as the scenario of population pressure within a subsistence society in practice, one further piece of analysis was conducted using the data obtained from the air photos for Svosve communal area. The land use histories of those areas categorised as experiencing erosion but differentiated according to their relative population densities were compared in order to assess potential effects of the presence of erosion on land use change. There were no significant differences between the categories as differentiated in this manner and as indicated by the Chi-square test.

In summary, this section has indicated that Svosve has not shown the classical responses documented for subsistence societies under pressure in terms of land use change. There have been no simple increases in area of land under cultivation, in the area per person cultivated or a subsequent decline and fragmentation of grazing resources. Just as with respect to stock holding and population concentration, major land use changes are more a response to 'external' factors such as policy directives and potentially climatic changes than population densities per se.

In addition, just as national level models have weaknesses in that they cannot accommodate the complexity of the local situation, there are variations within Svosve which are only illuminated via this further breakdown of sample areas into categories. Although care should still be taken in projecting any causal links between elements of pressure, it does appear that in areas where elements of pressure and signs of degradation problems are present (category 3), a wider variety of responses in terms of land use change are prompted. In category 3, the erosion problem may well have heightened awareness of the limitations of the grazing resource and therefore alternative
responses were sought. Further complementary work needs to be done to assess the potential impact on the environment of land use decisions such as that to expand grazing areas into bornhardt terrain. For instance, do these areas constitute viable 'grazing areas' in which successful resource improvement schemes can be established, or is the expansion detrimental to the resource base in the long term? Most importantly, the perceptions of the problem and motivations which prompt individuals to make such decisions, need to be more fully understood.

The erosion study.

Without compensating changes in inputs, intensity of resource use or level of technology, rising stock and human populations cannot be accommodated without some deterioration in the resource base. Soil erosion is one of the main documented outcomes of such pressure and the link between 'overstocking', 'overpopulation' and soil erosion both in the academic literature in Zimbabwe as well as in national and local historical sources, has been stressed. Local level analysis of stock and human populations and land use changes from a variety of sources has shown the complexity of the environmental, socio-economic and political history of the local situation, such that both academic and political endeavour in this area may be seriously questioned.

This quantitative analysis of land use change at the local level has reinforced the archival evidence of the previous chapter; it has confirmed the 'openness' of Svosve both to externally-directed government policies such as to move residents to Wedza and to internal responses such as to grazing shortages. This analysis has shown that the Svosve case study cannot be fitted into a simple model of human-resource relationship such as the 'subsistence land-use scenario' (Whitlow 1979). Such models are simplistic on two counts; firstly, they are unable to accommodate the role of political decisions which have been shown to be more important in determining access to the means of production than population pressure in Svosve and secondly, they underestimate the flexibility of responses on the part of the individual or the community.

This does not deny the potential seriousness of environmental degradation at the local or the national level, but that oversimplified conceptions of the problem, reinforced by technocentric modelling, may promote inappropriate, ameliorative rather than curative responses. This chapter uses sequential air photo analysis to quantify the change in the nature and degree of erosion in Svosve throughout the colonial period and details the contemporary erosion status in Svosve. The extent to which patterns of erosion change can be linked to the elements of pressure proposed within national models is also assessed. In addition, local level analysis provides the arena for the merger between
policy and implementation; the sequential air photo analysis is used to isolate the effects of government conservation policy on the erosion status at the local level.

Soil erosion and conservation in the field.

The three main forms of erosion by rainfall and the conventional distinction between mechanical and biological conservation methods were highlighted in Chapter One. The analysis in subsequent chapters of colonial conservation programmes implemented in the African sector showed clearly that the interrelated nature of sheet, rill and gully erosion were knowingly overlooked by the administration at the time. The technocentric model for conservation chosen and prioritised throughout the period, focused on the prevention of rill and gully erosion, the control of which could be little more than a holding operation in the light of the central role of sheet erosion in causing high runoff rates.

The construction of a series of contours at intervals down a slope, if adequately built and maintained, may present effective barriers to the build up of sufficient volumes of water at high velocities and therefore prevent the immediate danger of rill and gully formation in the arable block. However, contours also concentrate water. Water collects in the storm drains dug upslope of the barrier, which has to be subsequently redirected away safely into waterways. If these structures are not built to the appropriate standards, the runoff now concentrated in a defined channel, is likely to cause more problems than they were designed to prevent. For example, if waterways are not grassed, the velocity of water will not be slowed and will flow uninhibited over large distances. It is through poor construction and maintenance that the major problems with mechanical conservation works can stem. They can lead to gully formation at the point where contours drain into waterways or where contours break, allowing water to flow through. The major benefits of well-constructed mechanical conservation layouts is at periods of the year when vegetal cover is reduced, for example when crops have yet to be established.

Biological conservation techniques can influence both the impact of rainfall striking the soil and the amount of runoff which occurs. In addition they can restrict the movement of water across the land surface to some degree. The first function is a product of the height and continuity of the canopy and density of ground cover presented by the vegetation. Clearly, few agricultural crops present significant canopies during their maturation period, but they do produce vastly different degrees of ground cover, although this is in turn, influenced by planting densities. Groundnuts for example, through their leaf patterns present a denser ground cover than maize. As a result of the subsequent decreased energy of the water, infiltration into the soil is more
likely to occur. Crops also present some resistance to the flow of runoff across the field through their physical presence in the soil. Stems disturb the passage of runoff and therefore serve to dissipate energy. Different crops present varying resistance to flowing water and therefore the selection of particular crops and planting patterns can be useful biological conservation methods. As stressed already, however, the role of biological conservation techniques is inevitably very seasonal. In consequence, mechanical and biological conservation measures should be seen as complementary and a conservation programmes as necessarily incorporating both elements.

Although it was not the purpose of this research to stipulate precisely the cause of erosion in Svosve, gully erosion as the most visible form of soil loss has been shown to have been important in shaping colonial perceptions of erosion in Svosve. In addition, the conservation model promoted in the district in the past primarily addressed the prevention of rill and gully erosion. Extensive literature exists on the causes of gully cutting: see for example Stocking 1981), the main elements of which are detailed briefly here. Much of what is known about the causality of the most visible and often the most dramatic form of erosion, gully erosion, results from work done in the American southwest on arroyo cutting. A voluminous set of literature on the origin of these steep-walled, flat floored trenches excavated in valley floors variously known as arroyos (North America), Bocorocas (South America), Lavakas (France), and dongas or gullies in Zimbabwe, has concluded that they are the result of a complex set of environmental changes, some natural and some related to human activities.

It is well documented how change in an external variable such as climate, base-level or land use can trigger geomorphic events such as rejuvenation which in turn, initiates complex erosional and depositional responses (Schumm 1977). Such external changes, however, need not always be required for a significant geomorphic event to occur; abrupt erosional and depositional changes can be inherent in the normal development of a landscape. Patton and Schumm (1981) emphasise that gully cutting and filling may in fact be the normal means by which sediment is transported out of semi-arid drainage basins which have naturally high sediment yields.

The nature of the resisting vegetation has been shown to be an important factor in influencing the rate of gully cutting and filling; cutting starts when the tractive force in the channel exceeds the resistance offered by the valley floor. In semi-arid conditions with sparse, intermittent rainfall, it is difficult for a dense ground cover to develop without which promotion of infiltration and impediment of runoff are restricted, and therefore vegetation status can be critical in such areas. Occasional rainfall intensities, particularly in summer are likely to exceed the capacity of the ground to absorb water
and therefore sudden runoff and promotion of gullying is probable. Patton and Schumm (1981), however, suggest that it is unlikely that gully cutting and filling will be either initiated or stopped by vegetative changes.

The importance of physical factors in gully cutting has tended to be strongly overemphasised in the academic literature in Africa generally. Throughout the colonial period in Zimbabwe, to do otherwise within research or native policy, has been shown to be against the interests of the dominant group. Yet simple evidence against an anthropogenic origin to the gullying in Svosve for example, is the fact that the majority of the gullies appear to be of a similar age. Evidence from other sources suggests that population expansion (see figure 5.6) or the increased use of the plough (figure 5.14) in Svosve were neither ubiquitous nor simultaneous and therefore a consistent, synchronised response in the form of gully extension would not be expected. Some of the dangers of perpetuating such a conception of the problem of gully erosion in terms of the physical as well as the socio-economic environment in Svosve will be discussed in subsequent sections and chapters.

In summary, major gully systems are unlikely to be caused solely by human activity, yet they were regularly portrayed in this light by representatives of the dominant groups during the colonial period. Gullying on a smaller scale can, however, be a product of poorly constructed or badly aligned conservation works which serve to concentrate flows and fail to disperse runoff safely. Clearly, such a measure implemented in the name of resource conservation can serve to aggravate the overall situation. Sheet erosion is similarly subject to many determining factors; the degree of sheet erosion occurring is the outcome of the difference between the resistance of the soil and the energy of the water. Runoff itself occurs when soil moisture storage or the infiltration capacity of the soil are exceeded. Clearly the potential influence of human activity on these factors are very wide and more clearly identified than with respect to gully erosion.

Methodology.

The technique employed here replicates that used in the national erosion survey of Zimbabwe. This survey was designed to complement the extensive body of research already existent in the country, through providing a quantitative national baseline survey of erosion. The excellent aerial photography coverage for Zimbabwe provided the obvious data source, but a new methodology for data extraction needed to be devised to accommodate the scientific and logistical factors associated with the survey. The method had to be simple, systematic, quantitatively based and enable monitoring of erosion change. It had to be economical in terms of finance and manpower and it
The graph in Figure 5.14 shows the number of ploughs in use in Marandellas District from 1912 to 1936. The y-axis represents the number of ploughs, while the x-axis represents the years from 1910 to 1940.

Figure 5.14  Ploughs in use in Marandellas District 1912-1936.
should elicit information at scales appropriate for national and regional planning (Whitlow 1987).

The methodology devised for the national survey was on the basis of sample air photos selected through division of standard 1:50,000 scale map sheets into sixteen grid squares and analysis of the photo closest to the centre of each grid square. For the Svosve case study, all air photos were analysed thereby overcoming problems of sampling what is often a very localised problem of soil erosion. All four sets of Svosve photography were used to enable the assessment of change to be incorporated into the analysis.

The second stage of the analysis involved extracting the information from the air photos. For each of the four years, stereo pairs of photos covering the total Svosve area, were viewed at three times magnification under a Wild Avisopret APTI stereoscope. On an overlain, transparent template consisting of a 0.4 X 0.4cm grid (each cell thereby representing one hectare on the ground using 1:25,000 photography), the presence or absence of six forms of erosion were recorded as in the example shown in figure 5.15. Different symbols were used to represent the various combinations of erosion and land use and each template was photocopied in order that a permanent land use record for each part of the area could be presented. The grid squares provided a framework for the rapid recording of erosion and also served to reduce the inherent subjectivity of the interpretation. No attempt was made to separate sheet wash and rilling within the survey, since they invariably occur together and it is rarely possible to distinguish the dominant form operational in such cases.

The third stage of the analysis involved converting the annotated information contained on the templates into numerical data. For the national survey, this involved projection of data from the sample set. For the Svosve study, it was the simple process of counting the number of each symbol representing the various erosion forms for each set of air photographs, then amalgamating these to express the change in nature and extent of erosion over the time period. Information regarding the distribution of erosion remained preserved on the photocopied sheets.

Ultimately, an informed observer of air photographs is infinitely better than an uninformed one. Interpretation is greatly enhanced by an understanding of the type of relationship which can be expected to be present between the different erosion features in the landscape (Bergsma 1974). For example, a soil erosion sequence exists in which a series of erosion features and corresponding deposition features occur from the summit, along hill slopes and down to water courses. Such sequences are influenced by amongst other factors, relief, land management, substratum and climate,
Crop areas

△ Gully
△ Sheetwash/rilling
× Streambank

Grazing areas

● Gully
○ Sheetwash/rilling
/ Dambo

Figure 5.15 Template design and annotation used for erosion mapping.
but it is nevertheless possible to identify some generalised patterns. For example, erosion often increases with the distance from the hillslope divide; sheet wash occurs at the summit evidenced by a reticulate greytone pattern on air photographs, rill erosion becomes dominant towards the slope with a linear grey tone pattern being observed. Gullies may be evident further down the slope, starting off shallow and becoming deeper lower down and often in conjunction with severe sheet erosion. Familiarisation with such work and the fact that the study area was quite small enabling a concentrated period of fieldwork, made it possible to gain detailed knowledge of the area which aided understanding of erosion processes on the ground and improved the interpretation of the air photo coverage. Guidelines for interpretation forwarded by Williams and Morgan (1976) are reproduced in table 5.7 below.

<table>
<thead>
<tr>
<th>Erosion Feature</th>
<th>Air Photo Characterised by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet wash/rain splash</td>
<td>Light grey tones, especially at top and middle of hill slope. On dark subsoils, tones may be reversed, but normally lighter tones imply removal of topsoil.</td>
</tr>
<tr>
<td>Rills</td>
<td>Light grey tones in a linear pattern downslope. Slight definition of depth may be apparent under high magnification.</td>
</tr>
<tr>
<td>Gullies</td>
<td>Distinguished from rills by clear definition of depth.</td>
</tr>
<tr>
<td>-Active</td>
<td>Steep, unvegetated banks with evidence of slumping.</td>
</tr>
<tr>
<td>-Stable</td>
<td>Partially or fully vegetated banks</td>
</tr>
<tr>
<td></td>
<td>Association with outside of bends and light grey</td>
</tr>
</tbody>
</table>

Table 5.7 Guidelines for the interpretation of air photos (after Williams and Morgan 1976).


The changes in type and distribution of erosion based on mapping from aerial photography are shown in figure 5.16a-d. In 1947, the primary areas of gully erosion were aligned closely to the main river system in Svosve and were dominantly located in the grazing areas. By 1965, there was a secondary area of bad gullying in the north which was under arable cultivation. Throughout the later periods, gullying remains aligned to the river system, shows little sign of extension and sheet wash is sporadic and confined to the interfluves.

The change in extent of erosion by type is expressed in tabular form in table 5.8 and in graphical form in figure 5.17.
Figure 5.16a  The location and nature of soil erosion in Svosve, 1947.
Figure 5.16b The location and nature of soil erosion in Svosve, 1965.
Figure 5.16c  The location and nature of soil erosion in Svosve, 1975.
Figure 5.16d The location and nature of soil erosion in Svosve, 1981.
Table 5.8. Change in extent of erosion (hectares) by type.

<table>
<thead>
<tr>
<th>Type</th>
<th>1947</th>
<th>1965</th>
<th>1975</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Croplands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gully</td>
<td>89</td>
<td>89</td>
<td>69</td>
<td>42</td>
</tr>
<tr>
<td>Sheet/rilling</td>
<td>276</td>
<td>220</td>
<td>82</td>
<td>319</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>365</td>
<td>309</td>
<td>451</td>
<td>361</td>
</tr>
<tr>
<td><strong>Grazing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gully</td>
<td>264</td>
<td>390</td>
<td>366</td>
<td>256</td>
</tr>
<tr>
<td>Sheet/rilling</td>
<td>313</td>
<td>201</td>
<td>167</td>
<td>326</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>577</td>
<td>591</td>
<td>533</td>
<td>582</td>
</tr>
<tr>
<td><strong>Streambank</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>13</td>
<td>13</td>
<td>47</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1065</td>
<td>1055</td>
<td>1110</td>
<td>1061</td>
</tr>
<tr>
<td><strong>Dambo</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>98</td>
<td>142</td>
<td>113</td>
<td>71</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1065</td>
<td>1055</td>
<td>1110</td>
<td>1061</td>
</tr>
</tbody>
</table>

Clearly the change in overall extent of erosion in Svosve as identified from the air photos, has been very small, ranging from 9.6% of the total area in 1965 to only 10.1% in 1975. In relation to the national erosion survey (Whitlow 1988), this degree of erosion is classified as 'moderate' in that between 8.1 and 12% of the land area is affected. 27% of the Communal Lands as a whole experience more severe erosion than this, but it should be noted that with any sampling procedure such as used in the national erosion survey, there is likely to be localised areas in which erosion status is much worse and similarly, areas in which it is much less of a problem.

The Chi-square test was applied to the data in order to establish whether there were any significant differences in the relative importance of the various types of erosion across these dates. The Chi-square statistic confirmed that there are substantial differences in the relative contribution of each erosion type to the overall total of erosion in each year; although the total extent of erosion has varied very little over the period 1947-1981, there have been significant changes in the type of erosion. Some areas have deteriorated in condition, whilst in others conditions have been ameliorated.

Whilst little is known about the scope for or impact of individual actions regarding conservation, the pervasiveness of colonial conservation interventions in Svosve are known. The relative stability of the overall situation in Svosve as regards status of erosion may be attributed to the success of these internal and external conservation strategies combined. Despite the limited understanding of the former, the change in the relative importance of the different forms of erosion are linked to changes in the latter forces below.

Two of the observations highlighted via the chi-square test as to the relative importance of erosion types across the dates are the reduction in sheet erosion in the crop areas and the increase in gully erosion in the grazing areas over the period 1947-1965. In 1947, 40% of the communal area was under cultivation (see table 5.4) with many additional
Figure 5.17 Change in extent of erosion in Svosve by type.
areas showing signs of being under recent fallow on the air photographs. The rapid expansion in the use of the plough in the district in the 1920s and 1930s (see figure 5.14), undoubtedly enabled very large areas to be brought into nominal cultivation often in areas fairly unsuited to production. Problems of sheet wash and rilling in areas under cultivation were very prominent as evidenced by the 1947 photography; rills cutting across arable holdings and leading into small channel systems stand out very clearly and the many tracks and poorly constructed dirt roads are also focus points for sheet wash and gully formation.

The impact of conservation policy on the Svosve landscape were minimal at this stage. As discussed previously, centralisation and the associated programme of the demonstration of improved methods were the policies of the Native Department at the time, yet the former was not implemented at all in Svosve and the impact of the latter was restricted by the lack of extension staff in the area. Whereas elsewhere, contour building was being adopted on demonstration plots, there is no evidence of such activity in the case study area on the 1947 photography.

As indicated in figure 5.16a, gully erosion in 1947 was quite extensive but concentrated mainly along the line of the major river. As already discussed, the alarming gully erosion in Svosve was first referenced in the documentary evidence of 1945 and 1946. An area in the northeast of Svosve where the road entered the reserve was pinpointed by the Native Commissioner as hosting gullies big enough to hide trains in them. The air photography suggests that the majority of the gullying significantly predates this report, however. Many of the gullies were already relatively stable by 1947 as indicated by the vegetation identifiable in some of the systems. A comparison of subsequent sets of air photographs indicated that few gullies in this area showed any substantial extension over the period 1947-81 (see the case study example below). The reaction of the Native Commissioner to the gullies and his response in terms of a call for a gang of one hundred men, most likely reflected the thinking within the Native Department at the time; in terms of the increased awareness of soil erosion fueled by national and international events rather than a sudden intensification of the problem of soil erosion in Svosve itself. Certainly, the most visible form of soil erosion, gullying, was not a recent phenomena in 1945 as evidenced by the relative stability of the systems on the 1947 air photography.

The example of one area (grid reference 630730) shown in figure 5.18a illustrates some of the features of the 1947 landscape. Cultivation is seen to extend right up alongside the granite domes and along the streambanks and sheetwash and rilling are extensive. Pathways are broad, cross channels at points of gullying and traverse arable
Figure 5.18a  Case study area, 1947.
holdings in all directions. Settlement is concentrated at the upstream end of the secondary channel where gullying is also clustered.

By 1965, fairly substantial reorganisation of the reserve under the NLHA had had a profound effect on land use. The NLHA had been fully implemented in Svosve by the end of 1956. The removal from cultivation of those areas of Svosve which were marginal to agricultural use, such as the steeply sloping parts of the reserve and holdings adjacent to the ubiquitous granite blocks, undoubtedly contributed to the improvement in the erosion evident in table 5.8. The construction of contours in arable areas was accompanied by a marked decline in rilling identified on the air photos of 1965 and confirmed in table 5.8. Clearly, the high rates of runoff had been slowed by the contours serving to control rill and gully formation in the arable areas and concurrently, the accompanied sheet erosion also declined during the period.

The period 1947-65 also saw an increase in the amount of gully erosion in the grazing areas and a decline in sheet wash/rilling. Although the popular portrayal at the national level of this period was one of rising stock pressure and decline in the grazing areas, local level analysis has already shown that in Svosve, stock numbers varied considerably and by the early 1960s, the reserve area was considered substantially understocked. It is unlikely therefore that the increased problem of gully erosion in these areas during this period are due to overgrazing or stock pressure. The decline in rill and sheet erosion across the period 1947-65 may in fact reflect the decreased runoff as a result of vegetation regeneration under the low stocking levels. The increase in gully erosion may be partly accounted for by process of reassigning areas unsuited to cultivation or those showing signs of severe degradation as pastoral rather than arable areas under the NLHA. It could also be potentially attributed to the increased contouring in the arable areas serving to compound problems of gullying in the grazing areas.

Some of the effects of the NLHA in one study area can be seen in figure 5.18b. Settlement has moved north away from the gully sites, arable blocks have been consolidated and paths rerouted. The total area under cultivation has declined over the period as some fields were removed from cultivation and placed under fallow. The area to the east of the road which was in cultivation and was experiencing rilling in 1947, has been converted to pastoral use in 1965 and rilling/sheetwash problems are not as pronounced.

Between 1965 and 1975, the most significant deviation from the expected outcome in terms of the Chi-square test, was the relatively low incidence of sheet erosion and rilling problems in the grazing areas in 1975. In terms of the proposed national
Figure 5.18b Case study area, 1965.
models, it is advocated that the 1970s were a period in the communal lands of Zimbabwe of increasing population, uncontrolled settlement, fragmentation of the grazing resources and escalation of the problems of soil erosion. As outlined already within the discussion of land use change in Svosve, the experience of and response to 'pressure', particularly in the grazing areas, have been more complex than this. It is unfortunate that stock data for Svosve in the 1970s is rather lacking. The relatively low stock holdings in the 1960s as already suggested, may well have contributed to the reduced problems of sheet wash and rilling in the grazing areas of Svosve. Similarly, there were various responses to the need for increased arable areas not only an expansion at the expense of grazing areas. In this way, adverse effects on the erosion status in these areas may have been avoided.

The main changes in the case study area between 1975 and 1981 were the marked worsening of the situation in grazing areas with respect to sheet erosion and rilling problems. The early 1970s was a period of rising stock holdings in Svosve, and it is therefore likely that grazing pressure mounted with some effect on sheet and rill erosion during the latter part of the decade. In the crop areas, the need to accommodate more people and the opening up of new areas for cultivation with potential implications for erosion status, were partially offset by the return of many fields to fallow in conditions of absenteeism and shortage of family labour during the war of independence. As can be seen in figure 5.18d, the main changes 1975-81 have been in terms of land use with the state of the resources remaining very stable. Portions of the cultivated area are now under fallow and there has been minimal extension of the gullies. The mitre drains adjoining the road have been re-dug during this period indicating that government conservation work was maintained to a certain level at least within Svosve, despite the escalation of the war at this time.

Demographic and environmental change in Svosve: a discussion.

The analysis contained in this chapter has indicated that the changing human-environment relationship in Svosve has not been a straightforward one of increasing pressure and disharmony. Although the overall trend during the twentieth century has been one of growth, both human and stock populations have been subject to external policies which have served to interrupt any consistent increase in numbers. The overall extent of soil erosion as a problem identified from air photos also changed very little over the period 1947-81. Figure 5.19 illustrates the change in various parameters isolated within national modelling of 'societies under pressure' as indicators of environmental decline, drawn from the air photo analysis of this chapter and the documentary evidence from the previous chapter. It highlights both the discrepancies
Figure 5.18c Case study area, 1975.
Figure 5.18d Case study area, 1981.
Figure 5.19 Summary of changes in erosion, cultivated area, human and stock populations in Svosve 1940-1982.
evident between data obtained from multiple sources and the divergence of the Svosve case study experience from 'single hypothesis' modelling of human-environmental change already discussed.

The insights enabled through the variety of data sources incorporated in this analysis has confirmed that unicausal models of human-environment relationships are too simplistic and linear to accommodate the complexities of causal factors operating at the local level. Substantial variation in human and stock populations and associated indicators of 'societies under pressure' (Whitlow 1979), have been isolated, yet the overall extent of soil erosion in Svosve has been very constant. In addition, national level models are unable to accommodate the variety of either the experience of soil erosion or the responses to it, both at and within the local level. The nature and the location of soil erosion in Svosve has varied in response to both external policy directives and the diverse internal responses. The statistical techniques used in this study have shown few 'significant' differences in the land use or erosion changes between categories classified according to relative population density or erosion status.

Promoting generalised models of human-environment relationships courts the danger of responding via equally restrictive, technocentric conservation solutions; "the land may be conserved but peoples' predicament is ignored" (Cliffe 1988a p.52). As discussed in previous chapters, the colonial conservation model focused primarily on the control of rill and gully erosion via mechanical structures to control surface movement of runoff. Gully erosion, as the most dramatic and visible form of erosion was linked to mismanagement of lands within the dominant conception of soil erosion held at the national level at the time, and used to justify intervention into the Africa sector. The analysis presented in this chapter on the basis of detailed mapping of erosion change, has challenged this equation of gully erosion with human action. Although this analysis has not attempted to present ultimate causes or even suggest the relative importance of various contributory factors, the majority of gullies in Svosve were shown to predate the first set of air photography and the subsequent period of most rapid land use change. The stable gully networks in Svosve of similar age, weighs against an anthropogenic origin; the effects of demographic and land use changes in Svosve were spatially and temporally localised rather than ubiquitous or continuous.

In contrast to the place of gully erosion and mechanical conservation control methods within the dominant conception of soil erosion promoted throughout the colonial period, soil loss by sheet erosion and biological conservation techniques had minor roles. Sheet erosion, because it is less dramatic and less visible, is also the most
serious form of erosion. Whilst not denying that gully erosion is a contemporary problem in Svosve, the validity and usefulness of persisting to frame gullies as the ultimate evil to be avoided at all costs, possibly to the detriment of minimising loss of soil and nutrients via sheet wash is questioned.

The effects of forty years of promotion and implementation of the mechanical model for erosion control in Svosve are seen clearly on the physical landscape today. The effects of the conservation programmes in terms of the particular model for erosion control which they promoted, on the socio-cultural landscape will be addressed in the following chapters.
CHAPTER SIX. SOIL EROSION AND CONSERVATION AT THE NATIONAL AND LOCAL LEVEL IN THE POST-INDEPENDENCE PERIOD.

This chapter examines the extent to which colonial legacies have been dismantled or perpetuated in the contemporary political economy of soil erosion and conservation at the national and local levels. Independence and the new majority black government in Zimbabwe represented the coming to power of a new interest group. On the basis of informal interviews and analysis of official documentation, development plans and press and policy statements, this chapter constructs the post-independence conservation framework, firstly at the national level and subsequently for the case study area. The conception of soil erosion portrayed by central government and leading politicians, the proposed legislative and land use planning changes and the nature and content of conservation programmes are used to examine critically the way in which the problem of soil erosion is specified by this new interest group and how their conception of the causes influences the solutions advocated. Continuity and divergences with the past in these respects are highlighted throughout.

The national level.

The conservation framework.

Official recognition of the importance of the conservation of resources in Zimbabwe and statements of support, came very quickly after independence. At the first National Conservation Congress of Zimbabwe in 1980, Prime Minister Robert Mugabe pledged increased support for the Natural Resources Board and for the Intensive Conservation Area structure in the Commercial Farming Areas. Simultaneously he urged the need to extend rapidly the conservation movement into the communal areas;

"This area has been seriously neglected over the years in every way by successive governments which has led to the very poor state of conservation and productivity in this area generally" (Mugabe 1980 p.288).

The African farming areas are now receiving unprecedented attention both within research institutions and government circles. Immediately on independence, soil erosion together with other forms of environmental degradation in the communal areas, were being framed by both academics and practitioners within a set of interrelated agro-ecological, socio-ecological, socio-economic, infrastructural and institutional problems inherited from the past (see for example, Ministry of Lands, Agriculture and Rural Resettlement 1986). A burgeoning of research post-independence by Zimbabweans in
particular, led to a new sensitivity in the understanding of societal-environment relationships and the structural constraints operative.

Public statements regarding the commitment to resource conservation in the initial few months of independence were backed up in the early policy directives. Within the Transitional National Development Plan, the escalation of the problems of soil erosion and the subsequent decline in yields were explicitly linked to the conditions during the liberation war. The solution was an "active soil conservation programme" involving "technical measures and education of the people" (Republic of Zimbabwe 1982 p.61). For example, as a result of the war, control over the allocation and use of resources in the communal areas in the years up to independence was haphazard; the guerilla organisations as well as traditional chiefs became responsible for decision-making in many areas.

By the time the First Five Year National Development Plan (Republic of Zimbabwe 1986) was formally launched, official thinking regarding conservation had become more sophisticated. In including the "maintenance of a correct balance between environment and development" (p.3) as one of six primary objectives for the plan period, the government incorporated the central tenet of the World Conservation Strategy, the concept of 'sustainable development'. With the launch of the FFYDP, came a fresh wave of public statements emphasising the government's commitment to conservation, sustainable development and towards maintaining a balance between development aspirations and the environment. Excerpts from press statements at the time are contained in table 6.1 below. The Prime Minister's speech at the opening of the annual meetings of the African Development Bank and the African Development Fund is exemplary;

"Although in the past we have emphasised the need for economic recovery and progress, there has been a tendency not to give the question of the interaction between the environment and development the attention that it deserves, especially as regards our natural resources" (Mugabe 1986 p.4).

Similarly, the Minister of Natural Resources and Tourism publicly condemned the tendency for economic planning to be directed towards meeting external needs, predetermined goals and towards fulfilling certain production levels. "Development expectations should be related to the ecological, productive capacity of the continent and should meet the internal needs of our people" (Chitepo 1986a).
"Development without conservation is limited, short-sighted and short-lived" Chitepo (1986a).

"Despite all the glaring problems, Africa's crisis is not beyond hope. New approaches and new thinking are required and they have to accept the fundamental truth that the development activities have to be within the parameters of Africa's ecological stability. To achieve this certain concepts have to be reversed" Chitepo (1986a).

"We hear of the famine crisis in such places as the Sahel region of Africa, and one of the reasons for this crisis is that man, in trying to carry out development failed to take into account the need to conserve the environment" Mugabe (1986b).

"The issue of soil erosion is now a national problem whose seriousness permits no irresoluteness, half-hearted or forlorn measures" Banana (1986).

"While development provides for basic human needs through the transformation of natural resources into useful things for life, conservation on the other hand, ensures that resources necessary for this development continue" Mubako (1987).

"Development without destruction should be the cornerstone of Zimbabwe's environmental conservation programme" Chitepo (1987).

Table 6.1 The rhetorical commitment to conservation in independent Zimbabwe.

Maintenance of a balance between environment and development through sustainable resource use depends on local awareness of, individual participation in and commitment in all senses at all levels to conservation programmes. Hence, the FFYDP emphasised the need to strengthen and expand the key conservation institutions as well as articulating structural change such as within the resettlement programme. The plan specifically isolates over-crowding, overgrazing and deforestation as combining to cause severe soil erosion in the communal areas. This was in continuity with the conception of the environmental problems expressed in the Communal Land Development Plan of 1986;

"The most serious problems facing the country are soil erosion, overgrazing, indiscriminate removal of forest cover, lack of range management, cultivation of unsuitable land, lack of or poorly managed conservation works on arable land, siltation of rivers, pools and dams, illegal cultivation, squating and poaching. Underlying all these problems is the rapid growth of human population" (Republic of Zimbabwe 1986 p.65).

Malthusian principles concerning the relationship between society and resources are clearly reemerging in independent Zimbabwe in continuity with the colonial past;

"but simply blaming the evils on population growth is neither accurate nor realistic. The situation is the culmination of a century of colonial and post-colonial development patterns that have failed to create a sustainable way for the majority to improve their lives" (Chitepo 1984 p.2).
One month after independence, the Prime Minister pledged his support for the principles of the World Conservation Strategy and his government's commitment to the formulation of a National Conservation Strategy for Zimbabwe. The recently published document sets the guidelines for action regarding future natural resource use in the country (Ministry of Natural Resources and Tourism 1987). During the period of preparation of this document and particularly at the Conference/Workshop on the Implementation of a National Conservation Strategy in Zimbabwe held in Harare in November 1985, the problems of environmental degradation in the Communal Areas were once again linked explicitly with overpopulation, overgrazing and poor land use practices, but also to the challenges of the physical environment in these areas. In his opening address, Mr. Mugabe highlighted that only 17% of the country was climatically suited to intensive crop production and that much of this portion was too steep for successful production. However, his subsequent emphases were on future population growth which threatened to increase pressure on these marginal lands. Malthusian principles dominate the National Conservation Strategy but sensitivity in the conception of soil erosion is afforded to the inequitable distribution of land in the country and to the fragile environment. Population growth and imminent 'overpopulation' at a national level, however, are conceived to be threatening the success of both the resettlement and the sustainable use of resources in the country.

Specifically on arable lands, the National Conservation Strategy focuses on the lack of contouring in some areas and the marginal nature of much cultivation; "our rivers are in the process of silting due to erosion, due in turn, to streambank or unscientific cultivation" (Mugabe 1985 p.1 my emphasis). Erosion in the arable sector is conceived as being a problem due to a combination of climatic/environmental marginality and ignorance on the part of the cultivator. With respect to the non-arable land in the country, "only a small percentage of Zimbabwe's natural and semi-natural habitats have entirely escaped the influence of man" (Department of Natural Resources 1987 p.10). Persistent overgrazing and poor land management are highlighted as the cause of deteriorating stock and soil erosion problems in the grazing areas.

In summary, the independent government of Zimbabwe and central politicians at the national level have displayed a clear awareness of the problems of degradation in the communal areas of the country. However, the analysis has shown that the conception of the problem of environmental degradation generally and to some degree soil erosion specifically, has changed over the nine years of independence. Most of the environmental problems in the Communal Areas in the early independence period were framed explicitly in terms of the past. Soil erosion, however, was portrayed as a result of the haphazard conditions of control and use during the liberation war. In the
Transitional National Development Plan, an active conservation programme was called for involving 'technical' measures and education of local people, referring to a need to reconstruct contours which had been destroyed or allowed to fall into disrepair in defiance of the colonial regime. This was undoubtedly a substantial task considering the direction to the people, to firstly reject and then accept an identical model for erosion control, came from the same interest group.

The commitment to sustainable development within the First Five Year National Development Plan was a mature statement of the need for 'realistic' development goals which must ultimately accommodate the ecological realities of the country. The environmental challenge in Zimbabwe has become explicit both as a factor contributing to current problems of degradation as well as a factor in defining future development goals. In the most recent statement regarding the conception of soil erosion by the government, the National Conservation Strategy, the inherently poor quality of the land over a large proportion of the country and the additional threat of rapid population growth nationally, were conceived as the determining factors in the control of soil erosion and the sustainable use of resources in future. Within these latter statements, the limits to development and sustainability are internal to the communal areas themselves. Explicit reference to structural or historical origins are now less prevalent. The internal / external distinction within the conception of the cause and solution to soil erosion held at various levels, today and in the past, will be debated in subsequent sections. Although not the only dimension for distinction, it is a fundamental one which underlies the assessment of more specific policies.

The national government's commitment to translating rhetoric into action is clearly an essential component in achieving the objectives of sustainable resource development. It is the policies of central government which will determine whether resources are released for conservation, in what quantities and over what time period. The challenge to a developing nation in these terms alone are substantial and many were debated in Chapter Two. The challenges in ensuring commitment in practice at the local level test not only finances, but administration, extension services, grass roots institutions and ultimately, political support. Some of the specific challenges to the national government as they relate to the conception of the problem of soil erosion and the conservation response will be highlighted below through a detailed examination of the operational changes which have occurred since independence.
Conservation organisation.

Administrative changes.

As already suggested, the lack of an operational 'conservation movement' in the communal areas along the lines of the Intensive Conservation Area network existent in the Large Scale Commercial Farming Areas of the country, was a legacy the independent government was keen to modify promptly on coming to power. The inconsistencies in the conservation message promoted within the communal areas nationally and locally and the detrimental effects on the environment and on African enthusiasm, have been discussed in earlier chapters. The inadequacies of elements of the colonial conservation effort are clearly a contributing factor in the current status of environmental resources in the communal areas today. In 1982, provision was made for the establishment of conservation committees in each District Council area within the new District Council Act and these were to be the primary means through which the promotion and diffusion of the conservation message would occur at the local level. They were to be the mode of communication and action, through which better environmental management techniques could be disseminated and awareness of the need to conserve resources for future generations stimulated.

A second historical legacy, has been with respect to the multiplicity of organisations, ministries and departments involved in agricultural and conservation issues in the communal areas. However, these have in fact increased in number since independence. Coordinating the operation of these various institutions such that a consistent conservation message could be promoted and through which conservation efforts could be channelled in all areas, was one of the primary concerns of the National Conservation Strategy. The main ministries currently concerned with conservation issues are the Ministry of Lands Agriculture and Rural Resettlement and the Ministry of Natural Resources and Tourism. In addition there is the Natural Resources Board (NRB), the conservation committees of District Councils under the jurisdiction of the Ministry of Local Government Rural and Urban Development, the Department of National Parks and Wildlife Management, the Forestry Commission, voluntary organisations such as the Zimbabwe National Conservation Trust as well as the regional officers of UNEP, IUCN and SADDC. The National Conservation Strategy included plans for all Provincial Development Committees to establish a sub-committee for the environment; the establishment of an inter-ministerial committee for the Environment to coordinate the implementation of the National Conservation Strategy and the possible formation of a specialised Ministry to coordinate and administer legislation regarding resource use. There is also a Parliamentary select
committee on the environment planned, charged with reviewing current resource legislation, raising awareness amongst politicians and ascertaining the environmental implications of all legislation.

Local communities in Zimbabwe currently receive advice and information regarding conservation of resources via two main routes. Firstly through extension staff of the Department of Agricultural and Technical Extension Services (AGRITEX) within the Ministry of Lands, Agriculture and Rural Resettlement and secondly, via staff of the Department of Natural Resources and Tourism. These two routes to conservation advice are examined consecutively below. Continuities and divergences with the past are again highlighted.

On independence, the former Department of Agricultural Development (DEVAG) in the Ministry of Lands, Resettlement and Rural Development which had been responsible for extension in the Communal Areas, became amalgamated with the Department of Conservation and Extension Services (CONEX) which had served the large and small scale commercial farmers, to form AGRITEX in the new Ministry of Lands, Agriculture and Rural Resettlement. The AGRITEX officers have a central role in increasing the adoption of proven agricultural, conservation and management practices amongst farmers and thereby in increasing sustained production within all farming sectors. A Commission of Inquiry into the state of the agricultural industry in 1982 (Chavunduka 1982) urged large injections of funds, expansion of training facilities and the speeding up of recruitment of local staff as essential in enhancing the mobility of officers and in improving the success of the extension services. The main emphasis within much rhetoric surrounding the service has been associated with improving on the extension worker:farmer ratio (1:800 in 1982) in order to improve contact, success and therefore the morale of the staff. In addition to the field level staff, AGRITEX has soil and water conservation specialists based in the planning division. The structure of the soil and water conservation section of Agritex is shown in figure 6.1.

The extension model operative on independence was that inherited from the past; the 'classical' model of extension (Ngulube 1985) drawn from the United States. Characteristics of the model included the need for 'homophily' between the extension agent and farmer; that they were similar in certain attributes such as beliefs, values, education, social status and shared common meanings; extension agent and farmer differed only in their relative scientific education. Agricultural extension in the colonial period in Zimbabwe, was a top-down operation whereby innovations were communicated vertically from the Department of Research and Specialist Services.
Figure 6.1 Structure of Agritex.
and the University of Zimbabwe, down through field staff to farmers. Some of the shortcomings of this model with respect to soil erosion and conservation have already been discussed. Ultimately, the basic principle on which the model depended for success was lacking in the communal areas; 'source-receiver homogeneity' between extension officer and farmer, did not exist.

Despite this basic deficiency, the colonial administration persisted with the model for extension. From the discussion in Chapter Three, it can be seen that such a model which exalted one form of knowledge over another was easy to implement, furthered the political and cultural aims of the dominant group and was consistent with the development philosophy promoted by this group at the time; it served its purpose. It was also relatively successful in addressing the farming needs of the commercial farming sector. In the light of the almost total disregard for indigenous knowledge or for feedback concerning farmers' priorities or needs, 'extension' during the colonial period in Zimbabwe became effectively the dissemination and utilization of scientific knowledge only.

The limitations of this extension model are clear from the discussion in Chapter One. The top-down dissemination of one form of knowledge does not encourage the required sustained participation of individuals in programmes, and does not take advantage of the knowledge and skills held within communities. 'Farmer participatory' research and extension are gaining credence in the activities of governmental and non-governmental organisations in many areas of development, although they are limited to date in Zimbabwe. In recognition of the value of indigenous technical knowledge explored within farming system research and the need for sustained community commitment to development projects, the problem has been how to access such knowledge, to learn about it and to utilise it. Approaches such as the 'farmer-back-to-farmer' model (Rhoades and Booth 1982) and the 'farmer-first-and-last' model (Chambers and Ghildyal 1985) have attempted to develop practical ways in which farmers can participate in agricultural research, and in the dissemination of technical information.

On independence in Zimbabwe, the proclaimed socialist path to development in which local communities would define their own priorities and shape their own autonomous development, required concomitant changes in the national extension model. Only one author, however, has attempted to amend substantially the classical extension model operative within the country. Ngulube (1985) offered some procedures for changing farmers attitudes towards conservation via an alternative model for extension which stressed the systematic use of both scientific and ethnoscienctific knowledge. Instead of
a communication model such as the classical extension model, it was proposed that full common understanding would in fact be gained via extensive two-way communication. Since neither extension officer nor farmer has perfect knowledge, Ngulube advocates his 'problem solving, learning/teaching' approach;

"an approach which transfers the development initiative and decision making back to the people and which has as its philosophy, the development of human resources rather than the mere transferral of innovations" (1985 p.47).

Within the new model, farmers would be helped to look at their problem in the context of their full socio-economic and agronomic system. Communication is two-way as the extension agent learns how to adapt science to solve indigenous farmers' problems and also learns what portions of indigenous knowledge are relevant to the solution of current problems. Clearly, such an approach supports the community participation philosophy of the national government and incorporates the characteristics identified by the populist school of thought as being essential for the future conservation of resources; individuals must be involved at all stages in defining and planning as well as in implementing conservation projects, if their correct needs are to be identified and their participation is to be sustained. The model neither requires nor advocates substantial change in the structure of the extension organisation in the country. The change is more dependent on the attitude of existing personnel towards farmers and their problems; individual officers can modify the way they communicate with farmers, be sure to learn from them and to communicate their priorities to higher level staff.

The classical extension model currently persists within Agritex. There have, however, been some changes in the activities of officers and no doubt, in the attitudes of particular extension workers with respect to soil conservation programmes and policies. For example, whereas in the past it was the ground staff (the 'extension worker' at local level) who 'pegged' the conservation layouts and the arrangement of contour banks and storm drains, most is now done in many areas by conservation teams from the Regional offices of Agritex. The local extension officers are responsible for forwarding farmers applications for pegging services to the regional office and arranging for the subsequent visit by the team to the farmers field. The actual construction of the contour is up to the individual farmer and it is in this respect that local Agritex staff assist the farmer in advising on the correct construction and maintenance of conservation layouts. Most Agritex extension officers are resident in the local areas and are accessible in theory to deal with particular problems as they arise.
In practice, the change in responsibilities between officers post-independence has led to increased delays in pegging, since teams only visit once a year and individual farmers are awaiting the services of a team responsible for the entire district rather than the immediate area only. Such delays are also an inevitable result of a huge increase in the number of farmers requiring such services (not just the conservation pegging) in the post-independence period. How and when conservation issues are addressed with villagers in a specific community seems to vary a great deal. Staff do, however, receive communications via their district offices regarding latest recommendations from research establishments and are encouraged to attend 'refresher' courses in soil and water conservation.

The identification of farmers groups as a means of raising extension worker:farmer contact in the light of restricted resources, is well established in Zimbabwe. During the colonial period, extension services were concentrated on particular groups at several junctures; on plotters and coopters during the 1930s and 1940s, and on master farmers in the latter decades of that period. Post-independence, access to farmers groups has been widened by raised staffing levels in the communal areas and the removal of the major socio-economic and educational restrictions on membership. In Wedza communal area, Mashonaland East, a unique, government funded programme was established in 1982 aimed at further raising levels of contact and introducing new extension:farmer relationships. This ongoing project implemented by Agritex is part of the broader World Bank Training and Visit programme. In line with the aim of Agritex nationally, the project aims to increase production to gain household and national food self-sufficiency as well as to increase products to the markets. There is also, significantly within the Wedza project, a new emphasis on the adaption of technical recommendations and support services in response to the production constraints and felt needs of the farmers (Truscott 1985 p.1). The project was designed from the outset to "build upon farmers' initiatives to act together as a community in order to overcome perceived constraints" (Truscott 1985 p.2).

The project involves the identification of 'Farmer Extension Promoters' (FEPs). Communities elect a local farmer to act as an FEP, who then assists in the formation of farmers groups, is given some basic training and acts as a link between the farmers and the extension service. There is currently one extension worker per 850 farmers in Wedza and the twenty-nine FEPs now mobilise farmers in the area leaving the extension workers to concentrate on their agricultural training and demonstration. The extension workers still train the farmers but the FEPs do much of the follow-up work involved as well as identify farmers' needs, organise farmers and field or training days. Using previous studies, Truskott now concludes that as a result of the FEP...
programme, farmers receive extension advice more regularly and more of it takes place on the farmers' land than before. The problem of increasing contact between farmers and extension personnel is a persistent one. The success of the Wedza model suggests that benefits could be accrued through replication in other areas. Unfortunately, it has now been decided that the FEPs in the Wedza programme should receive payment for their role (Truscott 1986). Clearly, the prospects of replicating this model in other areas will now be restricted on financial grounds since the Ministry of Lands, Agriculture and Rural Resettlement cannot afford to create and pay what would effectively become another level in the extension hierarchy.

Conventional approaches to extension are also under change in a proposed national land use programme currently under experimentation in Mwenesi communal area, Masvingo Province. The programme is known as CAMPFIRE (Communal Areas Management Programme for Indigenous Resources). Within this, it is proposed that whole communities in large sections of the country which are unsuited to intensive crop production, will receive technical, financial and institutional support for the design and implementation of integrated policies for wildlife, trees, land and water. Voluntary participation, long-term solutions and systems of group ownership are also characteristics of this flexible programme with clear implications for soil conservation.

The second source of conservation advice at the local level is via staff of the Department of Natural Resources either on an individual basis or through their various educational and workshop promotions. The Department of Natural Resources itself lies within the Ministry of Natural Resources and Tourism and has three sections; the secretariat, extension and inspectorate divisions. The department works in conjunction with the Natural Resources Board towards creating awareness of natural resources, encouraging improvements and in guarding against the misuse of resources. Although the Natural Resources Board is an independent statutory body, it is serviced by the administrative and technical staff of the Department of Natural Resources and is also in close liaison with Agritex.

In 1986, there were 103 Land Inspectors within the Department of Natural Resources. It is the inspectorate staff who 'police' the use of resources and have the capacity to charge individuals whose actions contravene the Natural Resources Act (NRA) or related legislation. In practice, however, inspectorate staff continue in the main, to serve an advisory role similar to Agritex staff and the extension specialists of their own department. Inspectorate talk to farmers and explain why particular practices are encouraged or discouraged, although they themselves consult Agritex staff on all technical aspects of resource conservation. Inspectorate staff are less numerous than
Agritex staff and are therefore likely to be resident at District centres rather than in local centres. They liaise with the Agritex staff to isolate problem areas in each ward, such as cases where people are cultivating too close to a stream, and work together to plan an alternative layout for the area which would be more acceptable in terms of the NRA.

The Department of Natural Resources and Tourism has also continued its educational role post-independence. New initiatives such as the National Tree Planting day have been established between the Department of Natural Resources and the Forestry Commission to encourage reforestation and to promote awareness of conservation in general. Also within this department, a programme of District Consultative Conservation Workshops was initiated in 1985 to expand the department's awareness campaigns within District Council, urban and mining areas. For example, eight workshops were held in Mashonaland East during 1985 and 1986 (Rukambe 1986).

In summary, individual farmers in the communal areas of Zimbabwe therefore have two formal routes to conservation advice, both of which were established during the colonial period, but which have been expanded since independence. Although the Ministry of Lands, Agriculture and Rural Resettlement and the Department of Natural Resources and Tourism are now responsible for administering their services to both the former Large Scale Commercial Farming Areas (Rural Councils) and the Communal Areas (District Councils) in divergence from the past, the hierarchical structure of the departments has remained almost identical. Staff shortages and mileage restrictions and transportation difficulties experienced by local officers continue to restrict the contact between individual farmers and the technical personnel.

Legislative changes.

There are twenty-six statutes relating to resource use and conservation in Zimbabwe, the most important of which are listed in figure 6.2. However, the Natural Resources Act promulgated in 1941 but modified many times since, remains the most significant piece of legislation. This Act in 1941, gave the NRB the right to place orders on individuals concerning the construction and maintenance of soil or water conservation works; the preservation and protection of the sources, courses and banks of rivers and streams; the depasturing or limitation of stock; the prohibition or restriction of cultivation; the control of water including storm water; prohibition of erection of buildings or brick works which the Board considers to be too near a public stream and on the restriction of excavation of sand and gravel deposits.

Although contraventions of the NRA have occurred, it was not initially the policy of the Department post-independence to formally convict persons, such that in 1986 there had
Conservation of Natural Resources: An outline of Zimbabwean legislation.

Direct.

The Natural Resources Act. Chapter 150
The Parks and Wildlife Act, 1975
The Trapping of Animals (Control) Act. Chapter 134
The Water Act, 1976
The Regional Water Authority Act. Chapter 156
The Atmosphere Pollution Prevention Act. Chapter 318
The Forest Act. Chapter 125
The Bees Act. Chapter 122
The Communal Land Forest Produce Act. Chapter 247
The Rhodes Estate Act, 1978
The Regional, Town and Country Planning Act, 1976

Indirect.

The Rural Councils Act. Chapter 211
The Urban Councils Act. Chapter 214
The District Councils Act. Chapter 231
The Development of Tourism Act, 1975

Related.

The Animal Health Act. Chapter 121
The Plant Pests and Diseases Act. Chapter 128
The Noxious Weeds Act. Chapter 127
The Quelea Control Act. Chapter 130
The Locust Control Act. Chapter 126
The Fencing Act, 1976
The Communal Land Act, 1982
The Land Acquisition Act, 1985
The Agricultural Land Settlement Act. Chapter 137
The Rural Land Act. Chapter 155
The Electricity Act, 1985
The Road Act. Chapter 263
The Railways Act. Chapter 261
The Mines and Minerals Act. Chapter 165
The Hazardous Substances and Articles Act. Chapter 322.

Figure 6.2 Statutes relating to natural resource conservation in Zimbabwe.
been no convictions against the Natural Resources Act since independence (Tasosa 1986). The policy of the department since independence had been very much persuasion rather than prosecution;

"It is over-legislation in the communal lands which has left those areas in a very sad state. It is better to communicate with the people and create an atmosphere that is conducive to law enforcement" (Chitepo 1986b).

Recent developments, however, suggest that the policy of education rather than persuasion is changing. Convictions of both commercial and communal farmers under the Natural Resources Act are occurring; "eight years for education is enough" (Regional Land Inspector, Marondera 1989).

Although the legislation regarding natural resources use in independent Zimbabwe has changed very little since independence, the interpretation of the legislation at the local level varies substantially (see Bell and Hotchkiss 1989 for a discussion of legislation regarding use of dambo resources). Further local flexibility in legislation and interpretation has been introduced through the Communal Land (model) (grazing and cultivation) Bye-laws Act of 1984. This Act gives the District Council powers to make orders concerning control of grazing and cultivation areas, schemes for improving stock and crops and fixing standards of soil conservation according to the capacities and needs of their particular area. Monies raised through penalisation of people under these by-laws would then be attributed by the District Council and could be reinvested in the resources of the district. Problems are inevitably being encountered during the process of reorganisation under the Rural District Councils Act.

The flexibility in interpretation of legislation at the local level, although ideologically very sound and appropriate to the new political circumstances in the country, does, however, give rise to confusion if an inconsistent conservation message is promoted between officers either within or between organisations involved. Dividing responsibility for different aspects of conservation or successive elements of the conservation programme between different levels or sectors in the departmental hierarchy, can work against prompt solution of individual and community conservation requirements. These points will be elaborated on with respect to the case study area below.

Spatial changes.

Profound changes in the organisation of the conservation effort in Zimbabwe are imminent if the proposed policies on agrarian reform and communal land restructuring are operationalised. The first formal statements on options for agrarian reform in
Zimbabwe were put forward in 1985 by Lionel Cliffe in a technical appraisal for the FAO (Cliffe 1985). A subsequent symposium held in 1987, discussed and formulated priorities for intensifying and integrating the achievements made in resettlement and communal land productivity to date, within future rural development policies (Department of Rural Development 1987). It was recognised that performance between the resettlement schemes and between settlers had been uneven and achievements in productivity in the communal areas had been regionally and socially limited;

"These various considerations of the unmet needs and the complex problems of the most disadvantaged areas and households point to the need for a more intensive and broader-based strategy to promote rural development and one that will require restructuring of existing patterns of land use" (Department of Natural Resources 1987 p. 12).

The nature and content of this rural development strategy has yet to be finalised, the broad directions, from which the implications for conservation and sustainable development can be suggested are evident in the recommendations made by the Symposium in 1987, the details of the National Conservation Strategy and from interviews with local and national officers. One certainty is that several ministries and departments will be involved in the formulation of appropriate policy, legislation and institutions for effecting future rural development. Both the Ministry of Lands, Agriculture and Rural Resettlement and the Ministry of Local Government, Rural and Urban Development are currently involved in pilot projects, policy formulation and further discussions. The role of these two particular ministries are likely to be central in any rural development programmes. Their roles are also interrelated. For example, the Ministry of Local Government, Rural and Urban Development is currently formulating an 'integrated agricultural rural development' programme focusing on raising production and providing suitable residential plots in both the communal and resettlement areas. The restructuring of land use patterns is one of the Ministry's primary aims as one input for increasing agricultural productivity (Kunasingham 1989).

The precise model for the local level however, is formulated on the basis of land use plans assessed and drawn up by Agritex at regional offices. These resource inventories are also to be the basis for achieving the objectives of the National Conservation Strategy; "this organisation (Agritex), above all others will bear the brunt of the implementation of the National Conservation Strategy through the preparation of land use plans" (Department of Natural Resources 1987 p. 34). Officers from Agritex are currently involved in producing such plans for one village in each Vidco area and the target is that Agritex will plan all villages within seven years of the launch of the
Agritex assess the 'carrying capacity' of each village, establish the designation of land and outline suggested boundaries and potential settlement sites within the Vidco area. It is via the implications which such 'VIDCO planning option models' (Department of Natural Resources 1987 p.34) or 'resource planning models' (Department of Natural Resources 1987 p.23) have for the spatial reorganisation of farming activities and settlement patterns, that these policies have become commonly referred to as 'consolidation' or 'villagisation' programmes.

"The concept of consolidated villages stems from the need to restructure and reorganise the existing dispersed and isolated peasant settlements, to make for cost effective provision of social and physical infrastructure and services and to release additional land for agricultural development" (Communal Land Development Plan 1986 p.52).

Although neither 'consolidation' of land holdings nor 'villagisation' will necessarily be part of the agrarian reform in all areas, in the majority of cases, it is envisaged that some spatial reorganisation will be required. As well as enabling rural development, the consolidated villages form the ultimate stage in the creation of the seven tier settlement hierarchy.

Enhanced development of the communal and resettlement areas from this planning base will clearly depend on the resolution of associated issues such as tenure and rights to land. Whilst recognising the importance of security of tenure, the Symposium on Agrarian Reform in Zimbabwe concluded that individual freehold titles were not appropriate since they were likely to generate inequality, landlessness and indebtedness (Department of Rural Development 1987 p.26). They recommended a long term conditional lease to individuals, with community supervision of arable land use via by-laws outlining the proper utilisation and conservation of such resources. All resident households who presently farm the land would be eligible for such leases, with rights being withdrawn if people no longer cultivated those holdings. Relinquished holdings would then be reallocated to "more deserving members of the village" (Department of Rural Development 1987 p.29). Clearly, only those people actively earning a living from farming would maintain rights to arable land. Those people in "secure and gainful employment (will) be given least priority in land allocation" (Department of Rural Development 1987 p.29). It was also proposed that women should be accorded rights to land in their own capacity rather than indirectly through a male as currently operative. In summary,

"the land tenure system should place control over the agricultural land in the hands of those who actively farm and
manage the land and who get an income from it" (Ministry of
Lands, Agriculture and Rural Resettlement 1986 p.45).

It is intended that participation in any scheme by villagers be voluntary, but once a
decision has been taken at village level, all individuals are committed to involvement.
Local Government Promotion Officers from the Ministry of Local Government, Rural
and Urban Development are responsible for disseminating information regarding
consolidation from the District Administrator's office to the local people and also for
relaying in turn, individuals' fears and aspirations. The report of the Symposium
recommended that in time, Vidcos should take control over allocation of land and
regulation of land use from the District Council, with legal powers being invested in
them to back up the execution of their responsibilities. It also envisaged Vidcos taking
the leading role in the management of the common resources in the community.

The conception of soil erosion and conservation.

The problems of soil erosion and conservation in independent Zimbabwe have become
progressively bound up with far-reaching proposed land use and tenurial changes with
the passage of time. The overriding concern of the national government, currently, is
how to support a rapidly expanding population on a restricted resource base. In the last
few years, 'rationalisation' of resource use and 'efficiency' in physical and social
infrastructure provision have been promoted as the basis for sound management of
resources and for agricultural development in the communal areas. Despite the rhetoric
surrounding flexibility, various ministries and departments are presently involved in
formulating a 'model' for rural development appropriate to both the communal and the
resettlement areas. This model as currently taking shape, shows clear continuities with
the past, particularly in the "top-down specifying of ideal sizes of arable holdings and
cultivation patterns and of land-livestock ratios" (Cliffe 1988 p.52). The assessments
made of environments and resources in the area prior to reorganisation inevitably rests
on a calculation of the 'carrying capacity' of the region and the weaknesses that this
entails. Many are "as much guesswork as scientific estimate" (Cliffe 1988 p.54).

The Symposium on Agrarian Reform in Zimbabwe urged flexibility in assessment
according to the kind of farming system appropriate to each agro-ecological zone and
with regard to stocking levels to "give the needed flexibility to cope with drought and
the varied micro-climates" (Department of Rural Development 1987 p.21). However,
the rhetoric remains focused on 'rationalisation' with connotations which may threaten
sensitivity to the known complexity of the relationship between societies and the
resource base. There is a danger that herding practices or farming systems will be
overlooked in the urgency of reaching planning targets within the inevitably restricted
financial allocations for training and staffing of such a programme. The danger is that
the complexities of the local level will become lost in the blanket, centralised
prescription of solutions. As a result, the continuity with past programmes of spatial
reorganisation will become further entrenched; agrarian reform will become another
technocentric policy which negates the lessons learnt regarding the complexity of
indigenous farming systems and the specificity of the environmental challenges in these
areas. In recourse to conventional land management assessments, persistent tensions
for example between 'overstocking' and simultaneous shortage of cattle for ploughing
will not be resolved. Furthermore, knowledge which is available, for example,
regarding alternative agronomic techniques will be overlooked in the pursuit of
'rationalisation' and 'efficiency'.

The rationalisation of resource use is deemed essential for the conservation of soil
resources in future. In addition, measures in other parts of the rural sector are required
in order to reduce population pressure in the communal areas. The Symposium
recommended acceleration of the resettlement programme to a level that it significantly
contributes to limiting population increase in the communal areas, but also development
of other agricultural sub-sectors to absorb greater numbers in non-farm employment.
This document also links for the first time formally, the successful conservation of
resources in the communal areas with the adoption and implementation of a population
policy to minimise pressure on these areas (Department of Rural Development 1987 p.22).

"Whether the problem of the Communal Areas is one of 'overpopulation' or 'land
shortage' depends on one's perspective" (Cliffe 1988 p.53). As already stressed, in
the early years of independence, environmental degradation in the communal areas was
expressed in terms of the colonial past. The source of the problems of environmental
degradation were located externally in their association with shortage of land for the
population of the communal areas. Since 1986, with the publication of the First Five
Year National Development Plan and the National Conservation Strategy, the
conceptualisation of environmental degradation in the communal areas on behalf of the
national government has shown greater allegiance with the alternative perspective
highlighted by Cliffe; the cause of environmental degradation and the solutions now lie
internally within the communal sector, in rapid population growth and spatial
reorganisation respectively. Rather than the maldistribution of population in the
country being problematic and another product of the inherited past, the expansion of
cultivation and stock onto marginal lands are seen as a result of rapid population
growth per se.
Structural reform of land resources in Zimbabwe through the resettlement programme is still on the political agenda, but targets for the speed of transfer of people and the model for settlement have been modified in the light of changed political and economic circumstances. As discussed in Chapter Two, it is the realignment and realignance of class forces in Zimbabwe rather than race, which are shaping agrarian strategy currently. Recent emphasis within rural development statements have been towards movement of people within the communal sector rather than between sectors.

In summary, on independence, the new government of Zimbabwe inherited not only persistent problems of environmental degradation, but a great deal of 'well-entrenched orthodoxy' surrounding conservation;

"Not just in the texts and heads of the majority of old and new officials and politicians, but (in the) long-ingrained practices and blueprints, that are waiting on the shelves ready to be dusted off and slightly repackaged to fit the new political circumstances" (Cliffe 1988 p.51).

This analysis of the changing conception of the problem of soil erosion and conservation on the part of the national government, has highlighted an increasing continuity between present and past conceptions. It appears that the new dominant group in Zimbabwe is indeed dusting off those old blueprints for rural change. This is in spite of the much improved information which is currently available to policy makers. For example, whereas much soil erosion research in the colonial period was effected by natural scientists, the burgeoning research community in independent Zimbabwe has been important in overcoming many of the earlier bias. For example, authors such as Wilson (1986), Chavunduka (1978) and DuToit (1985) have been instrumental in drawing attention to the structural origins of contemporary environmental issues and in highlighting the sensitivity of indigenous environmental knowledge and practices to the environment and natural resource potential. In addition, the disruption to family life, to traditional means of coping and communication and to traditional environmental knowledge, of further centrally-planned movements of people, threaten to work against the encouragement of unified and committed communities so essential for sustainable development of resources.

Many of the stated socialist aims of the independent government overlap and reinforce those of sustainable development. Both demand, for example, considerable political commitment to ensuring that individuals and communities have the knowledge, resources and the institutions available to them to participate genuinely in forging their own development. The rhetoric frames the conservation and sustainable use of soil resources in future as a function of individuals' awareness and participation in resource
consolidation programmes in the communal areas; successful community representation through village development committees; and the effective coordination of local level technical and advisory officers. In practice, such objectives will only be achieved if there is an openness at all levels to alternative sources of knowledge and definitions of resource problems such as soil erosion. The increasing continuity identified at the national level between current and past conceptions of soil erosion, prioritising as it does, western knowledge and management principles, threaten the achievement of the mutually reinforcing benefits of socialism and sustainable development.

The Svosve case study area post-independence.

The following sections of this chapter focus on the political-economic framework for soil erosion and conservation in Svosve post-independence. On the basis of interpretation of regional development plans, informal interviews conducted with concerned parties and analysis of the nature and content of conservation programmes advocated and implemented in the area, the current conception of the problem of soil erosion in Svosve is presented and compared with those of the past. Emphasis is on the various perceptions expressed at different levels of the political and administrative hierarchy and the implications of such multiple perceptions for the future sustainable development of soil resources in Svosve. The structure for the conservation of resources at the local level in terms of the operation of new community institutions and local government activities is also critically overviewed.

Provincial developments.

The first clear policy directive for the future development of the Province were contained in the Mashonaland East five year Development Plan published in 1986. This document is drawn up by the Provincial Development Committee. It reflects both the development needs and the constraints within the Province as well as the six socio-economic objectives identified at the national level within the First Five Year Development Plan for Zimbabwe. In line with the national objectives, the Mashonaland East Five Year Development Plan itemised the conservation of resources as one of seven main development goals for the province over the next five years. Seven constituent objectives were outlined in order to achieve this goal. These were to;

1. Embark on re-afforestation programmes and ensure their continual management.
2. Provide contours to curb soil erosion where threatened.
3. Reclaim mechanically or biologically all gullies throughout the province.
4. Establish grazing schemes in the province.
5. Protect all catchment areas of existing and proposed dams.
6. Ensure observance of critical slope areas.
7. Establish game parks in suitable areas with the help of the National Parks and Wildlife Department.

(Mashonaland East Provincial Development Plan 1986 p.48).

As stressed, the Provincial goals were framed in the light of both the development needs as well as the constraints operating in the Province. Soil erosion was isolated as one of five such constraints hindering agricultural development. Others included land pressure caused by population increase; the impoverishment of arable land due to poor agricultural practices; the cultivation of unsuitable crop varieties contributing to poor yields and overgrazing and the encroachment of cultivation into grazing land.

The Mashonaland East Development Plan shows both consistencies with and divergences from the National Five Year Development Plan with respect to the conservation of resources. The differences inevitably reflect the challenges at the Provincial level. For example, within the National Plan, a balance between the environment and development is to be achieved by long term sustainable patterns of resource use through enhancing public awareness of conservation needs. At the Provincial level, there is a clear emphasis on the immediate remedial actions required; on reafforestation and gully reclamation projects. In clear continuity with the past and with national level statements, the emphasis at Provincial level remains on remedial actions and priority to the mechanical control of erosion via contouring. The most fundamental and pressing problem of sheet erosion is not addressed at this level as evidenced within official planning documents.

When questioned about the problem of soil erosion in Marondera district specifically, a senior Provincial Official felt that soil erosion in the District was serious and had two origins; firstly the proximity of the area to Harare and secondly that "we are overcrowded and overstocked and resettlement needs to be speeded up" (Ziyenge 1986a). He suggested that people have cut down trees in the district for sale in Harare and soil erosion was occurring as a result of deforestation. In each case, either the cause or the solution to the problem of soil erosion was located outside the district. He perceived a causal relationship between too many people, too little land and environmental degradation. On the basis of this perception of the problem, he advocated the speeding up of the resettlement programmes as the solution (see table 6.2 in the final sections of this chapter).

The role of local community institutions in defining and planning conservation priorities for action at provincial level was clearly promoted by the Minister for Natural
Resources and Tourism at the Provincial Conservation Consultative Workshop in Marondera in July 1986. The concern was emphatically on education however. Speaking to District representatives, Mrs Chitepo stressed that;

"Environmental responsibility should permeate to all levels of our society. Until the lowest level of our society appreciates the need to conserve our natural resources, your task remains difficult. It is therefore important that you make maximum efforts to influence the change of attitudes towards conservation activities of Vidcos and Wadcos in planning conservation awareness programmes in order to change our people's approach to environmental protection and create a deeper perception on the misuse of our natural resources....Ignorance and lack of conservation awareness are the major aspects of conservation problems...It is my hope and belief that once a unified approach is made to educate the rural populace, Zimbabwe could easily win the war of conservation by fighting ignorance amongst the people and creating a greater conservation awareness" (Chitepo 1986c).

The Minister continued to emphasise that raising the status of natural resources committees and their importance in the eyes of the community were critical to ensuring commitment and sustainable development;

"This calls for provincial planners to base their development on sound environmental and ecological bases as only such an approach will ensure the success of our development plans" (Chitepo 1986c).

The Provincial Governor at the same workshop reinforced his commitment to the Minister's sentiments;

"The time for rhetoric is certainly over. We should turn all our mobilizing slogans into action. We cannot feed our people on mere slogans but on sound land management systems. I want to stress that our national Development Plans depend on proper management of natural resources and therefore, I can assure you that I, on my part shall always encourage and promote conservation awareness to guide development plans in the Province" (Ziyenge 1986b).

**District developments.**

District Development Plans are formulated by District Development Committees (to be known as Rural District Development Committees after the promulgation of the Rural District Council Act) and are approved by the Rural District Council. An analysis of Marondera District Projects by sector is shown in figure 6.3. Agriculture and water development are prioritised as is infrastructural expansion. The main proposed commitment in monetary terms to resource conservation in particular in the district, centres on grazing schemes, dip provision and dam construction.
1 Agriculture and water development
2 Infrastructure and communications
3 Education
4 Health, social, cultural and welfare facilities
5 Settlements, commercial and industrial activities

Figure 6.3 Marondera District project analysis by cost.
When interviewed, one senior District official did not perceive a particularly serious problem of soil erosion in Marondera District. With specific reference to Svosve he stated that,

"The only problem was too many people in too small an area which was leading to many stock and human tracks and paths which was resulting in gullies following along these lines - that is why you don't get the problems of erosion in commercial farming areas - but this problem is being solved by the resettlement scheme" (Chikomo 1987).

He attributed erosion problems to the hilly nature of Svosve and contrasted it with Chiota communal area; "because of the lack of hills in Chiota, erosion is not a problem except where water concentrates in tracks" (Chikomo 1987). He clearly perceived the problem of soil erosion as essentially an environmental (i.e 'natural') problem aggravated by human and stock densities.

In line with the Provincial priorities already discussed, the Department of Natural Resources is concentrating its conservation efforts in Marondera district around gully reclamation, wood growing and grazing schemes. With respect to soil erosion problems, a senior regional officer concerned with extension expressed the essential need to promote awareness in the district (Rukambe 1986). He attributed soil erosion problems in the crop areas mainly to poor husbandry methods and specifically to incorrect planting densities. He suggested that in the grazing areas, illegal settlement had led to a reduced grazing area and therefore to a concentration of the problems due to animal trampling and the general decline of the grazing resource. He advocated methods designed to improve carrying capacities in the grazing areas such as using improved grass varieties and employing rotational grazing systems. With respect to the crop areas he urged closer collaboration with the 'experts' in Agritex to ensure proper mechanical conservation layouts and educational programmes to improve farming methods (see table 6.2).

A senior regional official concerned with inspection perceived the cause of the problems in the same terms, but perceived different solutions. The former extension official foresaw internal solutions to the problems; he stressed measures to improve husbandry and to raise the carrying capacities rather than external solutions such as destocking or resettlement. The latter official perceived the problem to be due to individuals' inability to build contours properly due to the labour required in their construction, and as such the solution lay with the government to provide funds for tractors and conservation gangs; "the other government did it before" (Regional Land Inspector 1986). His perceived solution to the problems in the grazing areas was the rationalisation of land use through the consolidation of villages and a reduction of cattle
numbers through incentive schemes to encourage farmers to sell off cattle (see table 6.2).

**Developments in Svosve.**

The conservation framework.

As already stressed, the six Vidco units of Svosve constitute one ward within the new administrative structure of the Province, and combine with the six wards in Chiota to make up Rhudaka District Council. The Village Development Committee areas in Svosve were shown in figure 5.4. All six Videoos in Svosve have well established development committees and hold regular meetings. The most visible growth to date in Svosve has been in the construction of school buildings and housing for government employees, with two Local Government Promotion Officers (LGPOs) from the District Administrator's Office now resident at Drihori. Assisting and improving the operation of Vidcos in the Ward is one of the primary roles of these officers (LGPO 1987). Specific projects proposed for Svosve within the Marondera District Development Plan include dam building, a Grain Marketing Board depot at Drihori, electrification of the Rural Service Centre, a police station and village court, new roads, grazing schemes, wells and cattle sales pens.

The Rhudaka Natural Resources Committee formed within the provisions of the District Council Act Amendment of 1982, had its first meeting in January 1983 and some indication of conservation issues prioritised in the study area since independence, is evidenced by items discussed at subsequent meetings of this committee. The Committee has thirteen members, half of whom are appointed by the District Council (i.e. are councillors - one per ward), with the remaining members appointed by the Ministry of Natural Resources and Tourism. Although the Natural Resources Board recommends monthly meetings of the Natural Resources Committees, the Rudhaka committee has averaged only three meetings a year since its formation. These meetings are held in the Council board room at Mahusekwa in Chiota Communal Area. Matters arising at past meetings have included contour pegging and gully fencing, tree cutting, use of sledges, garden cultivation and national competitions such as in tree planting. In their February meeting of 1983, gum planting projects were proposed for Svosve but,

"Since members of Svosve ward were absent nothing was passed about the ward, but the committee chairman pointed out that a message would be sent to Svosve" (minutes of the meeting of Rudhaka Natural Resources Committee 17.2.83).
By August 1983, the problem of non-attendance of Svosve members at the meetings was attributed to the transport difficulties between Svosve and Mahusekwa. Clearly, the problems of having physically disparate areas coming under the same jurisdiction were already being felt. It is unlikely that the environmental concerns of the Svosve area were being adequately discussed or forwarded in the absence of a representative from that ward. Since each ward has only one representative on the committee, doubt arises as to the effectiveness of this forum for forwarding the priorities of Svosve residents at any time, since the Svosve member is invariably outnumbered by six to one.

The District Administrator is trying to encourage Natural Resources Committees to forward proposals to the District Council for the establishment of by-laws concerning particular resource problems in their localities under the Communal Bye-laws Act. One senior district official conceded that "Rudhaka District Council is only just beginning to think about formulating its own by-laws" (Chikomo 1987). One of the problems he highlighted was the constant reshuffling and reelection of members on these committees.

The importance of definition from below of conservation priorities is clearly highlighted by the Provincial Governor in his speech at the opening of the Rhudaka District Council Natural Resources Workshop in May 1986. Speaking to Ward representatives, local officers and interested parties, he stated that;

"You, the people, the users of resources shall be expected at the end of the workshop to come up with correct solutions to the problems you will have identified.... with the advent of the people's government, the people from Vidco, Wadco and District levels are now being consulted and no longer does central government impose solutions to these problems like in the past. It is true to say that where such solutions are imposed without understanding and involvement of the people, there is a resentment to implement the discussions. The result has been the continued degradation and deterioration of our natural resources. Soil erosion in some areas has continued unabated, overgrazing has become the order of the day, siltation has been accepted as an inevitable course in life and deforestation and stream bank cultivation has become a way of life. We all know that these bad practices on our lands bring misery and unhappiness to all our people.... we hope this workshop will assist in the planning of conservation projects you would like to see done at your Vidco and Wadco level....Unless proper conservation practices are practised even the most expensive resettlement programmes will become useless as the once newly acquired land for the people will be impoverished in no time....I wish to comment on the efforts and contribution made by the Department of Natural Resources in initiating and organising this workshop. I wish the Ministries and Departments could adopt the approach to come out
more to the people and discuss with the people, rather than directing government policies from some offices in Harare or Marondera" (Ziyenge 1986c my emphasis).

At present the Rudhaka Natural Resources Committee seems to have gone into a state of 'limbo', awaiting the commitment of Vicos to the spatial reforms which have become known locally as 'villagisation'. This seems to be true of many of the local institutions; "the Vicos main role now is to encourage the villagisation programme" (LGPO 1987). The understanding at the local level as regards this new programme of villagisation is that capital projects such as building, house upgrading and borehole provision should stop, awaiting the replanning of villages. "There has been one hundred percent acceptance of the concept of villagisation in Svosve and peoples' understanding is very good" (LGPO 1987).

Conservation organisation.

Currently, as already discussed, the local officers from Agritex and the Department of Natural Resources are the source of conservation advice and information for most people in Svosve. Two Agritex officers are resident at Drihori and the Land Inspector responsible for the area is based at Macheke, but makes regular visits to Svosve on request by LGPOs or the Agritex staff. It can be assumed that the conservation message which these officers convey to farmers will be related to the conception of the environment and perception of soil erosion which they themselves hold. These perceptions are, in turn, influenced by their training, the details of which are highlighted here.

All Agritex field level staff have a Diploma in Agriculture gained through two years of study at one of either government training schools at Mlezu or Esigodini. Each officer therefore receives training in aspects of animal and field husbandry, engineering and horticulture. Further training for more senior staff may be obtained at the University of Zimbabwe. Each District has one Conservation Officer who receives specialist training in soil and water conservation prior to appointment. The principle is that training of local level staff (extension workers) takes place at the local level according to local needs under the guidance of this Conservation Officer (Hlakuhle 1986).

The District Conservation Officer disseminates conservation information via two main routes; annual refresher courses to extension staff and through his attendance at monthly meetings of the Natural Resources Committees of District Councils. The Marondera District Conservation Officer is based in Macheke and holds annual refresher courses focusing on practical classes on the pegging of contours, the
PAGE NUMBERING AS ORIGINAL
the grazing areas, what he perceived to be the primary cause of the problem and how it should be dealt with.

The physiographic and climatic characteristics of Svosve render it naturally susceptible to the problem of soil erosion. However, the conception of the problem of accelerated soil erosion in Svosve held at various levels in the administrative hierarchy reflect strongly those held at national level, with little acknowledgement of the environmental, socio-economic or cultural specificity of the local area. At the Provincial level for example, overstocking and overpopulation are perceived as the source of the problem of soil erosion in Svosve in line with the message portrayed generally for the communal areas. The perceived solution, resettlement, was also in line with that held at the national level at that time (1986). At the district level, the conception of the problem is very similar, but solutions focus more on ameliorative measures such as gully filling and reafforestation.

It is these local officers of the Department of Natural Resources and Agritex who currently have the greatest level of 'formal' contact with local farmers in Svosve. Their perceptions of the problem of soil erosion will therefore strongly influence their own commitment towards encouraging particular conservation responses amongst the populace. Table 6.4 highlights starkly the continuity between the perceptions of the problem and solutions at this level with higher officials, including those at national level. This undoubtedly reflects their training and exposure to 'official' priorities communicated from above. The continuity with the past reflects both the trends currently at national level identified in earlier sections and the length of service of these officers which in all cases extended back significantly into the pre-independence era.

Although the environmental constraints of the area were known and appreciated, this served to strengthen their allegiance to national level prescriptions. Their conceptions of the problem and perceived solutions did not include any sensitivity to the environmental variation at the local level. Similarly, the experience of contact with the local people did not appear to influence these officers' conceptions of the problem of soil erosion. There was no sensitivity to individual's problem, needs or potentials within the conception of soil erosion held at this level.

There are however, elements of the conceptions of soil erosion displayed by these officers which reflect their knowledge and experience in the local area which were not evident at many of the upper levels. There were also differences between the officers in this respect. For example, for one extension officer, he perceived an internal problem of overpopulation leading to cultivation encroaching onto marginal lands. His perceived response however, was external via the resettlement scheme. His
perceived solution to problems of degradation in the grazing areas focused on internally-directed destocking and grazing schemes. In contrast, the second extension officer perceived resettlement to be the required solution to both the externally derived problems of land shortage for cultivation and for grazing. Knowing the environmental limitations of the areas, he perceived resettlement to be the only answer to problems of degradation in both sectors.

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<tr>
<th>Level</th>
<th>Cause</th>
<th>Response</th>
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<td>Provincial</td>
<td>Overstocking/over-population</td>
<td>Resettlement</td>
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<td>Deforestation</td>
<td>Reafforestation projects</td>
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<td>Regional (Inspection)</td>
<td>Overstocking/illegal settlement</td>
<td>Pasture improvement measures</td>
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<td>Poor husbandry</td>
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<td>Regional (Extension)</td>
<td>Poor construction of contours</td>
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<td>Poor farming methods</td>
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<td>Unplanned settlement</td>
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<td>District (Extension)</td>
<td>Overgrazing/stocking</td>
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<td>Environmental factors and overstocking</td>
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<td>Overpopulation</td>
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<td>Grazing shortage</td>
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<td>Poor husbandry</td>
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Table 6.2 Perceived causes and related responses to soil erosion.

The conception of soil erosion in Svosve amongst Vidco Chairmen.

Although there are no blueprints for the role of Videcos in the community since the central concept of their formation is that they should have varying functions according to the needs of their particular areas, they clearly have a significant promotional and
consultative role in the villages and therefore an important potential role in the advancement of conservation. The six Vidco chairmen in Svosve were interviewed in order to assess their conceptions of the environment in Svosve and particularly their perceptions of soil erosion, in recognition of their influence in directing the future use of resources in the area. These men were not agricultural or conservation specialists. Half of them were indeed only part time farmers with their major role being as teachers.

The most striking conclusion to emerge from the interviews with chairmen of the Village Development Committees, was the wide range of responses given to the questioning in continuity with the situation isolated at Provincial and District level above. These Village Development Committee Chairmen are the representatives of the local people and are responsible for articulating their development needs to the next highest level in the hierarchical structure. Clearly, if they are conveying a narrow or inconsistent model of conservation, this may be important in affecting perceptions of the problem of soil erosion at the individual level. The direct quotations from a selection of interviewees presented below illustrates the range of perceptions involved.

| "Most people don't know the value of the contour ridges and don't maintain them". |
| "Every farmer understands the need for contours". |
| "It's yourself who stops soil erosion (through contour construction) not the crops". |
| "Soil erosion is not a problem in the grazing areas". |
| "Soil erosion is mainly a problem in the grazing areas". |
| "Maybe resettlement will solve the problem or maybe the problem will just be transferred to the resettlement areas". |
| "If you make contours, rain goes along contours but makes dongas at the end of them". |
| "Everyone has other farming problems, but the biggest one is soil erosion as all the soil could be taken away". |
| "People have very little understanding and are therefore unwilling to do the work." |

The chairmen's responses are summarised in table 6.3 in which their perceived causes and solutions are classified according to their environmental, technical, educational, structural, governmental or community roots. Clearly, the range of causes of soil erosion perceived by the chairmen is large and their conceptions of the required conservation solutions varied. Most mention the natural susceptibility of the area to erosion due primarily to the mountainous nature of Svosve and the high rainfall received. Structural factors also feature prominently in their responses, including the contributory role of marginal cultivation in accelerating erosion.

The responses are amalgamated further in table 6.4 in which the frequency which the group as a whole referred to the cause or solution to problems of soil erosion in the particular terms are shown. In summary, structural factors dominate the cause of soil erosion as perceived by the six chairmen; environmental and educational limitations
constitute secondary but important factors and technical inadequacies are also prioritised. The categories are not absolutely distinct, however, since the failure in the technical measure (contouring) may have been attributed to educational deficiencies, for example.

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<td></td>
</tr>
<tr>
<td>Organisation/supervision</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Table 6.3 The conceived causes of soil erosion and perceived conservation solutions amongst Vidco Chairmen in Svosve.

<table>
<thead>
<tr>
<th>Causes</th>
<th>No. of References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural</td>
<td>8</td>
</tr>
<tr>
<td>Educational</td>
<td>6</td>
</tr>
<tr>
<td>Environmental</td>
<td>6</td>
</tr>
<tr>
<td>Technical</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 6.4. Summary of perceived causes and solutions to soil erosion in Svosve by Vidco chairmen.

All chairmen stipulated a lack of knowledge as being a causal factor in relation to soil erosion on either crop or pastoral areas, yet as highlighted, their own perceptions of causes and required solutions vary enormously. For one chairman, conservation started and finished with the construction of contours and his conceptions of soil erosion did not extend beyond the crop areas. Another in contrast, observed a causal link between poorly designed contours and gully formation in the crop areas. For
several VIDCO chairmen, the problem of soil erosion was mainly located in the grazing areas with their perception cantering on large-scale gully formations.

Table 6.4 also indicates the chairmen's perceived location of conservation solutions. There were nine references to the need for central government commitment, including extension of the resettlement programme, financial provision for fencing and dip construction, for enforcing legislation and for providing enlarged grazing areas. Community responses commanded lesser priority although the need for collective action with respect to the management of the grazing areas was highlighted on four occasions.

Clearly, the perceived conservation solutions are strongly related to the individuals conception of the cause of soil erosion. The large emphasis put on structural causes to soil erosion by the Vidco chairmen acknowledges the historical roots to the problem and their perceived necessity for state intervention once again in solving the problem; resettlement for many is the necessary prerequisite for solving the problem in both crop and grazing areas. Environmental factors feature prominently in the chairmen's conceptions of the problem of soil erosion and reflects their knowledge of the local area, yet accommodating these constraints were once again perceived as being beyond community control or capabilities.

In summary, the widely divergent views of soil erosion held by the Vidco chairmen appears to be a function of conceptual disarray rather than any active disagreement between officers. As stated above, these chairmen are not necessarily conservation specialists, and for three of them, farming was not their primary source of income. The new Vidco institutions at the local level are multifunctional but are in the early stages of operation. The cacophony of competing interpretations expressed by the chairmen regarding soil erosion in Svosve were a function of a lack of vision beyond the individuals' experience, in the light of the absence of training or directives for these officers.

Contemporary conservation priorities and directions in Zimbabwe: a national / local comparison.

The primary contemporary issues regarding soil erosion and conservation identified from secondary sources and interviewing at the national and local levels are shown in table 6.5. The perceived constraints and needs are categorised into environmental, political/structural, technical and educational factors.
<table>
<thead>
<tr>
<th>National</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Too many people in too small an area. Hilly nature of Svosve. Heavy rains and steep slopes.</td>
</tr>
<tr>
<td>Only 17% of the country climatically suited to intensive crop prodn. Large areas unsuited to crops being grown or to cultivation per se.</td>
<td>Resettlement required. Enlarged grazing provision needed. Marginal cultivation due to land shortage in Svosve. Govt to enforce legislation more strongly. Funds for tractor and conservation assistance required.</td>
</tr>
<tr>
<td>National govt. committed to reorientating economy away from economic progress to ensuring balance between environment and develop. Continued support for resettlement. Various agrarian reform options under consideration. New administrative structure.</td>
<td></td>
</tr>
<tr>
<td>Knowledge regarding conservation benefits of tie-ridging and mulch tillage exists but not being strongly promoted. Contours dominate conservation message.</td>
<td>Individual problems with continual breaking of contours. Poorly aligned roads and water courses leading to individual problems. Increased technical support desired.</td>
</tr>
<tr>
<td>Strengthening of local conservation institutions to increase local awareness. Indiscriminate removal of forest cover, lack of range management, poorly managed conservation works, illegal cultivation and squatting deemed to be rife in communal areas. Natural Resources Conservation committees, Dept. Natural Resources activities and Communal Land Bye-law Act all increase local definition of needs.</td>
<td>'Most people dont know the value of contours and dont maintain them' 'Every farmer understands the need for contours'. Rhudaka Natural Resources Committee problems of staffing and operation. Need for ministries and departments to come to people and discuss issues. Collective action / organisation needed within community.</td>
</tr>
</tbody>
</table>

Table 6.5 Contemporary conservation priorities at national and local levels.

Environmental.

The inherently poor quality of the environmental resource in many of the communal areas was isolated on independence as a primary reason for low productivity in the sector and a direct result of discriminatory colonial land laws. The rapid improvement of communal production as measured by deliveries of controlled crops to marketing boards post-1980, has been accompanied by a decreased emphasis within national statements regarding environmental constraints. Overcoming the inherited
discriminatory transportation, pricing, technical and extension structures have been prioritised within government statements and plans in the early years of independence.

The re-emergence of environmental constraints within the conservation framework at the national level, in the context of a declining commitment to the resettlement programme and the proposals for internal reorganisation within the communal areas, has a hint of a reversion to dualist agricultural development in future. The agricultural policy since independence, has been two-tiered in continuing support for the commercial farming community as well as communal farmers. The emphasis identified in table 6.5 regarding the unsuitability of areas to particular crops or arable cultivation per se, needs to be followed up by an enhanced commitment to research into alternative production techniques and sources of income in the communal areas as well as resettlement. Pilot projects under the CAMPFIRE programme constitute progress in this direction.

However, the conservation message nationally to date, outside such selected regional programmes, has not differentiated between specific environments at the local level. The role attributed to environmental factors in the conception of soil erosion held, however, generally increased with the degree of contact at the local level; the mountainous and granitic nature of the Svosve physical environment being prioritised by individual farmers and Vidco chairmen over aspects of the 'national conception'. The role of the physical environment in the conception of soil erosion held by individual farmers in Svosve is assessed in the following chapter.

**Political/structural.**

The rhetorical commitment to conservation on behalf of the national government is undisputed. The financial commitment is unclear at present. On independence, the cause of degradation in the communal areas was located in the dualist colonial history. In correspondence, the solutions were seen in terms of a new administrative structure bringing the communal areas into the political sphere and the creation of local village-level institutions to maximise participation of the people in their own development, including conservation activities. The resettlement programme would provide land for ex-combatants and refugees and relieve congestion in the communal areas. In the early independence period, the cause and solutions to soil erosion were therefore located externally. In continuity with much of the colonial period, however, they are now once again portrayed as internal; poor cultivation and animal husbandry practices, low conservation awareness and rapid population growth are now perceived at the national level to be the cause of soil erosion in the communal areas. The conservation solution is perceived in terms of creating awareness, curbing population growth and effecting
the most rational use and conservation of all resources through the reassessment and reorganisation of land resources.

At the local level, however, the perceived conservation solutions still remain located in the main, in external initiatives such as the resettlement programme. Vidco chairmen, extension workers and district officers all refer to the inadequate size and poor resources of Svosve, the resultant overcrowding and overstocking and the subsequent need for resettlement. The proposed 'villagisation' scheme was not mentioned by Vidco chairmen or local officers. The LGPOs who are the most informed at this level as regards the programme, are optimistic about the effect it will have on agricultural and conservation status of the area. Personal communication with representatives of the local community, however, suggests that these officers are misjudging the aspirations of the people in the area.

The early commitment of the national government to extending the conservation movement into the communal areas has in operation, led to a burgeoning of responsible institutions, committees, working parties and even a proposed inter-Ministerial committee. At the local level, the new administrative structure and the Rural District Council Act made provision for representation at Ward level through Natural Resources Conservation Subcommittees. Under the Rural District Council Act 91988), council areas can now be declared Intensive Conservation Areas for the purposes of the Natural Resources Act. The Council in such cases becomes the natural resources conservation committee for that ICA. Existing ICAs falling within that council area are then deemed to have been dissolved, although the existing conservation committee for such former ICAs may be appointed as a 'subcommittee' for the council area. The Rural District Council may also establish further natural resource conservation subcommittees relating to additional wards within the council area. Each subcommittee would consist of established ward councillors and persons elected under the terms of the Natural Resources Act. An assessment of these institutions would be premature. The operation of Rhudaka Natural Resource Committee prior to this act, however, was prone to staffing and organisational difficulties and constituted a very limited forum for articulating or addressing local conservation needs. In effect, the lone Svosve ward representative (if indeed he or she is a member of a natural resource conservation subcommittee) will be struggling to present local needs within an even larger forum than previously). The problems of funding, coordinating, reporting and electing officers to these committees will need to be assessed in time.

Despite the establishment of Natural Resources Conservation Subcommittees at the District Council level, the experience in Svosve suggests that there is still no effective
forum for discussing and addressing individual or community conservation problems or priorities. The lines of communication between this sub-committee, local extension and inspection officers and farmers, do not at present exist. Communication between district and local officers is poor; "normally we get no cooperation at all. We hear there has been a meeting on villagisation, but we have not been invited" (Regional Land Inspector, Marondera District 1989). In addition, officers are unsure of who to deal with at the local level since different institutions (traditional or newly created), have responsibility for difference aspects of community life; "there are at least three leaders in each village and six villages in each Vidco" (Regional Land Inspector, Marondera 1989). The proposal to incorporate headmen as ex-officio members of the new Vidco and Wadco institutions within the Rural District Councils Act may help to minimise potential conflict between traditional and new institutions at the local level. The provision according to demand, within the Rural District Councils Act, for Natural Resources Conservation Sub-committees for each Ward, could greatly assist both the activities of local field staff on limited mileage allowances and constitute a more accessible forum for individual farmers or villages to forward their own priorities. Such committees could potentially serve the coordinating role for conservation at the local level which is needed.

The increased number of responsible bodies, committees and institutions for conservation in Zimbabwe not only compounds the problems of coordination and coherence, but necessitates the spreading of limited resources for conservation, very thinly. The issues of funding and staffing conservation in independent Zimbabwe were insufficiently addressed within this thesis for assertive statements to be made, but each committee brings additional costs of administration, travel, time and organisation simply at the planning stages. Monies for effecting conservation action in competition with other sectors such as education and defence, are bound to be limited.

In addition to the increased number of responsible bodies post independence, the Communal Bye-law Act enables district level determination of new conservation legislation referring to specific resource problems at that level. The interpretation of national legislation at the regional level has also been varied since independence. These developments have compounded the challenge of coordinating conservation and providing a consistent message. While flexibility is necessary and desirable, it is not sufficient and should not be at the expense of coherence.

In the recourse to increasingly centralised, large-scale 'models' for conservation and development in the communal areas, there is a mounting tendency to exalt the environment above the people. The continued movement of people within the
resettlement and communal land reorganisation programmes threaten to 'unsettle' people, disrupt social networks and work against sustainable development of soil resources in these areas. Rather than returning the environment to the control of the people, which was effectively removed during the colonial period, recent proposals within the National Conservation Strategy and agrarian reform documents threaten to move the environment further from their control. There is also a danger that through focusing on the internal malpractices and misallocation, the non-place based political-economic forces are once more assigned a passive or non-existent role within such technocentric thinking. There is a subsequent danger that the status quo will be preserved in the communal areas in order to serve the interests of a new emergent African elite at the expense of the original socialist aspirations for the country. An assessment of the issue of effecting an equitable and viable system of land allocation and use for communal land production was beyond the scope or the specific aims of this thesis, but clearly forms the context of any assessment of the conservation of resources.

Technical.

The content of the conservation message nationally and locally has changed very little over the independence period and has shown strong continuity with the past as discussed above. The model for erosion control is still very much arable-based and mechanical, centred on the construction and maintenance of contour banks. At the district level, community conservation projects have been initiated but have focused in the main on gully reclamation and ameliorative measures. Local Agritex officers in the study area have stressed the conservation benefits of good rotations and correct plant densities within their pre-planting meetings with farmers groups, but admit that soil erosion is not a high priority generally amongst farmers with whom they deal.

It has been suggested by a senior researcher at the Institute of Agricultural Engineering, that the continuity between the present conservation model and the past, is due to the unwillingness of the Directors of Agritex and Ministers of the Department of Lands, Agriculture and Rural Resettlement to take decisions.

"The research at the Institute of Agricultural Engineering plus all that from around the world is confirming that tie-ridging and mulch tillage are the two most conservationally sound practices which Agritex should be recommending to all their staff, but so far they have failed to commit themselves to this. What Agritex should be doing is saying 'these are the practices we are recommending'. The problem is that the Directors of Agritex give very little direction to their staff and they have not isolated what it is that they are going to recommend and stated it to their
field officers. Too often the latter are left to their own devices" (Elwell 1987).

Elwell does not suggest that there is one model for all communal areas but feels there is room for substantially more direction from the top within the agricultural extension service in the country. He suggests that it has always been the policy of Agritex (including during the colonial period) to let local communities define their own needs but also to,

"subtly 'show' them their needs, for example through the demonstration plots or by taking representatives of the area on flights of bad areas. If Agritex now had a clearer idea of what they were going to recommend, similar schemes could now be usefully operated" (Elwell 1989).

Clearly, this conception of the problem of soil erosion and conservation needs in the communal areas is still largely determined by a scientific background, in which future conservation is a matter of more vigorous direction from the top and greater education at the local level. Elwell's prescription for future change in conservation extends to a new broader conservation model to include tie ridging techniques in the communal areas and mulch tillage in the commercial farming sector. The extension relationship, however, remains unchanged; the inspiration and direction comes from the top rather than through collaboration between local farmers, extension personnel and research officers. Clearly, decisions regarding the commitment of the Department of Agricultural, Technical and Extension services need to be taken and made clear to all officers. Concurrently, however, local officers on the basis of their contact and communication with farmers, need to be given the opportunity and credit for articulating research priorities and suggesting modifications to existing models. Chambers refers to the tendency within developing countries for large departments such as for agriculture, community development or health, to be heavily centralised;

"Most face inwards and upwards, away from rural clients. Their structure and style are often authoritarian, hierarchical and punitive. From the centre and top come targets, commands, exhortations and threats. From the periphery and bottom comes a weaker flow of filtered information which placates and misleads. In meetings, subordinates are upbraided, cajoled and given orders. They are asked for reports of targets achieved, not for problems encountered. Poor performances or deviant initiatives are rewarded by punishment or posting. Promotion comes, if at all, through compliance or through working in headquarters. Real problems of implementation or impact are repressed; appearance of achievement applauded. Senior officers do not learn from their subordinates; and subordinates do not learn from their rural clients" (Chambers 1983 p. 210/11).
As suggested above, however, there have been few qualitative changes in the extension operation or organisation since independence to date in Zimbabwe.

Educational.

The emphasis on raising public awareness and improving conservation education at the national level has been translated into action through the work of the Department of Natural Resources through their District Consultative Conservation Workshops and the Natural Resources Board through their national campaigns such as tree planting. In addition, moves are in progress within schools to promote a more coordinated programme of conservation activities within agricultural and geographical syllabi. The initiative for and content of these programmes, however, comes from the national or regional offices. Although local communities are praised by senior officers including the Minister for Natural Resources and Tourism for conservation work done in their area within the district workshops, only two communal farmers in Svosve of the one hundred interviewed within the analysis presented in the next chapter, had attended one of these workshops. Admittedly, these workshops have recently been extended to Ward level activities in Marondera district with the acquisition of a vehicle equipped with promotional materials for mobile educational purposes. However, the problem of overlooking individual or local community priorities in favour of disseminating those determined at district or national level remains. Conservation education, in continuity with proposed conservation solutions, needs to be defined within an understanding of the social context of the recipient audience. The 'level' of awareness of soil erosion in Svosve is discussed in the following chapter through the construction of individual conceptions on the basis of interviews and observation.

Educational requirements in Svosve were stressed strongly by several Vidco chairmen. Many of their comments, however, referred to the value of mechanical conservation works in the area and the perception of local understanding and educational needs varied substantially between these individual officers epitomised by the contrasting statements presented in table 6.5. Understanding, coordinating and broadening of the conceptions of soil erosion and conservation needs amongst Vidco chairmen, as representatives of the local community and agents in defining local development priorities, will be essential for ensuring conservation programmes meet the needs of local people and local environments in the future.

In summary, the most striking conclusion obtained as a result of interviewing across all levels in the administrative and departmental hierarchies is that environmental degradation in Svosve for the majority, requires solutions which lie outside their control and/or outside the reserve boundaries; the conservation of soil resources in
continuity with the past, is out of individuals' hands, even at this level. During the colonial period, the changed political-economic and social circumstances forced African cultivators to respond to variations in these factors rather than to the intrinsic properties of the environment. The environment in consequence moved out of the control of the land users themselves. The actions of the independent government have not yet substantially changed this situation. The Regional Land Inspector for Svosve suggests that local leaders are not playing their part in conservation; "they see it as our project not theirs" (Regional Land Inspector 1989). He also referred to the unsettling effect on people in Svosve of the talks of 'villagisation'; "people are continually being pushed around. Such insecurity leads to poor conservation".

In addition, the interviews showed the continuity between the conceptions of the problem of soil erosion held amongst local officers with those at national level. However, the relative importance of personal experience and knowledge of the local environment increased amongst officers lower in the hierarchies. The following chapter uses a variety of techniques including interviewing, to construct the conceptions of soil erosion in Svosve held by individual farmers. It was anticipated that at this level, conceptions would reflect 'external understanding' (the 'official' view), but also personal experiences and locational factors (due to the known spatially limited nature of serious erosion in Svosve).
CHAPTER SEVEN. THE CONCEPTION OF SOIL EROSION AMONGST COMMUNAL FARMERS IN SVOSVE.

Recognition over the last fifteen years of the importance of local participation in designing and implementing sustainable rural development processes and programmes was explored in Chapter One. It was established that true participation depends on the acknowledgement that local communities have something to offer. In addition, for participation to be anything more than simply another input to be 'tacked on' to the rural development inventory, substantial 'reversals' in the way outsiders think and learn about indigenous communities are required.

In 1982, Millington stated that "one of the main problems facing agricultural development in the Third World at the present time is the incompatibility of 'western scientific' and 'folk' knowledge systems" (p.284). In fact, both systems of knowledge are open to continual change such that the distinction between the two, or the assessment of incompatibility, are not absolute. Millington does, however, isolate the fundamental populist case that one system has been prioritised over the other in agricultural development to date. Much work within the populist development critique generally and farming systems research in particular, has focused on understanding what people do and what they know, within systems of knowledge alternative to the western system. Relationships with the physical environment have inevitably featured strongly within such work. Knight (1981) for example, develops the concept of 'ethnogeographies' to refer to "their world view, their understanding of perceived environmental processes and patterns" (p.48) expressed by different societies. Awareness of these ethnogeographies is improving, but as highlighted in Chapter One, work on the perception of soil erosion in particular within this body of literature is limited.

The 'non-technical' constraints, the economic, political and social factors which limit individual decision-making and actions, are increasingly the focus of attention within the conservation (Hudson 1981) as well as the more general agricultural development literature. In Zimbabwe, the exploration of agrarian change in the communal sector since independence has elicited socio-economic factors such as access to cattle and off-farm income as primary determinants of the agricultural 'success story' which cut across the spatial, environmental limitations. In addition, work at the household level undertaken from the Department of Land Management, University of Zimbabwe, has focused on the economic and social determinants of specifically livestock production, which has further enhanced understanding of constraints on individual behaviour and development prospects (Bratton 1984, Drinkwater 1987). The ongoing work of the
Monitoring and Evaluation section of Agritex in Wedza communal area has explored a whole range of socio-economic factors relating to food production and consumption at the household level (Truscott 1985a, 1985b). Work by Zinyama, Campbell and Matiza (1988) concerning vulnerability to drought in the SADCC region, has also exposed the important gender, age and class differences in the recourse to, and types of, coping strategies adopted. Although this work has not specifically addressed the problem of soil erosion, clearly many of the economic and social factors which explain vulnerability to drought, patterns of food production and consumption, or ownership and production of livestock, will also be important forces in influencing decision-making behaviour as regards soil conservation. Soil erosion is socially defined, however, and therefore it is essential in the explanation of soil erosion and conservation to understand not only what people do, but what people think.

As established in Chapter One, there has been limited work to date on the perception of soil erosion. In 1959, Blaut et al reported that the chief hindrance to soil conservation in Jamaica was the "lack of awareness on the part of farmers that serious erosion exists, or alternatively, that anything can be done about it" (p.420). They conducted extensive survey work to establish peoples' beliefs concerning soil erosion. There was no attempt to relate such beliefs to socio-economic or environmental factors in the area, but some assessment of the nature or shape of those beliefs was made;

"Some farmers were well aware of what might be termed the scientific attitude toward soil erosion, and others were prepared to recite this attitude (having heard about it from agricultural agents or others) while still holding to the traditional beliefs" (Blaut et al 1959 p.417).

Millington's work in Sierra Leone focused on individuals' perceptions and understanding as reflected in the adoption of various indigenous conservation strategies. The commitment to such measures could not be tied directly either to the spatial pattern of erosion hazard (as identified through western scientific techniques) or to perceived erosion severity. He concluded that intervening mechanisms, such as past contact with colonial extension personnel and the diffusion of indigenous conservation knowledge, introduced further diversity amongst individuals' perceptions of soil erosion problems and frustrated simple interpretations. Kayongo-Male and Mbithi (1979) in their study of conservation groups in the Machakos area of Kenya, made some preliminary assessments of the physical and social factors which affect individuals' attitudes to soil erosion. They found that age and stock ownership were major dimensions along which individuals' perception of soil conservation in grazing areas could be differentiated, for example.
In Zimbabwe, raising public 'conservation awareness' and gaining 'acceptance' by the local people are stipulated repeatedly as critical to the conservation of resources in the future. It therefore becomes essential to understand peoples' 'awareness' as it stands and their definition of the problem. Understanding the shape and origins of such conceptions would help target more effective and sustained conservation programmes. In the previous chapter, the conception of the environment held by administrative and departmental officers, was seen to reflect quite closely the 'scientific' world view introduced in the colonial period but perpetuated since through such officers. This chapter focuses on the definition of the problem of soil erosion in Svosve held by individual farmers.

It is acknowledged that environmental conceptions are a complex function of many interrelated and interdependent variables. As indicated above, these include farm characteristics. From the analysis of secondary sources and informal interviewing, it is clear that what people think about environmental processes is also in part, a function of personal experience (accommodating the spatial distribution of observed soil erosion), contact with extension services ('introduced' knowledge) and the consensus view held by the society in which they are a part ('indigenous' knowledge). Although these forces are not themselves mutually exclusive, they form the major dimensions of interest within this section of the research.

In the light of these points, the household survey had three main objectives. Firstly, indicators of population pressure have been linked widely with environmental deterioration and soil erosion, and proximity to erosion has been isolated as an important factor in influencing perception of soil erosion. A primary objective of the household survey was to assess the importance of these 'environmental' factors in differentiating between people in terms of what they think about soil erosion. Secondly, the dominance and persistence of the technocentric conception of soil erosion promoted throughout the colonial period and the impact of a particular erosion control model on the physical environment have been highlighted. A second primary objective of the household survey was therefore to assess the strength of western scientific characteristics within the conception of soil erosion held by communal farmers in Svosve. The degree of contact with extension workers, past and present, was one dimension along which individuals were differentiated in this respect, but qualitative analysis of additional questions was also used. The third objective of this section of the research was to establish the role of ethnoscientific factors in influencing communal farmers' perceptions of soil erosion. This was not effected via a discrete set of questions, rather there was a general 'openness' towards such forces throughout the survey.
The 'methodological mix' used in the analysis presented in this chapter is a product of both the diverse aims of the study and the nature of the problem addressed. A formal questionnaire survey in the study area would not have been appropriate for eliciting perceptual-type data. The survey of one hundred households effected in this research was a result of, and in addition to, detailed historical, observational and oral research in the study area. The questionnaire itself (see appendix 3), was a combination of formal 'closed' questioning concerning empirical background details of the household, and substantial 'open' lines of questioning in which interviewees directed what was to be discussed at length. It was therefore a flexible approach in which the precise format of the interview was determined by the interviewees; according to their interests, age, length of residence in Svosve and knowledge concerning the issues. Every interview was conducted by the author, serving to permit such flexibility and to strengthen the overall approach.

Interpretation of the survey results was on the basis of simple counts or two-way analyses. All tentative explanations were made on the basis of both the 'quantitative' and 'qualitative' analyses; "formal quantitative procedures can detect subtle differences not 'visible' to the eye, but they cannot explain them" (Light and Pillemer 1982 p.21). Where individual responses are reproduced here, the grid square in which the interview was conducted is reproduced, rather than names of respondents. The variety of data sources offers a unique depth of understanding of the problem of soil erosion and conservation in Svosve.

The household survey.

The major characteristics of the desired survey were identified on the basis of secondary sources and detailed historical, observational and oral research in the study area, and finalised via a pilot study of eighteen households, three from each Vidco. The survey was divided into six sections (see appendix 3). The first section constituted the 'background questioning' which included questions on age, length of residence, access to dryfields and inputs. The second section focused on current farming and conservation practices implemented by the respondent. Section three comprised a series of open-ended questions designed to stimulate interviewees into thinking about how the environment had changed over the period in which they had been resident in Svosve, particularly focusing on their experience of erosion. The fourth section focused on the respondents' understanding of the mechanics of the erosion process addressing both biological and mechanical factors to elicit further details of the shape of their perception of erosion. Section five was a series of questions concerning
assessment of past conservation programmes, the problems and successes. The final section focused on current farming concerns and extension requirements.

Much of the data obtained through the background questioning (the 'closed' questioning) was in a form amenable to simple counts. The information expressed by respondents in the more 'open' style of questioning contained in subsequent sections, required more sensitive analysis. For example, several lines of questioning were often used to elicit the perception of a particular issue. The responses to such questioning were subsequently overviewed carefully on an individual basis. Common themes and patterns were then isolated and coordinated. The data obtained from the survey was therefore coded on the basis of interpretation of the various lines of questioning. In this way, some order was given to the dominantly qualitative information. The gross patterns expressed in the results are supported by direct quotations from individual interviews. It is felt that in this way, the loss of important qualitative data is minimised but data is elicited in a form more readily available for use in future extension targeting.

Where two-way analyses were effected, the Chi-square test was used to establish the significance of the observed results over those expected on chance alone. The two-way analyses are not exhaustive. They were designed to differentiate between farmers' perceptions of soil erosion along major dimensions such as location, age or farmer group membership.

No information was collected in the survey concerning the importance of off-farm income or the relative dependence on agriculture of the individual households. Work by Callear (1984) on Wedza communal area 30kms south of Svosve, reported that out of a sample of 98 families, 66 households received regular off-farm incomes via food or cash remittances from husbands working elsewhere, support from relatives working locally as teachers, builders and carpenters (or in the city) and via social welfare payments or government pensions. There is no reason to believe that such remittances are any less prevalent in Svosve, particularly as Svosve is significantly closer than Wedza communal area to large towns including Harare. Although such off-farm income generation has positive implications for the standard of living of rural households and the generation of cash, it may also have many less obvious negative implications for the farming system. Problems can arise through a shortage of labour which may contribute to late preparation and planting, underutilization of land due to parts being left fallow, and to a general decline in the speed with which decisions (still monopolised by the male) are made. These issues remain outside the scope of this thesis, but it is important to highlight them, since they form the context of the farming system within which issues such as soil erosion and conservation exist.
Sampling procedure.

The role of personal experience has been shown to be important in shaping perceptions of environmental problems and in guiding future actions (Barker 1977). In addition to the independent variables accommodated within the survey through the background questioning, the sampling procedure adopted for the household survey work enabled two further dimensions to be incorporated into the analysis of individuals' perceptions of erosion problems; those of proximity to known erosion hazards and areas of greater than average population density. The location of settlement in Svosve in 1981 was shown in figure 5.7. Reference was also made in Chapter Five to the procedure whereby the study area was divided up into a grid framework of one square kilometre units. A stratified random sample was selected with a weighting factor of two afforded to the presence of erosion. The sample was also differentiated by socio-economic pressure measured in terms of population density, in the light of the centrality of this factor to date in the literature concerning soil erosion. The four population density-degree of erosion categories from which the sample was selected are presented again here:

Category 1. Greater than average population density / presence of erosion.
Category 2. Less than average population density / presence of erosion.
Category 3. Greater than average population density / absence of erosion.
Category 4. Less than average population density / absence of erosion.

Once classified, random number tables were used to select grid squares for the purposes of interviewing. The sample constituted one hundred households thereby representing 15% of the total population of the study area. 34 respondents were drawn from category 1; 33 from category 2; 17 from category 3 and 16 from category 4, hence accommodating the weighting factors outlined above. Once selected, as many households as possible were interviewed in the selected grid square before moving onto the next selected square. In areas of greater population density, this procedure meant that fewer grid squares needed to be visited in order to access the required number of interviewees. Hence the distribution of grid squares according to category shown in figure 5.11.

Over the period October 1986 to March 1987, each selected grid square was visited by the author accompanied by Mrs. Charity Magobeya, a Local Government Promotion Officer posted in Svosve who acted as interpreter. The interview was conducted with the member of the household who took the primary role regarding production from that location. In 82% of the sample, this was a female on her own, in 4% of the cases the husband and wife both contributed during the interview and in 14% of the cases it was
the male alone. Although it was recognised that women are not necessarily the main
decision-makers in the farming system and that grazing areas are not traditionally a
female domain, it is women who spend the majority of the time and effort in the
dryfields with which the bulk of this survey was concerned. This is reflected in the
heavy emphasis on female respondents.

**Background characteristics of the sample population.**

The largest group (44%) of respondents was aged between 21 and 40 years old and
63% of the sample had been resident in Svosve for over twenty years. The precise
characteristics of the sample in this respect is shown in figure 7.1 and 7.2. In order to
build up the socio-economic context in which farmers' perceptions of the environment
were framed, several questions were asked concerning access to dryfields, labour
availability, agricultural yields and levels of technology. It is acknowledged that there
are several problems with such questioning including accuracy and willingness to
divulge what many people perceive on the basis of past experiences to be sensitive
information. For the purposes of this study, the aim was simply to provide broad
background information. Furthermore, since many people in Svosve reside fairly close
to their dryfields, observation could be used to verify some of the answers given.

There is no absolute ownership of communal land in Zimbabwe since all land is
considered a common heritage. Since 1982, the legal authority over land allocation has
been vested in the elected District Councils. Right of access to land in Svosve has been
allocated to the man despite the known high level of male absenteeism (as reflected in
the large proportion of female respondents in the sample). Since much subdivision of
original holdings occurs via the process of the man 'giving' land to elder sons or even
second wives, questions regarding acreages or arable land available for use are
notoriously complex. The average household in the sample cultivated between 0.5 and
1.5 hectares of dryfields although 32% of the sample held over 2 hectares. In contrast,
within the Wedza studies carried out by Agritex, the average household cultivated 2.9
hectares (Truscott 1986 p.5). The chi-square statistic was used to highlight any
differences between the locational categories of the study area. It indicated that there
was very little variation in this respect, although in category 1 there were unexpectedly
few holdings of less than 0.5 hectares despite the conditions of greater than average
population density and presence of erosion. Category 2 had an unexpectedly high
proportion of holdings over 4 hectares and was therefore more 'expected' and
consistent with the lower population densities in these areas.

Some indication of the level of production in Svosve is gained from questions
concerning ownership and access to farming equipment, the use of improved seeds and
Figure 7.1  Age of respondents.

Figure 7.2  Length of residence in Svosve.
fertilisers. 69% of the sample owned a plough, a further 26% borrowed a plough when required, usually from family, with the remaining 5% reliant on hand-held hoes for field preparation. The only significant differences between the categories was with respect to category 1 in which all respondents owned a plough or borrowed one. 28% of the sample also made some use of the tractor provided by the District Development Fund (DDF). An unexpectedly high proportion of farmers in category 4 use the DDF tractor and a low proportion of farmers in category 1 (see figure 7.3). Farmers in Svosve are able to arrange for the tractor team to come and plough their fields at current rates of $22 per acre. A problem is that due to the high demand for this service concentrated as it is at one critical time, farmers did complain about delays in planting due to waiting for the DDF tractor.

Maize was the dominant cash and food crop for all households with additional crops grown including rapoko, groundnuts, sorghum, roundnuts, sweet potatoes and sunflowers. Maize was the sole crop sold amongst the sample and 96% of respondents had used fertilisers on part if not all of their dryfields in the preceding season. The high level of fertilisers is consistent with Weiner’s assessment for Natural Region H in which 94.2% were found to use inorganic fertilisers (1988 p.70). 45% of the Svosve respondents normally worked their fields alone or with the assistance of one other adult person.

Fifty per cent of the sample sold maize in varying quantities during the preceding year. The average amount sold by these respondents was 8.5 bags although the range of transactions was 47 bags. There were significant variations between the categories in the proportion of respondents selling maize and the amounts sold (see table 7.1 below). For example, an exceptionally high proportion of farmers in category 3 (greater than average population pressure/absence of erosion) sold maize in the preceding season with the highest average sale per respondent across all categories. Further details of the amount of maize sold according to location is contained in figure 7.4. The chi-square statistic was used to highlight the main deviations from expected results and it indicated that an unexpectedly low proportion of category 3 farmers did not sell in the preceding season. The test was then applied to distinguish between the categories according to population pressure and erosion status separately. In the presence of erosion, there were no significant differences in the amount of maize sold according to population density (i.e between category 1 and 2). In the absence of erosion, however, an unexpectedly high proportion of farmers in category 4 (less than average population) failed to sell maize in the preceding season in contrast to the low proportion of farmers in category 3 (greater than average population). This would seem to contradict the
1. Harrow
2. Cultivator
3. Wheel barrow
4. Scotch cart
5. Oxen
6. Bicycle
7. Use of DDF tractor

Figure 7.3 Access to technology of farmers differentiated by category.
Figure 7.4 Maize sold according to locational category.

Figure 7.5 Maize sold according to group membership.
presence of any simple relationship between population density and level of production, certainly in the absence of erosion.

In conditions of high population pressure, there were also significant differences in maize sold according to the presence of erosion (i.e. between categories 1 and 3). The most significant difference between these categories was the unexpectedly high proportion of category 1 farmers who failed to sell in the preceding season and the low sales of between 11 and 15 bags in comparison to the high sales at this level amongst category 3 farmers. This seems to support the suggestion that the presence of erosion may have negative effects on production, but only under the additional condition of high population pressure. Once again, simple judgements of cause and effect relationships between population density and dependent variables should be avoided.

<table>
<thead>
<tr>
<th>Category</th>
<th>Number Selling</th>
<th>Percentage Selling</th>
<th>Total Sold</th>
<th>Average Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>35</td>
<td>165</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>50</td>
<td>325</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>76</td>
<td>244</td>
<td>19</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>37</td>
<td>94</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 7.1 Maize sold according to category.

Fifty-six per cent of respondents had access to stock capable of ploughing (oxen) and 83% of households owned cattle (as compared to the provincial figure of 45% calculated by the Zimbabwe National Household Capability Programme, CSO 1983/4). The range of cattle holdings for the sample was 44 head, with an average of 8.5 head per household. Using figures for stock recorded at the dips in Svosve in 1987 (7411) and for the number of households in Svosve at the 1982 census (1032), the average stock holding per household in Svosve is 7.2 head, seeming to indicate that the interviewees had not withheld information regarding stock numbers. Cattle distribution within the study area was very even with no significant differences in the total held between the categories. Only 24% of the sample kept goats with an average of 4.6 animals per household. The majority of the households kept chickens although in vastly differing numbers, and some kept other small animals such as rabbits.

Fifty-nine percent of the respondents are members of a farming group, organised by the local Agritex extension workers. In conditions of poor extension staff:farmer ratios (1:516 households in Svosve), farmers groups are a way of bringing more farmers into contact with extension advice than if local officers had to deal with farmers on an individual basis. "By grouping I can move faster" (extension officer 1986). Studies have shown a highly significant relationship between farmer group membership and access to extension advice, as well as with the use of fertilisers, winter ploughing, the
use of top-dressing and the like (Truscott 1985 p.9). The positive relationship between farmer group membership in Svosve and maize sold in the preceding season is shown in figure 7.5. Potential access to 'official' conservation knowledge for communal farmers in Svosve has also substantially increased since independence. 54% of the sample stated that they were now receiving more contact with extension services than they were before 1980 (18% reported experiencing reduced contact post-independence).

The average frequency of contact with the extension workers for the sample as a whole was once a month (see figure 7.6). For members of farming groups, 52% had either weekly contact with the officer or enjoyed the type of relationship with him whereby they felt they could call on him at any time. 49% of non-group members have never seen the extension worker or met him only once a year (see figure 7.7). Farmers pay between 20 and 75 cents to join one of the eleven farmers groups in Svosve. The size of the group seems to reflect the motivation of the local people in the area. The extension worker for the northern Vidcos referred to the less motivated groups consisting of seven members or less, in contrast to the better motivated groups with which he dealt consisting of fourteen to twenty members (extension officer 1986). The extension worker with responsibility for the southern section of Svosve dealt with six groups of farmers with an average membership of thirty, although attendance at many meetings was inevitably reduced (extension officer 1986).

Although both extension workers stressed a willingness to deal with individuals who were not members of farming groups, the problems of transportation, of restricted mileages and pure demand for their services, often restricts this in practice; "It is very difficult to complete the whole area" (extension officer 1986). 53% of category 1 farmers, 54% of category 2, 94% of category 3 and 56% of category 4 farmers are members of farmers groups. The exceptionally high proportion of category 3 farmers in farming groups probably reflects the chance proximity of the sample areas in this category to the major roads (see figure 5.11) and therefore accessibility to the extension worker.

Of the twelve respondents who reported meeting the extension worker alone, four felt that they could call on the officer at any time and therefore were probably a sample of the 'better farmers', and four reported seeing him only once a year - probably at the annual 'Green Show' (farming competition in the area). Both officers reported attempts to try to persuade non-members to join groups. It was clear from the interviews that some respondents were uninterested in the farmers groups. 14% had never seen an agricultural extension worker (see figure 7.6) and of these, three
Figure 7.6  Sample group contact with extension worker.

Figure 7.7  Extension worker contact according to group membership.
indicated that they had no wish to increase their contact in the future. Several
respondents felt self-sufficient in agriculture without additional help, but 88% of the
sample stressed a wish to have greater contact with the extension service.

67% of the sample reported improved yields over the last five years. Of these, 70%
attributed the improvement to the increased use of fertilisers, 25% to improved farming
methods and 5% to hard work. There were no significant differences in this respect
between the categories. Those people perceiving a decline in yields over the last five
years (27%) attributed it to the factors as shown in table 7.2.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late or inadequate rains</td>
<td>12</td>
</tr>
<tr>
<td>Soil is old</td>
<td>10</td>
</tr>
<tr>
<td>Too much rain</td>
<td>2</td>
</tr>
<tr>
<td>Lack of cattle</td>
<td>1</td>
</tr>
<tr>
<td>Inability to buy fertilisers</td>
<td>1</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 7.2. Perceived cause of declining yields.

Evidently, only one respondent of those perceiving a decrease in yields attributed this
to soil erosion; the failure or timing of rains were perceived by the majority as the most
important factor. Ten respondents did, however, attribute their reduced yields to the
fact that the soil is now old; the smaller yields being a result of reduced fertility in their
soils. In one instance, the experience was explicitly linked with an inability to buy
fertilisers.

Sixty-nine per cent of the sample expressed concern over particular farming problems
when questioned. The dominant concerns are shown in table 7.3 below.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of money for inputs</td>
<td>36.2</td>
</tr>
<tr>
<td>Ploughing problems/lack of cattle</td>
<td>24.6</td>
</tr>
<tr>
<td>Transport/marketing problems</td>
<td>14.5</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>10.1</td>
</tr>
<tr>
<td>Late rains</td>
<td>7.3</td>
</tr>
<tr>
<td>Baboons/pests</td>
<td>4.4</td>
</tr>
<tr>
<td>Shortage of land</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Table 7.3 Dominant farming problems expressed by respondents.

What is immediately apparent is that although soil erosion is ranked fairly low down
the list of dominant farming problems expressed by respondents, the problem is
prioritised by 10% of the sample as their foremost problem. The characteristics of this
group will be discussed below. The dominant farming problem expressed did vary
according to location (see figure 7.8) although care needs to be taken in interpretation
1. Soil erosion  
2. Ploughing problems  
3. Transport/marketing difficulties  
4. Lack of money for inputs  
5. Late rains  
6. Baboons/pests  
7. No problems

Figure 7.8 Biggest farming problem experienced by location.
where the numbers experiencing certain problems are very small. The most unexpected result indicated by the chi-square test, was the absence of ploughing problems specified in category 4, the biggest problem for these farmers being the lack of money for inputs. This former characteristic is difficult to explain since there are no significant differences between the categories with respect to the average number of stock held nor ploughs owned. The relatively low proportion of farmers selling maize in this category (see table 7.1), may contribute to a shortage of cash and hence to the emphasis farmers put on problems of purchasing agricultural inputs. An unexpectedly high proportion of category 3 farmers referred to problems of baboons and pests in destroying their crops highlighting a localised problem.

In summary, the data gained via the background questioning forms the basis for discussing individuals' perceptions of soil erosion. The widespread problem of land shortage in the study area is indicated by the relatively small holdings irrespective of location. The majority of respondents maintain successful subsistence production although supplementary feeding programmes were necessary in early 1987 due to lack of effective rainfall. There were few substantial differences between respondents with respect to their farming operations which could be attributed either to the presence of erosion or socio-economic pressure as measured by population density.

**The perception of erosion severity.**

**Crop areas.**

A series of questions were asked concerning erosion in Svosve in general. Respondents were asked to rank their perceptions of erosion severity in crop areas according to a five point scale. The results are shown in figure 7.9. The perception of soil erosion in the crop areas of Svosve in general reflects an almost perfect normal distribution in that the bulk of respondents perceive the problem to be moderate with decreasing numbers expressing the more extreme opinions. The distribution is slightly skewed, however, towards perceiving the problem as serious or very serious. 74% of farmers interviewed perceived soil erosion in the crop areas to be at least a moderate hazard or worse. Such perceptions may reflect the true extent of the problem and personal experiences of it, or it may express the success of the extension services past and present in propagating and disseminating awareness of soil erosion; respondents may be repeating what they have heard from others. Alternatively, they may have judged the overriding concern of my research.

In Chapter Five, the change in extent of erosion in Svosve by type over the period 1947 to 1981 was quantified on the basis of air photos (see table 5.8). Without
Figure 7.9 Perception of erosion severity in the crop areas.

Figure 7.10 Perceived severity of erosion in crop areas according to personal experience.
denying some of the real problems involved in isolating soil erosion on air photographs, it was established that the total erosion in the crop areas has changed very little over the time period. Over the most recent period between 1975 and 1981, soil erosion in the crop areas has decreased from 451 hectares to 361 hectares. Individual perceptions of the severity of soil erosion in the crop areas may well reflect this 'objective' situation. For example, 55% of the sample felt that the general erosion situation in the crop areas of Svosve was improving, with many attributing this to the increased construction of contours.

The influence of personal experience of soil erosion on individuals' perceptions of erosion hazard in the crop areas in general are shown in figure 7.10. 58% of the sample recorded having had personal experience of soil erosion in their own crop areas. This experience led to a heightened perception of a more severe problem in the crop areas in general in Svosve, indicated by a 'skewed' rather than a 'normal' distribution in figure 7.10. 83% of those having experienced soil erosion problems of their own perceived the problem to be moderate, serious or very serious in Svosve generally. In comparison, 56% of those having had no personal experience of soil erosion perceived the problem in Svosve to be moderate, serious or very serious.

Older people also perceived the problem to be more serious (see figure 7.11). 46% of the sample aged over 60 perceived the problem in the crop areas to be either serious or very serious, in comparison to only 30% of respondents aged between 21 and 40. The chi-square statistic highlighted an unexpectedly high proportion of respondents aged 41-60 who perceived the problem to be very serious. These findings could have substantial implications for future extension as will be discussed in Chapter Eight. There were no significant differences in the perception of erosion severity in the crop areas according to the length of residence in Svosve on the part of the respondent.

In contrast to what may have been expected, experience over the last five years of either improved or declining yields had no effect on perception of erosion severity in the crop areas. Figure 7.12 indicates that there has been no shift of response towards the more severe levels on behalf of those farmers experiencing declining yields nor a shift towards the less severe levels amongst those experiencing improved yields. The fact that only one respondent prioritised soil erosion as the explicit cause of declining years over the last five years, may partially explain this pattern (see table 7.2).

The potential influence of extension worker contact on the perceived severity of erosion in crop areas are shown in figures 7.13 a and b. The responses of those receiving high levels of contact (at least monthly contact), are distinguished from those receiving less regular contact, for purposes of clarity in presentation. From figure 7.13a, it can be
Figure 7.11 Perceived severity of erosion in crop areas by age.

Figure 7.12 Perceived severity of erosion in crop areas according to yields obtained.
Figure 7.13 a/b. Perceived severity of erosion in crop areas according to EW contact.
seen that very regular extension worker contact has had little effect on shifting the perception of erosion in crop areas away from the near perfect distribution of responses isolated in figure 7.9. Responses at the more severe levels of the scale are slightly raised suggesting some heightening of awareness. For those individuals receiving less than average contact with extension personnel, their perceptions of erosion severity are much more haphazard (see figure 7.13b). Contact with extension personnel may be much more important in influencing the shape of peoples' perceptions of erosion than it is in determining the level of their awareness. This will be addressed below.

Another factor thought to be important in shaping perceptions of erosion hazard was proximity to known problem areas. The perceived severity of soil erosion in the crop areas according to the four population density-degree of erosion categories, are shown in figure 7.14. There were no statistically significant differences according to population pressure between the categories. There were however, significant differences according to erosion severity across the categories, although the pattern is somewhat confusing. In areas of theoretically the 'least' environmental and social pressure (category 4), individuals' perceptions are heavily dominated by the 'moderate' response with an unexpectedly low 'serious' response. In the light of reduced proximal contact with 'the problem', individuals may well have settled for the median, least outspoken, response regarding soil erosion in the crop areas in general in Svosve. In areas of low population density but distinguished from category 4 on the basis of presence of erosion (i.e category 2), there is an unexpectedly high perception of the problem as both 'minor' and as 'serious' indicating substantial variation even within each category as to the severity of the problem of soil erosion in the crop areas in general in Svosve.

In the areas of theoretically the highest pressure in terms of environmental degradation and high population densities (category 1), perception of the problem is concentrated towards the lower end of the scale; an unexpectedly high proportion of the respondents in this category perceived the problem to be minor. This appears to be contrary to the hypothesis that proximity to the problem leads to a heightened awareness on the part of the individual. In areas of similar population pressure but absence of erosion (category 3), the responses are concentrated towards the more severe rankings on the scale, which further contradicts the hypothesis above.

Despite the fact that 58% of respondents had had personal experience of soil erosion in their crop areas, only 10% highlighted erosion as currently their biggest farming problem. All personal experiences of soil erosion were associated with the control of moving water and excessive run-off. The details of individuals' problems are shown
Figure 7.14  Perceived severity of erosion in crop areas according to locational category.
in Table 7.4. Although the categories are not mutually exclusive in that they are all different ways of verbalising the same process of soil erosion, the relative priority stressed by respondents to technical, environmental or structural factors may be important in influencing their response to the problem of soil erosion. Despite not being mutually exclusive in absolute terms, the categorisation does distinguish between different conceptualisations of the same problem. 19% of respondents who experienced a problem of soil erosion had solved the problem through the construction of contours, but 41% reported recurring problems associated with inadequate contours. Many respondents remained unsure of their ability to control water in the future through the construction and maintenance of their contours, and 21% stressed specifically that they were now receiving such heavy rains that they were suffering badly from erosion. 19% felt that their problems of erosion were due to the fact that they were cultivating in 'marginal areas' such as on steep slopes or in areas receiving rapid run-off due to the presence of granitic domes.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of contours</td>
<td>19</td>
</tr>
<tr>
<td>Inadequate contours</td>
<td>41</td>
</tr>
<tr>
<td>Too much rain</td>
<td>21</td>
</tr>
<tr>
<td>Marginal cultivation</td>
<td>19</td>
</tr>
</tbody>
</table>

Table 7.4 Perceived cause of personal erosion problems.

Clearly, despite not prioritising soil erosion amongst current farming problems, experience of soil erosion is widespread and problematic to many farmers. The subordination of soil erosion may reflect the urgency of the other farming problems listed, particularly that of securing inputs to maintain production levels. To those individuals with recurring problems of water breaking through contours, the problem is one of a failing in the technical measure which they have been compelled/advised to adopt. Those people perceiving the cause of the problem as excessive rainfall, may in fact be experiencing increased run-off rates due to poor infiltration on eroded soils, but clearly this requires further research. The widespread nature of the problem on the ground with 24% of the total sample experiencing recurrent problems of soil erosion, may confirm some of the problems involved in identifying sheet erosion from air photos. It certainly highlights the very localised and highly seasonal nature of the problem as conceived by individual farmers, which are determined largely by the incidence of particularly heavy rains and individuals' inability to maintain contours.

Grazing areas.

Perception of erosion severity in the grazing areas of Svosve for the whole sample is shown in Figure 7.15. Whereas the perception of erosion in the crop areas at this level
Figure 7.15  Perception of erosion severity in the grazing areas.

Figure 7.16  Perceived severity of erosion in grazing areas by age.
reflects an almost perfect normal distribution, with respect to the grazing areas, the
distribution shows substantial deviations. A large proportion of the respondents (55%)
either perceive no problem of soil erosion in the grazing areas or only a minor one, in
comparison to 28.7% of respondents who perceive the problem to be serious or very
serious. From the air photo analysis, it was calculated that over the period 1947-1981,
total soil erosion in the grazing areas increased only marginally from 533 hectares to
582 hectares. Also as highlighted in Chapter Five, gully extension in most areas has
been minimal; the majority of gullies in the areas substantially predating the first air
photo coverage. Since gullying is the most visible form of soil erosion, it may be
suggested that this relative stability influences peoples' perceptions of the severity of
the problem in these areas and in consequence, perhaps their motivation for
conservation. The perception of erosion problems in grazing areas as fairly
insignificant may be a perfectly 'rational' judgement of the 'objective reality' as
indicated by the air photographs. 57% of respondents felt the situation in the grazing
areas in Svosve to be worsening, however.

There were significant differences in the perception of erosion severity in the grazing
areas according to age. Younger people in the 21-40 age range were more likely to
perceived the problem as minor, in contrast to the over 60 age-group in which the
majority of respondents perceive the problem to be very serious (see figure 7.16). This
is in direct contrast to the perception of one extension worker in Svosve who suggested
that the younger people in the area were more aware of the problems and needs in the
grazing areas, whereas older people "still don't understand" (extension officer 1986).
There were also significant differences in the perception of erosion hazard in the
grazing areas according to length of residence of the respondent in Svosve. A high
proportion of respondents (60%) resident for less than five years in Svosve perceived
the problem to be minor, whereas the majority of respondents who had been resident in
Svosve throughout their lives tended to perceive the problem as serious or very serious
(see figure 7.17).

The number of cattle held by the household also substantially affected the perception of
erosion hazard in the grazing areas. 46% of respondents owning over 15 head of cattle
perceived the problem to be serious, in comparison to 13% of those respondents
owning less than five head (see figure 7.18). Clearly, the larger cattle owners have a
greater interest in the grazing areas, the erosion status and future use of grazing
resources.

The chi-square statistic was used to assess the importance of locational factors such as
the presence of erosion and socio-economic pressure in influencing perception of
Figure 7.17 Perceived severity of erosion in grazing areas according to length of residence.

Figure 7.18 Perceived severity of erosion in grazing areas according to cattle ownership.
erosion hazard in the grazing areas. Although there are no significant difference between the responses of categories 1 and 2, there are substantial differences between those of category 3 and those of category 4; in the absence of erosion, there are significant differences in the perception of erosion hazard in the grazing areas according to the degree of population pressure. These are not identifiable in the presence of erosion. However, the nature of the difference is once again confusing. In the absence of erosion and in areas of high population density (category 3), a high proportion (60%) of the respondents perceived there to be no problem of soil erosion in the grazing areas. Concomitantly, a small proportion of individuals perceived the problem to be serious. By contrast, in conditions of low population pressure (category 4), perception of the problem is the reverse, with a high proportion of individuals perceiving the problem to be serious. In summary, in conditions of theoretically the 'least pressure', perception of an acute erosion hazard in the grazing areas was more pronounced.

There are also significant differences in the perception of the problem according to the presence of erosion. In conditions of high population densities, an unexpectedly low proportion of category 1 (presence of erosion) farmers and a high proportion of farmers in category 3 (absence of erosion), perceived there to be no problem in the grazing areas of Svosve. This appears to be consistent with Millington's hypothesis that presence of erosion is contributing to a heightened awareness of the problem on the part of individuals, but this is only significant in those areas experiencing additional 'pressure' due to high population densities.

With respect to erosion in the grazing areas, contact with extension personnel does not have any consistent effect on individuals' perceptions of severity. There were significant deviations from expected outcomes across all levels of extension contact, potentially confirming that the 'extension message' as regards the grazing areas in Svosve has been confused. It is plausible that grazing areas have been 'left out' from the extension message to date in Svosve. The overriding problem in the grazing areas in the past and today in Svosve is their inadequate size, rather than explicitly soil degradation. As discussed in Chapter Three, the colonial conservation programme concentrated on the mechanical protection of arable soils. Such systems of contour and waterway construction were obviously not applicable in the grazing areas. Several respondents gave seemingly contradictory statements regarding the grazing areas. They could locate gullies in the surrounding area, yet failed to acknowledge in the interview a problem of soil erosion in the grazing areas. It may be that for such individuals, their conception of soil erosion is confined to that process which removes
their seedlings in their crop areas and does not include the process of gully formation. This point will be developed later.

Gender and age differences are important in shaping perceptions of degradation in the grazing areas. 82% of the respondents in the survey were female, and although the traditional division of labour into male and female domains is being gradually broken down in the light of labour migrancy and the reality of female headed households, it was clear from many of the interviews, that women felt hesitant to commit themselves to an interpretation of events in the grazing areas. Only 66 respondents expressed their perception of the problem in the grazing areas; only 44 were willing to indicate whether the problem was improving or worsening, 57% of whom perceived it to be the latter. Traditionally, it was the younger men and particularly boys who traditionally tended cattle, rather than the older men. This division, however, is also being gradually eroded through young boys being in school and young adult migrating to towns for work. Such socio-cultural factors which may influence perception are important in the analysis.

In summary, this analysis has highlighted the complexity of individual conceptions of erosion severity in both the crop and grazing areas. Locational factors such as the proximity to known 'problem' areas in terms of erosion and high population densities, had very little consistent effect on shaping individuals' perceptions of the severity of erosion in either crop or grazing areas. With respect to the latter, those people in category 1 (presence of erosion and high population densities) had a heightened perception of the severity of the problem. However, when differentiated according to the presence of erosion alone, there were no differences in terms of response with respect to erosion in either grazing or crop areas. It could be suggested that the spatial pattern of erosion rates in Svosve is not distinct enough to prompt clear differences in perception; the range of conditions in Svosve is quite small and experiences may be less exceptional. Since Svosve is a relatively small area, most individuals have probably seen gullies and heard of other peoples' erosion problems even if they have no personal experience of the problem. These inconclusive results regarding the role of locational factors in shaping perceptions of erosion severity may indicate that other factors are more important than personal experience as accommodated within the sampling procedure of this study.

It is conceivable that the method of classification of grid squares into categories may not have distinguished finely enough between those areas experiencing serious erosion and those experiencing very little at all. When each category was cross-tabulated with personal experience of erosion, it was found that 53% and 44% of respondents in
categories 3 and 4 respectively had had personal experience of erosion, despite having been classified into categories defined as having erosion absent on the basis of air photo interpretation. This may confirm the problem with air photographs for detecting localised sheet erosion. However, for many respondents, personal experience of erosion often centred on a temporary problem caused by particular storm events. The details of individual personal erosion problems will be highlighted later, but clearly since air photographs represent merely snapshots in time, they may well fail to pick up the significance of particular one-off events. This analysis has confirmed that identifying problem areas in terms of erosion on air photographs could not be used in isolation by extension agents wishing to target individuals with personal erosion problems, with heightened awareness or commitment to conservation programmes.

The perceived cause of erosion.

All respondents who perceived a problem of soil erosion were asked to indicate what they felt was the primary cause of the problem in the crop areas and separately in the grazing areas. With respect to the latter, they were also asked to forward potential solutions to the problem (conservation practices and solutions in the crop areas were the subject of other sections of the interview and are not addressed here). In line with the theoretical discussion above, it is hypothesised that knowledge of what individuals perceive as the cause of erosion problems will contribute to an understanding of the conception of the environment which they hold. Two aspects of individuals' environmental frameworks are of particular interest here; firstly, the location of control - is erosion perceived as an environmental, technical or socio-political problem, subject to internal/personal or external/community/central control; and secondly, the shape of individual perception - is the perception of the cause of soil erosion restricted in any particular direction?

Crop areas.

The perceived cause of soil erosion in the crop areas amongst the sample group is shown in figure 7.19. 43% of respondents felt erosion was due to a lack of or inadequate contouring and to many, their conception of the problem started and finished with contouring; "You have to have contours otherwise there will be soil erosion" (grid 86). "I cannot quite understand why erosion is occurring. People have put contours in, but there are still gullies in the river below" (grid 24). Several respondents made reference to people cultivating without the prior construction of contours and thereby causing erosion. One respondent perceived the operation of a historical legacy of resistance to conservation measures established during the colonial period;
Figure 7.19 Perceived cause of erosion in crop areas.
Sample response.

1. Hilly nature of Svosve
2. Too much rain/heavy rains
3. Poor/lack of contours
4. Combination of steep slopes and heavy rains
5. Soil is old
6. Streambank cultivation
7. Others
"Svosve is a hilly area. Many contours are not built properly. People were encouraged to plough anywhere during the liberation war and some are still refusing to build contours as they think it will make their lands even smaller" (grid 10).

Other respondents made reference to people opening up new areas for cultivation and ploughing without prior construction of contours. The air photo analysis of Chapter Five, however, indicated that cultivation in the 'grazing areas' is not as widespread in Svosve as promoted within national models of land use change. Once again, individuals may be expressing a 'second-hand' opinion of a 'detrimental' practice or a personal experience of a localised activity.

The hilly nature of the area is prioritised as the major factor in causing soil erosion by 20% of the respondents. The dominance of run off control problems as highlighted by those with personal experience of soil erosion has already been discussed and the highly granitic nature of the area is undoubtedly a factor in this. "Water comes from high places leading to run off and washes soil from the fields into rivers and dongas. When it does, crops are totally overpowered by floods and soil in the fields" (grid 38). 14% of respondents highlight heavy or excessive rainfall as the major factor in causing erosion in the crop areas.

"If rain comes very heavily it may destroy the contour, but normally if contours are good there is no problem of soil erosion. Some people have a problem every year, others never do. Those people who are most affected are those who plough near the water courses" (grid 63).

Several respondents noted that the problems were worse after several successive drought years; "The soil is very thin and some crops sink in the mud" (grid 15). These responses indicated a widespread problem of the breakdown in the structure of the soil. The above respondent added that; "Constructing contours and using manure can help stop this". The problem is summarised by the respondent who stated that; "The soil is old and when the heavy rain comes it is just taken away" (grid 3).

There were several respondents whose perception was shaped by experience of particular events. One respondent recognised the positive role of contours in redirecting run off away from fields, but also the possibility of gullies forming at the ends of contours (grid 63); that is the negative effects of mechanical erosion control discussed in Chapter Five. Another respondent highlighted the importance of correct conservation layouts;

"The demonstrators (extension workers) don't pick good places for water courses. The rain runs off the hills and without a clear line for water to follow, it just picks anywhere in my fields to go" (grid 8).
Similarly, another respondent's perception was influenced by her own experience; "Soil erosion is caused by the strong rainfall which comes from above my house and comes to my field via the water course from the road" (grid 60). The importance of these exceptional experiences in shaping perceptions will be discussed below.

There were no significant differences in the perception of the cause of erosion in the crop areas according to the location of the respondent in terms of the proximity to erosion and the relative population density. Similarly, there were no differences in perception according to the age of respondent, according to their perception of the severity of the erosion hazard, nor according to level of extension worker contact.

**Grazing areas.**

The perceived cause of erosion in the grazing areas amongst the sample is shown in figure 7.20. The majority of respondents (33%) perceived the problem of soil erosion to be primarily caused by cattle tracking and pathways leading to the concentration of rainwater and the formation of gullies. 16% of respondents highlighted overgrazing as the cause and specifically linked the degradation of pasture with the problem of erosion.

"There is not enough grazing for the numbers of cattle therefore it leads to the trampling in the same place, plus no grass leads to soil becoming thin and easily removed and therefore dongas form" (grid 86).

Only 4% emphasised overstocking per se as the main cause of erosion in the grazing areas. 14% of respondents who recognised a problem in the grazing areas could not forward a causal factor in the process of erosion. 13% attributed the problem to heavy rains and 7% to the continued use of sledges (heavy, forked tree sections dragged along the ground by oxen for transportation purposes). Respondents emphasising the latter may be repeating the well-known colonial extension message regarding the banning of sledges. The author saw no evidence of contemporary use of sledges in the area.

There were no significant differences in the perception of the cause of the problem in the grazing areas according to age, location, the number of cattle held nor the perception of erosion severity. Amongst those respondents perceiving the problem to be due to cattle tracking, overstocking or overgrazing however, there was a higher than sample average of willingness to destock. Those respondents recognising the source of the problem as too many cattle were more likely to be amenable to participation in destocking schemes. There were also some differences in the perceived cause of erosion according to the level of extension worker contact. A higher proportion of
1. Heavy rains
2. Cattle tracking
3. Don't know
4. Overgrazing
5. Use of sledges/dragging of ploughs
6. Others
7. Overstocking

Figure 7.20  Perceived cause of erosion in grazing areas. Sample response.
respondents receiving at least monthly contact perceived the cause to be due to overgrazing and made an explicit link between the degradation of pasture and the process of erosion. Those receiving lower levels of contact were less likely to hold such detailed perceptions of the problem. Both have implications for shaping and targeting future extension.

The perceived solutions to the problem of erosion in the grazing areas amongst the sample are shown in figure 7.21. 27% of the sample were unable to suggest how the problem should be solved, although an equal proportion suggested filling in gullies with a variety of stones and vegetation to impede the flow of water and soil. Although 40% of the sample indicated a willingness to destock, only 2% highlighted a reduction in cattle numbers as the primary solution to the problem of erosion in the grazing areas. "Too many cattle have been using a small area for too long leading to overgrazing. Therefore the solution is to limit cattle numbers as we cannot increase the grazing area" (grid 10).

Eighteen percent of respondents advocated rotational grazing schemes as the solution to the problem, 88% of whom were amongst the younger respondents aged 21-40. "We need to have a set area for grazing, separate and away from the arable areas. At the moment we have fields near grazing areas and erosion in the grazing area is affecting our fields - water is washing in" (grid 10).

Of the 8% advocating either resettlement or larger grazing areas as the solution, 75% were aged over 60. "The gullies are the cry for more grazing" (grid 15).

There were significant differences in the perceived solution according to location. In the areas of least pressure in terms of population density and proximity to known problem areas, there was a large emphasis on grazing schemes as the solution to erosion in the grazing areas. In the areas of greatest pressure, a relatively high proportion of respondents urged the government to assist in filling in gullies and improving the grazing areas.

"We were told that part of the commercial farming areas left by the whites would be reserved for grazing for Svosve farmers, but in fact the reverse has happened; now we are not allowed in these areas at all" (grid 10).

There were also differences according to the perceived severity of the problem. Those respondents who perceived the problem to be very serious were more likely to advocate resettlement or the provision of larger grazing areas as the solution to erosion. Those
Figure 7.21 Perceived solution to erosion in grazing areas. Sample response.

1. Destocking
2. Grazing schemes
3. Fill in gullies
4. Don't know
5. Others
6. Resettlement
7. Larger grazing areas
people perceiving the problem to be minor, were more likely to perceive the solution as one of filling in the gullies (see figure 7.22).

There were substantial variations in the solutions advocated according to the perceived cause of erosion in the grazing areas. For example, amongst those respondents perceiving the problem to be due to cattle tracking, 30% advocated filling in gullies as the primary concern of conservation, 23% could not recommend a solution and 11% suggested the provision of larger grazing areas. In other respects, there were strong relationships between the perceived cause and solution. 72% of those perceiving the cause as overgrazing promoted grazing schemes as the perceived solution to the problem. 60% of those perceiving the problem to be due to heavy rains suggested filling in gullies as the solution.

Several respondents recognised the lack of cohesion amongst the community with respect to dealing with the problems of the grazing area.

"We must put our heads together with our neighbours, then put it to 'those above' and then perhaps something will be done. We are the ones who should take care and control of the land" (grid 8).

There were many references to the need to be more united. "People need to be more cooperative in getting together and healing gullies" (grid 34). "If people were united we could get together and fill gullies but the problem is no-one is interested in them because the gullies are in the grazing area" (grid 96).

"The problem is that no-one takes care of the gullies. If people unite they may be able to collect stones and logs and put soil in gullies and plant grass. They have tried this on one gully and it was a success, but last year we had no help from the extension workers. In future, people need more encouragement and help from the government" (grid 86).

In summary, this section on isolating individuals' perceptions of the cause of erosion as one element in the understanding of environmental frameworks amongst a Svosve sample of communal farmers, has elicited four main conclusions;

1. Although there were very few gross differences (as indicated by the chi-square test) in the perceived cause of erosion according to the factors identified as important for this study, exceptional personal experiences stand out as being very influential in shaping perceptions, particularly as regards erosion in the crop areas.

2. The shape of individuals conceptions of soil erosion in some cases indicated a narrow perception of both the causes and solutions to the problem.
Figure 7.22 Perceived solution to erosion in grazing areas according to perceived severity.

1. Destocking
2. Grazing schemes
3. Fill in gullies
4. Don't know
5. Others
6. Resettlement
3. The location of the cause of the problem of erosion in both the crop and grazing areas and the required solutions, varied significantly between individuals.

4. Farmers' responses reflect strongly the acquired 'technical' message promoted in the past and currently in Svosve. It is suggested that individuals were prioritising this knowledge in their responses and perhaps understating additional sources. This is built on in subsequent sections.

Although there were wide variations in the expressed causes and solution to erosion in the arable and grazing areas of Svosve, these differences could not be explained in terms of relative location to known problem areas, socio-economic pressure or contact with extension officers. With respect to the crop areas, exceptional personal experiences, particularly previous negative experiences, were important in shaping individuals' conceptions of soil erosion. There were also no differences in the perceived cause of erosion according to the perception of severity of the erosion hazard. There was greater variety, however, with respect to the cause of erosion in the grazing areas, but again, these could not be accommodated in terms of differences in location, age, number of cattle held nor perception of severity.

The shape of individuals' conceptions of soil erosion in the crop areas as indicated by their perception of the causes of the problem were heavily technocentric in the main. A large proportion of the sample as a whole (43%) perceived soil erosion in the crop areas to be primarily a technical concern in that it was due to a failure to build or properly maintain contours. As a result, the shape of their conceptions stressed the control of moving water and the prevention of gully erosion, rather than on enhancing water infiltration or biological control. For those individuals who perceived the cause of erosion to lie in the environmental conditions of Svosve, the shape of their conceptions still emphasised the process of gully formation rather than sheet erosion.

Similarly, the shape of individuals' conceptions of soil erosion in the grazing areas as indicated by their perceptions of causal factors, prioritised the process of gully formation. The immediate causes expressed varied between cattle tracking, overgrazing or overstocking, but the process of erosion conceived was the same.

Additional information is gained regarding the shape of individuals conceptions of soil erosion from further questioning analysed in subsequent sections. Clearly, understanding of this aspect is important for targeting and designing future conservation and extension activities. Targeting 'awareness' campaigns at the understanding of sheet erosion may be more effective than targeting them at gully erosion which already seems to dominate peoples' conceptions of soil erosion.
The relatively consistent and in contrast, the varied perceptions of the cause of soil erosion in the crop and grazing areas respectively, confirm the importance of past extension advice. A biased 'official' message has been transferred to the local population both in terms of the sector targeted and the priority given to the control of rill and gully erosion. The extension message which they have received to date has been overwhelmingly technocentric, with the construction of contours presented almost solely as the means of erosion control. Further research is required in order to establish if the lack of priority given by farmers to biological conservation methods and sheet erosion processes is a function of a lack of understanding on the part of farmers or to shortfalls in the data collection technique; farmers may not have fully expressed aspects of their conception of the problem which were not prioritised by the extension officers. Resolving this question is clearly vital to the design of future conservation programmes which will need to include raising the status of biological conservation methods if sheet erosion, the primary erosion threat as suggested within recent literature, is to be controlled.

The location of the cause of soil erosion within individuals' conceptions is also important for targeting campaigns and action programmes. For example, to 39% of the sample, the cause of soil erosion in the crop areas was located in environmental factors; in the hilly nature of Svosve in combination with the heavy rains received. These are 'external' factors which individuals may perceive to be outside their own control, particularly if they additionally experience repeated failure in the technical measure forwarded to them as the solution to their problem. This may influence future receptiveness to conservation techniques.

Understanding of individuals' location of the cause and therefore the solution to soil erosion, is even more important for targeting and designing extension work in the grazing areas. The variety of perceived solutions expressed gives an indication of the challenge at the local level to the design of suitable conservation projects in the grazing areas and to ensuring sustained commitment. 13% of respondents stressed environmental roots to the problem, whilst the emphasis for the majority focussed essentially on too many cattle in too small an area. Despite the emphasis on cattle tracking, overgrazing and overstocking as the primary causes of erosion, only 2% advocated destocking as the solution. This low commitment to destocking as the solution seems unlikely to be due to fear of personal loss, since 40% of the sample indicated later in the interview that they would be willing to participate in destocking schemes. More readily it signifies a rejection of the technocentric approach tried and eventually abandoned in the colonial period as a solution to the erosion problem in the grazing areas. 18% of the sample clearly recognise the benefits to be gained in
improving the carrying capacities of the areas via grazing schemes. These respondents have tended to be the younger ones and this is encouraging for future extension. As noted earlier, however, the younger respondents tended to rank the problem of soil erosion in the grazing areas as less serious than older respondents which may constrain their sense of urgency for conservation schemes.

The low number of respondents advocating destocking as a solution to erosion problems in the grazing areas could also potentially be due to the conception of erosion which respondents hold. For many respondents, their conception of soil erosion in the grazing areas seems confined to the process of gully formation and therefore their solution to the problem is to fill in the gullies. 50% of those respondents advocating this solution perceived the problem as due to cattle tracking leading to the concentration of water and 30% to heavy rains; none of these respondents stressed the link between cattle, overgrazing, poor grass cover or the loss of soil from sheetwash.

The analysis of individuals perceptions of the cause of soil erosion in the crop areas has indicated that past extension efforts have been very successful in transferring the technical measures to farmers at the local level. With respect to the grazing areas, the analysis has indicated the substantial challenge which exists in designing and implementing an appropriate, coherent and coordinated plan for action in the light of the multiple conceptions expressed.

**Motivation for the conservation of resources.**

A series of questions were asked regarding the conservation of soil in the grazing and crop areas in order to establish individual motivation for participation in conservation programmes. Questions were also asked to determine the level of uptake in Svosve of the Forestry Commission's tree planting schemes and individuals' perceptions on why trees should be conserved. Responses regarding each resource are assessed separately in the following sections.

**Crop areas.**

87% of respondents felt that they were personally responsible for the conservation of soil in their crop areas. The perception of the sample as a whole as to why soil should be conserved in these areas is shown in figure 7.23. A variety of long and short term motivations were expressed. 58% of the sample reported the primary aim of conserving soil was to increase yields, reflecting short term ends. Those respondents reporting commitment to conservation of the soil in crop areas to ensure future cultivation or because 'soil is life', clearly perceive the dependent relationship they have on the soil
1. To increase yields
2. To stop soil erosion
3. For future cultivation
4. So seeds and fertilisers will not be washed away
5. It is life

Figure 7.23 Why conserve soil in crop areas? Sample response.
within agriculture and their own role in determining sustained production and their own livelihoods. Only 6% made the explicit connection between the prevention of soil erosion and the conservation of soil.

Kayongo-Male and Mbithi (1979) state the primary objectives of conservation as being the "retention of soil and the improvement of productivity" (p.302). Clearly, all the perceptions expressed in the survey as to why soil should be conserved have positive benefits to soil conservation if followed up in practice. Problems could, however, ensue if for example, the positive benefits of conservation to enhancing yields were no longer deemed by the individual to be sufficient to justify the labour or financial inputs required of the conservation practice. Similarly, commitment on the part of individuals perceiving their motivation for conservation in short term benefits, may not be forthcoming for conservation programmes in which self-interest was not so easily evaluated.

The major differences according to the age categories in the perception of why soil in the crop areas should be conserved are shown in figure 7.24. The most unexpected outcome as indicated by the chi-square test, was the relatively high proportion of respondents aged 21-40 whose primary motive for conserving soil in the crop areas was to save fertilisers, seeds and manure from being washed away. On the ground, this probably reflects the fact that the large scale use of fertilisers in particular, is a relatively recent development in the communal areas. Although such a perception clearly has conservation implications, the link between the prevention of soil erosion and the conservation of soil is not made explicit by these respondents with prospective implications for the type of problem regarding commitment to longer term conservation programmes highlighted above.

When the sample was differentiated according to locational category, the only significant difference between the responses was with respect to those in category 3 (greater than average population pressure / absence of erosion) (see figure 7.25). 80% of respondents in this category perceived the primary motive for conserving soil in the crop areas to be to increase yields. No respondents in this category connected the conservation of soil with the prevention of soil erosion or held the related response of maintaining seeds, fertilisers and manure in the fields. This may be related to the absence of erosion problems by definition in category 3, but this is not supported by respondents in category 4 (less than average population/absence of erosion). Further details will be elicited below in the analysis of motives for the adoption/non-adoption of conservation related practices.
1. To increase yields
2. To stop soil erosion
3. For future cultivation
4. So seeds and fertilisers will not be washed away
5. It is life

Figure 7.24 Why conserve soil in crop areas? Response according to age.
Why conserve soil in crop areas?

1. To increase yields
2. To stop soil erosion
3. For future cultivation
4. So seeds and fertilisers will not be washed away
5. It is life

Figure 7.25 Why conserve soil in crop areas? Response according to location.
Grazing areas.

In contrast to the situation as regards the crop areas, only 54% of respondents felt they had a responsibility in conserving soil in the grazing areas. 'Vidcos', 'headmen', 'the district administrator' and 'men' in general were amongst those highlighted in the interviews as being responsible for the conservation of soil in the grazing areas.

The majority of respondents perceived the primary motive for conserving soil in these areas as being to ensure food for cattle (see table 7.5). Only 11% of respondents indicated the explicit connection between the conservation of the grazing areas and the prevention of soil erosion. 7% recognised their role in ensuring the sustainable use of grazing resources in the light of the limited extent of this resource in Svosve. Table 7.5 also indicates, however, that conservation practices may be adopted for 'non-conservation' reasons as for example, the individuals who perceived the need to conserve soil in the grazing areas in order to avoid resettlement.

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>To stop soil erosion</td>
<td>11</td>
</tr>
<tr>
<td>For food for cattle</td>
<td>80</td>
</tr>
<tr>
<td>Grazing is limited, therefore</td>
<td>7</td>
</tr>
<tr>
<td>must conserve existing</td>
<td></td>
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<tr>
<td>So we wont be resettled</td>
<td>2</td>
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Table 7.5 The motivation for conserving grazing resources.

There were no significant differences in the motivation for conserving grazing resources according to locational category, although there were some differences with respect to the age of respondents. Those respondents over the age of sixty were more likely to stress the longer term benefits of the conservation of soil in the grazing areas; they recognise that grazing in Svosve is limited and the need for the sustainable use of the resource if present levels of stocking were to be perpetuated. The opinion expressed by the Agritex officers regarding older people and a decreased willingness to participate in grazing improvement schemes cannot be supported by a lack of awareness on the part of these people as indicated by the sample.

Tree resources.

83% of the sample had heard of the Forestry Commission's reafforestation programme although only 64% of respondents reported having planted seedlings on their own plots. The motivation for conserving trees expressed by the sample as a whole is shown in figure 7.26. 30% of the respondents stated that trees should be conserved to prevent soil erosion. However, when asked later in the interview why they had participated in the Forestry Commission programme of planting Eucalyptus seedlings,
1. Don't know
2. To stop soil erosion
3. To beautify the country
4. For fruits/building/fuel
5. To improve fertility
6. Others

Figure 7.26 Why conserve trees? Sample response.
only 4% of respondents gave this response as their primary objective, the majority prioritising future fuel and building needs. This suggests that potentially, farmers early in the interview were modifying their responses according to their perception of the objectives of the survey. Alternatively, they were repeating what they have been told at local meetings by staff from the Forestry Commission or the Department of Natural Resources with respect to the role of trees in preventing soil erosion, yet when questioned on their personal motives for participation in the programme, the conservation of soil was not their primary aim. This analysis again stresses the importance of perceived short term gains within conservation programmes. Commitment to community owned and controlled tree programmes or longer term soil conservation projects may not receive similar levels of support.

In summary, this section on the motivation for conservation has confirmed the priority which individuals attach to perceived short-term, personal benefits in motivating participation in conservation programmes. The prevention of soil erosion per se ranks as a minor element in peoples' perceptions of conservation programmes with respect to arable or grazing areas or reafforestation programmes. The potential problem in future is that not all conservation programmes will produce such immediate benefits or equal benefits to all, as in community projects or programmes concerning communal resources.

With respect to the crop areas where a large percentage of respondents already perceive conservation to be their own responsibility, many have already seen the benefits of conservation via the mechanical control of erosion. Education programmes now need to broaden the conception of the problem to include soil lost by sheet erosion and the conservation model to include the benefits to be gained from biological measures in terms of fertility and nutrient balances.

With respect to the grazing areas, the various motivations expressed confirms the need for individuals and community groups to be fully involved in prioritising, planning and implementing conservation programmes in these areas to ensure that self and community interest are perceived from the outset and sustained commitment ensured. The previous section highlighted the number of respondents who felt the need for groups of individuals to 'put their heads together' to devise solutions to the problems of erosion in the grazing areas. It is this type of initiative which all officials should be encouraging.

The main differences in motivation for the conservation of resources exhibited in the responses were according to age rather than location, further defusing the role of either proximity to erosion hazard or relative population density in determining the conception
of erosion and conservation amongst farmers in Svosve. In addition, the analysis
suggests that targeting conservation programmes on age groups rather than on 'worst-
first' or locational categories, would stimulate the greatest benefits. Older people have
the advantage of personal judgement of the changing resource situation over their
periods of residence in Svosve, whereas younger people are being exposed to a greater
amount of information regarding the importance of conservation. As highlighted in this
analysis however, greater years do not necessarily imply a decreased willingness to
participate in conservation programmes. A trend amongst the younger generations
which could have negative implications for commitment to conservation, is that of
increasing numbers perceiving farming as a subsistence base with their primary
income-earning activity being located in the towns or non-farm activities.

The adoption/non-adoption of various farming and conservation
practices.

Further understanding of individuals' perceptions of erosion are gained through
analysis of a set of questions designed to assess the degree of and motivation for,
adoption of various farming and conservation-related practices in Svosve. Percentage
adoption of the various practices amongst the sample population is shown in table 7.6
below.

| Conservation/ Percentage Percentage making   |
| farming practice | adoption | explicit link between practice and soil |
|                  |         | erosion                               |
| Contour construction | 94      | 76                                   |
| Contour ploughing | 94      | 61                                   |
| Crop rotations    | 79      | 4                                    |
| Fallow periods    | 56      | 8                                    |
| Manure application | 88      | 3                                    |
| Correct plant density | 83     | 5                                    |

Table 7.6. Percentage adoption of various farming and conservation practices.

All respondents were asked to state the reason for adoption or non-adoption of each
practice. The percentage of respondents who made explicit reference to the practice in
terms of slowing down soil erosion is also listed in table 7.6 Clearly, although the
percentage adoption of such farming practices is high, the primary conservation aims in
terms of the prevention of soil erosion of many of these practices are not prioritised by
the sample farmers. Again, individuals' perceptions of these practices may be
influenced by their own experiences past and present, details of the 'extension
message' which they have incorporated into their conception of the environment and
their farming system, together with locational and environmental considerations.
When a comparison was made between those respondents who had had personal experience of soil erosion problems and those who had not, there was very little difference between their conceptions of the farming environment and their perceptions of soil erosion. For example, amongst the 76 respondents who explicitly linked the construction of contours with the prevention of soil erosion, 51% had had personal experience of soil erosion whereas 45% had not. Personal experience of soil erosion may therefore contribute to a slightly heightened awareness of the role of contouring in slowing rates of erosion. Similarly, with respect to contour ploughing, 53% of those respondents who linked this practice with a decreased threat of erosion had had personal experience of erosion in comparison to 44% who had not. However, with respect to the biological control measures, personal experience of erosion had no substantial effect upon the already very limited perception of the link between various farming practices and the control of erosion.

Questions were also asked as to the source of peoples' knowledge of the various farming/conservation practices, to assess the relative importance of formal extension lines versus more traditional modes of learning. The responses are expressed in table 7.7. The vast majority received information via the government extension services both past and present. The number of respondents in each 'advice category' ('extension worker', 'parents/elders' or 'others'), expressing the conservation of the soil as the primary aim of the particular technique was therefore calculated with respect to each measure. For example, with respect to contour construction, 81% of those who received their advice from the extension workers, explicitly linked their construction with soil erosion control. 64% of those who received the information from elders or parents did likewise, while in the cases of those learning by experience or from neighbours, the figure was 79%.

It is evident in table 7.7, that the actual and relative importance of formal extension lines of communication declined with respect to many of the techniques other than contour construction. For example, in the case of contour ploughing, although those people receiving advice from extension workers had a better than average chance of understanding the links between the technique and the conservation of their soils, those receiving information from elders or parents were more likely to express the link. The proportion of respondents receiving information from sources other than formal extension officers, ranged from 19% as regards correct planting densities to 27% regarding contour construction. Clearly, although the precise nature and ultimate source of knowledge regarding the various practices is still not known, factors such as the strength of the extended family and traditional modes of communication have been
very significant in diffusing knowledge regarding farming and conservation-related practices.

<table>
<thead>
<tr>
<th>Conservation/ Source of</th>
<th>Percentage making explicit link between technique and erosion</th>
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<tbody>
<tr>
<td>Farming practice</td>
<td>advice</td>
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<tr>
<td></td>
<td>Contour construction (Total 76%)</td>
</tr>
<tr>
<td></td>
<td>Parents/elders</td>
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<tr>
<td></td>
<td>Experience/others</td>
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<tr>
<td></td>
<td>Contour ploughing (Total 59%)</td>
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<td></td>
<td>Parents/elders</td>
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<td></td>
<td>Experience/others</td>
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<td></td>
<td>Correct crop densities (Total 5%)</td>
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<td></td>
<td>Parents/elders</td>
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<td></td>
<td>Experience/others</td>
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<tr>
<td></td>
<td>Manure application (Total 3%)</td>
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<td></td>
<td>Parents/elders</td>
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<td></td>
<td>Experience/others</td>
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<td></td>
<td>Crop rotations (Total 4%)</td>
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<td></td>
<td>Parents/elders</td>
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<td></td>
<td>Experience/others</td>
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<tr>
<td></td>
<td>Fallow periods (Total 8%)</td>
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<td></td>
<td>Parents/elders</td>
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<td></td>
<td>Experience/others</td>
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</tbody>
</table>

Table 7.7 The effect of information source on perception of soil erosion control.

Since it has been hypothesised elsewhere that proximity to erosion sites contributes to a heightening of perception of soil erosion, adoption of each practice for their primary conservation aims was cross-tabulated with location according to the four categories used in the study. The results are shown in table 7.8. Interpretation of the results with respect to 'biological' conservation measures should be tentative however, since the overall totals of respondents making the desired link are so small (as low as 3% in category 2). Of interest, however, is that perception of the role of crop rotations and fallow periods in preventing soil erosion are confined to categories 1 and 2.

<table>
<thead>
<tr>
<th>Practice</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Contours</td>
<td>82</td>
</tr>
<tr>
<td>Contour ploughing</td>
<td>56</td>
</tr>
<tr>
<td>Crop densities</td>
<td>6</td>
</tr>
<tr>
<td>Manure</td>
<td>9</td>
</tr>
<tr>
<td>Crop rotation</td>
<td>9</td>
</tr>
<tr>
<td>Fallow period</td>
<td>21</td>
</tr>
</tbody>
</table>

Table 7.8 Percentage of respondents making explicit link between farming practice and erosion control according to category.
The results are not conclusive. With respect to contour construction, in areas of erosion (categories 1 and 2) a significantly higher proportion of respondents acknowledge adoption in pursuit of the primary conservation aims than in categories 3 and 4. However, there are no significant differences between the categories with respect to contour ploughing or crop densities.

Better understanding of peoples' conceptions of the environment and soil erosion is gained via an overview of why they implement some practices and why they fail to adopt others. The decision to adopt or not is made by individuals on the basis of a multitude of factors which include the three selected for study in this sample. The responses given listed in table 7.9 below, are likely to be the product of both personal experience, (some of which may be locationally specific), extension contact and advice received from neighbours and relatives, but may also reflect personal resource constraints or negative previous experiences concerning the technique.

Clearly, the reason for adoption / non-adoption of the practices varies significantly between individuals. Many of the responses reflect the low level of productivity of the households and the consequent inability to implement recommended practices through their lack of resources in terms of fertilisers, time, labour or money for other inputs. Previous negative experiences with the various techniques do not feature significantly in the respondents' reasons for non-adoption. The only exceptions to this were those respondents who did not build contours because they could not maintain them and the respondent who stressed that manuring had detrimental effects on her crops. Some individuals reported that they were able to cope well with the problems of soil erosion alongside normal farming production. One respondent stated that he built contours "to save the life of the soil for my children and to improve yields for myself" (grid 63), indicating a clear perception of both the long and the short term benefits of conserving the soil. He did not, however, employ rotations or incorporate fallow periods into his farming system and he did not stress any link between manure application and prevention of soil erosion; these did not feature in his conception of successful conservation.
<table>
<thead>
<tr>
<th>Practice</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contours</strong></td>
<td></td>
</tr>
<tr>
<td>To stop soil erosion / conserve soil</td>
<td>76</td>
</tr>
<tr>
<td>Told to / put in by government</td>
<td>6</td>
</tr>
<tr>
<td>To control water</td>
<td>13</td>
</tr>
<tr>
<td>Never told to / can't maintain them</td>
<td>3</td>
</tr>
<tr>
<td>Too rocky</td>
<td>2</td>
</tr>
<tr>
<td><strong>Contour ploughing</strong></td>
<td></td>
</tr>
<tr>
<td>To stop soil erosion</td>
<td>60</td>
</tr>
<tr>
<td>So we don't damage the contour</td>
<td>9</td>
</tr>
<tr>
<td>To control water</td>
<td>14</td>
</tr>
<tr>
<td>Don't know</td>
<td>3</td>
</tr>
<tr>
<td>Told to</td>
<td>6</td>
</tr>
<tr>
<td>To stop manure/fertilisers being washed away</td>
<td>2</td>
</tr>
<tr>
<td>To get a long plough/to use land efficiently</td>
<td>3</td>
</tr>
<tr>
<td>Too rocky</td>
<td>3</td>
</tr>
<tr>
<td><strong>Correct plant densities</strong></td>
<td></td>
</tr>
<tr>
<td>To stop soil erosion</td>
<td>5</td>
</tr>
<tr>
<td>To increase yields</td>
<td>39</td>
</tr>
<tr>
<td>Told to / Agritex knows best</td>
<td>27</td>
</tr>
<tr>
<td>No knowledge / too old</td>
<td>10</td>
</tr>
<tr>
<td>So we can apply fertiliser properly</td>
<td>3</td>
</tr>
<tr>
<td>Shortage of land</td>
<td>2</td>
</tr>
<tr>
<td>Lack of money / seeds / fertilisers / time</td>
<td>5</td>
</tr>
<tr>
<td>So roots are undisturbed and get enough food</td>
<td>5</td>
</tr>
<tr>
<td>So crops get fresh air and sunlight to ripen well</td>
<td>4</td>
</tr>
<tr>
<td><strong>Manure application</strong></td>
<td></td>
</tr>
<tr>
<td>To stop soil erosion</td>
<td>3</td>
</tr>
<tr>
<td>To increase yields</td>
<td>67</td>
</tr>
<tr>
<td>To improve soil fertility / strengthen the soil</td>
<td>20</td>
</tr>
<tr>
<td>Lack of cattle</td>
<td>9</td>
</tr>
<tr>
<td>Manure 'burns' crops</td>
<td>1</td>
</tr>
<tr>
<td><strong>Crop rotations</strong></td>
<td></td>
</tr>
<tr>
<td>To stop soil erosion</td>
<td>4</td>
</tr>
<tr>
<td>To increase yields</td>
<td>43</td>
</tr>
<tr>
<td>To improve fertility/retain nutrients/prevent disease/to strengthen soil</td>
<td>28</td>
</tr>
<tr>
<td>Shortage of land</td>
<td>12</td>
</tr>
<tr>
<td>Lack of seeds</td>
<td>2</td>
</tr>
<tr>
<td>Lack of knowledge</td>
<td>8</td>
</tr>
<tr>
<td>Soil is so tired that only maize will grow</td>
<td>3</td>
</tr>
<tr>
<td><strong>Fallow periods</strong></td>
<td></td>
</tr>
<tr>
<td>To stop soil erosion</td>
<td>9</td>
</tr>
<tr>
<td>To increase yields</td>
<td>6</td>
</tr>
<tr>
<td>To improve fertility / strengthen soil</td>
<td>39</td>
</tr>
<tr>
<td>Lack of land</td>
<td>35</td>
</tr>
<tr>
<td>Too much land to plough / lack of fertilisers</td>
<td>10</td>
</tr>
<tr>
<td>Get good yields without fallow periods</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 7.9 Reasons for adoption/non-adoption of various practices.
Some respondents expressed a lack of knowledge concerning some practices. In other cases there appeared to be confusion regarding the operation or purpose of the strategy. In combination, the incomplete understanding of the full aims of conservation practices and resource constraints may threaten the long term effectiveness of the measure and therefore the sustainable use of resources. One respondent (grid 96) does not incorporate fallow periods into her farming system since "I still get good yields from my fields". Although she exhibits partial understanding of the benefits to be gained from fallow periods, she does not perceive the full conservation aims of the technique. Resting the soil to her, is a policy to be adopted once the yields become poor. In an almost technocentric way, she perceives it as a technique to be used at a later date to solve the problem when it arises. Another respondent (grid 49) started employing a rotation but found he got better yields from maize than from other crops in the rotation such that he "is just planting maize now". He clearly did not prioritise the full conservation or agricultural benefits of this technique in his response. Fear of a community reaction also modified one respondent's motivation for non-adoption; she did not incorporate fallow periods into her farming system as she felt people would think she had too much land if she did and may take some away from her, since land was so scarce in Svosve (grid 96).

Other responses give indication of the importance of external forces in the non-adoption of practices and therefore the perceived responsibility for conservation actions. In the case of those respondents who were failing to maintain their contours because of their age, the solution to the problem of soil erosion lay beyond the capacity of the individual and therefore some community or official action was needed. Similarly, in instances where individuals gave responses such as 'too rocky' as a justification for their non-adoption of practices, they clearly located control of the problem of soil erosion externally in the environment or in the political-economic conditions which led to their marginality.

Resource constraints in the main, are not prioritised as being problematic with reference to the mechanical conservation measures, except in the cases of elderly widows having problems in maintaining contours themselves or in securing labour for such purposes. With respect to the 'biological' conservation techniques, however, resource constraints are perceived as being much more obstructive. Land shortage and lack of cattle are prioritised by many respondents as explanations for the non-adoption of rotations and fallow periods. Shortage of inputs further emphasise the interrelationship between conservation, the political-economic realities of the farming system, and the constraints which need to be overcome for full participation in conservation programmes.
In summary, this analysis of the uptake of various conservation practices amongst respondents has elicited details of some of the socio-economic and structural constraints which need to be overcome to ensure full participation in environmentally sustainable agricultural development. It has also further elucidated the shape of individuals' perceptions of soil erosion. The analysis indicates that although adoption of mechanical conservation techniques is high, uptake of biological conservation practices is in contrast, very low. In addition, with the exception of contour construction, there were a range of motivations expressed for adoption of the measure. In the majority of cases, prevention of soil erosion was not their primary motive. As suggested in previous sections, peoples' participation in conservation schemes in which individual benefits are not clearly identifiable and forthcoming, may not be guaranteed whilst such perceptions prevail.

Individuals' conceptions of the environment are moulded via complex inter-related forces. This section has indicated that the formal extension route has been a prime purveyor of technical information to farmers in Svosve and has been important in shaping their environmental frameworks; "This is where the Department (Agritex) have been very successful - in transferring technical knowledge, but farmers may still not effect it" (Ngulube 1986). The implications of promoting a restricted model of conservation based on the mechanical control of soil erosion is clearly seen in the predominance of expressions such as "if you have contours soil erosion won't be a problem" (grid 86). Such programmes in some cases have led to a conception of the environment in which for many people, conservation of the soil lies outside their own control. Those individuals who adopt practices simply because they are 'told to', clearly do not perceive their own role in the conservation of resources. Further research is required in order to assess the role of other techniques which they did not prioritise within their responses to the questioning within this survey. The IFAD report on soil and water conservation in sub-saharan Africa, states that if farmers are truly 'participating' in conservation, then they should be able to explain why they do so in terms of benefits to their agricultural production (1986 p.32). This, however, means more than short term increases in yields.

This chapter has highlighted the historical legacy of the colonial conservation programmes in terms of the socio-cultural environment in Svosve. The results of this survey indicate that in many cases, the perceptions of erosion held by farmers are restricted in some sense. For example, gully erosion for many, dominated the shape of their conception of soil erosion on croplands. Contour construction dominated their perceived response and their motivation for participating in conservation programmes was to gain better yields. These conceptions reflect closely the distorted narrow
conservation message which has been promoted in Svosve to date. The American-inspired model for conservation dominates the physical and human landscape in Svosve. It appears that conservation has become a separate activity in Svosve in the manner in which Makina (1983) suggested; separate from other aspects of life and often separate from the agricultural system itself in the case of the clinical and exclusive adoption of contouring. Further research would be needed to elicit other forms of knowledge and practices not prioritised by respondents in this survey.

This survey did not set out to document indigenous conservation practices. As a result, detailed agronomic techniques used by individuals may be underrepresented in the results. What is clear, however, is that adoption of crop rotations or incorporation of fallow periods was difficult for many respondents due to resource constraints, including land shortage. Future conservation programmes in Svosve need to be broadened; individuals need to be helped in overcoming particular constraints within their farming system to achieve development and ensure conservation. Giving greater status to biological conservation via a broadening of the 'official' conservation message may encourage farmers to prioritise what they know or are doing. In addition, for those respondents who are unable to reconstruct or maintain the required mechanical conservation structures by themselves, biological techniques may be more appropriate or more easily adopted within their current activities.

The shape of individuals' perceptions of erosion and conservation in Svosve are heavily influenced by personal experiences of quite exceptional erosion problems and only on a relatively minor scale, by factors of proximity to erosion hazard or population density. There is in fact very little evidence from the survey results of differences in background characteristics, perception of erosion and conservation or motivation for conservation amongst respondents differentiated according to these factors. This finding further challenges the value of models which relate erosion hazard to aspects of population or land 'pressure'. The variation in perception of erosion and the conservation response are complex and virtually location-specific. Personal experience of erosion problems in crop areas was related to particular problems of conservation layout; proximity to poorly aligned roads and mitre drains; environmental factors such as granite slopes and exceptional storm events. It was these 'exceptional' personal experiences which accounted for much of the variance in perceptions expressed. With respect to the crop areas, it was shorter term, localised, extreme and personal experiences which have the greatest role in differentiating between individual perceptions of erosion.
Knowledge of the local environment featured in individuals’ conceptions of the problem in Svosve. The heavy rainfall received and the mountainous nature of Svosve framed many peoples’ conceptions of the problem of soil erosion. Individuals’ conceptions could not, however, by further differentiated according to proximity to particular ‘micro-environments’ such as badly eroded areas.

Knowledge held within any community is a mixture of local knowledge and that introduced into the community. In contrast to Millington’s work with communities in Sierra Leone who had had very little contact with extension services, this research constitutes a study of the shape of peoples’ understanding of soil erosion in a society which experienced forty years of colonial conservation. Despite this long history of formal extension contact in Svosve and the predominance of ‘introduced’ elements in individuals’ perceptions of soil erosion problems, this chapter has highlighted the continued importance of other sources of knowledge for conservation practice. Parents, elders and neighbours remain important mediums for communication and learning alongside the rising contact through farmers group membership with extension officers.

Analysis of the shape of peoples’ perceptions of soil erosion has, nevertheless, highlighted the importance of ‘introduced’ elements; mechanical conservation techniques were prioritised over biological and gully erosion over sheet loss. Evidence of ethnoscientific elements within environmental perceptions amongst communal farmers in Svosve, was low. This was in contrast to the findings of other authors such as Wilson (1986) who identified rich sources of indigenous technical knowledge amongst communities in Chibi communal area, a drier region in southern Zimbabwe. The disparity in this respect is probably a function in part of the limitations of the survey method (incorporating only one visit for example); the established and continuing activities of government extension workers in Svosve; and location in terms of Natural Region and proximity to Harare.

This analysis of what people think about soil erosion in Svosve has emphasised the diversity which exists even within a small study area. Although many individuals are very ‘aware’ of conservation needs, of their own priorities and those of the community, the overriding picture to emerge from the analysis is the confusion which surrounds soil erosion and conservation. In continuity with the work of Blaut et al in Jamaica (1959), it is clear that many communal farmers in Svosve have adopted western scientific elements into their conceptions of soil erosion. For many individuals, these elements now dominate their understanding as exhibited by those respondents whose perceptions started and finished with the construction of contours.
To others, the continued presence of soil erosion in Svosve or their own persistent problems of soil loss despite the widespread adoption of contouring, was attributed to a variety of educational, environmental or structural factors. Nevertheless, with few exceptions, their faith in the western inspired model for erosion control did not falter.

This entrenchment of a restricted conception of soil erosion introduced and perpetuated by the colonial administration presents a substantial challenge to future conservation efforts in Svosve. At a time when the value of conservation techniques complementary to mechanical structures is being realised, together with the need to address soil and water conservation as interdependent issues, understanding the shape of peoples' awareness' is critical. This analysis demonstrates that the level of conservation awareness in Svosve is high, but that the shape of such understanding needs to be broadened. At present, the confusion which surrounds the incorporation of elements of the technocentric conception, threatens to prove immobilising.

The analysis has also stressed the specificity of the problem of soil erosion, both spatially and in terms of individual vulnerability. Use of conventional 'scientific' criteria such as population pressure or presence of erosion to highlight and target problem locations will not necessarily target those people who are most in need of help or to whom soil erosion is most problematic. In addition, individuals living in proximity to such areas do not have significantly heightened awareness of, or motivation for, soil conservation programmes. The survey has shown that it is not necessarily resource-poor farmers who cannot cope with soil erosion. In the light of the complexity of factors involved in influencing the conception of soil erosion held and the motivation for conservation amongst individual farmers, extension officers should take every opportunity to let individuals and groups define and initiate conservation programmes.
CHAPTER EIGHT. CONCLUSION.

This thesis aimed to complement and extend understanding of soil erosion and conservation in Zimbabwe through a methodological approach and a scale of analysis which have been under-represented in the literature. Soil erosion is an archetypal interdisciplinary problem, yet to date, the two sets of specificity identified by Blaikie (1985) as critical for explanation, those of the physical and social/economic systems, have not received equal attention by academics or practitioners.

Soil erosion is an explicitly political issue; conservation activities intervene directly between people and their means of production and therefore are enmeshed in the contradictions within society itself. A political-economic analysis enables the conceptions of soil erosion held by individual actors to be dissected; all have a view of how society does and should operate from which they make assumptions concerning the cause and solution to any failures. Political-economic analysis has highlighted the need to consider multiple problem definitions or conceptions of the environment, and has provided a theoretical base from which 'social' factors can be accommodated into the soil erosion debate. Such work is beginning to counter the established dominance of natural scientific endeavour within soil erosion research which forwarded a technocentric conception of an environmental problem subject to the laws of physical science. Within such research, social, economic or political factors were given only as explanations for the continued problem of soil erosion. Conservation policy options in consequence were restricted to the technical sphere, symptoms rather than underlying causes were addressed, and in the exclusion of political-economic forces in the explanation, the prevailing model for change was retained. Political economic analysis of the environment exposes the fallacy of the technocentric claims for neutrality or rationality which stem from the faith in western science, and searches for explanations of resource problems in the contradictory economic and social relationships which exist between individuals and groups in society.

The need to consider multiple conceptions of soil erosion has also been forwarded by the populist development critique. In particular, the value of knowledge generated outside formal science and conceptions of the environment other than the technocentric one, have been explored. Regional political ecology is a pluralist approach which combines the sensitivities of both political economy and the populist development critique. It provides a methodology for incorporating the 'unconnected and irksome' 'social' forces into the analysis without loss of sensitivity to the immediate causal variables, wind and water.
This thesis adopted a regional political ecology approach to soil erosion in Svosve communal area. The analysis focused on three primary objectives. These were firstly, to incorporate the environment into political-economic analysis through the identification of multiple conceptions of soil erosion as forwarded by different interest groups at the national, regional and local levels in the past and currently in Zimbabwe. Secondly, to examine the insights to understanding of the spatial distribution of soil erosion in Svosve communal area offered by the various methodological techniques and scales of analysis encompassed within the regional political ecology approach. Thirdly, to generate quantitative information on the historical change in conventional indicators of environmental degradation and soil erosion at the local level. The findings of the research in relation to these constituent elements are discussed below, subsequent to the main chapter findings.

The analysis of the physical environment presented in Chapter Two highlighted the natural susceptibility of Zimbabwe to soil erosion. The contemporary national pattern of soil erosion as outlined by Whitlow (1988) cannot be understood without recourse to the political and economic history of the country as well as to these given environmental conditions. In particular, the dualist development of African and European sectors promoted by the colonial administration had important implications for the environment. This is equally true at the local level. Analysis of the Zimbabwe-specific soil erosion literature, however, revealed that there was an established orthodoxy surrounding soil erosion and conservation which was dominated largely by national level analyses at the expense of local, which underestimated the role of social, political and historical forces in explanation and in which the 'expert' technocentric view of the problem predominated. Many of these characteristics were inherited from the past, but have not been substantially modified since independence. This thesis, on the basis of a variety of data sources drawn from differing levels, contributed to the countering of some of these biases and also contested some of the established orthodoxy as will be detailed below.

In Chapter Three, the political economy of soil erosion and conservation at the national level during the colonial period was overviewed. Political, economic and environmental forces operating at the international as well as the national level were highlighted and the impact on the conception of soil erosion forwarded at this level during three main periods debated. The conservation of soil resources in the communal areas during the colonial period was forwarded as justification for the demonstration policy, the destocking and resettlement programmes and for the transformation of native society under the Native Land Husbandry Act. In each case, the rhetoric prioritised the environment, yet it was superficial concern; the real cause of soil erosion
which lay within problems in the political economy went unaddressed and the specificities of local environments were not accommodated.

This research has reinforced but also extended these ideas on colonial conservationism through analysis of the content of the conservation model promoted during this period. As discussed within three time periods outlined in Chapter Three, the conception of the problem of soil erosion in the country changed during the colonial era. The model for erosion control presented, however, did not. It remained centred on an imported American hydrological engineering model which exalted the technical at the expense of socio-economic or cultural factors and was poorly suited to the environmental conditions in the majority of the communal areas. The colonial government persisted with this model, despite the existence of knowledge regarding more appropriate techniques and doubts expressed by serving officers. This reinforces the assertion made by others that the environment was wilfully manipulated within colonial conservationism to enhance the political, economic and cultural standing of the European settler. The analysis of colonial conservationism at the local level in Chapter Four confirmed that whilst sensitivity to the needs of the local environment, both physical and human, existed, it increasingly became subsumed by the trends within the broader political economy; by increasingly interventionist and centralised programme design, implementation and enforcement.

Research during the colonial period concentrated on the needs of the commercial farming sector with little attempt made within formal institutions to understand the real problems of African farmers. As discussed in Chapter Seven, within the changing political-economy of African society under colonialism, many former practices, social institutions and forms of regulation broke down. The Native Commissioner for Marandellas in his annual report of 1940 recognised that with respect to education; "we have deprived these gentry of their own code of manners, but have not taught them anything of our own" (p.78). By 1947, his concern was with the number of people eating bread, "even the natives of the reserves are cultivating the habit...Has Rhodesia the land which will raise the wheat for feeding 2 to 3 million people?" (annual report p.30). Clearly, many changes occurred within African society during the colonial period. This research has shown that the continued erosion of soil in the communal areas owes more to the failure of the colonial administrators, research officers, agricultural advisers and decision-makers at the time to understand and respond to these changes than it does to similar charges on behalf of African farmers.

In Chapter Four, the emergence of a problem of soil erosion in Svosve as framed within the reports of the Native Commissioner for Marandellas District was traced.
The conception of the problem, the conservation solutions promoted by the colonial administration at the local level and the model for erosion control forwarded in Svosve were highlighted. Soil erosion in Svosve was not identified by the Native Commissioner as a 'problem' until 1944. Prior to this, the larger reserves in the District, Chiota and Wedza, commanded the attention in terms of staffing and administration. In addition, Svosve was perceived as a problem reserve in terms of access, the physical capabilities of the area and the undetermined status and composition of its inhabitants, which delayed the intervention in the area. In the year following the Native Commissioner's initial references to the problem of soil erosion in Svosve, dramatic reports of huge gully networks and rampant erosion were forthcoming from his department. Since clearly, these gully systems did not materialise within the space of twelve months, the local level analysis confirms the assertion within Chapter Three, that it was issues within the broader national and international political economy which stimulated the sudden concern rather than any significant deterioration in the quality of the environment per se at this time.

Once identified as a problem in Svosve, the early response to soil erosion was characteristically technocentric. Reclamation work focusing on gully filling dominated the administration's concern and the need for large labour gangs and heavy machinery stressed. Soil erosion was conceived as a product of overpopulation and overstocking; in particular a product of indigenous attitudes towards levels of stock holdings and poor animal husbandry practices. There was some sensitivity on behalf of the Native Commissioner to the limitations of the physical environment in the area, but rather than this being cause for locally-specific development or conservation programmes, it was used to add urgency to the standard resettlement and destocking policies. There was no recognition of soil erosion as a symptom of inadequate land in Svosve for viable indigenous production.

The implementation and enforcement of these 'standard responses' in terms of resettlement, destocking and the NLHA in Svosve, was despite the high degree of uncertainty which undoubtedly existed regarding the objective situation with respect to human and stock populations or the extent and nature of erosion. The analysis in Chapter Four confirmed the real problems of enumeration of households or stock levels and the lack of detailed information regarding even the spatial distribution of erosion in Svosve. In line with this uncertainty, conflicting opinions were expressed by the Native Commissioner regarding relative levels of overpopulation or overstocking and the progress of the NLHA.
In Chapter Five, the change in erosion by type for the study area was presented from a 'scientific-objective' stance. Recourse to science within the technical solutions and management techniques promoted, were seen to form the basis of colonial conservationism at both the national and local levels, despite the lack of any detailed information regarding 'the problem' as so defined. The assessment of the change in nature and extent of erosion in Svosve as identified from air photographs, established that there had been little change in the overall extent of erosion in Svosve over the period 1947-1981. This adds further weight to the rejection of deterministic modelling of population-resource relationships, since despite the overall growth of human and stock populations and the substantial variation over time, this has not been matched by mounting environmental degradation. The majority of the gully systems in Svosve predated the first set of air photo coverage (1947), appear to have been of a similar age and have shown minimal extension to the current date. These factors combine to weigh against an anthropogenic origin to this erosion form in Svosve, since growth in population, modes of cultivation, area under cultivation and land cultivated per person has been shown to have been neither ubiquitous nor simultaneous in Svosve. The relative importance of the various forms of erosion to the total situation did, however, show some variation over the period and these changes were related to changes in government conservation policy.

The conservation framework in independent Zimbabwe was overviewed critically in Chapter Six. Administrative, legislative and spatial changes since 1980 were highlighted. The new Village Development Committees have brought the communal areas into the political sphere and provisions made for the establishment of new conservation organisations at the ward level. The main legislation concerning natural resource use in the country remains that established during the colonial period, although interpretations of this at the local level was seen to vary substantially. Significant spatial changes within the communal areas are proposed within the 'villagisation' model and justified in terms of resource conservation. 'Resource rationalisation' is portrayed as the solution to environmental degradation in the communal areas; models for agrarian reform, new legislation regarding the purchase of land for resettlement and comprehensive proposals for integrated agricultural rural development are all now in the planning stages and linked explicitly with the future sustainable development of resources in Zimbabwe.

The conception of soil erosion and perceived conservation needs of communal farmers in Svosve were highlighted in Chapter Seven. Multiple problem definitions of soil erosion with varying conservation priorities were expressed. The variance in these conceptions could not be accommodated by reference to location with respect to erosion
problem areas as identified by air photo analysis or relative population density. Some significant differences with respect to elements of individual conceptions were, however, isolated according to age, contact with formal extension personnel and personal experiences.

In operation, two aspects of the conception of soil erosion expressed by individuals were of particular interest within this research and are likely to have implications for future extension; firstly, the perceived location and nature of the cause and solutions to soil erosion and secondly, the conception of soil erosion as a process. In summary, the greatest variation between interviewees across all levels was with respect to the former. Generally the role attributed to environmental factors increased in line with the degree of contact at the local level, whilst the dominance of overstocking or overpopulation (aspects of the 'national' conception) declined. In addition, emphasis on historical factors, issues of marginality, and on technical or educational inadequacies compounded the complexity evident.

There was much greater continuity between the problem as defined by interviewees in terms of their conceptions of the process of soil erosion. In the main, soil erosion was perceived as a process of moving water causing the concentrated loss of soil within gullies. The more ubiquitous but less obvious removal of soil over large areas was not prioritised by the majority of respondents as articulated within the interviewing and survey techniques used within this research. It is concluded that this reflects, in part, the historical legacy as well as the contemporary dominance of gully erosion within erosion research, formal conservation extension training and advice, and within conservation literature and education.

Many of the motivations for conservation expressed by respondents in the survey also reflected a restricted conception of the problem in that the short term benefits of conservation were prioritised. Clearly, this may reflect the socio-economic realities of the farming system in Svosve, and indicates the resource constraints which are likely to have to be overcome to ensure sustained commitment to conservation. There may also, however, be scope for broadening the conception of erosion held by these farmers, of conservation measures and conservation benefits. Further research is required into indigenous techniques and knowledge which may not have been prioritised by individuals within their responses to this survey.

Although the local environment featured prominently in farmers' conceptions of soil erosion, access to inputs and fertilisers in particular, were often prioritised above soil conservation concerns. This strengthens the argument for a broadening of the conservation message in Svosve to stress the long term production benefits of erosion
control, particularly with respect to sheet erosion. The failure within the analysis of Chapter Seven to differentiate between individuals' conceptions of the problem of soil erosion on the basis of conventional, 'scientific' criteria, further challenged the value of models which related erosion problems to aspects of population or land 'pressure'. In addition, the primacy of personal experiences over soil erosion status, age or farmer group membership, would frustrate any attempt to target farmers for the basis of conservation extension according to these criteria.

The first specific objective of this research was to incorporate the environment into political-economic analysis through the identification of multiple conceptions of soil erosion as forwarded by different interest groups at the national, regional and local levels in the past and currently in Zimbabwe. The conception of the environment and soil erosion promoted at the national level throughout much of the colonial period, was dominantly technocentric. This view stemmed from and reinforced the modernist vision of the colonial encounter in general. The white political economy in Rhodesia depended for its survival and expansion upon the extension of technocratic rationality and control. Indigenous production systems were technically classed as primitive. By redefining the needs of African peasant farmers in terms of western scientific conceptions of reality, the colonial administration justified intervention into the African sector, satisfied any European doubts and suppressed African demands for more land.

Although the technocentric conception of soil erosion dominated, it was not uniformly expressed, particularly at the local level. Indeed, prime actors from within the colonial services, such as the Agriculturalist for the Instruction of Natives, expressed discontent at several stages regarding the content of the conservation model. However, in contrast to the experiences elsewhere where populist policies were much more prominent (for example in Nigeria), such concern as expressed by Alvord did not filter into agrarian policy in Rhodesia. Two prime junctures at which significant change could have been implemented during the colonial period, were the early 1940s associated with the report of the Native Trade and Production (Godlonton) Commission, and again in the early 1950s through the NLHA. Both events heralded substantial change, but in the direction of further entrenchment of existing priorities through recourse to increasingly centralised and restrictive legislation. The historical analysis of Marandellas district highlighted the challenges of the specificities of the human and physical environments at the local level to such 'top-down' policies, but indicated few compensating amendments to these standard models.

On independence in Zimbabwe, the conception of soil erosion and other environmental problems forwarded by the national government, centred on a combination of agro-
ecological, socio-ecological, socio-economic, infrastructural and institutional problems inherited from the colonial past. In consequence, structural change in the form of new development and conservation institutions, the incorporation of the communal areas into political life and the resettlement programme, were all elements of conservation solutions prioritised at the national level in the first years of independence. However, the nature and content of conservation programmes promoted during this period remained closely tied to those of the past; there were few modifications to the mechanical model for erosion control, legislative details largely went unchanged, colonial extension relationships persisted despite an increased number of officers with responsibilities in the communal areas, and programmes continued to be designed and implemented 'from above'.

Five years after independence, the Communal Land Development Plan (Ministry of Lands, Agriculture and Rural Resettlement 1986) and the FFYNDP (Republic of Zimbabwe 1986) expressed significant divergences from earlier statements in the official conception of the environment. These were consolidated in the National Conservation Strategy (Ministry of Natural Resources and Tourism). Soil erosion and conservation have become bound up with far-reaching proposed land use and tenurial changes within the communal areas. Rather than soil erosion being conceived as a product of the colonial past and its remedy in terms of structural change, both the cause and the solutions to soil erosion are now framed as lying internally. Mistrust for the peasant option (Cliffe 1988a) has resurfaced within national conceptions of how society does and should operate. Symptoms are once again elevated to causal status within this predominantly technocentric conception. The forces moulding such a view were seen to include the reshaping of class forces in the country and the well-entrenched conservation orthodoxy inherited from the colonial period. At the national level, continuities with the past have reemerged.

Despite this shift in national policy statements, the conception of soil erosion currently held by government representatives throughout the administrative hierarchy continues to reflect closely the earlier national views. External solutions, in contrast to recent emphases at the national level, still feature prominently in the conception of soil erosion and conservation held currently at the local level. Although local officers had the greatest contact with the human and environmental specificities of soil erosion in the case study area, this local knowledge served largely to strengthen their allegiance to structural reforms and resettlement in particular. The greatest variety in the conception of soil erosion was exhibited by the Chairmen of the newly formed Village Development Committees in Svosve. Although historical factors featured strongly in their conceptions and the majority emphasised the need for external initiatives such as
resettlement, substantial diversity was evident with respect to their perceptions of the detailed process of erosion.

Despite the complexity of factors influencing individuals' conceptions of the environment, communal farmers in Svosve showed a great deal of similarity in this respect. Their conceptions of soil erosion were technocentric in the main, emphasising gully formation and its control, mechanical conservation structures, and the need for more widespread contour construction and education of farmers. Individual perceptions of soil erosion could not be differentiated according to proximity to erosion hazard or degree of socio-economic pressure in their locality. There were also few significant differences with respect to age, access to inputs, extension worker contact or ethnoscientific forces. The legacy of western scientific thinking on the conception of soil erosion held amongst farmers in Svosve was widespread.

The conservation of soil resources in Zimbabwe hinges on the sustained commitment of those people involved directly in resource-use. Participation has been seen to depend on valuing and prioritising local needs and knowledge. Although understanding of what local communities do is improving, very little is known about what individuals think about soil erosion and conservation. The two are not entirely conterminous. Both are as important in the design of appropriate conservation solutions and for ensuring effective participation in such programmes. Appreciation of multiple, and possibly competing, conceptions of an environmental process such as soil erosion, enables understanding of priorities, constraints, interests and attribution of failures or persistent problems. Multiple conservation solutions need to be formulated as much on the basis of this perceptual specificity as they do on ecological or socio-economic particularism.

The second specific objective of this research was to examine the insights to understanding of soil erosion offered by the various methodological techniques and scales of analysis encompassed within the regional political ecology approach. The pluralist approach adopted within this research at a variety of spatial and temporal levels has enhanced the understanding of soil erosion in Svosve. For example, the historical dimension is fundamental to the understanding of contemporary human-resource relationships in Zimbabwe. To date, these have been analysed largely at the international or national level focusing on colonial conservation policy or oversimplistic indicators of socio-economic and environmental change. The explicit combination within this research of political economy and the environment at the local as well as the national level, has elaborated these interpretations.
Soil erosion in Svosve had a long history according to Native Commissioner reports. This was confirmed in the sequential air photograph analysis. However, a relationship between soil erosion, rising populations and the extension of cultivation expressed in archival sources was not corroborated. The combination of environmental and political-economic data, established that it was unlikely that the ultimate cause of gully erosion in Svosve was of anthropogenic origin. Analysis of land use and erosion status in Svosve via the air photo analysis also presented a baseline for interpretation of individual perceptions of soil erosion. These were accessed through interview and survey techniques. The various data sources, time scales and levels of analyses employed within this study are all essential components of the regional political ecology approach.

Measurement of the problem of soil erosion by scientists in Zimbabwe is improving, as is analysis of spatial patterns as evident from air photographs through Whitlow’s work. There is still, however, little understanding of the trends over time either at the national level or the local level. The third objective of this research was to generate quantitative information on the historical change in soil erosion and parameters which have been conventionally linked to degradation within past models of human-environment relationships. Modelling the impact of rising populations on a static resource base has been popular in the general as well as the Zimbabwe-specific literature. Blaikie and Brookfield (1987) refer to the explanations of land degradation in terms of population pressure as a "major 'single hypothesis' approach to land degradation" (p.27). The historical change evident in the Svosve case study did not fit the national scenario outlined by Whitlow (1979) for subsistence societies based on such single-hypothesis modelling. Such models do not take into account of factors such as the NLHA legislation. Nor do they accommodate the variety of local practices such the grazing cattle outside the reserve boundaries in Svosve.

Clearly, greater analysis of local, internal conservation initiatives is required for fuller understanding of the relationship, both negative and positive, between communities and the physical resource base. The Svosve case study illuminated clearly some of the problems involved in modelling human-environment relationships, particularly the tendency to oversimplify the actual trends at the local level. The seriousness of this misrepresentation becomes clear when such models appear in national documents, for example, the Communal Land Development Draft Plan (Ministry of Lands, Agriculture and Rural Resettlement 1986) or Whitlow’s national assessment of land degradation in Zimbabwe (1988). The concept of carrying capacity on which these models are based is also resurfacing as a diagnostic tool in Zimbabwe within the proposed Communal
Land reorganisation. This concept, by oversimplification, leads to the inappropriate design of subsequent conservation responses.

Limitations of study and pointers for future research.

As established, regional political ecology is a pluralist approach involving a chain of explanation. Clearly, there were elements in the chain which were not addressed sufficiently in the Svosve case study within this research. The conception of soil erosion held, for example, is only one determinant of action, particularly amongst the poorest and least powerful groups. Ideally, primary data would have been collected concerning the nature of the agrarian society in Svosve; in particular improved data on conservation practices and decision-making within the household. More detailed understanding is required of the internal means of regulation operative in Svosve; the cattle herding practices, the land use decisions and indigenous measures for erosion control. All these mechanisms were highlighted within the research as essential in determining the societal-resource relationships and require further analysis.

At the 'other end' of the chain of explanation, this research only touched on the role of the international economy in explaining soil erosion in Zimbabwe. Analysis of the role of the state could also have been more comprehensive. The research has, however, illuminated sharply the potential problems and the limitations to understanding which result from confining analysis to any constituent approach. A purely political economic analysis would not, for example, have differentiated between individuals in Svosve who were able to cope with soil erosion and those who were not; personal experiences of the environment due to location rather than access to resources, often accommodated the greatest variance in conception held. Each approach elicited its own data and offered further insights into the issue. Each set required interpretation in the light of the methodology for collection and, in the case of secondary sources, the interests represented by the authors at the time.

The analysis of the role of the state in future sustainable development of soil resources in Zimbabwe and the conception of the problem of soil erosion portrayed at the national level currently in the country, would have been enhanced by information concerning changes in the commitment to conservation in terms of funding and staffing levels. This is an area of future research which the author is endeavouring to fulfil. Problems are encountered through the absence, since independence, of published annual reports of departments such as Agritex and bodies such as the NRB post 1982. In addition, in time, critical assessments are required of the operation and effectiveness of institutional changes proposed within the National Conservation Strategy. The agrarian reform
promote the message at the local level, that conservation has implications for various sectors of communal life.

b. Priority should be given by administrators, Local Government Promotion Officers and local extension staff to identify and support a particular group to be responsible for coordinating, articulating and addressing the conservation priorities and problems of villages and individuals. All such inquiries could be relayed to this body either directly or via extension workers, Vidco chairmen or the like, who must have regular contact with and access to district decision-makers, inspection officers and technical advisers. This body need not comprise current Vidco chairmen nor necessarily other local leaders such as kraalheads, although clearly a respected position in the community would make promoting participation by others easier. It is not clear what the official attitude towards encouraging the formation of additional structures at the local level outside the new Vidco framework would be. Some indication may be forthcoming in the response to the agrarian reform proposals which included the recommendation for more formal recognition for kraalheads.

The optional formation of Natural Resources Conservation Subcommittees at Ward level under the Rural District Council Act is a welcome move, but the procedure for appointment of posts is still not ideal. Half are appointed by the Department of Natural Resources and half are already serving councillors. Such a system does not take full advantage of the commitment present at the local level amongst other more concerned but less well-connected, parties, nor the continued influence of various traditional leaders within the community.

c. The conservation message at all levels needs to be broadened from the technocentric base which it occupies currently. Although the case study analysis did not aim to assess explicitly the stock of 'indigenous' conservation techniques, the legacy of a restricted colonial conservation message on the socio-cultural, as well as the physical landscape, was clear. The control of gully erosion and the importance of contouring featured strongly in the majority of respondents' conceptions of the problem of erosion. A broadening of the conservation message is required in order to address the most serious form of erosion, sheet loss. Agronomic techniques focused on raising moisture retention may also be more appropriate to the socio-economic circumstances of household production. A broadening of the conception of the problem on behalf of extension officers is desirable to consider in more detail the total farming system and the most relevant solution to those circumstances. In the process, dialogue with the farmer would be encouraged; in the atmosphere of multiple problem solutions, individual farmers could potentially feel more willing to prioritise what they are already
doing or the strengths of their knowledge. These processes would be mutually reinforcing and lead to a cumulative improvement in conservation via the design of solutions appropriate to the socio-economic and environmental realities of the household and to clearly perceived self-interest in participation. By encouraging farmers' participation in the identification of priorities and selection of the conservation solutions, control over the environment which is essential for sustained use of soil resources is returned to the individuals and communities concerned.

Sustainable use of soil resources in Zimbabwe depends on both an accurate understanding of soil erosion as defined by the land managers themselves and an approach to conservation which is tailored to the political-economic and environmental differentiation at the local level. The regional political ecology approach adopted within this research has illustrated the sensitivity in understanding available as a product of multiple methodologies and various data sources. The research has outlined some of the dangers of the continued confinement of explanation within discrete disciplinary boundaries and uni-causal models of human-resource relationships. The specific attention to the construction of conceptions of soil erosion held amongst groups at various temporal and spatial scales within this research, has confirmed the necessity of multiple conservation solutions for Zimbabwe in the future.
Plate 1 and 2. Typical households in Svosve.
Plate 3 and 4. Gully problems.
Plate 5. Gully formation on pathway.

Plate 6. The role of stock in degradation processes.
Plate 7. Stable gully system in Svosve.

Plate 8. Problems with contour maintenance.


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Appendix 1.

Grid No. 88

1981

1975

1964

1947

| Cultivation | Sparse woodland/grazing | Sparse woodland/granite | Dense woody |
### Appendix 2.

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<tr>
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<td>4.5</td>
<td>25</td>
<td>69.5</td>
<td>4</td>
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<td>48.75</td>
<td>4.5</td>
<td>23</td>
<td>23</td>
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<td>45</td>
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<td>32</td>
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<tr>
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<td>17</td>
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<td>12</td>
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<td>17</td>
<td>71</td>
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</tbody>
</table>
Appendix 3. Household survey.

Date: 
Time: 
Grid Square: 
VIDCO: 

SECTION 1: BACKGROUND DETAILS

1. Name: 
2. Age: 
3. Birthplace: 
4. Length of residence in Svosve: 
5. Acreage: (a) Larger/smaller than formerly? 
   Larger [ ] Smaller [ ]
   (b) Why is this?

6. Level of education reached: 

7. Average number of people working in fields at any one time: 

8. Did you select this area yourself? Yes [ ] No [ ] 
   (a) If yes, why?

   (b) If no, who allocated it to you?

9. Are you a member of a farming group? Yes [ ] No [ ] 

10. (a) How often do you have contact with a government extension worker? 
    Once a week [ ] Once a month [ ] Every few months [ ] 
    When I need to [ ] When I call him [ ]
    (b) Is this more or less than before Independence? More [ ] Less [ ] Same [ ]
    (c) Do you meet him alone or in a group? Alone [ ] Group [ ] Both [ ]
    (d) How often does he actually visit your fields?
SECTION 2: FARMING/CONSERVATION PRACTICES

1. What crops do you grow?

Maize ☐  Rapoko ☐  Sorghum ☐  Groundnuts ☐  Roundnuts ☐  
Others:

2. How much of each crop did you sell and how much did you keep for household consumption last year?

<table>
<thead>
<tr>
<th>CROP</th>
<th>SOLD (BAGS)</th>
<th>CONSUMED (BAGS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapoko</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorghum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundnuts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roundnuts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Which of the following tools do you have access to for use on your farm?

Plough ☐  Harrow ☐  Cultivator ☐  Wheelbarrow ☐  
Scotch Cart ☐  Tractor ☐  Draught Cattle ☐  Bicycle ☐  
Car/Lorry ☐

4. Do you use any improved seed varieties? Yes ☐  No ☐

5. (a) How many cattle do you own?
   (b) Is this more or less than formerly? More ☐  Less ☐
   (c) What is the reason for this increase or decrease?

6. (a) How many goats, sheep, donkeys and chickens do you own in total?
   (b) Is this more or less than 5 years ago? More ☐  Less ☐
   (c) What is the reason for this increase or decrease?
7. Which of the following do you practise in your fields at present?

<table>
<thead>
<tr>
<th>ITEM</th>
<th>ADOPTION?</th>
<th>SOURCE OF ADVICE</th>
<th>REASONS FOR ADOPTION/NON-ADOPTION</th>
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<tbody>
<tr>
<td>Contours</td>
<td></td>
<td></td>
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<tr>
<td>Contour Ploughing</td>
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<td>Correct Crop Density</td>
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</tr>
<tr>
<td>Manure</td>
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<td>Fertilisers</td>
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<td>Crop Rotations</td>
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<tr>
<td>Fallow Periods</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Trees</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION 3: PERCEPTION OF EROSION

1. What changes have you seen in Svosve generally since you have been here?

2. What changes have you seen in your fields?

3. (a) Do you get better yields than formerly? Yes ☐ No ☐
   (b) If yes, why is this?

4. How have things changed in the grazing area?

5. (a) Do you think that soil erosion is a problem in Svosve? Yes ☐ No ☐
   (b) How serious is it?
      Minor problem ☐ Moderate ☐ Serious ☐ Very Serious ☐
   (c) Is the problem improving or getting worse? Improving ☐ Worsening ☐
   (d) What are the main causes of this erosion?
6. Why do you think soil in the cropland area should be conserved?

7. (a) Has erosion ever been a problem on your fields? Yes ☐ No ☐

(b) If yes, what was the cause of the problem?

(c) How did you solve it?

8. (a) In the crop areas, do you think you should be responsible for conserving the soil? Yes ☐ No ☐

(b) If not, who should be responsible?

9. (a) Do you think there is a problem of soil erosion in the grazing areas of Svosve? Yes ☐ No ☐

(b) How serious is it? Minor problem ☐ Moderate ☐ Serious ☐ Very serious ☐

(c) Do you think the problem is improving or getting worse?

Improving ☐ Worsening ☐

(d) What are the main causes of this erosion?

(e) What do you think are the main solutions to this problem?

(f) At present, is there anyone who controls the number of cattle grazing in your area? Yes ☐ No ☐

(g) If yes, who is this?

(h) If erosion is seen to be a problem, does anyone take any action? Yes ☐ No ☐

(i) If yes, what action is taken?

(j) If no, why is no action taken?
10. Why do you think soil should be conserved in the grazing area?

11. (a) Do you see the conservation of the soil in the grazing area as partly your responsibility? Yes ☐ No ☐
   (b) If no, whose responsibility is it?

12. (a) Is there an erosion problem anywhere else in Svosve that we have not mentioned? Yes ☐ No ☐
   (b) Where is this?
   (c) What are the main causes of this erosion?
   (d) What do you think are the solutions to this problem?

13. Why do you think trees should be conserved?

14. From whom did you learn about the importance of conserving the soil?
   Parents ☐ Ews ☐ Experience ☐ Neighbours ☐ Others ☐

15. (a) Do your children know about the importance of conserving the soil?
   Yes ☐ No ☐
   (b) Where did they learn this? Parents ☐ School ☐ Others ☐

16. Have you attended any of the conservation workshops in Mahusekwa or in Marondera?
   Yes ☐ No ☐

SECTION 4: MECHANICS OF EROSION PROCESSES

1. (a) At what time does maximum erosion occur in the crop areas?
   (b) Why is this?

2. (a) Is erosion less under some crops than others?
   (b) Why is this?

The following are some of the factors which may help make erosion worse or better. Can you explain to me as fully as possible how you think they may affect the rate of erosion.

3. How could the spacing of crops in the ground affect soil erosion?

4. How does slope affect the rate of soil erosion?
5. How does the construction of contours affect erosion?

6. How could ploughing along the slope affect erosion?

7. How could applying manure or fertilisers affect erosion?

8. How could leaving crop residues on the fields after harvesting affect erosion?

9. How could crop rotations affect erosion?

10. How could leaving fallow periods in your crop cycle affect the rate of erosion?

11. How could ploughing at different depths affect the rate of erosion?

SECTION 5: PERCEPTION OF PAST CONSERVATION PROGRAMMES

1. (a) Were you encouraged to construct contours on your fields in the past?
   Yes ☐ No ☐
   (b) If yes, when was this?
   (c) Were the reasons behind the need for construction explained to you?
       Yes ☐ No ☐
   (d) If yes, what were the reasons given?
   (e) Why do you think you were encouraged to construct the contours?

2. (a) At any time were you forced to construct contours? Yes ☐ No ☐
   (b) Did you construct contours on your fields? Yes ☐ No ☐
   (c) What would have happened if you did not construct them?

3. (a) Do you think the contours were successful in slowing down erosion on your fields?
       Yes ☐ No ☐
   (b) Did they lead to better yields? Yes ☐ No ☐

4. (a) In the past were you advised to plough in the direction of the contours?
       Yes ☐ No ☐
   (b) If yes, why were you advised to do this?

5. (a) In the past were you given any advice on manuring or fertiliser use?
       Manure ☐ Fertiliser ☐ Neither ☐
   (b) Why were you told to use manure/fertiliser?
6. Are there any other measures which you were encouraged to implement in the past which you think may have helped reduce soil erosion in your crop area?

7. (a) Do you remember in the early 1950s when the government introduced a programme of destocking in Svosve? Yes ☐ No ☐
(b) Did you own any cattle at this time? Yes ☐ No ☐
(c) Did you yourself sell any cattle at this time? Yes ☐ No ☐
(d) How many did you sell?
(e) Did you sell them willingly or did you resent it? Willing ☐ Unwilling ☐
(f) What would have happened if you had refused to sell them?
(g) Why were you told you must destock?
(h) Why do you think you were told to destock?
(i) What effect did the destocking have on the land in Svosve?
(j) What were the problems involved in this programme?

8. (a) Were you ever encouraged to improve your stock through breeding with imported bulls? Yes ☐ No ☐
(b) What was the idea behind this scheme as far as you know?
(c) What effect did it have on the land?
(d) What were the problems involved in this project?

9. (a) In the past do you remember any attempts to make paddocks in the grazing areas as part of a rotational grazing scheme? Yes ☐ No ☐
(b) What was the idea behind this scheme as far as you know?
(c) What was the effect of the project on the land?
(d) What were the problems with the project?

10. (a) Have you lost any cattle due to death, other than through old-age, in the last three years? Yes ☐ No ☐
(b) If yes, how many?
11. (a) Would you yourself be prepared to participate in a destocking scheme if it was introduced in this vidco? Yes □ No □
(b) If no, why would you not be willing?

12. (a) Do you remember in the 1950s any attempt in Svosve to separate the grazing and arable areas as part of the Land Husbandry Act? Yes □ No □
(b) What are the reasons behind this scheme as far as you know?
(c) What effect did it have on the land?
(d) What were the problems with this scheme?

13. (a) Do you remember around 1945 when some people were moved out of Svosve by the government into Wedza and Mangwendi reserves? Yes □ No □
(b) Why do you think these people were moved?
(c) What effect did it have on the land?
(d) What were the problems with the scheme?

14. (a) Would you yourself be willing to be resettled? Yes □ No □
(b) If not, why not?

SECTION 6: CURRENT FARMING CONCERNS/EXTENSION REQUIREMENTS

1. (a) Does the extension worker advise you on how to prevent soil erosion on your crop areas? Yes □ No □
(b) If yes, what advice does he give you?

2. (a) Has the extension worker ever suggested ways for improving the situation in your grazing area? Yes □ No □
(b) If yes, what sort of measures has he suggested?
(c) Have they been implemented? Yes □ No □
(d) If yes, have they been successful in preventing erosion and improving the grazing? Yes □ No □
(e) If they are not implemented, why aren't they?
3. Would you like more contact with the extension worker? Yes [ ] No [ ]

4. (a) What additional advice would you like in reference to conserving the soil in your crop area?

(b) What additional advice would you like in references to conserving the soils in your grazing areas?

5. (a) Can you list the three most serious farming problems which you are currently experiencing in order of importance?

(b) How serious is the problem of soil erosion in relation to these?

6. What is the main problem you have in conserving the soils in your crop area?

7. What is the main problem you have in conserving the soil in your grazing area?

8. What do you think is the most important factor which prevents some people from using the land in a sustainable way?