SOIL CONSERVATION POLICY IN SOUTH AFRICA, 1910 - 1992: THE 'HUMAN DIMENSION'

by

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PREFACE

The work described in this thesis was carried out in the Department of Geographical and Environmental Sciences, University of Natal, Durban, from February 1993 to October 1996, under the supervision of Professor G.G. Garland.

These studies represent original work by the author and have not been submitted in any form to another University. Where use was made of the work of others it has been duly acknowledged in the text.

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I dedicate this work to Graham and Claire, our two precious children.

Thank you all for being there for me.

I speak on behalf of the next generation
My sons and daughters, their children to come
What will you leave them for their recreation -
[A donga], an oil slick, a pile on an industrial slum?
Leave them the flowers, the grass and a hedgerow
a hill and a valley, a view to the sea.
These things are not yours to destroy
as you want to
... a gift, given once, for eternity.

Fish in the ocean - polluted and poisoned
Sand on the beaches - sticky and black
And you with your tankers, your banks and investments,
Say "never worry, the birds will come back".
Leave them the [soil], flowers, grass and a hedgerow
a hill ...
... a gift, given once, for eternity.

Anon (1979)

ABSTRACT

The overwhelming focus of documentary sources indicate that traditional approaches to land degradation and soil erosion in South Africa have focussed on the physical dimension of the problem and the development of practical solutions to its reduction. This study was undertaken from the viewpoint that this emphasis has resulted in the neglect of other (for example, socio-political) aspects of soil erosion and that such neglect has exacerbated the soil erosion problem manifest in South Africa. An examination of the 'human dimension' of soil erosion in South Africa was therefore undertaken through an analysis of soil conservation policy and legislation promulgated to effect policy objectives between 1910 and 1992. Acknowledging that the policy environment is influenced by factors within the economic, political, historical and perceptual (all human) environments, as well as the natural environment, this study attempts to integrate information relating to each of these parameters within the overall framework of South African soil conservation policy. Particular emphasis is placed on the role of environmental perception in the decision-making process, together with the critical influence of intervening variables found to be operative within the perceptual environment as represented in the South African context.

In the absence of substantive empirical data, this study posits a number of *a priori* assumptions regarding the extent and causes of soil erosion, support for which was initially derived from the extensive literature sources reviewed for the study. The basic premise of this study is that soil erosion persists in South Africa, and despite considerable government and public inputs and participation, and the existence of a legislative machinery created specifically to address the problem, progress in promoting soil conservation through implementation of specific measures has been slow. Following a review of soil conservation policy and legislation up to 1992, it is further submitted that factors other than legislative inadequacies could account for this problem and therefore warrant particular and thorough investigation.

To this end, this work firstly describes the physical context within which South African soil erosion occurs, followed by a brief appraisal of socio-economic and political variables which together have shaped contemporary perceptions regarding the nature, extent and causes of soil erosion in the country. A comprehensive review of relevant policy and legislation in the period 1910-1992 was then undertaken by reference to published and unpublished sources. The evolution of soil conservation policy in the country was charted through reference to relevant legislation and parliamentary debate. The temporal variation in the relative success of the policy and legislative enactments was measured by reference to relevant indicators.

The adequacy of South African soil conservation (as indicated by four key legislative enactments formulated to specifically address soil erosion) was evaluated using key elements of the World Soils Policy as a baseline. Analysis of the Forest and Veld Conservation Act of 1941, the Soil Conservation Act of 1946, the Soil Conservation Act of 1969 and the Conservation of Agricultural Resources Act of 1983, revealed a clear evolutionary progression in which successive acts sought to build upon successes and minimise the weaknesses of previous efforts. This analysis reveals marked temporal variability in the extent to which each element is addressed and explores the multi-environmental (political, social, historical, economic and perceptual) constraints on attainment of all goals. This assessment permitted the compilation of, what the author has termed the South African Policy Environment Model, which takes the form of a working hypothesis.

This hypothesis was subsequently tested utilising the 103 responses obtained from a postal questionnaire survey directed at 242 scientists, policy developers and extensionists (representing a 43 per cent return), that is, those persons who either currently or during the study period, were actively involved in the development of soil erosion research and/or the implementation of conservation policy objectives.

In spite of the apparent effort by the South African government to address soil conservation, contemporary opinion (according to documentary evidence) suggests that the policies formulated have failed to attain soil conservation goals and reduce the manifest extent and rate of land degradation in the country. This study broadly concludes that such inefficacy of policy may be ascribed to:

1. lack of importance ascribed to soil
2. national level control
3. non-uniformity in application of law
4. inadequacies in the implementation of policy
5. paucity of information on real nature and extent of problem
6. perceptions in an uninformed environment.

The study furthermore submits that images concerning the realities of soil erosion are shaped by perceptual filters and the value systems of individuals active in the soil conservation arena, or more specifically, key players' perceptions regarding the causes, extent and nature of the soil erosion problem, are what underpin and ultimately give rise to the relative effectiveness of soil conservation strategies.

This study identifies a multiplicity of factors which operate within five dynamically interative environments (the political, economic, historical, perceptual and natural environments) considered influential in shaping the temporal (and spatial) variation in the policy environment represented in this study. This examination of the multidimensionality of soil erosion has led to the conclusion that in addition to the problems broadly outlined above, soil erosion is also a problem of:

1. accountability;
2. focus;
3. priorities and government commitment;
4. situational incompatibility;
5. misinformed perceptions; and
6. timing.

It is submitted that lack of recognition of these inter- and intra-environment dynamics could account for the relative inefficacy of soil conservation policy to promote the sustained adoption of conservation practices. Such factors will in the past have been overlooked due to the neglect of the 'human dimension' of the problem in South Africa in the period under review.

It is believed that the measure of consensus derived from the results of this study, reflects contemporary realities concerning the status of soil conservation in the country, at least amongst those individuals most intimately involved in the development, formulation and administration of soil conservation policy. As such it provides an appropriate foundation upon which to base future policy decisions and more importantly, to derive optimum compliance with conservation norms and standards of practice amongst land users.

Only by recognising the multidimensionality of the soil conservation policy environment and its components, can the past inefficacies be overcome. It is submitted therefore that for South Africa to meet its challenges of the 21st century concerning the conservation and sustainable utilisation of soil, the priority of policy developers must be - the expedient adoption of a multi- and interdisciplinary approach to agricultural resource management, with particular emphasis on its 'human dimension'.

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CHAPTER ONE

THEORETICAL AND CONCEPTUAL FRAMEWORK

1.1 INTRODUCTION

Soil conservation has received considerable attention throughout the agricultural nations of the world, in one form or another, for several centuries. Particular case studies of erosion problems, such as the American 'Dust Bowl' of the 1930s, have received worldwide attention and clearly illustrate the importance of attending to resource degradation in the context of sustainable utilisation of soil. It has been variously recognised that humans play an important role in soil erosion through their interactions with and within the natural environment especially in regard to land-use practices. Much less significance has, however, been attached to the less direct or tangible ways in which humans can affect the erosion problem (positively and/or negatively) through their relationship with soil conservation policy and its mandatory provisions which are aimed at promoting the sustainable utilisation of the resource.

It is against this background that this thesis will examine the role of humans in formulating, defining, implementing, administrating and enforcing soil conservation policy in South Africa between 1910 and 1992. During this period South Africa underwent significant social, economic and political changes and this forms the backdrop against which soil conservation policy evolved. The thesis acknowledges and briefly reviews the traditional parameters which influence soil conservation practice, but focuses on the human dimension in an attempt to place all the interacting variables in a single dynamically interactive framework.

1.2 TRADITIONAL APPROACH TO PROBLEM SOLVING

Traditional approaches to the problem of soil erosion and land degradation in South Africa have, to date, reflected a predominantly technocratic bias, and have involved examination of the physical dimension of the problem and the development of practical solutions to its reduction. Such a narrowly constrained approach to soil erosion has been ascribed to a "one-sided preoccupation with environmental

influences", which has ultimately resulted in the significance of man as an agent in changing the environment being generally minimised, if not ignored (Sumner, 1973). Elliott (1989) in a study of soil erosion and conservation in Zimbabwe, established the existence of a similar emphasis there which prevailed throughout the colonial period. Many authors concur with this contention with reference to the African context in general, including Baker (1984); Blaikie (1985); Stocking (1985); and Blaikie and Brookfield (1987). Such a conception of the problem denied both the environmental viability which existed within communal areas and the sensitivities and realities of indigenous African farming systems (Elliott, 1989). "Concern for the environment was illusory in that underlying causal factors were not addressed, the status quo and commitment to the modernist view (of technocratism) were preserved, and political-economic and cultural hegemonic interests prioritised above those of the environment or the African land user" (Elliott, 1989). It can be argued that a directly comparable situation has prevailed in South Africa throughout and beyond the colonialist era, under the governance of nationalist and political ideologies; a scenario which generally has contributed little towards the amelioration of natural resource degradation.

This technocratic bias has been reflected similarly in the context of scientific research through the decades. To illustrate many authors (Jacks & Whyte, 1939; Ross, 1967; Penzhorn, 1972; Clarke, 1974; Scotney, 1978a; Moon & Dardis, 1988; Dixon & Heffernan, 1991 and Fuggle & Rabie, 1992), have expounded on South Africa's vulnerability to soil erosion with an overwhelming emphasis on the physical characteristics of the problem. Most commonly, factors identified as contributing to the soil erosion problem have included: low reliability of rainfall over most of the country; high rate of evaporation; drought; torrential thunderstorms giving rise to high run-off; and the high elevation of the southern African continent which renders conditions conducive to rapid rates of run-off. Preliminary investigations by the author, have highlighted an apparent neglect of a comprehensive consideration, other than possibly a cursory approach, of socio-political components of soil erosion (Cooper, 1993). Elliott (1989) describes soil erosion as an "archetypal interdisciplinary issue", a view supported by Blaikie (1985) which demands the recognition, comprehension and integration of two sets of 'specificity': a place-based concern for the immediate causal variables of the *physical system*, and the non-location specific concern of the *social economic system* (Blaikie, 1985). Omission of

a consideration of the physical system would result in a failure to identify the physical processes of soil erosion, their spatial variability and interaction, and immediate causal variables, *inter alia*, slope, vegetative cover, land use, soil structure, soil fertility and rainfall intensity. Unquestionably therefore, these physiographical variables are intrinsic to the system and as such are integral to an explanation of the soil erosion problem. It is, however, the failure to provide an explanation for human action within the social/economic system, that has led to a purely technocratic and physical analysis of the soil erosion problem in South Africa.

1.3 MODELLING EROSION CONCERNS

The place-based concern (of the physical system) and the non-location specific concern (of the socio-economic system), are embraced within the methodological constructs of political economy (Blaikie, 1985; Elliott, 1989), from which the political, economic and social forces influencing, both directly and indirectly, the relationship between people and their environments, can be theorised. It is within such a framework that soil erosion and conservation policy in the South African environment will be addressed in this thesis.

Interest in the relationship between human behaviour and the environment, or more specifically between a variety of psychological processes such as perception and cognition, the behaviour manifest and the environment, has grown in recent years (Viljoen, 1980). An awareness of man-environment's critical interrelationship was stimulated by the conspicuous results of exploitation of the natural environment (Viljoen, 1980). This awareness gave rise to the conception of a new and broadly defined field of psychology, which concentrates largely on environment perception and the cognition of the environment, and is known as environmental psychology, which takes the entire range of psychological phenomena in direct relationship to the large-scale environment as its subject matter (Ittelson *et al.* 1974; Saarinen, 1974; Viljoen, 1980). The manner in which humans perceive and form cognitions of their environment is now understood to be a determining factor in one's attitudes towards and behaviour in the physical environment, and as such provides social scientists with a new way of thinking about human behaviour in an environmental context. This view is shared by Popper (1969, cited in Loasby, 1976) who claims that "the main task of the theoretical social sciences ... is to trace the unintended social

repercussions of intentional human actions". A study of human perceptions therefore is an indisputably valuable tool in the understanding of real world decisions, and as Eastwood (1992) proposes, unless seen as a contributory variable in decision making, will otherwise continue to be "an intriguing abstraction" rather than a practical tool to explain or elucidate our understanding of real world processes.

Ittelson *et al.* (1974) by way of defining what is now referred to as 'environmental man', assert that an individual is neither a passive receiver of stimuli from the environment, nor a psychologically autonomous being, but a "person in dialectical tension with his milieu, interacting with it, shaping it, and being shaped by it". (Ittelson *et al.* (1974) and Viljoen (1980) provide a full exposition on the definition and characteristics of 'the environmental man'.) This conceptualisation of 'man' and the environment provides the necessary foundation upon which this study lies. Ittelson *et al*'s (1974) model reflects a shift from the traditional perspective of *object perception*, which in effect eliminated (or ignored) the larger environmental context as subject matter for investigation, to that of *environment perception*, which is based on the nature of man-environment relations' role in it: a transactional approach to perception (Viljoen, 1980). [Note: According to Viljoen (1980), most writers in the context of environmental psychology are no longer particularly concerned with differentiating between perception or cognition, and consequently both terms are used "almost interchangeably" and further, that they "have developed a tacit agreement that the two are in some sense, very largely synonymous". In the context of this study the same will apply.] Acknowledging the complexity of perception, Viljoen (1980) defines perception as "a phenomenal experience resulting from man's interaction with his environment and consisting of both a *source of information* about the environment and providing man with a *directive for action* in the environment. It is argued that both these elements and the relationship or interaction which exists between them, are of paramount importance in not only providing a more comprehensive and more fully-informed explanation of the complexity of the soil erosion problem in South Africa, but also, in potentially providing the key to explaining the extent to which soil conservation policies have achieved conservation compliance. The failure or inability (due possibly to a lack of understanding) of scientists, decision-makers, policy formulators to recognise the critical relationship which exists between perceptions and human behaviour in the environment, and by implication, the role of environment perception in influencing human behaviour,

could largely account for the inefficacy of conservation policies. Furthermore it is contended that as the sustained participation in conservation programmes is an essential prerequisite for redressing soil erosion and by implication critical for its prevention in South Africa. It is further advanced that an understanding of individuals' conceptions/perceptions of the problem, its causes, extent and solutions, should enhance the potential likelihood of realising such an objective.

These principles confirm the work of Duvel and Afful (1994) who in their study of landuser resistance to stock reduction in subsistence farming in South Africa, conclude, that despite the on-going debate as to the choice of appropriate solution in the presence of the many proposed to address the problem of natural resource degradation, the critical and decisive issue will always be the *adoption* of such a solution by the farmer or landuser. Duvel & Afful (1994) further conclude that despite the magnitude of valuable contributions from the human sciences which specifically strive to understand (or explain) human behaviour, there is as yet no single theoretical concept or model that makes adequate provision for the complexity and dynamics of human behaviour, whilst simultaneously permitting the formulation of "guidelines for the systematic identification of the causes of behaviour, and for bringing about change in a systematic and purposeful manner". As with other relatively new fields, research in environment perception lacks a firm theoretical framework and a well-developed methodology (Saarinen, 1974).

A review of adoption behaviour models undertaken by Duvel and Afful (1994), highlights the diversity of approaches developed since the 1940s to explain human behaviour and its interaction with or impact on/in the environment. Such approaches include the teaching method approach, the socio-cultural approach, the atomistic communication approach and the socio-structural group of factors (for further details see Albrecht, 1964; Bandura, 1977; and Duvel & Afful, 1994). It was not until the proposition of the situational-functional model that a meaningful contribution was made which accepted behavioural change to be the result of *an interplay of a number of dynamically interdependent variables.* This resembles largely the contemporary and popularly referred to systems approach (Duvel & Afful, 1994). Until this development, the type of data analysis and model building which more generally took place explicitly denied the existence of complex relationships among variables (Downs & Rocke, 1981). In the context of this study, it is suggested that key players

in both scientific and technological communities and particularly those involved in policy development, may have failed to recognise (or did not understand) this interplay between dynamically interdependent variables. This is investigated in terms of examing the relative effectiveness of policy to promote conservation compliance.

Simon (1969, cited in Downs & Rocke, 1981) defines a complex system as that which is "made up of a large number of parts that interact in nonsimple ways". The definition of "nonsimple" provided corresponds with the dimensions now commonly acknowledged in social scientists' conception of complexity, namely: "many variables and nonlinear relationships" or the existence of interactive relationships (Downs & Rocke, 1981). Duvel's (1975) model, which attempts to describe the mediating function of perceptions in innovation-decision making and problem solving, was probably the first consideration by the South African scientific community of the complexities of interactive relationships of variables in the context of veld management. Others have since contributed to this dimension of problem solving and decision making and as such it is argued that further scientific investigation is imperative. South Africa-specific references on the subject include: De Klerk and Duvel, 1982; Duvel, 1982; Duvel, 1986; Tapson, 1990; Duvel, 1991; Duvel and Scholtz, 1992; Lategan, 1994; Duvel, 1995.

Duvel's model (Duvel, 1975; Duvel & Afful, 1994) is based on a compromise between Lewin's field theory and Tolman's theory of intentional behaviour (Tolman, 1967) and schematically depicts the relationship between behaviour-determining variables, behaviour and its consequences (Figure 1.1). This model was developed for application in agricultural extension and attempts to explain the relationship between variables involved in influencing the adoption of particular behaviours.

A criticism of this model is the generality used in defining its independent variables. The model's basic assumption is that the influence of independent variables (and it refers specifically but generally to personal and environmental factors) become manifest in behaviour via the intervening variables (Duvel & Afful, 1994; Duvel, 1995). This study aims to develop a model which not only embraces the two sets of 'specificity' defined by Blaikie (1985) and Elliott (1989), that is the previously referred to place-based concern of the physical system and the non-location specific concern of the socio-economic system, but also adds the additional concerns or

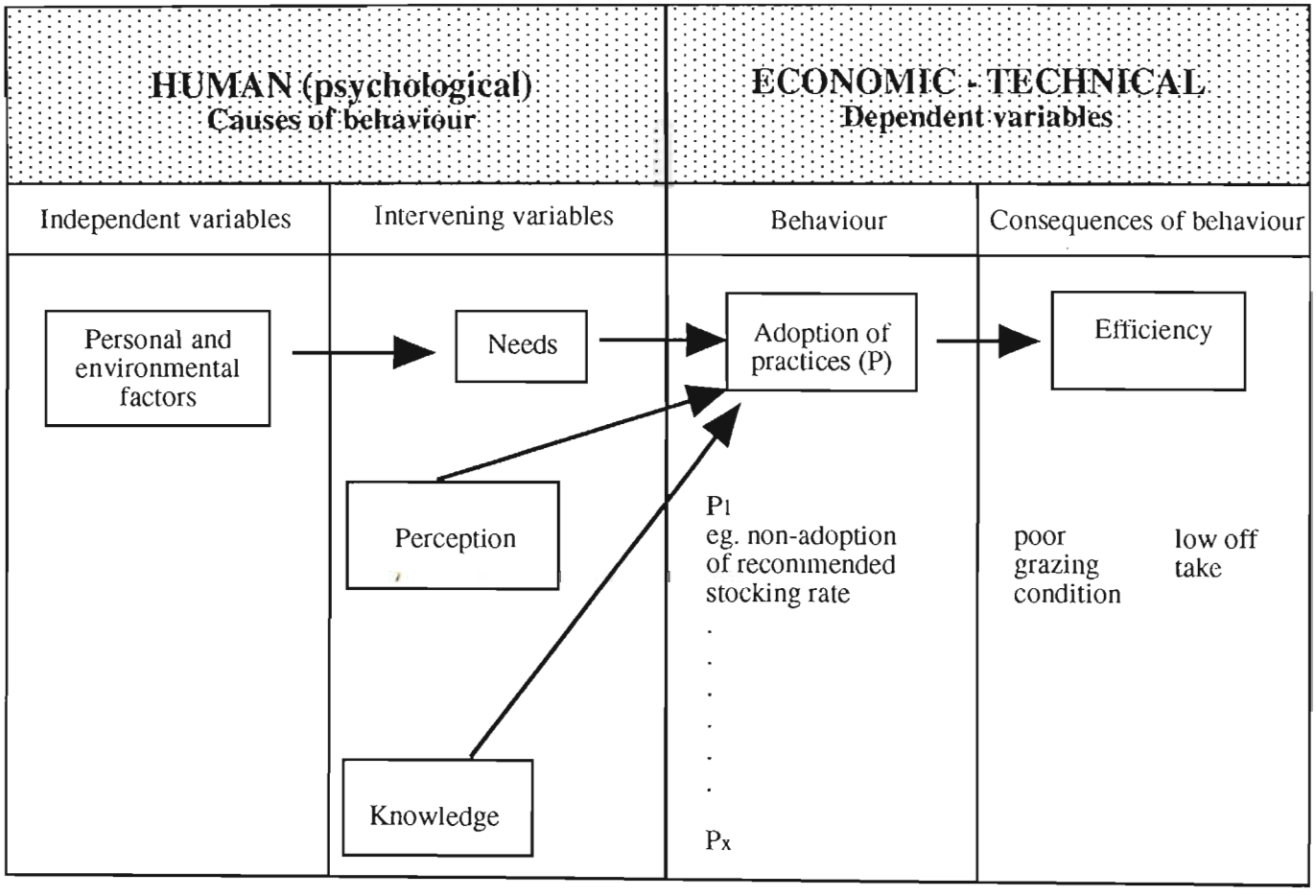


Figure 1.1 The relationship between behaviour-determining variables, the behaviour (e.g. stock reduction) and its consequences. (Duvel & Afful, 1994)

dimensions of the political, historical and perceptual systems or environments. In so doing it is hoped that it shall indicate firstly the complexity of interactions between variables within diverse yet dynamically interrelated environments and secondly, in drawing attention to the important influence of variables operative outside the physical environment, but within the system of policy, illustrate why the previous dominance of technocratic approaches to the problem have proved less than successful.

Baker's work (1984) on land degradation in the Third World and the conventional responses of the state to the problem indicate that the consequence in general of such an approach has been to see "environmental stress as a physical problem, one of energy imbalance amenable to a technical solution". Baker (1984) summarises the principal characteristics of the technocratic approach thus:

* it is a-historical;
* it elevates 'symptoms' to the status of 'cause';
* it places environment over people in a cynical way;
* it increases the polarisation of power relationships;
* it maintains a facade of concern, neutrality and objectivity;
* it reinforces the status quo and the prevailing model of development.

Each of these characteristics is present in the South African context, and therefore in part they can be understood to have influenced the relative non-success of soil conservation policy, its formulation, implementation, administration and enforcement. Figure 1.2 (from Baker, 1984) provides an illustration of the application of the technocratic perception to environmental protection in Kenya and its consequences. As is evident from the illustration, although some short-term goals may be achieved, the ultimate objective cannot be accomplished.

A criticism of the situational-functional model to redress the inadequacies of previous approaches and its ability to explain behavioural change rests in the existence or identification of an almost infinite number of potentially relevant variables which would require an extensive, time-consuming, specific situation analysis to hypothetically test all possibilities. These factors render it largely inappropriate for use by the "practitioner" as a means of explaining behavioural change (Duvel & Afful, 1994). This does not, however, negate the value of such an approach in at

PROBLEM	SYMPTOMS	CAUSES	SOLUTIONS	CONSEQUENCES
Kenya has an Environmental Crisis	Desertification	Overpopulation {overgrazing} {overcultivation}	Family planning	Lack of response
	Deforestation			
	Soil erosion	Ignorance {tradition {culture {inapp. practices	Education Change attitudes	Inappropriate knowledge = frustration
	Catchment loss			
	Silting		Demonstrate new ideas	Short term palliatives
	Decline of rivers	Lack of environmental awareness	Environmental education and EIA	Rationalising oppression
	Decline of food production			
		Inadequate legislation	Tougher legislation	Oppression and polarisation Protect environment against people
		Institutional weaknesses	Integration Min. of the Environment	New and more efficient ways of avoiding problem

Figure 1.2 The technocratic perception in environmental protection. (Baker, 1984)

least contributing to the understanding of a to date largley unexplored dimension of change within the context of soil erosion and the adoption of conservation-conscious behaviour. Jaspers' (1948) conclusion that "no theory is all-embracing or generally usable" emerges as both relevant and pertinent in the context of this study also and emphasises the acceptability or inevitability of using a variety of potentially useful theories to explain behavioural change. Ittelson *et al* . (1974) with reference to the new approach in research methodology in environmental psychology assert: "if there is a single point that needs to be emphasized in researching the everyday physical environment, it is simply that our strategy is usually flexible and pragmatic - from the full repertoire of methods, we borrow those that seem most likely to uncover the data that are sought. But in making such choices, priority should be given to those methods that leave the events and settings intact ... it is in this sense that environmental psychology as a field of inquiry relies relatively little on the laboratory and rather more heavily on exploratory and descriptive investigations."

In an attempt to find the most useful and appropriate theoretical concept which adequately explains behavioural change within agricultural extension, Hruschka (1969) singled out Lewin's field theory (Duvel & Afful, 1994). Duvel and Afful (1994) in their attempt to understand more about what influences behaviour or more specifically the adoption of a particular behaviour, summarise the main features of this theory using the following formulation:

$$B = f(Lsp) = (f(P, E))$$

This describes the behaviour (B) of an individual to be a function (f) of the "life space" (Lsp), namely the total situation, which constitutes a function of both the condition of the individual (P) and the environment (E), which they define as two closely interdependent variables. Despite the model's limitations and generality which have been criticised by other authors, such as Koch, 1941; London, 1944; Smith, 1951; as cited in Duvel & Afful (1994), a number of advantages and important implications of field theory support the proposed utilisation of this methodological approach in the analysis of South African soil conservation policy undertaken in this study. These will now be listed in point form.

* It provides a concept in terms of which the complex nature of a real-life situation can be studied in respect of factors relevant to behaviour. The acknowledgement of the complexity, diversity and situation specificity of human behaviour enhances the legitimacy of the model.
* In its dissection of detail it possesses the necessary ingredients requisite for interdisciplinary acceptance.
* The view that an individual's life space is time-specific, enables consideration of historical influences, wherever relevant, on the individual's perception, through which the awareness and interpretation of the life space takes place and which is directly dependent on one's reference system, previous experience, and needs.
* Field theory qualifies as both a "practice theory" and a "scientific theory", as it is action focused, whilst also of a descriptive and explanatory nature (Duvel & Afful, 1994).

In Tolman's theory concerning the "intentional" character of behaviour a useful concept of "intervening variables" is introduced (Tolman, 1967). According to Tolman's model three sets of variables are determinable, namely, independent, dependent and intervening variables. Duvel and Afful (1994) likened Tolman's intervening variables, which largely make up the "intermediate behaviour space" in his model, with Lewin's (field theory) "life space". As the objective of each of these models aims to illuminate the functioning of individuals' behaviour in space (behaviour analysis) the focus must be placed squarely on the intervening variables. On the basis of extensive research findings (refer to Duvel and Afful, 1994) these are broadly categorized into **needs**, **perception** and **knowledge**. These constitute the human issues that are important in determining behaviour. Other authors who assign comparable value to these issues include, *inter alia*, Hundleby (1991); Low *et al.* (1980); Vink (1986); De Klerk (1987); Vink & Kassier (1987; 1988); Auld & Rudman (1988); Vink & Van Zyl (1990); as cited in Duvel and Afful (1994). Figure 1.3 represents an adaptation of this model to make it applicable in the context of the soil erosion problem and associated soil conservation policy in South Africa. The assumed interdependency of behaviour, the consequences of behaviour and behaviour determining variables is illustrated in Figure 1.3 (adapted from Duvel and Afful, 1994).

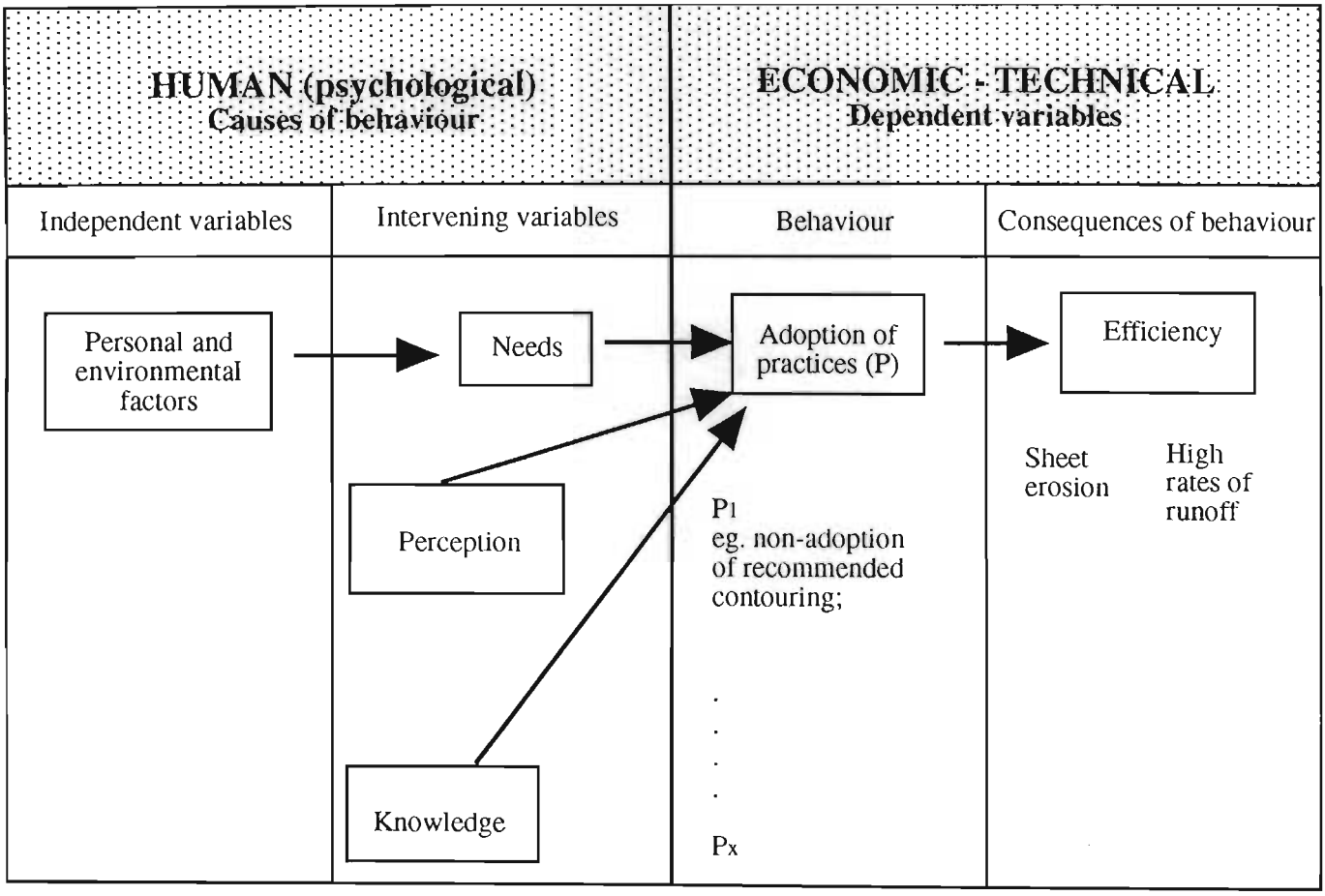


Figure 1.3 The relationship between behaviour-determining variables, the behaviour (soil conservation in South Africa) and its consequences. (adapted from Duvel & Afful, 1994)

The relationship between land degradation and society is both a social and physical one (Blaikie & Brookfield, 1987). By implication degradation is by its very nature both perceptually and socially defined. As in the case of many issues concerning social or physical change, there is a reflexive and two-way relationship between land degradation and society (Blaikie & Brookfield, 1987). It is argued that these critical dimensions of the concept of degradation have to date largely been either overlooked or are not fully understood in the context of soil utilisation and management in South Africa. Grieve and van Staden (1985) in their study of environmental concern in South Africa, agree with this contention. To further clarify the concept of degradation, modern agronomic literature defines it thus: a reduction in the capability of land to satisfy a particular use. Against such a definition Blaikie and Brookfield (1987) affirm that the role (and hence responsibility) of the land user concerning soil is the application of known or discovered skills to land use in order to minimize or repair degradation and in so doing to guarantee the capability of the land beyond its current use, present crop or other activity, or in other words ensuring sustainability or its availability for succeeding users or generations. [The potential for sustainability and the implications of current soil conservation policies is discussed further in sections 6.4.1.1 and 9.3.] Moreover, the means by which land is utilised is inevitably a function of factors such as population pressure, economic conditions, social structure and educational standards (FAO, 1983), or in terms of Blaikie's (1985) epistemology, the non-location specific concerns of the social economic system, which function within the "intermediate behaviour space" (Tolman, 1967) or Lewin's "life space". It can therefore logically be argued, that only when the linkages and interactions of such factors or independent variables have been identified and acknowledged by incorporation in policy considerations (decision-making) that any progress at all is possible to effectively formulate a policy which, should be capable of, for example, increasing the production potential of a given resource, whilst simultaneously providing for its conservation through the promotion or adoption of conservation-conscious behavioural practice. Holahan (1982) describes environmental attitudes as "peoples' favourable or unfavourble feelings toward some feature of the physical environment or toward an issue which pertains to the physical environment". It therefore follows that the resolution of problems relating to environmentally constructive or destructive behaviour patterns must preside in the recognition of the importance of both state regulation of the consequences of technological development and also in the attitudes and behaviour of the people who

use the technologies and will ultimately be influenced by them (Grieve & van Staden, 1985). This emphasises the reflexivity of land use and degradation and inferred sustainability of behaviour patterns.

A number of studies have been commissioned by the government of South Africa since 1910 to investigate the factors contributing to soil erosion in the country. The findings of these studies (derived from various sources, see Table 1.1) illustrate the superficial nature of the consideration given to socio-political aspects or human issues. Table 1.1 details a number of, in particular, human-induced factors identified by such studies as having contributed to the perceived extent and intensity of soil erosion.

Ludwig *et al.* (1993) postulated that resource problems are not by definition environmental problems, but human problems, generated within a variety of political, economic and social systems. It is therefore logical to assume broadly that a multiplicity of interdependent human, physical and environmental factors have in fact contributed to the depletion of soil as a natural resource and this is conceptualised in Figure 1.4. On the basis of this assumption it was felt that a preliminary appraisal of social, political and economic factors active within the human dimension of the soil erosion problem and described in the literature reviewed for this study should be undertaken. This preliminary study undertaken by the author in 1992 revealed a number of variables considered influential in the continuation of behavioural practices which have contributed to the deterioration of soil resources. These include: a general lack of public awareness, inadequate enforcement of existing legislation, [a universal problem in environmental concerns (Rabie, 1976)] a shortage of skilled manpower, insufficient allocation of funds to promote soil conservation, coupled with a tendency in the past to see reclamation of eroded land and resettlement as solutions to land degradation (see Cooper, 1993). It is the author's contention that the situation concerning soil erosion in South Africa is much more complex than it has historically been considered. The problem of soil erosion itself is multifaceted in character. Figure 1.5 illustrates how these additional dimensions of the problem could be conceptually illustrated in what the author has called the Soil

Table 1.1 Factors that contribute to increased rates of soil erosion (derived from government commissioned studies)

Date	Source	Details
1914	Drought, Rainfall & Soil Erosion Report (SC 2-1914)	1. Faulty veld and stock management 2. Injudicious road and railway construction
1923	Drought Investigation Commission Report (UG 49 - 1923)	Faulty veld (i.e. removal of vegetative cover) and stock management (i.e. over-grazing)
1946	Parliamentary speech by Min. of Agriculture and Forestry (Hansard, 1946)	1. Overemphasis on economic production 2. Sub-economic size of farming units 3. Inequitable farm product prices (incr. production costs)
1959	Commission of Inquiry into European Occupation of Rural Areas Report (GP-S 7029095-1959-60)	1. Incr. number of uneconomic farming units 2. Application of pirate cropping and monoculture 3. Faulty veld and stock management (overgrazing) 4. Uncooperative farmers (limited implementation of farm plans)
1969	Parliamentary Session Debates 1969 (pre-Soil Conservation Act No.76, Hansard 1969)	1. Emphasis on economic production (due to a decr. in wool prices) 2. Faulty veld and stock management (overstocking) 3. Prolonged drought
1968-72	Drought Feeding Patterns Reports of the Commission of Inquiry (RP 61/1968; RP 84/1970; and RP 19/1972)	1. Injudicious landuse practices 2. Uneconomic farming units 3. Inadequate regulation of soil use 4. Immobile farmers

Source: Compiled from various texts as listed.

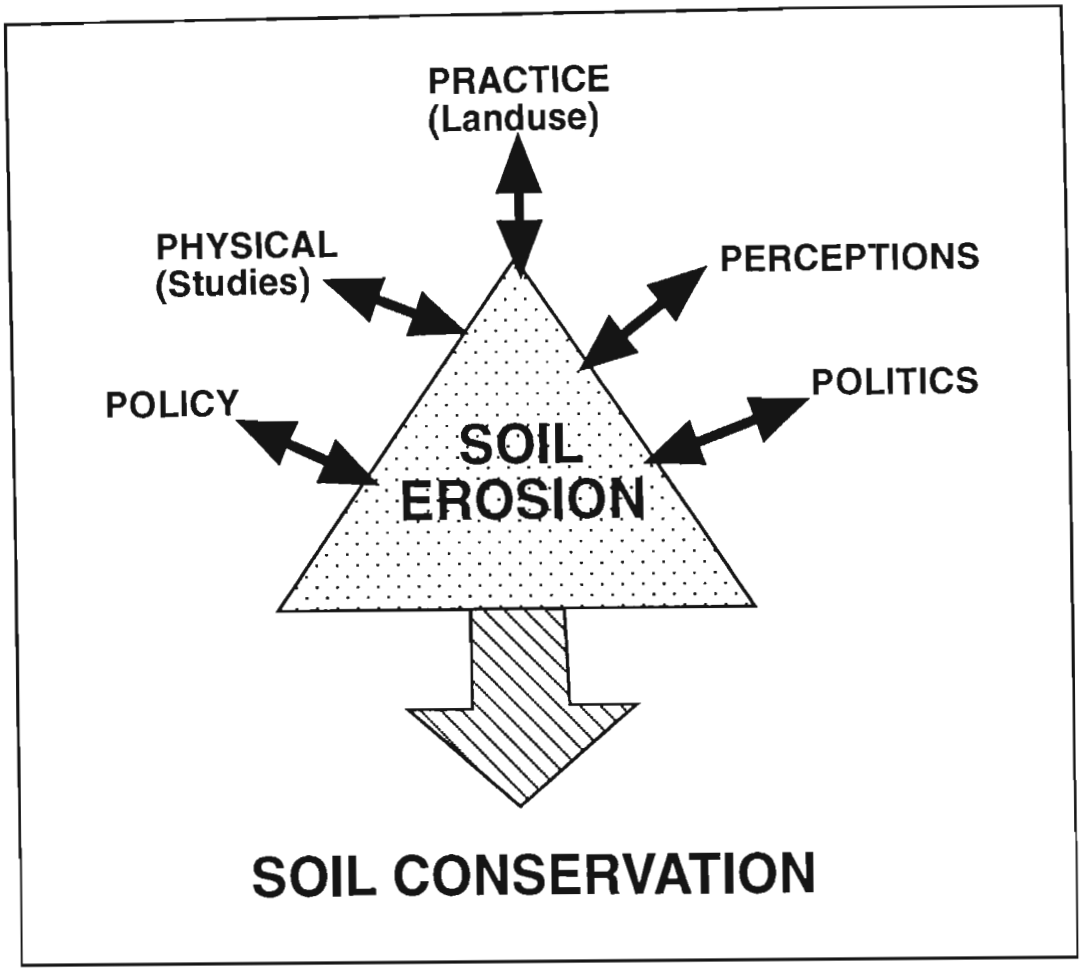


Figure 1.4 The 5 'P's of soil erosion. This figure illustrates the combination of factors which contribute to soil erosion and conservation. The importance of socio-political components and their impact on soil conservation is noteworthy.

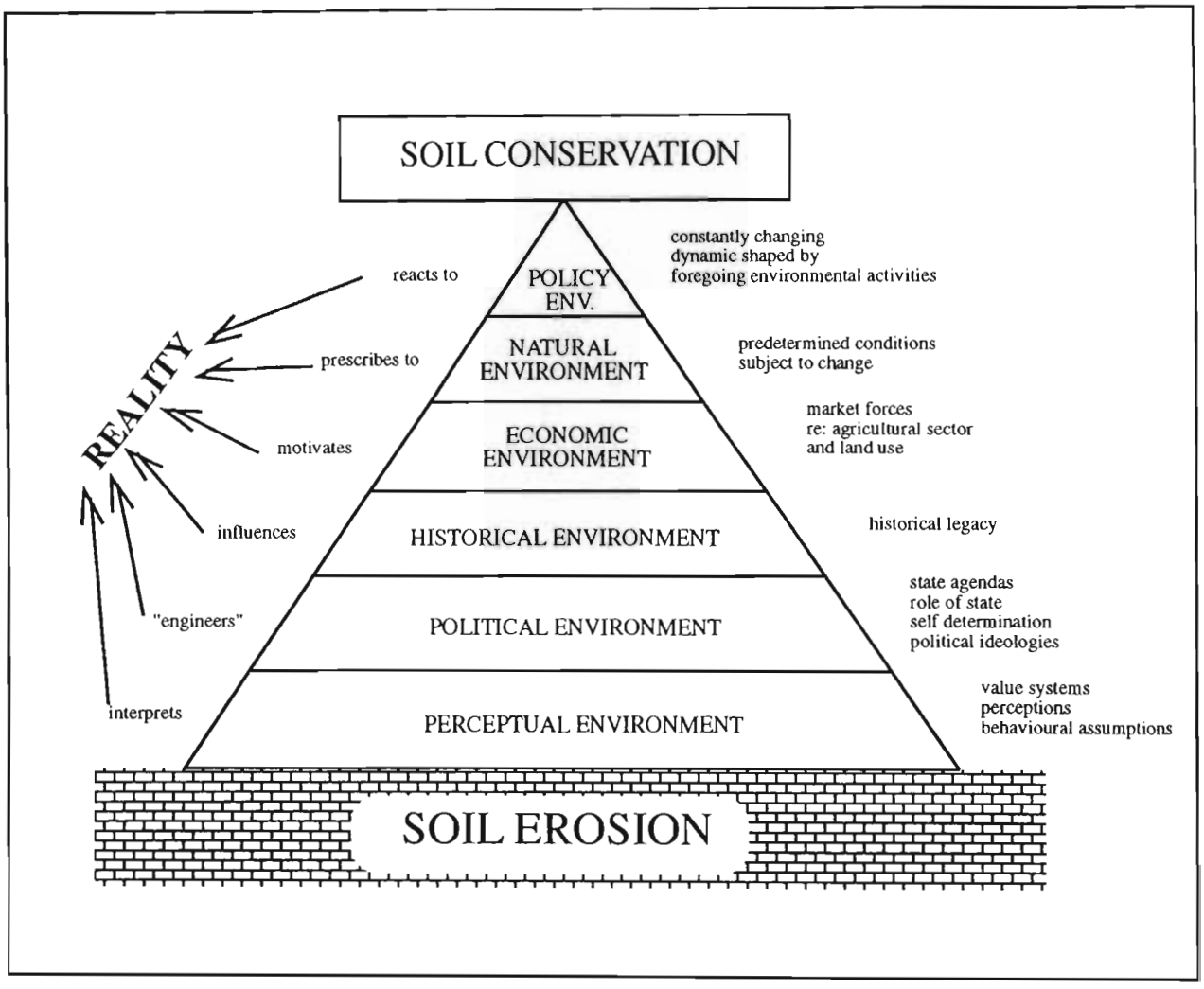


Figure 1.5 The soil erosion pyramid. This figure depicts a cascade of intervening variables within a number of dynamically interactive environments and identified in the South African context, as responsible for ultimately shaping the policy environment (and by implication the efficacy of policy formulated within it).

Erosion Pyramid, which encompasses in addition to the physical aspects of erosion within the natural environment, the economic, historical, political and in particular the perceptual environments. It is suggested that each of these dimensions is invariably interrelated with the others, and by implication so too are the variables within each level. This conceptualisation is further discussed in Section 5.2, Chapter 5.

As Chapter two will illustrate, soil erosion remains an area of concern in South Africa in spite of decades of effort by conservationists and extension officials, state expenditure and extensive legislative provision (Huntley *et al.*, 1989) (see Chapters 3 to 6). It is argued that factors other than those relating to the physical environment and agricultural and/or conservation practice must therefore be accountable. It is for this reason that this study has chosen to examine the broadly categorised 'human dimension' of soil erosion within the specific context of the South African soil conservation policy environment. Ultimately, the success of soil conservation depends on an understanding of the soil erosion process. Elliott (1989) concludes that increasingly and internationally, rural development and agriculture in particular, in the search for sustainable processes of change, is bringing "academics and practitioners into interdisciplinary dialogue and effort". This study ultimately aims to justify the adoption of a similar methodological approach to bring about change within South African agricultural environments to bring South Africa in line with the contemporary humanistic upsurge in geography which insists on the need for a "richer understanding of the human experience, including information on such abstract and complex concepts as feelings, values, sentiments and symbols" (Boulding, 1980; Saarinen & Sell, 1981).

Recognition that conservation is as much about social processes as physical ones and that major constraints are not only technical but also social is a necessary prerequisite to the success of future soil conservation policies. Such a development has neither been recognised nor acknowledged in South Africa in the context of soil conservation (despite its being acknowledged generally in the context of natural resource management), and this remains a major stumbling block to progress. According to Saarinen and Sell (1981), concern regarding the so-called significant "pendulum swing from positivism towards humanism" has prompted critical reactions. Concern that humanistic researchers might totally ignore the useful aspects of positivistic

work, in particular its methodological rigour, instead of developing a more balanced approach, is one such reaction. Again this undertaking not only acknowledges the importance of "methodological rigour" but strives where possible to apply and uphold it.

Perceptions concerning, inter alia, the real extent of soil erosion, or how soil degradation is exacerbated anthropogenically, or who should be responsible for conserving the resource, or the extent to which its further decline poses a threat to the national resource base, held by decision-makers at a national level will inevitably play an important role in directing intervention and influencing land use decisions at the local level (see Chapter 5 for a more detailed discussion). Furthermore, the overall orientation of the economy, and the availability or release of financial resources, are generally determined at the national level (Baker, 1976; Baker, 1984; Elliott, 1989). It is also political-economic structures which determine policies regulating land tenure and resettlement, and formulate legislation which provides for resource use (Elliott, 1989). All such policies shape individuals' perceptions of soil erosion and conservation, as much as it does their decision-making behaviour; and must therefore constitute an important element in any political-economic analysis. [Note: It is acknowledged by the author that two possible shortcomings are associated with the examination of soil erosion within a framework of political-economic analysis, as highlighted by Elliott (1989). These are (a) that environmental limitations may be underestimated, and (b) that an emphasis on using political-economic structures to explain environmental problems, "may tend towards determinism and breed pessimism", typical of the classical science paradigm. This is acknowledged as an inherent characteristic of this model and is in no way a subjectively determined outcome.]

Consideration of the 'policy process' per se is an essential prerequisite to policy analysis. Brewer and deLeon (1983) define policy as "a broad strategic statement of intent to accomplish aims". According to Clark (1992), most formulators of policy, particularly government agencies, implement policy in accordance with "objectives set forth in prior decisions". In a comprehensive examination of the foundations of policy analysis, six phases operative in the policy process were identified by Brewer and deLeon (1983): initiation, estimation, selection, implementation, evaluation, and termination. The phase in which policy is actually formulated and government

policy-makers are active is referred to as the implementation phase (Clark, 1992). Without successful implementation, the prescribed solutions (or defined objectives) of policy cannot be met (Brewer and deLeon, 1983). The Southern African Regional Commission for the Conservation and Utilisation of Soil (SARCCUS) (see Section 3.4.1) in its evaluation of soil erosion in South Africa before the promulgation of the Soil Conservation Act No.45 of 1946 claimed that the "key word at the end of the whole all-embracing subject of land use (and planning) was and still is, implementation" (Rowland, 1974). Consideration in this analysis is therefore principally given to the implementation of policy.

By way of defining further the framework within which the soil conservation policy analysis will be undertaken consideration will be given to the endogenous and exogenous forces identified by Clark (1992) to be actively shaping and influencing the effectiveness of policy formulation and actualisation of objectives within the policy environment. The author has translated these forces in a South African context and these are summarized in Table 1.2 as an indication that they constitute issues or variables to be addressed further in the ensuing analysis.

Finally, two questions have been raised in the scientific literature concerning the nature of soil erosion research. The first refers to a debate concerning the complexities involved in attempts to combine analyses of physical processes, such as soil erosion, with human agricultural/pastoral practices. A review of literature on the subject was conducted by Blaikie (1985), according to whom, texts by Winch (1958), Bernal (1969), Benton (1977), and Gregory (1978) provide a detailed discussion on the subject and therefore for the purposes of this work will only be outlined briefly . The problem referred to is essentially one concerning the deviation from and consequent provision of empirical evidence to support hypotheses that involve *a priori* assumptions, which are not amenable to proof. For example, according to Blaikie (1985) empirical verification is attainable to support claims that a conservation project reduces the rate of soil loss yet it is impossible to empirically prove by the same means that ineffective conservation is the result of a failure on the part of bureaucrats or policy makers to adequately implement policy due to a lack of financial inducement (Blaikie, 1985). Literature emerging from the social sciences in recent years, however, postulates the existence of acceptable methodological approaches to derive similar empirically verified results (Barnes, 1974; Sayer, 1984;

Campbell, 1989; Bateman, 1993; Bateman & Turner, 1993; Robinson, pers.comm.). The "humanistic upsurge" currently dominating the sciences,

Table 1.2 Forces that actively shape the policy process

In: Clark 1992	This study
***Endogenous factors*:**	
resource constraints	of the State and farming community
conflicting goals	divergent priorities of government departments
scientists' norms	real extent of erosion in the country
government hierarchies	administration and cooperation - different ministerial levels
ideology and culture	of apartheid versus agriculture
scientific and bureaucratic	norms, priorities and constraints
conservatism	political ideology
internal advocates	
***Exogenous factors*:**	
uneven popularity of issue	lack of consensus and public awareness
constituency groups	
conflicting interests	state versus industry versus agriculture (for example, supply of labour)
media	
legislature	
judiciary	Should soil erosion constitute a crime punishable by law?

Source: Taken from Clark (1992) and adapted for the purposes of this study.

particularly in Europe (Saarinen & Sell, 1981), in effect renders such a criticism redundant. Moreover, the approach adopted in this study constitutes a challenge to the formerly predominent positivist and technocratic emphasis on soil erosion studies in an attempt to bring South Africa more in line with research developments elsewhere, but more particularly given the conspicuous extent of the erosion problem, attempts to redress it.

The second question to arise with regard to soil erosion studies, relates to the issue concerning how exact a science is soil erosion assessment itself, given that its causes have proved extremely complex and difficult to determine within the physical sciences. It is hoped that the results of this study will demonstrate that a paradigm shift from the constraints of technocratic emphasis may prove to be enlightening and informative in its identification of numerous problems or constraints previously unrecognised. Limits of 'proof' therefore must be recognised in all studies pertaining to soil erosion. Be that as it may, this must not negate the value of postulated assumptions in their amenability to provide explicit and prior communication (this is conceded by Blaikie (1985)), and results which can be constructive and valuable, regardless of the controversy concerning the extent of objectivity inherent in studies of this nature.

1.4 MOTIVATION FOR STUDY

Glaeser (1995) asserts that "most developing countries" have gone through a long phase of economic and ecological exploitation, not only during colonial times, but also after gaining political independence. From the outset of this research it became evident that concern for landscape degradation and erosion in South Africa, focussed to a large extent on conditions prevalent on 'White' agricultural land, commercial land and forestry designated areas and to a lesser extent on those areas under the jurisdiction of legislated Betterment areas, that is, African Trust Land (or South African Development Trust Land). More specifically, South Africa's agricultural policy appeared to operate on two levels, reflecting a dualism wherein preferential policy treatment is afforded more particularly to one section of the community than to others. This is apparent in the differential application of legislative regulations, the

unequal allocation of funding to support soil conservation efforts, and the disparity which exists in the provision of incentives, support mechanisms and extension support in favour of predominantly large-scale, commercial, 'white' agricultural land, to the detriment of those in the former 'homelands', self-governing territories or Development Trust land. The problems of soil erosion transcend political boundaries; by implication state policies and legislative regulation should reflect this. Soil losses derived from agricultural activities on the Highveld, or in mountain catchment areas, will be transported seaward as river-borne sediments, resulting in on- and off-site impacts. Some of the worst cases of soil erosion reported in South Africa have been on White commercial farmland (see Chapter 2). Coupled with a situation of fragmentation of land and low productivity in many parts, such as in KwaZulu-Natal, this scenario cannot continue to persist into the future without a collapse of the natural resource base (Erskine, 1982), in other words, it is non-sustainable.

Regardless of whether conditions are at their worst in the homelands (Cock & Koch, 1991) due to apartheid structures, or whether it is true to say that accelerated erosion (as opposed to geological erosion) constitutes 95 per cent of all erosion in South Africa (Institute of Soil, Water and Climate, 1992, according to Garland, pers.comm.), is not the issue (see Chapter two for more details). With the widespread and in some areas reportedly conspicuous effects of soil erosion evident on the South African landscape, coupled with a loss of storage capacity in dams at a rate of 130 million m^3 per annum (Huntley *et al*, 1989), regardless of the source of siltation material, or the causes of the degradation, it is clear that the government's soil conservation initiatives aimed at mobilising the support of the public and farming community and a sustained commitment to soil conservation, have been inadequate in the past and the reasons for this require thorough appraisal and examination. This confirms Burgers (1995) contentions that government initiatives were "well-intended", however, "actually contributed to limited national awareness and improved land management".

From the literature reviewed it would appear that concern for the consequences and severity of soil erosion has been expressed by South Africans since the turn of the century. Legislation has also existed on the statutes, providing for soil conservation in one form or another from the turn of the century and considerable effort, utilising a

variety of approaches, has been expended by the State to promote conservation farming (Huntley *et al*, 1989). Soil erosion, according to Sir Walter Hely-Hutchinson, is a problem "demanding the gravest attention ... [and] one which should have been taken up not only by individual farmers", but is the encumbent responsibility of government to "lend its influence and, if possible, its assistance in dealing with the matter" (Matthee, 1984). Nevertheless, history has shown that this is not enough. Public awareness is indispensable for effecting change in national policy (Marx, 1970), but evidently, not least of all in the South African context, this alone does not guarantee results (refer to sections 5.2 and 5.3); this applies at a national, provincial and local level.

Developments post 1992 and up to and including the national general election in 1994, brought about the radical transformation of South Africa's political and socio-economic environments. The changes since the 2 February 1990 speech at the opening of parliament by the former State President, ushered in, not only a new era in South African politics, but also a new dispensation with regard to the environment. For example, the government's decision to repeal the land tenure Acts, as detailed in the Abolition of Racially Based Land Measures Act No.108 in 1991, has tremendous implications for the future distribution of urban and rural land and the conservation of resources therein (De Villiers, 1991). The White Paper on Land Reform, tabled in Parliament on 12 March 1991 stipulated that land tenure is essential in South Africa for political and social stability and justice (De Villiers, 1991). Policies to date have reflected ambitious aspirations for rural economic development (Watson, 1990). Should these be pursued into the 21st century under the new government, as a means of fulfilling the objectives of the Reconstruction and Development Programme, then it could be argued that erosional processes currently active in this environment, unless expediently and effectively controlled, could potentially realise unprecedented levels. A statement by the Chief Director: Environment Conservation of the Department of Environment Affairs, gives further impetus to the concern regarding future government priorities: "it must be realised that in the light of the increasingly urgent need for basic necessities in South Africa, unrealistic expectations of the quality of the environment cannot be cherished" (RSA Policy Review, 1991). Concerns do not simply rest with the allocation of funding; proposed land reforms and promised restitution further threaten the relative stability currently apparent. Except where land was transferred by prior arrangement immediately before the 1994 elections, the

Abolition of Racially Based Land Measures Act No.108 of 1991, made provision for the reincorporation of the former 'homelands' into South Africa, and the dissolution of the South African Development Trust, which effectively means that the majority of South Africans now live on nationalised land. The Restitution of Land Rights Act No.22 of 1994, made provision for mechanisms which will enable individuals or groups, who were previously and forcibly removed or dispossessed of their land as a direct result of racially based discriminatory land legislation, to claim restitution of their land, or alternatively, if the land is no longer recoverable or available, be awarded relief. The Minister of Land Affairs, Mr Derek Hanekom, during the second reading of the Restitution of Land Rights Bill in the Senate in November 1994, stressed that "the restitution process will not succeed in the absence of other land reform measures. It will be accompanied by measures which will give people who were historically denied access to land, real opportunities to secure access to land ...I refer namely to the ongoing process of redistribution and securing tenure for all South Africans. We want to make sure that we address the problems of skewed land distribution in a fundamental and significant way." (Land Info, 1994). With the repeal of the Land Act of 1913 and the Development Trust and Land Act of 1936, a major concern relates to the settlement of new, inexperienced farmers who "could negatively affect the future of the farming industry" (Policy Review, 1991). The implications of these land reform measures for the future promotion of soil conservation, are far-reaching in a context of severe financial constraints and socio-economic priorities. The former government is assumed to have failed in its attempts to transform the agricultural community into a soil-conscious one committed to the practise of agriculture in accordance with the principles of sustainability, despite apparently conscientious attempts and considerable financial investment. For reconstruction and development to proceed, future land policies need to deal efficiently with a number of factors in both urban and rural environments. These include:

* the injustices of racially-based land dispossession
* the inequitable distribution of land ownership
* the need for security of tenure for all
* the need for sustainable use of land
* the need for rapid release of land for development
* the need to record and register all rights in property, and

* the need to administer public land in an effective manner (Department of Land Affairs, 1996). Refer to the green paper on South African Land Policy published by the Department of Land Affairs (1996), for an in depth consideration of the "vision" and implementation strategy proposed.

Given the at best 'guestimated' costs of realising these goals, which must include in the case of 'emerging' farmers alone, *inter alia*, the provision of: access to land financing to purchase agricultural land; finance to purchase farm capital equipment; access to credit facilities; infrastructural support; access to extension services; and access to training; not to mention providing compensation for loss of land or unresolved cases of restitution, nor the impact on markets, land prices, interest rates and input costs (du Plessis, 1995). Against such a background, it does not seem unreasonable to propose that, (a) not only could soil erosion remain a feature of the South African environment, but further (b) soil conservation could run the risk of being relegated to a status of reduced importance, and (c) could even be passed over, in attempts to diffuse current tensions over land policy.

Clarification on these propositions is required. According to Garland and Stocking (1995), redistribution of land could result in the placement of unskilled and inexperienced farmers becoming integral components of small scale agriculture, the inference here relates to the potential to exacerbate already existing bad landuse management. Blaikie and Brookfield (1987), however, assert that whilst land reforms are not in themselves a panacea to reduce land degradation, they may be a necessary condition. Erskine (1982) concurs with this proposition in acknowledging that land tenure reform could potentially resolve the dilemma of 'commonalities', but adds that this will only be possible if it also includes "a real effort to allow the rural communities to define their collective needs and work together in achieving worthwhile goals". Moreover, this study does not claim that because of the projected land reforms proposed for South Africa, that land degradation will necessarily be reduced or exacerbated. Rather it is suggested that against this background the demand for resources (both natural and financial), will be great and for this reason, the risk of soil being delegated to a status of reduced importance is heightened, thereby intensifying problems associated with (in the context of this study) policy efficacy. Concerning the third proposition and the potential to overlook soil conservation: the World Bank in May 1993 at a conference on "property and the

constitution", presented its current position on land reform in South Africa, in the form of a number of recommendations believed by the Bank to be necessary preconditions for realising expedient satisfaction of "short term" goals. An emphasis is placed on diffusing current tensions by implementing "short-term" measures; what shall be the implications of such an approach in terms of sustainability and for environmental management? Furthermore, one of the short term measures referred to stipulated the need to abolish the Subdivision of Agricultural Land Act of 1970. Such a recommendation has already been acted upon and the Directorate of National Agricultural Resource Conservation is currently (November, 1996) in the process of formulating a "revised" conservation of agricultural resources bill which will completely repeal the Subdivision of Agricultural Land Act. This is to be done without any prior appraisal or consideration being given to the consequences and implications of such an act (Nduli, pers. comm.; Taylor, pers. comm.). Clearly, the situation is a volatile one which renders circumstances ripe for making rash policy decisions.

Moreover, whilst most scientists subscribe to the theory that soil erosion is a natural phenomenon, that may be exacerbated anthropogenically (President's Council, 1984; Grove, 1989; Watson, 1990; Department of Environment Affairs, 1992; Beckedahl, 1993), others, such as scientists of the Institute of Soil, Climate and Water (as previously indicated), have been reported to claim that as much as 95 per cent of erosion in South Africa is human-induced (Garland, pers. comm.). Meantime, Watson (1990), in her work on soil erosion in the Umfolozi Game Reserve and adjacent areas of KwaZulu-Natal, challenged a number of misconceptions on the subject and, called for a timely and "substantial revision of the general perception of soil erosion in this country".

The preferential treatment of erosion in specific geographical localities to date, and the historically dynamic changes within South Africa's socio-economic and political environments, coupled with a lack of consensus amongst scientists regarding actual causes, extent and gravity of soil erosion in the country, calls for further investigation and constitutes the motivation for this study. "It is clear that there will be no sustained political development without sustained economic growth, and no sustained economic growth without wise and sustained environmental management. A

prosperous economy cannot be built on a bankrupt environment." (Hansard 1995, col.1509).

The basic premise therefore, of this study, as alluded to in preceding paragraphs is: *that soil erosion in South Africa persists, and despite government and general public inputs and participation, and the existence of a legislative machinery created specifically to address the problem, progress in conservation farming and implementation of measures, is too slow.* Factors other than legislative inadequacies may be responsible for this failure and this warrants investigation.

1.5 STUDY AIMS

In view of the foregoing discussion, the aim of this study is an examination and analysis of the interactive variables, (by implication dependent, independent and intervening variables) operative and functional within the human dimension of the soil erosion process, specific to South Africa. To achieve this goal, by necessity requires the postulation of three assumptions. The first assumes that:

previous neglect of the 'human dimension' of soil conservation policy, or in other words, the interrelatedness of factors operative within the political, economic, historical, and most particularly the perceptual environment, (and not just the physical environment itself, which has largely constituted the traditional, technocentric view held to date), *has exacerbated the extent of the problem currently manifest in South Africa.*

The extent to which such an assumption can be supported, must be determined in accordance with the perceived validity and reliability of the results presented in this thesis.

As all five of the components outlined in Figure 1.4 cannot be examined thoroughly due to their inherent complexities, in isolation from the others, each by necessity will be addressed to various extents in this study. The merits of addressing the outstanding components in future complementary research endeavours, and their potential to further inform the multidimensional nature of the problem manifest is referred to throughout the text.

As shall be apparent from the succeeding chapters, the previously understated complexities associated with soil erosion in South Africa, justify a more in-depth examination of each of the variables than can be presented within the scope of this thesis. For the purposes of this study therefore, the analysis of the human dimension of soil erosion will be addressed specifically within the framework of soil conservation policy formulated and implemented between 1910 and 1992. It is intended that the findings be used to inform future decision making and the development of soil conservation policies into the 21st century, particularly at a time in South Africa's historical evolution, when the social and economic needs of, for the first time, all its people, weigh heavily on state budgets.

It must also be stated that this study aims to be more than a piece of standard policy research and analysis, the objectives of which generally address such questions as "did the law do what it was 'supposed' to do?" and "what 'rational' reforms can be suggested?" (Blomley, 1994). The analysis undertaken in this study, attempts to examine intervening variables (refer to Figure 1.3) and includes consideration of issues such as those described by Clark (1992) in Table 1.2, as well as others including, *inter alia*, the compatibility of government priorities with soil conservation objectives, personal versus official agendas of decision-makers, incentives and constraints of 'significant others' with the power to influence perceptions and public opinion, informedness of perceptions and perceptions of "need". In other words, there is an overwhelming emphasis on the role of human variables. In accordance with Duvel and Afful's model (1994), the intervening variables, namely needs, perception and knowledge, will also be considered within the scope of the study to determine whether or not the law did "what it was 'supposed' to do".

Broadly, the analysis will focus on the variables operative in specified environments, that is, variables which are considered by the author to have influenced policy efficacy. These include the historical, economic, political, perceptual and physical/natural environments, with specific reference to the policy environment and the variables responsible in shaping this environment (and by implication, its effectiveness in achieving soil conservation compliance). As will be further elaborated on in Section 1.7.1, the determined variables or factors will be used as elements of a working hypothesis. This will be tested using the responses derived

from a perception survey. To date there prevails little scientific or public consensus regarding the influence of the human issues raised in this study or on the soil erosion debate in general. To this end, the second assumption postulated in this study states that:

if a lack of consensus regarding soil erosion issues has in some way been detrimental to the anticipated efficacy of policy in achieving its goals, then by establishing some extent of agreement on the role of specifically defined human variables in influencing policy efficacy, that such established consensus or agreement, in the absence of information to the contrary, (due to a perceived inadequacy/incompleteness of the country's information base), can be accepted to reflect the contemporary realities of the soil erosion problem in South Africa, and as such a valid base upon which future policies may be formulated.

Thirdly and finally, it is proposed that in establishing such a consensus of national opinions with regard to contemporary realities of the erosion problem that:

the potential to mobilise wider support for soil conservation initiatives can be realised, by addressing the inadequacies of previous policies.

It is not within the ambit of this study to question previously conducted quantitative assessments of soil erosion nor the techniques nor methodologies utilised in these assessments. This research constitutes a wholly qualitative analysis of soil conservation policy with consideration given to the diverse contexts within which this policy was motivated, formulated, administered, implemented and enforced, within a stipulated period in South African history. NOTE: The qualitiative research procedures applied in this study are used to obtain **descriptions** and an **understanding of the quality of relationships** between variables. No claim is therefore made formally to *explain* or *predict* relationships between variables; this falls within the domain of quantitative research (Viljoen *et al.* 1987).

Two reasons are given for the period of study chosen, that is 1910 to 1992. Firstly, the status of land degradation in South Africa did not begin with the dawning of a new century, nor simply since becoming the Union of South Africa in 1910. Whilst acknowledging the necessity of describing the historical legacy of preceding decades,

by way of placing in context rural transformations in the country, because information prior to the creation of the Union of South Africa proved scarce and difficult to obtain, the year 1910 was considered an appropriate starting point for this study. The detail provided from this time is therefore directly and largely proportional to the amount of literature available to the author on the subject. Secondly, 1992 was a highly significant year in terms of South African politics and history. Debate concerning the politically sensitive and complex issue of land distribution was resumed at a national level in the early 1990s and amongst other developments, a workshop, hosted by the Institute of Democratic Alternatives for South Africa (De Klerk, 1991), provided a channel for discourse on land reform. This constituted the first step towards land reform. In 1991, the government issued a White Paper on the subject, an act which can be described as establishing the foundation upon which a new dispensation for environmental land management was to be built. It took until 1994, before a national election, in which all the people of South Africa for the first time in the country's history voted in a transitional Government of National Unity, however, it is argued that the wheels of change were first put in motion with the Abolition of Racially Based Land Measures Act No.108 of 1991, which came into effect in 1992.

By tracing the legislative history of soil conservation in the manner outlined and in particular by scrutinizing actors' motivations and aspirations, this work could be perceived to be, in the words of Blomley (1994) a political act, "dangerously nihilist". This is certainly not the objective of this study. It is intended, rather, that this research will provide a constructive contribution to future conservation initiatives by:

(a) assessment of the success or failure of conservation efforts during the past century;
(b) determination of the reasons for success or failure of past measures to counter accelerated rates of soil erosion (natural or anthropogenic); and
(c) provision of recommendations based on the record of past experience in order to enhance future efforts.

1.6 STUDY OBJECTIVES

The study objectives may be summarised as follows.

1. To evaluate, in brief, the extent of soil erosion in South Africa by reference to available literature.
2. To provide a review of legislation formulated between the years 1910 and 1992, that pertains either directly or indirectly to soil erosion in South Africa.
3. To trace the history and development of South African soil conservation policy, within a number of dynamically interactive environments, with particular emphasis on 'human', and other 'intervening' variables.
4. To analyse the data obtained with the purpose of evaluating the effectiveness of evolving policy initiatives, promulgated legislation and legislative structures, between the years 1910 and 1992.
5. To formulate a conceptual model of the South African soil conservation policy environment to be used as a working hypothesis.
6. Using the opinions of key players in soil conservation policy development and research, to determine the extent of agreement amongst the scientific community and those involved in the development of soil conservation policy, regarding the multidimensionality of the soil erosion problem, and furthermore, the role of 'human' variables in influencing policy efficacy.
7. To discuss the results in terms of the implications of the efficacy potential of future soil conservation practices.

To this end, Chapter two places in context the soil erosion problem as it is perceived to exist in South Africa. To achieve this objective, the introduction to the chapter describes the apparent extent of the problem as determined from numerous literature sources on the subject. A definition of soil erosion is provided. For a more holistic representation of the environment within which the problem is manifest, this is then followed by a description of the basic physical characteristics of the South African landscape. The specifics of land use and the dynamics operative within the socio-political environment from 1910 to 1992 are discussed and the chapter closes by examining agricultural productivity and outlines the controversial nature of a number

of contradictory perceptions concerning the causes, sources and extent of soil erosion in the country prevalent over the prescribed decades. Chapter three constitutes a review of government policy and legislative enactments formulated over the study period, which either directly or indirectly made provision for soil erosion control. In the remaining chapters, the following issues to date largely unquestioned but considered directly relevant in terms of the objectives of this analysis are addressed.

1. What has been the policy in South Africa regarding soil erosion since 1910 (and the Union of South Africa) through to 1992?

2. How has this policy evolved and developed to the present day?

3. What have been the characteristics of changing environments, other than the policy environment, with respect to soil erosion over the decades 1910 to 1992?

4. What is the role of individual perceptions in the context of soil degradation management?

5. What role have economic realities played in the context of decision making and policy compliance?

6. To what extent has the legacy of historical environmental developments/events pre-1910, influenced the success/non-success of South African soil conservation policies?

7. What role have South African politics and government agricultural and land use policies played in combating or sanctioning this problem?

8. How influential can soil conservation policies and legislative provisions be in the 21st century, with regard to their potential to mobilise the support of all to comply with the norms and standards of sustainable agricultural resource management?

1.7 METHODOLOGY

1.7.1 Data Sources

In order to establish a framework within which to carry out this analysis of soil conservation policy, it was first necessary to verify the commonly perceived extent of soil erosion in the country at a national level. This required an extensive review of literature on the subject and included consultation of diverse sources, primary and secondary, such as publications/reviews/inventories compiled by scientists in the fields of soil science, agriculture, conservation and agricultural extension, as well as government reports, historians' accounts, and ecological and literary works by authors interested in the South African landscape and its peoples (such as Robertson, Smuts). Archival material, such as that held by the National Veld Trust, (together with personal communications with staff of the Trust), newspaper clippings and SARCCUS records proved invaluable material sources. Personal interviews were conducted with members of the general public with an interest in soil conservation, or active in the promotion of soil conservation, such as, those serving on local conservation committees. Anecdotal information was also used where considered valuable, of interest and appropriate to the study's objectives.

A review of soil conservation policy from the turn of the century through to 1992 (and beyond for analytical purposes) was accomplished principally through meticulous and systematic searching in the Butterworths' series of the Republic of South Africa Statutes and the Union of South Africa and Republic of South Africa Assembly Debates and Government Gazette. Earlier research on the subject conducted by Rabie (1976), Beinart (1984), Roux (1990) and Fuggle and Rabie (1992), was also consulted. In addition, computerized library searches were conducted at the following academic centres within the Republic and abroad: Department of Geographical and Environmental Sciences, Durban; E.G. Malherbe Library, Durban; Life Sciences Library, Pietermaritzburg; School of Architecture, Durban; Law Department, Durban; and correspondence was entered into with the United Nations Environment Programme Library staff, in Nairobi and relevant materials were supplied by them. Exhaustive searches utilising SABINET and CAB CDROM were also carried out. Further references were consulted at Queens'

University Library, Belfast (Northern Ireland), University of Ulster, Coleraine (Northern Ireland), and UNEP, Nairobi. An inventory published by the Department of Environment Affairs in 1993 as a guide to environmental legislation in South Africa, also proved useful in deriving additional material pertaining to other legislation enacted in parliament that indirectly provided for soil conservation under the categories Nature Conservation, Land Use Planning and Settlement Acts.

Evolution of soil conservation policy throughout the study period prescribed, was traced by referring to Hansard's records of South African parliamentary debate for the years 1941 to the present time (1996), in particular 1941, 1946, 1969, 1970, 1971, 1977, 1981, 1983, 1984, 1985, 1990, 1992, 1994, 1995 and 1996 as well as utilising the material referred to above. As the assembly debates are recorded verbatim and no cumulative index has yet been published to aid reference to these works, this proved to be a formidable task.

As indicated in sections 1.3 to 1.6, this study encompasses more than a standard analysis of soil conservation policy. By examination of what might be termed the "human dimension" of soil erosion, this study has necessitated a multidisciplinary investigation, that incorporates aspects of the fields of economics, agronomics, agricultural extension, psychology, ecology, human ecology, politics, history, sociology, law, as well as physical and human geography. The comprehensive extent of the resource base from which the literature for this study was drawn should thus be stressed.

It is intended that the variables identified in the aforementioned qualitative assessment of soil conservation policy and legislation, and presumed to have had some influence on the assumed relative non-success of soil conservation policy, will then be utilised to construct a conceptual model of the South African soil conservation policy environment. Feit (1966) is of the opinion that qualitative models of this nature are "never perfect". The model represented in Figure 7.1 is therefore no exception. Nevertheless, it is argued, that despite the need to propose more assumptions pertaining to such models, they remain useful in that, as Feit's (1966) study of the policy of separate development and its implications in South Africa confirms, "they do seem to offer an adequate explanation to the observed situation".

To test this 'working hypothesis', the elements of the model will be used in the formulation of a perception seeking questionnaire (see Appendices I and II), the aim of which will be to determine the extent to which a sample of predominantly scientists and 'significant others', key players involved in soil erosion and/or the development of soil conservation policy, agreed or disagreed on the extent to which these variables have influenced the capacity of policies to achieve their objectives in the past. Descriptive statistics (offered by the Statistical Packages for Social Scientists software or SPSS), were deemed most suitable in satisfying the requirements of the study's objectives, and were used in the ensuing analysis.

A total of 242 questionnaires were posted to scientists, policy developers and extension officials, and 103 were returned duly completed. Downs and Rocke (1981) recommend when examining interactions between variables, that the sample size should not be less than 50; under such circumstances, the generation of predictions or prescriptions derived could be "hazardous". The sample utilised in this study therefore meets such a precondition. An additional 15 were returned to the researcher with an explanatory note describing various reasons why the questionnaire was not completed. The principal reason supplied was that soil erosion research and/or soil conservation policy development fell outstide individuals' frame of reference and they considered themselves "unqualified" to contribute to the survey. Lack of time was also given as a constraint by a number of respondents. The 103 responses analysed therefore constitute a 46 per cent return.

A number of personal interviews were conducted with individuals identified by the researcher through their substantial inputs either in the realm of science, policy or agricultural extension, (as determined from the literature search undertaken), and thus believed by the researcher to have shown themselves to be authoritative on the subject. (Please refer to Personal Communications for details of interviewees.) The information derived constitutes an important source of data for this study, as each individual was subsequently asked to further complete a questionnaire, the data presented within the questionnaires merely reinforced what was determined in conversation, but in some instances, a substantial amount of supplementary information was obtained.

The manner in which the questionnaire was compiled and questions chosen will now be described in order to demonstrate the care that was taken to maximise the reliability and validity of results and derive optimum use of the data.

1.7.2 **Qualitative Reliability**

Much contemporary debate exists concerning the merits of using questionnaires in sampling opinions (Schuman & Scott, 1987; Mason *et al*, 1988). Acknowledging such questions, whilst also anticipating the fact that a significant proportion of respondents would be natural scientists and by implication potentially unfamiliar with, and therefore critical of the qualitative methods utilised in this study, a number of steps were taken to safeguard, where possible, the reliability of data, with the intention of enhancing their credibility. A brief discussion of these will now be given.

1.7.2.1 Sampling procedure

At the outset of this project, a clearly accessible population, which would constitute all scientists and policy makers involved in soil erosion research and conservation policy development between the years 1910 and 1992, proved impossible to define. For example, certain individuals had either died, left the country, or changed profession, making it impossible to target a specific population. In any case, had it been possible to identify and make contact with all relevant individuals, it would not have been possible to obtain the responses of the population as there would have been no guarantees that individuals would have responded (Piper, pers. comm.). It must be acknowledged therefore that the results of this study are biased as a result of the way in which the sample was assembled/the sampling method employed. Given the considerable duration of time and effort expended on drawing up such a comprehensive list of participants (see Appendix III), and the means by which the sampling was subsequently undertaken, it can be argued, will have approximated as closely as possible with the object of attaining a representative sample.

Various sampling methodologies have been used in the past to select samples of people, each with their own merits and shortcomings (Stephen & McCarthy, 1958), and each one to a limited extent justified by the means to which they are applied. The

method used in this study is described by Stephan & McCarthy (1958) as "selection by taking what is readily available" and is supplemented by the procedure referred to as "selection by searching and matching". This approach involved sending correspondence to all research and tertiary educational institutions in the country considered to potentially have had or held currently any interest in the utilisation or management of soil. Furthermore, 42 key individuals were contacted either by telephone, Electronic mail or in writing, and asked to recommend or provide the details of other individuals known either to themselves through the context of their own work or the work of colleagues, who might be interested in assisting with the project and could legitimately be added to the mailing list. In addition, contact details were further derived by scanning relevant literature (as per the literature consulted for the analysis undertaken in chapters 2 to 6) for the names of principal research scientists and policy makers. In other words, participants were chosen especially if they were found to be prominent in associated soil erosion research circles or involved in related policy development, many of those included had either published or were currently active in research involved in *inter alia*, soil or pasture management, agricultural resource conservation and development, agricultural engineering, or policy formulation. Mailing lists of conferences which in some way have involved consideration of soil and/or land degradation and/or conservation over the decades of the study period, were sought from conference organisers, and permitted a substantial expansion of the mailing list.

1.7.2.2 Value in accuracy

Accuracy is important in any attempt to measure attitudes over a large population. However, the constraints of time and money or available resources tend to predicate the necessity for some compromise; and sampling provides part of the solution (Stephan & McCarthy, 1958). The value of the impact or impression made as a result of obtaining information on attitudes or opinions by sampling, will depend not only on the accuracy with which the information was obtained, but on how well it serves its purpose. Refer to Table 1.3, in which the value of new information in relation to its relative accuracy is crudely evaluated. One of the early and preliminary conclusions to be drawn from the opinions of participants in this study, states that the knowledge base upon which South African policy makers base their decisions about soil erosion, is inadequate. As Table 1.3 suggests, where previous information is

inaccurate, but new information is accurate, then there is the possibility of gain, however, this will be dependent on knowledge of the extent to which the new information can be trusted (Stephan & McCarthy, 1958). It is to be argued that much knowledge can be gained from studying perceptions of key players (see Chapter 5 for further explanation), as is the case in this study, and further, that this knowledge is enhanced if their relationship (that is the participants/respondents) with the subject matter (soil erosion research and conservation policy development) can be shown to be first-hand and directly experienced. For these reasons it is asserted that the sampling procedure employed in this study can be 'trusted' to represent contemporary realities, at least according to the perceptions of those sampled, regarding the extent, causes and nature of soil erosion in South Africa, and furthermore, that the results of this work as such, significantly contribute to the knowledge and understanding of "the thinking of a large population" on "an important issue of the day" (Stephan & McCarthy, 1958).

Table 1.3 Value of new information in relation to its relative accuracy

General Situation	Value of New Information
Previous information accurate New information accurate	only as a check or confirmation
Previous information accurate New information inaccurate	no gain and possible great loss
Previous information inaccurate New information inaccurate	no gain and possible loss
Previous information inaccurate New information accurate	**possibility of gain**
Previous information inaccurate New information extremely inaccurate	possible loss which may be small if new information does not seem plausible and hence not used*

Note: * Supports the contention that there exists a need to establish agreement or consensus on the specificity of soil erosion: place-based concerns and non-location specific concerns (see Section 1.3 above).

Source: Stephan & McCarthy (1958), p.11.

1.7.2.3 Questionnaire validity

Respondents were asked in closing, to make comments which they believed would constructively contribute to the overall value of the project. A number of issues were raised and criticisms advanced and these will now be discussed.

(a) Two respondents indicated their concern that "critical" issues such as desertification and the economics of the problem, were not adequately featured in the questionnaire (see Appendix I). The issues featured in the questionnaire, as already explained in Section 1.5.1, were derived from the literature reviewed for the analysis and also those variables identified in the course of the analysis, as responsible in shaping the soil conservation policy environment represented in the country and by implication those variables deemed to have significantly influenced the relative non-success of South African soil conservation policy formulation, implementation, administration and enforcement. In other words, such variables were not 'chosen' by the researcher and as such, the researcher makes no claim that the resultant model formulated (see Figure 7.1) represents exhaustively all possible variables which could have been incorporated to explain the dynamics operative within the South African soil conservation policy environment. However, it is contended that this model presents the most comprehensive conceptualisation to date depicting, in the context of soil conservation policy, the complexity of the soil erosion problem manifest in South Africa. Subsequent interdisciplinary research efforts, such as those recommended in Chapter 9, will inevitably refine and further contribute to this model in due course.

(b) A number of respondents expressed their apologies that not all questions were answered. The reason given was generally because of their perceived lack of qualification to give "educated" answers to particular questions. As the questionnaire addressed both the perceptions of soil erosion and perceptions regarding soil conservation policy, and those included in the sampling were either scientists, policy makers or others involved in agricultural extension, this perceived "lack of qualification" might have been avoided had two distinct questionnaires been compiled incorporating questions addressed specifically to a particular group of respondents,

that is, either scientists, or policy makers, or extensionists. However, as the objective of the study was to determine prevailing perceptions of key players on a number of issues which inevitably spanned both the realms of soil erosion research and conservation policy, and furthermore that in most cases respondents indicated that their field of experience or expertise spanned more than one category of answer, it is suggested that it was more appropriate to combine the two components, given their "blurred" boundaries.

(c) Two respondents assertively argued that the problem of soil erosion and related policies was "not clear cut" (which supports in part the first assumption presented in this work, refer to Section 1.5), and further that the questionnaire "was too structured" and should have used more "open"-type questions. One of these respondents concluded that the "results were therefore not amenable to meaningful analysis", and another queried the value of answers which "demanded too much gut feel".

With regard to the structure of questions, it is acknowledged generally, that 'closed' questions tend to "sharply restrict frames of reference by focusing attention on the alternatives offered" (Schuman & Scott, 1987), however, research undertaken in the 1980s drew attention to the concern that 'open' questions too can be shown to exercise their own form of constraint (Sudman & Bradburn, 1982; Schuman & Scott, 1987). In compiling the questionnaire used in this study, great care was taken to not only combine both types of survey questions but that where possible respondents were provided the opportunity to either "name", "give the main reasons why", "comment", or "justify" their choice of answer. It should also be pointed out that the questionnaire comprises two main sections. The first contains questions aimed at deriving as much detail and information on a number of complex issues as possible, and the second presented a number of either positively or negatively emphasized questions, which not only would have compelled the respondent to indicate the extent to which they agreed or disagreed with the statement using a 5-point Likert scale, but to a degree aimed at supplementing, but more importantly, reinforcing the information obtained in the first section. The issues focussed on in this questionnaire were therefore deliberately addressed more than once, either in the form of a statement, to which respondents were required to indicate the extent of concurrence, a question with yes/no options, or in the form of an 'open'-type question, where

respondents were free to elaborate on their opinions. This was done to minimise the chance of restricting respondents' choices, and exacerbating the potential bias in the sample.

The criticism noted concerning the issue of "too much gut feel" in answering the questionnaire, should have been anticipated, in that, because of the to date neglect of "social" issues in the study of soil erosion and conservation in South Africa, the majority of scientists contributing to this study were in fact natural scientists, who predominantly work in accordance with the principles of physics and immutable laws of science, within which results are empirically derived. Unfamiliarity with the social sciences and the acceptability of their approved methodologies (Schuman & Presser, 1981), is a realm yet to be breached by the technocrats, in South Africa, as indeed the first assumption made in this work emphasized. It is not within the scope of this work to justify and debate the acceptability of using questionnaires to measure public opinion. For a detailed exposition on this matter refer to Schuman *et al*, (1986).

(d) One respondent questioned the validity of the results given that it had been addressed to scientists and policy makers, the opinions of whom "may be very different because of their different backgrounds and disciplines". A study undertaken by Hondraki-Birbili & Lucas (1996), in which attempts were made to develop an appropriate methodology for environmental policy analysis, concluded that the perceptions of various groups of professional people and "affected parties" can provide a rapidly "assessable basis of pertinent and valid information" for complex assessments such as those involving environmental policy analyses. The sample used in this study targetted key individuals who were currently or had been in the past involved in any aspect of soil erosion research, as well as those who had in the past or were currently involved in the development of soil conservation policy. By implication, this will have included individuals from diverse backgrounds and with potentially different frames of reference. The possibility of differences in opinion existing between, for example, scientists and policy makers was examined during the analysis of the results and clearly there was no significant difference in the opinions of either of these two groups. The likelihood of there being representative subgroups within the sample measured, was therefore taken into consideration. Had statistically significant differences between subgroups been found to exist, this would still not

have invalidated the assessability of such a source of "pertinent and valid information".

(e) A number of respondents (three) suggested that given the percentage of the sample that may have been predominantly Afrikaans speaking, would have warranted the preparation of an Afrikaans version as well as the English one. This is a significant shortcoming and will therefore be redressed should follow-up studies be conducted. The necessity to translate the questionnaire and/or subsequent questionnaires into multiple ethnic languages is hereby acknowledged.

CHAPTER TWO

SOUTH AFRICAN SOIL EROSION IN CONTEXT

2.1 EROSION IN CONTEXT

Soil erosion is a global, natural phenomenon. Clarke (1974) contends that "the problem is as old as the earth itself". Soil erosion in the context of colonial Africa has been examined by numerous authors to date, such as Hall (1934), Anderson (1984), Beinart (1984), Grove (1987), Anderson & Grove (1987), Showers (1989), Stocking (1985) and Garland & Stocking (1995). Moreover, it is widely acknowledged that the rate of soil erosion has for decades been accelerated due to human activities (Penzhorn, 1972; Sumner, 1973; Scotney, 1978a; Scotney, 1978b; Stocking, 1985; Acocks, 1988; Lyne, 1994), in particular since World War II (Laker, 1993), although, in many cases, little empirical data is available to quantify and substantiate these claims (Showers, 1989; Watson, 1990; 1993). In both developed and developing countries, the problem of soil erosion has been variously attributed to monocropping, intensive farming, regulation of rivers, overuse of agrochemicals, and urbanisation.

In South Africa, the commonly held perception to date is that the climate and topography render its soils particularly vulnerable to erosion (Acocks, 1975; Rabie & Theron, 1983; Moon & Dardis, 1988) and these conditions are exacerbated by bad land-use practices, overgrazing and overcultivation, particularly when practised on marginal lands (Hattingh, 1979; Broderick, 1987; Scotney, 1978a; Scotney, 1978b; Cock & Koch, 1991). In addition, invasion of land with arable potential, by non-agricultural uses such as mining, industrial and urban development, infrastructure and spreading rural residential areas, has been claimed to have exacerbated the situation (Laker, 1993; Burgers & Bruwer, 1995). Since 1971 more than 221 000 hectares of agricultural land have been alienated in terms of the Subdivision of Agricultural Land Act of 1970 for urban and other non-agricultural usage (Burgers & Bruwer, 1995), and this trend is apparently persisting at a rate of some 20 000 hectares per year (Scotney & McPhee, 1990). The removal of trees for fuel by rural

peoples particularly in the former homeland areas, had unquestionably accelerated the rate of denudation and consequent erosion of much of the country's surface area (Jacks & Whyte, 1939; Ross, 1967; Cock & Koch, 1991; and Fuggle & Rabie, 1992). Bush encroachment of undesirable plant species has provided a conspicuous indication of pollution in the vegetal cover of the soil due to anthropogenic interventions (Burgers & Bruwer, 1995) and has been responsible for the loss of millions of hectares of valuable grazing throughout South Africa. (Burgers and Bruwer (1995) provide a more specific exposition of the extent of encroachment.) Scotney and Dijkhuis (1990) concluded that "trends of greatest concern [with regard to the fertility status of South African soils] are: a significant drop in organic matter content; rapidly declining nitrogen levels; increased acidification; a drop in micro-nutrient status; expanding saline and alkaline areas; and excessive phosphorus levels in certain cultivated soils".

Against this background, of the 14 million hectares suitable for cultivation in South Africa, only 3 million hectares are considered to have a high potential (South African Communication Service, 1992; Burgers & Bruwer, 1995; Garland & Stocking, 1995), and only 10-12 per cent of South Africa's surface land area is currently utilised for crop production (Cock & Koch, 1991; Huntley *et al*, 1989; Fuggle & Rabie, 1992). This amounts to an available 0,5 hectares of arable land per head of population, a figure expected to decrease to 0,2 hectares per head of population by 2020 (Verster *et al.* 1992) as conditions deteriorate through population growth. Sustainable use of these limited arable land resources is of crucial importance to the future of food production for the nation (Burgers & Bruwer, 1995). Midgely (1952) reported that annual soil losses nationally, were estimated at 363 million tonnes and this accounts for an estimated loss of 130 million m^3 of storage capacity in dams per year due to siltation (see Section 2.9 for discussion). According to Burgers and Bruwer (1995) until recently water development in South Africa has been largely earmarked for agricultural usage. However, with the rapid economic development over the past thirty years the increase in urban and industrial demand has exceeded that of the agricultural sector by 400 per cent. With a current total rate of increase in the demand for water of 7 per cent per year, should this trend continue, the total demand for water by the year 2000 could be of the order of 25 000 million m^3 per annum (Burgers & Bruwer, 1995). Currently the total usable runoff if in the region

of 38 million m^3 per year; the implications of which projected into the 21st century are self-evident.

Ross (1967) claimed that erosion had already destroyed more than 25 per cent of South Africa's soil reserves by the mid-sixties. By the 1970s, a large proportion of this valuable resource, essential for food production purposes, had been "blotted out" by expanding urbanization (Sumner, 1973; Hansard,1983). Despite this, agricultural production has increased by nearly 100 per cent between 1970 and 1990. During the same period, the net income of farmers, however, decreased due to escalating production costs (see Section 5.3.3.2), and agriculture's overall contribution to GDP declined from 12,5 per cent in 1960 to 4,8 per cent in 1990 (South African Communication Service, 1992). (Refer to Chapter 3 for further details.)

The significance of this problem is inevitably heightened against a scenario of burgeoning population growth (South Africa currently has a growth rate of 2,2 per cent (Griffiths, 1993)), rapid urbanization and a need to not only feed this population but provide housing, services and an infrastructure to accommodate such growth. By 1990 the population had increased from 16 million as it was in 1960, to 38,5 million; it is estimated that by 2020 this figure will have escalated to the region of 80 million. The key to future security remains with the country's ability to sustain its people through an adequate provision of food. In addressing the question "does South Africa need a soil conservation policy?", Garland and Stocking (1995) conclude that: if erosion makes the economy more vulnerable to drought, crop failure and environmental impacts, then a policy to manage and utilise South Africa's natural resources is clearly indicated. Their assessment of erosion in South Africa and its potential impact on the economy, reflects the urgency of conservation and hence, the critical need for policy (Garland & Stocking, 1995). The more recently legislated Abolition of Racially Based Land Measures Act No.108 of 1991 and the Restitution of Land Rights Act No.22 of 1994 also means that demand for agricultural land and land for commercial purposes will be intensified.

It is within this context, that consideration in this study is given to the efficacy of soil conservation policy and legislation, formulated in South Africa from the turn of the century to 1992. It would nonetheless be a futile exercise to describe the perceived extent of soil erosion in South Africa without first providing a scenario of the

problem in its environmental context. In this chapter therefore, relevant components of the physical environment which have traditionally been identified as contributing to soil erosion, are outlined. Sections 2.3 to 2.6 discuss the physical factors briefly, while sections 2.7 to 2.9 discuss land use, the socio-political environment and agricultural productivity and erosion perceptions in South Africa. It is first necessary to establish what is conventionally understood by the concept 'soil erosion'.

2.2 SOIL EROSION DEFINED

Textbook definitions of soil erosion concur in their conclusion that degradation will take place when disaggregating forces and the forces of removal overcome the forces of internal resistance within the soil (Moon and Dardis, 1988; Morgan, 1981; Watson, 1990). In other words, only when the rate of soil loss exceeds the rate of soil formation does soil erosion occur (Fuggle and Rabie, 1992). Such a process may be described as a natural phenonenon which can be, furthermore exacerbated anthropogenically, the impacts of which are dependent on numerous additional intervening factors and variables.

The extent and intensity of soil erosion in southern Africa, is a result of complex interactions between exogenous and endogenous factors, that is, determined primarily by the nature of the processes operating, and subsequently by the response of land systems to, *inter alia*, climatic, geomorphic, geological and anthropogenic conditions (Moon & Dardis, 1988). Soil characteristics, vegetative cover and topography are also highly significant in this process. Figure 2.1 illustrates the interaction of recognised variables in the soil erosion process (Moon & Dardis, 1988).

According to Watson (1990), the relative importance of each of these factors will vary according to "the spatial and temporal scale over which they are being considered". Hudson (cited in De Boodt & Gabriels, 1980), who researched commonly practised erosion prediction techniques, also recognised scale as an important factor in evaluating the relative impact of different variables in the soil erosion process. Climate, for example, which exerts an influence on the erosion process at the meso- and micro-levels, is predominantly influential at a macrolevel (Watson, 1990). Geology and topography are most significant at a mesocale, (or

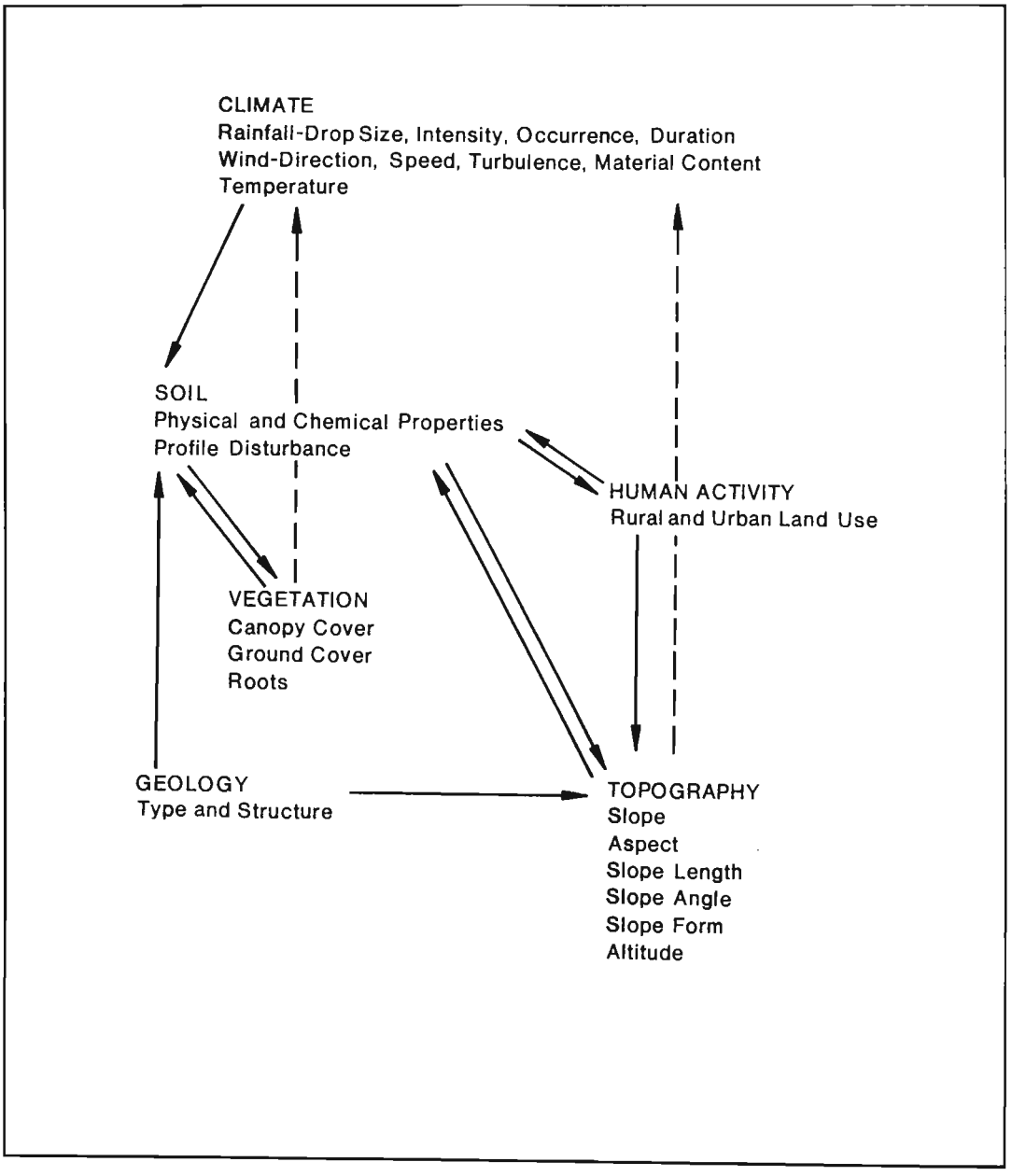


Figure 2.1 Variable interaction in the soil erosion process (Moon & Dardis, 1988).

regionally) as is vegetation, and at a microlevel landuse generally exerts the strongest influence, together with climate, soil type and seasonal variations in vegetation cover and surface roughness (Morgan, 1981; Watson, 1990). As the objective of this chapter is to outline the extent of soil erosion in the country in an attempt to place currently held perceptions of the problem in perspective, these variables will be discussed briefly as a means of describing the contemporary South African environment. Chapters 4-7 will discuss the previously unexplored human dimension of soil erosion.

2.3 THE PHYSICAL ENVIRONMENT

The geology of an area exerts controls on topography and soils, both of which are important elements in the mechanics of soil erosion on a regional scale. In this regard an appreciation of the general characteristics of South African geology and topography is necessary if soil erosion is to be placed in context. South Africa is composed largely of a core of ancient kratonic rocks, most of which formed during the Archaean and Proterozoic. Tankard *et al.* (1982) provide a comprehensive review of the geological history of South Africa and a generalised stratigraphic sequence is presented in Figure 2.2. The present surface exposure of rocks has been determined largely by denudation processes and patterns during and since the mid Jurassic. A generalised geological map of South Africa in which the distribution of surface rock types is illustrated in Figure 2.3.

Topography acts as a strong control on rainfall and erosion potential. Orographic anomalies do occur with increased rainfall in mountain regions with diminished levels recorded in valleys (Tyson, 1987). Slope parameters such as angle, length, shape, aspect and location interact to increase or decrease the efficacy of disaggregating and removal forces in the soil erosion process (Watson, 1990).

The southern African landscape, extending across an expanse of 1 228 376 km^2 is both diverse and ancient. This landscape evolved into its present state through tectonism, volcanism and geomorphical processes during the last 200 million years since the fragmentation of the former supercontinent of Gondwanaland (Moon & Dardis, 1988; South African Communication Service, 1992).

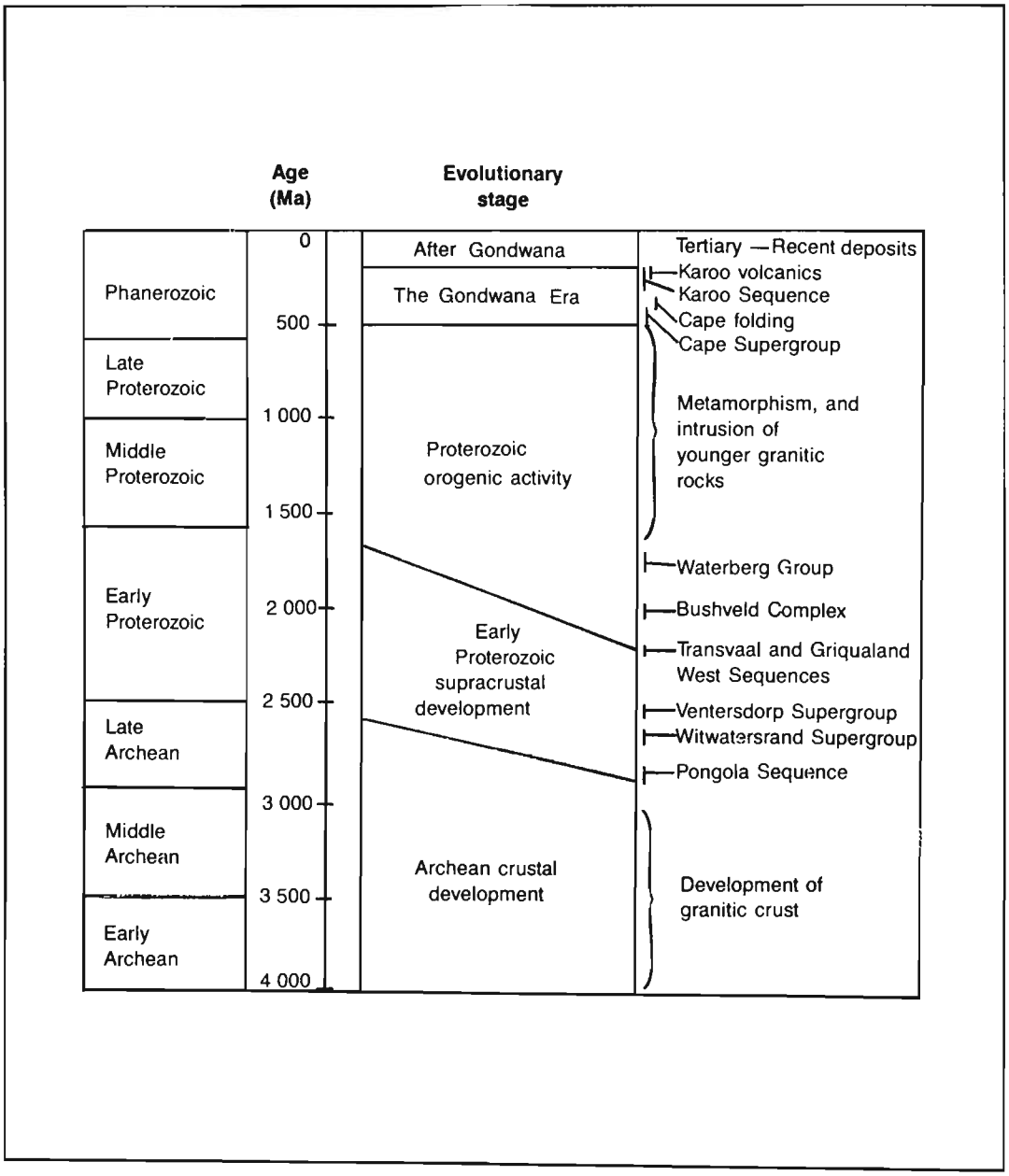


Figure 2.2 Summary of the stages in the geological development of southern Africa. (Tankard *et al.*, 1982)

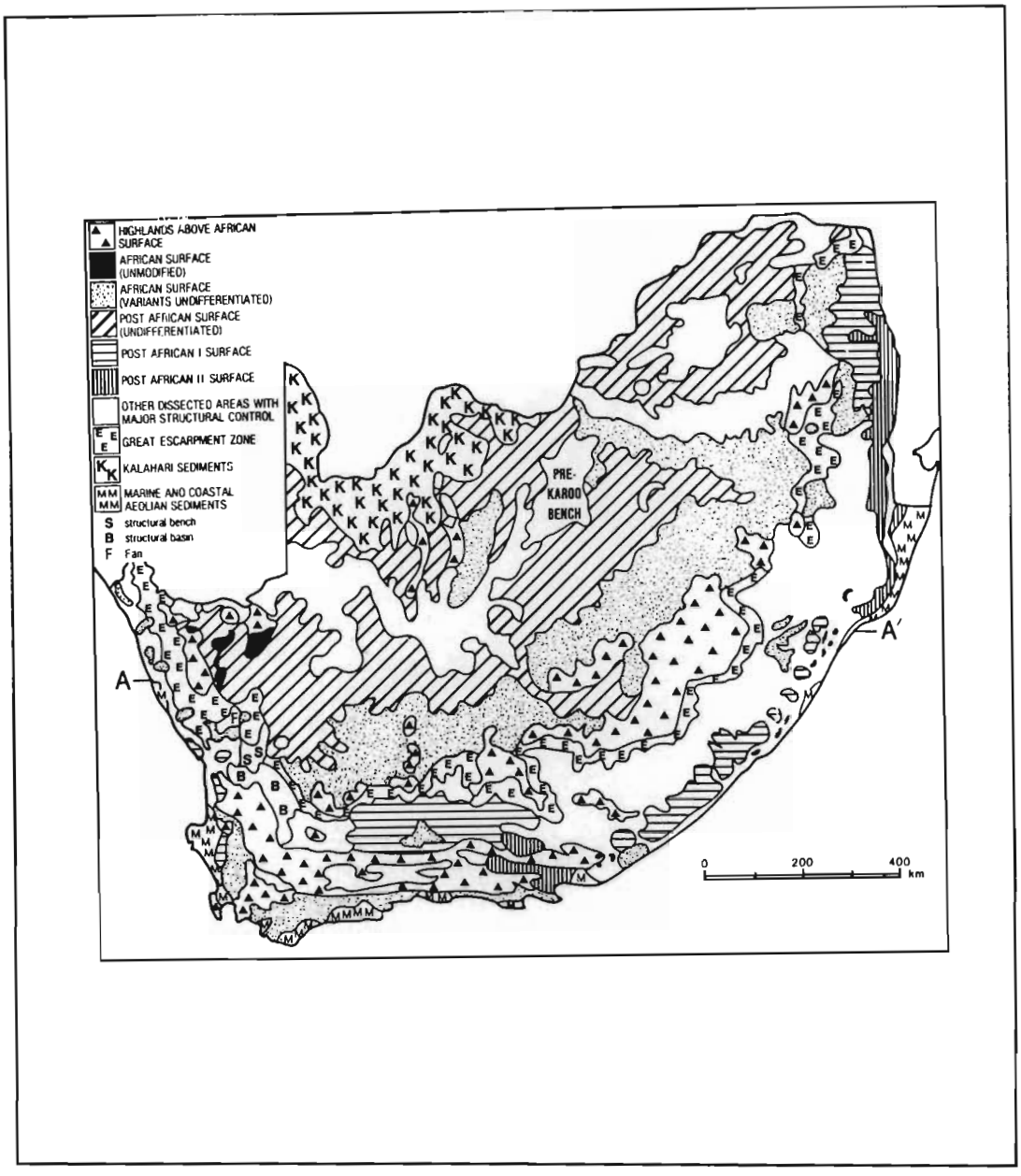


Figure 2.3 The distribution of erosion surfaces and dissected areas on the southern African subcontinent. (Partridge & Maud, 1987)

Wellington (1955) and later King (1963), divided southern Africa into several physiographic regions or geomorphic provinces (Moon & Dardis, 1988). Using LANDSAT, airphoto and other topographical data, Kruger (1983) identified thirty distinct types of terrain on the basis of relief and drainage morphology (van Zyl, 1985, in Moon & Dardis, 1988). Partridge and Maud (1987) presented a comprehensive assessment of the geomorphological evolution of the subcontinent which has been marked by several planation events separated by periods of uplift along major axes. These planation events resulted in the formation of extensive flat surfaces (peneplains) on some of which distinctive palaeosoils or duricrusts were produced. These surfaces have subsequently been dissected by fluvial incision to produce the present land surface.

2.4 CLIMATE

According to Dardis *et al.* (1988) soil erosion in southern Africa occurs in nine major soil erosion forms. In South Africa two forms predominate, sheet or rill erosion and gullying (Broderick, 1987; Watson, 1990). These processes involve the removal of surface soil particles by rainsplash and runoff. For this reason rainfall regions and their characteristic seasonality, frequency and variability will be discussed in the ensuing paragraphs. Wind erosion is also a major erosion type, particularly in the more arid western parts of south Africa. Thus rainfall and evaporation rates are relevant in the context of soil erosion.

In common with other subtropical regions, South Africa is generally dry, with highly seasonal rainfall, that varies both spatially and temporally throughout the country (Tyson, 1987). South Africa receives a mean annual rainfall of 502 mm (Tyson, 1987) and may be divided into three regions characterised by annual and semi-annual rainfall cycles, that is:

(i) the south-western Cape region, where more than 80 per cent of annual rainfall occurs in winter (April to September),

(ii) the interior northern regions, where rainfall is a summer phenomenon (October to March), and

(iii) in contrast, the southern Cape coastal belt and adjacent interior regions which exhibit a weak semi-annual cycle, receiving rainfall uniformly throughout the year (Tyson, 1987).

Extreme wet and dry cycles have occurred throughout the twentieth century and data reveal a clear spatial and temporal pattern (Figure 2.4). For the period 1910/11 to 1983/84 a singularly regular series of alternating wet and dry periods emerges from accumulated data (Tyson, 1987). Figure 2.5 illustrates the cyclical pattern of above normal and below normal rainfall recorded for South Africa over a 70 year period.

The World Resources Institute (1992) examined climatic classes and soil constraints in southern African countries. Based on its research, of the land in South Africa estimated to have no inherent soil constraints, 47 per cent is considered to be arid, 18 per cent semi-arid and 34 per cent humid (see Table 2.1). Of the total available productive land that is potentially free from the constraints of soil erosion, nearly 50 per cent is non-arable and therefore rendered unsuitable for commercial purposes.

Table 2.1 Climatic classes and soil constraints in South Africa

Total land area km:		1 221 040
- Percentage of land area*:		
Arid	55	
Semi-arid	13	
Humid	32	
Land area with no inherent soil constraints		74 483
- Land with no inherent soil constraints:		
Arid	47	
Semi-arid	18	
Humid	34	

Source: Adapted from World Resources Institute (1992)

* Land area refers to total area, excluding the area under permanent water bodies, such as rivers and lakes.

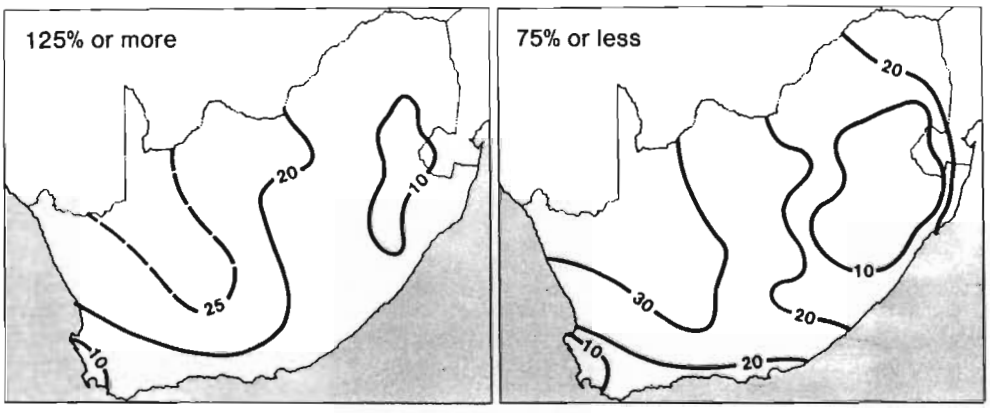


Figure 2.4 Percentage number of years equalling or exceeding 125 per cent (left) and equalling or falling below 75 per cent of normal annual rainfall (right) over the period 1910-1977 (Tyson, 1987).

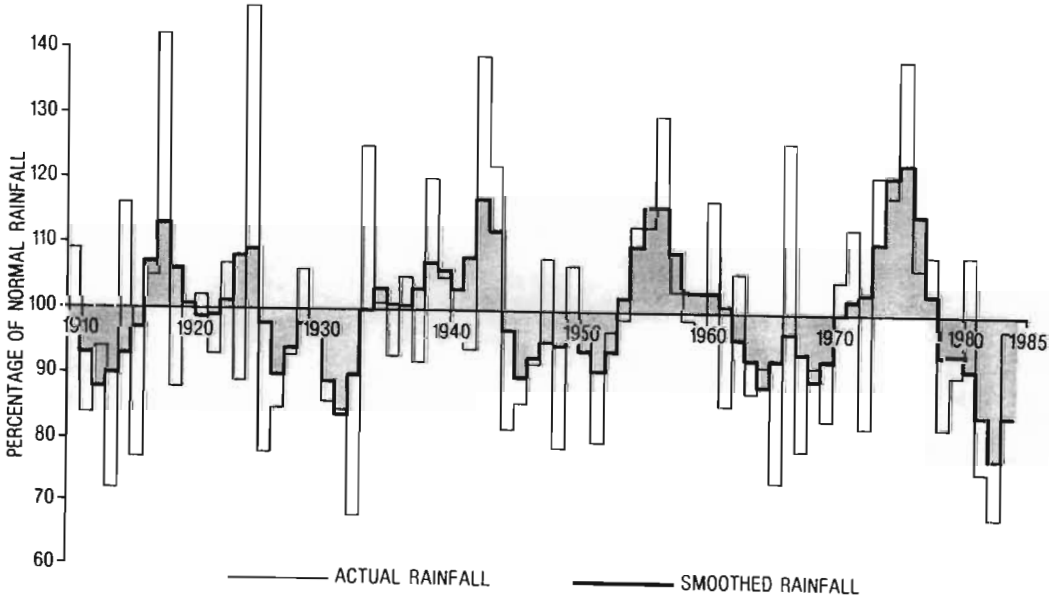


Figure 2.5 An areally-averaged rainfall series for the October-September rainfall year in the summer rainfall region for the period 1910/11 to 1983/84 (Tyson, 1987).

Arid conditions prevalent in western regions of the country are a function of precipitation and evaporation (Tyson, 1987). Loss of arable land for commercial farming has occurred due to desertification (refer to Section 2.5). Figure 2.6 illustrates the extent of Karoo encroachment and Figure 2.7 the degrees of desertification hazard estimated for southern Africa as a whole.

Note: Whilst droughts alone cannot be held responsible for the large scale contemporary desertification (see Section 2.5), they have in the past and continue to impact on the national economy of South Africa. For example, in 1969 (see Figure 2.5) when regional average rainfall figures were below normal (Tyson, 1987), drought and its related causes, contributed to a total reduction in profits of the agricultural sector of 57 per cent (Theron *et al.*, 1973). [See Section 2.9 for further discussion on the perceived extent of soil erosion and other causes of degradation.]

2.5 VEGETATION

Vegetative cover has been acknowledged as the chief determinant of soil loss and specific erosion rates in southern Africa (Stocking, 1984). Five broad categories of indigenous vegetation can be identified on the South African landscape: desert and semi-desert, Mediterranean, bushveld, forests and temperate grasslands (Bureau for Information, 1990). White (1983) defined eleven, more specific, types and these are noted in Table 2.2.

According to Acocks (1975; 1988), a total of 70 veld types, together with 75 additional variations, characterise the South African landscape and knowledge of these more localised variations is imperative in farm management. Acocks (1988) defines a 'veld type' as "a unit of vegetation whose range of variation is small enough to permit the whole of it to have the same farming potentialities". Variables such as numbers and types of grazing animals, birds, insects, light, temperature and primarily, water or precipitation, are continuously changing in the natural environment. This results in variations in the vegetation type, which ultimately determines the mode of management to be practised. Neglect of these variations has, in the past, been responsible for a great deal of erosive damage experienced throughout the country (Acocks, 1988).

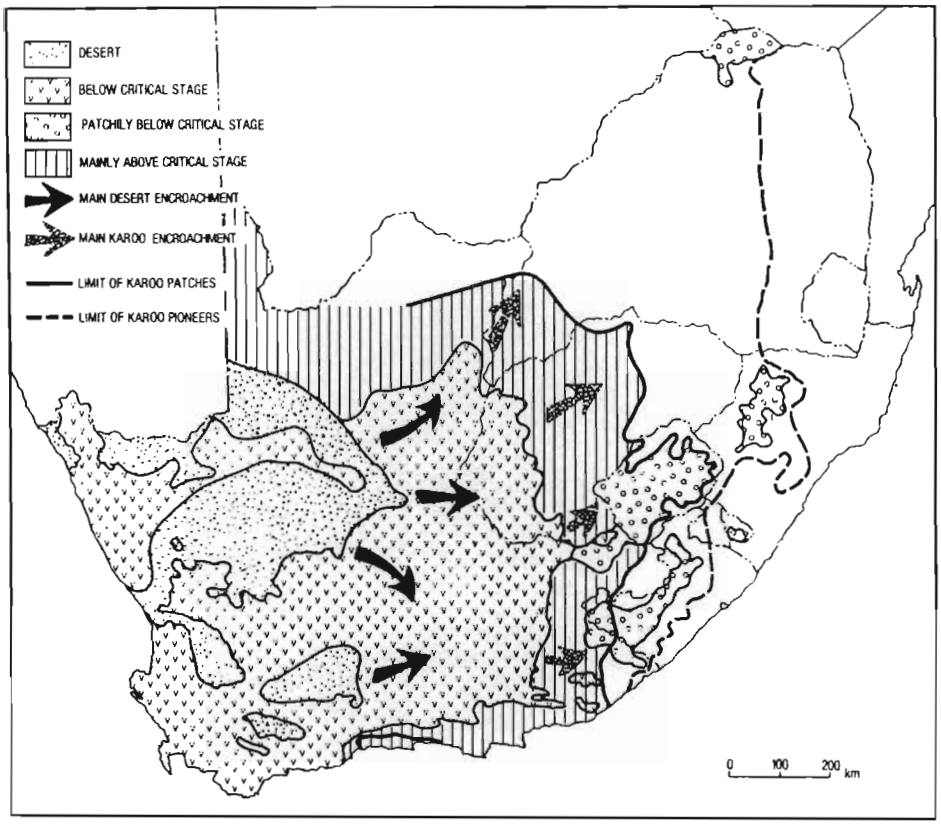
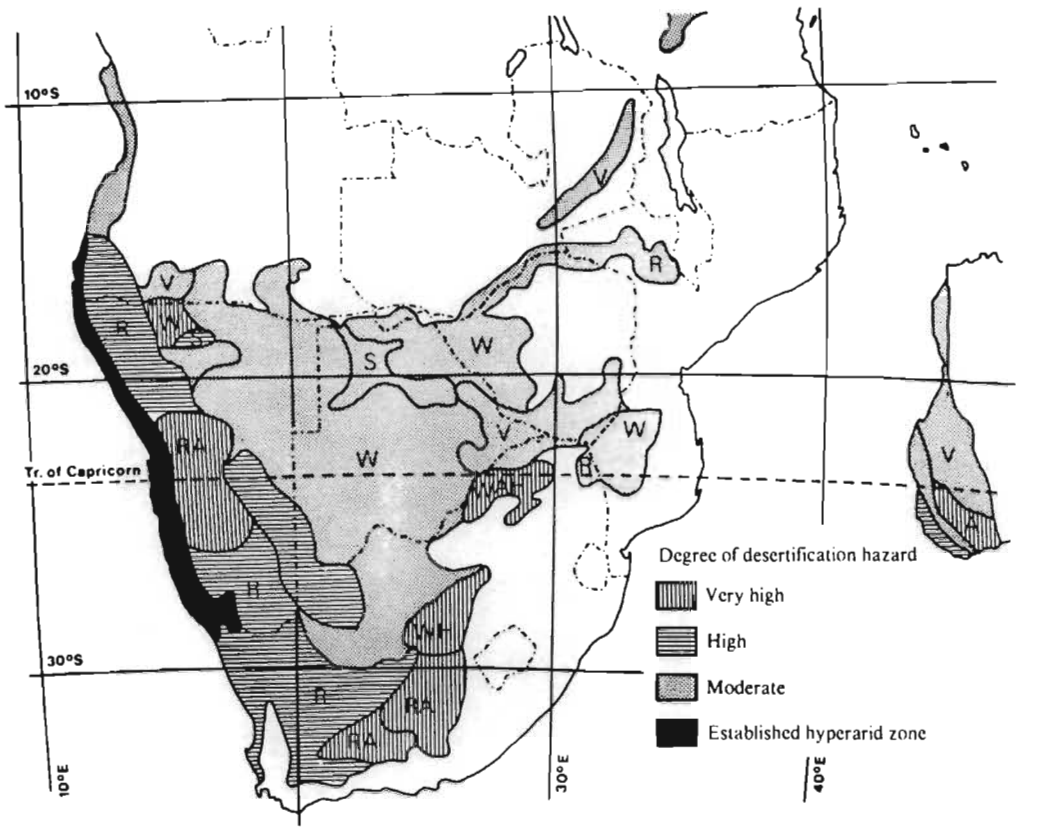


Figure 2.6 Karoo encroachment over South Africa (Tyson, 1987).



Desertification map for Southern Africa prepared for UNCOD. Desertification is here defined as 'the intensification or extension of desert conditions; it is a process leading to reduced biological activity, with consequent reduction in plant biomass, in the land's carrying capacity for livestock, in crop yields and human well-being.' Legend: W, surfaces subject to sand movement; R, stony or rocky surfaces subject to aerial stripping by deflation or sheet wash; V, alluvial or residual surfaces subject to stripping of topsoil and accelerated runoff, gully erosion on slopes and/or sheet erosion or deposition on flat lands: S, surfaces subject to salinization or alkalinization; H, subject to human pressure; A, subject to animal pressure.

Figure 2.7 Degrees of desertification hazard for southern Africa (after UNCOD, 1977, in Tyson, 1987).

The presence of vegetation on a land surface therefore is of the utmost importance as it will result in (a) the interception of raindrops by the canopy cover, and (b) the detention of runoff by basal cover. These are the direct positive effects of vegetation

Table 2.2 Major structural vegetation forms in South Africa

Category	Area km^2
Evergreen forest*	4 051
Deciduous forest	2 002
Forest-savanna mosaic	-
Moist woodland#	55 394
Arid woodland	366 437
Arid shrubland	428 472
Sclerophyll shrubland	46 393
Moist grassland	187 442
Arid grassland	129 475
Wetlands and swamps	-
Deserts	1 128

Source: Adapted from White (1983)
* Forest includes thickets
# Woodland includes savanna and wooded grassland

(Watson, 1990). Indirect effects are the result of the influence on pedogenesis, aggregation, infiltration capacity, and biological activity (Watson, 1990). Growing concern for desertification (defined as "the impoverishment of arid, semi-arid and some subhumid ecosystems by the combined impact of man's activities and drought" (Robertson, 1967; Tyson, 1987)) and Karoo encroachment (towards northern and eastern parts of South Africa) is therefore justifiable. Substantial research has been undertaken since the mid-19th century on the processes involved and reasons for this encroachment, and scientists concur that the long-term productivity of the region has been significantly reduced (Tyson, 1987; Huntley *et al.*, 1989). Bush encroachment

in the bushveld and grassveld systems has resulted in a loss of 3 million hectares of bushveld rendered unproductive for commercial or grazing purposes (Huntley *et al.*, 1989). The carrying capacity of an additional 14 million hectares of savanna grasslands is steadily being reduced due to bush encroachment (Huntley *et al.*, 1989). The condition of a further 60 per cent of available grassland is such that it is expected it will be unable to meet sustained production requirements (Huntley *et al.*, 1989).

The spread of invasive exotic plants, which is increasing (Huntley *et al.*, 1989) has resulted in the loss of much of the country's natural veld. They pose a serious threat to the production potential of land (Presidents Council, 1984) and income from agricultural profits has been required to combat their spread. According to Huntley *et al.* (1989), a reduction in the capital value of the country's agricultural sector by an amount exceeding billions of rands has resulted.

2.6 SOIL GROUPS AND SOIL TYPES IN SOUTH AFRICA

Stocking (1984) estimated that African weathering rates produce new soil at rates up to 100 tonnes per km^2 per year, however, the physical nature of soils is an important determinant of their erosivity and conservation importance. It is therefore necessary to provide a review of the different types of soil in South Africa. The physical nature of the soils of South Africa has been the subject of several studies, concerned mainly with their classification (Beater & Maud, 1960; Nuttonson, 1961; Van der Eyk *et al.*, 1969; Beater, 1970). Nuttonson (1961) noted the important role of underlying geology in determining the nature of South African soils in comparison to climatic factors which assume a subordinate role.

South African soils vary in composition from gravelly coarse sands to heavy clays, and in mineral content which results in a broad range of levels of potential agricultural productivity (Nuttonson, 1961). Details of these variations are provided in the references cited above, to which the reader is referred for further information. Nuttonson (1961) identified ten distinct soil zones in South Africa, whose spatial distribution is shown in Figure 2.8.

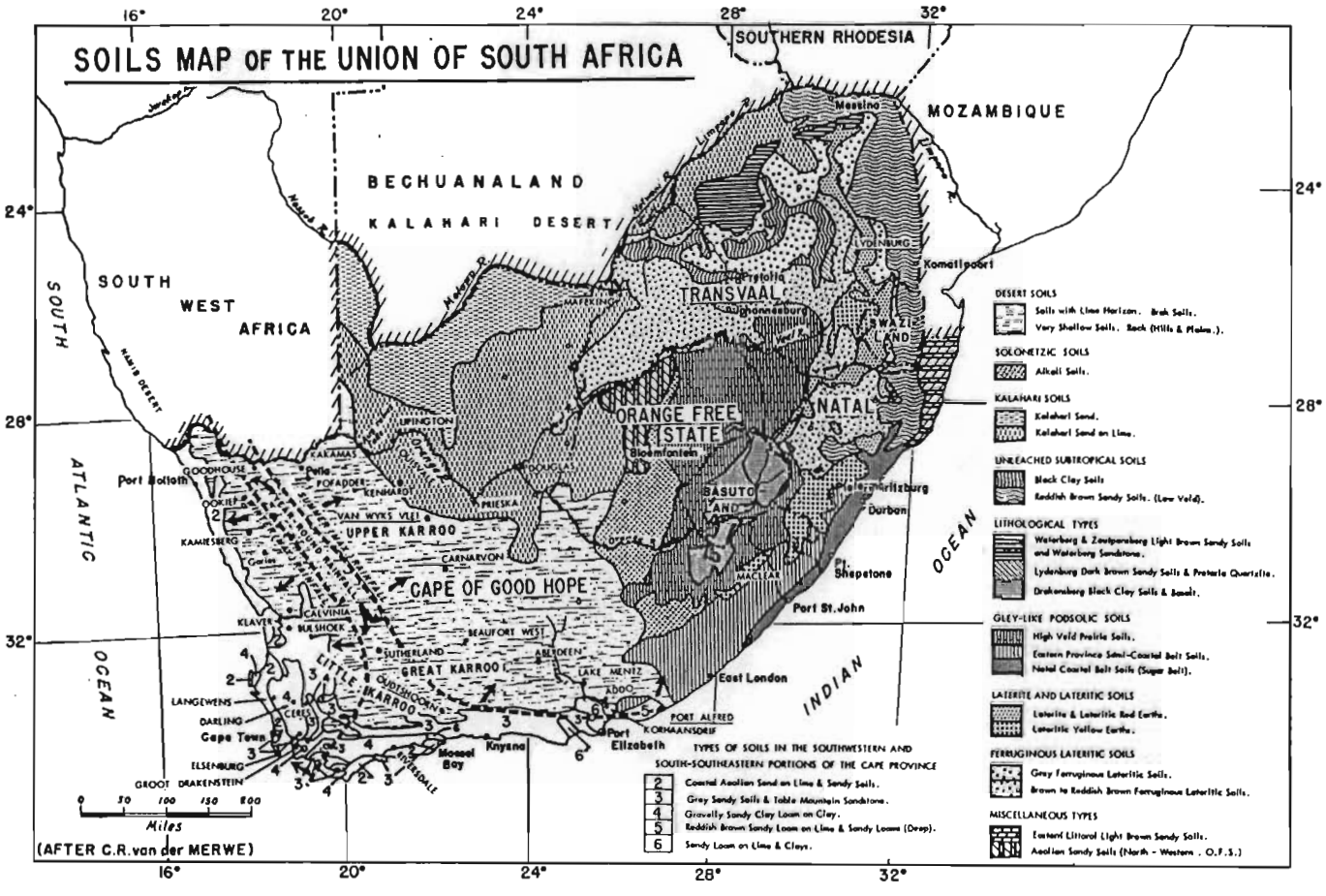


Figure 2.8 Soils map of the Union of South Africa (after C.R. van der Merwe, in Nuttonson, 1961).

2.7 LAND USE (HUMAN ACTIVITIES)

Soil systems in the southern African region are considered to be in a state of dynamic equilibrium (Stocking, 1978; Moon & Dardis, 1988). Extrinsic variables such as anthropogenic use of the land, often act as catalysts, in forcing readjustment towards a new state of balance (Moon & Dardis, 1988). A period of readjustment may, for example, be characterised by a period of intense soil erosion, which will persist until an equilibrium state is reestablished (Schumm, 1973, cited in Moon & Dardis, 1988). For example, on non-agricultural land, activities such as deforestation, mining and earth removal operations, urban development and extension of communication networks (Watson, 1990) may cause soil, canopy and basal vegetation losses. Although soil erosion is a natural phenomenon poor landuse practices on agricultural land and mismanagement of resources, have in some instances been responsible for accelerated soil losses (Watson, 1990).

Figure 2.9 outlines the land-use potential of South Africa according to Huntley *et al.* (1989). Of South Africa's surface land area of 122 million hectares (S A Foundation, 1992), 101 million hectares are farmland. Of this total, only 16,6 million hectares (12-12,5%) is considered arable and is cultivated (Huntley *et al.,* 1989; South Africa Foundation, 1992). The 83,4 million hectares of nonarable land remaining is used primarily for grazing. The Department of Environment Affairs in its report to the United Nations Conference on Environment and Development, in 1992, provided a detailed breakdown of the estimated extent of current cultivation in the agricultural regions of South Africa in 1987 (Table 2.3). The former distribution of land between 'white' South Africa and the "black' homelands is summarized in Table 2.4, and Table 2.5 provides specific information pertaining to these two areas. Population densities in the former homelands, former national states and former 'White' South Africa are presented in Table 2.6

Table 2.7 provides a breakdown of nationally protected areas in South Africa, according to the World Resources Institute (1992), established as a result of provisions in recently enacted legislation.

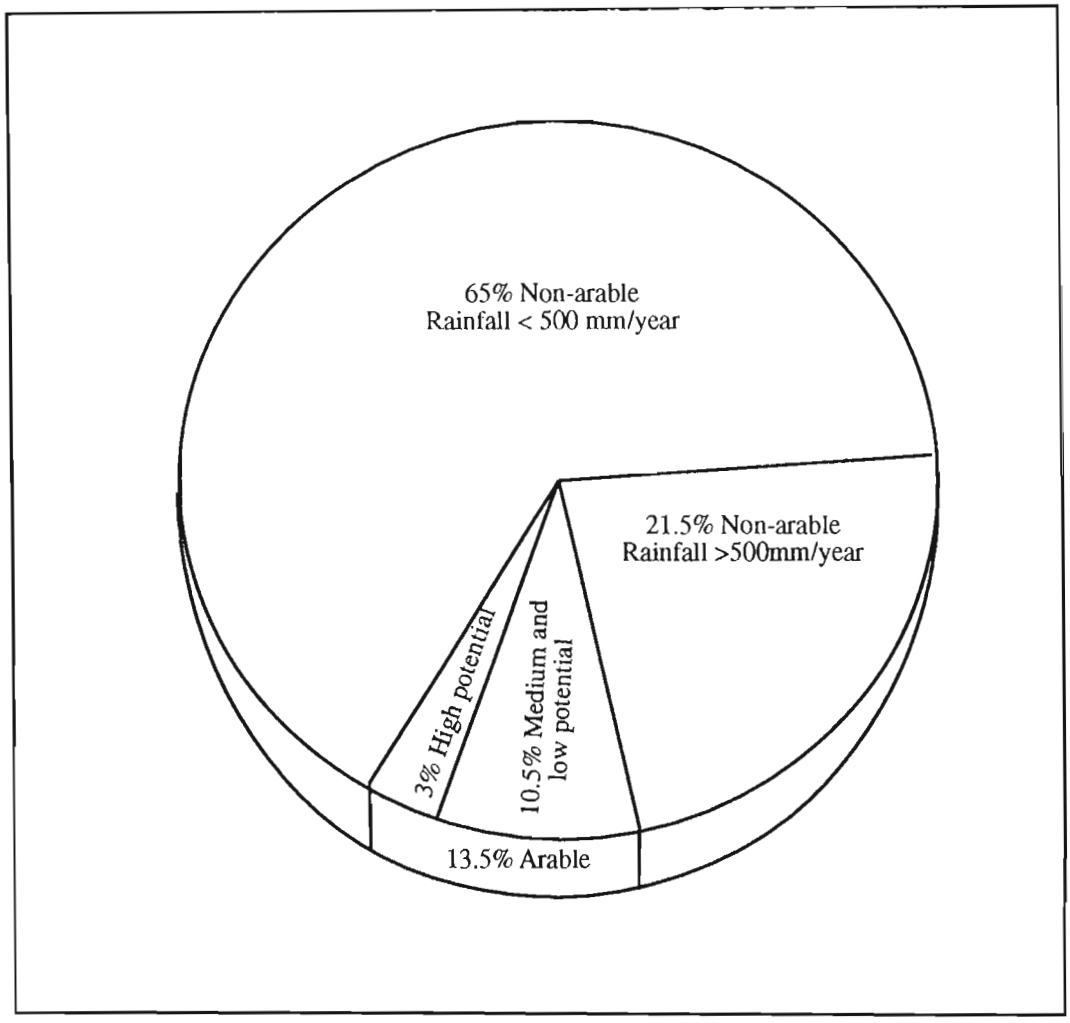


Figure 2.9 Land-use potential of South Africa (Huntley *et al.*, 1989).

Table 2.3 Cultivation in the agricultural regions of South Africa (1987)

Agricultural regions	Total area (km2)	Area of current cultivation (km2)	Cultivation as % of total
Transvaal	152 490	22 020	14,44
Natal	58 321	9335	16,01
Highveld	115 859	56 782	49,01
Free State	204 823	16 836	8,22
Winter rainfall	138 000	18 000	13,04
Eastern Cape	54 000	4 264	7,89
Karoo	290 600	1920	0,66
Gazankulu	6 790	630	9,28
KaNgwane	3 850	470	12,21
KwaNdebele	3 140	905	28,82
KwaZulu	31 750	3 830	12,06
Lebowa	22 120	3 330	15,05
QwaQwa	620	60	9,68

Source: Department of Environment Affairs, 1992.

Table 2.4 Division of land in South Africa

Republic of South Africa (as a whole) =		1 228 376 km^2
Transkei	41 000 km^2	
Bophuthatswana	44 000 km^2	
Venda	7 176 km^2	
Ciskei	9 000 km^2	
Republic of South Africa (excluding TBCV states but including self-governing territories) =		1 127 200 km^2

Source: Data from South Africa Foundation, 1992

Table 2.5 Former distribution of land in South Africa

	'Whites'	Homelands
Land held (percentage)	87	13
Land held (million ha)	85,4	15,1
Proportion arable (m ha)	14,3	2,3*
No. of farmers	50 000	700 000
Ha per farmer	1 700	22
Agricultural output (%)	94	6

Source:Data from Huntley *et al.* (1989)

Note: The ratio of total aid to white versus black agriculture was:

197:1 (1910 - 1936)

14:1 (1950s)

2:1 (1980s)

* The figure quoted by different authors for the proportion of agricultural land per family in the homelands ranges from a maximum of 2,3 ha (Huntley *et al.*, 1989) or 1,9 ha (Marais, 1988) to a minimum of 0,2 ha (Marais, 1988) or an average of 1 ha (as in QwaQwa) (Coetzee, Thompson, 1987, cited in Marais 1988).

Table 2.6 Population densities: Former independent states; National states; and 'White' South Africa, 1980 (km^2)

Independent States:	
Bophuthatswana	37
Ciskei	73
Transkei	73
Venda	67
Average:	57 per km^2
National States:	
Gazankulu	76
KaNgwane	77
KwaNdebele	303
KwaZulu	109
Lebowa	81
Qwaqwa	327
Average:	98 per km^2
Rest of South Africa (excluding above areas):	
Cape Province	8
Natal	48
Transvaal	36
Orange Free State	15
Average	17 per km^2

Source: Presidents Council Report, 1984.

Table 2.7 Area of nationally protected areas in South Africa

Category	x1000 ha
Totally protected areas*	3 094
Partially protected areas#	3 215
National land area protected	5.2 per cent

Source: Adapted from World Resources Institute (1992)

Note: * IUCN categories I-III include scientific and strict nature reserves, national and provincial parks, and natural monuments and landmarks.

\# IUCN categories IV, V are managed nature reserves, wildlife sanctuaries and protected landscapes.

2.8 SOCIO-POLITICAL ENVIRONMENT

Of particular importance to the socio-political environment in South Africa is the fact that South African politics was characterised by a lack of other than white participation in the formal political process. A brief, chronological account of the dynamics within the socio-political environment in South Africa from the turn of the century to 1992 will now be outlined highlighting particular developments which have shaped the environment as represented in 1992.

On 31 May 1910, the four colonies of the Cape, Natal, Orange River and Transvaal became known as the Union of South Africa. At this time, the subject of land for Africans, was already an established and major political issue (Griffiths, 1993) (see sections 3.10 and 5.4). In 1913, a total of 9,1 million hectares was scheduled under The Natives' Land Act, as 'reserves' for the exclusive occupation of this sector of the population (Hattingh, 1979). This Act stated that no land, outside the scheduled areas could be acquired by Africans (an area comprising 7,3 per cent of the total area of the Union), who constituted 67,3 per cent of the total population of the country at that time. Despite the proposals of the Beaumont Commission in 1916, established

to investigate the distribution of land in the Union, no additional land was released until 1936, when in terms of the Native Trust and Land Act No.18 (some texts refer to The Development (Bantu) Trust and Land Act), a further 6,2 million hectares was made available for African occupation (Hattingh, 1979; Griffiths, 1993). According to Griffiths (1993), this quota of land was never fully released (see Figure 2.10).

In 1948 the National Party (NP) was voted into power and Dr D.F. Malan, became the first Nationalist Prime Minister. A general election in 1953 realised an increased majority for the National Party and saw the promulgation of the Bantu (Black) Authorities Act No.68, which provided for the establishment of regional authorities in the reserves, with limited autonomy in decision making (see Section 3.10 for details). In 1954, Dr Malan resigned as Prime Minister and was replaced by J.G. Strijdom, H.F. Verwoerd articulated his vision of 'Grand Apartheid' and 'total separation of white and black', and The Native Resettlement Act was passed in parliament (Griffiths, 1993). The Tomlinson Commission report on 'independent African homelands' was published in 1956. H.F. Verwoerd became the country's Prime Minister in 1958 and the issue of homeland 'independence' was mooted and the Bantu Self-Government Bill was tabled in parliament. In 1960 after a referendum, South Africa was declared a Republic and withdrew from the British Commonwealth on 31 May 1961. After the assassination of Verwoerd in 1966, the National Party, under B.J. Vorster, won the general election with an increased majority. The Betterment Areas Proclamation R196 of 1967 (see Section 3.10), empowered the Bantu Affairs Commissioner of a given area with the authority to reclaim and expropriate land where considered necessary for the prevention of soil erosion. This legislative provision was the forerunner to the government's policy of forced removals which was to dominate the 1970s.

In 1970, the Bantu Homelands Citizenship Act was passed which provided 'homeland' citizenship to all Africans in the country, as was the Self-Governing Territories Constitution Act No.21 (of 1971) (see Section 3.10). The 1970s were characterised by civil unrest, with a policy of forced removals being implemented in earnest in 1973 (Griffiths, 1993). In 1978 P.W. Botha became leader of the National Party and Prime Minister. A general election in 1980 saw a massive swing to the right and the establishment of the President's Council. The proposition of a Tricameral parliament was mooted for the first time, and ultimately came into being in

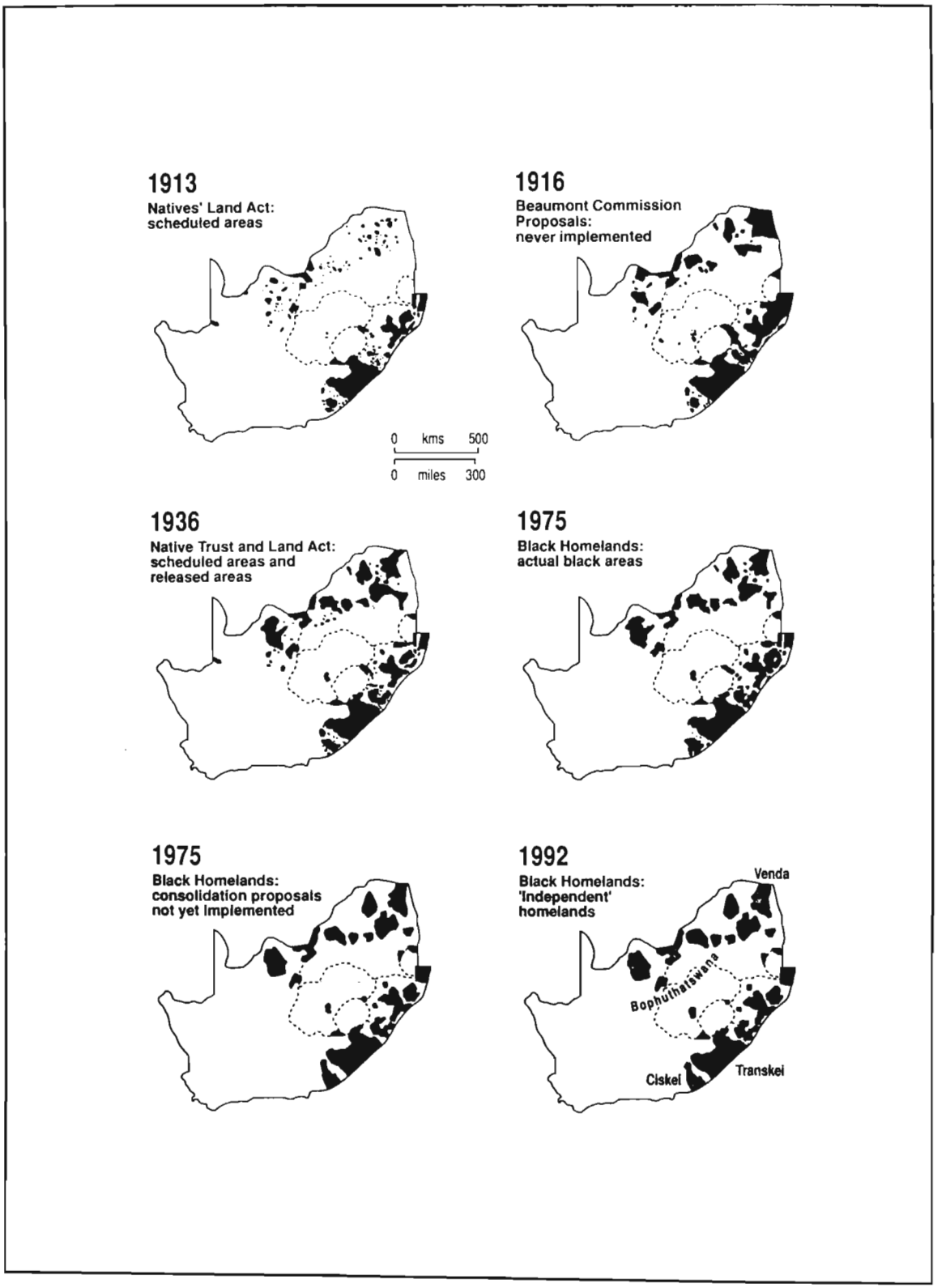


Figure 2.10 Distribution of land for Africans (Griffiths, 1993).

1984. P.W. Botha became Executive State President at this time and civil unrest in the country peaked (Daily News, 1991).

The year 1985 is significant in South African history, in that it is seen as having ushered in a new era in South African politics, with the repeal of the 1949 Prohibition of Mixed Marriages Act and parts of the 1957 Immorality Act (Daily News, 1991). These acts are significant in the context of this study in that they heralded the beginning of the end of the 'apartheid era' in South Africa, a suspension of the forced removals programme and a promise of political representation for all Africans (Daily News, 1991). 1987 saw the return of the National Party in a general election, with the Conservative Party as official opposition, and again in 1989 (when FW de Klerk was inaugurated as State President).

From 1990 the pace of socio-political reform was accelerated at an unprecedented rate and changes since the 2 February 1990 speech at the opening of parliament by the former State President, F.W. de Klerk, (refer to Section 1.4 for more detail), have ushered in, not only a new era in South African politics, but also a new dispensation with regard to the utilisation and subsequent interaction with the environment. The Abolition of Racially Based Land Measures Act No.108 of 1991 provided for the repeal of previous racially discriminatory laws pertaining to urban and rural land use, and the White Paper on Land Reform, tabled in parliament on March 1991 stipulated the necessity for land tenure reform in South Africa. The implications of these land reform measures for the future promotion of soil conservation, are far-reaching, especially in the context of financial constraints and other socio-economic priorities.

2.9 AGRICULTURAL PRODUCTIVITY AND SOIL EROSION PERCEPTIONS

South Africa claims to be the only country in Africa that exports food (Hansard, February 1981, col.2514), and one of six countries in the world whose total food exports exceed imports (Hansard, August 1981, col.1284; Bureau for Information, 1990). Exports of agricultural products increased from R447 million in 1950 to R5, 652 million in 1980 (Hansard, April 1983, col.4811; Bureau for Information, 1990), and according to the South African Communication Service (1992) agricultural production has increased nearly 200 per cent over the past 20 years. The principal

export is maize; others include sugar, fresh and processed fruit, canned meat, baby foods, powdered milk, eggs, maize products, various flours (Bureau for Information, 1990; South Africa Foundation, 1992; Department of Agricultural Development, 1992a), wool (South African Communication Service, 1992) and since 1985 forestry products including sawn timber, rayon pulp, newsprint, other pulp and paper products, pulpwood chips and wattle tanning extract (Official Yearbook of South Africa, 1991-2). By 1994, South Africa produced more than 40 per cent of the marketable agricultural products of Africa (Hansard, 1994, col.2605-2606), representing an increase of 12,2 per cent in the volume of agricultural production for the year 1994-95. This increase has been ascribed to the "opening up" of new world and African markets, confirming South Africa as the only nett exporter of agricultural products in Africa.

Despite periodic droughts during the 1980s which have prevailed throughout the early 1990s also (Department of Agricultural Development, 1991; 1992a), South Africa has sustained the capacity to produce surpluses of a number of major agricultural commodities (Van Zyl *et al.*, 1993). Table 2.8 provides details concerning imports, exports, production and consumption figures, as well as a self-sufficiency index for each of these major commodities. It should be noted that for the period 1985 to 1992, South Africa was self-sufficient in all of the five most important staples (wheat, maize, potatoes, vegetables and sugar).

Despite the apparent growth, success and self-sufficiency in agricultural production, agricultural contribution to gross domestic product (GDP) has declined from R615 million (or 12 per cent) in 1960, to 4,8 per cent in 1990, and the number of farms has decreased from 120 000 to 72 000 in approximately 30 years, that is up to 1981, according to the report of the Jacobs Committee (Hansard 1981, col.2512-2514) and further to 60 000 by 1988 (Van Zyl *et al*, 1993). This decrease constitutes a reduction in the overall labour force of 28 per cent (Hansard 1981, col.3655). Production costs have increased considerably over the past decades, inputs such as fuel, fertilisers, sprays and maintenance have increased in cost by an estimated 11,6 per cent. Table 2.9 reflects the increased prices of farming requisites for the years 1984 to 1993. The result is a net reduction in farmer income from R6 700 million in 1989 to R5 400 million in 1990 (South African Communication Service, 1992).

Table 2.8 Average annual production and consumption of selected agricultural commodities in South Africa, 1985-92 (1 000 ton)

Commodity	Imports	Exports	Production	Consumption Total*	Human#	SSI+
Wheat	94	449	2 612	2 262	2 119	115,5
Maize (white & yellow)	484	1 689	7 422	6 127	2 615	121,1
Potatoes	5	8	1 042	1 039	872	100,3
Vegetables	4	27	1 739	1 717	1 545	101,3
Sugar	63	863	2 044	1 258	1 258	162,5
Beef	81	16	579	644	639	89,9
Mutton, goat's meat & lamb	14	1	182	195	193	93,3
Pork	1	2	110	109	108	100,9
Chicken	3	0	521	524	519	99,4
Eggs	0	3	181	178	169	101,7
Deciduous & subtrop. fruit	0	466	1 366	897	808	152,3
Dairy products	35	58	2 344	2 321	2 321	101,0
Sunflower seed oil	14	1	84	96	85	87,5
Citrus fruits - fresh and processed	0	426	706	278	278	254,0

Source: Food balance sheets of the Directorate of Agricultural Economic Trends of the Department of Agriculture (as processed) (after Van Zyl *et al.*, 1993).

* Available for use: opening stock + production - closing stock + imports = exports

\# Net human consumption: available for use - other uses - losses, and further adjusted for extraction rate

\+ SSI (self-sufficiency index): (Total production / Total consumption) x 100

Table 2.9 Price indices of farming requisites, 1984-1993

Year: 1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Item:										
All requisites	43	51	60	66	75	89	100	112	119	130
Machinery & implements	34	42	54	64	74	90	100	109	115	130
Fixed improvements	40	47	58	66	75	87	100	110	116	125
Short-term requisites	47	55	64	67	75	90	100	113	120	131
Fertiliser	41	55	63	63	78	93	100	110	109	118
Fuel	51	64	69	62	67	88	100	122	133	146
Stock feed	56	60	67	73	78	90	100	111	121	134
Packing material	41	44	56	65	77	87	100	106	111	123
Tractors	34	43	56	63	72	90	100	111	117	127
Implements	36	44	56	67	75	88	100	108	112	129

Note: Base 1990 = 100.

Source: Adapted from Department of Agriculture, Annual Report, 1 April 1993 to 31 March 1994 (1994), p.80.

The perceived balance being maintained in the agricultural sector, and the marked increase in productivity and apparent efficiency, is questionable given that the profitability of farming has declined steadily in recent years (Hansard, 1983, col.7985). The worsening debt situation of farmers was reportedly reaching crisis dimensions back in the 1980s (Hansard, 1983, col.7982-84), a situation which has steadily degenerated to the extent that in 1993 the government made a decision to make available to farmers an input subsidy of R375/ha to a total amount of R2 400 million (Department of Agriculture, 1994). This step was reportedly necessary to

prevent the closure of many farms. (Refer to Section 5.3.3.2 for further discussion of the agricultural debt crisis which forces the question as to whether or not farmers can actually afford conservation (Hansard, 1983, col.7982-84), a situation it is argued, could significantly influence conservation compliance.)

The current rate of soil loss in South Africa is estimated to be more than 30 times the rate of soil formation (Huntley *et al.*, 1989) or 10 tonnes per capita annually (Roberts, 1993), (that is in terms of what Le Roux (1990) defines as 'absolute rate of erosion' or 'denudation'). Le Roux (1990), makes this distinction and maintains that the relative rate of erosion is what is most significant to agriculture, and estimates this to be "at least twice to three times or more", the rate of soil formation or replacement by weathering. It is the belief of Huntley *et al.* (1989) that as a consequence of "over a century of careless environmental management", had the country a "healthy, resilient complex of soils, vegetation and animal life" the damage sustained by recurring natural disasters could have been averted.

Huntley *et al.* (1989) refer to the 1980s as "the decade the environment hit back" and further assert that even compared to conditions of the 1930s, never before in the history of South Africa has such environmental degradation (rural and urban) taken place. Table 2.10 outlines a number of notable natural disasters which occurred nationwide from 1981 to 1988 and have had an irreversibly negative impact on soil resources. Furthermore, the results of an extensive and longitudinal research project undertaken by Acocks (1975) suggest that if veld deterioration continues unabated South Africa will be largely desert and desertlike by the year 2050. By way of qualifying this claim, Roux (1990) points out that Acocks' predictions were based principally on prevailing conditions before and during the 1940s, at a time when the extent of vegetal cover was relatively sparse, in arid regions of the country and soil erosion rates were high. This qualification merely places in perspective the pessimism of Acocks, it does not negate the extent to which vegetation in the country has undergone and continues to undergo considerable deterioration (see Tidmarsh, 1948; Acocks, 1988; and Roux, 1990).

Table 2.10 Natural Disasters in South Africa in the 1980s

1981	Laingsburg flood
1981	Drought relief (R180 m)
1982	Hail damage to crops (R68 m)
1983	Drop in maize production from 14 m to 4 m tonnes
1984	Demoina floods, R210 m damage
1986	Windstorm damage, Eastern Transvaal, R65 m
1986	Hail damage to crops, R98 m
1986	Sandstorms, Eastern Cape
1986	Locust swarms, R40 m control costs
1987	Natal floods, R1,100 m damage
1988	Floods, Cape/Orange Free State R600 m damage
1988	Veld fires, Western Cape, 150 000 ha burnt
1988	Drought relief, R396 m

Source: Huntley *et al.* (1989)

Many studies indicate a reduction in the amount of topsoil and accumulated sediments being removed from major catchments and lost to sea, revealing greatest losses to have occurred in the early 1900s (Huntley *et al.*, 1989). In 1952 (as indicated in Chapter 1), Midgely (1952) calculated that soil was being washed away by rivers at a rate of 363 million tonnes annually. However, Schwartz and Pullen (1966) reported that the total annual sediment production in South Africa was in the region of 233 million tonnes. [Note: by way of illustrating how information can be portrayed and potentially give rise to misinformation, a number of texts referred to in the course of this research reported on losses of topsoil to be in the region of, for example, 500 million tonnes (Van Rensburg, 1992) and 400 million tonnes by Huntley *et al* (1989)]. Moreover, Rooseboom and Maas (1974), after conducting research on sediment delivery in the Orange, Tugela and Pongola rivers, concluded that sediment losses had decreased in certain instances by more than 50 per cent over a 30 year period from the 1930s to 1960s, and Alexander, in his study on rainfall, run-off and sediment production in the catchment regions of the Great Fish and Sunday's River, reported a decrease in run-off per unit rainfall and sediment per unit, which was confirmed by a steady increase in the extent of vegetal cover since 1950 (Adler, 1981). Be that as it may, scientists are at pains to point out that this is not an

indication that soil erosion is now under control and that current land use practices have resulted in conservation practice. This perceived reduction in the rate of soil loss, has been attributed to dam construction and a progressive change in available material, rather than changes in land use (Downing, 1978). [Note: South Africa has a total of 450 dams, excluding farm dams (South Africa Foundation, 1992)]. For example, whilst annual soil losses from the Orange River catchment area were reduced to 35 million tonnes in 1935 from 120 million tonnes in 1920, this was due to the construction of two extensive storage dams, H F Verwoerd and P K le Roux dams. Actual rates of soil loss from individual farms have virtually remained static (Huntley *et al.,* 1989). Rooseboom (1976) believes that this reduction is a consequence of the fact that the topsoil in the Orange catchment had already been so depleted that little remained as a potential source of sediment, and improved conservation practices were not significantly influential in effecting this change. In substantiating the need for more extensive research on erosion rates, Le Roux (1990) asserts that it is not the absolute rate of erosion (or denudation) that should be important to the future of agriculture, but the relative rate, that is, the difference between rate of soil formation (weathering) and the rate of denudation. The results of a study undertaken by Le Roux (1990) to examine the spatial variations in the rate of fluvial erosion (sediment production) over South Africa, using data supplied by the Department of Water Affairs, on the rate of sedimentation in 87 major storage dams in the country (each with sedimentation records exceeding 15 years), indicate that the rate of erosion is at least twice to three times or more the rate of replacement by weathering. Huntley *et al.* (1989) claim that from the turn of the century until the 1940s, soil erosion in the former province of Natal was very much on the increase but that such conditions have been reversed since this time. [It must be said, that despite such an important statement, by these authors neither references, nor other means of substantiating these claims are provided.] It is possible that dam construction was an influential factor in reducing rates of soil loss in this region.

The perception that soil erosion is at its worst in the former homelands (President's Council, 1984) was investigated by Weaver (1988). The results of his study of erosion and land use changes in the South African and Ciskeian portions of the Yellowwoods Drainage Basin, confirm this perception in that the South African portion of the catchment reflected a greater decrease in uneroded land than the Ciskeian portion, the Ciskeian portion showed a relatively greater increase in severely

eroded land. Ross (1967) refutes such a perception, however, and asserts that some of the most badly degraded areas are on white farmland. Garland and Broderick (1992) in their study of erosion in the Tugela catchment, found that the extent of eroded land in former KwaZulu was less than that in former Natal (although the measured difference was not statistically significant) [See Table 2.11 which indicates a reduction in the percentage of eroded land on most land types in Natal and KwaZulu.]. Nonetheless, from a review of available scientific literature Watson (1990) found, a general consensus has been established that soil erosion rates prevalent on communal peasant lands are greater than those on commercial farmland or land under conservation management. These are the areas reportedly most heavily overgrazed to the limits of their carrying capacity and only in times of drought are the consequences of this overgrazing most severely realised, and population pressures exacerbate this already vulnerable situation (Hansard, 1983, col.4835-38). Writing in the context of KwaZulu, Anon (1980, cited by Weaver, 1988) reported that "overgrazing in the black homelands, where some 33 per cent of the country's population occupy 12 per cent of the land area, has severely reduced the agricultural land conservation value of large areas". The absence of alternative sources of energy, necessitates the use of woody plants, shrubs, trees and manure as fuel sources and inevitably the rate of utilisation exceeds the rate of regeneration. This was confirmed in the report of the President's Council Science Committee, yet this is a concern repeatedly expressed to the government which has failed to satisfactorily address (Hansard, 1983, col.4835-38). "While the major responsibility for the deterioration of the natural soil resources in South Africa must be placed on ineffective government policy, the real cause is the lack of appreciation of conservation principles by most of the country's 77 000 white farmers, who control 71 per cent of the nations land" (Anon, 1980; in Weaver, 1988). Such an opinion therefore places the burden squarely on the white, largely commercial farming community and not on those landusers occupying predominantly communal lands.

Table 2.11 Percentage of eroded land in former Natal and former KwaZulu: comparing 1944/45 and 1976-81 estimates.

	Eroded Area (%)		
	1944/45	1976-81	Extent of erosion
All data	2,1	0,9	decrease*
KwaZulu	2,1	0,8	decrease*
Natal	2,1	1,0	decrease*
Veld	2,7	2,8	increase
Commercial	5,7	1,5	decrease*
Subsistence	6,9	4,2	decrease@
Forestry	0,0	0,0	-

Source: Garland and Broderick, 1992

Notes: * significant at: p = 0,001

@ significant at: p = 0,1

Showers (1989), in her study of soil erosion in Lesotho between 1830 and 1950 proposes that possibly the greatest disturbance of soil cover and channeling of previously unchanneled water resulted from the introduction of roads on the landscape from as early as 1880. She further claims that by the turn of the century, main roads were neither drained, nor did they have gravel surfaces, and most roads were not laid out on the contour, therefore rendering them very susceptible to erosion, and she supports this contention with reference to the perceptible lack of planning, engineering or maintenance involved in the initial preparation of roads. Watson (1990; 1993) drew a similar conclusion in her consideration of the perception that erosion was at its worst in KwaZulu-Natal. She too explains that much of the conspicuous erosion in these areas is to be found next to roads and tracks and could therefore account for such a perception, and not poor cultivation practices at all. The Department of Environment Affairs have apparently since acknowledged the contribution of footpaths, livestock paths, and badly planned roads as attributing to the extent of erosion conspicuous throughout the country (Farmers Weekly, 1991).

By 1966, most of the Bantu areas had been proclaimed under Betterment Area proclamations, and more than 50 per cent of this land area had not only been planned in terms of land use, but implementation of schemes and practise effected (see Section 5.4.3.3 for further discussion). Ross (1967) attributes this to the willingness of Bantu farmers to cooperate with the government in attempts to stabilise the agricultural potential of these areas.

Another commonly held perception concerning agriculture in the homelands is that bad landuse practices and mismanagement of resources by black farmers has resulted in widespread formation of dongas and extensive areas of degraded landscape (President's Council, 1984). Huntley *et al.* (1989) refute this claim stating that until the enactment of legislation, such as, The Glen Grey Act of 1894 which severely restricted black farmers' use to 10 acres of farmland each, that black agriculture had been extremely successful and capable of satisfying food demands in the eastern Cape and western Transvaal regions. They further suggest that due to the highly erodible nature of marginal lands [which by definition are low-yielding, high-risk or unreliable in productivity or in economic terms land that yields only enough to cover costs (Roberts, 1993), and in the South African context are taken to include land slopes over 20 per cent, long slopes and those underlain with erodible soils (see Russell 1992, for further definition)], coupled with the currently high population densities in these areas (on average 45 persons per km^2, with 70 per km^2 in KwaZulu) (South Africa Foundation, 1992), that traditional farming methods alone cannot explain or be responsible for the extent of erosion estimated to exist in these localities. Indeed according to Clarke (1984) modern technologies can account for most of the degradation apparent on the South African landscape, as the agricultural sector has "at best used 20th century technology clumsily and wastefully". Cooper (1990) agrees and refers to the "destructive process" caused by white farmers ploughing up large areas of grazing land in attempts to grow more profitable field crops. Hallsworth (1987) claims that modern research has since confirmed the value of traditional conservation practices, some of which have been in use for more than 1 000 years. Sanders (1990) agrees with this contention. Overstocking and consequent soil erosion are indisputably inevitable, under the overcrowded conditions currently prevalent in the former 'homelands' and on marginal lands, and do therefore exacerbate the erosion problems experienced (Huntley *et al.*, 1989). This

has been confirmed by Mdluli (1977), Broderick (1987), Showers (1990), and later Watson (1990), who further perceived there to be general recognition in the contemporary literature that: (i) much of the gully erosion visible in, for example, those areas administered by KwaZulu, has its origins before land was designated by the colonial government for tribal use, (ii) a number of gullies are natural, thereby predating anthropogenic influence, and (iii) much of the land demarcated as communal for native use, is marginal and by definition more susceptible to erosion and that traditional land use practices are not therefore exclusively responsible for the extent of erosion in these areas.

From an ideological perspective, apartheid and its policy of 'separate development' perceived by some to be a manifest form of social engineering, and as such accountable for the extent of soil erosion in the homelands (Khan, 1989; 1990a; 1990b; Cooper, cited in Cock & Koch, 1991). Soil erosion is thus perceived to be the legacy of decentralisation (both industrial and by implication demographic), a scenario exacerbated by the fragility and vulnerability of land in marginal areas. Others argue that state interventions to combat erosion problems in these areas, have resulted in contributing further to the extent of degradation (Showers, 1989; De Wet, 1989). Indeed, the Desert Encroachment Committee, commissioned in 1948 to investigate drought conditions in the country, asserted that with regard to marginal lands "natural conditions are highly sensitive ... where the balance may be disturbed ... even by application of favourable farming techniques" (Desert Encroachment Committee, 1951). Others have attributed the problem to colonisation (O'Donoghue, pers.comm.; Showers, 1989), and contrary to the opinion that traditional farming methods have exacerbated the vulnerability of these lands, recognition is given to the part played by missionaries and early settlers of the colonial period who, it has been argued, "arrived in the region with the attitude that natural vegetation must be disturbed in order to produce civilisation" (Showers, 1989). Reports of increased flooding during this time, have been attributed to the effects of missionaries' deforestation, as prior to this it is documented, traditional land use systems involved minimal disturbance of indigenous vegetation. (Showers, 1989 provides a detailed exposition of social influences and land use in the Kingdom of Lesotho.) Showers (1989) contends that rather than regarding the indigeni as "negative elements in the landscape", they should be viewed as "victims of imposed technological

interventions", or more specifically in the context of South Africa's historical development, "victims of imposed state interventions".

The findings of a review of soil conservation activity in the Republic (Roux, 1990), suggest a contemporary tendency to overstate the current status of soil erosion. This does not invalidate claims that progress in terms of conservation has been unsatisfactory, nor others which have suggested that an entrenched apathetic attitude amongst farmers to soil degradation persists and consequently inadequate application of conservation measures at farm level. Rather, it supports the proposition (as made in Section 6.2), that an intensification of effort should be invested in research on aspects such as, prediction modelling and a necessary multidisciplinary approach to conservation (Quirk & Dudal, 1990; Scotney & McPhee, 1990). Hallsworth (1987) claims that the basic principles of soil conservation have in fact been understood for centuries, if this is true and Sanders (1990) believes it to be so, then the question which needs to be answered is: why is soil erosion still a serious problem and why are farmers not making more use of conservation farming practices? Sanders (1990) suggests that the reason could be that policies, strategies and the general approach to soil conservation have been faulty. Such a claim requires further exploration and this study aims to provide some clarification on such a suggestion.

2.10 SUMMARY

Although necessarily descriptive, this chapter has served to provide an account of the framework within which South African soil conservation has been addressed. The account has drawn upon diverse sources in order to address the multidisciplinarity of the soil conservation environment. It included a general appraisal of environmental conditions (topography, climate, vegetative cover, geology and related soil types), which combine to render South Africa particularly vulnerable to soil erosion. The predominantly agricultural land use activities outlined above (12% arable, 84% grazing) coupled with marginal agricultural potential provide additional conditions favourable for soil erosion.

Historically, human activities have been subject to a policy of racial segregation and racially discriminatory legislation which resulted in separate legislation and form of government in various parts of the country. This situation will be shown in

subsequent chapters to have important implications for soil conservation policy in South Africa. Partly as a result of this political situation, agriculture is spatially segregated by type and intensity of exploitation; this too is particularly relevant in understanding soil erosion and approaches to its solution in South Africa.

Finally, the factors outlined above, have produced a situation in which a (largely unproven) perception exists of aggravated soil erosion in former African areas. In regard to soil conservation policy, such perceptions must be considered, since they, together with contemporary political ideology, must influence the policy formulators themselves and the decisions they make.

CHAPTER THREE

SOIL CONSERVATION POLICY IN SOUTH AFRICA: A REVIEW

3.1 INTRODUCTION

This chapter provides an overview of state policy and legislative enactments formulated to address soil erosion in South Africa over the past 100 years, having established that a soil erosion problem has long been acknowledged in South Africa (Chapter two). Given that legislation can be considered as the primary indicator of policy (Rabie & Glazewski, 1990), but, also, that not all official policy is ultimately transformed into legislative enactments, the objective in this chapter is to gather and present information that relates to both government policy and legislation enacted in response to the perceived problem. It was intended that an analysis could then be made of potential temporal changes and developments in government policy and the reasons sought for such changes. To this end, soil conservation policy and relevant legislation is described utilising a variety of sources in this chapter. Only the facts are presented below; an analysis of the material follows in chapters four, five and six.

In the following sections a summary of government policy is presented for each of several periods. Each of these is followed by a description of the legislation enacted in pursuance of the stated policy. The selection of time periods is entirely arbitrary and designed purely for ease of management and presentation.

Although previous reviews of environmental legislation and public policy in South Africa have been presented by various authors including Rabie (1976), Beinart (1984), Rabie and Glazewski (1990), Verster *et al.* (1992), Garland *et al.* (1994), and Garland and Stocking (1995), they were found to be incomplete. This chapter therefore represents the most comprehensive compilation and review of soil conservation policy to date. As is supported by the findings of Garland *et al.* (1994), policy evolution in South Africa must be considered alongside historical political developments. The legacies of pre-independence colonial administration as well as post-independence rule (under 'apartheid') are evident in the dualistic nature of South

African agricultural policies in general, and more specifically erosion control (refer to Section 1.2 for further details).

3.2 LEGISLATIVE RESPONSE TO SOIL EROSION PRE-1910

According to Beinart (1974), Rabie (1976) and Verster *et al.* (1992) no legislation existed in South Africa before 1941 to specifically address soil erosion. Legislation which indirectly concerned soil conservation was, however, implemented as early as the seventeenth century in the Cape Province. Such early legislation was contained in a number of placaaten [N.B. Cape placaaten took the form of legislative measures and although *ultra vires*, were *de facto* enforced (Verster *et al.* 1992)].

Several placaaten of the mid 17th century (14 October 1652, 21 December 1653, 22 August 1654, 10/12 April 1655 and 20 July 1657) were designed to protect cultivated gardens, lands and trees against damage or destruction and therefore indirectly affected soil erosion.

Similarly, several placaaten (19 November 1658, 16 December 1661, 8 April/11June 1680 and 19-20 February 1687) deal with prohibition of veld burning (Verster *et al.* 1992). Although this legislation was aimed at protecting crops and trees it also addressed soil conservation needs indirectly. In addition, several early ordinances (legislation applicable at a provincial level) and statutes (nationally applicable) that related to the prohibition of veld burning included: Ord 5 of 1836, Ord 28 of 1846, Act 18 of 1859, Act 28 of 1888, Act 20 of 1902 and Act 20 of 1908 (Cape); Law 21 of 1865, Act 31 of 1895 and Act 18 of 1902 (Natal); Law 2 of 1870, Law 8 of 1870 and Law 15 of 1880 (Transvaal); Chapter 125 OFS Law Book of 1891 and Act 32 of 1908 (OFS) (Rabie, 1976).

Felling of trees for firewood and timber was controlled by the following pieces of legislation which again indirectly affect soil erosion: placaaten of: 1 October 1659, 26 September 1660, 3/6 December 1670, 1/4 July 1671, 10 July 1676 and 17 February 1683 (Verster *et al.* 1992). In 1693, rangers were appointed to enforce these provisions (Resolution of 13 January 1693) (Rabie, 1976; Verster *et al.* 1992).

Apart from the legislative provision for the control of state forests (Laws of 20 October 1795 and 26 January 1801), no other legislation relevant to soil conservation was enacted in the 18th century (Rabie, 1976; Verster *et al.* 1992). Towards the end of the 19th and beginning of the 20th centuries, legislatures were created for the provinces of the Transvaal, Orange Free State and Natal (Fuggle & Rabie, 1992). Considerable provision was further made in terms of the control of veld burning and the protection of trees in each of the four provinces. Relevant legislation included the following: Cape Laws 5 of 1836, 28 of 1846, 18 of 1859, 28 of 1888, 20 of 1902 and 20 of 1908; Natal Laws 21 of 1865, 31 of 1895 and 18 of 1902; Orange Free State Law Book of 1891 and Act 32 of 1908; and Transvaal Laws 2 of 1870, 8 of 1870 and 15 of 1880 (Fuggle & Rabie, 1992).

None of these laws specifically addressed soil conservation and any soil conservation that may have resulted from the above enactments was purely coincidental. The first provision aimed directly at the control of soil erosion pre-1900, was the requirement contained in the Placaat of 13 May 1681, which obligated landowners to keep clear all watercourses and furrows to combat potential erosion during the rainy season (Rabie, 1976).

3.3 POLICY AND LEGISLATIVE RESPONSES TO SOIL EROSION: 1910 - 1939

3.3.1 Soil Conservation Policy (1910 - 1939)

In 1912, due to the growing concerns of farmers, the congress of the South African Agricultural Union adopted a resolution to make concerted efforts aimed at the prevention of soil erosion (Hansard 1983, col.4824-25). This decision led to a government commission in 1913 and in March 1914, a Senate report entitled the "Report of the Select Committee on Droughts, Rainfall and Soil Erosion (SC 2-1914)", was published. This was the first official attempt to investigate the causes of soil erosion in South Africa (Rabie, 1976). This investigation was instigated in response to growing concern regarding the apparent increased incidence of droughts and the perceived expansion of concomitant soil erosion in the country. Contrary to scientific investigations at this time, which claimed that the South African climate was becoming drier (Rabie, 1976), the committee concluded that:

1. there had been no significant diminution of rainfall in the country;
2. soil erosion was responsible for desiccation in certain areas;
3. soil erosion was the product of human activities, such as the destruction of natural vegetation through veld-burning, overgrazing, cutting down trees and bush and by injudicious road and railway construction.

Although compulsory legislation for the control and "filling up of sloots" (or dongas) was considered at this time, it was not recommended: the committee was of the opinion that the public were not yet educated regarding soil conservation and considered the enactment of legislation to be premature (Rabie, 1976). Little or no positive action resulted from this report (Penzhorn, 1972). This has been attributed to the First World War (Hansard 1983, col.4825).

Figures furnished by the Census Department, estimated that a drought in 1919 had realised a direct loss to farmers of 16 million pounds sterling (Rabie, 1976). A Drought Investigation Commission appointed towards the end of 1920, was consequently asked to report on improvements in farming conditions generally, such as progress in the prevention of soil erosion and the provision of more water (Penzhorn, 1972; Rabie, 1976). The final report (UG 49-'23) was published in October 1923.

The Drought Investigation Commission concurred with the Senate Select Committee on Droughts, Rainfall and Soil Erosion, that no meteorological data existed to suggest a change in rainfall patterns. The commission, in their consideration of drought impacts, concluded that "the position demands the earnest attention and, if need be, intervention of the State" (Drought Investigation Commission, 1923). The commission concluded that:

1. small stock farmers are the largest single contributor to drought losses [and concomitant soil erosion], that is, losses principally due to "faulty veld and stock management, such as, kraaling of stock, overstocking, and destruction of vegetation";
2. soil erosion is caused, mainly by deterioration of the vegetal cover, "brought about by incorrect veld management, and that "all efforts to improve the latter will have a beneficial result on the former";

3. soil erosion can be held responsible for the drying up of rivers and waterholes, reduction in water table levels and the increasingly disastrous effects of droughts;
4. "prompt action is therefore imperative".

A number of recommendations were advanced. Those specifically addressing soil erosion included:

1. the extermination of the jackal [the perceived principal agent in the need for a kraaling system, responsible for soil erosion];
2. the organisation of the farming community and education of farmers in terms of soil conservation practice;
3. the appointment of a soil conservation officer in the Department of Agriculture.

This commission also considered that conditions were not conducive to legislation; an educated farming community and general public was a preliminary requirement.

The Drought Investigation Commission report gave rise in 1925, to the establishment of the Agricultural Extension Service, the function of which was to educate farmers on sound land utilization (Rabie, 1976; Adler, 1985). Soon after, in 1929, the Department of Agriculture and Forestry organised a Soil Erosion Conference, in Pretoria, which was aimed at creating awareness of the consequences of land-use mismanagement and provided information on available financial and technical aid to farmers (Rabie, 1976). The outcome of the conference was the establishment of the Soil Erosion Advisory Council in 1930, (on which the South African Agricultural Union and provincial agricultural unions were represented (Hansard 1983, col.4825)), the approval and launch of financial aid schemes (Penzhorn, 1972), and the formation of local soil erosion committees (Adler, 1985). [The Council functioned until 1933 (Rabie, 1976).] Under such schemes, a total of approximately R6 million was spent on erosion control before the more comprehensive schemes under the Soil Conservation Act 45 of 1946 were effected (Rabie, 1976). Soil erosion schemes also provided funds for research on soil and veld conservation and by 1947, 16 Pasture Research Stations were established throughout the country (Penzhorn, 1972).

A 1934 parliamentary investigation was asked to discover why rivers were "drying up" and what measures could be implemented to preserve the water resources of the country. This gave rise to the proclamation of the Drakensberg Conservation Area, the purpose of which was to study the utilisation and conservation of soil and water resources in catchment areas (Rabie, 1976). According to Rabie (1976), this investigation also led to: (a) the reservation of all vacant or unalienated crown land to conservation; and (b) the expropriation of many private farms situated in mountain catchment areas (see Section 3.3.2 for more details).

The principal aim of betterment planning schemes implemented in the 1930s, were reportedly concerned with the control of soil conservation (de Wet, 1990). Fencing grazing areas and contour bank construction, were two soil conserving methods encouraged at this time. After World War II, State objectives were redirected and focussed on rural transformation and 'rehabilitation', which was attributed to the increased exploitation of land and agricultural resources in these areas. Minimal positive influence in terms of erosion control, resulted from these betterment schemes. (See Section 5.4.3.3 for further discussion on betterment schemes.) According to Garland *et al.* (1994) soil erosion in African/Bantu areas was mainly addressed by Proclamations of the State President, rather than acts of parliament. These will be discussed in Section 3.10 below.

3.3.2. **Legislative Response (1910 - 1939)**

Apart from the Forest Act 16 of 1913, as amended by Act 14 of 1917 and Act 28 of 1930, little was achieved in terms of formulating legislative provision for the growing concern regarding land degradation and erosion during this period.

To counter the uneconomic subdivision of land, The Unbeneficial Occupation of Farms Act 29 of 1937 was legislated (Rabie, 1976; Verster *et al.* 1992). This situation transpired firstly as a result of a system of bequests in wills, a system which has its foundation in the Roman Dutch Law (Glavovic, pers. comm.), that entitles a landowner to do as he/she pleases with that land and, secondly, because the amount of land available for farming had become scarce in relation to the number of people who wished to own land and to farm. This Act (which was subsequently repealed by

the Abolition of Racially Based Land Measures Act No.108 of 1991) made provision for the appropriation and allotment of land which was not being beneficially utilised for farming purposes and from which the occupants were unable to derive a sufficient income to subsist (Fuggle & Rabie, 1992).

The Weeds Act 42 of 1937 (as amended by Acts No.2 of 1939, No.50 of 1952, No.32 of 1964 and No.74 of 1969) provided for the eradication of all plants declared as weeds by proclamation of the State President. A duty was placed on the owner or resident of the land to eradicate such weeds. Regard for the consequences of denudation and concomitant soil erosion was required in terms of this Act.

According to Fuggle & Rabie (1992) acts concerning common pasture management in specific settlement areas provided for rules to be determined with respect to the conservation of soil and vegetation by appointed committees. These Acts included:

- Kopjes Irrigation Settlement Act 38 of 1935 (which provided for the planting, care and protection of grass, trees, shrubs and bushes; and the burning of grass and eradication of noxious weeds (Section 17)).
- The Cannon Island Settlement Management Act 15 of 1939 (which provided for the preservation of all water courses against flood damage, erosion and denudation (Section 12)).
- The Mapochs Gronden Water and Commonage Act 40 of 1916 (which provided for the maintenance, protection and destruction of trees; and the burning of grass and the eradication of noxious weeds (Section 9)).
- The Settlement Committee and Management Act 21 of 1925 (which provided for the planting, maintenance, protection of grass, trees and bushes; and the burning of grass and the eradication of noxious weeds (Section 2)).

3.4 POLICY AND LEGISLATIVE RESPONSES TO SOIL EROSION: 1940 - 1949

3.4.1 Soil Conservation Policy (1940 - 1949)

The Forest and Veld Conservation Act 13 of 1941 (see Section 4.3.1.1) passed in Parliament, was seen as the first tangible attempt to provide comprehensive

legislation addressing soil erosion and its associated problems in the country (Rabie, 1976).

A Departmental Committee for the Reconstruction of Agriculture was appointed by the Department of Agriculture and Forestry in 1943, the aim of which was "to guide agriculture in the process of adapting to the needs of the post-war period and to formulate basic agricultural principles for the future" (Rabie, 1976). The committee's report (GP-S 9278-1943), published in December 1943 recommended that sound utilisation of land should be based on soil and veld conserving methods, and that this should be in conjunction with reclamation measures and the subsidization of the same (Rabie, 1976). The committee highlighted that the Forest and Veld Conservation Act of 1941 had focussed on reclamation rather than concentrating on soil conservation needs. They recommended that further legislation was therefore urgently required to address this need.

The National Veld Trust since its inception in 1943 had been actively involved in promoting the soil conservation cause nationwide. Its members prepared a Model Bill and Explanatory Memorandum (1945) addressing the need for legislation which focused specifically on soil conservation. This Bill was tabled in Parliament and ultimately became the foundation upon which the 1946 Soil Conservation Act was based (Robertson, 1975).

In 1944, the Social and Economic Planning Council was appointed to report on the recommendations postulated by the Reconstruction Committee (UG10-'45). These events gave rise in 1945 to the tabling of a White Paper in Parliament on agricultural policy and the formulation and enactment of the Soil Conservation Act 45 of 1946 (see Section 3.4.2). The Division of Soil Conservation and Extension was established to administer the act.

Concern for prevailing drought conditions continued, and in January 1948, the Desert Encroachment Committee was appointed. Their report (UG 59/1951), submitted in March of 1951, was a comprehensive document, which concluded:

1. insignificant change had occurred in the amount or intensity or seasonal distribution of rainfall;

2. changes in the amount of vegetative cover and soil was directly related to the utilization of land;
3. a shift in free-roaming game to domestic stock farming in confined areas has given rise to selective overgrazing and destruction of the veld, especially where systems of veld management were not applied;
4. this was particularly relevant in marginal lands where natural conditions are highly sensitive and where the balance may be disturbed "even by application of favourable farming techniques";
5. safeguards to counter land or veld degradation should be installed before settlers are placed in such areas;
6. a real need exists for pasture research, since to date the causes of veld deterioration are relatively unknown.

A state aided fodder bank scheme for stock in times of drought was established in 1948 and a Fodder Bank Committee was appointed. Of significance for soil conservation was the committee's recommendation in its 1949 report, that assistance should only be made available to those farmers who apply conservation farming. [This same principle was to be advanced in the Recommendations of the Commission of Inquiry 1966-72 and again in the report prepared for the Rio Summit, 1992 (van der Merwe, 1992).]

One of the more significant steps in addressing soil conservation in southern Africa as a whole was the formation of the Southern African Regional Commission for the Conservation and Utilization of Soil (SARCCUS), of which South Africa is a founder member (Rowland, 1974). SARCCUS was established as a consequence of an African Regional Scientific Conference, which convened in 1948 at Goma, Zaire (the then Belgian Congo) (Rabie, 1976).

3.4.2 **Legislative Response (1940 - 1949)**

The Forest and Veld Conservation Act 13 of 1941 was the first legislation enacted which specifically made provision for the control of soil erosion in South Africa (Rabie, 1976; Verster *et al.* 1992). Two provisions were made. Section 4 of the Act awarded the Governor-General the right to expropriate all land required for the prevention of sand drift, soil erosion, or for reclamation, protection of catchment

areas or conservation of water resources (Rabie, 1976; Adler, 1981; Verster *et al.* 1992); whilst Section 5 of the Act permitted the declaration of additional land, considered to be under threat of degradation, to be proclaimed at the discretion of the State, a conservation area, (Rabie, 1976; Adler, 1981; Verster *et al.* 1992). The Annual Report of the Secretary for Agriculture, for the year ended 31 August 1946, proclaimed five Conservation Areas, totalling an area of 1 404 612 hectares (Adler, 1981).

This Act did not apply to land held in the SA Native Trust (established under the Native Trust and Land Act 18 of 1936). [The issue of non-applicability of legislation is discussed further in Chapters 4-6.] The principal measures provided for in terms of this Act include:

1. expropriation of land (by the Governor-General) for forests and "certain other purposes", [by implication conservation of soil and water resources] (Section 4);
2. expropriation or suspension of owners' rights, for the purposes of reclamation (Section 5);
3. protection of certain trees and forests as proclaimed/authorised by the Governor-General (Section 6);
4. compensation for loss of trees or forests under the above proclamation (Section 7);
5. proclamation of Crown forests as nature reserves and prohibition of hunting and cutting in these proclaimed areas [the only provision applicable on specifically demarcated native trust lands] (Section 8);
6. demarcation, alienation and withdrawal from demarcation of Crown forest land (Section 9);
7. servitudes and regulations pertaining to these over Crown forest land (Section 10);
8. control of access to Crown forestry areas (Section 11);
9. export, import, transport, sale, manufacture and grading of trees and timber (Section 12).
10. offences and penalties in terms of the Act (Chapter 2 of the Act);

11. protection from and regulation of veld burning [a great deal of emphasis was placed here on wilful destruction, negligence and damage to forests or forest produce] (Chapter 3 of the Act) (Hansard 1941, col.2087-2106).

The Land Bank Act No.13 was enacted in 1944 for the purposes of consolidating the laws in force in the country relating to the Land and Agricultural Bank of South Africa. In terms of Section 22 of this Act, provision was made for the bank to make advances for the blocking of sluits, dongas and water courses to prevent soil denudation.

Shortcomings identified in The Forest and Veld Conservation Act, [principally its focus on reclamation and correction, rather than conservation and prevention (see sections 3.4.1 and 4.3.1.2)], gave rise in 1946 to the enactment of the Soil Conservation Act No.45. This Act replaced the Forest and Veld Conservation Act and was aimed at providing the principles required to control the soil erosion problem (Rabie, 1976; Verster *et al.* 1992). Whilst it included some of the provisions of the earlier act, the Soil Conservation Act also made provision for:

(a) the conservation of vegetation and water supplies; and
(b) the establishment of a field conservation and advisory service (Ross, 1967).

The Soil Conservation Act 45 of 1946, made provision for the establishment of soil conservation districts and associated committees, the role of which was to prepare, for each individual farmer in a given district, a farm plan (or soil conservation scheme) (see Section 4.3.2.1). This was done in conjunction with the farmer in order to obtain consent or consider objections to it. Once settled, failure to comply with or contravene a provision of such schemes, rendered the land owner or resident/user liable to prosecution. In essence the Act (which was administered by the Department of Agriculture and Forestry's Division of Soil Conservation and Extension), provided a basis for cooperation between the State and farming community and afforded the farmer the freedom to initiate action without waiting for State intervention (Fuggle & Rabie, 1983; 1992). Declaration of soil conservation districts, preparation and enforcement of soil conservation schemes by district committees, depended on the initiative of farmers (Rabie, 1976) (see Section 4.3.2.1).

Two settlement acts, the Klipdrift Settlement Act 23 of 1947 (which provided for the planting, care and protection of grass, trees, shrubs and bushes; and the burning of grass and eradication of noxious weeds (Section 6)), and the Skanskop Settlement Act 24 of 1947 (which provided for the preservation of all water courses against flood damage, erosion and denudation (Section 4)), thus provided, to a limited extent, for soil and vegetation conservation (Fuggle & Rabie, 1992).

3.5 POLICY AND LEGISLATIVE RESPONSES TO SOIL EROSION: 1950 - 1959

3.5.1 Soil Conservation Policy (1950 - 1959)

In December 1952, the Soil Conservation Board, established in accordance with the provisions of the Soil Conservation Act 45 of 1946 (Penzorn, 1972) [and subsequently dissolved in 1969 in terms of the new Soil Conservation Act 76 of 1969], recommended that an interdepartmental committee be appointed to investigate mountain catchment areas (Rabie, 1976). The report which was submitted to the Board and later published (1961) by the Department of Agricultural Technical Services as "The Conservation of Mountain Catchments", was considered important in terms of managing soil erosion and represents an important milestone for soil conservation in the country. The committee reported that:

1. efforts historically focused on the improvement of land utilization in order to control soil erosion and increase agricultural production;
2. this focus had resulted in the neglect of water conservation;
3. degradation of mountain catchments was the direct result of land use malpractice;
4. existing legislation remained adequate under given circumstances.

Solutions to the perceived problems included:

1. action to eliminate malpractice;
2. general adoption of methods of land use compatible with sound catchment management;

3. appropriate measures for the reclamation and restoration of areas damaged by abuse in the past.

The Board considered that the long term objective of the state, in terms of the power invested in it by the Soil Conservation Act and other associated statutes, should be to acquire control of degraded areas to enable supervision of the progressive withdrawal of land from Black or White farmers, to be placed under permanent protection where necessary, to ensure adequate conservation of water supplies.

In February 1956, a Commission of Inquiry was appointed to investigate the reasons why rural areas were becoming gradually depopulated, why the size of farming units were seen to be fluctuating, and to determine the economic, social and agricultural consequences of this fluctuation in size. Their commissioned report entitled "Report of the Commission of Inquiry into European Occupancy of the Rural Areas", was submitted in 1959 (GP-S 7029095-1959-60) and noted that:

1. there had been an increase in the number of smaller farms;
2. larger landowners had also increased their total land ownership;
3. an increase in the number of smaller farms had led to an increase in the number of uneconomic farming units and concomitant application of "pirate cropping and monoculture";
4. this had led to the inevitable destruction of soil structure and fertility;
5. farmers, under such conditions, could not afford to apply soil conservation and farm planning;
6. stock farming areas and uneconomic units had contributed to overgrazing and destruction of the veld;
7. larger landowners also failed to cooperate with soil conservation committees in terms of planning and soil conservation practice. This disregard had in many cases contributed to the depletion of soil fertility;
8. uneconomic farming units had largely given rise to the depopulation of rural areas.

The commission therefore recommended that the subdivision of all land should be subject to the ratification of the Department of Agricultural Technical Services, to make way for the application of sound and economic farming systems. It was further

recommended that policy pertaining to the subdivision of land should be revised by the Land Bank and the Department of Lands, to, where possible, combat the emergence of additional uneconomic farming units.

Further attempts at mobilizing public support for soil conservation led to the largest ever national public awareness campaign, the Green Cross Campaign, launched in the early 1950s. This drive, aimed at awakening the public mind to the dangers of soil erosion, was directed principally at the youth and was organised by the National Veld Trust (National Veld Trust, 1990).

In 1958, an attempt was made by the Division of Soil Conservation and Extension, to assess the progress made in terms of the Soil Conservation Act during its first 10 years of operation (Division of Soil Conservation and Extension, 1959) (see Section 4.3.3 for details). The report concluded that commendable progress had been made in terms of the Act in many areas, but in others erosion and desiccation of land continued. Availability of professional and technical staff to direct the work still required was given as the principal limiting factor in soil conservation (see Section 4.3.3 for discussion).

3.5.2 **Legislative Response (1950 - 1959)**

Whilst the Soil Conservation Act 45 of 1946, still constituted the most significant legislation to directly address soil erosion to date, provisions contained in other legislation passed in the 1950s also implicitly addressed soil conservation.

As soil eroded from the land surface ends up being transported by rivers and carried ultimately to sea, both soil and water conservation are intimately interrelated. For this reason provisions of The Water Act 54 of 1956, aimed at conserving water resources, had an impact on the conservation of soil (Rabie, 1976; Looser, 1985). In terms of this provision, catchment control areas could be declared by the State President if it was considered that the flow of a public stream in a particular area should in the national interest be controlled:

(a) for the prevention or control of silt;

(b) or for the purpose of reducing the possibility of damage to agricultural land in the event of a flood.

Exemptions permitted in terms of The Water Act formulated specifically for soil conservation purposes, included:

(a) the storing of public water for the purpose of flooding the veld in accordance with soil conservation measures, was not deemed to constitute unbeneficial storage of water (Section 25); and

(b) the alteration of the course of a public stream, was permitted only where the course is altered for the purposes of constructing a soil conservation work (Section 20).

3.6 POLICY AND LEGISLATIVE RESPONSES TO SOIL EROSION: 1960 - 1969

3.6.1 Soil Conservation Policy (1960 - 1969)

A drought which peaked between 1960 and 1961 instigated an enquiry aimed principally at investigating feeding patterns of stock in times of drought (Rabie, 1976). Possible practices which would prevent and/or alleviate the ravaging effects of drought were also considered.

The committee, in its report submitted in 1965 (Report on Drought Feeding), claimed that soil conservation practices, together with the application of planned farming are prerequisites to the financial and biological welfare in stock farming. Methods to counter the negative impacts of drought could only be successful if these objectives were met and for this reason the committee stressed the importance of prioritizing these objectives.

In addition, the committee recommended:

1. uneconomic farming units were considered a major obstacle in the recovery of degraded land and on this basis urgent attention was required;
2. repeated expenditure on drought relief together with consequential direct and indirect stock losses, the country could not afford to permit the continued disregard for appropriate farming planning and implementation of soil conservation strategies;
3. the time was ripe for drastic action to be taken by the State.

As a consequence, a Commission of Inquiry was appointed in May 1966, the tasks of which were to:

1. prescribe basic principles for healthy farming systems;
2. determine by what means and in what respect farming systems had failed to meet recommended practice;
3. suggest the means according to which these shortcomings could be eliminated;
4. investigate and make recommendations regarding the reconstruction of agriculture in areas particularly susceptible to drought conditions (Rabie, 1976).

A number of reports of the 1966 Commission of Inquiry (RP 61/1968; RP 84/1970; RP 19/1972) (Rabie, 1976) were prepared during the period 1968 to 1972, the recommendations and conclusions of which are detailed in Section 3.7.1.

A number of nationwide awareness creating campaigns were undertaken towards the end of the 1960s. For example, the Festival of the Soil in 1968, a government initiative, resulted in the release of numerous publications on soil erosion, agricultural practice and soil conservation.

In March of the same year, representatives of the various soil conservation district committees were the invited delegates in a second National Conference, organised by the Department of Agricultural Technical Services (Rabie, 1976). According to Rabie

(1976), a report compiled on the conference and published in 1969, merely highlighted the inefficacy of the Soil Conservation Act of 1946.

Recommendations which emerged from the conference proceedings to improve the implementation of the act included:

1. the suggestion that district committees alone should not be responsible for enforcement, but if they worked together with the Department of Agricultural Technical Services, implementation may prove more effective;
2. the establishment of a separate inspectorate - a body detached from the civil service or independent of the Department of Soil Conservation (Rabie, 1976).

3.6.2 **Legislative Response (1960 - 1969)**

The Agricultural Credit Act No.28 was passed in 1966 and was formulated to:

(a) provide assistance to persons carrying on or undertaking to carry on farming operations; and
(b) for the exercise of control in respect of assistance rendered.

In terms of Section 10 of this Act, a loan for the construction of soil conservation works could be granted, but only on the recommendation of the Minister of Agriculture.

Nature conservation in its broadest sense entails the conservation of land, its vegetation and the wildlife living on that land, in particular in protected areas (Fuggle & Rabie, 1992). For this reason much of the legislation relating to nature conservation bears relevance to the conservation of soil in these areas. The Fencing Act 31 of 1963, in which the consolidation of laws relating to the erection of fences, fencing of farms and other holdings is provided for, where a dividing line between two holdings may take the form of a water course, river, range of hills, or rock outcrop, provides an example of such legislation.

The Soil Conservation Act 45 of 1946 was subsequently amended by Act 37 of 1960, Act 30 of 1964 and Act 15 of 1967. The 1946 Act, perceived by many at that time to be the panacea of the soil erosion problem, failed to meet its objectives, however, and resulted in the drafting and tabling in Parliament, the Soil Conservation Act 76 of 1969 (Rabie, 1976) Numerous shortcomings of the previous Act, coupled with the belief that the majority of South Africans remained uneducated regarding the extent of soil erosion (Hansard, 1969) (see Section 4.3.2.2 for a more detailed analysis and discussion of the inadequacies of this Act), necessitated this action. The Act was passed in June of the same year and came into effect in March 1970.

The Soil Conservation Act No.76 of 1969, provided regional guidelines to promote soil conservation and regional planning and succeeded in attempts to stimulate renewed conservation efforts (Looser, 1985). By 1980, 73 per cent of the total area of Republic's agricultural land, had been planned in accordance with the terms of the revised Act (Adler, 1985). This outcome has been attributed to the Department of Agriculture's policy of optimum resource use (Adler, 1985) (See Section 6.2 for details).

With the dissolution of the former soil conservation district committees, the establishment of soil conservation committees appointed by the Minister of Agriculture, and an Extension Service (established in 1925), made it possible to address specific problems in specific areas (Fuggle & Rabie, 1992). These new committees no longer enjoyed executive powers but acted in an advisory capacity, answerable to the Division of Soil Protection of the Department of Agriculture (Fuggle & Rabie, 1983; 1992). Members of such committees were appointed by the minister after conference with the South African Agricultural Union. Through a notice placed in the *Government Gazette* or written notice to a landowner or resident, the Minister of Agriculture was then able to declare a specific course of action applicable to a particular area. Such direction could relate to a variety of actions aimed at soil conservation (Fuggle & Rabie, 1983; 1992). Some of the actions enumerated in the Act against which directions could be made include, *inter alia*:

(a) the cultivation of the land, the protection, stabilizing or withdrawal of the land from cultivation, the application of crop rotation and the disposal of crop remnants and plant residues (Section 3 (1)(a));

(b) the laying out of lands, the destruction of vegetation and the planting of trees in natural watercourses (Section 3 (1)(b));

(c) the drainage of vleis, marshes, natural water sponges and watercourses (Section 3 (1)(c));

(d) the runoff or drainage of rain water, the withdrawal from cultivation, the protection and stabilizing of natural watercourses and the establishment, maintenance and protection of artificial watercourses (Section 3 (1)(d));

(e) the protection, temporary withdrawal from grazing and stabilizing of any soil surface including mountain slopes and natural watercourses which are or may become subject to erosion or denudation of vegetation (Section 3 (1)(e));

(f) the use of areas reserved as water catchment areas (Section 3 (1)(f));

(g) the protection and stabilizing of barrier dunes on the coast, of other dunes where drift sand occurs or may occur and of its vegetation (Section 3 (1)(g));

(h) the number and kind of stock which may be kept on the land (Section 3 (1)(j)i-iv);

(i) the prevention of erosion, the denudation, disturbance or drainage of the land (Section 3 (1)(k));

(j) any other disturbance of the soil which creates or may create conditions which cause of may cause any form of erosion or pollution of water by silt or drift sand (Section 3 (1)(m) (Fruit and Fruit Technology Research Institute, 1973; Fuggle & Rabie, 1983).

Other provisions of the Act specifically include the following:

1. virgin soil and land not normally under cultivation may not be ploughed without the consent of the minister and on conditions prescribed by him;
2. contour cultivation must be applied to lands with an average slope of 2 per cent or more (unless adequately protected by perennial fodder crops);
3. vleis, marshes, watercourses and water sponges may not be ploughed, cultivated or drained;
4. no land may be ploughed, cultivated or drained, and no vegetation (except proclaimed weeds and other noxious plant) may be destroyed within 10 m of the edges or banks of rivers, brooks, springs, vleis, marshes, dongas, watercourses or earth channels (Fuggle & Rabie, 1983).

Other general areas not covered by the above provisions but addressed in the Act include: (a) veld burning; (b) private roads (see Watson 1990, on the influence of road construction and soil erosion); and control of invasive plants (Fruit Technology Research Institute, 1973).

Failure to comply with these provisions constituted an offence and a magistrate's court was vested with the jurisdiction to impose a penalty as determined by the Act (Fuggle & Rabie, 1983). Penalties in terms of the 1946 Act were increased to a maximum fine of R1,000 or maximum imprisonment of 2 years (or both fine and imprisonment) in accordance with the provisions of the 1969 Act (Rabie, 1976).

Grants, aimed at promoting soil conservation, were offered by the Minister of Agriculture, to individuals to carry out conservation activities in accordance with the Act (Fuggle & Rabie, 1983). Two important schemes in this regard were the Veld Reclamation Scheme, which came into operation in September 1966 (N.B. under the 1946 Act) and expired in May 1973 and the Stock Reduction Scheme, instituted in October 1969.

The Veld Reclamation Scheme was introduced to encourage farmers to withdraw a portion of the pasture on their land for the duration of at least a full growing season. Where withdrawal was essential for the recovery of the veld, financial assistance would be provided in terms of the Soil Conservation Act provisions (Rabie, 1976).

The Stock Reduction Scheme was aimed at the systematic reduction in the number of stock held in grazing areas. Overstocking, in conjunction with prolonged droughts, (together with a decrease in wool prices), was considered to be a major cause of overgrazing and concomitant degradation of the veld. Compensation was awarded to farmers for each stock unit withdrawn. Participation in the scheme was voluntary.

The Land Tenure Act 32 of 1966 makes the following provisions in respect of soil erosion:

1. the Minister of Agriculture may acquire land suitable for use in connection with farming purposes (Section 4 (1));

2. the minister may also expropriate land in a Government water control area (Section 4 (2));
3. such land may be prepared as a settlement and be sold to farmers in terms of the State Land Disposal Act 48, of 1961, or of the Agricultural Credit Act 28, of 1966;
4. the Agricultural Credit Board (established in terms of Section 2 of the Agricultural Credit Act 28 of 1966), bears the responsibility to ensure land sold to farmers constitutes economic farming units or parts thereof (Rabie, 1976).

The Physical Planning Act No.88 of 1967 (or, after the renaming in 1973 of the Department of Planning to the Department of Planning and Environment, which was responsible for coordinating legislation relating to the control of pollution and the conservation of natural resources, the act itself was subsequently renamed in 1975, the Environment Planning Act No.88 of 1967) provides for the coordinated planning and utilisation of resources. Due to some civil service rationalisation in 1981 the act was subsequently renamed the Physical Planning Act) (Verster *et al.* 1992). The utilisation of soil as a consideration in environmental planning, renders this Act significant in the context of this thesis. Provisions within the Act relating indirectly to soil erosion control include:

1. land is to be reserved for certain purposes only, whereafter any use contrary to the specified purposes, without a permit, is prohibited (Section 4);
2. the drafting of guide plans for all future development of land (Section 6A) (Rabie, 1976).

Whilst the above provisions do not apply to the use of agricultural land, that used for pastoral purposes, or for the purposes of road or railway construction, they have some bearing on the control of erosion in that they provide control of land use practices in areas adjacent to agricultural lands and by implication therefore, could positively or negatively influence the potential of such practices to give rise to, or exacerbate soil erosion problems.

In The Forest Act 72 of 1968, besides provision for the protection of land, vegetation and forest produce in state and other forests, consideration is also given to the setting

aside of forests for the conservation of water supplies or the prevention of sand drift. The aim of protecting these forests and their produce is principally soil conservation. Further provisions specifically address the prevention of soil erosion and the control of cultivation and grazing land within forested areas. The Act further provided for the declaration of any land, or trees on that land, not contained within state forests, protected land or trees, with a view to prevention of soil erosion or sand drift or the reclamation of the soil or of drift sands. Finally, to clear, break up or cultivate land in or on a state forest or private forest without authorisation, was deemed an offence, punishable by law. [Whilst this act formerly neither applied to South African Native Trust land, nor the self-governing territories, this was subsequently amended by the Abolition of Racially Based Land Measures Act No.108 of 1991 and now applies to all land in South Africa.]

3.7 POLICY AND LEGISLATIVE RESPONSES TO SOIL EROSION: 1970 - 1979

3.7.1 Soil Conservation Policy (1970 - 1979)

The Commission of Inquiry appointed in May 1966 to investigate the feeding patterns and behaviours of stock at times of drought (their report was published in 1968), produced numerous recommendations and conclusions over a period of approximately 6 years. In summary they found that:

1. injudicious soil utilisation practice was considered to be the single biggest factor responsible for the "retrogression of our agricultural resources";
2. optimal utilisation of resources "with and within the limits set by natural environmental factors" was imperative;
3. the recovery of land particularly vulnerable to erosion was dubious whilst it remained under private ownership. State possession should therefore be extended, especially in catchment areas and other important water surplus regions, together with mountain slopes where devastation is "almost inevitable";
4. expropriated lands would then be available for lease but subject to strict conservation measures;

5. as uneconomic farming units are considered one of the greatest agricultural problems in South Africa, legislation for the effective control over the subdivision of land must be considered in rural areas;
6. consolidation of uneconomic units into economic units made operative;
7. granting of state aid (drought relief) to be conditional, that is, only offered in cases where soil conservation practice has been implemented;
8. the success of soil conservation will be subject to the social and economic attitudes of the farming community, therefore additional state assistance in the form of technical and economic advice was to be made available;
9. regulation of soil use should be undertaken by a proposed Central Institute of Land-Use Planning (Rabie, 1976).

In the early 1970s, an inter-departmental Study Committee investigating the use of agricultural land, better known as the "Tomlinson Committee", expressed concern at the rate at which valuable agricultural land was being lost to townships and for other development purposes (Rix & Duvel, undated). This led to the adoption of an official policy by the Department of Agriculture to promote optimum land use. This policy stipulated that the requirements for agricultural production should: (a) be in harmony with the natural environment; (b) not be practised to the detriment of agricultural resources; and (c) be conducted on an economic basis (SARCCUS, 1974; Rix & Duvel, undated; Adler, 1985).

Campaigns in the 1970s to increase public awareness of soil erosion included 'The Water Year' in 1970 and 'Our Green Heritage' in 1973 (Rabie, 1976; Fuggle & Rabie, 1983). A national conference on 'Man and His Environment' hosted by the National Veld Trust in 1971, did much to create awareness in the general public about the dangers of pollution, soil loss and general environmental degradation (Veld Trust, 1990). It also gave rise in 1974 to the establishment of the Habitat Council, a national coordinating body of non-governmental organisations involved in the conservation, management and planning of the environment (Veld Trust, 1990). Amongst the more than 20 newly established conservation organisations actively promoting conservation and concern for the environment during the period 1970 to 1975 was the Cape Co-ordinating Council for Nature Conservation (1970), and a sister body in the Eastern Cape (1973) (Verster *et al.* 1992).

3.7.2 **Legislative Response (1970 - 1979)**

Acts such as The Water Act 54 of 1956, The Forest Act 72 of 1968 and the Soil Conservation Act 76 of 1969, provided for the conservation of mountain catchment areas, but increasingly concern was expressed regarding the need for a more coordinated approach to this subject (Rabie, 1976). This concern culminated in the promulgation of The Mountain Catchment Areas Act 63 of 1970. To provide for centralized control, the matter was entrusted to the Minister of Water Affairs and Forestry (Hansard 1970, col.3708; Department of Environment Affairs, 1993).

In terms of the Act, the minister has the power to declare directions to be applicable to a landowner or resident on land in these areas. General directions related to:

(a) the conservation, use, management and control of such land;
(b) the prevention of soil erosion;
(c) the protection and treatment of natural vegetation;
(d) fire protection plans and the establishment of fire protection committees.

Fire protection plans contained provisions relating to the regulation or prohibition of veld burning, and the prevention, control and extinguishing of veld and forest fires (Department of Environment Affairs, 1993).

The Subdivision of Agricultural Land Act 70 of 1970, was aimed at eliminating the practice of subdividing land into uneconomic farming units, with concomitant detrimental effects on the soil due to a lack of capital to implement soil conservation measures (Fuggle & Rabie, 1983). The Act compelled the farmer, or landowner, to seek consent from the Minister of Agriculture before subdividing a given portion of agricultural land. Described as long overdue, the Act was considered one of the more effective instruments in the conservation of soil (Rabie, 1976; Verster *et al.* 1992). This Act did not apply to land appropriated to people designated as 'Blacks' or 'Coloureds' (in terms of Section 1 (d) and (e)) (Rabie, 1976).

Control of soil erosion could have been influenced by the provisions of the Expropriation Act No.63 of 1975. In terms of this act, land rights or ownership may be affected when (a) control of land owner's activities alone would not be considered

adequate to achieve a desired goal, and (b) where, to serve public interest effectively, the state would require all rights of ownership of a particular area (Verster *et al.* 1992). This could have proved a proficient means of controlling the abuse or mismanagement of land, however, due to the imposed obligation to pay land owners compensation, making this an expensive act to administer, coupled with the lack of popular support, the act was seldom enforced. This rendered the act, at least in terms of soil erosion control, ineffectual.

Watson (1990) working on soil erosion in the Umfolozi Game Reserve and surrounding KwaZulu region, found that a great many gullies present in these areas are located adjacent or in close proximity to roads. Methods utilised to drain or dispose of accumulated water from these largely impervious surfaces, were concluded to have contributed to the problem of soil erosion. This confirms the findings of Tempany (1949) and Showers (1989). For this reason legislation enacted to provide for the construction of roads and railways, bears some relevance in the context of soil conservation. For example, Section 5 (1)(c) and (e) of the National Roads Act 54 of 1971, empowered the National Transport Commission (or South African Roads Board) to plan, design or construct any national road, and to stimulate or protect vegetation with a view to preventing soil erosion on a national road, or as a result of the construction of a national road.

A further act promulgated in the 1970s which had an influence on the control of soil erosion was The Common Pasture Management Act 82 of 1977. [This act was subsequently repealed by the General Law Amendment Act No.139 of 1992.] In terms of this Act, the Minister of Agriculture, by notice in the Gazette, may:

1. withdraw from the control of a committee of management, any portion of state land which has been set apart as common pasture (Section 2 (1)(a) and (b));
2. reserve as common pasture any state land which he considers suitable for such purpose (Section 2 (1)(c));
3. designate one or more pieces of land as an agricultural unit (Section 3 (1)(a));
4. allot any particular common pasture to an agricultural unit (Section 3 (1)(c)).

The Act further provided for the establishment of a pasture management committee for a given common pasture, the task of which, besides the control and management of said pasture, was to raise funds for the construction of soil conservation works (or any other action contemplated in terms of the Soil Conservation Act 76 of 1969) (Verster *et al.* 1992). The kind and number of stock per agricultural unit permitted to graze on the common pasture concerned, is determined by the committee, with the approval of the minister (Rabie, 1976).

The Soil Conservation Act of 1969 was subsequently amended by the Soil Conservation Amendment Act 22 of 1977 (Hansard 1977, col.2428-2462). A number of provisions of the 1969 Act were considered to require revision and these are briefly outlined below (Hansard 1977, col.2429-2435).

(a) For the purposes of calculating the number of stock when large stock is replaced by small stock, and vice versa, a conversion factor is stipulated.

(b) Previous reluctance to serve directions with regard to the construction of soil conservation works is addressed. Adequate supplementation is therefore provided.

(c) Provisions in terms of the maintenance of constructed conservation works had previously excluded successors from this responsibility. An obligation to include successors in title is proposed.

3.8 POLICY AND LEGISLATIVE RESPONSES TO SOIL EROSION: 1980 - 1992

3.8.1 Soil Conservation Policy (1980 - 1992)

Public awareness of soil erosion and the implications of this awareness was very much greater before the implementation of the 1969 Soil Conservation Act compared to the period preceding the introduction of the 1946 Act (refer to Section 5.3.2 for details). The provisions offered in the 1969 Soil Conservation Act equipped farmers with the power to establish (at their own initiative), soil conservation committees (Fuggle & Rabie, 1992). Under the 1946 Act, the Department of Agriculture established these automatically, with or without the consent of the farmer. The

anticipated positive response from farmers anticipated with regard to this arrangement was never realised.

Five subsequent amendments to the 1969 Act failed to rectify perceived inadequacies of the Act (Adler, 1985). In the 1980s, prompted by the continued deterioration of agricultural resources in the country, the State instituted a programme which was aimed at the rationalization of environmental legislation. This culminated in a critical evaluation of contemporary soil conservation legislation (Verster *et al.* 1992), and eventually to the promulgation of the Conservation of Agricultural Resources Act No.43 of 1983. This act was acclaimed to herald a new era in agriculture and was enthusiastically and optimistically received and passed in parliament (Hansard 1983, col.4856-57).

Severe drought conditions experienced particularly during the period 1983 to 1985 (Camp, 1991), was the impetus which drew attention to the extent of degradation in the country. The National Grazing Strategy was declared in 1985 and its objectives focussed mainly on the problem of veld management, that is, identification of problems and implementation of action to improve the situation, the overreaching objective being "to develop and manage the veld in the Republic of South Africa to gain the greatest sustained benefit for the present generation, while maintaining the production potential for the benefit of future generations" (Camp, 1991).

Concerns regarding the rate at which agricultural land was being lost to non-agricultural usage increased throughout the 1980s and gave rise to the introduction of the Land Conversion Scheme in 1986 for wheat farmers in the winter rainfall areas and in 1987, a similar scheme was established in the summer cropping areas (Department of Agricultural Development, 1991). Two additional schemes were introduced which aimed to reduce the excessive dependence on dryland summer rainfall cropping regions and wheat cultivation in the winter rainfall region, by converting cultivated marginal land to land under perennial pasture crops. These schemes came into effect in 1987 and 1989 respectively (Department of Agricultural Development, 1991).

The promotion of soil conservation and educational campaigns concerning soil erosion continued up to the 1990s, with the organisation of conferences, such as

'Man: Endangered Species?', a Veld Trust initiative in 1985, and 'Save Our Soil' (Veld Trust, 1990). A further stimulus was the government's 'White Paper on the Agricultural Policy of the Republic of South Africa', tabled in parliament in May 1984. This was an official declaration of the State's agricultural policy (Adler, 1985). Whilst the policy of optimum resource use was initiated in the 1970s (refer to Section 3.7.1 for details), the concept of optimum soil use was stressed in this paper and indeed the first of eleven production goals detailed in this publication, was the "striving towards optimum use of natural agricultural resources" (Adler, 1985).

An upsurge in public interest reflected generally an increased awareness of deterioration in environmental quality as a result of various development and population pressures (Rabie & Glazewski, 1990). This gave rise to the enactment of the Environment Conservation Act No.100 of 1982, which was later replaced by the Environment Conservation Act No.73 of 1989, and in 1983 the establishment of the Council for the Environment, under its revised role as a statutory advisory body to the Minister of Environment Affairs (Rabie & Glazewski, 1990; Rabie & Fuggle, 1992).

The theme for World Environment Day in 1991 was 'Soil is Life', and a poster and a number of soil conservation fact sheets were prepared and distributed by the Department of Environment Affairs.

3.8.2 **Legislative Response (1980 - 1992)**

The conclusion of an effort by the State to evaluate contemporary soil conservation legislation, with a view to rationalisation of laws, was the repeal of the Weeds Act 42 of 1937 (as well as its Amendment Acts of 1939, 1964 and 1969), all but Part IV of the Soil Conservation Act 76 of 1969 (which was subsequently repealed by the Forest Act 122 of 1984 - see below for details) (together with its Amendment Acts of 1971 (1 and 2), 1973, 1974 and 1977), section 82 of the Expropriation Act of 1975, and the enactment of the Conservation of Agricultural Resources Act No.43 of 1983 (Hansard 1983, col.4812; Looser, 1985; Verster *et al.* 1992).

The principal objective of The Conservation of Agricultural Resources Act is to provide for the effective utilisation of natural agricultural resources of the Republic,

in order to promote the conservation of soil, water resources and vegetation. This was to be achieved by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water resources, and by the protection of the vegetation and the combating of weeds and invader plants (Section 3) (Department of Environment Affairs, 1993). The consolidation of all measures concerning soil utilization and conservation and the transfer from the Minister to a functionary of the power to make general day-to-day decisions is the principal means utilised in the Act in order to achieve its defined objectives. Assistance by the State is provided in the form of schemes, intended to help the "conservation-minded rather than wasteful, exploitive farmers" (Verster *et al.* 1992). Such schemes are published in the *Government Gazette*. Payment of subsidies may be made in respect of:

1. the construction of soil conservation works;
2. the reparation of damage to the natural agricultural resources or soil conservation works which has been caused by flood or any other disaster caused by natural forces;
3. the reduction of the number of animals being kept on land in order to restrict the detrimental effect of a drought on that land;
4. the restoration or reclamation of eroded, disturbed, denuded or damaged land;
5. the planting and cultivation of particular crops which improve soil fertility or counteract the vulnerability of soil to erosion;
6. the combating of weeds or invader plants;
7. the performance or omission of anything else which the Minister may deem necessary or expedient in order to achieve the objects of the Act.

Control measures provided for by the Act may relate to the restoration or reclamation of eroded land or land that is otherwise disturbed or denuded, and the construction, maintenance, alteration or removal of soil conservation works or other structures on land (Department of Environment Affairs, 1993). A number of control measures were prescribed by regulation (Part 1 GN R1048 of 25 May 1984) and these relate to:

1. the cultivation of virgin soil (Regulation 2);
2. the cultivation of land with a certain slope (Regulation 3);

3. the protection of cultivated land against erosion through the action of water (Regulation 4);
4. the protection of cultivated land against wind erosion (Regulation 5);
5. the prevention of waterlogging and salinization of irrigated land (Regulation 6);
6. the utilization and protection of vleis, marshes, water sponges and water courses (Regulation 7);
7. regulating the flow pattern of run-off water (Regulation 8);
8. the utilization and protection of vegetation (Regulation 9);
9. the grazing capacity of veld (Regulation 10);
10. the maximum number and kind of animals that may be kept on the veld (Regulation 11);
11. the prevention and control of veld fires (Regulation 12);
12. the restoration and reclamation of eroded land (Regulation 13);
13. ... of disturbed or denuded land (Regulation 14);
14. the protection of water sources against pollution on account of farming practices;
15. the construction, maintenance, alteration or removal of soil conservation works or other structures on land.

Any land user who (a) refuses to receive a directive served on him in the prescribed manner, or (b) refuses or fails to comply with a directive binding on him, shall be guilty of an offence (Section 7 (6a & b).

The Forest Act 72 of 1968, and Part IV of the Soil Conservation Act 76 of 1969 (concerning the prevention and combating of veld, forest and mountain fires), were simultaneously repealed and replaced by The Forest Act 122 of 1984. This Act provided for the protection, management and utilisation of forests; the protection of certain plant and animal life; the regulation of trade in forest produce and the prevention and combating of veld, forest and mountain fires (Department of Environment Affairs, 1993). In terms of soil conservation, the Act provided for:

1. the protection of trees on private land, wherein trees could be declared protected for the purpose of preventing soil erosion, sand drift, reclamation of the soil or drift sand (Section 13);

2. the setting aside of state forests as nature reserves (Section 15 (1)(a)(i));
3. ... or as wilderness areas (Section 15 (1)(a)(ii));
4. regulations, under certain circumstances, to be made in respect of state forests, prohibiting the grazing of stock or the cutting of forest produce in order to prevent soil erosion or sand drift, or in order to reclaim soil or drift sands (Section 73 (1)(a)(xiv)-(xv));
5. regulations may be made regarding state forests as to the grazing of animals and the manner in which pasturage shall be used (Section 73 (1)(a)(v));
6. ... and as to the clearing, breaking up or cultivation of land (Section 73 (1)(a)(vi) (Fuggle & Rabie, 1992; Department of Environment Affairs, 1993).

In 1985, Regional Services Councils were established in terms of the Regional Services Councils Act 109. These councils which were appointed by an administrator, were charged with an environmental conservation function in respect of the region over which it was assigned jurisdiction.

The Environment Conservation Act No.100 of 1982 and its subsequent revision, the Environment Conservation Act No.73 of 1989, has been described as the government's most significant attempt to address the conservation of environmental resources in a holistic manner (Verster *et al.* 1992), and thereby constitutes a major milestone in the development of environmental law in South Africa (Rabie & Glazewski, 1990). The Act provides generally for the effective protection and controlled utilisation of the environment and as such provides for the authoritative determination of an environmental policy which requires the compliance of all administrative bodies. The Council for the Environment, established under Section 4 of the Act, in its advisory capacity, assists the Minister of Environment Affairs on matters relating to policy and other matters. A newly established body, the Committee for Environmental Management (Section 12), is not only responsible for the coordination and promotion of compliance with the Act's provisions, but also advises the Director General: Environment Affairs on issues affecting activities that relate to the protection and utilisation of the environment (Section 13). Whilst soil conservation is not provided for directly in terms of this Act, under Section 21 of the Act, the Minister of Environment Affairs is empowered to identify activities that may have a substantial detrimental effect on the environment, or more specifically, natural

resources (defined as "any raw material obtained from nature and includes soil, air, water and minerals"). Activities identified include resource development, resource renewal and resource removal; it is logical to assume that activities promoting soil loss or denudation, would qualify as such an activity and under Section 22, a fine may be imposed not exceeding R100 000 and/or 10 years imprisonment (Department of Environment Affairs, 1993). Further, regulations may be made concerning the repair of damage to the environment by unauthorised activities (Section 27). Other activities identified in the Act as having the potential to detrimentally effect the environment and exercise some influence on erosional activity, include:

(a) land use and transformation;
(b) water use and disposal;
(c) agricultural processes;
(d) transportation; and
(e) recreation (Section 21).

In terms of the House of Representatives Rural Areas Act No.9 of 1987, provision is made for the control, improvement and development of rural areas and settlements and disposal of land in these areas. The Board of Management is empowered to make regulations concerning provisions for the management, control and protection of all grazing and land vested in the board or under its control, and for prohibiting or restricting the disfiguring of lands or other natural features (Department of Environment Affairs, 1993).

3.9 LOCAL GOVERNMENT LEGISLATION

Originally, in terms of the Soil Conservation Act No.76 of 1969, soil conservation fell outside the jurisdiction of local authorities (Rabie, 1976) The Soil Conservation Amendment Act No.21 of 1974 rectified this shortcoming. Relevant examples of local government ordinances which make provision for local authorities to make bylaws for the conservation of commonages, thus providing for the control of soil erosion at a microlevel, include:

- Section 80(62), (65) and (110) of the Transvaal Local Government Ordinance 17 of 1939;

- Section 132 and 146(13) and (37) of the OFS Local Government Ordinance 8 of 1962;
- Section 197(1)(d) and (1)(i)(iii) of the Natal Local Government Ordinance 21 of 1942;
- Section 241(37, (69) and (71) of the Cape Municipal Ordinance 19 of 1951; and
- Section 215(27) and (35) of the Cape Divisional Councils Ordinance 15 of 1952.

3.10 LEGISLATION APPLICABLE IN BLACK FARMING AREAS

None of the aforementioned legislation described was applied in land designated as Black farming areas, that is, under the jurisdiction of the South African Native/Development Trust tribal lands and reserves and scheduled areas set aside for future incorporation in reserves or 'homeland' areas. Attempts to deal with erosion took place principally in terms of "betterment" policy applied through the offices of the Native Affairs Department (Garland *et al.* 1994). The Soil Conservation Act 45 of 1946, whilst supposed to be uniformly applicable to both White and Black farming areas, by verbal agreement and implicit understanding between ministers, was never applied or enforced in black areas (see Section 5.4.3.2 for discussion on preferential policy treatment). The Forest and Veld Conservation Act 13 of 1941, together with the Soil Conservation Act 76 of 1969, and the Conservation of Agricultural Resources Act of 1983, all contain provisions which explicitly exclude application in black areas; that is, until the Abolition of Racially Based Land Measures Act No.108 of 1991, which made the Act applicable in SADT areas, but still excluded self-governing territories (Cowling & Olivier, 1992).

Black (tribal) authorities were established and their functions detailed in terms of the Black Authorities Act 68 of 1951. This Act gave statutory recognition to the traditional black political and administrative structures. Regional authorities were empowered to provide for the construction and maintenance of infrastructure for preventing or combating soil erosion.

Legislative provisions pertaining to soil conservation in Black areas are enacted in terms of the Native Administration Act No.38 of 1927, the Bantu Homelands Constitution Act No.21 of 1971 and various proclamations made by the State President (Rabie, 1976). Instituted in terms of the National States Constitution Act

21 of 1971, Transkei and Ciskei, formulated legislation to address soil erosion. No such legislation was enacted in Venda or Bophuthatswana up to 1990. The Self-Governing Territories Constitution Act 21 of 1971 provided for the establishment of legislative assemblies and executive councils in black areas. In terms of the powers provided to legislative assemblies, provision was made for the formulation of Acts to be made relating to:

- infrastructure for the purpose of preventing and combating soil erosion;
- the conservation and utilisation of water sources and resources; and
- nature conservation.

The Transkei Constitution Act No.48 of 1963, provided for the legislative assembly to enact soil and veld conservation laws for the Transkei (Rabie, 1976). In addition, it could further amend or repeal any Act promulgated by the South African parliament. For example, the Transkei Agricultural Development Act No.10 of 1966 (amended by Act No.7 of 1969), provides for the extensive control of soil erosion (Rabie, 1976), effected by application of soil conservation schemes. [Note: This Act repealed the Soil Conservation Act of 1946.] Where a landowner fails to comply with the provisions of such schemes, the government may provide for the conservation or reclamation of private land. Subsidies are made available to landowners compelled to apply soil conservation schemes proclaimed by government and provision is also made for the expropriation of land for the purposes of soil conservation in terms of this Act (Rabie, 1976). In effect, these provisions are very similar to those issued in the Acts described in Sections 3.4.2 and 3.6.2. Similarly, compliance with the Act's provisions is effected through criminal sanctions. Where an individual is prosecuted in terms of the Act for contravening provisions relating to livestock and grazing control, in addition to imposing the relevant penalty, the individual in question is required to remove the livestock from the area; failure to comply will result in forfeiture to the government of this livestock. In a case where expropriated land has been utilised, in addition to the normal penalty imposed for such contraventions, individuals may also be physically removed by police (Rabie, 1976).

The Ciskeian Agricultural Development Act No.5 of 1973, is the only piece of Ciskeian legislation enacted to promote soil conservation, the provisions of which

reflect those of the Transkeian legislation detailed above (Rabie, 1976). According to Trollope (1974) the implementation of veld rehabilitation schemes provided for in terms of the Black Authorities Act 68 of 1951, since their inception in 1959, have significantly controlled the extent of erosion in this region.

The most important proclamation aimed at regulating soil erosion control in Black areas was the Proclamation 116 of 1949 (Ross, 1967), which was later repealed by the Betterment Areas Proclamation R196 of 1967. The principal objective of these proclamations concerned the restriction of the number of cattle units and grazing control in betterment areas (de Wet, 1990). Technical guidance and practical assistance in the application of improved farming methods, was further provided (Ross, 1967; Rabie, 1976; Garland *et al.* 1994). The Bantu Affairs Commissioner of a given area, assisted by an advisory committee consisting of taxpayers resident in the declared betterment area, enforced these provisions and was empowered to make rules in respect of the method and manner of land cultivation and for the reclamation of land or the prevention of soil erosion. Expropriation of land considered necessary for the prevention of soil erosion was also provided for by this proclamation (Rabie, 1976).

In terms of the Bantu Trust and Land Act 18 of 1936, the State President was permitted to make regulations with regard to Black areas for the:

(a) combating and prevention of soil erosion;
(b) limitation and control of livestock in relation to pastoral resources;
(c) prevention of veld fires; and
(d) subdivision of land (Rabie, 1976).

Other proclamations containing provisions that addressed the control of soil erosion in Black areas were:

- The Control of Stock on Trust Land Proclamation R198 of 1967 (made provision for the control of stock and grazing restrictions);
- The General Agricultural Proclamation R197 of 1967 (provision was made in terms of the prescription of contour ploughing and control of veld burning);

- The Protection of Works Proclamation R199 of 1967 (made provision for the protection of soil reclamation or conservation works);
- The Trust Forest Regulations R191 of 1967 (provision was made for the general protection of vegetation in forests for the conservation of water supplies and prevention of soil erosion).

The Promotion of the Economic Development of National States Act 46 of 1968, provided principally for structures aimed at promoting economic development in the national states. The powers entrusted to the newly established Corporation for Economic Development, allowed for the planning and carrying out of projects that relate to the exploitation, development or utilisation of a natural resource, which by implication, provided for the utilisation of soil as a natural resource.

3.11 GENERAL CONCLUSION

Beinart (1984) in his consideration of South African soil conservation policy, concludes that the development of official conservation thinking over the decades was neither a "knee-jerk" reaction to alarmist literature of the 1930s, nor to developments internationally such as the American 'Dust Bowl' experience (see Chapter 5 for further discussion), nor was it "purely an excuse for re-organising South African rural society for more effective political control". Rather, it had "at least some of its roots in pre-twentieth century deliberations" (Garland *et al.* 1994) and has evolved over a period of time in response to a range of influences and changing circumstances within social, political, historical, economic and physical systems.

CHAPTER FOUR

SOUTH AFRICAN SOIL CONSERVATION POLICY ANALYSIS 1:
Introduction and legislative and institutional framework

4.1 INTRODUCTION

In an attempt to place South African soil conservation policy in a global context, international expectations for soil conservation (as defined in the stated objectives of the World Soils Policy), were used as the standard against which South African policy was assessed in this research. The World Soils Policy, formulated and approved at an international meeting sponsored by UNEP, FAO and UNESCO, and subsequently endorsed by UNEP's Governing Council, in 1982, stipulates a number of principles considered fundamental in combatting the related problems of soil erosion and degradation.

Having collected all available information and presented a review of the relevant South African conservation policy and associated legislation in chapter 3, an analysis of this legislation will be undertaken, in this and the two succeeding chapters, using the World Soils Policy (WSP) as a baseline. Given the comprehensive nature of this policy's prescriptions for effective soil conservation, the analysis will be undertaken in 3 parts. Part one (this chapter) deals with the extent to which South African policy meets the legislative and institutional requirements defined in the WSP. The second and third parts (chapters 5 and 6) of the analysis deal with the remaining elements or objectives of the WSP.

4.2 SOIL CONSERVATION POLICY - A GLOBAL PERSPECTIVE

In this section, the WSP objectives are briefly outlined (UNEP, 1982). In particular, the prescribed demands "required of all national governments" committed to soil conservation are presented.

The objectives of the World Soils Policy have been summarised as follows (UNEP, 1982):

In recognition of the fact that soil is a finite resource, and that continuously increasing demands are being placed on this resource to feed, clothe, house and provide energy for a growing world population and to provide worldwide ecological balance, the Governments of the nations of the world agree to use their soils on the basis of sound principles of resource management, to enhance soil productivity, to prevent soil erosion and degradation, and to reduce the loss of good farmland to non-farm purposes .

Eight principles aimed at attaining these objectives were prescribed in this policy. They may be summarised as follows (UNEP, 1982):

1. To increase and apply scientific knowledge of the soils of the world with a view to increasing their potential for production and undertaking their sound management;
2. To encourage and assist countries in improving the productivity and management of their soils and in reducing soil degradation;
3. To encourage the management and conservation of soil, reduce pollution, and improve the quality of water and air;
4. To develop and promote agricultural production systems that assure the use of the soil on a sustained basis;
5. To enlarge and improve the world's supply of arable agricultural land through irrigation, flood control, and reclamation;
6. To slow the loss of productive agricultural and forest land to other purposes;
7. To monitor changes in soil quantity and quality and in land use;
8. To bring to the attention of the people of the world, and their political leaders in particular, the extent of world soil degradation and its seriousness, its causes and its remedies.

The policy was formulated for the attention of and subsequent implementation by:

(a) international and regional organisations, such as UNEP, FAO and UNESCO, who share responsibilities in promoting and supporting the international and regional activities suggested;

(b) national governments and non-governmental organizations "without whose support the recommendations cannot be carried out"; and

(c) individuals who, conscious of their individual and collective responsibilities for safeguarding soil, water and related resources, are willing to lend support to the principles of a World Soils Policy (UNEP, 1982).

In order to achieve the stated aims of this policy, comprehensive objectives were outlined by the compilers, with regard to what was expected of the three participating groups (UNEP, FAO, UNESCO). Twelve guidelines to be followed by national governments, were established which were considered necessary if the policy's aims were to be met. These are outlined below and will be used as the framework within which this study's analysis of South African soil conservation policy will be undertaken.

All national governments are expected to achieve each of the following 12 objectives.

1. Commit themselves to the sound use of land and water resources;
2. Develop a land-use policy and the necessary legislative framework to implement it;
3. Increase awareness among all sections of the community of the problems caused by the loss of productive soil and of the need for prompt action;
4. Identify, map and assess the potentials and constraints of soil resources, map current land use, assess the present extent of soil degradation, predict foreseeable hazards and develop methods for their prevention;
5. Adapt soil capability classifications and methods of land evaluation to local conditions;
6. Develop programmes to ensure the availability and wise application of fertilizers and other actions appropriate to the improvement and sustained use of the soil;
7. Establish an adequate legislative and institutional framework for monitoring and supervising soil conservation development and management;

8. Impose obligations on users, with the aim of ensuring the most rational use of land, through the use of tax exemptions, subsidies, credit facilities and other types of financial devices;
9. Train an adequately paid professional cadre of extension workers to assist farmers in managing soil and water resources effectively;
10. Establish and fund programmes, where needed, for reafforestation, irrigation, and reclamation of saline, flooded or other land not presently productive;
11. Actively pursue research needed to develop systems of farming that combine adequate production with resource protection and are compatible with socio-economic and cultural conditions;
12. Help develop local institutions to secure the leadership, assistance and cooperation of farmers in applying soil and water improvement and conservation practices. Provide an adequate programme of environmental education in support of resource management activities (UNEP, 1982).

Scrutiny of this list of objectives indicates that the World Soils Policy adopts a multidisciplinary approach to soil conservation issues and, rather than adopting a purely physical or agricultural production focus, it recognises and gives consideration to a multiplicity of factors within both the physical and socio-economic systems.

The following section and succeeding chapters review South African soil policy against each of these objectives.

4.3 LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

Schwella and Muller (1992) propose that to a large degree, the ultimate success of environmental administration in a country will be dependent upon the legislative framework within which policy objectives are translated into legal mandates for implementation by various prescribed authorities. This is confirmed by Harker and Michalson (1980) and is furthermore reflected in Objective 7 of the World Soils Policy which requires that national governments committed to the conservation of soil resources within their borders must: *establish an adequate legislative and institutional framework for monitoring and supervising soil conservation development and management.* Furthermore, objective 1 of this policy requires, the commitment of

national governments *to the sound use of land and water resources,* and implies the necessity for an holistic approach to resource management. Since both are clearly related, they will be discussed together under this section.

In this section South African policy and the legislative machinery created to implement and enforce it, will be evaluated against these two requirements. In order to accomplish this, four pieces of legislation, enacted to directly address soil erosion in the country, were specifically selected and subjected to close scrutiny. These are:

1. Forest and Veld Conservation Act No.13 of 1941
2. Soil Conservation Act No.45 of 1946
3. Soil Conservation Act No.76 of 1969
4. Conservation of Agricultural Resources Act No.43 of 1983.

Blaikie (1985) asserted that South Africa should be considered one of the more advanced of all developing countries of the world, in terms of having the legislative capacity to address soil erosion and promote conservation of resources. From the detail presented in Chapter 3, with regard to the volume of enactments passed to address soil erosion, it could be assumed that this proposition is true. Nonetheless, two factors exist which immediately negate such a claim. The first refers to the fact that despite such legislative provisions, control of soil erosion in African Trust Lands, has been repeatedly and specifically excluded from these provisions, and, secondly, tangible evidence exists to support the perception that the percentage of land in the country under threat from erosion is increasing, and related production levels are at an all time low in South Africa. It might be assumed that the country possessed the legislative capacity and political will or commitment required to rectify the soil erosion problem manifest, soil conservation goals would by now have been realised.

In chapter 3, a review of soil conservation policy and legislation in the Republic since the Union of South Africa, was provided, which in effect outlines the legislative framework which has been evolving in South Africa over a period of eight decades, for the purpose of monitoring, supervising and managing soil loss and environmental degradation. The results of this study suggest that despite the apparent wealth of laws on the statute book, soil conservation cannot yet be acclaimed a nationally

recognised priority, nor has it been recognised as such by all those operating within the agricultural/rural sector, in the past, or at present.

Dreyfus and Ingram (1976) conclude that policy performance generally falls short of policy promise and that ambitious and creatively innovative intentions "boldly stated in the preambles of legislation become diluted and deferred in the practical chore of translating what legislatures say into what government does". They further propose that the causes of this so-called 'performance gap' are numerous and policy expectations are in general rarely realised, especially in the context of proposing innovative change which is more likely "to face frustration in application" (Dreyfus & Ingram, 1976). In the context of this chapter's objectives, it is argued that this inconsistency which is acknowledged to be universally inherent between policy intent and practice could be a function of the capabilities and proficiency of the legislative framework and institutional structures established to translate policy objectives into legal mandates for implementation. In other words, if the perceived "general rule" proposed by Dreyfus and Ingram (1976) that targets and goals of policy formulators recede as the implementors take over, it is suggested that such an effect could be alleviated by strengthening the institutional framework.

Cortner (1976) believes that the context and orientation of the legislative process is ordinarily "remedial": it aims to correct an ill or to restructure or replace a sagging institution. This is confirmed in the results presented in Chapter 3 and will be further demonstrated in this chapter, wherein it is evident from the analysis of the evolutionary course of South African soil conservation policy that perceived shortcomings and inadequacies of current legislation were repeatedly being addressed by the policy formulators in subsequent enactments in attempts to rectify these "ills" or deficiencies. In a sense it could be argued that such an action constituted an unofficial, informal, policy audit. According to Blaikie (1985) one reason for the failure of some countries in the developing world to effectively control soil erosion, is the failure of governments to recognise that effective legislation, notwithstanding their potential capacity to implement, is an important area of institutional strengthening that is imperative for the future success of soil conservation.

Another factor attributing to the failure to effectively control soil erosion relates to the fact that many statutes in place in, for example, Kenya, Zambia, Zimbabwe and

Tanzania, date from the colonial British administration. They may therefore reflect perceived-to-be "outdated" priorities and cannot possibly take cognisance of temporal changes within respective environments. In many instances they have received only minor redrafting by post-colonial governments (Blaikie, 1985). The same factors cannot be applied in the South African context. Despite the concession that in certain areas of the country increases in soil erosion have been minimised and occasionally soil losses reduced (Scotney, 1978b; Blaikie, 1985; Watson, 1990), this is not a national phenomenon and therefore policy objectives have not been realised. Factors other than outdated colonially-based policies must be sought to account for this and these will subsequently be discussed in this chapter, with further deliberation in chapters 5 and 6. With regard to the holistic nature of agricultural resource management in the country, this study further aims to illustrate the inadequacy of the established legislative framework to comply with this requirement of the World Soils Policy, until relatively recent times.

Whilst the tangible effects of soil erosion on the landscape were evident and in many instances documented as early as the 16th century, the situation was not identified as having attained hazard proportions until nearly 200 years later (Garland *et al.*, 1994). From this time, a great many laws on the statute books indirectly or otherwise, made provision for soil erosion and its attendant effects. (See Chapter 3 for examples). By analysing these four Acts considered to be most comprehensive in addressing the issue of soil conservation in South Africa, an attempt will be made to: (a) determine the adequacy of the legislative and institutional framework which has evolved in this country for this purpose, and (b) to evaluate to what extent this framework succeeds in its predetermined goal of "monitoring and supervising soil conservation development and management" (UNEP, 1982).

4.3.1. Forest and Veld Conservation Act 13 of 1941: Background Assessment

The foundations for soil conservation practice were laid in the period 1910 to 1939, with an emphasis on environmental education and increasing public awareness of soil erosion. (Refer to sections 3.3.1 and 5.3.2 for more details.) This eventually paved the way for the enactment of The Forest and Veld Conservation Act of 1941 (refer to Sections 3.3.1 and 3.3.2).

As early as 1914, a report published in March of the same year by the Select Committee on Droughts, Rainfall and Soil Erosion (SC 2-1914) (Section 3.3.1), recommended that:

1. soil erosion control should be administered from a central office;
2. schools and general public should be informed of the problem;
3. fencing, construction of dams, afforestation and regrassing should be encouraged;
4. control should be exercised over veld-burning and road and railway construction (Rabie, 1976).

In 1929, prompted by a recommendation of the Drought Investigation Commission (1923) that action was required by the state to increase awareness of the soil erosion problem at a national level, the government organised a Soil Erosion Conference, in Pretoria (Adler, 1985). As a consequence of a healthy interchange of ideas between various State departments and other groups and individuals already committed to conservation efforts, a proposal to establish a permanent Soil Erosion Advisory Council, under the control of the Department of Agriculture, was put forward. The Council was formed in 1930 and by 1933 a number of soil erosion schemes were established providing subsidies for anti-erosion practices (Adler, 1985). By 1938, Soil Conservation Committees, set up in response to repeated requests for such a body prior to and during the conference, involved an estimated 540 farmers, established in 220 districts (Rabie, 1976). [This number increased to more than 800 by 1967, which according to Ross (1967), constituted approximately "the whole of the private farm lands of the Republic", as measured at that time.] The Division of Soil and Veld Conservation, controlled by the Department of Agriculture, was further created towards the latter part of 1939 (Adler, 1985), in an attempt to control all activities associated with the conservation of soil and veld and also the expropriation and protection of mountain catchments.

Recommendations advanced by the Drought Investigation Commission, (their report was published in October 1923, see Section 3.3.1 for details), resulted in the establishment of the Agricultural Extension Service in 1925. [The role of the service is discussed in sections 6.4 and 6.4.1.]

A number of non-statutory, institutional structures provided the apparent foundation for the sound promotion and practice of soil conservation during the 1930s. Only 10 per cent of farmers availed themselves of financial aid schemes [administered by the Soil Erosion Advisory Council] (Hansard 1946, col.8266). Adler (1985) ascribed this disappointing response to the subduing effect of the economic depression which had engulfed the world, and this scenario was subsequently reinforced by World War II. Moreover, Adler (1985) reported an increase in the exploitation of natural resources during the war years. Indeed in 1947, the Director of Soil Conservation and Extension reported that "all the destructive practices that give rise to erosion are still rife in farming today".

The Unbeneficial Occupation of Farms Act No.29 of 1937 made provision for the appropriation and allotment of land which was not being beneficially occupied for farming purposes or from which the occupant(s) did not derive a sufficient income to enable them to maintain a reasonable standard of living (that is, combined with any other source of income) (Verster *et al.* 1992). This act could proved useful in combatting the erosion problem, however, as no 'machinery' was established to enforce the act, in practise it was not implemented. The act was subsequently repealed by the Abolition of Racially Based Land Measures Act No.109 of 1991, and as there now exists no legislatory control of unbeneficial occupation of agricultural land, this in effect renders such lands more vulnerable to exploitation or mismanagement leading potentially to further degradation. This example illustrates the importance of institutional structures within a legislative framework for effective implementation of policy.

Against this background, the Forest and Veld Conservation Act 13 of 1941 was tabled and passed in parliament. This Act has been described in the literature as South Africa's first tangible attempt to provide for soil conservation (Rabie, 1976) (see Section 3.4.2), with sections 4 and 5 of the Act's chapter one, providing specifically for the control of soil erosion (Hansard 1941, col.2086-2106). The principal measures defined in the Act provided, *inter alia*, for the acquisition, tenure, demarcation and regulation of forests, and trade in forest products. The conservation of soil and water are implicitly provided for under Section 4 of the Act which reads

"expropriation of land (by the Governor-General) for forests and 'certain other purposes'" (Hansard 1941, col.2087).

4.3.1.1 **Institutional Structures: Forest and Veld Act of 1941**

No provision was made in this Act to establish new statutory structures within which to "monitor and supervise soil conservation development and management". However, local soil erosion committees, established with support from the Soil Erosion Advisory Council until its dissolution in 1933, remained functional and continued to promote forest and veld conservation.

4.3.1.2 **Discussion: Forest and Veld Act of 1941**

In terms of the extent to which soil conservation was prioritized in the country and in addition, commitment afforded to the "sound use of land and water resources" this Act reflected the government's apparent concern at this time for the realities of the situation. Parliamentarians were seemingly united concerning the timely passing and necessity for the various provisions within the Act (col.2092, Hansard, 3 February 1941).

Decisions made in the process of formulating policy (which by implication influence the ultimate effectiveness of the policy in question), require the balancing of legal requirements, and/or technical considerations, and/or the need for political consensus (Clark, 1992). Yaffee (1982, cited in Clark 1992) asserted that agency (or institutional) decisions are founded on a "mix of science, art, and politics". An understanding therefore of the forces operative within the South African political arena at this time, that is prior to the 1948 election of the National Party, is an essential prerequisite to (a) understanding the complexities and subtleties of the policy process evolving in the country at this time, and (b) the implications *vis-a-vis* government priorities. From the literature reviewed it would appear that the South African government at this time prioritized the conservation of forest and veld before soil conservation, despite propaganda attempts by various agencies to place soil conservation foremost on political agendas. Within the constraints of this study and in terms of its objectives, the political environment can only be examined

superficially. In evaluating the Forest and Veld Act of 1941, a number of factors have been identified to explain this situation.

(a) The emphasis of this Act appears to have been rooted on the importance of particular provisions pertaining to, for example, control of deforestation and veld burning, and neglects measures providing more specifically for soil conservation (Hansard 1941, col.2095). This permits the assumption that soil erosion and the consequences of soil loss, were not yet acknowledged on the scale required to promote the cause to national importance, and was certainly not perceived to be as important as the conservation of State forestry. By implication, soil conservation did not warrant priority attention in terms of allocating resources for its effective implementation (Hansard 1941, col.2095-96). From the parliamentary discussions reviewed, it would appear that economics provided the impetus for the enactment of this piece of legislation, and that as yet the impact of soil erosion on the economy of the agricultural sector [despite direct losses to farmers amounting to £16 million, see Section 3.3.1], had not been perceived to be on a scale comparable to that concerning State forestry. This conclusion is supported by the motivation provided by the Minister of Agriculture and Forestry, in his parliamentary speech (Hansard 1941, col.2086-2088), concerning the need for the Forest and Veld Conservation Bill to be passed expediently. He emphasized the scale of operations in the sector, in particular, the extent of investments, coupled with the growth of the industry (3 423 000 acres of Crown forest estate, 500 000 acres of privately owned wattle forests and 300 000 acres of eucalyptus) and its increasing value and contribution to GDP (collectively £18 100 000 in terms of annual revenue) (Hansard 1941, col.2086-2088).

(b) The provision made under Section 4 of the Act, which refers to the reclamation of land (that is, land could be expropriated by the Governor General for the purposes of soil conservation), was evaluated as inadequate in terms of soil erosion control and loss, by the Reconstruction Committee in their report (GP-S-9278) published in 1943. Their criticism stemmed from an emphasis on the correction of soil erosion rather than its prevention or conservation.

The report of the Drought Investigation Commission (UG 49-'23) had been acclaimed in the past, a "classic" in the field of soil conservation in this country.

Pioneering investigations into soil erosion, this report was considered to be the first attempt at a "coordinated analysis of the fundamental shortcomings in agricultural land use" (Rabie, 1976). The committee focussed on, *inter alia*: rainfall; kraaling of stock; overstocking; water supply; and soil erosion (Section 3.3.1). In their consideration of drought impacts they concluded that "the position demands the earnest attention and, if need be, intervention of the State" and with regard to the soil, as a "limited and irreplaceable quantity ...we are morally and economically bound to conserve it ... it is the greatest national asset" (Drought Investigation Commission, 1923). The report further stressed the extent of erosion evident in the African reserves, and claimed this was due to mismanagement of the land. It was probably on the basis of this report that current perceptions concerning land use in the country were founded (see sections 1.2 and 3.3.1). Be that as it may, it is important to note, that despite the extensive nature of the investigation undertaken, the two issues emphasized (a) the importance of soil as a non-renewable resource and the country's "greatest asset", and (b) the need to attend to soil erosion in African reserves, were not addressed within the legislation and structures established at this time in terms of the Act.

A Report of the Committee on Forests presented at the Empire Forestry Conference in 1935 (Department of Agriculture and Forestry, 1935), in defensive opposition to the suggestion that the government's policy of afforestation had had a detrimental effect on the general water supply, emphasized the importance of combining engineering operations with afforestation to combat cases of extensive gullying established in parts of the country. Afforestation was perceived by the Department to be a means of increasing the economic value of land, whilst at the same time addressing problems relating to faulty veld management and consequential soil erosion.

The State's response, on the other hand, did not reflect similar recognition. In terms of the provisions made for the protection of the veld and forest lands from fires in the Act of 1941, no reference was made to the consequences of such malpractice in terms of soil loss particularly, or environmental degradation in general (col.2098, Hansard, 3 February 1941). Issues raised in the context of this Act related to "native" activities and the impacts of these activities with regard to deforestation (col.2096), microclimate and vegetation cover and its influence on deforestation (col.2098). At

no time during parliamentary debates, were the consequences of soil erosion and provision for its prevention discussed. Thus government officials had clearly failed in their deliberations (a) to recognise soil conservation as a major problem warranting the State's priority support and intervention and (b) to take into account the need to address agricultural resource management from an holistic perspective.

4.3.2 Soil Conservation Act 45 of 1946: Background Assessment

The mid- to late 1940s has been described in the literature as a period of "awakening" with regard to the soil erosion problem, with concerted efforts from agencies such as the Division of Soil and Veld Conservation and the National Veld Trust (NVT). The NVT, a non-governmental organisation, has since its establishment in 1944, remained active in promoting soil conservation to the present time (Adler, 1985), although activities were periodically curtailed by resource constraints (Robertson, 1975). The ravages of war had a "sobering effect" on the South African people, which, according to Adler (1985), resulted in effectively raising to conscious levels the importance of natural resources, such as soil, and their protection. There was increasing pressure to introduce new legislation in order to address the problem (Grobler, 1967; Rowland, 1974). Calls for statutory enablement to address soil erosion were made (Hansard, 1946; 1983). Evidence exists to suggest that many farmers and certain State officials were becoming increasingly aware of the consequences of soil erosion and the need for effective control. Farmer demands for greater autonomy and flexibility in implementing conservation schemes prior to the enactment of the 1946 Act, and the fact that in many instances conservation initiatives had already been undertaken "eagerly" and voluntarily by a number of "progressive farmers" (Hansard 1946, col.8262-8266) confirms such claims.

In contrast, however, it might be suggested that reduced levels of productivity, decreased net profits, rising costs in production inputs, together with an overall decrease in contribution to GDP (South African Communication Service, 1992), constituted the real source of agriculturalist concern rather than an increased environmental consciousness and desire to conserve natural resources, as inferred from Adler's claims (1985). In the Minister of Agriculture and Forestry's introduction to the second reading of the Soil Conservation Bill in parliament, he ascribed the status of soil erosion to an overemphasis on economic production, with

little consideration for the permanency of agriculture (Hansard 1946, col.8259). During the same speech, the Minister coined the slogan "No social security without soil security" (Hansard 1946, col.8260) and called for stability in agriculture through stabilised land use practices (Hansard 1946, col.8261). The Minister acknowledged that a great deal of land abuse could be ascribed to economic pressure, the chief reasons for which he identified as: firstly, inflated land values, with resultant overcapitalisation, often accompanied by excessive mortgage debts; secondly, sub-economic size of farm-holdings; and thirdly, inequitable prices of farm products compared to costs of production (Hansard 1946, col.8260-8262). Costs due to direct and indirect damage caused by soil erosion were estimated to run into millions of pounds annually (Hansard 1946, col.8259). The Minister further claimed that as a result of propaganda articles published by Government officials and the progress made in terms of the State's conservation programme provided for under the Forest and Veld Conservation Act No.13 of 1941, "the country as a whole is definitely erosion-conscious" (Hansard 1946, col.8264) and the time was right to introduce new legislation to promote conservation farming. It was against this background that 1946 saw the promulgation of the Soil Conservation Act No.45 and the establishment of the Division of Soil Conservation and Extension in the Department of Agriculture, the responsibility of which was to oversee the execution of the various provisions of the Act.

Sections of the Act which provided for the structured and more highly regulated control of soil erosion and conservation-related activities, include the following:

1. Establishment of a Soil Conservation Board (Section 3);
2. Declaration of soil conservation districts (on application of farmers in a particular area) (Section 9);
3. Establishment of soil conservation district committees (in accordance with newly declared soil conservation districts) (Section 10);
4. Preparation of soil conservation schemes (by newly established district committees (Sections 13(a) and 16);
5. Establishment of fire protection committees (Section 15);
6. Establishment of soil conservation areas (Sections 26 and 27);
7. Expropriation of land for soil conservation and reclamation purposes (Section 28) (Rabie, 1976; Fuggle & Rabie, 1992).

Attempts were also made to address the inadequacies (outlined in Sections 4.3.1.1 and 4.3.1.2) (Hansard 1946, col.8257-8344; Annual Report of the Secretary for Agriculture, 31 August 1946; Report of the Reconstruction Committee (GP-S-9278) 1943). These were subsequently debated and analysed, and resultant revisions incorporated in the drafting of the new Soil Conservation Act No.45 in 1946 (Section 4.3.2).

4.3.2.1 **Institutional Structures: Soil Conservation Act of 1946**

The main provisions of this Act as outlined in Sections 3.4.2 and 4.3.2 above, in effect illustrate the comprehensive nature of the institutional framework established under this Act, aimed at "monitoring and supervising soil conservation development and management". Representation on and structure of each of the bodies established will now be discussed in an attempt to evaluate their effectiveness in meeting the objectives of the task for which they were established.

As an appointed representative statutory body, the *Soil Conservation Board* was required to "advise and assist the Minister on all matters relating to the conservation of natural resources", ensuring "proper coordination of soil conservation activity among the various State Departments, the farming community, and other bodies or agencies concerned" (Hansard, 1946). The Board was also assigned a number of specific tasks which entailed: (a) the recommendation of soil conservation schemes where considered necessary or as proclaimed by the Minister (this entailed the preparation of a detailed scheme or farm plan for each individual farm in a given district); (b) examination of draft schemes; (c) inspection of scheme operations; (d) consideration of applications and proposals for establishing soil conservation districts and soil conservation areas; (e) expropriation of land within and outside conservation districts and areas, in terms of the provisions of the Act.

Representation on the Soil Conservation Board comprised ministers from a number of government departments concerned with various aspects of land use. The objective of such a constitution was to ensure cooperation and coordination in conservation efforts at ministerial level (Hansard 1946, col.8276-8277; Rabie, 1976): a move which can only be considered as a significant advance reflecting commitment

to effecting conservation goals. Clauses 2 and 3 of the Bill detail the composition of the Board. The Chairman of the Board was the Secretary for Agriculture. Other members included the Secretary for Lands, Secretary for Native Affairs, Director of Irrigation, Director of Forestry and the Director of Soil Conservation and Extension, with a total of 15 persons in all (Hansard 1946, col.8277).

A number of criticisms were, however, advanced regarding the size and composition of the Board by numerous parliamentarians, the justification for which was that it comprised largely government officials, with little representation from the farming community itself. Insufficient representation from the various provinces on the Board was forwarded as a further criticism (Hansard 1946, col.8941-8942). The Board's credibility and its potential acceptance by landowners, was for these reasons seriously questioned (Hansard, 1946).

Soil Conservation District Committees comprised mainly farmers of a particular soil conservation district, and their responsibilities included: (a) the preparation of a soil conservation scheme for its own district; (b) collation of the consent or objections of the various land owners located within a given defined district; (c) enforcement of the provisions made within soil conservation schemes; (d) performance of an advisory function with regard to conservation and related matters.

A *soil conservation scheme* took the form of a detailed plan which outlined comprehensive procedures for the reclamation of land. Land could be reclaimed or expropriated (a) if it had been degraded as a result of soil erosion or (b) for the purpose of preventing further soil erosion, or (c) for purpose of general conservation, protection and improvement of soil, veld and water resources (Rabie, 1976). Details of land use practices and methods promoting conservation were detailed in these schemes. Provisions were also made for (a) the withdrawal of land from cultivation or and/or grazing, for the same purpose for given time periods, (b) the restriction of number and kinds of livestock permitted to graze on a plot of land, and (c) the control of veldburning. An important distinction was made between soil conservation measures and soil conservation works, both provided for in terms of the soil conservation schemes. A "measure" related to a prescribed system or method of land use, whereas "works" referred more specifically to actual mechanical structures constructed on a plot of land covered by a particular conservation scheme. This

distinction is significant as, in terms of contravening a provision to erect or construct conservation *works*, prosecution proceedings could not be applied. Only where farmers failed to comply with provisions relating to conservation *measures* were owners or occupiers of land guilty of an offence (Hansard 1946, col.8319).

A number of problems were identified from the literature reviewed with regard to the problems experienced in serving schemes on landowners and Rabie (1976) ascribes this to the generalised nature of conservation schemes, in an evaluation of environmental law in South Africa. Each soil conservation district comprised numerous farms, all of which were incorporated into one district. Officials could in no way visit every individual farm in a given district (Hansard 1946, col.8317). In addition, district schemes were compiled by the Soil Conservation Board, and not district committees, which raised concerns among farmers regarding the suitability of schemes and their utility in terms of microlevel application (Hansard 1946, col.8316). Furthermore, these district schemes were expected to address diverse needs and conditions pertaining to individual farms, a situation which often proved non-conducive to attaining the high expectations of the State regarding the application of these schemes (Hansard, 1946). Other problems with respect to the functioning of district committees, included (a) the fact that many committees did not actively pursue the provisions of conservation schemes (an understaffed division of the Department of Agriculture was responsible for organising meetings and encourage involvement in schemes), and (b) there was a serious shortage of professional and technical support staff (Rabie, 1976) (refer to Chapter 6 for further discussion). For example, Kaleski (cited in Rabie 1976), provided the example where, one district comprising 1 350 farmers was allocated one soil conservation extension officer, the duties of whom included, *inter alia*, the execution of conservation surveys and the preparation of farm plans for the assigned district.]

The formulation of the 1946 Act was founded on a draft Model Bill entitled "The Veld and Soil Conservation Act", prepared and submitted to the government by the National Veld Trust. This was based largely on American prototypes (Hansard 1946, col.8269). The Trust recommended that provision should be made for the creation of a National Soil Conservation Authority (similar to the Tennessee Valley Authority, a tried, tested and successful body in America that combats soil erosion). They further proposed that this authority should be a completely autonomous body which would

assume full responsibility for a national programme of soil conservation, administer its own funds, and appoint and remunerate personnel in accordance with their own specifications (Hansard 1946, col.8268). The Trust further recommended that this central authority would be responsible for dividing the entire country into conservation districts and that each district would have its own committee with full responsibility for conservation in its area. The establishment of conservation districts and associated committees, as provided for under the 1946 Act, were therefore in accordance with the Trust's recommendations. The establishment of an autonomous, non-statutory, central authority was nevertheless considered inappropriate and "unacceptable" (Hansard 1946, col.8270). [The issue of centralised control of conservation resources is one which is repeatedly raised over the ensuing decades.] A non-statutory body, the Soil Protection Advisory Board (the members of which were appointed by the Minister), was eventually appointed, but without executive powers, and served only an advisory function.

4.3.2.2 **Discussion: Soil Conservation Act of 1946**

The principal objectives of the new Act of 1946 aimed to (a) prevent soil erosion rather than correcting it through reclamation, and (b) providing a comprehensive institutional framework established for the control of these actions. As such the Act addressed the serious shortcomings of its predecessor, the Forest and Veld Conservation Act of 1941. Furthermore, the Act made comprehensive provision to involve farmers. A field conservation and advisory service was established, and soil conservation districts and associated committees were to be established (that is at their request and with the support of farmers). In addition, soil conservation schemes were to be prepared and subsequently enforced by district committees (although the functions of these committees were dependent on the initiative of farmers) (Hansard 1946, col.8271). In essence, the new Act therefore (a) provided a basis for cooperation between the State and farming community, a necessary precondition for enhancing the ability of the Act to attain its prescribed goals; (b) afforded the farmer the freedom to initiate conservation farming without relying solely on State intervention (Fuggle & Rabie, 1992) and (c) provided farmers with an opportunity to practise proactive conservation farming (rather than corrective conservation).

In addition, the Act made significant provision for the conservation of vegetation and water resources, thereby acknowledging, the importance of holistic resource management. A vigorous national campaign to promote soil conservation was considered by the State to be a prerequisite for the success of the Act (Hansard 1946, col.8267), and the provisions of this Act, were intended to provide statutory enablement for a campaign of such magnitude (Hansard 1946). These undertakings by the State, together with the corrective measures introduced suggest a serious increase in the government's commitment to soil conservation at this time. However, grievances concerning the institutional structures and framework established by government to achieve conservation objectives, persisted as significant obstacles to reforms in agricultural practice.

An additional criticism that was vociferously directed at government, challenging the sincerity of its commitment to conservation, refers to the repeated requests made prior to the promulgation of the 1946 Act, for the State to stipulate the extent and limits of financial assistance to be made available for soil conservation (Hansard, 1946). Examples, such as the case of Italy (which was considered to be a "relatively poor" nation), were quoted in parliamentary sessions to illustrate the level of commitment demonstrated by other nations in addressing soil erosion (Hansard 1946, col.8286). For example, a total of £40 million was spent by the Italian government on soil conservation between the years 1929 and 1933 (£26 million on conservation, reclamation and protection, and £14 million on subsidies) (Hansard 1946, col.8286-8287). Still, the South African government refused to comply with these requests and conceded only in the preparation of estimates of costs and proposed aid (Hansard, 1946). This may raise a question concerning the extent of the South African government's real commitment (in financial terms) to soil conservation.

4.3.3 **Soil Conservation Act 76 of 1969: Background Assessment**

From a review of a number of reports by Directors of Soil Conservation of the Department of Agriculture, scientists and extension officers (Adler, 1985) and the Division of Soil Conservation and Extension (1959), the Department of Agriculture concluded that 90 per cent of the total white/commercial farm land had been proclaimed Soil Conservation Districts and a total of 14 457 farm plans were prepared and applied. Although much progress was thus achieved with regard to

long-term plans and projects involving soil conservation, little evidence existed in terms of biological recovery of the soil or the application of improved land use methods (Division of Soil Conservation and Extension, 1959). This would suggest that the anticipated mobilisation and support of farmers and their commitment to conservation at a national level, was yet to be achieved.

Table 4.1 details the progress made in terms of the first 10 years of the 1946 Act. [This was in spite of deterioration in an additional 40 per cent of mountain catchments being recorded since a Report on the Conservation of Mountain Catchments published in 1960 (Adler, 1985)]. (Also refer to Table 4.7 for a summary of state expenditure/progress in respect of soil erosion 1930 to 1992.)

Penzhorn (undated) (former Chief, Field Services, Department of Agricultural Technical Services) reported that by 1960 the number of soil conservation districts proclaimed had increased to 691, which constituted an area of 94 300 000 morgen. An additional 22 district conservation schemes had been served on landowners in soil conservation districts (that is, 597 in total since the enactment of the 1946 Act) and 16,750 detailed farm plans had been prepared and applied to individual farms. The progress achieved was therefore considered to be "highly satisfactory" especially in respect of the rate of progress over the previous five years (Penzhorn, undated). Although this did not refute the fact that erosion and desiccation had been brought under control on many individual farms as a result of improved methods of land use and other measures, in many parts of the country "these evils are still rife and even on the increase" (Penzhorn, undated).

Table 4.1 Total Developments in Soil Conservation - 1948*-1958

Soil Conservation Districts proclaimed	666
Total area covered by s.c. districts (morgen approx.+)	90 491 843
Above area as % of European farming area (%) approx.)	90
No. of farms in the above s.c. districts	106 839
No. of landowners in the above s.c. districts	74 438
District conservations schemes served on the above	579
Detailed farm plans prepared and applied	14 457
Value of farmer-works approved for construction	£15 219 355
Value of farmer-works completed	£8 583 741
Subsidies and rebates to farmers for completed works (approx.)	£3 000 000
Value of State-works approved for construction	£1 169 281
Value of State-works completed	£772 792
Soil Conservation Areas proclaimed	8
Total area of s.c. Areas (morgen approx.)	2 500 000
Fire Protection Committees established	30
Total area served by Fire Protection Committees (morgen approx.)	2 500 000
Grants to Fire Protection Committees (approx.)	£150 000

Source: Division of Soil Conservation and Extension (1959)

Note: * Although the Act came into operation in 1946, financial regulations for the Act were finally approved in 1948, from which time the Act began functioning.

\+ 1 morgen = 2,2 acres (approximately) or 0,84 hectares.

By 1969, further progress had been achieved in that a total of 577 000 farmers' works had been approved (at a cost of R81 million), but a total of only 269 000 had actually been completed (at a cost of R44 million), constituting approximately 50 per cent of proposed efforts. The 1969 Act was considered to have been too idealistic in its attempts to be democratic, thereby failing to take cognisance of the "realities of the soil erosion situation" and once again a call was made for the Act to be substantially amended to meet the needs and demands of conservation farming (Hansard 1969, col.6049; Fruit Technology Research Institute, 1973).

A number of factors were identified as responsible for limiting the anticipated success of the 1946 Act. These included: (a) the limited availability of professional and technical staff to implement various provisions such as, the design and application of farm plans in designated soil conservation districts, coupled with (b) the State's implicit policy of persuasion rather than prosecution, (c) the persistence of drought (which had peaked between 1960 and 1961 (Rabie, 1976), and (d) (despite earlier claims of an educated nation), inadequate levels of awareness nationally (Hansard 1969, col.5898-5904). In 1969 therefore, the Soil Conservation Act No.76 was formulated to address the shortcomings of previously enacted soil conservation legislation and this Act came into effect in 1970. Substantial amendments were made to the 1946 Act and significant new provisions formulated. These are subsequently discussed under sections 4.3.3.1, 4.3.3.2, and in chapters 5 and 6.

4.3.3.1 **Institutional Structures: Soil Conservation Act of 1969**

The Soil Conservation Board was replaced by a national advisory soil conservation board, called the Soil Protection Advisory Board (Rabie, 1976). This was a non-statutory body, assigned only advisory powers, the members of which were appointed by the Minister after consultation with the South African Agricultural Union. As a non-statutory body no provision was made for this authority in the Act. Regional Advisory Committees were also created for all seven of the country's ecological regions, the task of which was to transmit advice and information to Regional Directors and soil conservation committees concerning optimal land use and soil utilisation (Hansard, 1969).

Under section 9 of the Act, former soil conservation district committees were dissolved and replaced by soil conservation committees. With the Extension Service already in place, it was possible to address specific problems in specific areas (Fuggle & Rabie, 1992). These new committees now acted in an advisory capacity only, and their former powers were conferred on a newly created executive body, the Division of Soil Protection of the Department of Agriculture (Fuggle & Rabie, 1992). [Note: some documents refer to the Division of Soil Conservation]. This division was assigned an inspectorate which acted with executive authority. Members of these committees were no longer elected by the landowners themselves, but were appointed by the Minister after consultation with the South African Agricultural Union (the support and cooperation of which was consistently sought and considered imperative in terms of the successful administration of the Act). Conservation committees were required to work closely and in cooperation with government officials and extension officers, on every aspect relating to the promotion of sound conservation practice and in addition, to provide assistance and advice to farmers.

Soil conservation schemes were no longer compiled by district committees at their discretion. Plans were to be drawn up by way of directions in the *Government Gazette*, by declaration of the Minister of Agriculture, and after consultation with conservation committees in specific districts (Section 1). Through a notice placed in the *Government Gazette* or written notice to a landowner or resident, the Minister of Agriculture was able to declare a specific course of action relevant to a specific area (Fuggle & Rabie,1992)]. (See Section 3.6.2 for specific details concerning directions the Minister was empowered to give). Directions were then carried out utilising the assistance and support of conservation committees and extension workers. Therefore, whilst the powers of the Minister largely mirrored those provided for under the terms of the 1946 Act, with regard to enforcement, executive authority to ensure compliance with declarations, was re-assigned to the Division of Soil Protection and was no longer the responsibility of conservation committees. The above amendments and provisions under the new Act aimed at stricter regulation of controls (see Section 6.3 on enforcement, incentives and soil erosion).

4.3.3.2 **Discussion: Soil Conservation Act of 1969**

The Division of Soil Conservation and Extension estimated that in 1946, the cost of restoring the devastation wreaked by soil erosion on agricultural lands, had been in the region of R200 million. By 1966 this figure had risen to R600 million (Hansard, 1969). Mounting concern regarding the growing extent of land areas adversely affected by soil erosion, had prompted The Division of Soil Conservation and Extension, to embark on an exercise to evaluate what progress had been made in the first ten years of the Soil Conservation Act of 1946 (see Section 4.3.3 and Table 4.1 for details of developments 1948-1958). Their report was published in 1959. Regional Directors of soil conservation committees, were requested to report fully on farming conditions in their respective regions by means of comparing prevailing conditions with those ten years previously. Many aspects of conservation farming were reported on and this permitted the Division to, *inter alia*, assess the rate at which farm plans had been prepared over the period 1946-1958 (Table 4.2). They concluded that despite the apparent increase annually in the output of farm plans, a severe shortage of extension staff and engineers, would continue to limit progress in terms of the 1946 Act and in particular, progress with regard to implementing the plans prepared (Division of Soil Conservation and Extension, 1959; Adler, 1981).

Table 4.2 Number of farm plans served nationwide (annually)

1946 - 52	1 860	(5 year period)
1952 - 53	1 586	(in 1 year)
1953 - 54	1 353	(down 123 on previous year)
1954 - 55	1 839	(up 486 on previous year)
1955 - 56	2 062	(up 223 on previous year)
1956 - 57	2 844	(up 782 on previous year)
1957 - 58	2 913	(up 69 on previous year)
Total	14 457	

Source: Division of Soil Conservation and Extension, Department of Agriculture, 1959.

It was for this reason that the government, in an attempt to accelerate progress on the conservation front, justified the publication of farm plans declared by the Minister, in the *Government Gazette*, in order to alleviate the time-consuming nature of the previous procedure provided for under the 1946 Act, which had required district committees to draw up and serve detailed farm schemes to the respective farmers. The move also succeeded in accentuating repeated previous criticism of the extent of the Minister of Agriculture's powers (Hansard, 1946; 1969), (refer to Section 5.3.3.1 for further discussion), which was subsequently shown to negatively impact on the potential mobilisation of farmers and their incentive to practise conservation strategies.

In its Report of the Select Committee on Droughts, Rainfall and Soil Erosion, back in 1914 (details in Section 4.3.1), Senate recommended control of soil erosion from a central office. The National Veld Trust, in their preparation of the Model Bill in 1945, had made the strongest recommendation to establish an independent, multi-racial (Clarke, 1974), national body, assigned sole responsibility for soil conservation in the country (Robertson, 1975). The proposed task of such a body was to initiate and coordinate research, formulate rules and establish an inspectorate to enforce conservation standards. The name recommended for the body was to be the Bureau of Ecological Standards, or BEST (Robertson, undated(a)). With the enactment of the 1969 Act, together with five subsequent amendments (Adler, 1985), a great many shortcomings of earlier legislation and policy initiatives were addressed with tremendous expectations and a number of parliamentarians and members of the farming fraternity were optimistic that the need for such a body would finally be recognised by the State. Still, the issue concerning centralised control of conservation endeavours, by an autonomous body, never appeared on the government's agenda. Indeed, today nearly 80 years later, the government has not conceded to this request or recommendation.

When challenged on the issue of staff shortages to implement provisions of the new Act, the government indicated that much had been achieved in this regard (Hansard 1969, col.5954). Special provisions had been made at universities for the training of extension officers; part time technicians had been appointed; and training provided for soil conservation committee members. By 1969, a total of 1 858 and 1 000 members had received basic and advanced training, respectively (Hansard 1969, col.5954).

The government refused therefore to accept full responsibility for manpower shortages. On the subject of increasing the salaries for professional and technical staff as an incentive to attract personnel to the available posts, the Minister of Agriculture stated during a parliamentary session, that the agricultural sector could not possibly offer the financial enticements afforded in commerce and industry (Hansard 1969, 5954-5955). It would appear therefore that limited progress was made on this front.

Renewed interest in conservation farming was, however, aroused and it attained apparently unprecedented levels, as a result of, *inter alia*, regional guidelines drawn up under the provisions of the 1969 Act (Adler, 1985), which contributed to widespread regional planning and concerted efforts on the part of the farming community to arrest soil erosion. According to SARCCUS records, progress in conservation and land use planning in South Africa since 1946, was to be commended (Rowland, 1974). Table 4.3 details the progress recorded in terms of conservation and land use planning for the period 1968-70. (See the figures provided by the Department of Soil and Agricultural Extension for the period 1948-58, for comparative purposes, Table 4.1). By 1980, 73 per cent of the Republic's total agricultural land was reported to have been planned in terms of the Act (Adler, 1981). Table 4.4 illustrates the extent of work still to be achieved in terms of erosion protection (Adler, 1981).

Table 4.3 Developments in conservation and land use planning (1968-1970) and total progress overall (1946-1970)

	Progress	
	1968-1970	Total since 1946
Soil conservation districts proclaimed	4	819
Area proclaimed as % of European land	1,37	98,22
District Conservation Schemes served	3	810
Farming units provided with maps and supplementary schedules	6 206	43 973
Total area of planned farms (ha)	4 848 924	50 441 024
Farming units on which physical planning has been completed	1 294	11 000
Total area on which physical planning has been completed (ha)	1 210 268	14 269 699
Value of farmer works approved for construction	R9 198 086	R74 823 539
Value of farmer works completed	R5 406 244	R40 610 460
Subsidies and rebates paid to farmers in in respect of completed works	R3 264 918	R17 709 817
Value of State works approved for construction (approx.)	R729 150	R4 652 951
Value of State works completed	R549 566	R4 008 532

Source: Rowland (1974).

Table 4.4 Arable land in White areas in May 1980 (hectares)

Region	Protected against erosion	No need for protection	Must still be protected	Total
Transvaal	420 000	200 000	2 380 000	3 000 000
Natal	400 000	-	300 000	700 000
Highveld	1 000 000	750 000	2 750 000	4 500 000
OFS	1 050 000	1 050 000	900 000	3 000 000
Karoo	-	-	-	-
Eastern Cape	204 700	101 400	75 900	382 000
Winter Rainfall	404 000	842 000	1 562 000	2 808 000
Total	3 478 700	2 943 400	7 967 900*	14 390 000

Source: Adapted from Adler (1981)

Note: * Refer to Section 1.1 for further details regarding suitability of this land for cultivation.

4.3.4 Conservation of Agricultural Resources Act 43 of 1983: Background Assessment

The momentum with which conservation farming had proceeded since the promulgation of the 1969 Act, diminished gradually from about 1977 (Adler, 1981; 1985). Even in 1974, SARCCUS (1974) reported that the "overall conservation picture [for South Africa] is by no means encouraging". Despite the success rate of many conservation projects and an increase in production levels on many farms, farm plan prescripts were not being practised ubiquitously and consequently deterioriation and erosion of the veld continued unabated. Subsidies paid on conservation work decreased from R7,2 million in 1977/78 to R2,5 million in 1978/79. Subsidies paid in respect of soil conservation works the year prior to the enactment of the Conservation of Agricultural Resources Act had increased to R4 million (Hansard 1982, col.551), and whilst this was more than actually budgeted (which was an

amount of R3 350 000, the balance being reportedly financed from savings on other items), this was still considerably less than in 1978. This is surprising given the increased awareness of the public generally, both nationally and internationally, of environmental issues, in particular environmental pollution and degradation of resources (Garland *et al.* 1994; Garland & Stocking, 1995). General awareness of conservation farming and good progress towards optimal utilisation of resources was acknowledged in parliament, but "the ideal has not yet been reached" (Hansard 1983, col.4812). Acts such as The Water Act 54 of 1956, The Forest Act 72 of 1968 and the Soil Conservation Act 76 of 1969, provided for the conservation of mountain catchment areas, but increasingly concern was expressed regarding the need for a more coordinated approach (Rabie, 1976). This concern culminated in the promulgation of The Mountain Catchment Areas Act 63 of 1970. To provide for centralized control the matter was entrusted to the Department of Forestry (Hansard, 9 September 1970 3708) (Fuggle & Rabie, 1983). Central government activity regarding environmental issues in general, was hastened by the appointment of a cabinet committee in January 1971 (Rabie, 1976) to investigate environmental pollution. Both pollution and environmental conservation were the topic of discussion in Senate (12 March, 1971) (Rabie, 1976) and in the House of Assembly (26 March, 1971) (Hansard, 1971). The outcome of the committee's report published in 1972, was the establishment of a permanent Cabinet Committee on Environment Conservation [chaired by the Minister of the Department of Planning and the Environment] (Rabie, 1976). Further, the South Africa Committee on Environment Conservation was appointed, the role of which was to advise the Cabinet Committee on "environmental issues" (Rabie, 1976). In 1975 this was renamed the Council for the Environment. Through the contributions of numerous working groups, constant attention is given to both pollution control and resource conservation, in particular, where insensitive development has given rise to environmental degradation (Council for the Environment, 1989).

In South Africa the economic plight of farmers, that is, an inability on their part to sustain production levels whilst the cost of production inputs continued to increase, and an ignorance on the part of the general public with regard to the complexities of agricultural production and economics (how can production levels be impaired when surpluses exist?) were the reasons postulated for the failure of conservation efforts at this time (Adler, 1985). Furthermore, a large percentage of arable land remained

unprotected against erosion "the consequence of which is the silting up of our country's dams and river estuaries", "the quality of grazing continues to deteriorate at a perceivable rate", "desertification increases in grazing areas" and there is an "increase in weeds and woody invasive plants particularly in bushveld areas" (Hansard 1983, col.4812). Despite state expenditure of over R130 million on promoting sound, conservation-conscious agricultural land use (Hansard 1983, col.4812; Verster *et al.* 1992), and the state's national awareness campaign of the previous decades, provided for under the Acts of 1946 and 1969, by 1983 the necessity for a new and more vigorous approach to soil conservation, requiring greater public participation was acknowledged.

A major criticism concerning the 1969 Act was its provision for solely corrective erosion measures (Hansard 1984, col.4934) and these measures were not always successfully applied (Fuggle & Rabie, 1992). By 1983, 14 million hectares of agricultural land remained unplanned and unprotected, as only 196 conservation committees had been set up since the enactment of the 1969 Act. Table 4.5 provides details of the number of farms in each ecological region that remained unplanned in terms of the Soil Conservation Act No.76 of 1969, at the end of 1983. This scenario, which depicted the retarded progress of conservation efforts, coupled with a government initiative to rationalize existing agricultural legislation, resulted in the repeal of the Soil Conservation Act 76 of 1969 (and the Weeds Act 42 of 1937, see Section 3.8.2 for details), and the tabling in parliament of the Conservation of Agricultural Resources Act No.43 of 1983 (Hansard, 1984).

The principal objective of this Act (refer to Section 3.8.2), in accordance with Section 3 of provisions of the Act, was the conservation of the natural agricultural resources of the Republic by maintaining the production potential of land whilst simultaneously protecting the vegetation and combating weeds and invader plants (Department of Environment Affairs, 1993). Despite being described as "basically a consolidation of existing measures" at the time, it adds a new dimension to them in that for the first time in the history or evolution of soil conservation, it deals with the "total spectrum of utilisation and conservation of natural agricultural resources" (Hansard 1983, col.4812-13), and as such marked a significant step forward in terms of meeting the objectives defined in the World Soils Policy.

Table 4.5 Farms per ecological region yet to be planned in terms of the Soil Conservation Act 76 of 1969

Ecological Region	No of farms
Highveld Region	7 049
Karoo Region	997
Natal Region	2 850
Eastern Cape Region	1 228
Free State Region	5 905
Winter Rainfall Region	5 785
Transvaal Region	35 348
Total to be planned	59 162

Source: Extracted and compiled from Hansard, 11 April 1984, col.922-923.

4.3.4.1 **Institutional Structures: Agricultural Resources Act of 1983**

In a concerted attempt to enlist support from the farming community (in recognition of failed previous endeavours to mobilise farmers' support) and members of Organised Agriculture, a Conservation Advisory Board was establised in terms of the Act (Section 17).

The Conservation Advisory Board (members of which are appointed by the Minister), has statutory recognition and consists of:

1. an executive officer (of the Department of Agriculture, designated by the Minister);
2. a second official of the same department (if considered necessary by the Minister);
3. one officer of the Department of Environment Affairs (nominated by the Minister of that department);
4. a fourth official nominated by the South African Agricultural Union;

5. one representative from each of the appointed regional committees.

The responsibility of the newly established Board is to advise the Minister on all matters relating to:

(a) the appropriateness of control measures issued by him with regard to a particular area;
(b) the desirability of establishing a proposed scheme and its provisions; and
(c) any other matter concerning the implementation of the Act or a scheme, or which it may deem necessary in order to achieve the Act's objectives or which the Minister may refer to for advice.

Besides the retention of local committees to promote the objectives of the Act, already in place from provisions of earlier legislation, the Act also provides for the establishment of Regional Conservation Committees, the members of which are appointed by the Minister of Agriculture (Hansard 1983, col.4813; Hansard 1984, col.2921). Furthermore, due to the extension of local committees' activities to include the total spectrum of the natural agricultural resources, they were to be known as conservation committees in the future (Hansard 1983, col.4812-13).

Regional Conservation Committees may be appointed by the Minister in any region deemed appropriate by him (Section 16) and comprise:

1. a regional director;
2. an officer of the Department in a specific region;
3. two representatives from each area within a particular region; and
4. one representative of each provincial agricultural union in the region (Section 16 (3)).

The principal strength of the structure of the Regional Conservation Committee seems to exist in its position as a coordinating body, and its ability to coordinate a cross-section of opinion. This was referred to as an important backbone of the committee and imperative for the application of the legislation (Hansard 1983, col.4853).

These committees are required to:

(a) provide advice to conservation committees (prior to this enactment they were referred to as local conservation committees) in the region relating to the conservation of all natural agricultural resources in their respective regions;

(b) advise the Department and Advisory Board on any matter arising from the implementation of the Act or a scheme in a given region, or which it may deem necessary in order to achieve the Act's objectives in a given region; and

(c) conduct any other duties in accordance with the provisions stipulated by the Minister (Section 16 (2)).

In terms of the 1969 Act, conservation committees (formerly district conservation committees) were established for specific areas by the Minister of Agriculture. Likewise, the establishment of regional conservation committees provided for in terms of this new Act (1983) were created on the initiative of the Minister, but were solely for areas considered necessary by him to meet the Act's objectives (Section 15). Members are appointed onto these committees by the Minister, on the basis of the extent of their knowledge and interest in the conservation of natural resources. The committee comprises:

1. two landusers in a given area;
2. a minimum of three additional persons - one of whom is to be nominated by the farmers' association, farmers' union or district agricultural union (Section 15 (3)).

In spite of the comprehensive nature of institutional structures provided for under the 1983 Act, which included most particularly the involvement of local communities to a greater extent then ever provided for previously (Hansard 1983, col.4836), and the implied increased potential of the Act to promote soil conservation, these measures have proved disappointing. In many parts of the country, committees have yet to be created, and in a great many instances, committees are being utilised for purposes other than conservation (for example, for the discussion of labour and farming problems) (Fuggle & Rabie, 1992). Possible explanations for this will be discussed in Section 4.3.4.2 and further analysed in chapters 5 and 6.

4.3.4.2 Discussion: Agricultural Resources Act of 1983

Paramount to the successful administration of any legislation is the existence of an adequate implementing workforce (refer to Chapter 6 for further information). This requirement has been repeatedly stressed since the enactment of the first legislation ever tabled in parliament to combat soil erosion (see Chapter 6) by the farming community, extension personnel and those persons involved in policy development, as well as politicans. The provisions of the Conservation of Agricultural Resources Act of 1983 are undoubtedly the most comprehensive concerning soil conservation in particular, and holistic in terms of agricultural resource management in general, since the turn of the century. Yet with a mere 14 inspectors appointed to serve the entire nation (Fuggle & Rabie, 1992), and an inadequate technical support system in place (see Section 6.4 for details), the major issue challenging the government of the 1980s and today in the 90s, is not how highly motivated members of the farming community might be, but that projects are destined to fail without the necessary assistance and advice concerning implementation of sound farming practice and legislative measures prescribed.

An investigation conducted by the Directorate of Resource Conservation revealed that for each town in South Africa, there should be a minimum of one technician to provide assistance in implementing legislative provisions, (larger towns require up to three) (Fuggle & Rabie, 1992). This requirement is not being met in South Africa. Demands placed on most technicians by cooperative, conservation-conscious and motivated farmers, are alleged to be such that when cases of soil or land abuse are reported to technicians, unavailable time or inadequate resources manifest in a no response situation. The private sector has been actively assisting extension and technical officers in attempts to rectify this situation. For example, the Sugar Association currently supplies technical support to assist State officers (Fuggle & Rabie, 1992). Notably farmers seeking similar support are required to pay for these services, whereas State advice is free. It is logical to assume therefore that only the more progressive, conservation-conscious farmers, or those who can afford the expense, will seek assistance of this kind.

A situation that further complicates this scenario of inadequacies in the support system, is the fact that technical support staff and inspectors are appointed by

different government departments (Fuggle and Rabie, 1992). The efforts and activities of each department will be dictated by resource constraints and the availability of personnel. Each member, will undoubtedly have a different perception with regard to how serious they consider the soil erosion problem in the country to be. Inevitably, the consequence will reflect a range of diverse departmentally-oriented priorities. Furthermore, Table 4.6 illustrates the frequency with which the portfolio assigned to the Department of Agriculture was altered throughout the study period. Revised responsibilities would inevitably have necessitated a re-examination of priorities. Under such conditions it seems logical to assume potential conflicts of interest may arise; a situation non-conducive to continuity in promoting a coordinated approach to soil conservation.

Table 4.6 Changing portfolios assigned to the Department of Agriculture

1906 - 1908	Natal Department of Agriculture and Mines
1908 - 1910	Natal Department of Agriculture
1910 - August 1934	Department of Agriculture
Sept 1934 - Sept 1945	Department of Agriculture and Forestry
Oct 1945 - June 1958	Department of Agriculture
July 1948 - 1980	Department of Agricultural Technical Services
	Department of Agricultural Economics and Marketing
	Department of Forestry
1980 - 1981	Department of Agriculture and Fisheries
1981 - 1984	Department of Agriculture
1984 - 1989	Department of Agriculture and Water Supply
1989 - 1992	Department of Agricultural Development

Source: Compiled from various texts.

In countries such as the United States of America, Japan, Switzerland, France and England, the response to the need for comprehensive coordination of the conservation of natural resources has been the creation of a Department of Environment. In South Africa this need was met by assigning to the Minister for the

Department of Planning and the Environment, a portfolio which included responsibility for coordinating the activities of those local, provincial and central government departments engaged in enforcing environmental laws. The fact that "environmental matters" constituted only one of four subdivisions of the Physical Planning Branch (one of 3 main divisions of the department) (Rabie, 1976), is surely indicative of the low priority afforded such concerns in this country.

Devolution of the Minister of Agriculture's powers were provided for in the 1983 Act. Authority for administrative processes and the power to make general day-to-day decisions was delegated to an official functionary (refer to Section 3.8.2), and comprehensive revision of institutional structures was aimed at providing increased support at a local level. This was done "without depriving the Minister of his overall responsibility and authority" (Hansard 1983, col.4813) and therefore did little to quell the debate and dissatisfaction with the extent of ministerial authority, and the issue therefore remains a source of grievance and a major stumbling block to mobilising the farming community in South Africa.

From the foregoing discussion, it seems conceivable that a solution to this problem of coordinating and prioritizing conservation efforts, would be the constitution of an autonomous, non-statutory controlling body, such as was first mooted in 1914 by the Select Committee on Droughts, Rainfall and Soil Erosion (refer to Section 4.3.1), further recommended by the National Veld Trust in their Model Bill of 1965 (Clarke, 1974), and proposed by Robertson (1975). The 1946 Soil Conservation Act made provision for the establishment of a Soil Protection Advisory Board, the members of which were to be appointed by the Minister. The board, however, had no executive authority and served only an advisory function. This was the closest South Africa ever got to having a "controlling body" with the potential to serve the agricultural community in the interests of soil conservation. The recommendations of Robertson (1975) and the National Veld Trust were not implemented, and furthermore were considered "unacceptable" (Hansard 1946, col.8270).

The issue concerning applicability of legislation must be considered here. Possibly the most significant deficiency of all the legislation enacted to control the erosion problem, must be the non-applicability of these laws to lands held by the former South African Development Trust, self-governing territories and independent states.

This has since been redressed by the provisions of the Abolition of Racially Based Land Measures Act No.108 of 1991, and the majority of lands have since become nationalised, but during the period of this study and in effect due to the current collapse of structures, such as local government, to date the enactments analysed have not been applied ubiquitously. This is despite the repeated calls in parliament made throughout the study period asking government to address this deficiency. As before, the issue was overlooked or unsatisfactorily justified (Hansard 1983, col.4836).

Finally, Verster *et al.* (1992), noted a definite conceptual shift in emphasis at this time, from controlling and protecting individual resources, such as soil, to a more integrated and holistic approach to management, as illustrated by the comprehensive nature of this legislation enacted. Inexplicably, until the enactment of the Conservation of Agricultural Resources Act, whilst an acknowledgement generally has been made concerning the interrelatedness of soil conservation and the management of water resources (Hansard 1985, col.4034), this was never translated into and provided for within the framework of legislation or institutional structuring. Craffert *et al.* (1995) claim that a holistic approach to resource management must be reflected in institutional structures. However, despite (i) the progress made in terms of soil conservation developments and state expenditure on soil conservation to date (tables 4.7, 4.8 and 4.9), (also refer to tables 4.1, 4.2 and 4.3 this chapter), and (ii) the extensive administrative machinery established to implement the Act (as described in this chapter), with insufficient law enforcement personnel (see Section 6.3), inadequate capacity to apply all the provisions of the Act, (for example, in terms of specifying the grazing capacity of each piece of farmland, Hansard 1983, col.4847), a lack of political and social will (see Section 6.3), and the extent of farmers' debt (see tables 5.2, 5.3 and 5.4) it is likely that the effectiveness of the Act's provisions will to a large extent be lost and annual rates of soil loss accelerated by anthropogenic influences estimated to currently occur, will continue unabated.

Table 4.7 A summary of indicators of state expenditure/progress in respect of soil erosion, 1930 - 1992

Date	Source	Expenditure/Progress
1930-46	Hansard (May 1946)	- **10%** of farmers availed themselves of financial aid (admin. by the Soil Erosion Advisory Council)]
1930-46	Rabie (1976)	- **R6 million** - State expenditure on soil erosion control under non-statutory soil erosion schemes (pre-1946 Act]
1930-46	Penzhorn (1972)	- **16** pasture research stations established with funding provided for by non-statutory soil erosion schemes
Up to 1938	Rabie (1976)	- Soil conservation committees established in response to farmer requests [involved participation of **540** farmers, in **220** soil conservation districts]
1941		***Forest and Veld Conservation Act No.13***
August 1946	Annual Rpt. of the Sec. for Agric. (1946)	- **5** conservation areas proclaimed [**1,404,612 ha**]
1946		***Soil Conservation Act No.45***
By 1959	Dept. of Agric. (1959)	- **90%** of total white/commercial land proclaimed conservation areas [**1,809,837 ha** = + 400,000 ha since 1946 estimate] - **14,457** farm plans prepared and applied - **666** conservation districts proclaimed [involved participation of **74,438** farmers = + 73,898 since 1938] - **8** conservation areas proclaimed [= + 3 since 1946]
1967	Ross (1967)	- **800** conservation districts proclaimed [= + 134 since 1959]
By 1969	Hansard (April 1969)	- 269,000 farmers soil conservation works completed at a cost of R44 million (= 50% of works approved)
1969		***Soil Conservation Act No.76***
	Hansard (April 1969)	- Re: staff training for conservation committee members: - 1,858 received basic training - 1,000 received advanced training - university courses for extension workers now available
By 1970	Rowland (1974) (SARCCUS records)	- **819** soil conservation districts proclaimed [= + 19 since 1967] = **98,2%** of white/commercial farmland - **43,973** farm plans prepared and delivered [= + 29,516 since 1959] = area of **50,5 mill ha**

Continued .../

Table 4.7 continued .../

By 1975	Scotney (1978a)	- nearly **50%** of all arable land protected by mechanical works
By 1977	Serfontein (1977)	- **55%** of approved soil conservation plans had been completed
By 1980	Adler (1981)	- **73%** of total agricultural land planned in terms of the 1969 Act
By 1982	Verster *et al.* (1992)	- **160** requests (out of possible 300) submitted to establish soil conservation committees provided for in terms of the 1969 Act.
Up to 1983	Hansard (April 1983)	- **R16** million = state expenditure on key conservation works erected in terms of the Act of 1969 - A further **196** conservation committees set up since 1969
1946-83	Hansard (April 1983) Verster *et al.* (1992)	- **R130** million = total state expenditure on erosion control (i.e. paid to farmers for conservation works or other measures)
1983		***Conservation of Agric. Resources Act No.43***
By 1989	Scotney & McPhee (1990)	- Approx. **R303** million spent on soil conservation schemes
1992	Dept. of Agric. Dev. (1992)	- Ongoing research - total of 92 projects (34 new) currently undertaken at universities alone

Note: Also refer to Table 6.6 for activities involving programmed extension 1990-92.
Sources: Various texts as listed.

Table 4.8 Particulars of soil conservation works and subsidies paid in 1989/90 and 1990/91

	1989/90		1990/91	
	No. works	Subsidy paid (R)	No. works	Subsidy paid (R)
Contour banks	1 701	1 703 432	1 163	1 632 809
Soil cons structures	82	500 199	129	792 601
Erosion fences	64	32 098	92	47 422
Drainage works	329	1 164 377	392	1432 688
Camp fences	2 012	418 047	1 519	296 345
Stockwatering systems	504	488 933	414	362 917
Flood relief schemes:				
Ordinary	26	28 164	11	77 857
Disaster	3 902	3 589 304	3 023	5 541 140
Bush control	588	866 471	436	638 065

Source: Department of Agricultural Development, Annual Report 1990 to 1991.

Table 4.9 Regional Soil Conservation Developments, 1990 to 1992

Developments in terms of:	Region	Details
Grazing Scheme:		
1990 - 1991	Winter Rainfall Highveld	- 28 000 ha newly estab. under pasture - potential grazing capacities calculated for 43 of 57 farming areas
Land Conversion Scheme:		
1990 - 1991	Highveld	- 3 676 applications for conversion of marginal croplands to pasture (= 305 942 ha) - actual conversions = 168 355 ha [>50%]
	Free State	- 62 446 ha established - [Total since 1987 = 111 800 ha]
	Natal	- 16 004 ha (in Dundee sub-region only)

Continued .../

Table 4.9 continued .../

Developments in terms of:	Region	Details
1991 - 1992	Highveld	- 5 195 applications for conversion of marginal croplands to pasture (= 466 287 ha) - actual conversions = 255 737 ha
	Free State	- 858 applications ... (= 129 168 ha) - total participation = 2 625 applications or (353 000 ha) - 176 480 ha established in total
Soil Conservation works:		
1990 - 1991	Highveld	- decrease on 1989-90 due to "weak financial position of farmers"
	E. Cape	- decrease - 634 approved (32% less than 1989-90) - value of subsidy R435 930
	Transvaal	- increase on 1989-90
	Free State	- decrease of 34% on 1989-90 - value of subsidy R1,8 million (completed works)*
	Winter Rainfall	- decrease of 12% on 1989-90 - value of subsidy R1,750,499 (completed works)*
1991 - 1992	Highveld	- increase on 1990-91 (of 41%) i.e. - approved 2 664 / completed 1 413
	Natal	- below average attention to works reported
	E. Cape	- increase on 1990-91 (of 44%) i.e. - approved 1 460 / completed 415
	Transvaal	- decrease reported
	Winter Rainfall	- increase of 88% on approved works (= 2 086) - increase of 51% on completed works (= 1 228)
Farm Planning:		
1990 - 1991	Karoo	- 216 660 ha (first plannings) - 988 300 ha (replannings and supplementary planning)
	Free State	- 171 000 ha (first plannings) - 982 700 ha (replannings and supplementary planning)
1991 - 1992	Free State	- increase of 46% on first plannings (= 249 660 ha) - increase of 26% on replannings etc. (= 1,2 mill ha)
	Natal	- 70 farm plans completed

Note: * Excludes flood relief schemes or other relief schemes.

Source: Compiled from regional departments of agriculture's annual reports, as presented in Department of Agricultural Development, 1991; 1992; and 1993.

Many government officials are of the opinion that the Environment Conservation Act of 1989, "will fail miserably in attaining its goals" (Hansard 1990, col.2551) due to deficiencies in the "machinery" and institutional structures established to administer it. "Successful execution of the Act's provisions and the enforcement of control measures, regardless of the institutional structures established to effect policy objectives, will ultimately depend on the measure of cooperation received from farmers, but also the officials of the department and 'other bodies' created to promote the cause" (Hansard 1983, col.4856-4857). The same can be said with regard to the Conservation of Agricultural Resources Act.

4.4 CONCLUDING COMMENT

Given that successive acts concluding with the Conservation of Agricultural Resources Act of 1983, have variously recognised the need for and contributed to the provision of an institutional framework to various degrees, it is clear that, reasons other than just the provision of a legislative framework and institutional structures aimed at implementing legislative provisions and regulations, and the monitoring and supervising of soil conservation development and management, must account for the recorded ineffectiveness of conservation efforts and initiatives in South Africa to mobilise the farming community as a whole. Chapters 5 and 6 develop this analysis further in an attempt to isolate responsible factors other than those already referenced, which may have inhibited progress in this regard and even accelerated rates of erosion in the country.

CHAPTER FIVE

SOUTH AFRICAN SOIL CONSERVATION POLICY ANALYSIS 2:
Awareness of soil erosion, and land use policies

5.1. INTRODUCTION

Having examined the legislative and institutional framework in Chapter 4, this chapter develops further the analysis of South African policy and selected legislative enactments so far undertaken, by examining (a) levels of State and public awareness of soil erosion as indicated in the literature reviewed for this study (which by necessity will require consideration of the dynamics operative within the perceptual environment), and (b) additional policies relating to land use and agricultural practice in general in South Africa (which will incorporate an appraisal of relevant historical developments and inherent legacies of government-initiated policies). These two subjects embrace three further components of the World Soils Policy, (defined in objectives two and three, and part 2 of objective 12, to be discussed in sections 5.3 and 5.4 this chapter). By their very nature both may be considered to be related and highly influential in determining the efficacy of soil conservation policy and practice in South Africa. For this reason they are examined together in this chapter and in isolation from the outstanding elements of the World Soils Policy, despite their interrelatedness with these. Each element is considered in turn and a general discussion concludes the chapter.

5.2 PERCEPTIONS AND DECISION MAKING

5.2.1 Introduction

Firstly, it must be noted that the rationale upon which this chapter in particular and the study in general has been based, postulates that:

of all the forces active in shaping ultimately the formulation of policy in South Africa, and which are consequently accountable for the success or otherwise of soil

conservation in the country, those within the perceptual environment are of paramount importance.

It is solely within this environment that reality is interpreted (see Section 5.2.3 for further discussion). Figure 1.5, the Soil Erosion Pyramid (referred to earlier in Chapter 1) depicts a number of dynamically interactive environments, identified as applicable to soil erosion generally, but more particularly relevant in the South African context, as responsible for ultimately shaping the policy environment and by implication the efficacy of policy formulated within that environment. The pyramid can be viewed as a broadly hierarchical scheme representing cascading variables within a number of dynamically interrelated environments. It is argued, that these variables ultimately shape the policy environment and influence the formulation of policy and its effectiveness in achieving its objectives. For this reason the policy environment sits at the apex of the pyramid. Further it can be argued (and will subsequently be explained in Section 5.2.3) that as the realities of soil erosion are interpreted and decisions made regarding its management through dynamics operative within the perceptual environment, this sits at the foundation of the soil conservation model. This establishes a need to refocus attention on the role of environmental perception and its influence on decision making and effecting policy objectives. This study suggests therefore that the attitudes, opinions (which may be described as the verbal expression of attitudes), and perceptions of government authorities, responsible for effecting change in the environment at a national, provincial, and local level, concerning the extent of the problem outlined, have played possibly the single, most significant role, in the formulation of policy and its administration, implementation and enforcement.

As Clark (1992) proposed: "developing a policy orientation starts with perception and needs". It is suggested that in the context of this study this refers to individuals' perceptions concerning the reality of the extent and causes of soil erosion in South Africa, and the compatibility of individuals' needs with such perceptions to effectively optimise problem solving. It is argued therefore that if individuals' perceptions and needs are not taken into consideration in the formulation of policy at its conception, then the chances of realising policy objectives must be significantly reduced. Evans (1993) asserts that "farmers take decisions in the context of their 'whole' situation, the complex of constraints within which they live, work and

produce". The multifaceted nature of these constraints is inferred from Evans' (1993) identification of constraints to include social, economic, cultural, religious, and technical, to which must be added the constraints of politics. [Refer to Duvel and Afful, 1994 for details of cultural constraints in subsistence farming in South Africa, also Erskine (undated) on traditional attitudes to agriculture and conservation in South Africa.] If farmers' problems are to be addressed "we need research into the complex of constraints" concludes Evans (1993); a dimension to decision making and problem solving in South Africa, it is suggested, that has been transparently overlooked. [Section 5.2.2 below develops this notion of needs further.]

Perception is an extremely complex concept (Downs, 1972). Eastwood (1992) notes that the *International Encyclopedia of the Social Sciences* presents more than fifty pages of discussion on the meaning of perception. As indicated in Chapter 1, a study of human perceptions can be an indisputably valuable tool in the understanding of real world decisions. Eastwood (1992) proposes, that unless seen as a contributory variable in decision making, perceptions will otherwise continue to be "an intriguing abstraction" rather than a practical tool to explain or elucidate our understanding of real world processes. Many authors agree that perceptions form an integral part of the decision making process (*inter alia*, Edwards & Tversky, 1967; Eastwood, 1992; Duvel, undated; Carr & Tait, 1990; Roux, 1990), and that agreement affords legitimacy to the rationale upon which this entire thesis is based.

Acknowledging the complexity of perception, Viljoen (1980) defines perception as "a phenomenal experience resulting from man-environment interactions and consisting of both a *source of information* (knowledge) about the environment and providing man with a *directive for action* in the environment. It is argued that both these elements and the relationship or interaction which exists between them, are of paramount importance in not only providing a more comprehensive and more fully-informed explanation of, for example, the complexity of the soil erosion problem, but also, in potentially providing the key to explaining why soil conservation policies have failed in the past to achieve conservation compliance. The failure or inability (due possibly to a lack of understanding) of scientists, decision-makers, policy formulators to recognise the critical relationship which exists between perceptions and human behaviour in the environment, and by implication, the role of environment perception in influencing human behaviour, could largely account for the inefficacy

of policy. Furthermore it is contended that as the sustained participation in conservation programmes is an essential prerequisite for redressing soil erosion and by implication critical for its prevention in South Africa, it is further advanced that an understanding of individuals' conceptions/perceptions of the problem, its causes, extent and solutions, should enhance the potential likelihood of realising such an objective.

5.2.2 Needs and Behavioural Change

MacVicar (1991) claims that a 'problem' experienced by a farming community or individual land user constitutes a 'need'. More specifically, problem perception can be defined as "the perceived discrepancy between the present situation and the desired situation", and this has been shown to be a key dimension in behavioural change or adoption behaviour (Haschke, 1995). If behavioural change is associated with movement, as is done by Lewin (1951) (refer to Chapter 1 for further details), then according to Duvel and Afful (1994), the causes or incentives of change can be attributed to forces with positive or driving forces leading towards change, and negative or restraining forces preventing it. It is argued then, that the needs or related goals or aspirations of land users represent major positive forces which may or may not ultimately give rise to behavioural change (Duvel & Afful, 1994). A study undertaken by Duvel and Afful (1994) examined stockowners' perceptions of their personal aspirations and goals with the intention of establishing whether or not these needs were compatible or reconcilable with improving veld management or stock reduction. The results of their study indicate that not only is need-compatibility (in the context of the principles of behavioural change) one of the most critical issues in adoption behaviour, but where recommended practices are rejected, the major causes can be expected to be found in the incompatibility with needs. They furthermore conclude that there is a tendency for farmers with lower stocking rates to be more aware of the advantages of stock reduction, for example, such as resting of camps and improved stock condition, and this suggests that knowledge of the advantages of an innovation or practice is a contributory factor to adoption behaviour (Duvel & Afful, 1994).

The variable 'knowledge' requires further explanation. According to Duvel (undated) knowledge that is relevant in innovation or behaviour adoption can be categorised as follows:

(a) basic knowledge or knowledge of principles;
(b) knowledge connected with the awareness of advantages (relative advantages); and
(c) knowledge in respect of the application of an innovation or practice (that is, practical knowledge).

In other words, it is not simply knowledge of a practical nature that influences practice or behaviour adoption, but from the point of view concerning the potential to motivate behaviour, according to Duvel (undated) a combination of (a) and (b) but more particularly knowledge of an innovation's relative advantages, is more important and recent research conducted in South Africa confirms this (Barlow & Nieuwoudt, in press; Barlow, Nieuwoudt & Levin, in press). Farmers investing their own capital when implementing soil conservation measures, and doing so without outside technical assistance, were more likely to perceive erosion as a problem worth resolving, and this is positively influenced by knowledge of erosion's adverse implications for agricultural productivity (as well as the inputs of extension officers in providing information on erosion) (Barlow *et al.* in press). Furthermore, Barlow and Nieuwoudt (in press) also propose that variables such as sufficient financial resources, as well as *inter alia*, farm enterprise types, farmers' willingness to invest their own capital in conservation activities (as above), awareness of erosion's adverse implications for agricultural productivity (as above), as well as conspicuous or visible erosion impacts, significantly affected the extent of behaviour adoption.

Duvel (1990), in an attempt to explain what he had observed as an apparent under-adoption of efficient conservation measures and/or the over-utilization of natural resources in agriculture, was interested in the concept of 'perceived' levels of production in the agricultural sector. He equates 'felt needs' with the difference or discrepancy between a perceived present level of production (or efficiency) (see Figure 5.1) and the perceived optimum level of production (or efficiency) (Koch, 1991). Figure 5.1 is a diagrammatic illustration of this concept. If the magnitude of

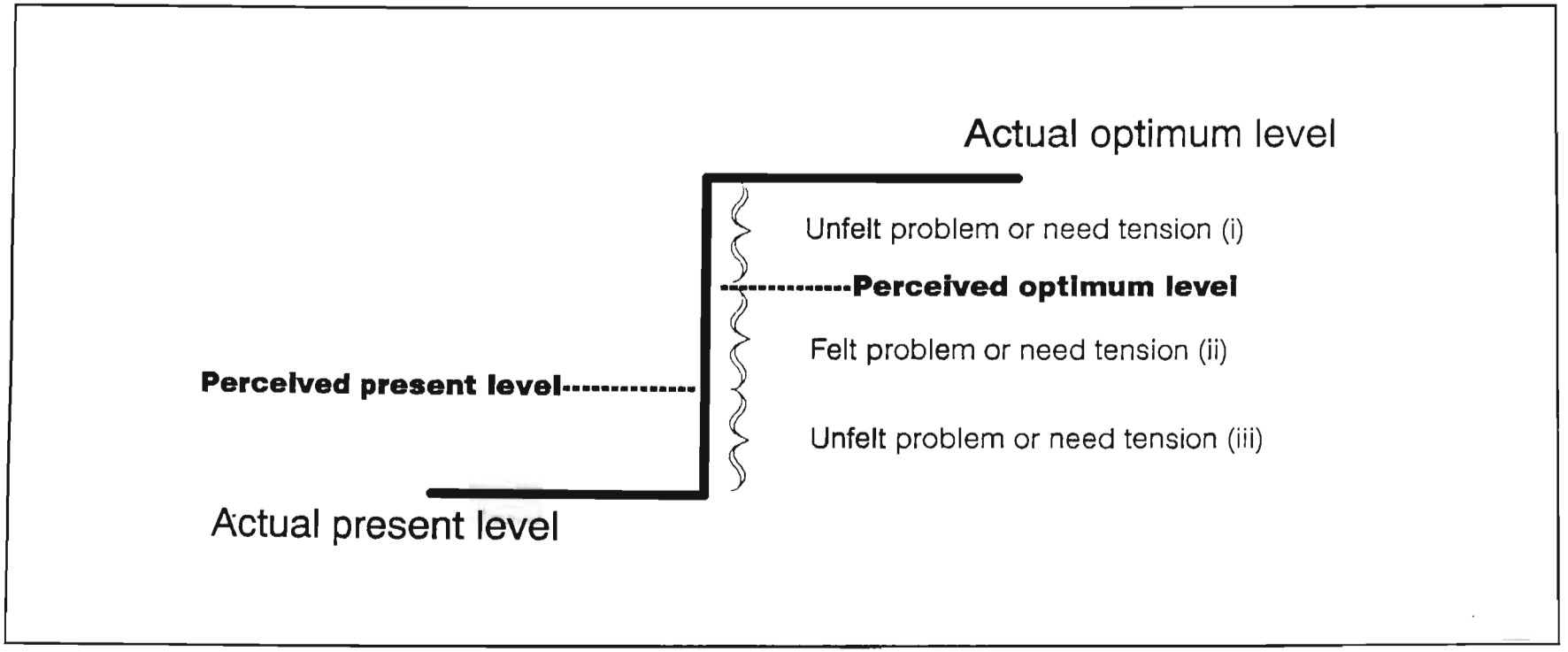


Figure 5.1 Diagrammatic illustration of a problem and the influence of perception on problem magnitude and need tension (after Duvel, 1990).

'unfelt' needs or, to put it differently, satisfaction with the implementation of conservation practices, (applied in the context of this thesis) is totalled: (i) plus (iii), this would result in a value which exceeds the magnitude of 'felt' needs, that is, (ii). Koch (1991) explains that it is due to this discrepancy that entrepreneurs, land users, can and have over-exploited resources, and caused serious losses of soil unintentionally.

From Duvel's (1990) investigations, he concluded that incorrect perceptions can lead to:

(a) the under-adoption of conservation or other measures because the present level of adoption is (erroneously) perceived (or estimated) as higher than the actual desirable level; and/or,

(b) under-adoption of conservation or other measures due to the optimum level of adoption being (erroneously) perceived (or estimated) as lower than the actual desirable level.

This emphasizes the need for adequate and appropriate knowledge to inform and guide perceptions positively or in a manner which ultimately gives rise to the actual adoption of behaviour which is compatible with soil conservation policy goals. Rix and Duvel (undated) conclude that two significant 'hindrances' or constraints to the adoption of behaviour in accordance with optimum land use principles, were knowledge and understanding. This focuses attention on the role of extension and the adequacy of this service to farmers. Rix and Duvel (undated) further suggest that it is possible that most extension efforts are directed at the communication of knowledge to farmers, while less time and effort is expended on ensuring the farmer understands the information presented. This places tremendous responsibility on the extension officers and the service they provide. This subject is examined further in Chapter 6.

According to Porteous (1977), it is on the basis of individuals' personal environments (or in other words within one's personal frame of reference) that decisions are made which are ultimately translated into actions within the phenomenal environment. Porteous (1977) further explains that in a hypothetical unmotivated state an inactive individual can be described by (a) a set of personal functional

variables (mental and physical abilities, value system), (b) a set of personal structural variables (including *inter alia* age, income, occupation) (Grieve and van Staden (1985) examine these personal structural variables in the South African context), and (c) a set of existence variables (location, orientation). Decisions therefore occur when the individual is motivated to make them, either by self-generated needs or external stimuli, as a result of some form of interaction within the phenomenal environment (Porteous, 1977). Carr (1967, cited in Porteous, 1977) describes a five-phase summary of the man-environment interaction process (and further proposes this to be relevant or applicable in any level of planful interaction from a personal level to national planning). The five-phases include: (1) the Directive Phase; (2) the Intelligence Phase; (3) the Planning Phase; (4) the Action Phase; and (5) the Review Phase.

These phases will now briefly be discussed with a view to illustrating the importance of perceptions, needs and knowledge, in decision making and furthermore why particular land users may or may not choose to comply with soil conservation controls and regulations mandated in official policy.

The *Directive Phase*.is the phase in which individuals' needs, desires, and purposes (or goals) are determined. Throughout this study thus far it is evident that soil conservation policy has reflected the largely 'top-down' approach, typically represented in a Third World context. (Refer to Chapter 6 for further examples.) The discussions to date have clearly shown that at no stage in the policy process, either in its formulation, implementation, administration and enforcement, were individuals' needs and desires taken into account. It could therefore be argued that this is a fundamental deficiency of the policy process operated in the context of soil conservation in the country, and in itself unless individuals' needs, desires and goals are determined, could render future attempts to achieve soil conservation objectives ineffectual.

According to Carr (1967, in Porteous, 1977) the phenomenal environment consists of a myriad of "To Whom It May Concern" messages, from which the individual selects those which concern him. This constitutes the *Intelligence Phase*. Furthermore, it is according to the individual's "idiosyncratic predilections" (or preference) that the individual perceives and remembers aspects of this environment,

and creates his own personal behavioural environment from it. From this it could be argued then, using the issue concerning compliance with legislated stocking rates as an example (Trollope, 1993; Duvel & Afful, 1994), that unless individuals believe or perceive there to be an overstocking problem on their land and further believe that this has contributed to overgrazing or land degradation, the individuals concerned will be unlikely to make the decision to change their behaviour or practice to satisfy or comply with legislated regulations aimed at achieving a conservation ideal. (Refer to Section 5.2.2 below for further discussion of needs). It can therefore be concluded that it is this stage in the decision making process that determines whether or not a landuser will perceive soil degradation to be a problem, or more specifically a problem that the individual believes can be influenced positively or negatively by his own behaviour. It is the dynamics within this phase (and also the *Action Phase*) in which the author is most interested as these support the contention that variables operative within the perceptual environment are instrumental in influencing policy efficacy. In summary it is suggested that it is at this stage in the decision making process that individuals' attitudes or opinions are determined, but it is dynamics and constraints presented within the *Action Phase* that ultimately give rise to behavioural change. [Perhaps this can help elucidate the to date largely unexplained discrepancy which exists between individuals' attitudes and their behaviour, where according to a review undertaken by de Fleur and Westie (1963), attitudes are "generally accepted" by social scientists to be separate from behaviour and more general than their specific overt expressions. However, as a development of this proposition falls outside the objectives of this study, it will not explored further here.]

The third phase is called the *Planning Phase*. It is during the previous *Intelligence Phase* that an individual's model of the real world is developed, and so it is using this model that a 'plan' of action or behavioural intent is made (Porteous, 1977). Past experience (for example, the costs incurred in maintaining previously constructed conservation works), changes within the phenomenal environment (for example, the incidence of drought, or flooding), and feedback from ongoing activities, all influence this planning phase and an individual's intention to take action. This leads to the fourth phase in the decision making process the *Action Phase*. This is the stage at which the plan is converted into action, for example, the decision is made to adopt a behaviour that will promote sustainable utilisation of soil in accordance with conservation ideals, or to comply with stocking regulations to permit the recovery of

veld. A complicating factor operative within this phase is the form and content of the phenomenal environment (Porteous, 1977), which hold the potential to support some activities and hinder others. It is the individual's perception of these constraints and supports which will guide his action. The importance of these constraints and supports must not be overlooked, as it can further be argued that they hold the key to sustaining behavioural change. For example, numerous incentives and subsidies have been provided for in the soil conservation legislation formulated since the Forest and Veld Conservation Act of 1941 (see Chapter 6). It has been suggested that these have variously attributed to a greater or lesser extent to the levels of compliance realised over the decades, yet few if any have realised sustained behavioural changes in landusers. Once again the role of individuals' perceptions comes to the fore. Even if individuals decide to change their behaviour and adopt sustainable land use practices, if the individual's perception of the constraints and supports within their phenomenal environment is negative, the likely outcome will be the cessation of this action.

The final and fifth phase in the interaction process of man and his environment is called the *Review Phase*. It is suggested that this is also very important in influencing sustained behavioural change. According to Porteous (1977) feedback from the phenomenal environment permits assessment of the rewards obtained from a given action. This assessment will be used in evaluating the possibility of other, future actions (or as already proposed sustaining behavioural change). Knowledge resulting from action adds ultimately to the meaning the phenomenal environment has for us (Porteous, 1977), and in so doing reinforces or arguably re-shapes an individual's value system.

These principles are confirmed in the work of Duvel and Afful (1994) who in their study of landuser resistance to stock reduction in subsistence farming in South Africa, conclude, that despite the on-going debate as to the choice of appropriate solution in the presence of the many proposed to address the problem of natural resource degradation, the critical and decisive issue will always be the *adoption* of such a solution by the farmer or landuser. As discussed in Chapter 1, Duvel & Afful (1994) further conclude that despite the magnitude of valuable contributions from the human sciences which specifically strive to understand (or explain) human behaviour, there is as yet no single theoretical concept or model that makes adequate

provision for the complexity and dynamics of human behaviour, whilst simultaneously permitting the formulation of "guidelines for the systematic identification of the causes of behaviour, and for bringing about change in a systematic and purposeful manner". As with other relatively new fields, research in environment perception lacks a firm theoretical framework and a well-developed methodology (Saarinen, 1974).

It was not until Duvel's (1975) model was published which attempts to describe the mediating function of perceptions in innovation-decision making and problem solving, that any consideration was given by South African scientific community to the complexities of interactive relationships of variables, that is, in the context of veld management, and in particular the role of the intervening variables, needs, perception and knowledge. Few others have since contributed to this dimension of problem solving and decision making and as such it is argued that further scientific investigation is imperative. South Africa-specific references on the subject are given in Chapter 1 (see Section 1.3).

To summarise, the decision to adopt or reject an innovation or practice such as soil conservation, in effect rests with the land user. Accordingly, the problem of non-adoption and the challenge to promote adoption is one of behaviour and behavioural change (Duvel & Scholtz, 1992). It can be accepted that human behaviour is purposeful. From this, it can be concluded that there must be a motive behind all adoption behaviour, that is, behaviour preceded by conscious decision-making (Duvel & Scholtz, 1992). Awareness and knowledge of a problem is therefore an important positive factor in the motivation to institute, for example, conservation methods (Roux, 1990), but this does not infer that this is enough to effectively bring about a particular behavioural change. Duvel (1987; undated) suggests that whilst knowledge influences the formulation of individuals' perceptions, it does not necessarily always lead to improved behaviour (in terms of adoption) (Rix & Duvel, undated). For example, the motive can be directly or indirectly need-dependent, especially if needs are interpreted in the wider sense, that is, including need-associated variables such as drives, aspirations, goals and problems or constraints (Duvel, 1987). The attractiveness of an innovation such as soil conservation, therefore, can be expected to depend on its compatibility with an individual's needs or objectives or its instrumental relationship with them (Duvel & Scholtz, 1992).

Phrased differently, the perception of the relative advantages of an innovation, which could be positive or negative, will influence the practice adopted (Duvel, 1995). This confirms the complexity of adoption behaviour and the need to examine all three of the intervening variables defined by Duvel and Afful (1994), that is, needs, perception and knowledge, in understanding the relationship between behaviour-determining variables, the behaviour itself (such as stock reduction or soil conservation) (refer to figures 1.1 and 1.3) and its consequences, and by implication to promote the adoption of an innovation, such as soil conservation.

To conclude this discussion of perceptions, there follows a theoretical consideration of a number of additional factors involved in shaping the perceptual environment, which are suggested by the author to have been potentially instrumental in influencing the opinions, attitudes and perceptions of policy formulators (at a national or central government level) and the farming community itself (at a microlevel). Examination of the role of environmental perception in decision-making generally, will be succeeded by an appraisal of the uncertainties associated with environmental change, risk perception, and the part played by the intergenerational criterion and its influence in motivating farmer compliance and participation in soil conservation.

5.2.3 **Environmental Perception in Decision-Making**

According to Boulding (1956), "... there are no such things as 'facts' ... only messages filtered through a changeable value system". Such is the complexity of understanding the perceptions of decision-makers and their manifest behaviours. It is generally accepted by social psychologists, that decision-makers, formulators of state policy, make decisions pertaining to the environment as they perceive it to be, not necessarily as it is (Brookfield, 1969). This is done against an informed background of their own personal beliefs and values. For example, a response to change within the physical environment, such as, accelerated soil erosion, requires an assessment of what is actually happening within that environment, what the potential effects are and how acceptable these are to the decision-maker (Fischhoff and Furby, 1983). Such a response to change begins with awareness of change (Rabb, 1983).

Perceptions directly influence human spatial behaviour and the way in which an individual perceives the environment and the decisions made therein, is governed by

the attitudes, fundamental beliefs (life view) and values he holds concerning that environment. This is illustrated in Downs' (1970) conceptual schema of environmental perception given in Figure 5.2 (Saarinen, 1974). Downs and Stea (1973) describe man as a complex information-processing system. In general terms, information is received by an individual from his "real world" through a system of "perceptual receptors" and the exact meaning of this information is determined by the interaction between an individual's "value system" and his "image" of reality. This is environmental perception, on the basis of which the individual adjusts himself/herself with respect to the real world (Saarinen, 1974). Nathan (cited in Clark 1992) concluded that "analysis is less important than values and beliefs as a basis for policy-making" and according to Heinz and Youmans (1985), the problems which give rise to ineffective conservation are of a political nature and "will continue to be because of conflicting human values".

Downs (1970) suggests that these "perceptual receptors" or psychological filters are responsible for causing different people to see "the same segment of the real world differently" (Saarinen, 1974). Information received by individuals regarding, for example, the extent of soil erosion in South Africa, is screened by such filters as language, social class, personal values, needs and culture, and so the way information is assessed and the decisions taken within a given context, and the manifest behaviours exhibited in response to receiving this information, will differ from one individual to the next. Such actions, as they occur within the phenomenal environment, inevitably have consequences for others (University of South Africa, 1984). [For example, in sections 4.3.1.2 and 4.3.4.2 reference is made to the role of departmental priorities and their influence on effecting national level support for soil conservation practice.]

With regard to soil erosion, according to Rabb (1983), "attitudes are the vital intermediary between physical change and a change in behaviour" and the quality of assessments at any one level constrains the wisdom of the decisions made at others (Fischhoff and Furby, 1983). For example, failure of central government to adopt a coherent policy regarding soil erosion would be likely to thwart efforts at provincial and local levels. [For example, refer to chapters 4 to 6 for an evaluation of the efficacy of soil conservation policy in South Africa.] Conversely, failure of the farming community to respond to government soil conservation policies and comply

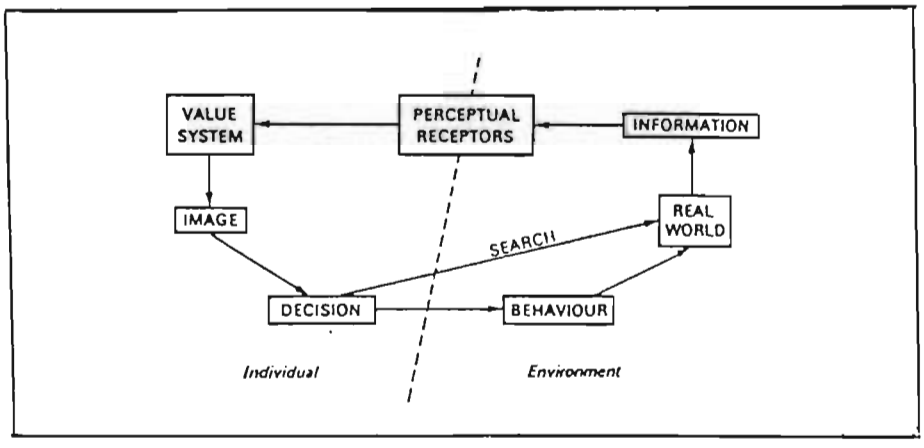


Figure 5.2 A conceptual schema of environmental perception (Saarinen, 1974).

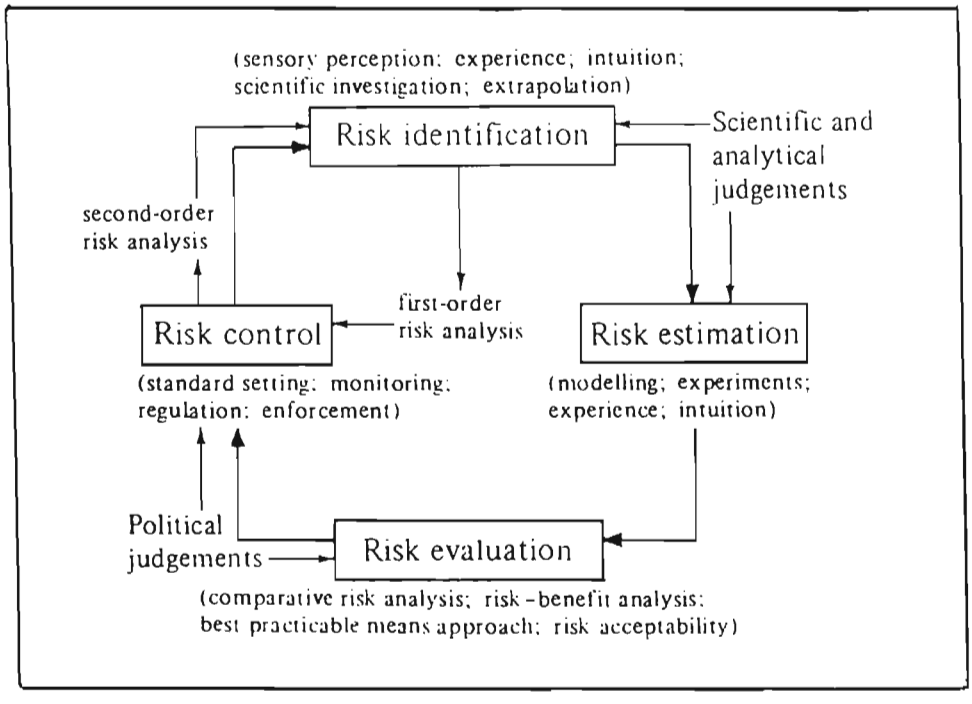


Figure 5.3 Environmental risk-management functions (O'Riordan, 1981).

with legislated provisions for sound agricultural practice, would negate government efforts at a national level.

An attitude is defined as an internal affective orientation that explains behavioural patterns in man (Reber, 1985) and is manifest in a tendency to evaluate an object, situation or issue (such as the extent of soil erosion) in either a positive or negative manner (Viljoen *et al*, 1987). According to social psychologists and social scientists, three factors are responsible for the formation of attitudes. It is suggested that the first two are of particular relevance in the context of this study and further account for the perpetuation of establishing perceptions, particularly those of 'white' South Africa, by implication the state.

1. Classical conditioning - wherein attitudes are learned towards conditioned stimuli, such as, an environmental condition or setting.
2. Social learning - attitudes are acquired when certain behaviours are observed or attitudes expressed and imitated by an observer.
3. Instrumental conditioning - through processes of punishment and reward, attitudes are either weakened or eliminated, or reinforced and maintained (Viljoen *et al.*, 1987).

5.2.4 Situations of Uncertainty and Risk Perception

As proposed in Section 2.1 and is further evaluated in Section 6.2, a general perception concerning the causes and extent of soil erosion in South Africa was established decades ago. This has been reinforced to date through classicial conditioning and social learning (see Section 5.2.3). This situation may be ascribed to a lack of scientific data to substantiate the claims made by soil scientists and interest groups such as the National Veld Trust, that soil erosion, desertification and land degradation is on the increase. Scientific research, by necessity, forms part of the response process. Unfortunately, however, the range of uncertainties involved in analytical and predictive scientific research (Section 6.2) must surely contribute to a pervasive lack of, or unsatisfactory level of, response from the public in general (Chen *et al.*, 1983).

Two factors influential in shaping response to, for example, environmental change, are the existence of situations concerning considerable uncertainty and the perception of risk. Otway and Pahner (cited in O'Riordan, 1981) define "risk" as being the probability of an undesirable event occurring, accompanied by the uncertainty of that probability, coupled with the probability that an outcome will be associated with the occurrence of a particular event. In the context of environmental degradation and more specifically the growing extent of soil erosion, the presence of such uncertainty and probability, may be the reason why the nation as a whole has not taken seriously the warnings of propagandists and their emphasis on the gravity of the subject.

The process of risk determination involves a sequence of logical steps:

(a) risk identification - wherein an attempt is made to understand the nature and impact of, for example, soil erosion;

(b) risk measurement - which involves the assessment and classification of the problem based on scientific and analytical judgements; and

(c) risk evaluation (and re-evaluation) - which involves a comparative risk analysis in order to make a judgement about which actions are required to deal with the risk and the possible need to re-evaluate the risk options (Hertz and Thomas, 1983). [Refer to section 6.2 and 6.2.1 for an assessment of the availability, reliability, accessibility and transferability of soil erosion information in South Africa.]

The schematic diagram presented in Figure 5.3 illustrates the interaction between the component functions in the process of environmental risk-management. According to O'Riordan (1981), as long as decision-making institutions (or "risk managers") remain uncertain in their belief in scientific research and analytical judgements concerning a particular issue, they will fail to engender support amongst their electorate for these judgements or assessments of the perceived risk. Furthermore, not only does uncertainty fail to generate response, but as the results of Kates' (1962) study on people's reaction to natural hazards indicate, the difficulty in considering an "impending disaster" or its impacts, in the absence of previous relevant experience, may also contribute to a lack of response. This is confirmed by Hawkes *et al.* (1984), who further concludes that individuals perceiving the highest levels of risk were characterised by their expression of little faith in the experts in charge of a

particular operation and by their low expectation of success. The group of individuals expressing a perception of low levels of risk primarily had greater faith in the experts and an expectation that the programme would be successful. Applying this in the context of this study's consideration of the risks involved in adopting soil conservation, it could be argued that if land users (a) had greater "faith" in the capabilities and expertise of extension officials and (b) could be more confident (perhaps, for example, as a result of 'proof' provided through demonstration at experimental stations within their region) that the knowledge they are given regarding the probable outcomes of adopting soil conservation practices is sound, then it could be possible to conclude this would give rise to greater participation in such programmes.

5.2.5 Intergenerational Criterion

Decisions concerning the environment are aimed at improving social well-being over time and planning, by implication, concerns provision for the future. Fuggle and Rabie (1983), in their consideration of resource allocation decisions, ask the question "what is the socially relevant time horizon?". The same question can be asked of planning decisions made at a local level with regard to soil conservation and the answer will depend to a large extent on the decision-maker's definition of society - does society refer to the individuals in existence today, or does it include future generations? Decisions made today will inevitably affect the social well-being of our successors: this is the intergenerational criterion. When land users fail to comply with government provisions to promote soil conservation practice in the long-term, it is evident that their time horizon is very short. They fail to consider the long-term impacts of their decisions and land use practices with regard to ongoing environmental change.

5.3 AWARENESS OF SOIL EROSION IN SOUTH AFRICA

5.3.1 Introduction

The third objective of the World Soils Policy, defined as an essential precondition to promoting and sustaining sound utilisation of soil, requires national governments *to increase awareness among all sections of the community of the problems caused by*

the loss of productive soil and of the need for prompt action (see Section 4.2). The second part of objective 12 (as referred to in Section 6.4), requires governments to *provide an adequate programme of environmental education in support of resource management activities*. As both objectives are clearly related these are considered together in this chapter. Reference should also be made to Chapter 6 for further discussion on the role of environmental education and extension.

As explained in Section 1.1, this research has necessitated the proposition of a number of *a priori* assumptions. In this section, to assist in the assessment objectives of this chapter, it is assumed that:

levels of awareness in South Africa, can be measured or are reflected in terms of:

- *farmers' response to conservation policies and the extent of mobilisation, and*
- *States' provision for soil erosion (demonstrated in the policies formulated).*

It is within this framework that awareness of the farming community with regard to the causes and extent of soil erosion in the country will be evaluated.

Prior to the enactment of each piece of legislation, the State legislature considered the time to be appropriate in terms of the potential receptivity of the farming community. However, repeatedly (in retrospect) the inadequacy of public awareness was given as the reason for the perceived failure of the various Acts to achieve their goals (col.5900, 5898, Hansard 1946). It would appear therefore that the levels of public awareness as perceived by State officials, never correlated with the actual reality of the situation and always represented an overestimation of the extent of conservation consciousness. In 1923, the Drought Investigation Committee reported that "educative work [with regard to soil conservation] is now highly necessary to induce the individual to do his share". On the basis of this recommendation the decision was made that direct legislation would at that time be futile. To follow on from this, it seems logical to assume that with subsequent enactments, the State was confident of having the support of an educated nation and therefore by implication, a motivated and receptive people. This has subsequently been shown not to be the case; the reasons for which are again sought from the literature reviewed.

Table 5.1 provides a chronological overview, of institutional structures, legislative provisions, global phenomena (such as World War II), natural environmental phenomena (such as droughts) and political developments, from 1910 to 1992, that is events and conditions considered by the author to have been influential in determining the levels of awareness evaluated in this study. A number of events and conditions considered by the author to be particularly significant in describing the course of public awareness or most influential in determining the extent of mobilisation amongst farmers, (and presented in Table 5.1), will now be selectively discussed and evaluated to illustrate their relative importance in defining the levels of awareness realised. [Also refer to tables 4.1, 4.3, 4.7 to 4.9 which provide numerical data pertaining to progress and developments in terms of soil conservation, derived from the literature reviewed for this study covering the period 1930 to 1992.]

5.3.2 Evolution of Soil Conservation Awareness in South Africa, 1910 - 1992

Economic losses sustained as a result of the drought (which peaked in 1919, the consequences of which realised direct losses to farmers totalling R32 million) served as the catalyst throughout the early 1900s, in alerting the South African farming community to the problem and potential consequences of soil erosion (Rabie, 1976). (Refer to Section 3.3.1) [Note: In 1960-61 a further drought initiated the same response, as did the prevailing drought of the 1980s. (See Chapter 6 for details of drought relief schemes.)] According to Beinart (1989), soil erosion and conservation failed to receive similar levels of concern elsewhere on the subcontinent, whereas in South Africa these issues did "successfully creep" into official and national consciousness. For example, shortly after the Union of South Africa, drought impacts stimulated an official enquiry into the factors responsible for droughts and a select committee was set up by the Senate to investigate and report on the extent of the drought problem. Senate in its Report of the Select Committee on Droughts, Rainfall and Soil Erosion (1914) (refer to Section 3.3.1), recommended that as the public was not yet educated regarding soil conservation, compulsory legislation was considered premature. Consequently, little or no positive action (with regard to formulating policy decisions) resulted from the report (Penzhorn, 1972). It can be said though that this initial interest paved the way for what has been described as the pioneering investigation into soil erosion and its causes in the country, by the

Drought Investigation Commission (1923). The resulting report (UG 49-'23) is today regarded as a "classic" in the field of soil conservation and was considered to

Table 5.1 Chronological overview of events and conditions which have influenced public levels of erosion awareness

1910 - 1939:	
1910	Union of South Africa declared
1914	Drought
1919	Drought
1925	Agricultural Extension Service created
1929	Government organised soil erosion conference, Pretoria
1929 - 32	Economic depression
1930	Soil Erosion Advisory Council established; first financial aid schemes implemented
1933	First soil erosion schemes implemented; field surveys and agro-economic surveys conducted as part of schemes
1933 - 34	Drought
1934	Drakensberg Conservation Area proclaimed
1939	Outbreak World War II
1940 - 1949:	
1941	Forest and Veld Conservation Act promulgated
1943	Departmental Committee for the Reconstruction of Agriculture appointed
	National Veld Trust (NGO) established
	Social and Economic Planning Council appointed
	Land Bank Act No.13 promulgated
1945	Tabling in parliament White Paper on Agricultural Policy
	NVT Model Bill and Explanatory Memorandum tabled in parliament
1946	Soil Conservation Act No.45 promulgated
	Division of Soil Conservation and Extension established to administer the Act
1948	Prevailing drought conditions
	Appointment of the Desert Encroachment Committee
	Fodder Bank Scheme established
	Formation of SARCCUS
1950 - 1959:	
1950s	Green Cross Campaign
1956	Commission of Inquiry into European Occupancy of Rural Areas appointed

Continued.../

Table 5.1 continued.../

1960 - 1969:	
1960 - 61	Drought peaked Drought feeding patterns investigation
1966	Veld Reclamation Scheme established (concluded 1973)
1966	Land Tenure Act No.32 promulgated
1967	Soil Conservation Act amended by Act 15 of 1967 Festival of the Soil campaign (government initiative) Environment Planning Act promulgated
1968	Forest Act No.72 promulgated National conference involving delegates from Organised Agriculture and other farming bodies
1969	Soil Conservation Act No.76 promulgated Stock Reduction Scheme established First soil classification scheme (binomial for South Africa) published
1970 - 1979:	
1970	Mountain Catchment Areas Act No.63 promulgated Subdivision of Agricultural Land Act No.70 promulgated State policy of optimum resource use initiated Awareness campaigns: Water Year (government initiative) Our Green Heritage (NVT initiative) Man and Environment (NVT initiative)
1972	Cabinet Committee on Environment Conservation established South African Committee on Environment Conservation (became the Council for Environment (in 1975)
1974	Habitat Council established to coordinate NGO activities
1977	Soil Conservation Amendment Act No.22 promulgated
1980 - 1990:	
1980	Awareness campaigns: Man: Endangered Species (NVT initiative) Save Our Soil (NVT initiative)
1983	Conservation of Agricultural Resources Act No.43 promulgated
1984	White paper on South African Agricultural Policy published Forest Act No.122 promulgated
1985	Regional Services Council Act No.109 promulgated Regional Services Councils established
1985	National Grazing Strategy
1987	Natal floods
1988	Orange Free State floods
1989	Environment Conservation Act No.73 promulgated

Source: Extracted and compiled from various texts.

be the first attempt at a "coordinated analysis of the fundamental shortcomings in agricultural land use" (Rabie, 1976).

This report not only attracted wide attention and offered useful, practical suggestions to farmers regarding the control of erosion and the improvement of farming methods, but it focussed public attention on the interrelated problems of soil erosion and drought (Ross, 1947). It also gave rise in 1925, to the establishment of the Agricultural Extension Service, the function of which was to educate farmers on sound land utilization methods (Adler, 1981) (see Section 6.4 for a discussion of extension activities). The Department of Agriculture and Forestry in 1929, organised a Soil Erosion Conference, held in Pretoria, the aim of which was to create awareness of the consequences of land-use mismanagement (Rabie, 1976). Significant developments to emerge as a result of this conference included the establishment of a permanent Soil Erosion Advisory Council (which came into effect in 1930) and the first official suggestion concerning financial assistance and technical aid to farmers for combating soil erosion. The Council functioned only until 1933, however, as a result of its recommendations the government approved a number of Soil Erosion Schemes, which were launched in 1933 and provided for the subsidising of anti-erosion works, including dams and reservoirs for stock-watering purposes (Penzhorn, 1972). With the inception of these schemes, funds were also provided for research on soil and veld conservation and by 1947, 16 Pasture Research Stations had been established throughout the country (Penzhorn, 1972).

The Division of Soil and Veld Conservation was created within the Department of Agriculture in 1939 to direct and control all activities regarding pasture research, weed eradication and erosion control. Membership and participation on soil conservation committees was increasing (refer to tables 4.7 and 4.9 for details), and given the progress achieved in terms of soil erosion control and the rate of development which took place during the period 1910 to 1939 (Ross, 1967), it does not seem unreasonable that the government should conclude that the logical and appropriate next step should be the enactment of The Forest and Veld Conservation Act of 1941. (Refer to Section 3.4.2 for details.)

By 1945, however, only 10 per cent of farmers were reported to have availed themselves of the support provided by financial aid schemes administered by the newly established Soil Erosion Advisory Council (Hansard 1946, col.8266). This is an indication of the limited extent of mobilisation realised at this time. This figure represented the approximately 540 farmers who had been appointed as members of local soil conservation committees (set up as a consequence of the conference in 1929), established in 220 districts. This number did subsequently increase to more than 800 by 1967, a figure according to Ross (1967), which constituted approximately "the whole of the private farm lands of the Republic".

The 1930s and 40s were characterised by economic depression and war (Adler, 1985). These two events not only overshadowed conservation efforts but contributed to an exacerbated exploitation of available natural resources (Adler, 1985). According to Adler (1985), however, World War II also had a "sobering effect", one responsible for the realisation "that permanence and continuity are anchored to the soil", a realisation which engendered support for the conservation of soil and allied resources amongst the general public (Adler, 1985). The National Veld Trust was established in 1943, the aim of which was to educate the public in matters pertaining to soil conservation and to encourage the formation of pressure groups to implement basic agricultural laws (Natal Mercury, 1956), and it can be argued that this non-governmental organisation (which incidentally did receive a quarter of its financial support from the state despite its designation), has played the single most committed role, at least until the late-1970s, in raising levels of public awareness and promoting the soil erosion 'cause'. Despite these developments, Verster *et al.*(1992) claim that one of the main reasons why the Soil Conservation Act No.45 of 1946 failed to attain its objectives was due to a prevailing spirit of apathy in the country . It may be argued that whatever the potential positive influence war and economic depression may have offered, in South Africa this was shortlived and had no real impact on sustaining conservation activity levels or behavioural change in the medium- to long-term. [Refer to Section 5.2.3 on environmental perception.]

There is no doubt that activity levels were heightened during this decade (as the increase in the number of newspaper articles featuring soil erosion would suggest) (refer to Section 5.3.3.4 below for a discussion of the role of the media and environmental awareness). This may be ascribed *inter alia*, to the efforts of agencies

such as the Division of Soil and Veld Conservation, (established within the Department of Agriculture in 1939) (Adler, 1981), the National Veld Trust (which, besides the initiatives to be outlined in the ensuing paragraphs, produced an educational film "South Africa in Danger" - shown throughout the nation), and a visit by the eminent Dr. H.H. Bennett (world authority on soil conservation) in 1944. A gradual awakening to the problem was identified amongst South Africans (Rabie, 1976). An increase in research efforts also occurred (refer to Section 6.2 for details).

In 1950 a liaison committee was formed by the National Veld Trust and the Soil Conservation Board "to investigate and discuss the subject of school and adult education in various branches of soil conservation" (Star, 1950). The committee made recommendations regarding (i) the possibility of including soil conservation as a school subject, (ii) the formation of adult education institutions and centres, and (iii) a proposal that a "national service day" and a "national service week" be held for school children every year (Star, 1950). From the review of literature undertaken for this study, it appears that none of these recommendations were actioned. Further attempts to mobilize public support for soil conservation led to the largest ever national public awareness campaign, however, which was launched in the early 1950s, and was called the "Green Cross Campaign". This was organised by the National Veld Trust (Veld Trust, 1990), and was aimed at "awakening the public mind" to the dangers of soil erosion, principally among the youth (Veld Trust, 1990). This was the biggest ever educational campaign undertaken by the National Veld Trust and was to last a year (Middelburg Observer, 1956).

As reported by the Division of Soil Conservation and Extension (1959), whilst progress had been achieved with regard to long-term plans and projects involving soil conservation, little physical evidence existed in terms of the biological recovery of the soil or the application of improved land use methods. Consequently it was assumed that efforts had again proved ineffectual in engendering a spirit of commitment to conservation throughout the nation. [Refer to Section 4.3.3 for a summary of developments and progress in soil conservation activities for the years 1948 to 1958.] It is possible, that prevailing drought conditions (which peaked in 1960-61), may have accounted for the subdued enthusiastic response to conservation in practise. Studies in Kenya, for example, have shown that severe droughts dampened

enthusiasm for the adoption of soil conservation strategies (Otieno & Rowntree, 1986).

Watson (1990) defends three reasons why the widespread implementation of soil conservation measures in South Africa's white-owned commercial farmlands was retarded up to and including the early 1960s. These refer to: (i) a lack of conviction of the effectiveness of these measures (this included the construction of stone walls across gullies: a measure recognised more recently as being too costly to be practicable, the perceived failure of the veld burning policy initially prescribed by agricultural extension, and an overemphasis of the role of physical works by agricultural extension) (Scotney, 1978a), (ii) a lack of awareness of the benefits of their implementation (Scotney, 1978a; Rabie & Theron, 1983), and (iii) the ineffectiveness of soil conservation legislation (Rabie & Theron, 1983).

This example highlighted by Watson (1990) illustrates the extent of influence obviously wielded by the extension service and by inference the potential of this organisation to direct and ultimately contribute to the actualisation of conservation goals. Indeed such a contention is supported by the attribution of the lack of awareness at this time to be in part a consequence of a "shortage of well-trained and enthusiastic agricultural extension staff" (Scotney, 1978a; Rabie & Theron, 1983).

Scotney (1978b) suggests that after 1960 attention in South Africa was largely focussed on problems other than soil erosion. For example, the country reportedly had one of the fastest growing populations in the world at this time (with figures increasing from 12 million in 1953 to 25 million in 1978), and this created a demand for more food and a multi-use approach to planning (Scotney, 1978b). Programmes and plans focussed on urban development, improved transportation, recreational facilities, environmental protection, all to the detriment of conservation programmes and initiatives (Scotney, 1978b). Notwithstanding this, the state did continue with its attempts to enhance public awareness of soil erosion and land degradation throughout the ensuing decades. For example, in 1968, a government initiative called the Festival of the Soil, resulted in the publication of numerous bulletins and pamphlets on soil erosion and sound agricultural practices to promote soil conservation (see Section 3.6.1). A national soil erosion conference which took place in 1968, was acclaimed to have contributed significantly to conservation efforts, in that delegates

from Organised Agriculture and other farming bodies were represented and resulted in the healthy interchange of ideas and questions on the subject of soil conservation. Educational and awareness campaigns in the 1970s included 'The Water Year' and 'Our Green Heritage' (both government initiatives), and 'Man and Environment' (organised by the National Veld Trust), and contributed to the perceived increase in awareness. However, a SARCCUS evaluation of progress (Rowland, 1974) indicated that the "overall conservation picture is by no means encouraging" and by the late-1970s, progress which had gained momentum from the mid-1960s (in terms of increased farmer participation) had in fact diminished (see Section 4.3.4). This is supported by the fact that the number of subsidies paid on conservation works decreased from R7,2 million in 1977/78 to R2,5 million in 1978/79 (Adler, 1985). [Refer to Section 4.3.4 for further details on developments.] Despite this, awareness levels were unquestionably significantly greater than in the past; the reason suggested for the failure of farmers to remain committed to soil conservation has been ascribed to their inability to sustain the costs of conservation practices (Hansard, April 1984).

Additional campaigns such as 'Man: Endangered Species' and 'Save Our Soil' (two National Veld Trust initiatives), took place in the early 1980s, together with an added stimulus, the government's 'White Paper on the Agricultural Policy of the Republic of South Africa' (see Section 3.8.1 for details), and all reportedly enhanced previous attempts by the government and NGOs to promote soil conservation. General awareness amongst the farming community of conservation farming, together with "large inputs of the state", was reportedly accountable for the good progress being made towards the optimal utilisation of resources, yet "the ideal has not yet been reached" (Hansard 1983, col.4812). The enactment of the Conservation of Agricultural Resources Act No.43 of 1983, was acclaimed to herald a new era in agriculture and was enthusiastically and optimistically received and passed in parliament (Hansard 1983, col.4856-57). This can be considered to be undoubtedly the most comprehensive legislative enactment promulgated to date to holistically address soil erosion (see Section 3.8.2 for details), and reportedly succeeded in dispelling a number of previous criticisms made by farmers with regard to the extent of executive authority afforded to the Minister of Agriculture, and has therefore been described as 'most significant' in terms of its potential to enlist the support of the farming community (Hansard 1984) (see Section 4.3.4.1). It was furthermore described as coming at a time when the nation's attention was more finely tuned to

other socio-political and environmental issues, such as demographics, environmental conservation generally and related issues, all of which have been described to be "necessary precursors" to the success of the Act (Hansard 1983, col.4856-57). Fuggle and Rabie (1992) conclude nonetheless, that many conservation committees (established in terms of the Act) have yet to respond to the legislative provisions, and furthermore have failed to commence operations. Once again therefore it would appear that the expectations associated with this Act regarding its potential to mobilise the support of the farming community, have not been realised.

Severe drought conditions experienced particularly during the period 1983 to 1985 (Camp, 1991) was the impetus once again which drew attention to the extent of degradation in the country. The National Grazing Strategy (NGS) declared in 1985, formulated in response to the drought, has contributed significantly towards raising the levels of awareness regarding the need to apply veld management in accordance with the principles of sustainable agriculture. By applying important extension principles (Camp, 1991), it is anticipated that such a strategy could go a long way towards simultaneously realising conservation objectives.

In terms of promoting environmental education, it was not until 1991 that the Department of Education, in acknowledging the importance of raising and sustaining awareness of environmental degradation, decided it a priority to "look into ways of including environmental studies in the early education of school children" (Hansard 1994, col.1376). According to the Department of Agricultural Development (1992a), the reality that the number of applications for admission to their 2-year diploma course in agriculture, presented at the 6 colleges of agriculture, have exceeded the number of available places at these colleges, could suggest an increase in interest and by implication awareness of environmental management. The inclusion of the subject Agricultural Environmental Studies as a compulsory first year component in the diploma course, where the focus is on both the human and natural environments in resource management (Department of Agricultural Development, 1992a), acknowledged the perceived need for such a course, but furthermore could prove instrumental in raising current levels of environmental awareness. However, up to 1992 the educational and training emphasis remained predominantly scientific and technological.

Media inputs are reported to be increasingly playing a major part in contributing towards making the general public aware of the extent of drought and farming problems, and how "farmers are suffering" (Hansard 1992, col.1106). Despite this, together with the 'prodding' effects of natural disasters, propagandists' and NGO efforts, together with ongoing State intervention and initiatives (such as 'Soil is Life' which was the theme for World Environment Day organised by the Department of Environment Affairs in 1991) (see Section 4.3.4.2 which discusses the impact of departmental fragmentation in the promotion of soil conservation), the extent of mobilisation in the country remains poor. Heightened levels of awareness (for example, during and after drought periods), have not correlated with an upsurge in the adoption of land use practices in accordance with conservation goals. Whilst it can be accepted generally that a person's behaviour will be expected to reflect the individual's attitudes towards a particular issue such as soil erosion (Viljoen *et al.* 1987), awareness of a problem is not necessarily manifest in behavioural change or more specifically compliance with mandated legislatory conservation controls (Grieve & van Staden, 1985). Moreover, Duvel & Afful (1994) conclude that the relationship between attitudes and behaviour change is inherently a complex one, and furthermore should positive change result in the adoption of conservation practices, this does not guarantee the sustained commitment to them. (Section 5.2 this chapter provides a more detailed exposition of this). Other reasons besides awareness of the problem must therefore account for the current lack of commitment and inability to promote a protracted and long-term commitment to soil conservation.

5.3.3 **Discussion**

The laws and concomitant level of enforcement, inevitably go some way in legally committing farmers to practise conservation farming (refer to sections 6.3 and 6.3.1 for enforcement details). However, this study suggests that the limited extent of mobilisation realised amongst the farming community in South Africa, reflects more than the influential inadequacies of the various Acts to effect long-term behavioural changes in landusers and a commitment to conservation. The motivated cooperation of farmers remains a prerequisite for the efficacy of legislation and vice versa as this study will indicate, but other factors can account for this lack of motivation. These are discussed below.

5.3.3.1. Extent of ministerial authority. The controversy concerning the extent of ministerial authority has consistently been raised in parliamentary sessions, and is identified here to be a major factor adversely affecting the mobilisation of farmers. In terms of the 1941 Forest and Veld Conservation Act, all powers and initiative for forest and veld conservation rested solely with the Department of Agriculture and Forestry (Hansard, 3 February 1941; Hansard, 10 February 1941). The State, or more specifically the Governor-General, (as outlined in sections 4-6 of the Act and section 8) was given the power to expropriate land, owners' rights to land, proclaim certain trees and forests as (a) protected from cutting, and (b) as nature reserves, and in terms of section 7, decide on the necessity for and allocation of compensation for loss due to such proclamations (col.2087, Hansard 1941). No provision was made to mobilise the support of, or obtain input from, the farming community, despite the direct impacts these proclamations would have on the functioning of individuals' farms. Attempts were made to address this shortcoming in the terms of the Soil Conservation Act 45 of 1946 (and subsequent amendments of Act 37 of 1960, Act 30 of 1964 and Act 15 of 1967) (refer to sections 3.6.1. and 3.6.2 for details).

For example, implementation of the 1946 Soil Conservation Act was largely left to land users within the farming community, the dominant feature of which was to provide landowners with the statutory/legislative "enablement ... to have a large measure of say in regard to what should be done" with regard to combating soil erosion (Hansard 1946, col.8268). The potential for such a provision to succeed nevertheless presumes that all farmers (a) are equally aware of the causes, extent, consequences and the gravity of the situation concerning soil erosion, and by implication the imperative to enforce the provisions for conservation schemes and respective controls, (b) are motivated, and charged and dedicated to executing these controls to promote conservation, and (c) will be prepared morally and ethically to initiate prosecution proceedings against a fellow farmer found to be contravening regulations. With regard to the first presumption, soil erosion received much publicity during and after the war years (refer to Section 5.3.2). An educated nation, as acknowledged by parliament at various sittings prior to the promulgation of this Act (Hansard 1946, col.8266-8270), was an essential precondition for the success of the legislation. However, the fact that the Act subsequently failed in its attempt to promote conservation farming nationwide (Ross, 1958; Hansard, 13 May 1969), provides confirmation of the assumption that the South African population were not

yet educated regarding the matter and the government's presumption therefore, contrary to expectations, contributed significantly to the inefficacy of the Act. Finally, the revised, democratic spirit in which the Act was formulated which was aimed principally at enlisting farmers voluntary support and cooperation, and which was favoured in preference to using the "mailed fist" approach (Hansard, 23 May 1946), as had been applied in terms of the 1941 Act, did not take into account the reluctance of individuals to report fellow farmers for contravention.

In addition, the Minister was given the power to expropriate land for a specified period of time which could mean temporary or permanent withdrawal, for the purposes of soil conservation and/or reclamation (in terms of Section 86 of the Act). This could be done with or without the consent of landowers, although where dissatisfied with the decision taken by the Minister, farmers could appeal (Hansard 1946, col.8279-8282; Rabie, 1976), a situation hardly conducive to fostering support, goodwill and cooperation from the farming community. The appeal procedure will now be briefly described to illustrate this point. Should a landuser or landowner be dissatisfied by any decision or act of the Executive Officer, be it of relevance in terms of the Act or a scheme, he is entitled to lodge an appeal to the Minister, under Section 21 of the Act. Despite this, and as explained by Fuggle & Rabie (1992), this is not an appeal in the normal sense in that an appeal to a court of law is excluded; provision is made for administrative review and this is carried out by the Minister of Agriculture. The decision concerning an appeal rests ultimately with the Minister therefore, who when in possession of all available evidence pertaining to a particular case, presents his decision in writing and this is legally binding. It was recommended by the Resource Conservation Inspector of the Directorate of Resource Conservation, that were the government to provide for an independent review tribunal to deal with appeal cases (rather than the decision ultimately resting with the Minister of Agriculture), that farmers may be more inclined to cooperate in respect of the various directives issued and regulations prescribed by the Minister (Verster *et al.* 1992), in the knowledge that choices are available to them and that before prosecution their case will be heard by an independent and neutral committee. The Air Pollution Appeal Board, which was established in terms of the Atmospheric Pollution Prevention Act No.45 in 1965, and has functioned effectively since, is one example of such a committee. To date, however, this recommendation has not been acted upon.

Throughout parliamentary debates it is evident that despite opposition from particular ministers with regard to proposed measures or provisions of a Bill presented, should the Minister of Agriculture consider the issues raised to be irrelevant or not conducive to effectively passing a Bill, voices were ignored and overruled, a scenario suggesting the existence of predetermined agendas. Whilst the legislative process entails the presentation of a proposed Bill before parliament and the subsequent debate of same, which may or may not result in the appointment of a Select Committee to investigate issues of concern, such as particular provisions of a proposed Act and how they affect the interests of those involved, ultimately the final decision concerning these issues rests with the Minister. One minister referred to this level of control as resembling something akin to that possessed by a "dictator" (col.8281,8284, Hansard, 1946). Another minister in parliament, in promoting the role of the Minister of Agriculture, claimed that he (the Minister) was not only "well-trained", "with practical experience", [it is worth noting that without exception, the Minister's of Agriculture appointed throughout this study period had all formerly been farmers themselves], but could further guarantee that the Minister would "know precisely what the farmer in South Africa needs" (Hansard 1981, col.3731). Clearly, this was not the opinion of the farming community as a whole.

5.3.3.2. Costs of soil conservation, subsidies and farmer debt. No limits were imposed on the amount of money individual farmers could potentially be called upon to spend on implementing conservation provisions declared by the Minister (Hansard 1946, col.8319). Repeatedly, speakers in the house warned that this was not a provision likely to be conducive to mobilising the support of farmers, especially given the serious debt conditions experienced by farmers (this section) (also refer to Section 6.3). Provisions to reward compliance in the form of subsidies and grants to participative farmers were formulated in terms of the Act. (See Figure 6.2). However, as these never covered 100 per cent of incurred costs, considerable and compulsory financial demands were forced on the farming community, regardless of their desire to participate in soil conservation schemes or not. (The provision of subsidies is discussed further in Section 6.4.)

Variables such as droughts, floods, disease and pests, increased costs of production inputs such as fertilizers. For example, these were reported to have increased by as

much as 200 per cent over the 10-year period 1968/1970 to 1979/1980 (Hansard 1981, col.1286), (refer to Table 2.9 for further examples of increases, 1984-1993). This scenario, coupled with relatively lower than ever [consumer] prices for farm products (Rabie, 1976), placed pressure on farmers' financial resources and these constraints no doubt impacted on the availability of funds for conservation farming. Even in cases where farmers may have been fully aware of the extent of the soil erosion problem, they may not have been in a position to respond favourably to it. Financial constraints inevitably and negatively affect farmers' motivation to participate in conservation farming, voluntarily or otherwise. (Refer to Section 5.2.2 in which the knowledge variable is considered in the context of adoption behaviour. According to Barlow and Nieuwoudt (in press), not only knowledge of the relative advantages of a particular innovation, such as conservation, but also the sufficiency of a farmer's financial resources and willingness to invest his own capital in conservation, were factors found to significantly influence not only the adoption of behaviour but also the extent of conservation 'effort', or commitment.). Table 5.2 indicates the extent of farmers' debt up to 1983. Table 5.3 reflects the particulars of financial assistance paid to farmers for the period 1990-1992, and Table 5.4 provides a summary of long-term financial assistance provided by the state under selected schemes for the years 1988 to 1994.

Table 5.2 Magnitude of farmers' debts up to 1983

Carried forward in 1981	R106 million
by 1983	R700 million
Interest payments 1969	R262 million
by 1982	R903 million
Loans to grain farmers 1982	R900 million*
by 1983	R1,200 million
Short-term debts up to 1983	> R2,000 million
Total debts as at 1983	> R5,000 million

Note: * Crops subsequently lost due to drought.

Source: Compiled from text in Hansard 1983, col.7982-7983.

Table 5.3 Financial assistance to farmers, 1990/1991 and 1991/1992

Scheme	Loan Applics. No. Granted	Rejected	Amount R	Loan Applics. No. Granted	Rejected	Amount R
	1990/1991			1991/1992		
Purchase means of crop production: (seed, fertiliser, fuel, etc.)	2,078	404	109,639,200	2,570	424	159,197,600
Purchase of livestock	38	93	2,167,300	59	115	3,148,700
Soil conservation works	85	4	5,090,300	63	5	3,501,500
Waterworks	1	-	25,000	1	1	13,600
Drilling	1	-	6,000	-	-	-
Purchase of agricultural land and grants of land	60	206	9,637,500	171	215	26,921,100
Improvements or repairs	0	2	nil	0	1	0
Payment farming debts, including mortgate debts	524	1,111	51,183,000	1,109	1,361	125,087,200
Disaster aid: stock feed scheme in scheduled grazing distress areas	1	-	23,000	-	-	-
Flood relief scheme: Natal flood (September 1987) and Free State floof (March 1988)	53	1	1,717,500	14	1	2,855,300

Source: Data extracted and compiled from the Annual Reports of the Department of Agricultural Development, 1991; 1992a.

Table 5.4 Summary of long term financial assistance paid to farmers under selected schemes, for the years 1988 - 1994

Scheme and year	No. of loans	Loan amount (R)	Average (R)
Discharge of debts:			
1988/1989	556	55 603 363	100 006
1989/1990	534	52 174 705	97 705
1990/1991	524	51 183 000	97 677
1991/1992	1 109	125 087 200	112 793
1992/1993	1 727	196 355 500	113 697
1993/1994	613	43 072 600	70 265
Soil conservation works:			
1988/1989	55	2 351 759	42 759
1989/1990	85	5 361 500	63 076
1990/1991	85	5 090 300	59 886
1991/1992	63	3 501 500	55 579
1992/1993	64	3 316 700	51 823
1993/1994	5	168 800	33 760
Livestock:			
1988/1989	22	1 080 800	49 127
1989/1990	37	1 657 700	44 802
1990/1991	38	2 167 300	57 034
1991/1992	59	3 148 700	53 368
1992/1993	84	4 177 400	49 731
1993/1994	35	1 444 900	41 282
Implements:			
1988/1989	-	-	-
1989/1990	3	97 400	32 466
1990/1991	8	485 600	60 700
1991/1992	3	131 300	43 767
1992/1993	23	1 116 200	48 530
1993/1994	16	831 300	51 956

Source: Department of Agricultural Development, Annual Report 1993-1994.

The Minister of Agriculture in 1946 was reported to have acknowledged that a great deal of land abuse could be ascribed to economic pressure, the chief reasons for which he identified as: firstly, inflated land values, with resultant overcapitalisation, often accompanied by excessive mortgage debts; secondly, sub-economic size of farm-holdings; and thirdly, inequitable prices of farm products compared to costs of production (Hansard 1946, col.8260-8262). Yet, it must be noted that the country's agricultural policies and strategies formulated subsequently and to date have not reflected this recognition, at least not with regard to the need to raise the attractiveness of an innovation such as soil conservation.

Economic incentives and punitive measures should be seen to reflect soil conservation as a cost-effective practice. To ask farmers to utilise the land or agricultural resources in the interests of the environment and the sustainability of resource-use, by necessity requires that the costs of compliance should be less than the penalties for non-compliance (ESA, 1993). Gillespie *et al.* (1990) are convinced that a profit motive will lead to the requisite conversion of practices to promote the conservation of soil.

In countries such as Zimbabwe (FAO, 1986) and the U.S.A. (Burtraw, 1991) serious attempts have been made to estimate on- and off-site costs of erosion, and Norris and Clark (1995) claim this has attributed to increased levels of compliance. As indicated in Section 6.2, research efforts have tended to focus on the on-site physical or biological consequences of erosion. In terms of motivating individual farmers to combat or reduce the extent of degradation on their land, it is argued that by assigning an actual Rand value to the costs or consequences of on-site erosion, and if this can reflect that the practise of land use in accordance with soil conservation principles can be cost-effective, that such a positive force (to use Lewin's (1951) nomenclature) could enhance the chances of adoption. This concurs with the recommendations of Napier (1989), who suggests that if the failure to adopt appropriate conservation measures can be shown to result in some type of personal loss to a farm operator, then the extent of this loss or costs can act as a positive motivational force in the interests of agricultural sustainability. As off-site costs and consequences of erosion (or non-source point degradation, to which some of the literature reviewed refers) are most frequently borne by nonfarm populations, off-site damages seldom act as motivators for adopting soil conservation practices at a farm

level (Napier, 1989). It could also be argued that in some cases those most affected by source-point soil losses include other land users within a catchment who might themselves be conscientious practitioners of soil conservation, and therefore in effect are forced to manage the consequences of someone else's transgression or non-compliance. This perhaps highlights the importance of peer pressure as a potential force in promoting or enforcing 'socially acceptable' behaviour.

5.3.3.3. Geological versus accelerated erosion. The debate regarding what is understood by 'geologic' or 'normal' erosion as opposed to 'accelerated' erosion, could have contributed to the limited extent of mobilisation identified in the country. The sediment yield of many South African rivers in recent years has diminished (refer to Chapter 2 for further discussion). Uncertainty as to whether this condition can be attributed to improved agricultural practices, is reinforced in the absence of scientific verification (see Section 6.2). The situation is further complicated by the very nature of soil erosion as a natural phenomenon, defined as geologic or 'normal' erosion, and a process which can be accelerated by human activities. Geologically normal rates of erosion operate within natural ecosystems that are in dynamic equilibrium. Rates can be high and are determined by a complex interaction of numerous physical variables, each one manifesting in considerable variations over time (Chapter 2 describes some of these controls) (Moon & Dardis, 1988). Medium- to long-term temporal variations are largely uninfluenced by human activity and only in exceptional circumstances is anthropogenic interference predicted to reverse a natural geomorphological trend, and then only at a microlevel for a limited duration (Garland & Broderick, 1992). This would suggest that human controls such as land use change, overexploitation of natural resources, or mechanical conservation measures, produce impacts at a local level only and from a 'normal'/geological perspective of erosion, are transient (Garland & Broderick, 1992).

What can be considered 'normal' or not normal/'abnormal' according to Showers (1989) is complicated by the fact that broad definitions of the terms 'normal' and 'accelerated' for different environments exist, and can be dependent on the judgement of the observer. She affirms that the concept 'normal' is not necessarily a "portable" one, as normal in one situation may be abnormal in another. This infers that as it is individuals' perceptions of the environment which inform the assumptions on which they make decisions pertaining to land use and policies, it is imperative that

an understanding is sought to define what is 'normal' for a particular region. If it is left to the landusers own judgement to determine whether erosion exceeds what can be considered 'normal' or 'accelerated', this could lead to a lack of response confronted with uncertainty.

It is suggested, that all too often the reality that soil erosion is a natural phenomenon, which is manifest in seasonal, spatial (meso- and macro-level) and temporal variations, is overlooked in the overall analysis of erosion in South Africa. It is not suggested here that scientists, professional engineers, technical and extension officials are ignorant of the distinction between what constitutes normal or accelerated soil erosion, rather it is proposed that members of the general public and furthermore government officials or decision-makers, are unenlightened and therefore propaganda-initiated or educational programmes established, fail to adequately differentiate between these two conditions.

The perceived 'soil erosion problem' implies often exclusively to human accelerated erosion and the implicit objective of soil conservation management relates to reducing rates of soil loss to the geologic norm (Watson, 1990). An alternate perspective on this question recognises that soil erosion rates are accelerated by natural phenomena, not just anthropogenic, in other words, geological erosion can be further defined as having two components: the 'normal' and 'accelerated or abnormal'. Acceleration therefore can be natural and anthropogenic (Watson, 1990). It is not within the scope of this study to investigate the physical dimension of the soil erosion debate, (Watson (1990, 40-41) cites numerous examples of proponents of these two perspectives), however, it is necessary to note that confusion, with regard to this distinction has given rise to a failure to recognise the contributory influence of human activities in soil erosion events, the causes being mistakenly attributed soley to natural phenomena (Garland, 1979; Watson, 1990) and by implication vice versa. Such uncertainty can only be ascribed to a lack of scientifically, reliable data (see Section 6.2). A review of soil erosion literature confirmed that no consensus or conclusive evidence exists with regard to an increase, decrease or stabilization in South African erosional activity since the turn of the century (Watson, 1990). Such a situation could have exacerbated the situation regarding who is actually to blame for the erosion problem, and moreover, the question of whether it is indeed a problem, and if so should it be interfered with?

5.3.3.4. Communication and media. A problem identified by Garland *et al.* (1994) on the subject of education, awareness and soil erosion, relates to the fact that in South Africa, where two official and numerous unofficial languages are used, this inevitably complicates the problem of ensuring conservation information reaches all sectors of the farming population (commercial, and subsistence sectors). Without the existence of a sophisticated and advanced monitoring system and data base on research activities and progress in conservation practice (refer to Section 6.2), it is impossible to measure the extent to which this problem concerning the transfer of knowledge has improved with the expansion of school and university populations, the increased involvement of NGOs and other environmental organisations. It should be noted after all, that the government made a serious attempt to address this communication issue, in its provision whereby new conservation schemes and other proposed measures, were to be published in the *Government Gazette*. However, surely such a provision must fail to achieve its objective, in that it focusses on the needs of a particular sector of the community, that is, (a) literate individuals, (b) those with access to publication, (c) motivated, (d) progressive, (e) conservation-conscious, characteristics that are not representative of those most in need of support and advice, much less so the entire nation. Furthermore, it is argued that such a provision will be even more inadequate if continued to be used in future, given the proposed influx of 'emergent' farmers as a result of land reform policies and measures, for whom the publication of proposed schemes and provisions in the Government Gazette will be inappropriate because the farmers concerned (a) are illiterate, (b) ignorant that the publication exists, (c) cannot get access to the publication, (d) will be suspicious of the advice offered, (e) will choose to utilise the land in accordance with traditional systems, and (f) cannot afford to implement and maintain the soil conservation measures or practices recommended.

The role of the media in "mass communications" is an important one in terms of informing and more particularly, maintaining public concern for environmental issues (Parlour, 1980), and by implication inducing public response. Parlour argues that media portrayal of such issues is structured by dominant power-holding groups in society with the result that they function merely to maintain and reinforce the *status quo* to the advantage of these dominant groups: any influence the media may exert therefore is superficial and transitory. If this is true, it is logical to argue that

environmental management generally, and more particularly soil conservation, cannot be construed to be a major concern of such dominant groups, otherwise the level of conservation-consciousness amongst the general public would be much greater than currently realised.

Little work has been done in South Africa on the relationship between the mass media, the decision-makers/politicians/opinion leaders and the general public with regard to environmental decision-making. However, Preston-Whyte (1987) in his study of "the sludge issue" concluded, that the mass media cannot be dismissed as totally ineffective communicators. Environmental decision-making takes place within the political culture of a society (Preston-Whyte, 1987), the nature and characteristics of which are based on various attributes of a community, amongst them the rights of citizens to information directly relevant to themselves, thus ensuring their participation in the environmental decision-making process (Preston-Whyte, 1987). The mass media represents the conduit for such information flows (Figure 5.4).

Examination of the social, political, economic and ideological characteristics of the framework within which mass communications take place and the part which these play in conditioning of media responses, is necessary if one is to understand the relationship between the mass media and the rest of society (Parlour, 1980). Such an examination falls beyond the framework of this study, although it can be shown that the media do play an important role in informing public opinion, moreover about issues which directly concern them, making them "more aware". They help activate public interest and according to O'Riordan (1981) "give the impression at least, of aroused public opinion". Neuman (1990) agrees with this claim as the results of his study on issue-attention cycles of the general public and the evolution of public awareness confirm, there is consistent evidence of a curvilinear relationship between the volume of media coverage and the level of public concern. Wyman (1987) ascribes the widespread awareness of soil conservation "that is taken for granted in the U.S. today" to *inter alia* mass media influence. In the context of South Africa, Mills (1991) attributes the increasing awareness of environmental problems to a number of factors, not least of which is increased media coverage.

The inference to be derived from the foregoing discussion is obvious: if the media can inform the nation of, for example, the extent of storm damage, why can it not be

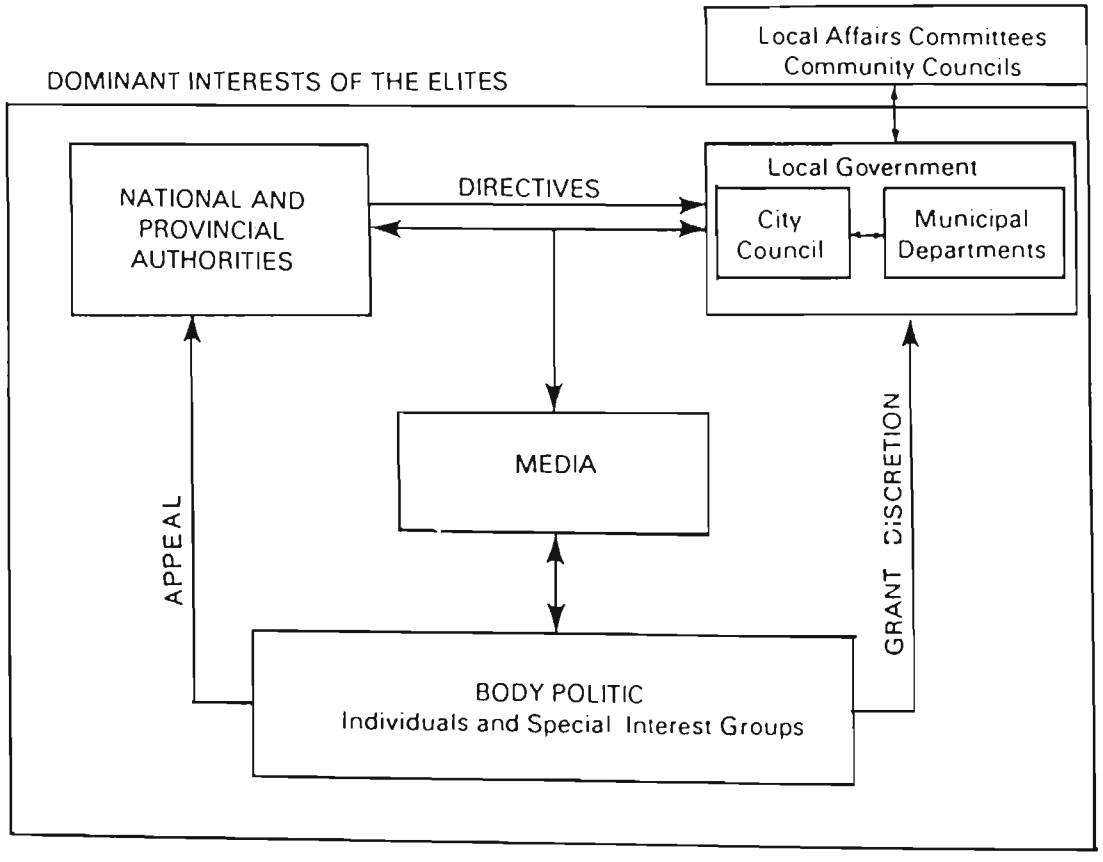


Figure 5.4 Communication links between the public, media and tiers of government. (after Preston-Whyte, 1987)

used also in an educational function? The problems associated with soil degradation and soil conservation need to be first acknowledged by government as priority national problems (not regional, local or agricultural), and 'adopted' and advertised as such by the mass media. The major question to be answered, however, is how does one persuade the so-called dominant power-holding groups to take this issue 'on board'? Furthermore, it is conceded that even if soil conservation did receive significant media coverage, which it has been argued would arouse levels of public awareness, (a) how can these levels be sustained, and (b) to what extent will it actually contribute to behavioural change and the sustained adoption of soil conservation practices?

Blaikie and Brookfield (1987) suggest that whilst most conservation policies introduced by the state have a tendency to fail, (or at least fall short of expectations), accepting there are exceptions to this, schemes offering significant funding as compensation to land users, coupled with the political means of mass mobilization, have as experience would confirm, a higher chance of achieving results. The insistence of the state, throughout this study period, that agriculture should be kept out of the political arena, although not pursued within the scope of this work, is an issue worthy of further investigation. Furthermore, it is suggested that as mass communications are utilised as the medium through which political ends are achieved, the politicisation of soil conservation coupled with a concomitant dependence on the media as a means of communicating to the masses, could realise the actualisation of hitherto unattainable goals.

In a study conducted in the Orange River Catchment area, 15 per cent of farmers were found to actively participate in soil conservation (Scotney, 1978a). Surveys conducted elsewhere in the country support this scenario (Serfontein, 1977). In accounting for this poor response, it has been suggested that not enough effort has been spent by the State and its officials, on demonstrating by example, that conservation farming pays. For example, research undertaken by Pearson in 1967, indicated that layouts on sugar-cane plantations managed in accordance with conservation measures, increased annual production by 12 per cent (Scotney, 1978). It is with regard to demonstrating soil conservation successes in particular, that the media could be utilised to best effect, to promote its cause.

5.3.3.5. Accepting responsibility for soil erosion. A further issue repeatedly raised in parliamentary sessions concerns who is actually to blame for the extent of soil erosion in the country. Contrary to government opinion, farmers blamed the state for the extent of soil erosion in the country, stating that imposed economic pressures necessitating exploitative agricultural practices were the chief determinant (Hansard 1946, col.8294-8303) (refer to Section 5.4.3 for further discussion of South Africa's agricultural policies). Moreover, farmers accused the government of not providing them with the necessary machinery to permit compliance with the Act's provisions, despite their willingness to pay for this and other implements from private budgets (Hansard 1946, col.8275-8278). [Note: the same complaint was made in 1981, Hansard 1981, col.1286.] Their insistence prior to the enactment of the 1946 Act, that legislation and government provision to halt soil erosion was urgently required (Hansard 1946, col.8300), would suggest that farmers were aware to some extent, of the realities of erosion, but needed direction and support from the State before effecting the changes required for sound land management practices. Factors such as an unidirected agricultural economy, the consequence of government policies such as their price assistance policy (Hansard 1946, col.8295), and a desire in farmers to eke more than a subsistence standard of living from exploiting agricultural resources (Hansard 1946, col.8303; Adler, 1985), are commonly forwarded as causes of erosion in the ongoing debate of the decades. Government departments, provincial councils and local authorities, have been blamed for neglect and soil erosion with regard to road maintenance; the Railway administration, in abandoning railway lines which act as basins in collecting vast quantities of water; the Department of Agriculture, in its failure to properly manage catchment areas in forest reserves through the country (Hansard 1946, col.8298); and the reality that soil conservation legislation does not even apply to areas under the control of the Department of Native Affairs, are all reported in the literature, to be accountable for the erosion problem in the country.

The Maize Board's control of maize prices, that is fixing them at such a rate that the country produces a surplus of maize (and exports are sold at lower than local market prices), and subsidy provisions have contributed to the perception amongst farmers that the profitability of maize farming is virtually guaranteed; the result of which has been the ploughing of areas which should either not be ploughed or cultivated at all (marginal lands). Such a scenario, it has been argued, exacerbated the erosion

problem and in effect constituted not only a misallocation of resources (Hansard 1981, col.3691; col.3722), but an economically-driven mismanagement and unsatisfactory utilisation of agricultural land (Hansard 1992, col.1080).

Ferguson-Bisson (1992) concludes that three additional factors which give rise to unsatisfactory land management practices include:

1. a lack of a perceived stake in the land's future: this has been proven to turn people into "disinterested land managers" - it is argued that the same is particularly relevant in the South African context and further, that this has attributed to the current lack of mobilisation amongst the farming community in the country;
2. a lack of access to education and technical knowledge: which creates "ill-informed land managers" - this issue which infers reference to the role of agricultural extension is discussed in Section 6.4, but for now it is sufficient to suggest that this service has been deficient in South Africa since its inception in 1925; and
3. for those individuals positioned at the bottom of the "socio-economic hierarchy" satisfaction of their basic needs or "immediate subsistence needs" will be foremost on their agenda, before the pursuit of longer-term interests such as, conserving soil and water resources. This supports Khan's (1990b) assertion that the satisfaction of basic needs should as a precondition for natural resource management take precedence over such environmental concerns.

5.3.4 **Concluding Comment**

In conclusion, a number of the above factors considered influential in inhibiting the potential of the enacted soil conservation legislation to engage the support of the farming community at large in South Africa, would appear to relate to a problem concerning communication. Environmental education has been stressed as essential for environmental management (ESA Commentary, 93). In the past, publicity information pamphlets have been produced, such as, 'Soil Conservation Fact Sheets', one example was entitled 'Adopt A Donga and Doctor It', which aimed at encouraging active public participation in soil conservation. The extent to which such

educative tools achieved the aims for which they were created, is reflected in the poor response of farmers to practise soil conservation. According to the IUCN (1993), changing behaviour is more than increasing people's knowledge. In most countries environmental education is unformulated at a national planning level (Padua, in IUCN, 1993). Up to 1990, the same can be said of South Africa. Unless farmers' attitudes to soil erosion change, "our greatest problem will remain a subject of conversation rather than conservation" (Scott, cited in Scotney 1978a). Perhaps environmental education can go some way towards preventing such a scenario developing further in South Africa. [Refer to Section 6.4 for a discussion on support mechanisms and extension, both of which are essential tools for the promotion of environmental education.]

Environmental education has been described as a holistic, issue-based, problem solving approach to environmental management, which emphasizes critical thinking, participatory decision making and socially-responsive action (Khan, 1991). For this reason it makes an ideal vehicle to promote the acceptance of environmental issues as relevant (Khan, 1991). It could be argued that the government back in the 1950s subscribed to this belief and this accounts for why their attempts to mobilise public support through its Green Cross Campaign, was aimed principally at the youth. However, Khan (1991) argues that the "sanitised version" of environmental education offered to the white youth at this time focused on the study of the natural environment and the benefits of a healthy outdoor programme at the expense of an holistic approach. Such an emphasis does not serve the "ends of environmental education" (Khan, 1991), and it can be argued that this misplaced focus can account for the subsequent failure of such a programme to realise the anticipated extent of mobilisation. In 1946, Roux in his publication entitled: *A Book on Soil Erosion for South Africans - Veld and the Future*, a promotional publication aimed at the general public including "school children, farmers and townsmen, including government", forewarned that "the soil does not really belong to this person or that who has the right to use a bit of land. It belongs to the nation and it belongs to the children who are yet unborn. Soil erosion is everybody's business".

Matthee (1984) asserts that it is ultimately the farmer's responsibility to carry out and maintain soil erosion counter-measures. Extension officers and engineers must be available to advise the farmer, this is essential, but it is the farmer who knows his

farm best and is therefore intimately acquainted with its problems (Matthee 1984). The Minister of Agriculture in a speech in parliament in May 1983 stated: "the Government and the Department are doing and will continue doing everything in their power to play their role in combating these severe drought conditions [which had exacerbated the existing extent of soil erosion], but it goes without saying that farmers will have to make sacrifices themselves in order to absorb these problems, ... capital expenditure will have to be restricted to what is absolutely essential, soil conservation practices will certainly have to improved ... we shall have to implement improved production techniques in order to increase productivity. This is the task of the individual farmer." (Hansard 1983, col.7979-7980). It could be argued, that against such a background, it is not surprising that farmers have yet to uniformly give their committed support to soil conservation. (Refer to Section 5.3.3.2 for details of the farmer debt crisis.) Moreover, given the massive decrease in the number of farmers since the 1950s (120 000 down to 77 000), which has not only caused the rural areas to be reportedly "bleeding to death" (Hansard 1981, col.2512-2514), with a population growth rate of 2,3 per cent, and by implication an increased pressure and demand for agricultural products and therefore increased productivity, the question to be answered is: can the government 'afford' to continue with their interventionist strategies at current levels?

The depopulation of rural areas has been ascribed to the economic problems of farmers (Hansard 1981, col.1411). It is claimed that farmers "find it increasingly difficult to adapt their production systems to economic demands and the technological-scientific revolution in agriculture, which places high demands on investment and management" (Hansard 1981, col.1411). The extent of the farmer debt problem is worsening and some consider it to now be "beyond the control of the farmer" (Hansard 1983, col.7984), yet it is acknowledged that all farming systems should be in keeping with environmental constraints (Hansard 1992, col.1081). So, it is argued that a problem exists here that goes beyond the need to enhance conservation-consciousness amongst the farming community, or raise awareness levels so to promote conservation-consciousness. "Subsidies represent no more than a government aid to encourage farmers to practise conservation farming ...these incentives or method of encouragement must be revised and/or increased if the practice of encouragement is to achieve its goal" (Hansard 1983, col.4833-4834). The nature and adequacy of the South African Extension Service, enforcement

measures, support structures and education, all important tools and mechanisms to promote the adoption of soil conservation practices are evaluated in the following chapter, in an attempt to further elucidate the problem of policy inefficacy and non-adoption of soil conservation.

5.4 LAND USE AND RELATED POLICIES

As the general review of soil conservation policy and the legislative enactments formulated to implement such policy undertaken in Chapter 3 revealed, not only a differential application of legislative regulations, but an unequal allocation of financial assistance to promote and support soil conservation throughout the entire country. As explained in Section 1.5 and Section 3.10, the four key soil conservation acts formulated in South Africa to combat soil and land degradation, were explicitly excluded in their application to the former 'homelands', self-governing states and land held by the South African Development Trust. The Black Authorities Act No.68 of 1951, empowered regional authorities in Black areas to provide for the construction and maintenance of infrastructure for the prevention of soil erosion, and as demonstrated in Section 5.4.3.3, progress has been made in some areas despite the state's preferential treatment of predominantly 'white', large-scale, commercial agricultural land.

Therefore, whilst an evaluation of soil erosion in these areas goes beyond the scope of this study, because this conscious omission by officials in effect represents an important element of the policies formulated, consideration of this omission constitutes a necessary component of the work. In addition, much of the literature reviewed agrees with the proposition that such an omission has contributed to, even exacerbated, the extent of erosion in the country. It is for this reason that the discussion of policy undertaken in this section, is expanded to include a consideration of land use policies implemented in South Africa, which directly affect farming practice and by implication utilisation of soil resources in those localities excluded from the legislative provisions of the Acts evaluated in this chapter, chapters 4 and 6. Moreover, a discussion of South Africa's agricultural policy in general (see sections 5.4.2 and 5.4.3.2) cannot be adequately conducted without consideration of this additional element. The discussion to follow, however, is by no means exhaustive

and issues such as the upliftment and self-determination of the "Afrikaner" and the creation of "elitism", 'official ideology' and apartheid, the suppression of black agriculture, and the role of party politics, for example, cannot be explored within the scope of this work and must therefore be included as recommendations for further research.

As a large body of literature already exists which both reviews earlier publications on land tenure and agricultural reforms in South Africa, and further analyses the implications of the government's preferential policies and institutional structures, this discussion constitutes no more than a cursory appraisal of the matter, by way of placing in context or more probably justifying the necessity of including the political dimension in the soil conservation policy model formulated in this study (Figure 1.4). Examples of such works include those by Pepler (undated); Jacks and Whyte (1939); Peattie (1947); Tatz (1962); Board (1967); Van Schoor (1968); Du Plessis (1971); Whittington and Daniel (undated); Sumner (1973); (Van Biljon, 1947, cited in Hattingh, 1979); Cross (1992); Elwell (1992); Land Update (1996).

5.4.1 **Historical Background to Land Use in South Africa**

Society's propensity to ignore historical perspective is notorious (Sumner, 1973). For example, colonial empire building ignored geographical and political boundaries already in place, which besides giving rise to cultural, and socio-political conflict, resulted in the concomitant exploitation of soils. With the territorial conquests of the colonialists exhausted and a latent desire for more land, efforts were inevitably revised to improve the productivity of conquered lands (Sumner, 1973).

In 1652, Europeans arrived in the Cape, settled, cleared indigenous vegetation and trees to provide land suitable for cultivation and ploughed it. In addition they ranched cattle and sheep, hunted for game and "totally disrupted the ecological balance" (Thornycroft, undated). However, much of the degradation which today scars the natural environment, has been ascribed to contemporary land use malpractices (Elwell, 1992), and, more specifically, to current day extension services. These practices have effectively eradicated many traditional practices such as zero tillage, relay, mixed and multiple cropping practices, which in the past proved to be ecologically beneficial. The consequence of which has caused a reduction in the

fertility status of soils, decreased yields, diminished vegetative cover and heightened rates of soil loss (Elwell, 1992).

Mismanagement of land through unsound farming practices in European regions, has resulted in an exhaustion of soils as a consequence of continuous cropping, which furthermore, has caused soil erosion in these parts (Jacks & Whyte, 1939). The results of these practices are only now becoming apparent.

In the 1930s, Jacks & Whyte (1939), wrote about the state of environmental resources in South Africa prior to European settlement, wherein the native lived as a nomadic hunter and pastoralist, and consequently the impact on soil resources was minimal. The mode of living has since changed, and is now primarily one of the agriculturalist and secondly pastoralist. Location of people in areas too small to accommodate their numbers gave rise to overpopulation and overstocking. In other words, the carrying capacity of occupied land was exceeded, resulting in soil losses. It must be noted therefore, that environmental conditions are not necessarily a direct consequence of bad land use practices in these areas, as the common perception might suggest (refer to sections 1.1 and 2.9).

A number of anti-erosion works which were conducted in these areas in the 1930s proved inadequate in their attempts to reduce soil losses. The solutions recommended at this time included a reduction in stock numbers, the purchase of additional land to alleviate the overpopulation problem, and implementation of schemes to control stock numbers and grazing (Jacks & Whyte, 1939). It is interesting to note that control of stock numbers and grazing was subsequently addressed in the decades to follow, but overpopulation on African reserves was never acknowledged by government to be a contributory factor deserving of attention, with respect to controlling soil erosion. This is in spite of the fact that the eastern Highland region (an African settlement area), constitutes the source and headwaters of South Africa. It is in this region that the water regime of entire river systems is controlled. Without adequate watershed protection regional erosion control is destined to fail (Jacks & Whyte, 1939). For this reason, the management of land use in African reserves, which were historically defined, is surely an important element worthy of consideration in terms of soil erosion control, and yet these areas have

been specifically excluded from the jurisdication of the soil conservation legislation promulgated by the South African government from 1910 to 1990.

'White' subsistence farming was eventually superseded by commercial farming, which focused on production for markets (Rabie, 1976). Greater change in agricultural practice was precipitated by the 2nd World War, wherein agricultural techniques were improved. Coupled with mechanisation and irrigation, this meant more land under the plough, farms were subdivided into smaller units, and farmers were left to their own discretion regarding (a) the draining of farms; (b) burning veld; (c) cutting down of trees; (d) overstocking; (e) ploughing of steep slopes and on river banks. Since they were inexperienced with regard to intensive farming methods, farmers were compelled to adapt to these new conditions, the collective impact of which was the progressive degradation of land (Rabie, 1976). With an overemphasis on production, guided by market demands, the result was the overtaxing of land, abuse and widespread erosion (Garland *et al.*, 1994; Rabie, 1976). [Refer to Section 5.3.2].

Matthee (1984) in his review of the history of soil erosion in South Africa, concluded that "soil erosion became a known problem nearly 150 years ago, whereas previously travellers had commented on the lushness of the veld and the abundance of game". He further reported that a number of authorities are reported to believe that soil erosion may have been one of the reasons for the Great Trek, given that the majority of Voortrekkers came from the Eastern Karoo, an extremely vulnerable and eroded region (Matthee, 1984). Regardless of whether or not this speculation is true, the first trekboers, and their management of huge flocks/herds, must be considered a factor in the process of veld deterioration (Roux, 1990).

Scars on the South African landscape therefore cannot all be reported to be of recent origin (Penzhorn, 1972; Watson, 1990). Sparrman (in Hall, 1934) wrote of the ravages of overgrazing and land degradation and claimed that much attention had been given to the conservation of South Africa's natural resources since as early as 1775. For example, in a communication by the Board of Heemraden of Stellenbosch and Drakenstein (Jan 11, 1751), changes reportedly evident in the older settled districts included the disappearance of grass and subsequent replacement by small bushy shrubs (Penzhorn, 1972).

In Watson's analysis of the extent of soil erosion in the nineteenth century, she describes how the Zulus' use of Natal's gully systems for protection in ambush situations and as escape routes for early Dutch settlers, suggested the already advanced state of soil erosion prior to European colonization (Broderick, 1985; 1987, in Watson 1990). Broderick (1985, in Watson 1990) studied farmer and local authority records, photographs and travellers' journals in a search for references to soil erosion, and found that the earliest documented concern regarding this, was in terms of its effect on water quality (Watson, 1990).

Msimango (1990) claims that sufficient evidence exists to suggest that before colonization in South Africa, indigenous people lived in close harmony with their natural environment and that traditional farming policies were geared toward the wise-use of resources. He therefore claims that whilst erosion may have existed before the turn of the century, European settlement and farming practice has exacerbated the situation.

5.4.2 **Land Use and Related Policies 1910 - 1990**

The second objective defined by the World Soils Policy (see Section 4.2) requires national governments *to develop a land-use policy and the necessary legislative framework to implement it.* Land use and its associated policies is a particularly complex subject in the South African context, as the ensuing discussion will illustrate. For this reason, the analysis will focus on three related aspects of land use with a view to evaluating the implications for soil conservation provided for within the guidelines of these policies. These are:

1. allocation of land in South Africa and land tenure;
2. South Africa's agricultural policy in general (with reference to preferential treatment policies); and
3. Betterment Areas policy.

The applicability of provisions with regard to soil conservation defined in the four Acts analysed in this study (see Section 4.3), is first defined and is followed by consideration of the abovementioned land-use policies. The discussion is by no

means exhaustive and aims merely to place the legislation providing for soil conservation reviewed in Chapter 3, within the broader context of land use in South Africa.

The provisions of the 1941 Forest and Veld Conservation Act did not apply to land held by the South African Native Trust (established under the Native Trust and Land Act 18 of 1936) (in other words, native trust lands), although were applicable to Crown forests on these lands (Hansard 1941, col.2086).

It is significant to note, that the 1946 Act was initially applied in the Ficksburg area alone (Rabie, 1976), and only after the general election in 1948 was the act applied extensively (Hansard, 1969). With regard to the Act's applicability elsewhere in the Republic, despite the reported applicability to all land proclaimed in terms of the Act, in practise and by implicit agreement among Ministers appointed to the newly established Soil Conservation Board, (contrary to statutory provision), the controls, regulations and provisions were not enforced on land occupied by Blacks, (that is, reserves designed by the state for the occupation of Blacks) (Hansard 1946, col.8936; Ross, 1963). Subsequently, in terms of the Soil Conservation Amendment Act No.15 of 1967, all urban land and land reserved for Blacks and Coloureds (so named in terms of the Population Registration Act of 1950), was officially excluded from the operation of the Act (Rabie, 1976). These provisions reflect those outlined in the 1946 Act's amendment 15 of 1967, in spite of repeated requests to include within the jurisdiction of the Act, all the lands of the Republic, including those under the control of the Native Affairs Department (Hansard 1946; 1969). Indeed, it was the opinion of a great many parliamentarians at the time and the Natal Agricultural Union, (an affiliated member of the South African Agricultural Union), that such an omission constituted the fundamental weakness of the Act (Hansard 1969, col.5947). Many were of the opinion that by excluding Bantu areas, the government was in effect exempting landusers in these areas from the provisions of the Act (Hansard 1969, col.6092), and in so doing providing them with a mandate to utilise land and agricultural resources in a manner which could ultimately exacerbate the existing erosion problem. The government's position was, however, resolute despite warnings that such an exemption was not favoured among the farming community and could not be expected to promote compliance of the Act in European areas (Hansard 1969, col.6092).

As for the Soil Conservation Acts of 1946 and 1969, the provisions formulated in the 1983 Act do not apply to: (a) land situated in urban areas (except in connection with weeds and invader plants); (b) South African Development Trust Land; (c) land situated within a mountain catchment area, although the State President may extend the operation of the Act to the trust areas. (This did in fact come into effect in 1991 under Sections 2 and 41 of the Abolition of Racially Based Land Measures Act 108) (Fuggle & Rabie, 1992).

5.4.3 **Discussion**

Research has consistently shown that land degradation is exacerbated when farmers are forced to operate on marginal lands, especially on steep slopes (Ahmad, 1977; Blustain, 1982; Chicsi, 1986; Gumbs *et al*, 1985; Hudson, 1983; Lovejoy and Napier, 1987; Napier and Camboni, 1987; cited in Napier, 1989; D'Huvvetter & Laker, 1985, cited in Laker 1993). Population pressures imposed by the South African government as a consequence of a number of land use policies (to be discussed further below), have given rise to intensive utilisation of marginal soils and particularly in the homeland areas, steep slopes (Scotney, 1978b). Topographical variations in the former self-governing states and homelands of Transkei, KwaZulu, Kangwane, southern region of Gazankulu and central Ciskei, are characteristically dominated by steeply undulating hills and deeply incised river valleys. The remainder of these developing regions, are characterised by moderate to gently undulating landscapes; Bophuthatswana, being the only exception, is marked by large expanses of flat plains.

Laker (1993), estimated the human carrying capacity of South Africa to be in the region of 35 million people. In 1993, the population totalled 39 million including the self-governing territories and independent homelands. In other words, South Africa has already exceeded its carrying capacity (on the basis of Laker's criteria) by 10 per cent. Notably, in terms of national policy planning, it has been assumed that the country has a human carrying capacity of 80 million people; given Laker's estimate, the consequences of this 'overstocking' in a human context, into the future, are self-explicit and do not bode well for the recovery of degraded land nor the realisation of conservation goals. Agricultural land use policies formulated since the turn of the

century have unquestionably contributed to this problem described by Laker (1993) and consideration will now be given to these.

5.4.3.1. Allocation of Land in South Africa and Systems of Land Tenure

To give consideration to South Africa's agricultural policy by implication involves consideration of land use and distribution policies formulated in the past, which today describe the landscape subdivided. Numerous authors provide exhaustive historical coverage of the means by which 'blacks' and 'whites' took possession of land in southern Africa, the clashes that ensued and ultimately how land was apportioned between the two groups (Van Biljon, 1947, cited in Hattingh, 1979; Tatz, 1962; Board, 1967; Van Schoor, 1968; Du Plessis, 1971). In accordance with the objectives of this study therefore, only salient developments will be discussed.

Former governments, under the influence of early European settlers, restricted the access of the Bantu to land rights from an early stage in history and created African reserves, which ultimately proved too small to support a viably, independent African agriculture (Binswanger & Deininger, 1993). Tenant farming therefore became the main mode of farming accessible to the Bantu and by 1882, 55 per cent of the native population in Natal alone, lived as tenants (35 per cent on privately owned land and 20 per cent on Crown land) (Bundy, 1985). Legislation imposing an excessively restrictive 'traditional' communal tenure system, that is the Glen Grey Act of 1894, limited farmer access to land that did not exceed three hectares in dimension (Binswanger & Deininger, 1993). The Act furthermore levied a labour tax on all men living in reserves who did not own land (which ultimately forced them to seek employment beyond reserve boundaries, in order to pay the imposed levies), and banned the sale, rental, or subdivision of land by introducing a form of communal tenure. In the Transvaal, for example, 14 per cent of Africans farmed their own land, 20 per cent lived on Crown land and up to 50 per cent occupied white-owned land. As the government's policy objectives were aimed principally at this time at ensuring the constant and readily available distribution of and access to labour, legislation was the vehicle used to effect these goals, and tenancy became increasingly pronounced by 1904.

Thus even prior to the turn of the 20th century, land tenure and occupation of land by Africans had been regulated by legislation. In 1910, the Department of Native Affairs was established, the responsibility of which was the administration and development of designated Black areas. The Bantu (or sometimes referred to as Native) Land Act 27, passed in 1913 and confirmed in 1936, consolidated provisions of earlier Acts and in so doing, made possible the implementation of a policy of segregation and the delimitation of areas for black occupation on a national scale, a move which in accordance with much of the literature reviewed, significantly impacted on the natural physical environment and ultimately on the soil resources of the country (Hattingh, 1979; Fuggle & Rabie, 1992; Binswanger & Deininger, 1993).

In terms of the 1913 Act, so called "scheduled" areas, totalling 9,190,010 hectares, were reserved for the exclusive use of Africans (Hattingh, 1979). Based on the recommendations of the Beaumont Commission report of 1916, and the subsequent promulgation of The Development (Native) Trust and Land Act 18 of 1936, additional land (6,209,858 ha), divided amongst the country's four provinces, was released for black occupation (Hattingh, 1979), a move which confirmed the restrictive nature of the Glen Grey Act provisions concerning communal tenure, and in effect reinforced the goverment's policy of segregation between black and white (Binswanger & Deininger, 1993). The main objective of the Act (which in essence constituted the very foundation of the country's future apartheid policy (Wilson, 1971)), was the transformation of tenants into wage workers for the mines (Binswanger & Deininger, 1993). With a loss of their right to purchase land outside designated reserve areas, black farmers were removed from their farms on the more fertile, accessible, and now white-owned, farming regions and relocated on what was in most cases marginal land. Further State interventionist policies, complemented by stringent pass laws and subsequently in 1970, the Subdivision of Agricultural Land Act No.70 (see Section 3.7.2), succeeded in the artificial depression of black agriculture (and workers' wages), whilst at the same time supporting European agriculture through, *inter alia*, marketing monopolies, direct transfers, credit and output subsidies (Binswanger & Deininger, 1993). Resistance against the government's policy of so-called 'rehabilitation' (certain literature sources use this term), took the form of destruction of fences and similar forms of sabotage: "malicious opposition", as recorded in numerous reports published by the Native

Affairs Department (Beinart & Bundy, 1980). [For further details refer to reports U.G.14-1948:21, U.G.51-50:2,32, U.G.61:1, and U.G.30-1953:5.] However, on the orders of Verwoerd, from the 1950s on a "blanket of secrecy was draped over rural resistance and maintained by his successors" (Beinart & Bundy, 1980).

In terms of the resultant influence on the spatial structure of the South African landscape, the promulgation of the Promotion of Bantu Self-Government Act No.46 of 1959, culminated in State recognition of eight national units and the emergence of a new concept of black 'homelands' as opposed to 'areas' (Hattingh, 1979). Despite the government's acknowledgement of the need to consolidate isolated Bantu areas into larger single territories for the purpose of cultural, social, political and most significantly, economic viability, they did not perceive such a move to be essential in terms of effecting their policy of separate development and consequently the matter was shelved. Further consolidation proposals submitted in 1975 contributed to the more satisfactory reduction of approximately 100 separate units into 35 land blocks. Under these proposals, six of the homelands comprised more than one single unit (refer to Table 5.5 for details).

These details were further rationalised and in the final analysis, this resulted in an allocation of 13 per cent of South Africa's total land area for 80 per cent of the population (Dixon & Heffernan, 1991). [Details pertaining to (a) the extent of cultivation in the agricultural regions of South Africa, (b) division of land in South Africa, (c) distribution of land in South Africa, and (d) population densities in the former independent and national states, is provided in Tables 2.3, 2.4, 2.5, and 2.6. This information will not therefore be duplicated here]. The South African landscape as represented in 1990, is therefore characterised by fragmentation and to a large extent degradation, a situation further exacerbated by the system of land tenure practised in these areas.

Liggitt (1988) reported on the importance of land ownership and its influence on erosion rates. For example, in a study conducted in Natal, 15,3 per cent of KwaZulu (where communal land tenure applies), 6,5 per cent of Trust Land, and 10,6 of White commercial farmland in Natal, was found to be significantly eroded. Whilst it was acknowledged that underlying physical features have influenced these results, the study's conclusions concerning ownership of land, remained statistically significant.

Table 5.5 Black Homelands: Number of land units before and after consolidation

Black Homelands	No. of units (1975)	No. of units after consolidation
KwaZulu	44	10
Bophuthatswana	8	6
Lebowa	13	6
Gazankulu	4	4
Transkei	3	3
Venda	3	2
Ciskei	19	1
KaNgwane	2	1
Qwaqwa	1	1
South Ndebele	1	1

Source: Hattingh, 1979.

Agriculture in African reserves has been described as being largely uneconomically viable (Ashforth, 1990). This has been attributed principally to overpopulation, but more particularly the form of land tenure available to farmers in these areas, which has provided specifically for the 'one man, one plot' system of communal/tribal tenure (Ashforth, 1990). Such a policy excluded the possibility of the more successful farmers consolidating holdings and expanding production levels, and checked any possibility of a capitalist farming sector emerging from within the reserves (Beinart & Bundy, 1980). Clearly, this was in accordance with the government's intent that reserves should continue to function primarily as reservoirs of labour for industry.

Communal land tenure applies in most areas of rural South Africa. As a traditional form of tenure, it was eminently suitable for small, stable populations, practised on

sparsely settled land, providing for grazing, hunting and the collection of wood and other wild produce (Grove, 1989). However, this precondition no longer applies, as a consequence of the State's policy of separate development (discussed below). With an inadequate degree of security of tenure, a land user inevitably possesses only minimal incentive to make permanent improvements with regard to the efficiency of his/her operation, and this has obvious implications for soil conservation practice (Rycroft *et al*, 1987). To further complicate this scenario, essential services required viable agricultural activity, such as, water, finance, fertilisers, seeds, marketing assistance, extension services and other facilities which typically make up the infrastructure available to commercial farmers in other regions, are simply not accessible to black farmers (Rycroft *et al*, 1987). Unstable communities, utilising uneconomic units of land, inadequate support mechanisms and infrastructure, represent the scenario of subsistence agriculture in South Africa. As previously stated in Chapter 2, soil erosion knows no political boundaries. Land use practices applied in these regions will inevitably impact on the commercial farming sector (refer to sections 5.3.3.5 and 6.2 for a discussion of the realities of on- and off-site costs of soil erosion), yet these areas were specifically excluded from the government's conservation policies reviewed in Chapter 3, formulated between 1910 and 1992.

5.4.3.2 South Africa's Agricultural Policy in General

According to Christiansen *et al.* (1993), the tools or mechanisms of preferential treatment of large-scale, commercial agriculture in South Africa, are very similar to those utilised by the decision makers and policy formulators active in other eastern and southern African countries, that is, with regard to input subsidies, preferential access to land and single channel output marketing systems. Whilst the scenario in South Africa is therefore not unique, the distortions present in its rural economy, represent an extreme on the continuum of practice. [Lipton and Lipton (1993) conclude that by worldwide standards, the discriminatory practises in South Africa, are the most severe, and Binswanger and Deininger (1993) conclude that, in contrast to other countries, the enforcement capabilities of the South African government are unrivaled. (Refer to Section 6.3 in which the enforcement provisions specific to soil conservation are examined). It is significant to note, that the conclusion drawn in this section states that as a consequence of a lack of political will and individual motivation, on the part of farmers and also State officials, conservation controls

provided for in the legislation, were not effectively enforced. This poses the obvious question of why did efficacy of enforcement exist in the context of land use and segregation while relative inefficacy characterised conservation enforcement.]

Basically, the government's policy initiatives, therefore, must be interpreted as having been aimed at stimulating capital-intensive, large-scale, (consequently white-owned) farming, with the simultaneous suppression of African agriculture. The instruments utilised by policy makers, to achieve these objectives, included *inter alia*, restrictions on land sales and rental markets, segmentation of labour markets, monopolistic pricing strategies, marketing for inputs and outputs, protection from external, international markets and capital subsidies. Since the economic depression of 1929 to 1932 and a severe drought in 1933, South Africa's agricultural economy has been characterised by comprehensive, permanent, State intervention in the marketing of agricultural produce and substantial legislative intervention and control with regard to agricultural prices (Rycroft *et al*, 1987). South Africa's agricultural policies in the past have shaped the structure of the rural economy represented today.

Blaikie (1985) made reference to the implicit 'battle' which ensued between 1930 and 1960, in which the opponents were the Department of Agriculture and Department of Mines. The source of the problem was the 'menace of soil erosion', which, coupled with the induced population pressure in the reserves, threatened the viability of the reserves as labour pools, causing the potential breakdown in social structures and starvation. The Department of Agriculture wished to promote the independence of farmers in the reserves, however, the Department of Mines, needed their continued dependence, thus ensuring their availability as a reservoir labour force. Land availability and political pressures were the forces which ultimately defeated the Department of Agriculture (Beinart, 1981).

Randall (1970) posited a strong case for the primacy of politics in an evaluation of 'apartheid' or separate development, and further claimed that consequently, economic forces have a tendency to "defer to and accommodate themselves to" the racial ordering of society in South Africa. Furthermore, economic needs have been subordinated to political imperatives "even if this means a declining growth rate". Indeed such has been the case throughout the course of South African history, whereby government-initiated policies have reflected preferential treatment of

European agriculture to the explicit and deliberate detriment of the African. Paradoxically, the pursuit of 'white' economic development in the country reinforced the indissoluble economic links between white and black South Africa. In the end, and just as Randall (1970) had predicted, the South African economy has forced the government into a radical revision of previous agendas as a result of the serious consequences of former policies. The economy simply could not sustain the costs incurred and consequently the 1980s saw the "liberalization" of the entrenched agricultural policies and their subsequent dismantling (Christiansen *et al*, 1993). Features of the changes which took place within the policy environment were studied by Brand *et al.* (cited in Christiansen *et al.* 1993) and are summarised below.

(a) repeal of the Land Acts, although the homelands continue to exist;
(b) increased exposure of farmers to market-related interest and exchange rates;
(c) 50 per cent decline in real terms since 1987 of budget allocations in support of white farmers, (in part as a result of eliminating a number of subsidies);
(d) efforts to rationalize the present fragmented structure of agricultural, institutional support in white-owned and homeland agricultural areas;
(e) a shift towards a wider range of decentralized support services (as opposed to the former large-scale, centrally managed projects typically found in the homelands);
(f) a decline in real producer prices of critical commodities, with maize declining by 25 per cent in real terms since 1984, and wheat declining by 25 per cent since 1986;
(g) deregulation of controlled marketing under the terms of the Marketing Act;
(h) changing tax treatment for agriculture, with write-offs for capital purchases extended from one to three years, thereby reducing implicit subsidies.

5.4.3.3 **Betterment Areas Policy**

Betterment areas were introduced on Trust land, which had previously constituted white-owned land in the [former] homelands. This land was purchased by the South African Native Trust, in a bid to alleviate the problem of overcrowding in rural 'black' settlements. In de Wet's (1990) evaluation of the socio-ecological impact of development schemes in the [former] 'homelands' of South Africa, it was concluded that, contrary to the expectation that in government-initiated schemes, as a

consequence of the reorganisation of land-use and resource-utilisation, that rational land-use would be promoted whilst providing economic benefits to the population, in South Africa the result of the government's policy of Betterment planning was environmental, economic and social destruction.

De Wet (1990) identified a number of reasons for the negative impacts of this policy. These are outlined briefly below.

(a) The principal aim of betterment planning schemes in the 1930-40s sought to promote soil conservation by means of fencing grazing areas and contour bank construction. However, after World War II, objectives were revised and focussed on the fundamental transformation of rural areas, which necessitated implementation of a policy of resettling people into State-demarcated residential areas [refer to Section 5.4.3.2 above which discusses South Africa's agricultural policy in general]. This procedure was imposed on the African population, more often than not against their will, and without negotiation. This inevitably gave rise to social conflict, confrontation and furthermore antagonism, as a consequence of a break up of established territorial groupings and social relationships; a situation hardly conducive to instilling a conservation-conscious ethic amidst social chaos.

(b) Demarcated areas were typically too small to accommodate the numbers of families resettled and farmers were forced to work 'economic units' (that is, plots of arable and grazing land, ambitiously defined by government as substantial enough to support a family and from which to derive an income). These units ultimately proved to be uneconomic, and consequently people were economically worse off than before. This situation was exacerbated by an influx of 'newcomers' into these areas, in search of somewhere to reside, which resulted in the further subdivision of plots and utilisation of arable land for residential purposes. Such pressures on available land significantly changed the physical environment and land use patterns in rural areas, a situation which manifest in the over-exploitation and exhaustion of soil resources, rather than the promotion of soil conservation.

(c) Agricultural extension services were planned to offer effective support to farmers to promote sound land-use on what was often unfamiliar terrain. Unfortunately, due to financial and personnel constraints, this support did

not materialise. [Refer to Section 6.4 where the same situation applies with regard to commercial agriculture.] Without this assistance and financial input to encourage and support conservation practices, land was used indiscriminately, resulting often in an accelerated loss of soil and vegetative cover.

Furthermore, the manner in which betterment planning schemes were introduced to 'black' farmers and subsequently implemented, that is, in accordance with the now widely debated concept, the 'top-down' approach, was hardly conducive to gaining the support of farmers for conservation. Official policies formulated, *inter alia*, to combat erosion, have resulted in exacerbating the land degradation situation. Politics are intimately interwoven in the South African context, with all issues concerning land use and rural development (de Wet, 1990). de Wet (1990) concluded, that unless the historical and contemporary political issues are resolved, future development projects in the country are destined to result in negative socio-economic, ecological and by implication environmental impacts.

In spite of the foregoing conclusions, some progress on the conservation front was achieved even with the implementation of discriminatory policies (Rowland, 1974). Figures prepared by the Department of Bantu Administration and Development (Table 5.6), indicate the extent of conservation work achieved in the Betterment Areas up to December 1970 (Rowland, 1974). [For a more detailed exposition of developments and planning in these areas, refer to Lemon (1976).]

These developments cannot be attributed to legislative enablement provided for in the Acts analysed in this study. On the contrary, they are the result of initiatives formulated by the authorities in the former self-governing territories and homelands of South Africa.

Table 5.6 Progress in Soil Conservation in Betterment Areas (up to 1970)

Total area constituting Betterment Areas (ha)	16 800 000
% of total area planned	50.77
% used for agricultural production	97,3
% of total area cultivable	12,8
% of total area tilled annually (climate dependent)	7-9
% of total area available for livestock grazing	84,5
Successful boreholes	7 282
Boreholes equipped	7 004
Kilometres of fencing	99 423
No. of betterment areas planned	1 141
Total area planned (ha)	8 265 646
Diversion banks and contours (km)	29 532
No. of conservation dams constructed	5 444
No. of grass waterways	18 725

Source: Rowland (1974).

5.4.4 Concluding Comment

The foregoing discussion of state policies and land use illustrates the extent to which historical and political developments must not be overlooked in attempts to understand policy inefficacy. In the context of land use and degradation, for example, conflicts in land use have incorporated political, economic and environmental issues and it can be argued that they can only be fully understood and appreciated by examining the historical context within which the problems arose and intensified (Whitlow, 1995). De Selincourt (1992); Showers and Malahleha (1992); and Binswanger and Deininger (1993) agree with this contention. Lemon (1976)

argues that "the sources and possible directions of change in South Africa cannot be considered meaningfully" without at least a basic understanding of theoretical models of political pluralism. The scant attention afforded this political dimension of change in South Africa was necessary given the scope of the study's objectives. However, for this reason it is recommended that as political developments (as demonstrated in the foregoing discussion (Section 5.4)) have the potential to influence the course of soil erosion and conservation in South Africa, together with historical developments (as the two are inextricably related) that further examination of these two dimensions (both are featured in Figure 7.1 the conceptual model of the South African policy environment) is imperative in future evaluations of policy efficacy and in particular soil conservation policy. Notably, to date these issues have been overlooked.

CHAPTER SIX

SOUTH AFRICAN SOIL CONSERVATION POLICY ANALYSIS 3:
Information transfer, enforcement, support mechanisms and education

6.1 INTRODUCTION

To conclude the analysis of South African soil conservation policy, the outstanding requirements for effective soil conservation policy and practice, as defined in the World Soils Policy, will be examined in this chapter. These include, in accordance with objectives 4-6 and 8-12, (a) the need for an adequate information base, research which must be ongoing and applicable at both the micro- and macrolevels, (b) enforcement and incentives to encourage legislation compliance, (c) the development of support mechanisms to implement and encourage sustained conservation practice, (d) adequately skilled manpower, sufficient in numbers to effectively provide an extension service, and (e) environmental education. Data available to the writer from numerous literature sources, personal communications and the material derived from the analysis of the four selected pieces of South African legislation undertaken in Chapter 4, constitutes the information base for this part of the study.

6.2 AVAILABILITY, ACCESSIBILITY AND INTERPRETATION OF DATA

It is proposed that three objectives of the World Soils Policy (outlined in Section 4.2), relate to the need for field studies and ongoing research to provide an information base essential for informing policy decisions at every level of society. For this reason, objectives 4, 5 and 11 will be discussed collectively under this section. The content of each objective will now be defined and the extent to which South Africa has met these objectives will subsequently be evaluated.

Objective 4 - *Identify, map and assess the potentials and constraints of soil resources, map current land use, assess the present extent of soil degradation, predict foreseeable hazards and develop methods for their prevention*;

Objective 5 - *Adapt soil capability classifications and methods of land evaluation to local conditions*, and

Objective 11- *Actively pursue research needed to develop systems of farming that combine adequate production with resource protection and are compatible with socio-economic and cultural conditions.*

The conclusions drawn from investigations carried out by the Drought Investigation Commission in the 1920s, were the foundation upon which formally held perceptions regarding the extent and intensity of soil erosion in the homelands and Trust areas, were built, that is, that bad land use practices (faulty veld and stock management, see Table 1.1) were the root causes of the problem in these areas (Drought Investigation Commission, 1923). This perception has subsequently been reinforced to date by repeated claims of land use malpractice in the areas reserved for Africans and what would appear to be entrenched perceptions concerning unprecedented and anthropogenically-accelerated rates of soil loss (Hattingh, 1979; Adler, 1981; Robertson, 1967; Acocks, 1988). [The role of perceptions in influencing policy decisions and behaviour is discussed in Chapter 5.] The purpose of this section, however, will be to suggest that these claims cannot be supported by substantive data. On this basis such claims are unfounded and potentially misguided, as the ensuing discussion will attempt to illustrate.

Soil loss estimates calculated by Midgely in 1952, are repeatedly quoted today both in the popular media and in the scientific literature (despite subsequent work by Schwartz and Pullen (1966), Doornkamp and Tyson (1973), Rooseboom (1975), and Le Roux, 1990). This is in spite of the fact that agricultural and conservation research has been ongoing throughout the 20th century (Watson, 1990). For example, a comprehensive publication produced by the Department of Agricultural Development (1992b), details an apparent wealth of agricultural research projects, undertaken or funded by the Department in the past decade. For example, a survey of land use and farming in Natal, undertaken between 1979 and 1989, enabled the collation of data involving 69 per cent of privately owned farms in the province, utilising responses from some 6000 farmers (Department of Agricultural Development, 1991). Numerous research areas and projects were undertaken by the

Department of Agriculture since 1973 (Table 6.1). Further, in 1974, SARCCUS reported that as a result of research efforts in recent years, "a mass of valuable information [on various aspects of soil conservation] is awaiting practical application" (Rowland, 1974). Meadows (in press) drew the same conclusion with regard to the management of land degradation in the south-western Cape region. He claims that the Department of Agriculture collects useful census data from individual farms in the region but this is neither summarised nor collated, which renders it effectively impractical and unfunctional, not to mention inaccessible. The need for data processing is emphasized to serve the purpose of "broader-scale management" decisions regarding practices which may promote conservation, or mitigate against forms of degradation (Meadows, in press).

Table 6.1 Agricultural Research Areas: 1973 -1989

Area of Research	No. of Studies	Year
soil surveys	19	1973 - 1989
veld surveys	17	1980 - 1988
soil conservation research	23	1982 - 1989
farm planning and management	106	1979 - 1989
programmed extension	105	1979 - 1989

Source: Department of Agricultural Development, 1992

This study suggests that despite the efforts of the State, there remains a considerable dearth of available data in the country to adequately inform policy decisions with regard to soil conservation and that this is in spite of calls in parliament to increase the contribution of the government for research and extension and claims that "there is no better investment a country can make than an investment in research in agriculture" (Hansard, May 1982, col.556-557). A similar conclusion was reached in the 1950s in the findings of the Desert Encroachment Committee. Growing concern for prevailing drought conditions, had culminated in January 1948 with the appointment of the Desert Encroachment Committee (Rabie, 1976). After what was considered to be a comprehensive investigation into the causes of veld deterioration, the committee published their report (UG 59/1951) in March of 1951. In this report the committee

emphasized the need for pasture research and confirmed that to date causes of veld deterioration had been "relatively unknown". The Social and Economic Planning Council, in 1946 (UG 9-'46), in its task of investigating aspects of the Union's national social and economic life, found it essential to investigate socio-economic conditions in the 'Native Reserves', as they believed activities in these areas impacted extensively on the economy of the nation as a whole. In the course of their research, they not only realised that there was a paucity of factual material available for these reserves, but they emphasized in their report the necessity of (a) having an informed public with regard to social and economic issues, and (b) being in possession of adequate information as a "first requisite to the formulation of a sound policy". As has previously been highlighted in both chapters 1 and 2, and will not therefore be expanded on further at this juncture, the overwhelming emphasis on the physical dimension of the erosion problem and the development of practical solutions, is most apparent in the South African context, despite repeated calls to consider its related 'human' dimension. [It is pertinent to note that contemporary approaches to sustainable agriculture (not just those formulated prior to 1992) still promote the advantages of technological solutions, for example, like that proposed by Lyne (1994) in his paper on "Engineering, [the author was referring specifically to agricultural engineering] a solution for sustainable agricultural production"]. It is contended that no single solution in future can be heralded as the panacea for degradation, however, a necessary precursor must include an acknowledgement that the problem is as much cultural and social as it is technological.

Borlaug and Dowswell (1995) in their evaluation of science-based agricultural development, describe how in African agriculture agricultural science has been subject to changing fashions and fads (in terms of its focus) throughout history. For example, in the 1930s and 1940s the development of polyploid varieties (doubling of chromosomes) aimed at plant improvement was promoted extensively. In the 1950s and 1960s, mutation genetics was very popular, yet by the 1970s and 1980s, somatic tissue culture and farming systems were the fashion. By the late 1980s and currently, much emphasis is placed on the promotion of biotechnology and genetic engineering, computer modelling of cropping systems, maximising biodiversity, low-input sustainable agriculture and farmer participatory research. Borlaug and Dowswell (1995) suggest each approach has its merits, but none can be regarded as the panacea. It could be argued that only by releasing the scientific community's hold

on the promotion of technocratic solutions, that more meaningful progress can be advanced. This study constitutes an important move to redress the implied deficiency of earlier research efforts.

A further consideration of the nature of scientific data and its capacity to inform decision-making concerns disciplinary monopoly. It could be argued that not only has soil erosion in South Africa been perceived to be solely an agricultural problem (Hansard 1969), but further the belief prevails that only soil scientists and engineers can provide the answers and design the technologies to address the problems associated with land degradation. Garland (1993), however, proposes that as many of the constraints to land use are geomorphological in nature, it is logical that geomorphic inputs could contribute a necessary and important role in land use decision-making processes. This confirms Morgan and Rickson's (1988) claims that since geomorphologists study the form and materials of the land surface and the processes operating thereon, that they are qualified to understand and predict the consequences of changes in land use. In this capacity that are best equipped to help the policy-maker in, for example, predicting the likely effects of different policies and in developing strategies to mitigate these effects (Morgan & Rickson, 1988). In a review of geomorphological reports and articles, Garland (1993) identified a number of broad areas of interest, which included coastal zone management, urban and infrastructural development, water resources and rural land use, and environmental conservation. (Refer to Garland (1993) for details of research undertaken in this field of expertise.)

Policies for soil erosion control need to be based on knowledge of the severity of the problem and the nature of the processes involved. Vital background information to inform soil conservation planning comes from an evaluation of the resources of the land with respect to its suitabiity for different uses and from research into the mechanics of water and wind erosion, all of which the geomorphologist is well-equipped to provide (Morgan & Rickson, 1988). One of the conclusions drawn from Garland's (1993) review is particularly relevant in the context of the earlier reference to disciplinary monopoly. Much applied geomorphological input is conducted not by geomorphologists but other earth scientists, such as, civil engineers and engineering geologists, who can be considered to be "higher profile professionals". Morgan and Rickson (1988) warn of the "dangers" inherent in not obtaining the advice of

geomorphologists in designing systems for erosion control, implying they are often based on inadequate knowledge. It is suggested that this could be the reason why Midgely's soil loss estimates, calculated back in 1952 are still being quoted in contemporary texts in the 1990s, despite ongoing investigations and field measurements by other scientists in the country (Scotney, pers. comm.). Garland (1993) suggests that this is because few land use decision makers confronted with geomorphological problems are even aware that such a discipline exists. It is argued that this is a weakness that could simultaneously be addressed in the adoption of a multi- and interdisciplinary approach to soil conservation, as advocated in this study. [Section 9.2.2.1 provides further deliberation on the need to address land use problems, specifically soil degradation from a multi- and interdisciplinary approach.]

In the absence of reliable and valid scientific data, anecdotal information and/or propaganda (which may or may not be misinformed), gives rise to the creation of certain perceptions, which are largely speculative and ultimately inform and direct policy formulation (see Section 2.9). Due to the relativistic (and subjective) nature of these observations, in terms of quantifying problems, this makes for a problematic data source (Watkinson, 1992). Problems associated with land use techniques, sampling methods and subsequent comparability of results measured by different methodologies, gives rise to the question, which results are policy formulators to believe, when faced with contradictory measurements and, for that matter, messages? (Stocking, 1987). In the presence of ambiguities compounded by a lack of consensus, do decision makers instinctively choose (a) the one that proves their preconceptions (which may or may not be misinformed but will inevitably be influenced by their own personal frame of reference and value system (see Section 5.2 and the interpretation of reality), (b) the most complicated and apparently technically superior measurement (a decision taken on the belief that scientists never err), or (c) the one providing the neatest, cheapest or most satisfying solutions? (this will depend not only on resource/financial constraints, but also individual agendas).

In the South African context, it is probable that all three options seem likely, depending on who the decision-maker is, farmer, extension worker, or politician, given the entrenched perception that soil erosion in the country has occurred as a result of landuse malpractice by specifically black farmers, and the dualistic structure of agriculture in the country. The apparent policy of preferential treatment with regard

to White commerial farming and neglect of similar practices on lands worked by Africans, would support this theory (refer to Section 5.4). Shaxson (1990) acknowledges the importance of overcoming a lack of credibility of, for example, government staff (by implication extension personnel in the context of taking information and technology to the landuser), in the eyes of the landuser may be the most important initial barrier to progress. Experience internationally has shown that social consideration generally proves critical to success (Shaxson, 1990). Such a consideration has been seriously disregarded in the South African soil conservation context. If it can be assumed that the landuser is the ultimate "decider" of what will happen at the surface of the land on a daily basis, if what the state or other organisation or agent recommends is not in their own interest, then they are unlikely to change their patterns of behaviour (Shaxson, 1990). Figure 6.1 illustrates the crucial role of credibility in the transfer of information from an advisor or extensionist to the farmer and its positive or negative influence on community receptivity. Real and committed participation of individuals in conservation projects or programmes will depend intimately on the availability and accessibility, as well as credibility of the message or information being transferred. Shaxson (1990) refers to the need for meaningful transfer of information, in both directions, that is between extensionist and farmers.

Unsatisfactory transfer of information could manifest as unfulfilled promises and failed recommendations. Feelings of the landuser regarding the perceived "remoteness" or inappropriateness of strategies and advice presented, and planners' or extensionists' assumptions that their 'top-down' approach will produce what is best for the landuser, may all combine to produce feelings of disbelief, disinterest, apathy, even antagonism, in which receptivity to new ideas or approaches will understandably be low (Shaxson, 1990). This presents one of the most crucial challenges in terms of future research and future policy development, that is, the need to enhance the overall communicability (Wilenius & Tirkkonen, 1995) and hence transferability of information pertaining to land use, soils and degradation, from the research community to the decision-maker to the extensionist and the landuser, and in reverse, as a tool to effect more effective policy implementation.

Clark (1992), referred to the concept policy orientation in his consideration of policy formulation and defined this as "having [the] knowledge (or intelligence) that is

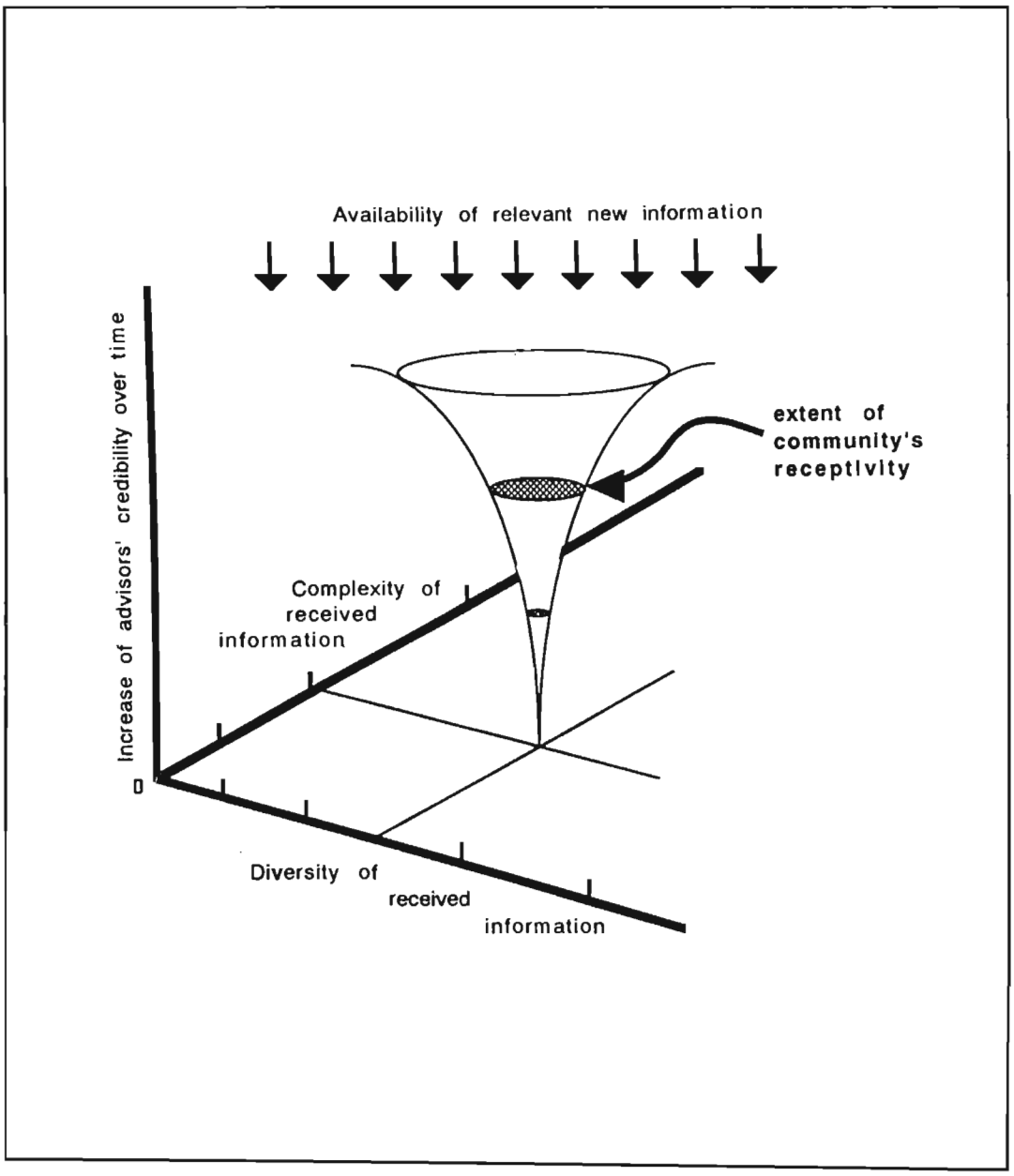


Figure 6.1 The influence of increased credibility on community receptivity. (Shaxson, 1990)

directly useful in the policy process". He further proposed this to be an essential prerequisite for the formulation of policy. Applied to the objectives of this study, this may be translated as, knowing how reliable the available data supplied is with regard to the information it provides on, for example, the extent and intensity of soil erosion in a given locality. A further prerequisite defined by Clark (1992) involved "having knowledge of the policy process itself", such as the effectiveness with which policies are implemented or the consequences of applying different conservation strategies. [The term policy orientation originated in 1951 with Harold D. Lasswell, the father of the policy sciences (Clark, 1992)]. Ongoing scientific research forms part of the "response to environmental change" process. Failure to respond to a particular environmental condition by policy makers, for example, has been attributed to the range of uncertainties commonly associated with analytical and predictive scientific research (Chen *et al*, 1983).

It could be argued that an additional issue relates to the 'nature' of the knowledge itself. Chapter 1 and various sections within this chapter make reference to the technocratic bias which has dominated the sciences since largely the turn of the century. Just as the author proposes that this bias can account for the inefficacy of soil conservation policy generally, the same criticism can be applied or transferred to the context of agricultural extension. According to MacVicar (1989) (Director: Natal Region, Department of Agricultural Development), to achieve success at extension, officers must be successful "masters of the best technology needed by [Natal's] farmers" and "we must communicate that technology successfully" to them. Notwithstanding the imperative for successful technology transfer to, *inter alia*, effect conservation objectives, this must be 'appropriate' technology.

This section will attempt to address the question of (a) to what extent therefore are policy formulators in South Africa informed with regard to the potential and constraints of soil resources, (b) are soil capability classifications applied at a microlevel, and (c) how adequately have developed systems of conservation farming combined protection of resources with production whilst remaining compatible with prevailing economic and cultural conditions?

It would appear from the literature reviewed, that efforts in the past have been made to better inform policy decisions. 1933 saw the implementation of the first soil

erosion schemes, which addressed design and construction and funding of anti-erosion works, including the provision of dams and reservoirs for stock watering purposes (Matthee, 1984). Between the World War II years (1939-1945) (see Section 5.3.2. on levels of awareness and policy), a gradual awakening to the reality that rates of soil erosion in certain regions were apparently on the increase occurred (even if the causes of same remained unidentified, unconfirmed, and/or largely speculative (Hansard, 1946; Desert Encroachment Committee, 1951)). A significant consequence of this heightened awareness was the commissioning of systematic field surveys of soil and vegetation, and agro-economic surveys were conducted as part of the soil erosion schemes practised at that time. Soil surveys are required for the purposes of defining and evaluating soil types, slope, existing land use or extent of natural cover, susceptibility to erosion, and the extent of erosion already in place (FAO, 1983). Without this information there can be no physical basis upon which to determine the suitability of land for a given purpose. For example, the carrying capacity of land is determined on the basis of rainfall. Stock numbers are determined and permitted according to the rainfall and the characteristics of the soil in a given region.

Firstly, if the 'characteristics' of the soil are not fully known, that is, in terms of its erodibility threshold, its potential and constraints, how can a farmer be rightfully accused of overstocking on his land? Secondly, should a farmer experience losses as a result of drought conditions, and it can be proven that he has overburdened his land, he is disqualified from receiving drought aid. Again it can be argued, how can the correct carrying capacity of land be determined without adequate and extensive surveys? Farmers therefore may be wrongfully perceived to have overexploited land and receive punishment. This has been a serious inadequacy of current policies that has been repeatedly expressed by farmers particularly of late (Hansard 1983, col.4816-4818). [Note: In the United States of America, official recognition of the importance of soil surveys with regard to conservation emerged in 1952, when the management and administration of all federal soil survey activities were transferred to a central organisation, the Soil Conservation Service (FAO, 1983)]. The survey material (as referred to at the beginning of this paragraph) collated at this time therefore provided a source of educationally useful, informative maps and bulletins for public consumption (Penzhorn, 1972), but still fell short of what was necessary (Scotney, 1978a; Hansard 1983, col.4816).

In the early 1960s, there was growing recognition of the fact that soil investigations were a fundamental prerequisite for the compilation of farm plans (legislative provision for which was given in terms of the 1946 Soil Conservation Act). Dangers associated with over- and under-estimation of South Africa's agricultural production capacity could only be minimised in the presence of reliable data on actual soil potential and this information could only be derived if soil capability assessments were conducted (Rowland, 1974) (see Section 5.2.2 on perceptions and estimating problem magnitude and needs). According to SARCCUS records, progress was being made with regard to soil capability assessment methods, and these were accordingly at that time being used with increasing effect (Rowland, 1974).

In 1969, a binomial system for soil classification for South Africa was developed (by Van der Eyk *et al.* 1969; MacVicar, 1989), and published, constituting a comprehensive definition of over 500 soil series nationwide. The classification is considered to be one of the most important contributions to land use planning to date in terms of its contribution to improved land management, and establishment of priorities for extension and research work (Scotney, 1978a). Table 6.2 summarises the extent of soil surveys completed in South Africa, up to and including 1978.

In October 1971, the Water Research Act No.34, provided for the establishment of the Water Research Commission. The Commission was responsible for coordinating water research in the country, promoting research results and accelerating research efforts by providing the necessary finance for relevant projects (SARCCUS, 1974).

In the early 1970s, the Department of Agriculture introduced a policy of optimum resource use (as referred to earlier in Chapter 3). This policy stipulated that the requirements for agricultural production

Table 6.2 Extent of soil surveys in South Africa (up to and incl. 1978)

Max. intensity of survey	Extent (mill.ha.)	% of S.A.*
1:5 000 to 1:10 000	2,7	2,3
1:20 000 to 1:50 000	9,6	8,1
1:100 000 to 1:500 000	2,1	52,6
Total	74,4	63,3

Source: Scotney (1978b).

Note: * The extent of surveys is expressed as a percentage of surface area less state land, cities, towns, roads and railways.

should: (a) be in harmony with the natural environment; (b) not be practised to the detriment of agricultural resources; and (c) be based on economic principles (SARCCUS, 1974; Adler, 1985). To implement such a strategy, however, required the thorough understanding and knowledge of the country's natural resources. Consequently, an increase in the number of surveys conducted at this time occurred, and an area comprising 41 per cent of the country's agricultural land, up to 1984, was covered by landtype surveys. Data collected in these surveys included particulars of soil, terrain and climate in a given area, and this information was reported to have gone a long way in promoting the use of agricultural land in accordance with its scientific potential (Adler, 1985).

Monitoring sediment yields or soil erosion rates is expensive and time-consuming (Higgitt, 1993). Yet, predicting the effects of changing landuse patterns; providing a reference base for monitoring change in the extent and rate of erosion; assessing conservation strategies; planning agricultural development; designing soil conservation techniques and strategies; and the evaluation of on- and off-site impacts of erosion, all require estimates of actual and/or potential soil erosion in a given locality (Watson, 1990). In addition, such estimates are required in assessing

intervening factors of influence, delineation of areas subject to the risks of erosion, and landuse suitability (Morgan, 1979; Watson, 1990). For all of these reasons therefore, soil erosion estimates are the critical input to erosion hazard assessment (Watson, 1990), without which policy decisions cannot be adequately informed. Despite the research advances outlined above, the extent of unsurveyed land is still "disturbingly" high, (Scotney, 1978a), and the need to make progress in this area of research is imperative.

At an international level, establishing estimates for actual soil erosion and soil erosion potential has been complicated by a general lack of agreement concerning the scale and techniques to be employed in assessment (Morgan, 1979; Stocking, 1987; Watson, 1990) and on methodological approaches (Watson, 1990). Watson (1990; pp.100-110) provides a detailed analysis on actual and potential soil erosion estimation internationally and within South Africa. For the purposes of this analysis, suffice to say that the technique employed in South Africa for estimating soil losses from arable lands, is the Universal Soil Loss Equation (USLE) (developed by Wischmeier and Smith, 1962), (as recommended by the Department of Agriculture). International controversy surrounding the accuracy of estimates using the USLE, after values derived for Zimbabwe using the USLE, were poorly correlated with measured rates of actual soil loss (Watson, 1990), raises the question of the suitability of this technique for South African conditions. Elwell (in Adler, 1981) warned that the USLE should not be used in South Africa, as insufficient data for establishing factor values was available in the country. Watson (1990) suggested, that the costs of improving USLE estimates in South Africa, would have necessitated experimental efforts costing in excess of several times the total agricultural research budget, and this is likely the reason why the USLE continues to be utilised.

An alternative model was developed in 1974 and accepted by the SARCCUS Sub-committee for Land Use Planning and Erosion Control, and considered a more reliable indicator of potential soil loss. This is referred to as the Soil Loss Estimator Model for Southern Africa (SLEMSA) (Watson, 1990). It must be noted, that despite the model having been introduced to the Department of Agriculture and in 1976, the fact that they were responsible for extending its conceptual framework, the model has not been extensively employed in South Africa (Watson, 1990). This is in spite of the acknowledged greater applicability of SLEMSA to larger arable lands and

rangelands (Elwell, 1984; Abel and Stocking, 1987); its ability to indicate and prioritize research needs and provide farmers with conservation alternatives (Scotney, 1978b); and the fact that it was developed to be "simpler, less data hungry, cheaper" and lends itself more to extrapolation of unmeasured conditions, compared to the USLE. Had the importance of obtaining this sort of information been realised or acknowledged by government and/or its agencies, finance may not have been a constraint inhibiting progress. An example of the impracticality of USLE concerns the fact that it requires that soil erodibility be measured on standard sized plots kept bare and fallow over a minimum period of ten years (Russell, 1992). The decision was taken by the Natal Region's Department of Agricultural Technical Services (as it was called then) in 1976 to adopt the simplified method of determining soil erodibility, SLEMSA which according to Russell (1992) has produced very satisfactory results.

Laker (1993) has suggested that a poor understanding of Africa's agricultural resources (a consequence of inadequate information on, *inter alia*, soil types, geology, and erodibility of soils), has resulted in unwise practices, such as poor planning, and has not only adversely affected agricultural development and resource potential, but has initiated serious land degradation and consequently exacerbated the soil erosion problem. Laker (1993) was, making reference to Africa as a whole, but these conditions are also applicable and relevant in the South African context (Scotney, 1978a; 1978b).

Data is currently available reflecting "reasonable estimates" of average erodibility of the majority of soil formations in the country. Information pertaining to the influence of erodibility on soil erosion in Natal has, however, been limited by the unavailability of information on the soil formations present (Adler, 1981; Watson, 1990). In particular, information relating to the interior and southern portions of Natal and most of KwaZulu is unavailable with regard to soil formations (Watson, 1990), making estimations of soil loss in these areas impossible. [See sections 5.4 to 5.4.3.3 for a discussion concerning preferential policy treatment in commercial/white farmland areas.] Failure to determine "allowable soil erosion rates for selected soil series" is considered a major obstacle in the management of agricultural resources and whilst progress has been made with particular regard to land use planning, much research is still needed concerning erosion control (Scotney, 1978a).

Studies in the United States of America indicate that assessments of on- and off-site consequences of soil loss, are fundamental in setting conservation goals (Piper, 1989; Scotney & McPhee, 1990). On-site damages concern those affecting the land on which the erosion originates, and off-site damages refer to those which occur at locations beyond the source of soil displacement (Napier, 1989). Examples of the latter include sedimentation in reservoirs/dams, potential disruption of transportation systems as a result of landslides or sediment deposition, and reduced utility of water resources as fishing nurseries, or for recreation or irrigation purposes. Vosloo and Koch (1992) acknowledge that possibly as a result of too much emphasis on mechanical control measures on-site rather than on biological control, that losses and hence consequences of on-site erosion have at times been greater off-site than at source. In the United States of America, recent studies suggest that the costs of off-site soil displacement are more significant and problematic than on-site consequences (Napier, 1989). Without empirical evidence to substantiate similar claims in the South African context, it is not possible to positively assert that this is the case in South Africa. From the literature reviewed and the apparent paucity of material on this subject, the failure to recognise the importance of assessing on- and off-site costs in South Africa, is assumed to be a further inadequacy of soil erosion research efforts.

Another aspect concerning availability of scientific data relates to the importance of understanding the relative chronology of soil erosion episodes or events, which enable a comparison of pre-existing conditions with modern accelerated erosion (Showers, 1989; Payton *et al.*, 1990, cited in Boardman *et al.*, 1990; Walling, 1990). Except for anecdotal references to veld conditions prior to 1910, and work by Beinart (1981; 1984; 1989), Garland and Stocking (1995), little additional information was found to be available for South Africa specifically. [See Beinart and Bundy (1980), Stocking (1985), and Showers (1989), for studies in colonial Africa and Lesotho.] Without adequate data on pre-existing conditions (with regard to the temporal, seasonal and spatial variations) no authoritative assessment concerning the perceived acceleration of erosion, geological or anthropogenic, can be advanced.

In 1993, MacVicar of the Cedara Agricultural Development Institute, undertook a review of research and extension developments and progress in the Department of

Agriculture with a view to evaluating the future potential sustainability in agriculture. The study concluded that on-going research has led to a present level of expertise in public sector research and extension, where "considerable knowledge is to hand" regarding in general terms:

1. the conditions required for optimal crop growth, and the effect on yield of decreasing one or more inputs;
2. the conditions required for minimum soil loss, and the knowledge that failure to meet such standards will result in degradation;
3. the management required for optimal veld management, and the consequences of non-compliance on veld condition and grazing capacity ;
4. the use of veld and cultivated fodder crops for dairying, beef, sheep and goat production;
5. the method needed to evaluate the costs and profitability of enterprises, either independently or within farming systems;
6. how to determine the most profitable group of enterprises for a farm;
7. the provision of inputs for commercial farming (power, fertilizer, seed, etc.);
8. the marketing of produce of commercial farms.

MacVicar (1993) further concludes that research and development must take place at the local level, but on a coordinated basis to avoid unnecessary duplication. Serious deficiencies with regard to the following areas currently exist, particularly in respect of small farms (and by implication these in effect highlight current research needs:

1. on- and off-farm demand for produce;
2. conditions of production on small farms, including: soil conditions; veld conditions; climate; water resources; farm size; tenure and ability to determine suitable landuse; tenure and long-term interest in conservation; tenure and an interest in capital developments; input infrastructure (roads, stores, finance); output infrastructure; affordable and relevant inputs (for example, fertilizer in cheap, small packaging); land preparation and harvesting equipment; level of expertise.

According to Vosloo and Koch (1992), official figures indicate that as little as 30 per cent of land under cultivation is protected against erosion and that only 50 per cent of conservation works are maintained effectively. Further they conclude that conservation measures to combat wind-erosion are "practically non-existent", and about 30 per cent of vleis and 60 per cent of natural veld is considered to be "reasonably well conserved" (Department of Agriculture, 1989; Heyns, 1991 cited in Vosloo & Koch, 1992). No reliable estimate exists regarding the total extent of the acidification problem. It has been suggested, however, that at least 500 000 hectares of land under maize has already been contaminated in this way (Vosloo & Koch, 1992). Compaction on fine sandy soils (with a clay content < 15 per cent) could reduce yields by 30 to 40 per cent on these soils (Vosloo & Koch, 1992). Apparently more than 2 million hectares of land in maize producing areas alone are fine and sandy (Scotney & McPhee, 1990). The problem concerning sludge disposal and deposition and industrial effluents on agricultural land, is increasing in extent (Scotney & McPhee, 1990). Approximately 42 per cent of grazing is presently threatened by alien invasives (Department of Agriculture, 1989) and nearly 13 million hectares of Bushveld is detrimentally affected by undesirable woody invasives (Vosloo & Koch, 1992). The combined impacts of these many forms of degradation impact on the soil resource base on aspects such as:

* the loss of high potential land;
* off-site and on-site damages from erosion;
* loss of production potential;
* fertility losses;
* sedimentation and impacts on water storage capacity;
* impacts on unique ecosystems (such as wetlands); and
* economic considerations. (Scotney & McPhee, 1990).

Clearly, the challenges facing agricultural researchers today, are even greater than those prior to 1992.

6.2.1 **Discussion**

It is suggested that this evaluation permits the conclusion that the government, whilst it recognises the importance of research as an essential input in agricultural systems,

has not afforded the matter priority. The HSRC (1996) in their assessment of the role and function of the Directorate Agricultural Resource Conservation, which in effect constitutes an audit of its activities and functions, and commissioned by the Directorate itself, confirm this conclusion. With regard to research and the development of technology they claim that research issues in agriculture have not been sufficiently prioritised and the danger exists that some of the most urgent problems challenging resource conservation are not being investigated. They further state that as a result of the commercialisation of agricultural research there is a danger that investigations are being fragmented and that the "themes" for which funding is not available will be marginalised. As a result of excessive specialisation, results from these "experts" do not take into account broader contexts. Moreover it is suggested that the inputs of research in policy making are as a result ineffective and that "better marketing of findings concerning the deterioration of agricultural resources is vital" (HSRC, 1996).

It could be argued therefore that inadequate funding has accounted for the inadequacy of research efforts, as has the government's focus on improving agricultural production to the detriment of conservation and sustainability. This gives rise to the question of government commitment to solving the erosion problem manifest in the country. A number of authors suggest the level of commitment to be low. According to Greyvenstein (cited in Scotney, 1978b), only "meagre efforts" have been realised in this field in South Africa, and Scotney (1978b) describes the low level of commitment as an "inexplicable" response to the problem.

In 1983, the government called for a critical evaluation and subsequent radical revision of existing soil conservation legislation. This was precipitated by increasing awareness of rising production costs in agriculture (see Section 5.3.2) and a prevailing perception that agricultural resources were deteriorating, despite an amount of R130 million having been spent up to that time on improving agricultural land use (Verster *et al.* 1992). The Conservation of Agricultural Resources Act 43 of 1983, which repealed the Soil Conservation Act 76 of 1969 and the Weeds Act 42 of 1937 (Verster *et al.* 1992), was the culmination of this increased level of concern, which placed the emphasis on maintaining the production potential of land fit for agricultural use; that is agricultural sustainability. (Awareness levels are discussed further in Chapter 5 and the concept of agricultural sustainability is discussed in Section 9.3.)

In the absence of information that only detailed land surveys for the entire country can provide, even with legislative enablement, it is proposed that the revised objectives of the 1983 Act, (as was the case with previous enactments), cannot be met.

Even if scientific data were adequate in terms of its content, availability and accessibility to South African policy makers, where data are underutilised or misused [or give rise to the implementation of misappropriated conservation measures (Watson 1990, 65-67)], resources can be wasted and "opportunities for better-informed policy decisions are foregone" (Brunner, cited in Clark 1992). For example, in the context of this study, such a situation often explains the problems that exist concerning the transferability of scientific information from scientist to extension worker, from extension worker to farmer, from scientist to government official or policy maker. Translated in terms of the potential efficacy of the policy process, analysis becomes less important than "values and beliefs as a basis for policy-making" (Nathan, cited in Clark, 1992). (Refer to Section 5.2 for a discussion on values and decision making). This issue becomes particularly salient in the context of the anticipated increase in the numbers of 'emergent' farmers utilising the country's available agricultural resources, as a result of land reform measures, some of whom may be inexperienced farmers/land users. It is suggested that this will inevitably place an increased pressure on all concerned in agricultural research, decision-making, policy development, and agricultural extension, to enhance the efficiency with which information is disseminated and transferred to the land user.

Clearly, the South African government has not adequately satisfied objectives 4, 5 and 11 (defined at the beginning of this section), prescribed by the World Soils Policy. This is in spite of the noteable financial contribution made by the state (see for example, Tables 4.7 and 5.4) although this was reportedly regarded as "never enough" (Hansard 1983). For example, in 1983, the South African Agricultural Union (SAAU) made representation to the Department of Agriculture regarding the allocation of funding for research purposes. It was proposed by the SAAU that insufficient funds were being allocated compared to that in "other sectors" (Hansard 1983, col.193). Whilst the Minister conceeded this was true, it was further commented "the seriousness of the situation is realized, but under the prevailing economic conditions it is difficult to make an allocation which will satisfy all the

needs" (Hansard 1983, col.193). Despite the State's recognition to a degree therefore, that research is necessary for the development of farming systems aimed at raising production levels whilst maintaining sustainable resource utilization: "research remains one of the most important life supports of our agricultural development" (Hansard 1983, col.8139), it could be argued that the priority status afforded soil conservation and erosion research was less than it should be and furthermore, little regard has been given to the requirement of developing such systems to be "compatible with socio-economic and cultural conditions". Marked data deficiencies are evident for both sectors of the South African agricultural economy. Output data for white commercial farms do not fully meet the needs of the policymakers (it, for example, only covers marketed produce) (Lipton and Lipton, 1993), and input data are available on a systematic basis for only "the upper one-third of [white commercial] farmers (Roth, Dolny & Wiebe, 1992, cited in Lipton & Lipton, 1993).

Research on soil erosion is nonetheless ongoing. For example, by 1985 between 50 and 60 per cent of agronomic land in the Highveld Region (the "granary of South Africa") had been included in run-off control planning and some 42 000 km of subsidised contours in the Winter Rainfall Region had been completed (Adler, 1985). Grazing patterns continue to be a major threat to agricultural land; the management of which constitutes a serious State challenge. Research by regional organisations of the Department of Agriculture, into developing breeds of animals better suited to South African conditions, is one example of attempts to attain optimum grazing levels at a local level (Adler, 1985). Bibliographic data compiled by Weaver (1989), provides a fair indication of the increase in research efforts concerning soil erosion from 1920 to 1989. Figure 6.2 reflects this increase.

The Department of Agriculture (1991) reported progress in the following general areas of research. These are by no means exhaustive and are included for illustrative purposes only.

1. Soil physics: validation of a soil strength model for soil structure was achieved.
2. Soil mineralogy: guidelines were established with regard to disposing of drainage water and sewage on soil (avoiding heavy metal leaching into ground water sinks).

3. Soil chemistry: given the apparently "drastic increases" in soil and water pollution.
4. Water research: (a) the continuation of a project with Israel to prevent crusting of soils and hence decrease the potential run-off and erosion; and (b) a method (yet to be tested in practice) was developed to forecast the stability of soils against water erosion.
5. Agricultural meteorology: computer models were developed for monthly drought analyses in the Karoo and adjacent areas and their potential to function as early warning systems is currently being investigated as a service to farmers.
6. Remote sensing: techniques for maize and natural veld drought assessments are being finalised.

The Department of Agriculture noted in their annual report dated March 1991 to March 1992, the successful advances achieved in agricultural resource development in that year. These include, *inter alia*, a unique laboratory method of determining a nitrification inhibitor with a flow system in soil; a coordinated monitoring programme to determine soil fertility; a model to simulate light interception through a vineyard; a programme to provide an indication of the location and extent of acid soils. Excellent progress was also made with the monitoring of rangeland using a vegetation index derived from satellite data. A new method to estimate evaporation rates from soil surfaces was also developed. Further, the production of rainfall maps has been semi-automated by linking the microcomputer based agrometeorological database to the map-generating algorithm, enabling monthly, 3-monthly, 6-monthly and yearly forecasts of drought conditions. There were reportedly 92 applications to undertake research at universities, 59 of which concerned continuation of existing projects and 33 of which were new (Department of Agricultural Development, 1992a). Unquestionably therefore research is on-going. The issue which must be addressed is the appropriateness of the endeavours.

With support from the State and adequate funding, and in addition, inputs from private sector agencies, inadequacies with regard to research highlighted in this discussion, could go a long way to not only improve the country's capabilities in terms of the agricultural potential of its soils, but also to promote sustainable utilisation and management of this limited resource. In fact, it is the author's

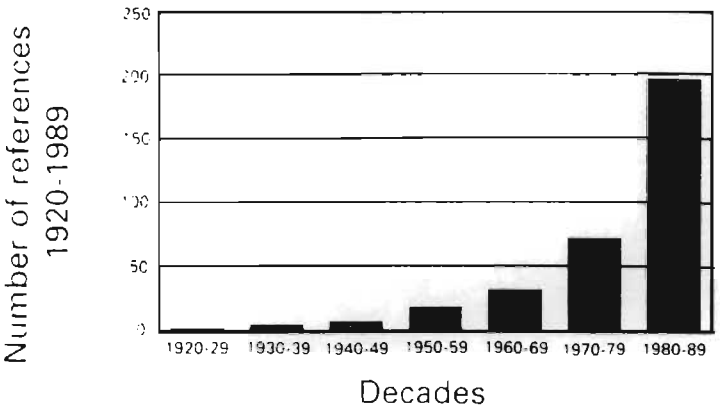


Figure 6.2 References concerning soil erosion and sedimentation (after Weaver, 1989)

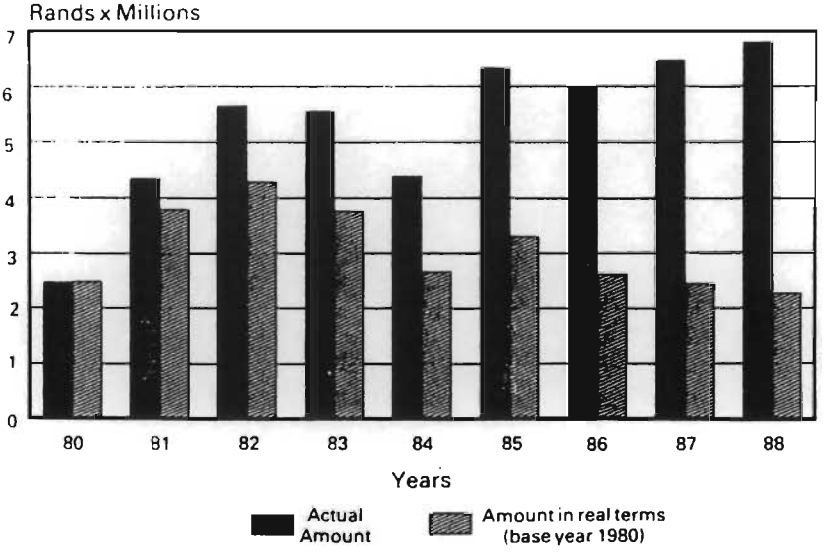


Figure 6.3 Amount of subsidies paid for soil conservation schemes, 1980-1988. (Scotney & McPhee, 1990)

contention that even before consideration should be given to educating the population, directed research should be the principal priority of government and the necessary resources available to the State should likewise be made available to decision makers and utilised for this purpose. With empirical data and scientific consensus, policy and planning decisions can be made more efficient and relevant for the control and utilisation of soil resources, and ultimately more conducive to winning the support of all those utilising the land. The credibility of the information source and hence the data itself, will be determined by the resources made available to the source. Similarly, the perceived validity of the information, will be a function of consensus amongst reputable scientists, [wherein conflicting advice derived from otherwise credible sources results in both being disregarded (Sabatier 1978, cited in Cullen, 1990)], with consensus being conducive to influence (Cullen, 1990). Backing by the state is imperative to meet this end.

After acknowledging that research efforts are less than adequate and further, given the anticipated amplification of this inadequacy in accommodating the needs of the small-scale farmers, MacVicar (1995) in his consideration of Kwa-Zulu-Natal's future agricultural research role, highlights the salience of the following three conclusions.

* The priorities of research should be determined according to the extent to which results will successfully enable farmers, particularly small-scale farmers, achieve their prioritised aims. It follows that the identification of research projects and the prioritisation of such projects is done in conjunction with the farmers.
* As in the case of all research, the starting point in addressing a problem in a given area, is the data already available. This may be of such a nature that no further research is required to address the particular issue.
* Should the Province be incapable of carrying out priority research, it will contract another organisation to do so, with or without provincial cooperation.

It is therefore proposed that successful agricultural research:

(a) Requires that not only are research endeavours in the future to be prioritised in order of importance or need, but furthermore, that this priority rating should be determined in conjunction with (a) what the farmers themselves perceive to be priority problem areas, and (b) which will inevitably be determined or influenced by the farmers' own goals, objectives and expectations. (Refer to Section 5.2.2 on problem perception.). This should also redress the issue concerning the "appropriateness" of research.

(b) Necessitates the conduction of a provincial review of currently available data and information pertaining to, *inter alia*, agricultural/natural resources, conditions of production (MacVicar, 1995 refers to 'component research'), farming systems, farm business management, and technology transfer. This relates to the necessity of establishing information networks. Networking is currently perceived internationally to be imperative in meeting the ambitious goals of agricultural sustainability (O'Riordan, pers. comm.). In this way human and financial resources in particular are 'conserved' by way of minimising the chances of duplicating research efforts.

(c) Setting priorities in association with the farming communities and individuals within the provinces, that should state budgets be unable to meet the costs of carrying out the research required, seeking inputs from other sectors such as the private sector.

6.3 ENFORCEMENT AND INCENTIVES

The following analysis of provisions for the related aspects of statutory law enforcement and incentives, will attempt to illustrate the extent to which the obligations imposed by the South African government, and the State-aided programmes established to recover degraded lands, were effective in attaining the desired aim of promoting sound agricultural practice through conservation methods. Two World Soils Policy objectives (8 and 10) incorporate these issues and will therefore be collectively addressed under this section.

Objective 8 of the World Soils Policy (Section 4.2), stipulates that national governments should *impose obligations on users, with the aim of ensuring the most rational use of land, through the use of tax exemptions, subsidies, credit facilities and other types of financial devices*. In terms of objective 10, governments are further required to *establish and fund programmes, where needed, for reafforestation, irrigation, and reclamation of saline, flooded or other land not presently productive.*

According to Beinart (1989), in the 1920s white farmers in settler states were extremely influential politically, with the result that conservation-minded officials were compelled to tread carefully in pursuit of their cause. Economic conditions at this time reflected the insecurities of farmers and tenants as a consequence of fluctuating agricultural prices and production which typified the inter-war years. Associated ecological problems compounded by drought resulted in conditions which were not conducive to adopting conservationist practices. Officials at this time therefore were not in a position to enforce conservation measures rigorously (Beinart, 1989). Only the more 'progressive' farmers therefore voluntarily participated in these methods. It was only in 1946 with the promulgation of the Soil Conservation Act No.45, that land users were "obliged" to utilise resources to meet conservation objectives and officials were provided with the necessary extended powers to intervene if provisions were contravened.

In 1948, government sources estimated that an amount of R200 million in State aid would be required over a period of 25 years if soil erosion was to be brought under control (Adler, 1981). However, according to Adler (1981), by the mid-1970s, only R100 million had actually been spent and furthermore the established costs of restoring eroded land had risen to R600 million. To place this amount in perspective, over this same period, the official price index for farming requirements increased by more than 500 per cent, from 55,2 in 1947/48 to 292,1 in 1978/79, which highlights in real terms the disparity between the funding required and what was actually spent by the State. (Refer also to Table 2.9 for further details on the rising costs of production inputs.) The extent to which conservation works were subsidised by the State between 1980 and 1988, is indicated in Figure 6.3. A total of approximately R303 million was spent by government in the years 1947 to 1989 on soil conservation schemes. According to Scotney and McPhee (1990), however, in real terms, this support has not kept pace with inflation and in no way correlates with the

total costs of on- and off-site damage caused by soil erosion. On an annual budget of R6 million, 9 construction teams are reported to complete an estimated 24 'key' conservation works per year (Scotney and McPhee, 1990). Many of the works constructed by the State have, however, subsequently not been maintained as private land owners are unable to meet the costs. (Subsidies are available for the construction of conservation works and these can cover up to 93 per cent of the total costs involved, however, the land user is entirely responsible for the maintenance costs (Russell, pers. comm.)). [Table 6.3 summarises actual developments in conservation practice, that is, in terms of the number of conservation works constructed, for the period 1947 to 1989 (see Tables 4.1 and 4.3 for values of these works in financial terms)].

Table 6.3 Total developments in soil conservation practice (1947 to 1989)

578	works constructed in badly eroded flood plains
110	major waterways for the control of runoff constructed in Western Transvaal
122	soil conservation works erected on State-owned land

Source: Scotney and McPhee, 1990

Prior to the promulgation of the Forest and Veld Conservation Act 13 of 1941, much attention was given to the issue of policing the Act during the course of assembly debate, that is, assigning powers to an authority for the purposes of expropriating land and for prosecuting offenders (Hansard 1941, col.2091, 2099-2101). Whilst it was widely acknowledged that the success of the Bill depended on the way it was implemented and enforced, the extensive powers perceived by MPs at that time to be "tremendous" (Hansard 1941, col.2099), entrusted to the Department of Forestry, were considered extreme and in effect akin to the powers of a police officer. For example, the forest official entrusted with this authority, could, without the need for a warrant, arrest any person "reasonably suspected" of having been responsible for or had a part in the destruction of forest produce, tree or veld (Hansard 1941, col.2091). Enforcement of the Act's provisions to prevent indiscriminate destruction

of forest and veld by fires, was repeatedly emphasized as imperative (col.2098), however, government officials and members of the farming community who where clearly uncomfortable with certain provisions of the Act, recommended that forest officials, many of whom were claimed to be too young and inexperienced to be entrusted with such responsibility (Hansard 1941, col.2092), were persuaded "in the strongest terms" to endeavour to exercise their powers "sympathetically and with common sense" (Hansard 1941, col.2091). Official fears concerning these powers were in effect ill-founded in that they were neither enforced nor exercised effectively (Annual Report of the Secretary for Agriculture, 1946), in other than extreme cases (Rabie, 1976).

Attempts to rectify the perceived authoritarian nature of the Forest and Veld Conservation Act, resulted in the 1946 Act being formulated in what was considered to be a more democratic spirit. It provided farmers with the freedom to establish soil conservation districts, and in addition to prepare and enforce soil conservation schemes (set up by district committees). A total of 21 prosecutions were served in terms of the Act, 14 of which were successful (col.8308, Hansard, 1946) (Table 6.4 provides additional figures up to 1990). Given the extent of regulated controls for soil erosion provided for by the Act, the efficacy of law enforcement was, however, deemed highly unsatisfactory at this time and was ascribed in part to a reluctance of farmers to instigate proceedings against fellow community members or neighbours (Hansard, 1946; Rabie, 1976; Fuggle & Rabie, 1983; Verster *et al.* 1992).

A state aided fodder bank scheme for stock in times of drought was established in 1948 and a Fodder Bank Committee was appointed. Of significance for soil conservation in the country was the committee's recommendation in its report of 1949, that assistance should only be made available to those farmers who apply conservation farming (Rabie, 1976). [Note: this same principle was to be advanced in the Recommendations of the Commission of Inquiry 1966-72 (Rabie, 1976) and again in the report prepared for the Rio Summit, 1992 (Department of Environment Affairs, 1992).]

Table 6.4 Law enforcement and contravention of provisions for soil conservation (1941-1990)

Details/Dates	Cases of malpractice reported	Prosecutions served	Prosecutions effected
In terms of 1941 Act	No cases reported and no prosecutions by forest officials		
In terms of 1946 Act	-	21	14
1972 - 1973	1 655	41	-
1970 - 1977 (Total)	9 000	178	24
1988 - 1989	1 143	419	6
1983 - 1990 (Total)	-	-	49

Source: Extracted and compiled from various texts.

By 1969, progress with regard to gaining largescale support and cooperation of farmers was considered too slow (Hansard, 1969; Adler, 1981) In an attempt therefore to mobilise the farming community the provisions for law enforcement, under the Soil Conservation Act of 1969, were radically reviewed. For example, disciplinary action was to be taken only after consultation with conservation committees and only after repeated warnings had been issued to respective offenders (this was in accordance with the new Act's policy of "guide, assist and admonish until no alternative but prosecution remains") (Hansard 1969, col.5899-5904).

Demand for stricter application of legislation originated with members of the farming fraternity and government officials (Rabie, 1976). Recommendations to arise from a national conference organised by the Department of Agricultural Technical Services in 1968 (details in Section 3.6.1), suggested *inter alia*, that for implementation of conservation legislation to be more effective, enforcement should be the responsibility of not only the district committees but also staff of the Department of Agricultural Technical Services. In addition, it was suggested that a need existed to establish an inspectorate, independent of the Department of Soil Conservation and the civil service (Rabie, 1976). Both recommendations were subsequently provided for in terms of the 1969 Act. Enforcement of the Act in 'white' areas was committed to

the newly established Division of Soil Protection (Rabie, 1976). Enforcement of restrictive legislation was the responsibility of the Division's inspectorate and as staff of the extension service previously empowered with this responsibility, were now available to pursue other important duties, such as promoting conservation farming and establishing a *rapport* with the farming community in order that advice may be more willingly sought from and receptively received by farmers, these revised provisions were considered to be potentially more conducive to promoting compliance. [This was again in accordance with the State's preferred policy of persuasion, rather than coercion.]

Approximately 150 directions to support enforcement of conservation measures were provided for under the 1969 Act, but prosecution continued to be pursued only as a last resort (Hansard 1969, col.5899-5904). The number of offenders reported (as opposed to the number of directions served) illustrates this. (See Table 6.4). Once served with prosecution proceedings, many farmers were inclined to rectify the malpractice done and comply with soil erosion controls. In only 7 per cent of cases reported did farmers fail to comply with regulations (Rabie, 1976; Serfontein, 1977). Whilst the information collated from available literature is patchy, a clear trend is reflected in the results with regard to the consequence of the government's policy of persuasion (see Table 6.4). Many cases of malpractice were identified and reported to the authorities, however, few offenders were finally prosecuted for contravening the law. Between 1970 and 1977, 9 000 cases of land abuse were reported and investigated. However, only 178 directions were served, with 24 actual prosecutions (Hansard 1977, col.2429). The reason for this was again ascribed to the success of the Department of Agricultural Technical Services and the enthusiasm of members of soil conservation committees, to guide and persuade landusers to cease their malpractices. Enforcement of the Act, nonetheless, remained largely dependent on the cooperation of farmers and only where cooperation was refused was prosecution sanctioned by the Act (Rabie, 1976).

Economic incentives, offered in terms of the 1969 Act, in the form of subsidies and grants paid to landowners or landusers in respect of conservation works constructed or conservation measures applied, and the Veld Reclamation and Stock Reduction Schemes, have proved effective, although only to a limited extent (Rabie, 1976; Scotney, 1978a). (Refer to Section 6.3 for further discussion of state-aided schemes

and incentives.) A total of 7 000 farmers located in arid regions, were reported to have participated in the Stock Reduction Scheme voluntarily, and against this background, the government was confident that the provisions of the 1969 Act had resulted in the early 1970s being characterised by an effective soil conservation policy (Hansard, 1 March 1977).

The Veld Reclamation Scheme was introduced in 1966 (and subsequently expired in 1973) (see Section 3.6.2), to encourage farmers to withdraw a portion of the pasture on their land for the duration of at least a full growing season, for the purpose of restoration (Beinart, 1989). Where withdrawal was essential for the recovery of the veld, financial assistance was provided in terms of the Soil Conservation Act's provisions (Rabie, 1976).

Government, in recognising erosion control would be expensive, made available to farmers "generous" financial aid. Scotney (1978b) provides a figure of R118 million having been paid out by government in the form of loans and subsidies since the 1946 Act, with a further figure of R2,5 million having been spent on State works. More than 80 per cent of subsidies has been spent on veld improvement.

The Stock Reduction Scheme was aimed at systematically reducing stock numbers in grazing areas. Overstocking, in conjunction with prolonged droughts, (together with a decrease in wool prices), was considered to be a major cause of overgrazing and concomitant degradation of the veld. Compensation was awarded to farmers for each stock unit withdrawn. Payments amounting to R50 million (up to 1977) have been made in terms of this scheme (Scotney, 1978b), however, according to Serfontein (1977), only 55 per cent of approved soil conservation plans have been satisfactorily completed, totalling amounts in excess of R84 million.

Of all the programmes aimed at veld improvement, the Stock Reduction Scheme has proved the most effective in bringing about sound grazing practice (Serfontein, 1977; Scotney, 1978a; Roux, 1990). Participation in the scheme was, however, voluntary and clearly not all farmers availed themselves of these incentives to promote soil conservation. In addition, once terminated, the positive practices derived from such schemes during their implementation effectively fell away with largely negative repercussions and consequent increases in soil losses (Roux, 1990). Such incentives

have proved not to guarantee a change in behaviour/practices after incentives are exhausted or financial aid expires (Koch, 1991; Garland & Stocking, 1995).

In 1975 alone, more than 140 formal projects were undertaken by the South African extension service. These projects actively addressed issues such as veld improvement, stock reduction, mechanical protection of cultivated land, reclamation of denuded areas, and dune sands and run-off control planning (Scotney, 1978a). The outcome of these concerted efforts by extension staff was the protection, by mechanical works, of nearly 50 per cent of arable land in the country. Subsequently these works were poorly maintained. Scotney (1978a) claims that since the installation of mechanical protection works, failure to monitor progress in these areas has resulted in no documentary evidence to confirm conclusive reduction in soil losses. It is, however, believed that technological advances, such as increased use of fertilizer, improved cultural practices and special tillage techniques, contributed to the perceived improvement in conservation at this time and not mechanical protection works (Scotney, 1978a).

Subsidies for conservation works varied between 55 and 85 per cent of costs incurred, (never 100 per cent) that is prior to 1976, therefore in all cases, farmers were required to significantly supplement the costs of conservation efforts, utilising personal financial resources (Rabie, 1976). These proportions have significantly increased in recent years, where at worst farmers will be asked to pay 7 per cent of construction costs (Russell, pers. comm.), however, the cost of maintaining works is left entirely to the farmer. It seems reasonable to assume that this requirement may well have inhibited conservation efforts, and indeed it was subsequently identified as a significant source of grievance amongst the farming community (Hansard, 1977). Economic advantages from practising conservation farming, are long term gains and estimates in the past suggest it could take a minimum of 10 years to be realised (Rabie, 1976). Furthermore, money spent on conservation measures and constructing conservation works, proved not to increase the market value of a farm by a comparable amount (Hansard, 1977). Economic incentives fall into one of two categories, one is pressure related, the other persuasive, and the measure by which environmental policy objectives are realised is dependent on whether these are perceived as burdens or benefits (Ramsden 1991, cited in Vosloo & Koch, 1992), by recipients. For both the reasons described then, the incentives offered by the State,

must surely have negatively influenced farmers' willingness to incur conservation-related debts (Rabie, 1976), and those farmers who did participate, failed to achieve sustained commitment to the cause. Despite the slogan promoting conservation in South Africa for nearly 50 years, of "Conservation pays", according to Vosloo and Koch (1992), the prevailing perception is that conservation is a non-paying venture. Table 6.5 provides a summary of subsidy and rebate details paid by the state specifically for soil conservation works. (Also refer to Figure 6.3 for further subsidy details.)

Table 6.5 State subsidies and rebates for completed soil conservation works (m = million)

Date	Total amount	State works		Farmer works	
1948 - 58	£3 m	approved	£1,2 m	approved	£15,2 m
		completed	£772 792	completed	£8,6 m
by 1970	£17,8 m	approved	R4,6 m	approved	R74,8 m
		completed	R4 m	completed	R40,6 m
1977 - 78	R7,2 m				
1978 - 79	R2,5 m				
1982	R4 m				
1990	R5,2 m	excluding flood relief allowances			
1991	R5,1 m	excluding flood relief allowances			

Source: Compiled from various texts including:
Hansard 1969, 1983; Department of Agricultural Development Annual Report 1991, 1992.

A number of drought disaster or relief schemes have been introduced over the decades to provide assistance to farmers to cope with the additional burdens at these times. For example, in 1980 a Special Drought Relief Scheme was introduced, comprising a government guarantee and interest subsidies to assist sugar cane farmers in Natal, and further to assist farmers in the fruit and wine producing areas of the Western Cape, through the granting of production loans for a extended period up

to 1985 (Hansard 1983, col.4214-4215). The primary purpose of the Disaster Drought Assistance Scheme introduced in the late 1980s, is protection of the natural resources and to give farmers financial support to farmers particularly in the extensive crop production and stock grazing areas of the Republic during disaster droughts (Department of Agricultural Development, 1991). The farmer is expected to make personal provision for seasonal droughts, which are considered to be a normal occurrence in the livestock-producing areas. However, when a drought assumes disaster proportions, especially over a sustained period, it is considered in the national interest to assist farmers to overcome the disaster drought financially and to maintain a "healthy nucleus herd" (Department of Agricultural Development, 1991). Areas are only declared such upon the recommendation of the district drought committees to the National Drought Committee. This is subsequently repealed when the drought has been broken. For example, during the period 1990 to 1991, 18 districts in the Cape Province (twice the number of the previous year), 4 in the Free State and 3 in the Transvaal were declared disaster drought areas. These numbers had increased to 26 districts or parts of these districts in the Cape Province and a further 5 in the Transvaal were declared disaster drought areas by the end of 1992 (Department of Agricultural Development, 1992a).

A Special Disaster Drought Assistance Scheme for stock farmers (in the intensive crop production areas of the winter rainfall region) and dairy farmers, was introduced on 1 November 1991 by the National Drought Committee, to provide financial support to certain farmers who cannot fully join the Disaster Drought Assistance Scheme owing to their particular farming patterns. These schemes were merely supplementary to the Disaster Drought Assistance Scheme for stock farmers (Department of Agricultural Development, 1992a). A further special drought assistance scheme was introduced for the summer cropping areas under which state guaranteed Land Bank loans are made available to cooperatives. Members who suffer crop damage can therefore receive an extension for the repayment of production debt and obtain new production credit for the following season.

In his annual report for 1990 to 1991, Dr van der Merwe, Superintendent-General of the Department of Agricultural Development, claimed that the maintenance of "viable rural communities" remains an important government objective (Department of Agricultural Development, 1991). Table 6.6 summarises the financial assistance

made available to farmers under various schemes for the period April 1990 to March 1992.

Table 6.6 Financial assistance to farmers for the period April 1990 to March 1991 (a) and April 1991 to March 1992 (b)

Item	Amount (R mill.) (a)	Amount (R mill.) (b)
Debt consolidation	55, 3	98,7
Crop production loans	107	157,1
Purchase of land	16,9	10
Interest subsidies on carry-over debt and new production credit	104,4	112,6
Flood disaster aid	56,5	18,1
Diaster drought assistance	10	50,3
Land conversion scheme	51,9	50
Farm labourer housing	7	16,5
Total assistance	409	513,3

Source: Department of Agricultural Development, 1991; 1992.

Despite the government's policy of persuasion and the subsequently few prosecutions instituted over the years, the various Acts still failed to mobilise the support of farmers and promote a sustained commitment to conservation land use. A number of factors identified from the literature and statutes reviewed for this study, and considered by the author to have been instrumental in minimizing the potential effectiveness of legislative provisions and ultimately hindering compliance with conservation standards are discussed below.

(a) The revised extent of powers vested in the Minister of Agriculture, inevitably enhanced the enforcement capabilities of the 1969 Act, especially, given previous failed attempts by district conservation committees, to effectively control the problem (Rabie, 1976). It could be argued, however, that such powers were subject

to abuse and indeed this very concern was expressed not only by MPs in parliament but repeatedly by the farming community at large (Hansard 1969, col.5936). Awareness of the potential for abuse, could potentially have given rise to dissention and refusal of landowners to comply with the provisions of the Act, which would have severely curtailed further attempts to mobilise the farming community. There now follows a brief summary in point form of some of the directions the Minister of Agriculture was empowered to give. [Note: These provisions also applied in the 1946 Act.]

- The Minister could order a landowner to construct soil conservation works on his land, if such construction was deemed necessary to achieve a specific provision or objective of the Act (Section 4). The landowner was then obliged to maintain these works and the costs incurred in construction were recoverable from the landowner. [Note: Subsidies and grants made payable to landowners were provided for in terms of the various acts, however, these never realised 100 per cent of incurred costs.]
- The Minister could expropriate land, if this action was considered necessary to (i) prevent soil erosion and promote land stability, (ii) prevent drift sand and concomitant destabilisation of land, and (iii) protect catchment areas and/or conservation of water source (Section 18).
- The Minister could execute any additional direction deemed necessary to meet conservation objectives, with or without the consent of landowners (Section 19). This direction was also applicable to successive title holders, who were also legally bound to comply with these provisions (Section 3).

(b) Financial relief, in the form of a tax deduction, with regard to soil erosion was provided for in terms of the Income Tax Act No.58 of 1962. Provision was made to allow tax deductions for expenditure incurred in respect of specifically, the eradication of noxious plants and the prevention of soil erosion. However, as grants or subsidies provided to farmers in respect of soil erosion works, qualify as "gross income", they are taxable (Rabie, 1976). By not exempting government subsidies and grants from tax, the provisions must surely reduce any incentive intended in the provisions of the Act, to encourage farmer participation.

(c) The ambiguous nature of many of the provisions stated in the various Acts may also have attributed to the pervasive lack of cooperation amongst farmers to comply with legislated provisions (Fruit and Fruit Technology Research Institute, 1973). For example, a case was brought to the attention of ministers in the House, regarding one farmer who after placing his farm on the market was disappointed in the price offered for his land. Apparently he had "drained vleis and marshes on his farm and had planted trees on that soil thereby increasing the productivity of his farm" and could not comprehend the valuation he was given. In terms of the 1969 Act (see Section 3.6.2), it emerged that he was in fact liable to prosecution, as these acts had contravened the Act's provisions. In his ignorance he had been unaware of this. Clarity was therefore called for with regard to certain stipulations in the Act (Fruit and Fruit Technology Research Institute, 1973). The potential for such confusion to arise, had incidentally been raised during parliamentary discussions prior to the promulgation of the Act, but had not been adequately addressed by the Senate Committee appointed for this purpose (Hansard, 1969).

(d) Another complicating factor concerns the lack of information to inform those responsible for compiling and preparing conservation strategies. In Section 6.2 (refer to this for further details) above, the conclusion is drawn that South African policy makers and decision makers execute these tasks in the absense of empirical data to support land degradation claims. It is further suggested, that scientists and technicians are often unable to adequately transfer information concerning approved land use practices to the land user. For example, farmers present at the Soil Erosion Conference in Pretoria in 1957, were reported to have been unimpressed by the proposition of a 'Soil Conservation Grand Strategy' proposed by SARCCUS. They considered the strategy to be "remote" from their practical daily tasks and practice (Farmers Weekly, 22/5/57). This could be ascribed to the inability of scientists and professionals to translate into practical advice proposed conservation strategies and methods. Such a situation cannot be conducive to earning the respect and confidence of farmers in the capacity of professional engineers and extension workers to understand the erosion and land management-related problems at a grassroot level.

Under the 1983 Act, an attempt was made to rectify a number of these perceived shortcomings which had ultimately given rise to discontent and antagonism between the State and the farming community (Hansard 1983, col.4834). It would appear that

the failure of previous legislative provisions to enforce conservation practice, forced the government into realising the necessity of prescribing harsher penalties in cases of contravention and making it easier to institute prosecutions. "Some farmers are hard of hearing ... it is necessary to make them 'feel' ... strict enforcement is therefore necessary" was the opinion expressed in parliament (Hansard 1983, col.4840) in relation to the belief that the 1983 Act makes adequate provision for this. Failure or refusal to comply with any one of the comprehensive control measures issued by the Minister of Agriculture (see Section 3.8.2 for details), as well as any provision of the Act, currently constitutes an offence (in terms of Section 6 (5)) and therefore renders the offender liable to prosecution. One of the more significant criticisms levelled at the 1969 Act was that it contained preventative measures (col.4936, Hansard, 15 April 1984) which in themselves were commendable, but which were neither strictly nor successfully applied. An estimated 14 million hectares of agricultural land were still unprotected as illustrated by the number of established committees and an obviously inadequate number of officials to enforce the Act (Verster *et al.* 1992).

Penalties for contravening the Act included a provision for fines (a) up to a maximum of R5 000 or 2 years imprisonment for a first offence (or to both depending on the gravity of the contravention); and (b) R10 000 or 4 years imprisonment for a second offence (or again to both depending on the extent of the contravention) (Hansard 1983, col.4814). In addition, a fine not exceeding R500 or imprisonment (not exceeding 3 months) or again both (depending on the offence) was to be paid should an offendant, *inter alia*:

1. refuse to receive a direction served on him;
2. after an application for participation in a scheme has been approved, refuses or fails to comply with these provisions (Hansard 1983, col.4814).

Once again provision was made enabling the Minister to introduce financial schemes as incentives to promote conservation farming (Section 8). This is now done in collaboration with the newly established Conservation Advisory Board, and with the agreement of the Minister of Finance. This constitutes a significant qualification of the Minister's executive authority in that it represents a devolution of power. Schemes are published in the *Government Gazette*, for the attention of the farming community at large. Subsidies payable in terms of the 1983 Act, were extended to

include conservation works (not provided for under earlier Acts), as well as conservation measures. More specifically these include:

(a) the construction of soil conservation works;
(b) the reparation of damage caused by flood or other disaster to natural agricultural resources or soil conservation works;
(c) the reduction of the number of animals being kept on land in order to restrict the detrimental effect of a drought;
(d) the restoration or reclamation of eroded, disturbed, denuded or damaged land; and
(e) the planting and cultivation of particular crops which improve soil fertility or counteract the vulnerability of soil to erosion (Department of Environment Affairs, 1993).

Despite the perceived reparations, the volume of prosecutions have been reported to be relatively insignificant (Fuggle & Rabie, 1992). For example, during the period 1988-89, a total of 1 143 cases of contravention were reported; 419 directives by the Minister were served (resulting in 6 prosecutions); a total of 711 cases of malpractice (up to 1992) were being rectified by the offending persons; constituting a total of 49 prosecutions since the Act came into effect in 1983. It was suggested by Fuggle and Rabie (1992), that if more attention was focussed on the more serious cases of soil abuse and these were subsequently reported in the media, that this might raise public awareness levels and significantly promote compliance. The ultimate responsibility must, however, rest with the government. Failure on the part of the State to chastise transgressors, will result in the effective endorsement of their actions (Vosloo, pers. comm.) and the enforcement measures provided for in terms of legislation are rendered, in effect, illusory (RSA Policy Review, 1989). Under the goverment's currently implicit policy of persuasion (RSA Policy Review, 1989), it is unlikely that any significant change to the *status quo* will occur.

6.3.1 **Discussion**

SARCCUS records indicate that priority in respect of financial assistance to farmers, was always given to the financing of works or measures designed for the reclamation and protection of resources, as opposed to works or measures aimed at the further

development of resources for the purposes of production (Rowland, 1974). The inevitable result has been an overemphasis on curative practices, rather than what would seem to be the more economically viable alternative in the long term, prevention of soil loss and erosion. This point was in fact raised in parliament, when with reference to soil conservation the comment was made: "always crisis relief, never proactive management" (Hansard 1983, col.4515). The prodding effects of drought have been a recurring reminder to South African society of the importance of sustaining conservation practices and the adoption of long-term planning strategies (Hansard 1983, col.4815-4816), however, little regard to a proactive approach to conservation has been evident throughout the study period. That is, until the promulgation of the 1983 Conservation of Agricultural Resources Act, which went some way to redressing this overemphasis (Hansard 1983, col.4813-4814). (Refer to Figure 7.2).

Related to this concept is the recommendation by UNEP (1991), wherein the design and implementation of measures to ensure that the right of ownership to agricultural land carries with it an obligation to sustain its productivity (which may entail a "combination of regulatory and incentive policies"), is proferred as an important prerequisite to enforcing conservation compliance and the perceived solution to sustainable agriculture. The obvious question emanating from this concerns the method(s) by which this goal can be realised. As the foregoing analysis of enforcement legislation has indicated, the imposition of "obligations" on farming individuals in South Africa, has not effected legislative compliance but has in fact negatively reinforced farmers' attitudes towards State intervention. Kingwell (undated) concluded that, whilst subsidies and enforcement of laws are necessary imperatives, without the extra dimension of an instilled land ethic, exploitation will not stop and land will continue to be degraded. Rodgers (cited in Wichelman, 1976) posited four conditions which he believed could predict the degree of congruence between the content of a statute and the consequences it engenders. These include:

1. The extent to which the regulated agree both that a legal standard has been established by a legitimate source and that the standard requires compliance. (It could be argued that this will be a function of individual awareness and perception. See Chapter 5.)

2. The extent to which the law clearly and carefully defines both who is responsible for seeing that it is obeyed and the type and amount of compliance required. (It is argued that this will be a function of the adequacy of the information base upon which perceptions are established.)
3. The extent to which the regulated perceive that certain and severe sanctions will result from noncompliance. (This is a function of precedent and previous experience.)
4. The extent to which those who are to receive the benefits of the law are cohesive and take strong actions to achieve their rights.

The literature generated by researchers on soil conservation adoption was reviewed by Napier (1989) who suggested that in all societies of the world, but in particular in less-developed countries, economic and institutional barriers were the greatest problems in terms of adopting conservation practices. The reason given for this related to an awareness that developing societies seldom have the economic resources or institutional support mechanisms in place to promote farmer adoption and successful implementation of schemes. This would appear relevant in the South African context too.

Research has shown that overwhelmingly, conservation policies implemented by governments worldwide, have failed to effectively promote largescale conservation practice (Blaikie & Brookfield, 1987). Exceptions to this apparent rule exist only in cases where major schemes have supported substantial compensations to farmers. Where substantial financial inputs have not been invested in conservation, attempts to mobilise support have involved imposition of land use restrictions, subsidized assistance post-conservation works construction and a large measure of persuasion and example. Whilst this study has shown that the situation concerning South African conservation policy and practice is much more complex than the scenario presented by Blaikie and Brookfield (1987), a failure on the part of the State to provide the necessary financial inputs, has unquestionably exacerbated the situation.

Blaikie and Brookfield (1987), demonstrated that most farmers perceive farming to be primarily a business through which the subsistence needs of the family are satisfied, despite structural classifications of commercial and subsistence agriculture. Against this orientation of thought, farming practices which produce optimum

production levels, will inevitably be sought and implemented. Conservation farming practices, have not yet proved this is possible. Even with an adequate system of incentives in place, research on the assessment of economic returns on soil conservation investments, has shown that in most cases, erosion control is not profitable in the short term, and further, may not necessarily produce profits even in the long term (Napier, 1989). Regardless, therefore, of the incentives on offer, where farmers perceive the adoption of recommended conservation practices as having high risk potential, they will be unwilling to participate in such schemes (see Section 5.2.4 on the perceptual environment and evaluating risks). Exploitation of natural resources inevitably realises substantial profits in the short term; this is a universal principle. Given the relatively poor correlation between the market value of a piece of land and its conservation status (Tainton, 1988), the inevitable result in both the medium and long term, is further exploitation where profit is the motivating factor. Tainton (1988) suggested, that the logical means of reversing this scenario would be to tangibly reward conservation-conscious farmers, and alternatively, poor conservation practice should carry direct costs. The promotion of conservation by necessity requires rewards (Hansard 1969, col.5967), and economic manipulation within the agricultural system is therefore essential. To sustain positive practices through sustained behavioural change will, however, require regular and ongoing financial State assistance.

Furthermore, farmers decisions are strongly influenced by national level structural factors, such as, national tax policies, national inflationary and recessionary trends, national credit policies, all of which play a significant role in affecting and indeed, effecting, production decisions and activities at the farm level (Napier, 1989). Such factors shape the domestic market system in place in possibly most economies of the world (Napier, 1989). South Africa is no exception. Land operators are motivated for survival in the short term and it is the domestic market system which dictates how they perform at a given time. Against this background it is entirely possible that soil conservation should assume a low priority in terms of landusers' values (Napier, 1989).

The Planning Committee of the President's Council (Report on Nature Conservation in South Africa) concluded on the one hand that soil erosion is a natural phenomenon, "a process that takes place inevitably", while, on the other, emphasized

that soil losses could be minimised by wise land use (1984). The Committee stressed the necessity for creating "stronger" long term incentives, to assist farmers in implementing conservation strategies.

Conservation compliance was provided for in terms of the United States' 1985 Farm Bill (Gillespie *et al*, 1990). Results of a 1987 study undertaken by Gillespie *et al.* (1990) indicated that despite expectations, the conservation compliance standard, prescribed in the Act, did not significantly affect farmers' cropping practices (in the Sand Mountain region of Alabama). It was, however, suggested that this strategy had the potential to effect changes in farming practice in other regions, not as a direct consequence of enforcement, but as a result of the profit motive associated with this practice. In other words, if the compliance standard was shown to result in increased profits or productivity levels, conversion was considered highly likely. Norris and Clark (1993) concluded that conservation compliance plans were acceptable only on condition that they did not place undue financial burdens on the farmer.

Problems associated with intensification of enforcement activities (Norris & Clark, 1993) include the following:

1. they would require additional financial resources, placing strain on state budgets;
2. they would inevitably result in an increase in the number of violations discovered;
3. they would affect a larger proportion of farming community and may give rise to widespread ill will between state and farmers;
4. erosion control would likely be increased with time; and
5. stricter enforcement measures could influence farmers to withdraw their participation to avoid compliance requirements and conservation gains would then be reduced.

It is suggested that the gravity of the above problems, however, will depend largely on availability of manpower to (a) police controls (b) advise on aspects of compliance and (c) monitor and supervise standards and on-going maintenance.

The foregoing analysis moreover permits the conclusion that enforcement is complicated by a number of ambiguities associated with soil erosion in South Africa. These relate to the following questions. (a) Who is to accept responsibility for the soil erosion problem, the State, the landuser, or both? (b) How is soil erosion actually caused? Not even scientists can agree on this issue which has proved to be highly complex and requires specialised knowledge (Vosloo, pers. comm.). Only an adequately researched soil and land use data base can provide answers to these questions. This matter has already been discussed (refer to Section 6.2) in the context of carrying capacities of soils, which if wrongly calculated on the base of inadequate or incomplete information, could lead to overgrazing, overstocking and ultimately exacerbated degradation. The Conservation of Agricultural Resources Act of 1983 provided that farmers will only be entitled to aid if they have shown to have complied with the "land's limitations" (Hansard 1983, col.4817-4818). In the absence of the correct information farmers could be wrongfully denied (or awarded) aid. The Act provides for the promulgation of control measures which will specify the grazing capacity of each piece of farmland, yet this cannot be done immediately if farmers have no clear official guidelines of what the stocking rates should be (Hansard 1983, col.4841).

Blaikie and Brookfield (1989) concluded that the reasons why soil conservation policy worked in the United States of America, were (a) the government's appreciation that the maintenance of farm income was important, not just conservation, and (b) farmers were subsidized to undertake conservation programmes and construct works, but also "to take threatened land out of production". With an emphasis on farm income support and conservation as a byproduct, the ultimate objectives of soil conservation were still realised.

In Kenya, despite legislatively enforced soil conservation being in practice before independence (1963), when enforcement relaxed after independence, works were not maintained, terraces ploughed up, deforestation became more pronounced and overgrazing widespread (Rutto, 1993). The Kenyan government's 'back to the land' policy resulted in the cultivation of 'virgin' land without conservation measures, led ultimately to increased soil erosion and reduced crop yields despite location in medium to high potential areas. Other priorities of the Kenyan Department of Agriculture (such as settlement schemes), the perception that soil conservation

activities are equal to forced labour, difficulties in implementing destocking policies (policy described by Watson (1990) in South African context as non-viable, due to the economic rational value attached to livestock by tribal communities), inadequate information, land tenure and inadequate extension support, were factors thought to be responsible (Rutto, 1993).

6.4 SUPPORT MECHANISMS, EXTENSION AND EDUCATION

The World Soils Policy (Section 4.2) stipulates the need for national governments to provide ongoing support mechanisms, institutional structures and associated agency support systems in order to secure and maintain a conservation-conscious utilisation of agricultural resources. Provisions within the legislative and policy framework established for this purpose in South Africa are discussed below, with the intention of assessing the efficacy of these provisions in terms of attaining prescribed objectives.

Three objectives of the World Soils Policy will be addressed under this section. These are:

- Objective 6 - Develop programmes to ensure the availability and wise application of fertilizers and other actions appropriate to the improvement and sustained use of the soil;
- Objective 9 - Train an adequately paid professional cadre of extension workers to assist farmers in managing soil and water resources effectively; and
- Objective 12 - A two part objective: (a) help develop local institutions to secure the leadership, assistance and cooperation of farmers in applying soil and water improvement and conservation practices, and (b) provide an adequate programme of environmental education in support of resource management activities. [An evaluation of part (b) of this objective has in part been incorporated in the analysis of awareness undertaken in Section 5.3.2.]

Erskine (1985), in an evaluation of South Africa's agricultural development, described the three key components of a meaningful agricultural knowledge system, as training, research and extension. As the research component of Erskine's 'agricultural knowledge system' has already been discussed in Section 6.2 (with

reference to information transfer and availability), it will not be considered here. Legislative provision for extension and training, will now be discussed.

With the establishment of the South African Extension Service in 1925, the Department of Agriculture embarked on a programme aimed at motivating and teaching farmers to practice conservation methods of farming (Penzhorn, 1987; Abbott, 1993). An evaluation of extension activities by Koch (1991), (a former President of the South African Society for Agricultural Extension), permitted the conclusion that much had been achieved to "inspire them [farmers] to action" since the inception of the service. This was achieved by means of teaching land users how to assess their needs, to solve their problems, to help them acquire knowledge and understanding (Raudabaugh 1967, cited in Koch, 1991). According to Koch, the State has employed three basic approaches in its attempts to achieve this goal.

1. The extension approach - which requires voluntary participation from landusers, to adopt recommended conservation strategies formulated to suit specific needs. [The problem realised with such an approach is that progress in terms of combating increased rates of soil loss is too slow. Refer to Chapter 2.]
2. The project approach - with which incentives are offered in the form of projects or schemes, aimed at accelerating adoption of conservation principles and practices (for example, the Stock Reduction Scheme). [This approach was evaluated under Section 6.3 and was shown to have largely failed in its attempts to mobilise the long-term, sustained commitment of the farming community].
3. The legal approach - which requires the prosecution of individuals guilty of contravening the provisions, controls or regulations prescribed by the legislature. [This approach is evaluated under Section 6.3 and proved largely ineffectual in its 'persuasion' to adopt conservation farming methods].

Van Rensburg (1992), confirmed Koch's assessment of the extension approach, as inefficient in its attempts to promote conservation farming in South Africa. The plausibility of such a conclusion it could be argued is supported by the fact that soil degradation is conspicuous throughout the country and further that storage capacity in the country's dams continues to be reduced as a result of siltation/sedimentation

annually (refer to Chapter 1 and 2; Huntley *et al.* 1989). However, it should be acknowledged that the progress made in terms of soil conservation (refer to Tables 4.1, 4.7, 6.7 below) could not have been effected without the inputs of the extension service; this is in spite of the perceived inadequacy in manpower numbers. Robertson (undated), reported that despite having available posts for 200 extension officials, the Department of Soil and Veld Conservation have provided for 160, and of these only 60 posts are occupied. Further figures quoted in parliament on 28 March 1984 (Hansard 1984) are detailed in Table 6.8 and illustrate the high staff turnover within the Department of Agriculture. The Department of Agriculture's Directorate of Resource Conservation which is actively involved in promoting extension services, is reported to reach on average 1 per cent of farmers each year (Van Rensburg, 1992), although the validity of the percentage of farmers reached is questioned given the figures quoted in Table 6.7 by the Department of Agricultural Development (1991; 1992a). Notwithstanding these inputs noted, Meadows (in press) asserts that there can be no doubt that the manpower available to provide this essential service, has consistently been inadequate.

Consistently and repeatedly throughout the study period reference was made to the need for adequately trained professional and technical staff as a prerequisite to the success of the Act; legislative enablement was acknowledged not to be enough (Hansard, 1946; 1969 and 1983). Dr. Bennett, in his visit to the country in 1944, recommended that at least 1 000 men were needed to adequately and efficiently provide the extension support necessary to meet the conservation objectives for South Africa. Robertson (undated (b)) ascribed the inability to find personnel with the necessary qualifications to employ in the field of extension and conservation promotion, to the fact that "little more than an unskilled labourer's pay" was offered for services rendered. Appointing staff on competitive salaries, which would make job descriptions more attractive and potentially increase the number of appointments made, was offered as a means to solve the manpower shortage problem (Hansard 1946, col.8308).

Table 6.7 Summary of activities involving Programmed Extension (according to regions), 1990 to 1992

Highveld:
1990 - 1991

* 54 active study groups - 801 members (= 5 % of 16 300 farmers in region)
* 4 new study groups created - 2 of these since dissolved
* courses: 6 on: soil classification
* 3 on: pasture management
* other activities: several 'farmers days', tours and information days
* 30 radio and television presentations
* 70 conservation committee meetings - addressed by extension staff
* 29 farmers' association meetings - addressed by extension staff

1991 - 1992
* other activities: 'farmers days', information days
* demonstrations: focused on agronomy, stock and grazing issues
* 52 conservation committee meetings - attended by 348 members
* 95 farmers' association meetings - attended by 1 656 farmers

Karoo:
1990 - 1991
* 18 active study groups
* 68 meetings - topics incl. veld plants, pasture management, economics
* establishment of the Fish River Development Centre at Cradock
* 230 farm visits made (either individually or jointly) by extensionists
* 36 conservation committee meetings

1991 - 1992
* 18 study groups remained active
* demonstrations: focussed on record-keeping

Natal:
1990 - 1991
* courses: short course programme (covering all farming aspects)
* special veld course (in terms of National Grazing Strategy)
* 50 farmers included in development programmes (economics emphasized)

1991 - 1992
* 5 active study groups
* courses: on soil classification (130 participants)
* new course on farm planning and veld management design
* on fodder planning (involved a symposium and manual)
* seminars: 4 on: invader plants
* other activities: 18 farmers' days

Eastern Cape:
1991 - 1992
* study groups on record-keeping - 30 participants

Table 6.7 Continued .../

Transvaal:
1991 - 1992
* 57 study group meetings
* 16 conservation committee meetings
* 4 188 farms were visited
* 741 letter of advice written, 2 788 office and 5 736 telephone interviews
* newsletters sent to 33 971 farmers
* 32 articles published in local newspapers and 12 radio and television talks

Free State:
1990 - 1991
* 368 group meetings held - attended by 5 449 farmers
* 2 155 farms were visited

1991 - 1992
* 331 group meetings - attended by 3 600 farmers
* 1 574 farms visited
* newsletters sent to 17 850 farmers
* other activities: 2 'farmers days' (focus on feed flow planning and fodder cultivation)

Winter Rainfall:
1990 - 1991
* 24 134 persuasion and advice actions by extension personnel
* 849 group meetings held - attended by 16 393 farmers

1991 - 1992
* 940 group meetings - attended by 17 444 farmers
* 76 newsletter and journal articles published
* 50 radio presentations

Source: Material extracted from the Annual Reports of the Department of Agricultural Development, 1991; 1992a.

Table 6.8 Numbers of extension officers, 1981 to 1983

	New staff	No's left	Nett gain/loss
1981	29	17	+ 12
1982	20	23	- 3
1983	36	30	+ 6
Total staff gain in three years			15
Total vacant posts as at 28 March 1984			49

Source: Hansard 28 March 1984, col.776-777.

A suggestion mooted in session, concerned the employment of personnel from overseas positions (Hansard, 1946). This was, however, thrown out completely with little debate, the justification for which was given as only local people, officials of the Department of Agriculture could be familiar enough with South African land conditions to be qualified to address its problems. Similarly Hanlon (undated), from an evaluation of land use progress, projects and prospects in the SADCC region, concluded that the reluctance on the part of SADCC agriculture ministers to adopt strategies recommended by donor agencies, could be ascribed to the fact that external prescriptions, with regard to the design and implementation of specific strategies and programmes, could by necessity only provide for problems manifest at a macrolevel and as such were perceived inadequate in terms of their provision for microlevel needs. The same conclusion was drawn by South African ministers (Hansard, May 1946). In addition, considerable reluctance was expressed by government ministers to accepting the value of experience gained in other parts of the developed world, such as Australia and America, as also in developing countries, such as Kenya and Rhodesia, with regard to soil conservation (Hansard 1946, col.8270, 8275, 8315). Confidence in South African officials and their capabilities to address the soil erosion problem themselves without international intervention, was reiterated over the decades.

A significant development of the 1990s emerged as a result of a Cabinet decision to establish a statutory agricultural research council. The council established in terms of a provision under the Agricultural Research Act No.86 of 1990, was fully appointed on 1 April 1991. In terms of extension the most important consequence of such a development was the establishment of Agricultural Development Centres (ADCs). The first of its kind to be created was the Outeniqua Experiment Farm in the Winter Rainfall Region and is known as the Outeniqua Development Centre. A second was established at Vredendal (Department of Agricultural Development, 1991). It is ultimately the Department's intention that a number of centres will be established within each of the seven agricultural development regions, the aim of which is to provide centres of expertise, strategically located in the different farming areas of the country. It is already evident that many producers have an urgent need for production and management systems to enhance the profitability of their operations and the assistance they receive from staff at these centres is proving most beneficial (Department of Agricultural Development, 1992a).

A typical agricultural development centre is staffed by a multi-disciplinary team of agricultural specialists, including trained scientists, engineers, economists and technicians (MacVicar, 1993), whose task it is to relay specialised technology to local farming communities in given service areas, as well as extension officers and conservation officers (Department of Agricultural Development, 1991; MacVicar, 1993). In addition, research and demonstration work is conducted at these centres to develop the technology required and considered relevant to the service area. Demonstration work and trials play a fundamentally important role in extension efforts generally, but are given particular emphasis at ADCs. For example, research stations currently in operation in the Natal area alone include Kokstad, Cedara, Dundee and Makatini (MacVicar, 1993). The existence of these centres within specific homogenous regions could suggest the following advantages:

1. that extension support will be more readily accessible to the land user seeking assistance or advice, due to the proximity of these centres;
2. that the extension support and advice provided could be perceived by land users to be 'state of the art' and more 'relevant' by implication less 'remote', as staff will be specifically trained in accordance with the conditions specific to the regions.

The *modus operandi* of these service centres is such that priority is given to the "profit motif to address the shrinking profit margins that typify most farming enterprises" (Department of Agricultural Development, 1991). This in effect places "the importance of an agricultural econometric *quid pro quo* in respect of all advisory and extension services rendered by these centres, in the foreground" (Department of Agricultural Development, 1991).

Such a development is highly significant in the context of evaluating the effectiveness of the extension services on offer in South Africa, in that, explicitly the primary objective or role of these centres is economically-driven, with the purpose of enhancing productivity levels and increasing profitability. With such a purpose to the fore, it seems logical to assume that there leaves little room for conservation and the promotion of conservation extension, an area of extension support already confirmed to be largely absent prior to the institution of ADCs (Russell, pers.comm.). Given the objectives of the post-1993 Government of National Unity's RDP (refer to Section 9.2), it is suggested that these centres could be better utilised to promote agricultural sustainability, or perhaps more appropriate in terms of the South African context, optimal resource utilisation and not as can be inferred from an economic motive, maximum resource utilisation. The importance of including a philosophy of conservation in education, by way of "preparing future generations" to equip themselves with the knowledge to "appreciate ... the vital significance of conservation ...for the provision of water, meat and bread ... for the future ...requires conservation attitudes and agricultural skills for beyond those provided by existing educational systems", was stressed in 1964 by SARCCUS representatives (SARCCUS, 1964). Clearly, this recommendation has not been heeded.

In general, agricultural training centres in South Africa can be divided into four categories:

- agricultural vocational secondary schools
- agricultural colleges
- faculties of agriculture at universities
- farmer training centres (Erskine, 1985).

Staff training was to be effected by various agricultural colleges in the country. Progress on this issue was reported to include the creation of two additional faculties of agriculture at Stellenbosch and Pretoria, the offer of a specialised course in conservation at the University of the Witwatersrand. Further, it was at that time proposed to establish a faculty at Pietermaritzburg (Hansard 1946, col.8316) (this was subsequently realised). Table 6.9 provides a summary of information on institutions which provide training for extensionists, derived from a review conducted by Erskine (1985), of the extension service in (formerly) Natal/KwaZulu.

In 1990, formal training facilities nationwide for prospective farmers became available at six colleges of agriculture of the Department of Agricultural Development (Department of Agricultural Development, 1991). These include Cedara Agricultural College (Natal) (referenced above), Elsenburg (Winter Rainfall Region), Glen (Free State Region), Grootfontein (Karoo Region), Lowveld (Transvaal Region) and Potchefstroom (Highveld Region). Table 6.10 shows the student numbers at the various colleges for the years 1989/90 to 1991/92.

A 2-year diploma course in agriculture is presented at the 6 colleges of agriculture. According to the Department (1992a), applications for admission have recently exceeded the numbers some colleges could accommodate. This would indicate an increase in interest and by implication awareness of environmental management concerns. Short courses are also offered at the colleges on various aspects of farming practices and management. For example, at Potchefstroom 28 courses with a participation/attendance of 623 were presented in 1991. In addition, 11 courses were offered in grain grading and 4 in milk production. Each was attended by 256 and 200 individuals respectively. At Elsenburg 15 short courses were presented during the period 1990 to 1991 and a further 163 individuals attended 4 courses for cattle and 2 dairy cattle courses. At the Glen College of Agriculture 10 short courses were presented with an attendance of 78 persons (Department of Agricultural Development, 1991). During the period 1991 to 1992, an additional short course was offered at the Glen College of Agriculture. This was attended by 24 individuals over a 3-day period, the aim of which was to provide expertise to pesticide users to promote the effective and safe use of substances (Department of Agricultural Development, 1992a).

Table 6.9 Institutions providing agricultural education in Natal/KwaZulu (1980)

Institution	Admission Requirement	Duration of Course	No. admitted (per annum)	Qualification Gained
Weston Agric. High School	Std. 7	3 years	50	Senior Cert.
Vryheid Agric. High School	Std. 5	5 years	20	Senior Cert.
Estcourt High School	Std. 5	Variable	Variable	Senior Cert.
Cedara College of Agriculture*	Senior Cert.	2 years	90	Dip. Agric.
Cwaka College of Agriculture+	Senior Cert.	2 years	60-80	Dip. Agric.
University of Natal	Matric or exemption	4 years 3 years	120 93	B.Sc. Agric. B.Agric Mgt.

Notes: * For White students who desire to farm, either as farmers on their own land or as managers.

\+ For African students, who almost exclusively will seek employment with the government service as extension officers. In essence, therefore, there is a lack of tertiary facilities to provide farmer training for African students.

Source: Erskine (1985)

Table 6.10 Student numbers at agricultural colleges 1989/90 to 1991/92

College	1989/90	1990/91	1991/92
Cedara	133	130	141
Elsenburg	156	154	180
Glen	146	150	144
Grootfontein	111	130	108
Lowveld	-	95	173
Potchefstroom	156	157	156

Source: Department of Agricultural Development, 1991; 1992a.

A significant development in the context of promoting environmental awareness and environmental education, in 1991 the subject Agricultural Environmental Studies was introduced as a compulsory component of the first-year course, with a focus on both the human and natural environments. The course was introduced with the acknowledgement that the general public were currently exhibiting greater environmental awareness (Department of Agricultural Development, 1991).

6.4.1 **Discussion**

Erskine (1985) concluded that information transfer capabilities, evaluative mechanisms and provision for coordination within a system, are inadequate in both the commercial and subsistence sectors of South African agriculture, and further that as a consequence, resources invested in the three components outlined have yielded poorer than expected results. Watson (1990) cited numerous examples where misappropriated strategies have resulted in increased rates of soil loss in the country. For example, studies conducted by Erskine (1986), Ahn (1977), Okigbo (1977), Morgan and Scoging (1981), Lal (1984), and Morgan (1986), all indicated that implementation of government subsidized schemes gave rise to incorrect construction and/or inadequate maintenance, and consequently increased soil losses were

recorded. This would suggest that either (a) there was a lack of or inadequate supervision from extension workers, where landusers, inexperienced and untrained with regard to construction or maintenance of engineering structures, were left to their own devices, and/or (b) there was an absense of follow-up activity or monitoring. In a report published by the Cedara College of Agriculture in 1994, in its consideration of the sustainability of South African agriculture, it was concluded that at present the government does not have:

1. an efficient method of monitoring the changes taking place in South Africa's natural resources;
2. an efficient mechanism whereby the available scientific and technological expertise in South Africa (in, for example, scientific councils, universities) can quickly and effectively be tapped to:
   (a) determine acceptable norms of environmental impact, such as the rate of soil erosion in a given locality, and the landuse techniques (for example, contouring, terracing) needed to satisfy those norms, and further
   (b) to establish the extent of an actual or potential damage to the environment. (Cedara, 1994)

Both conditions are described in the World Soils Policy (see Section 4.2) as essential to supplementing legislative and institutional structures. Despite both conditions being provided for in terms of the 1946, 1969 and 1983 soil conservation Acts (see Section 3.4.2, 3.6.2 and 3.8.2 for details), as the foregoing discussion has illustrated, South Africa has failed to satisfy the standards set by the World Soils Policy under objectives 6, 9 and 12.

A focus on production and technological advancement, and investment in science and technology has, from its inception in 1925, been reflected in the activities and support structures provided by the Extension Service. Chapter 1 (Section 1.2) illustrates how such a technocratic bias could account for the failure of soil conservation in South Africa.

The subject of ambiguities in legislative provisions (an issue identified as inhibiting farmer mobilisation), could be alleviated if the advice and support from extensionists

was adequate. According to Koch (1992), where farmers disregard advice from extensionists on theoretical grounds, it may often be assumed that farmers (a) have not understood the practical relevance of what has been said, (inevitably, once a farmer understands the theory, this is translated into practice), or (b) have over-estimated their own efficiency, know-how and capabilities, and consequently deny any need for assistance.

A major criticism of extension services in South Africa (Erskine, 1985) involves the nature of extension training. In-service training programmes are described as being biased towards the natural sciences and production technology, with little regard to rural sociology and other social scientific aspects of agricultural development, such as agricultural economics. This is hardly surprising given the technocratic emphasis which to date has pervaded the sciences (Russell, pers. comm.). (Refer to Section 1.2 for further discussion). There are two dimensions to the extension services offered, the first concerns production extension and the second conservation extension. There can be no doubt that extension officials have not been fully informed and aware of the urgency of promoting resource conservation, consequently attention has focussed on production extension to meet the demands made on agriculture (Russell, pers.comm.). Objective 9 of the World Soils Policy specifically refers to the need to develop systems of farming compatible with socio-economic and cultural conditions characterising the community for which the system of land management and practice is being developed. Without this background knowledge or support base, it is difficult to envisage how the extension service could fulfil the requirements stipulated in objectives 6, 9 and 12.

Much of the contemporary literature focusses on improving the effectiveness and role of extension programmes and officials both in the context of improving general agricultural productivity and promoting conservation farming (Koch, 1992; Erskine, 1985; Elwell, 1992). Inadequate extension coverage, or management aimed at effecting optimum land-use, are two factors identified by the Department of Agriculture, to have contributed to the often poor decisions taken by farmers in white agriculture (Erskine, undated). In addition, popular criticisms are repeatedly directed at the "top-down" approach to extension, wherein the scientist is responsible for determining research priorities, conducts the necessary research and ultimately transfers the technology on to the Extension Services, who in turn advise the

farmers. Although studies have revealed considerable success in interactions with the commercial sector in African countries, such as Zambia and Zimbabwe, consistent failure has characterised interactions with the subsistence farmer (Elwell, 1992). Many reasons are given for this, such as the perception that top-down technology is paternalistic in nature, even dictatorial, and has often been associated with the "repressions of colonialism" and is thus refuted. It is not possible in terms of this study, to categorically conclude that such claims also apply in the South African context, however, given the regulated and discriminatory nature of the legislative structure, the provisions for soil conservation (which specifically exclude all land owned or utilised by Africans), and the methods of law enforcement prescribed by the State (in particular, their policy of persuasion and farmers discontent surrounding the issue of Ministerial authority), it would not be unreasonable to suggest that such is the case in South Africa. In Erskine's (1985) critical evaluation of the extension service in South Africa, it was suggested that such services aid only the more sophisticated, progressive, commercially efficient farmers and in effect fail to address the needs of the resource-poor, small farmer (subsistence or commercial). Assistance will be imperative to help the smaller farmers cross the divide between the subsistence sector and the modernizing commercial sector (a process inevitable under the current economic climate) (Erskine, 1985). The provision of practical training, and in particular management training, for South Africa's farming community, across the sectoral divide, should be high on the government's priorities.

In terms of the National Priorities Act No.119 of 1984, provision is made for the establishment of the State President's Committee on National Priorities, to define its powers and duties and to provide for incidental matters (Department of Environment Affairs, 1993). It is the responsibility of the committee to determine, for example, in promoting national interests, priorities by virtue of which available financing sources, natural resources and manpower of the Republic may be apportioned, as well as all activities associated with these, between the public sector and the private sector (Department of Environment Affairs, 1993). To date it would appear, in the absence of supportive material to suggest otherwise, there has been no significant increase in government inputs, support of extension programmes or projects, directed at the specific promotion of conservation farming. It is therefore concluded that support from the State has proved inadequate in three areas, (a) research, (b) enforcement, and (c) policy implementation utilising qualified extension personnel.

Al-Sudeary (1982, cited in van Niekerk & van Niekerk, 1992) contends that "agriculture has the dubious distinction of being that field of human endeavour which exhibits the greatest gap between available knowledge and what is actually practised. This would suggest therefore that regardless of the 'amount' or even 'appropriateness' of the knowledge to be transferred, if optimum transferability of information is not attained, then once again a scenario within which the *status quo* is maintained becomes reality. This is why an effective and efficient extension service (the ambit of which must now also meet the needs of small-scale and 'emergent' farmers) is crucial to the future success of soil conservation. Because it is behaviour that eventually impacts on the environment, attention should be given to strategies aimed at behavioural change (HSRC, 1996). Research has shown that interventionist strategies by the state, including the payment of subsidies (this chapter), have resulted often in short-term behaviour change but rarely long-term change, a necessary precondition for sustainable agricultural production. This is why educational strategies should aim to not only effect changes in individuals' attitudes and behaviour, but also change the value systems of individuals and by implication society in general. (Refer to Chapters 1 and 5 for further discussion of behavioural change.)

CHAPTER SEVEN

POLICY ANALYSIS DISCUSSION

7.1 DISCUSSION AND IMPLICATIONS

This chapter attempts to consolidate the findings presented in chapters 2 to 6 in an overall assessment of policy evolution between 1910 and 1992. In the light of these findings a number of further observations can be made in considering the analyses holistically. To this end, in addition to several specific implications, a conceptual model of the variables involved in soil erosion is presented.

From the information presented in the foregoing chapters, it is clear that the traditional view of anthropogenic factors (for example, overgrazing, deforestation) being responsible for the extent of human-induced soil degradation in South Africa, is a gross simplification. Experience elsewhere has suggested that such actions should rather be seen as symptoms rather than causes of the problem (Laker, 1993; Baker, 1984). The results of the analysis of policy undertaken in the preceding chapters support such a claim. It can therefore be advanced that the real causes are the result of interactions between a multiplicity of factors which have combined to render successive attempts at soil conservation less than optimal. From the literature reviewed, in the context of Africa in general, such factors include *inter alia*, poor quality and unstable soil resources, high population pressures relative to the status of resources, and cultural and socio-economic factors (Laker, 1993). Whilst similarities exist between other African countries and South Africa, the situation in South Africa is characterised by greater diversity and complexity.

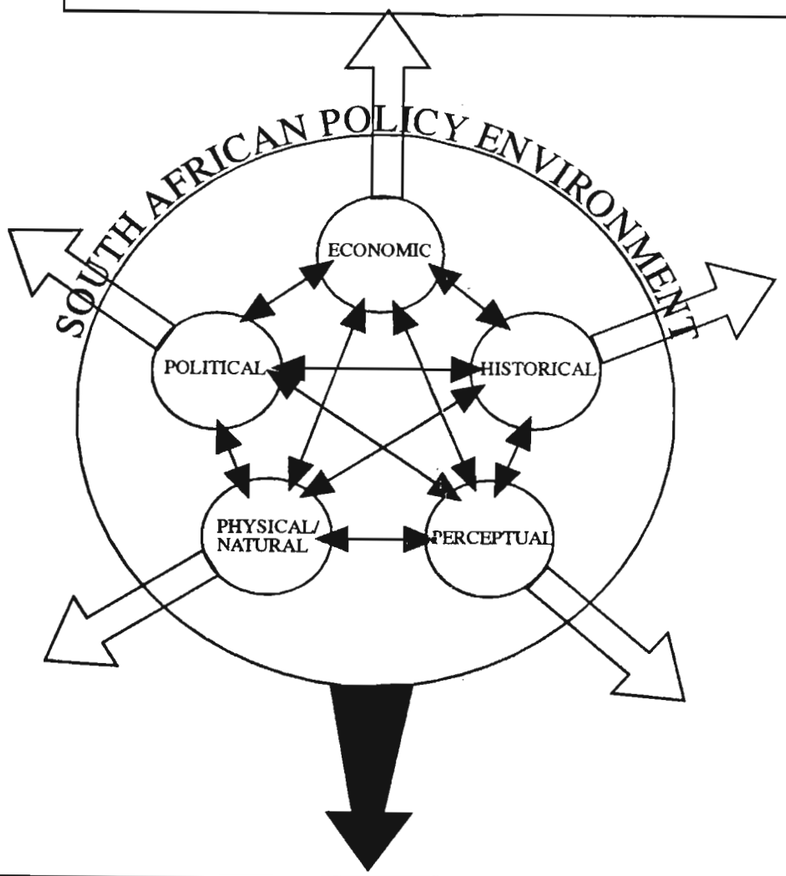
It is clear from chapters 3 to 6 that each of the elements in the World Soils Policy has influenced South African policy success. On the basis of the results a conceptual model of the interactive variables represented in a number of dynamically interrelated environments is presented in Figure 7.1. Figure 7.1 depicts the numerous variables identified in this analysis to be significant in shaping the contemporary South African policy environment. By its very nature, the model attempts to illustrate such diversity and consequent complexity in interaction between factors in a visually structured

ECONOMIC ENVIRONMENT

- insufficient allocation of State funds -
  - (a) to promote soil conservation nationwide;
  - (b) to support efforts of NGOs and statutory agencies
- resource constraints of -
  - (a) NGOs
  - (b) farmers
  - (c) government departments
  - (d) ?State
- migratory labour system - conflicting goals of the
  - (a) Department of Mines
  - (b) Department of Agriculture
- agricultural dualism reflecting -
  - (a) overemphasis economic production/commercial agriculture (increasing production levels)
  - (b) neglect of subsistence agriculture/small-scale farming operations
- profitability factor - soil conservation - in presence of alternative investment options
- costs of implementing preferential treatment policies - drain on available resources for soil conservation

POLITICAL ENVIRONMENT:

- pre-set/determined objectives/agendas of politicians and policy makers
- ideology and culture - apartheid versus agriculture -
  - (a) different priorities and aspirations
  - (b) differences in motivation and commitment
  - (c) justification for expropriation questionable
  - (d) prescribed extent of ministerial authority
- resistance to change
- lack of political will
- agriculture and landuse policies -
  - (a) land tenure
  - (b) separate development
  - (c) Betterment
- pass laws - mobility of labourers
- extent of ministerial authority
- party politics - importance of winning votes
- interagency and interdepartmental cooperation and coordination
- preferential treatment policies and mechanisms
- conferment of land rights



HISTORICAL ENVIRONMENT:

- colonial conquests for land - ignored geographical and political boundaries
- colonial landuse practices -
  - (a) cleared indigenous vegetation and trees and ploughed land
  - (b) continuous cropping methods, mechanization and irrigation
- exceeding carrying capacity thresholds (relates to landuse policies of the past and present)
- failure to manage landuse in entire catchments (relates to preferential policies)
- inherited state of environment - with/without anthropogenic interference
- agricultural policies - shaped structure of economy -
  - (a) optimum resource use
  - (b) Betterment
  - (c) separate development/"rehabilitation"
- agricultural dualism

PHYSICAL/NATURAL ENVIRONMENT:

- scientists' norms - what is the real extent of the problem?
- land ownership - (a) no security of tenure
  - (b) communal systems
- demographics
- fragmentation - land use
- droughts/floods/disease - subdued enthusiasm for conservation
- differentiation between geologic and accelerated (natural or anthropogenic) erosion
- utilisation of marginal lands (inherently fragile, vulnerable and char. by steep slopes)
- uneconomic viability of plots
- no provision for off-site consequences of soil erosion

PERCEPTUAL ENVIRONMENT:

- uniqueness of individuals' frame of reference/formation of attitudes, opinions and perceptions of - (a) judiciary (b) decision-maker (c) policy formulator (d) general public (e) government officials/ministers (f) farmers
- "felt" needs - discrepancy in perception of - overexploitation of resources
  environmental perception and interpretation of reality determined by number of perceptual filters
- risk perception - uncertainty and probability (consequence of inadequate data and scientific consensus)
- intergenerational criterion - (a) time horizons
  - (b) social relevance
- actual perception of soil erosion - (a) non-profitable
  - (b) no short term rewards
  - (c) long term returns not guaranteed
- perceived suitability of conservation approach - (a) curative (b) corrective (c) proactive (d) prevention
- uneven popularity of issue = f (consensus, awareness)
- discontent regarding extent of ministerial authority - (a) perception = dictatorial
  - (b) opposition to "imposed obligations"
- question of 'who is to blame for soil erosion?' - causes speculative -
  - (a) natural or anthropogenic?
  - (b) State - imposition of economic pressures?
  - (c) farmer - bad landuse practices?
- inadequacy of educational efforts and focus

SOIL CONSERVATION POLICY ENVIRONMENT
shaped and characterised by:

- management of soil resources - failure of State to prioritize
- approach to environmental resource management - general lack of commitment to coordinated and holistic management
- national level control -
  - (a) microlevel applicability questionable; remotely relevant to farmers
  - (b) poor coordination/cooperation different ministerial levels; conflicting priorities of government hierarchies
  - (c) implementation 'top-down' approach - perceived paternalistic/dictatorial approach e.g. with regard to expropriation of land, allocation of subsidies and enforcement of legislative controls
- divergent perceptions of soil erosion - shaped by lack of scientific consensus/uncertainty, risk perception, intergenerational criterion and
- reinforced by classical conditioning and social learning
- inherent legacy of pre-Union land use and agricultural policies
- contemporary -
  - (a) systems of land tenure
  - (b) preferential treatment white commercial agriculture
  - (c) inadequacies in support mechanisms, structures, programmes, infrastructure, personnel, incentives and enforcement provided for in legislation
- inadequate information baseline to inform policy decisions
- conflicting interests - (a) State (b) agriculture (c) industry
- preferential legislative provision for soil erosion control
- problematic communicability of legislation - multi-lingual population
- legislation focus - (a) correction versus prevention
  - (b) forestry versus soil conservation
- institutional structures - (a) changing portfolios
  - (b) inadequate representation from farming community
  - (c) question of conflicting priorities
  - (d) failure to address individual needs at microlevel
- inadequate legislative enforcement - (a) non-reporting of contraventions
  - (b) policy of persuasion versus prosecution

Figure 7.1 A conceptual model depicting the complexity of human interactions operative within the policy environment, together with the factors identified in this study to have significantly influenced the relative non-success of South African soil conservation policy formulation, implementation, administration and enforcement.

way. In so doing, it illustrates the conclusion drawn in Chapter 4, that reasons other than simply the provision of a legislative framework and institutional structures for the implementation of legislative provisions and regulations, must be invoked to explain the recorded relative inefficacy of conservation efforts and initiatives in South Africa.

Five environments are featured in this model, the economic, political, historical, physical and perceptual environments, which individually and collectively shape the South African policy environment. The importance of the historical environment was illustrated in Chapter 5 (see Section 5.4.4) where historical developments (both spatial and temporal) in the context of land use and degradation are shown to have contributed to the contemporary extent of soil erosion. The economic environment poses a number of constraints to attaining conservation goals, as does the complexity of dynamics represented within the political environment, and the physical environment has been the focus of most previous studies. As indicated in Chapter 5, however, it is the perceptual environment and the variables operative within this system which has to date largely been overlooked and as the results of this study can illustrate, are of paramount importance to the ultimate success of soil conservation policy.

Table 7.1 presents the results of a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of the four key legislative enactments upon which this study has focussed. Although conducted with the benefit of hindsight, it highlights the perceived strengths and weaknesses, and the prevailing opportunities for and threats to, the potential of these acts to attain their stated objectives. In short, it is clear from these results that the Conservation of Agricultural Resources Act of 1983 provides to date (that is, up to 1992), most comprehensively for the conservation of soil and water resources, whilst aiming to maintain the production potential of land and its sustained use. The one (highly significant) shortcoming of this enactment is its non-applicability to all agricultural land in the country, a weakness which will inevitably result in the ultimate failure to address conservation objectives in South Africa.

Figure 7.2 provides a visual assessment of each of the four acts analysed in this study in the form of a schematic matrix depicting the extent to which each act complies with World Soils Policy (WSP) objectives aimed at the sustainable

Table 7.1 A SWOT analysis of key soil conservation legislative enactments (1941, 1946, 1969 and 1983)

Legislation	Strengths (perceived)	Weaknesses (perceived)	Opportunities	Threats
Forest and Veld Act 1941	First tangible legislative attempt to provide for soil management	1. Focus: (a) reclamation and correction (rather than conservation and prevention; (b) deforestation and veld burning 2. Authoritarian nature 3. Not applied to Native Trust lands - implies a mandate to exploit agricultural resources 3. Soil and water management not provided for holistically 4. Limited provision for farmer involvement	1. Established institutional framework already in place to monitor and supervise efforts e.g. 1925 - Agric. Extension Service created; 1930 - Soil Erosion Advisory Council; 1938 - first Soil Conservation committees set up; and 1939 - Dept. of Soil and Veld Conservation established 2. Parliamentary consensus re. timeliness of the Act	1. Failure to id. soil conservation needs as priority could potentially exacerbate the problem 2. Preoccupation with the world war; attention focussed and resources utilised in other areas 3. Uneducated population - not conservation conscious
Soil Conservation Act 1946	1. Democratic spirit - basis for cooperation between farmers and State 2. Provides for Fodder Bank Scheme (1948) 3. Provision for soil, vegetation and water conservation 4. Field conservation and advisory service, and soil conservation district committees established 5. Attention to microscale activities - preparation farm plans 6. Provision generally for structured, more regulated control 7. Provided farmers the opportunity to practice proactive cons. farming	1. Enforcement of controls left mainly to farmers (soil cons. district committees) 2. Not applied in Black areas 3. Prosecution not applicable to conservation works (only measures) 4. Perceived as too idealistic by farming community	1. 1943 - Dept. Commission for Reconstruction of Agriculture appointed 2. Statutory enablement provided for national awareness promotion campaign (tremendous magnitude) 3. First binomial soil classification system published. Important in establishing extension and research priorities	1. Limited manpower - professional and technical 2. Uneducated population 3. Overemphasis on economic production (post w.war) 4. Inadequate and insufficient data - results: (a) needs not identified; (b) strategies could be misplaced and limited resources wasted 5. N.B. Drought peaked - 1960-61

Continued.../

Table 7.1 continued...

Legislation	Strengths (perceived)	Weaknesses (perceived)	Opportunities	Threats
Soil Conservation Act 1969	1. Provided regional guidelines for conservation practice 2. Stricter penalties for contravention 3. Provided for Veld Reclamation Scheme (1966-73) and Stock Reduction Scheme (1969) 4. Provided for enhanced regulated control of soil erosion 5. Revised scheme for farm plan preparation (less time consuming)	1. Initiative to establish soil conservation committees left to farmers 2. Not applied in Black areas (as before) 3. Provision for solely corrective measures which were neither strictly nor always applied	1. Post drought and 1946 Act - period of heightened awareness 2. Statutory enablement for national awareness campaign (e.g. Green Cross, 1950s) 3. Formulated simultaneously with State's policy of optimum resource use 4. Division of Soil Conservation and Extension established (1946/47) 5. Non-statutory advisory board established (Soil Protection Advisory Board) - enhanced the potential to win farmer support	1. Multiplicity of legislative provision (diverse Acts) for soil erosion control (need for rationalisation) 2. Lack of farmer support due to regulatory nature of Act - not conducive to mobilizing support (e.g. ministerial powers perceived to be dictatorial) peaked at this time 3. Inadequate data base on the basis of which important policy decisions were made
Conservation of Agricultural Resources Act 1983	1. New emphasis - providing for soil conservation through the maintenance of the production potential of land (i.e. sustainability) 2. Provided for the holistic management of soil, water, weeds, vegetation and invader plants 3. Incentives to reward conservation conscious farmers only 4. Provision for regional conservation committees to be established	1. Not applied universally to all agricultural land in South Africa (as before)	1. Global/international interests re. environmental concerns - heightened at this time 2. Increase in private sector inputs i.e. technical support	1. Land reforms, redistribution of land & land restitution 2. Inadequate workforce (only 14 inspectors for entire country) 3. Priorities of diverse departments - results in uncoordinated support for soil conservation 4. Inadequate data base - how can production potential of land be maintained if not known! 5. Focus on large scale commercial interests

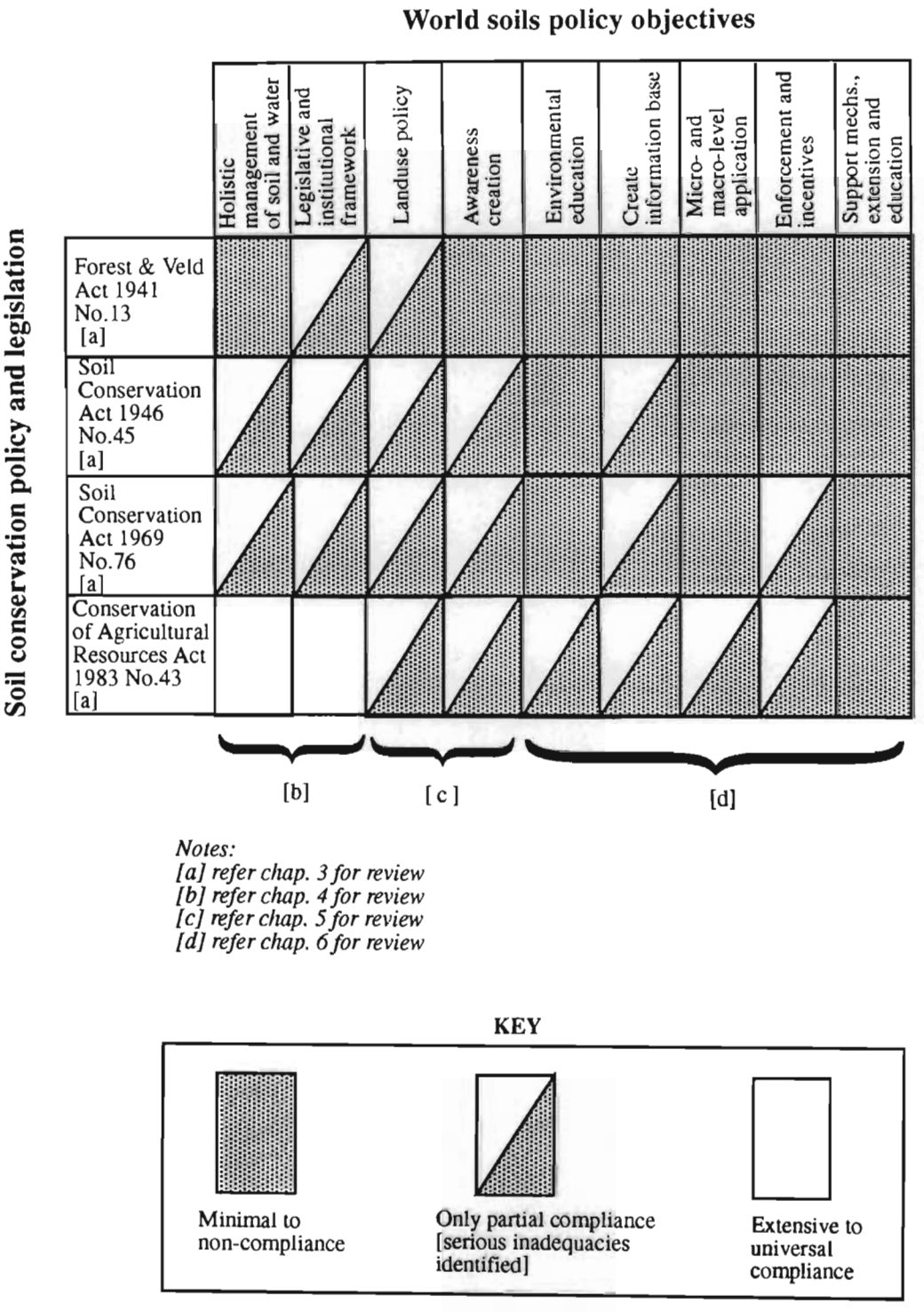


Figure 7.2 A schematic matrix depicting the extent of South African compliance with World Soils Policy objectives for the sustainable utilisation of soil.

utilisation of soil. Three important conclusions may be drawn from this summary schematic which shows graphically the nature of improvements, in a generalised form, effected by successive acts.

(a) The overall impression is one of general improvement towards compliance of WSP objectives.

(b) Throughout the study period, the objectives requiring the provision of support mechanisms, extension and educative programmes to reinforce and sustain conservation ideals, were seriously neglected.

(c) It was not until the promulgation of the Conservation of Agricultural Resources Act of 1983, that legislation provided holistically for the sound management of soil and water, and the institutional framework to achieve such an objective established.

Notwithstanding the progress which has been made in many areas throughout the country, the results of this study, in general, confirm that soil conservation policies formulated during the period 1910 to 1992 have fallen short in their attempts to realise the conservation ideal anticipated by the State, in which the committed support of the farming community at large was to be harnessed and motivated to use sound principles of resource management in the sustained utilisation of soil. Broadly, it is proposed that this may be ascribed to a lack of appreciation of the need to understand the interrelatedness of intervening factors within each of five dynamically interactive environments, namely the economic, political, historical, physical/natural and, perhaps of paramount significance, the perceptual environment (as illustrated in Figure 7.1), which are ultimately responsible for shaping the South African policy environment, and by implication the formulation, implementation, administration and enforcement of policy.

Whilst each of chapters 3 to 6 (within which the analysis was undertaken), provide a discussion and draw their own conclusions, some of the more broadly defined yet pertinent conclusions regarding the reasons for past inefficacy in South African soil conservation policy, will now be outlined.

7.1.1. **Lack of importance ascribed to soil**

Despite the apparently comprehensive and sincere efforts of the public sector to effect soil conservation that have been displayed in the nature of the legislative and institutional framework which has been shown to have continuously evolved through a number of revisions and rationalisation throughout the study period, soil conservation objectives have not been realised. This may be attributed to a failure on the part of State officials and decision makers to recognise the need to prioritise the management of soil as an important, non-renewable resource and the necessity of committing themselves to the holistic management of agricultural resources in general, that is, land and water (although with the promulgation of the Conservation of Agricultural Resources Act of 1983, represents a positive shift in emphasis reflecting a more integrated and holistic approach to management). The objectives of the proposed land reforms, however, as detailed in the government's RDP (Section 9.2), aggravate the chances of realising the ultimate goal of soil conservation generally.

7.1.2. **National level control**

Soil erosion in South Africa was almost exclusively controlled at a national level (Rabie, 1976), certainly up to 1995 (Nduli, pers.comm.; Taylor, pers.comm.) when legislative provision introduced provincialisation (that is, involving the devolution of central powers to the newly established 9 provinces established in terms of the Land Administration Act No.2 of 1995). This is reflected in the various legislative provisions for soil conservation that were reviewed and analysed in the study. The relevance and applicability of policy and its related strategies and programmes at the microlevel was consequently questioned by land users and it is argued that a lack of cooperation and coordination of conservation efforts realised at different levels of the ministerial hierarchy, together with further fragmentation represented in the legislation itself, has hindered attempts to mobilise the farming community at large. Clearly there is a need for consolidation of departmental authority, which was not achieved during the period under review.

7.1.3. **Non-uniformity in application of law**

The inherent legacy of pre-Union land use and agricultural policies, which were utilised as the foundation for the government's policy of separate development under the political ideology of 'apartheid', were progressively intensified during the decades covered by this study. This accounts for much of the degradation which scars the South African landscape today. Fragmentation of resource development planning and the systems of land tenure practised, have further complicated catchment management problems. The preferential treatment of, and support mechanisms afforded to, 'white' commercial agriculture, reinforced by legislative provisions have, in effect, exacerbated the extent of soil loss and degradation in the country. The limited recognition afforded to resource management in the former tribal lands, homelands and national states, by their governing bodies has also contributed. Under the new political and economic dispensation and the promulgation of the Abolition of Racially Based Land Measures Act No.108 of 1991, and the transitional Government of National Unity's commitment to the Reconstruction and Development Programme, a re-evaluation of resources in these areas has been demanded. Ultimately more comprehensive and uniform legislative and institutional structures and provisions for soil conservation should become mandatory countrywide. To date, however, such actions have not been undertaken.

7.1.4. **Inadequate implementation**

The implementation phase in the formulation of policy was expressed by Clark (1992) as being of paramount importance to the success of policy. Without adequate support structures and mechanisms, education and related programmes to support resource management activities, skilled extension personnel, and the provision for incentives and enforcement of legislative controls and regulations, to complement the implementation of policy, objectives cannot be realised. With regard to each of these areas, this study has shown that South African policy has failed to satisfy the expectations and requirements formulated in the respective objectives of the World Soils Policy. [Refer to Figure 7.2 for details.]

7.1.5. **Lack of information on real nature and extent of problem**

Policies formulated to provide for soil erosion control, should be prepared against a comprehensive database detailing the nature, extent and severity of soil erosion (UNEP & FAO, 1974; Morgan & Rickson, 1988). Policy development should always be guided with consideration to the actual and potential extent of soil erosion and degradation, the frequency and seasonal variation of erosion events and the relative importance of extreme events (Higgitt, 1993). Without a comprehensive and holistically oriented information baseline, policies cannot be adequately informed and the management of environmental resources cannot be effectively realised.

7.1.6. **Perceptions in an uninformed environment**

The perceptions and attitudes of government officials, which are shaped by, and reflect, individuals' values, needs, aspirations and ideologies, are considered instrumental in having influenced previous policies formulated and their subsequent administration, implementation and enforcement. Figure 7.1 indicates the specifics of this conclusion. This situation has probably been reinforced by the lack of conclusive research on even the physical aspects of soil erosion in South Africa.

CHAPTER EIGHT

PERCEPTIONS OF SOIL EROSION IN SOUTH AFRICA

8.1 INTRODUCTION

Chapter 8 presents the results of a perception survey undertaken by the researcher to determine the extent to which key individuals active in the soil conservation arena agree or disagree that these variables have in fact contributed to the relative inefficacy of South African soil conservation policy realised today, and further, its formulation, implementation, administration and enforcement. On the basis of experiences elsewhere (Section 1.3) and from the conceptual model (Figure 7.1) it is clear that the role of human perceptions not only in decision-making but in their relationship to the policy process as a whole, has been overlooked. It can be argued that the perceptions of various groups of professional people and affected parties (like those interviewed) can provide an assessable basis of pertinent and valid source of information (see Chapter 1 for an exposition of the role of perceptions). The function of Chapter 9 is to collate the results of chapters 7 and 8 and derive a number of general conclusions concerning South African soil erosion and soil conservation policy, and present these with a view to highlighting the potential implications for future policies, should the perceived deficiencies of past policies not be addressed or overcome.

Taking the *a priori* assumptions presented in Section 1.5, and the working hypothesis featured in Figure 7.1, this chapter will attempt to examine the responses derived from a postal questionnaire survey, which was addressed to 242 individuals, identified either as scientists, policy makers/developers, technical advisors/engineers, and/or extension officials, who are either currently or were in the past in some way actively involved in soil erosion or soil conservation policy development.

The principal objective of this analysis is to test the abovementioned hypotheses in general, and in particular to examine the role of perceptions in the policy environment. On the basis of the demonstrable importance of perceptions highlighted

throughout this thesis it was hoped that this would contribute to an understanding of the nature and role of human perceptions in decision-making, and more specifically the perceptions of key individuals in soil conservation policy in South Africa. The questionnaire also aimed to simultaneously determine whether agreement exists concerning a number of important, and prior to this study untested, contemporary perceptions regarding the nature, extent, and causes of soil erosion in South Africa, and its associated conservation policies and legislation. Generally, it was intended to establish the extent to which respondents:

1. believe soil erosion to be a problem;
2. believe soil erosion poses a threat to the sustainability of the national resource base;
3. perceive soil conservation policies to be effective in terms of:
   - 3.1 promoting the practice of sustainable utilisation of soil in accordance with conservation principles, and
   - 3.2 procuring sustained compliance of land users with regard to legislative regulations, controls and directives.

In particular, the analysis intends to establish respondents' perceptions regarding a number of associated and pivotal issues, which can be defined as specific to South Africa. These include respondents' perceptions regarding:

1. the nature, extent and causes of soil degradation;
2. the nature and characteristics of policy decisions;
3. the nature and characteristics of soil conservation policies;
4. the role of critical variables, such as, state priorities, government commitment, state ideologies, in the decision making process;
5. the receptivity of the general public and agricultural community to statutory land use controls and directives concerning soil conservation.

It was hoped that by identifying the practitioners' perceptions of the shortcomings and inadequacies of previous soil conservation policies, and by assessing the level of agreement among a body of scientists, policy developers, engineers/technical advisors and extension personnel (that is, those individuals with the greatest potential to influence the opinions or perceptions of others on the subject of soil erosion and

conservation) on the influence of these factors in effecting defined policy objectives, that these findings may be translated into lessons and used to address these problems and ultimately enhance the potential efficacy of future policies.

8.2 PERCEPTIONS CONCERNING SOIL EROSION AND CONSERVATION POLICY

Given that the overriding objective of this study is to establish the opinions of key individuals intimately involved in soil erosion research and/or soil conservation policy development, with regard to whether or not soil erosion is considered to be a serious environmental problem in the country and furthermore, to establish the extent to which these same players believe soil conservation policy has been effective in promoting soil conservation, it is necessary to establish at the outset what the respondents' perceptions are in this regard. This was achieved through questions 4 to 13 (refer to Appendix I). The results indicate that not only did 100 per cent of respondents consider soil erosion to be a problem in South Africa, with the largest majority of respondents (59,4 per cent) identifying it to be of such proportions that immediate and coordinated action is required, but 98 per cent considered the problem to "pose a serious threat to the national resource base". Consistency of opinions with regard to this issue is confirmed as illustrated when respondents were asked to indicate and rank later in the survey their opinions with regard to problem areas which should receive national priority attention, soil conservation featured third (out of 12 possibles), after education and water, (which were ranked first and second respectively). (See Section 8.5 for further discussion of national priorities.)

To illustrate their opinions with regard to the extent of soil loss experienced in South Africa, respondents were asked to indicate the extent to which they agreed or disagreed with the statement: "storage capcity in dams was reduced in the past due to soil loss in the catchments". A total of 89,9 per cent of individuals indicated firm agreement that storage capacity has been reduced as a result of soil losses in catchment areas. When asked whether or not they agreed with the claim that contemporary rates of soil loss are not significantly different from those measured by Midgely (1952), the greatest majority or 41 per cent of respondents answered "don't know" and a further 31 per cent disagreed with the statement.

Section 2.9 highlighted a number of inconsistencies in research and the prevalence of conflicting perceptions or opinions of South Africans in general, regarding the actual nature, extent and causes of soil erosion or degradation in the country. To shed some light on these misconceptions, firstly an attempt was made to establish with whom the responsibility for soil conservation should rest, and secondly, to establish the extent to which respondents agreed or disagreed with a number of statements reflecting various perceptions extracted from the literature reviewed for this study on the general causes of soil erosion, with particular emphasis on landuse policies.

To this end, respondents were asked to indicate the extent to which they either agreed or disagreed with the following two statements: soil conservation is the responsibility of the farmer; soil conservation is the responsibility of the state. To the first statement 90,9 per cent of respondents indicated their belief that the farmer should be accountable and 79,8 per cent were of the opinion that the state should be responsible. When asked to indicate with whom does the ultimate success of policy remain (more than one selection was permitted), the farmers, the state or with extension officers, engineers and technical advisors, the majority of respondents in all three questions concurred that all three play an important role, but most were of the opinion that success lay ultimately with the farmers/landusers (75,8 per cent), followed by the inputs of extensionists and advisors (55,6 per cent) and thirdly with the state (51,5 per cent).

The extent to which respondents agreed with six statements pertaining to a number of perceptions, believed by the author to challenge currently held dominant national perceptions concerning soil erosion, again derived from the literature reviewed for this study, will now be given in numerated form. [Please note that (a) the figures quoted are percentages, and (b) the percentages quoted represent percentages in terms of the number of respondents who answered these particular questions. Between 3 and 7 respondents chose not to answer one or more of these questions.]

1. *Soil erosion knows no political boundaries* -
   78,8 agreed, 3,0 "dont know", and 14,1 disagreed.

2. *Communal systems of land tenure, overgrazing and overpopulation on marginal lands have inevitably exacerbated the soil erosion problem* -
86,8 agreed, 1,0 "dont know", and 9,1 disagreed.

3. *Traditional farming methods practised in the former 'homelands' cannot alone explain the extent of erosion manifest in these areas* -
73,7 agreed, 10,1 "dont know", and 12,1 disagreed.

4. *Much of the gully erosion visible on marginal lands pre-dates the policies formulated after 1910* -
32,3 agreed, 30,3 "dont know", and 32,3 disagreed.

5. *Agricultural dualism and separate development contributed significantly to the extent of erosion* -
67,7 agreed, 17,2 "dont know", and 11,1 disagreed.

6. *Non-applicability of legislation to all agricultural land has exacerbated the erosion problem* -
80,0 agreed, 12,1 "dont know", and 4,0 disagreed.

Table 8.1 indicates the composition or internal structure of the sample in terms of participants' involvement with soil erosion. None of the categories were found to be mutually exclusive, however, for the purposes of this analysis, the structure of the sample permitted further categorisation into 4 subgroups representing predominantly:

1. scientists and non-policy makers;
2. policy makers and non-scientists;
3. scientists and policy makers only; and
4. others, including engineers, extensionists, lecturers and farmers.

As there was no statistically significant difference in the responses given by each of the 4 subgroups, the results presented below are in terms of the full sample measured.

Table 8.1 Internal structure of the sample measured (see question 1, Appendix I)

Category	Description*	Frequency
1.	scientist and non policymaker	48
2.	policymaker and non scientists	15
3.	scientist and policymakers	18
4.	others non scientists non policymakers	22
Total sample size		103

Note: * Based on selection of category underlined.
Four options plus an 'other' option were offered for selection - see question 1, Appendix I.
The diagnostic category of respondents within each subgroup is underlined.

Out of a total of 103 returns, 64,6 per cent of respondents had or were currently involved in soil erosion research; 33,3 per cent had contributed to or were currently active in the development of soil conservation policy; 29,3 per cent had or were currently contributing to the subject either in an engineering capacity or as technical advisors; 15,2 per cent of respondents were involved in an extension capacity; 5,8 and 7,8 per cent of participants were involved as lecturers on the subject at a tertiary level and farmers respectively. Of the total sample 53,5 per cent of respondents believed they had in some way contributed to or influenced soil conservation policy decisions or development in the past, and nearly 47 per cent of respondents indicated the contrary. It must be emphasized that the contributions of these respondents remain unquestionably relevant in the context of this study. Their relevance lies in

their potential to be involved in future development of soil conservation policies as they are part of a body of scientists, engineers, academics and technicians currently either pursuing erosion research or assisting in the implementation of existing policies and strategies, and as such they form part of the community who possess the capacity to influence prevailing perceptions of and opinions on the erosion problem.

On the question of whether or not respondents believe soil conservation policy in the country has failed to control soil loss and degradation of agricultural resources, by implication, has failed to achieve its defined objectives, an overwhelming majority of 96 per cent replied in the affirmative. Respondents were requested to justify their evaluation of soil conservation policy and the reasons given for the perceived inefficacy of policy will be discussed later (see Section 8.6). When asked does South Africa already have the legislative capacity on the statutes to address soil erosion, the majority of respondents (61,7 per cent) were of the opinion that it does, 17,2 per cent of respondents "dont know", and 15,1 per cent believed it did not. In support of this, 73,7 per cent of respondents were of the opinion that the country did not need more laws to effect soil conservation objectives, "only the political will".

Having established general agreement amongst respondents therefore that:

1. soil erosion does exist in South Africa,
2. the problem has reached such an extent that it threatens the future sustainability of the national resource base and consequently requires priority government attention,
3. past policies have failed to: (a) promote effectively the practice of sustainable utilisation of soil in accordance with conservation principles, and (b) procure sustained compliance of land users with regard to legislative regulations, controls and directives,

it is now important to establish respondents' perceptions/opinions with regard to the specifics of the problem, that is, why they believe the above scenario to be prevalent in the South African context.

8.3 PERCEPTIONS CONCERNING POLICY EFFICACY

All but 5 respondents indicated their belief that soil conservation policies formulated in the past have failed to achieve their defined objectives. Figure 8.1 shows the reasons given by the majority of respondents to justify these opinions. The differential application of soil conservation policies across South African agricultural land is identified most often as the most significant limitation of these policies. Respondents refer more specifically to a belief that policies have wrongly focussed on promoting soil conservation on "cultivated", "commercial", "large-scale", "white" farmland, and have either failed to recognise the extent of the problem experienced by the small-scale farmer who can "least afford soil conservation", or have explicitly neglected the problem manifest on "communal" and "marginal" lands, which are by implication, low potential land.

As Figure 8.1 indicates, "policies motivated by political agendas" was the second most common opinion given for the relative inefficacy of soil conservation policy. Examples proferred by respondents include reference to policies enabling the cultivation of maize in dry areas, betterment policies, policies promoting maximum production and yields as opposed to optimum resource utilisation, land tenure policies (such as communal land tenure), and a lack of accountability in the former homelands. A change in any of these policies was believed to potentially result in "a loss of votes".

Other problem areas highlighted (in order of relative importance according to respondents) include reference to the nature of enforcement of legislative controls and regulations, failure to adequately punish offenders, the government's poor attempt at "persuading" land users to adopt soil conservation practices, problems relating to policy implementation, a lack of political will and real commitment of government as reflected in the provision of inadequate funding, subsidies, and incentives to promote and support soil conservation in practice (see Section 8.5).

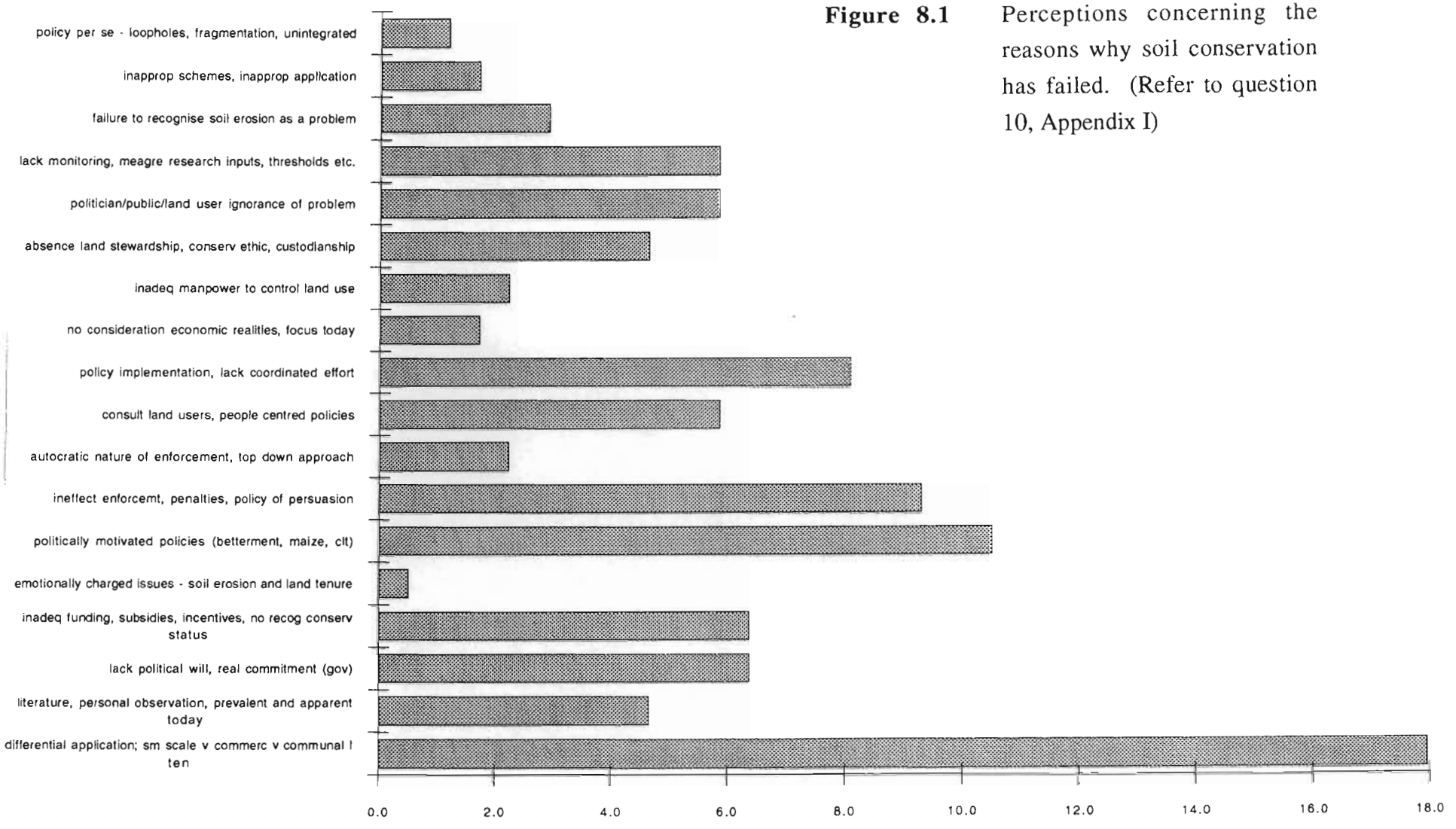


Figure 8.1 Perceptions concerning the reasons why soil conservation has failed. (Refer to question 10, Appendix I)

8.4 PERCEPTIONS AND DECISION MAKING

In Chapter 1 five key components or 5 'P's of soil erosion were identified: practice, perceptions, physical studies, policy and politics (see Figure 1.4). It is supposed that each of these components hold the potential to in some way influence the formulation of policy and by implication its effectiveness to achieve its objectives. Respondents were asked to rank each of these components, where a rank of 1 was to be accorded to the most influential and 5 the least influential. 'Perceptions' was ranked by the largest majority of respondents (32,3 per cent) to be in their opinion most influential in this process, (a total overall of 55,6 per cent of respondents, an overall majority, considered it worthy of a ranking of either 1 or 2). This was followed by politics (28,3 per cent) and subsequently practice (or landuse techniques), policy (its formulation, administration, implementation and enforcement), and finally soil erosion's physical component (research or field studies).

By way of determining the perceived contribution of science, or scientific inputs in the South African decision making process, respondents were asked to indicate the extent to which they believed policy decisions to be scientifically informed (Table 8.2), and whether or not, prior to 1992, they believed policy makers/developers adequately consulted scientists before making policy decisions. Whilst 47,5 per cent of interviewees (the greatest majority of replies) considered policy decisions to be "informed", it is perhaps more significant to note that (in terms of combined percentages):

(a) 58,6 per cent of respondents believe decisions are informed to well-informed,
(b) 81,8 per cent of respondents believe them to be informed to poorly informed.

With the greatest majority of respondents indicating a belief then that policy decisions in South Africa are inadequately informed, in support of such contentions, 52,5 per cent of individuals were of the opinion that policy makers did not adequately consult scientists prior to making policy decisions. Furthermore, they maintained that information transferral operated as a one-way process in South African agricultural resource management, which has resulted in feedback from extensionists (or the implementors of policy) to scientists and/or decision makers to be negligible.

Table 8.2 Perception of scientific basis of policy decisions prior to 1992 (question 11, Appendix I)

Category	Frequency (%)
no reply	4,0
well informed	11,1
informed	47,5
poorly informed	34,3
no scientific foundation	3,1

Two questions were posed to participants aimed at challenging their personal (the sample comprising predominantly scientists and policymakers) perceptions or evaluations regarding the extent to which scientists and policy makers either overstate or minimise the extent of the erosion problem. Just over 70 per cent of respondents disagreed that scientists overstate the extent of the problem and 58,6 per cent of respondents were of the opinion that policy formulators were inclined to minimise the extent of the problem. Respondents were then asked to indicate the extent to which they agreed or disagreed with the statement: "policy formulation reflects the dominant perceptions of policy makers". The majority of respondents (77,8 per cent) agreed with the statement, 12,1 per cent answered "dont know" and only 5,1 per cent disagreed.

With regard to what respondents perceive as the dominant approach of government in addressing the issue of soil erosion when formulating policies in the past, the largest majority of respondents believed policies to be reactive (25,8 per cent), followed by 16,2 per cent, who believed policies reflected a combination of reactive and curative measures, and 13,1 per cent, believed policies served only a curative purpose in terms of managing soil loss and degradation. This issue gave rise to an interest in the perceived adequacy of the information base utilised in informing policy decisions and thereby prompted the inclusion of a number of statements pertaining to the nature of data on soils in the country. These are discussed in Section 8.8.

8.5 PERCEPTIONS CONCERNING STATE COMMITMENT TO SOIL CONSERVATION

Throughout the study period 1910 to 1992, South African soil conservation policy has been formulated at a national level. Policies and strategies were formulated at a national level and the Division of Soil Conservation and Extension (currently named the Directorate of Agricultural Resource Conservation) was responsible for their administration and enforcement. A significant change to this institutional structure came into effect in 1993 when the country as a whole became subdivided into 9 provinces as opposed to formerly when there were 4, Transvaal, Orange Free State, Natal and Cape provinces. Considerable debate is ongoing concerning the implications of these political-economic changes in terms of land use management (see sections 8.6.2 and 9.2.3), however, in order to ascertain the opinions of the respondents involved in this study the question was posed: at which level do you think soil erosion could be most optimally controlled? The greatest majority of respondents (44 per cent) were of the opinion that soil erosion could be most optimally controlled at a local level. Furthermore, 100 per cent of these respondents believed soil degradation to be a national resource problem. Regional level control was the second favoured option (34,3 per cent), followed by national (30,3 per cent), provincial (28,3 per cent) and two additional categories proposed by respondents included the recommendation that optimum control could be achieved at catchment level and finally farm level. Twenty-six per cent of respondents preferred a combination of levels, with the highest percentage of respondents in this category indicating their belief that optimal control could only be effected with combined inputs at national, provincial, local and regional levels. (See Section 9.2.3 for further discussion).

The receptiveness of the South African government to international agency advice with regard to the utilisation of soil and the management of this resource, is an issue which has received some attention in parliamentary debates (Hansard 1946; 1969). Indeed a small number of respondents questioned the purpose or relevance of this question in the context of South African soil erosion and conservation policy. However, this concern will subsequently be addressed this concern in Section 9.2.2.3. Suffice for now to indicate that the largest majority of respondents (45,4

per cent) believed the former South African government to be "not very receptive" to taking advice from international agencies.

Respondents were then asked to rank 12 key socio-economic and environmental areas in accordance with the order in which they believed (a) current government and (b) former government, perceived the greatest needs of their people to exist. The results are given in Tables 8.3 and 8.4. Clearly, soil conservation (and water conservation), do not feature higher than 6th in the list of priorities of either the previous government (soil receiving the rank of 8th overall, or most commonly ranked 7th) or the current government (soil receiving a shared rank of 9th overall, or most commonly ranked 6th).

[It is interesting to note that in terms of potential reliability of respondents or consistency of responses, respondents ranked defence as the number one priority of the former government. Furthermore, defence was most commonly allocated a ranking of 1 by respondents in the survey. This coincides with the commonly held public perception (which has been subsequently confirmed by government sources with reference to state expenditure).]

Soil and water conservation were the only two environmental management concerns included in the list of possible priority areas. For the purpose of comparison, water conservation was perceived by respondents to have been ranked 7th overall in terms of current government priorities (and furthermore allocated most commonly a rank of 7), and ranked joint 5th (with commercial agriculture/forestry), but significantly was allocated most commonly a rank of 2 in terms of former government priorities.

Table 8.3 Perceived priorities of the <u>current</u> government (see question 16, Appendix I)

Category	Overall ranking (by all respondents)	Freq (%) allocated rank of 1	Most common ranking assigned
education	3	19,8	2
housing	1	29,7	1
defence	2	25,7	9
reconciliation of people	4	13,9	joint 4/9
rural economic development	5	3,0	5
commercial agriculture/forestry	6	2,0	5
water conservation	7	1,0	7
soil conservation	9	0,0	6
healthcare	8	1,0	6
self-determination	9	0,0	8
self-sufficiency	9	0,0	8
other@	12	0,0	12
crime prevention	12	0,0	12
basic services	12	0,0	12
national econ. development	12	0,0	12
population growth	12	0,0	12
political empowerment	12	0,0	12

Note: @ : category 12 was an open category. Respondents were asked to name other important priority areas. Those proferred included: job creation, crime prevention, provision of basic services, national economic development, population growth/development, political empowerment.

Table 8.4 Perceived priorities of the <u>former</u> government (see question 17, Appendix I)

Category	Overall ranking (by all respondents)	Freq (%) allocated rank of 1	Most common ranking assigned
education	4	8,9	3
housing	7	6,9	joint 6/10
defence	1	20,8	1
reconciliation of people	3	11,9	9
rural economic development	2	16,8	joint 1/6
commercial agriculture/forestry	5	7,9	joint 2/9
water conservation	5	7,9	2
soil conservation	8	5,0	7
healthcare	9	3,0	8
self-determination	10	2,0	joint 4/8
self-sufficiency	12	0,0	4
other@:	12	0,0	12

Notes: @: category 12 was an open category. Respondents were asked to name other important priority areas. These included: national economic development, job creation/employment, separate development, cultural protection, population growth/development, political empowerment.

Respondents were asked to agree or disagree with the statement: soil erosion was never a state priority. More than 38 per cent of respondents agreed with this claim, but a marginally larger majority of respondents, or 47,4 per cent, believed it had in fact been considered with priority status by the former government. Respondents were subsequently asked to indicate the extent to which they agreed or disagreed with the statement: "policy decisions have reflected a commitment to conservation throughout the period 1910 to 1992". Responses indicate that a small majority disagreed (36,4 per cent), whilst 32,3 per cent concurred with the statement and a

further 28,3 per cent indicated "dont know". The statement: "the state has provided the necessary legislative machinery, incentives and support mechanisms to encourage and promote soil conservation farming", was disagreed with by a majority of respondents (50 per cent), with 37,3 per cent in agreement.

Both soil and water conservation therefore, in the opinions of the respondents, not only rank quite low (although water conservation would appear to have been deemed more important than soil), in terms of the overall priorities of government, but would seem to have been reduced in terms of their status to levels of reduced importance under the current dispensation. This is not surprising given the socio-economic and political pressures to be addressed in the New South Africa, but nonetheless this does not bode well for future land management and sustainable utilisation of resources.

Given that the population targeted for this survey were a body of individuals involved in soil erosion research and/or the development of soil conservation policies, it is not surprising therefore that when respondents were subsequently asked to indicate which of the 12 priority areas previously mentioned in their opinion (and by implication, within their frame of reference), should receive preferential attention in terms of allocating 'slices of the Exchequer's cake', education was overwhelmingly and most commonly allocated a ranking of 1, followed by water, soil, rural economic development, health and finally housing, receiving the ranks of 2 to 6.

To test opinions concerning whether or not respondents believed the South African government had the potential or capacity to effect policy objectives, the following statement was included: "the regulation of spatial landuse was realised through legislative enactments [referring implicitly here to separate development policies]. Likewise it should be possible to regulate environmental landuse in accordance with conservation ideals." Of the 97 individuals who responded to this statement, 63,5 per cent (the majority) were of the opinion that conservation ideals should be possible through legislative enactments, 21,3 per cent were in disagreement. With regard to whether or not South Africa as a nation "is financially capable of carrying the costs of erosion control", 47,5 per cent believed it could, 28,3 per cent "dont know", and 20,1 per cent believed it could not.

8.6 PERCEPTIONS AND POLICY INEFFICACY

The remaining issues addressed in the questionnaire were intended to investigate more specifically from respondents the reasons why they believed soil conservation policy in South Africa has proved relatively ineffective. These findings will now be dealt with under a number of subheadings.

8.6.1 Levels of awareness

When asked during which period between 1910 and 1992 did individuals think the general public and farming community were most conscious of the extent of the soil erosion problem, the largest majority indicated the period post-1980. Other periods in which there was perceived to be a surge in interest include a prolonged period from 1940 through to 1959, and 1970 to 1979. In terms of the study period, this translates in effect to a perceived period of limited awareness during the years 1910 to 1939 and approximately 1960 to 1969.

Respondents were asked to justify their claim by itemising events or factors which they believed could have accounted for or given rise to periods of heightened awareness. The responses are given in Figure 8.2. Evidently, the visit of Bennett from the United States of America in the early 1940s, the role of state initiatives such as environmental education campaigns like Save Our Soil (1980), the inputs made by NGOs such as the National Veld Trust and their awareness building crusades were, in the opinions of respondents, the most significant contributions to raising levels of awareness. Furthermore, the physical, social and economic impacts of drought, the United States' 'Dust Bowl' experience, the "conspicuous" bush encroachment in the Karoo and more widespread soil degradation, together with in particular post 1975, the accessibility of information and news through the media (television), were all factors most commonly proferred by respondents believed to have influenced levels of awareness during the study period described.

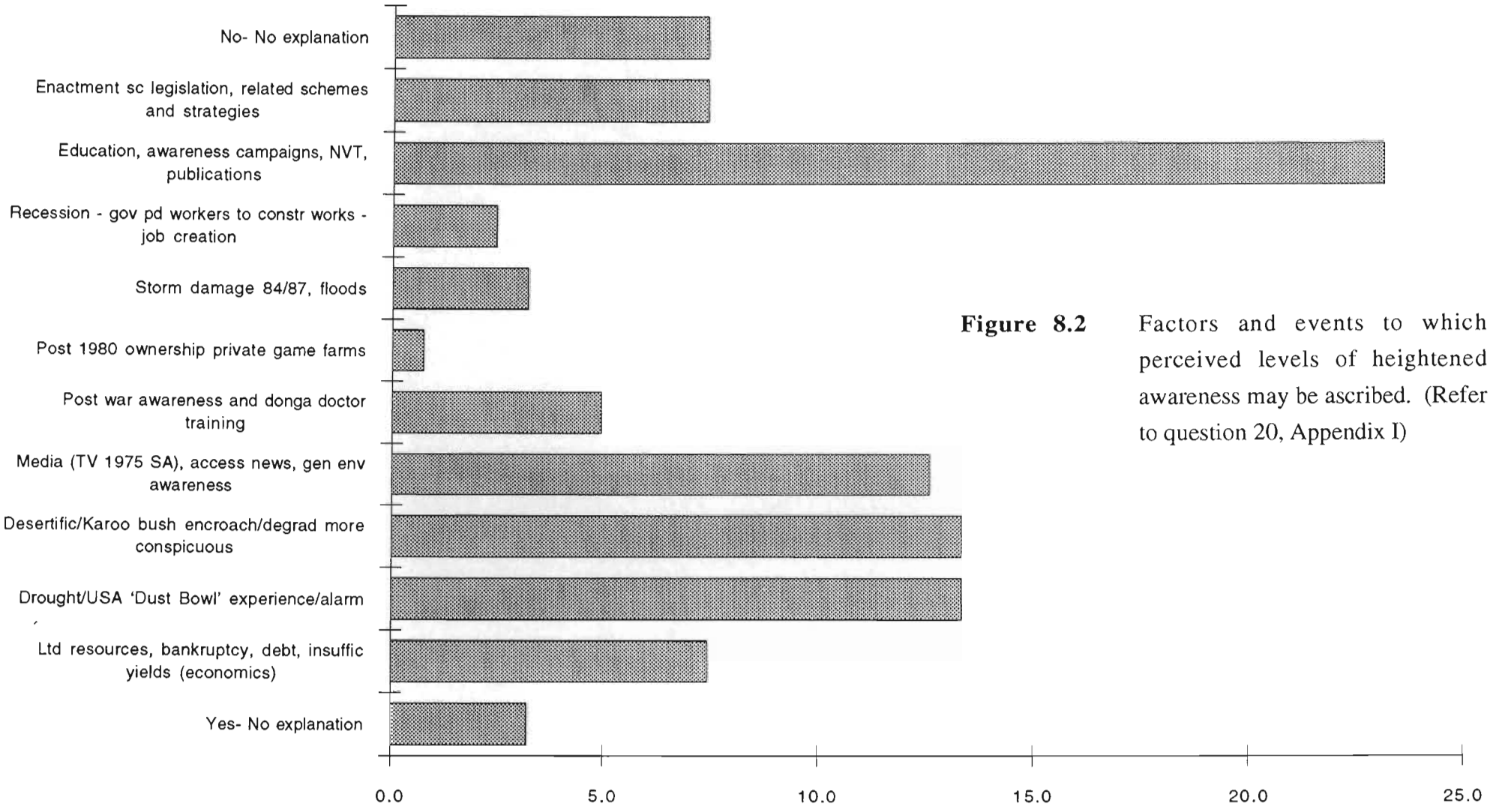


Figure 8.2 Factors and events to which perceived levels of heightened awareness may be ascribed. (Refer to question 20, Appendix I)

8.6.2 Lack of interagency and interdepartmental cooperation and coordination of effort

Of the respondents who responded to the statement (derived from the literature reviewed for this study) that a lack of interagency and interdepartmental cooperation and coordination of conservation efforts has contributed to ineffective implementation of policy in the past, 91,5 per cent concurred with this claim. Nearly 25 per cent of respondents in their justification of their claims indicated that they believe the responsibility for soil conservation to be fragmented. For example, Dr. Scotney, former Chief Director of Resource Conservation and former Chief Executive of the National Veld Trust, referred to 5 different government departments which had some jurisdiction over the utilisation of soil, including the Department of Environment Affairs, Department of Water and Forestry, the Department of Agriculture and Land Affairs, the portfolios and names of which regularly changed throughout the study period (see Table 4.6). Often conflicting differences in departmental priorities, agendas, budgetary constraints, a preoccupation with "own affairs" and departmental interests, together with a desire to "build an empire" were also suggested to account for the lack of coordinated effort by the South African government towards promoting soil conservation. In a personal interview conducted with Dr. Scotney, he pointed to the fact that there are "in the region of 60 acts on the statutes" which either directly or implicitly provide for the utilisation of soil, each stipulating their own norms and standards, and he concludes a coordinated conservation effort cannot be possible within the context of such fragmented legislative control of the resource.

8.6.3 Perceived deficiencies in policy according to landusers

Respondents were asked "are you aware of particular grievances raised by landusers in the past to the provisions" (for soil conservation) of the four acts subjected to analysis in this study. Only 35,4 per cent of respondents answered this question with a "yes" or "no", and only 18,9 per cent of the sample gave any form of elaboration. A number of pertinent factors were referred to and these are represented in Figure 8.3.

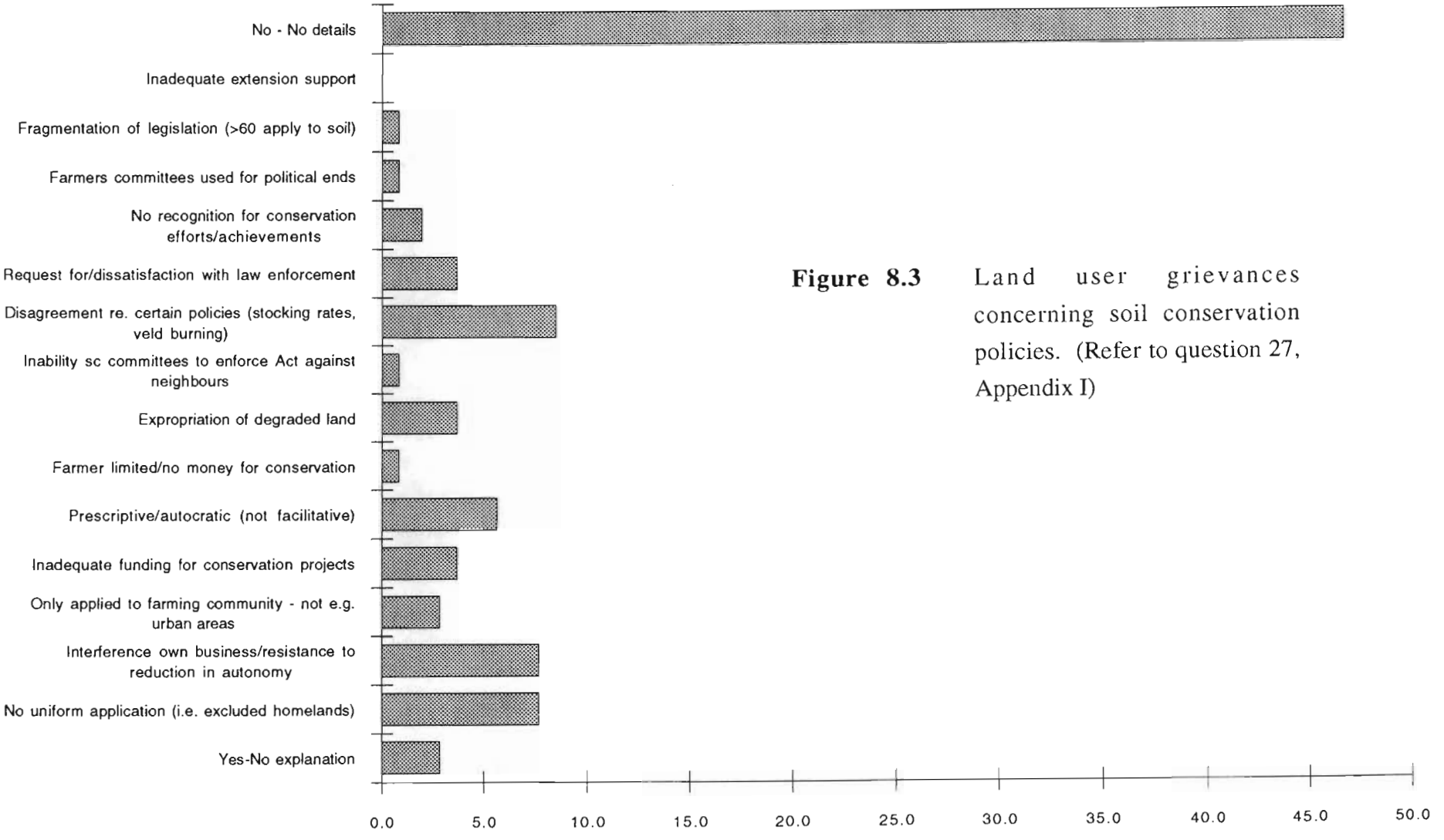


Figure 8.3 Land user grievances concerning soil conservation policies. (Refer to question 27, Appendix I)

Disagreement with specific controls provided for in the legislation was the main grievance noted by respondents. Controls on stocking rates, correct times in the season for burning veld, are two examples of policies or strategies perceived by landusers to be inappropriate. Such an evaluation on the part of the landuser could no doubt have resulted in the non-compliance with these controls. A resistance to "any interference in ones personal business" or perceived reduction in the autonomy of the landuser, was apparently another significant constraint on attaining farmer compliance. Finally, the lack of uniformity in the application of the acts, that is that they specifically excluded the former homelands, was the third most commonly raised grievance, according to respondents of this survey, to the abovementioned soil conservation policies.

8.6.4 Perceived deficiencies in policy according to scientists

The question relating to whether or not respondents were aware of particular grievances raised by scientists in the past to the provisions of the four acts subjected to analysis in this study was also poorly answered. Only 35,5 per cent of respondents answered this question with a "yes" or "no", and only 19,5 per cent of the sample gave any form of elaboration. Notwithstanding this, a number of pertinent points were highlighted and these are represented in Figure 8.4.

In the opinions of the respondents, scientists' principal difficulty with these four acts, is that they did not provide "enough teeth to the legislation", and without effective law enforcement the acts could not promote sustained conservation ideals. Ineffective policy implementation was another key problem area, and in view of this, coupled with a lack of money to support and sustain proper implementation of policy/legislative enactments, scientists apparently believed the potential of the legislation to achieve its goals would be severely hindered. Other factors referred to by greater numbers of respondents included the perceived inappropriateness of recommended land use strategies, an apparent rigidity in the imposition of regulations and the fact that the application of legislation was explicitly excluded in the former homelands (a factor which recurs throughout this analysis in different contexts). The reactive nature of procedures and control measures to the problem, instead of "an approach dominated by prevention and research" was further criticised.

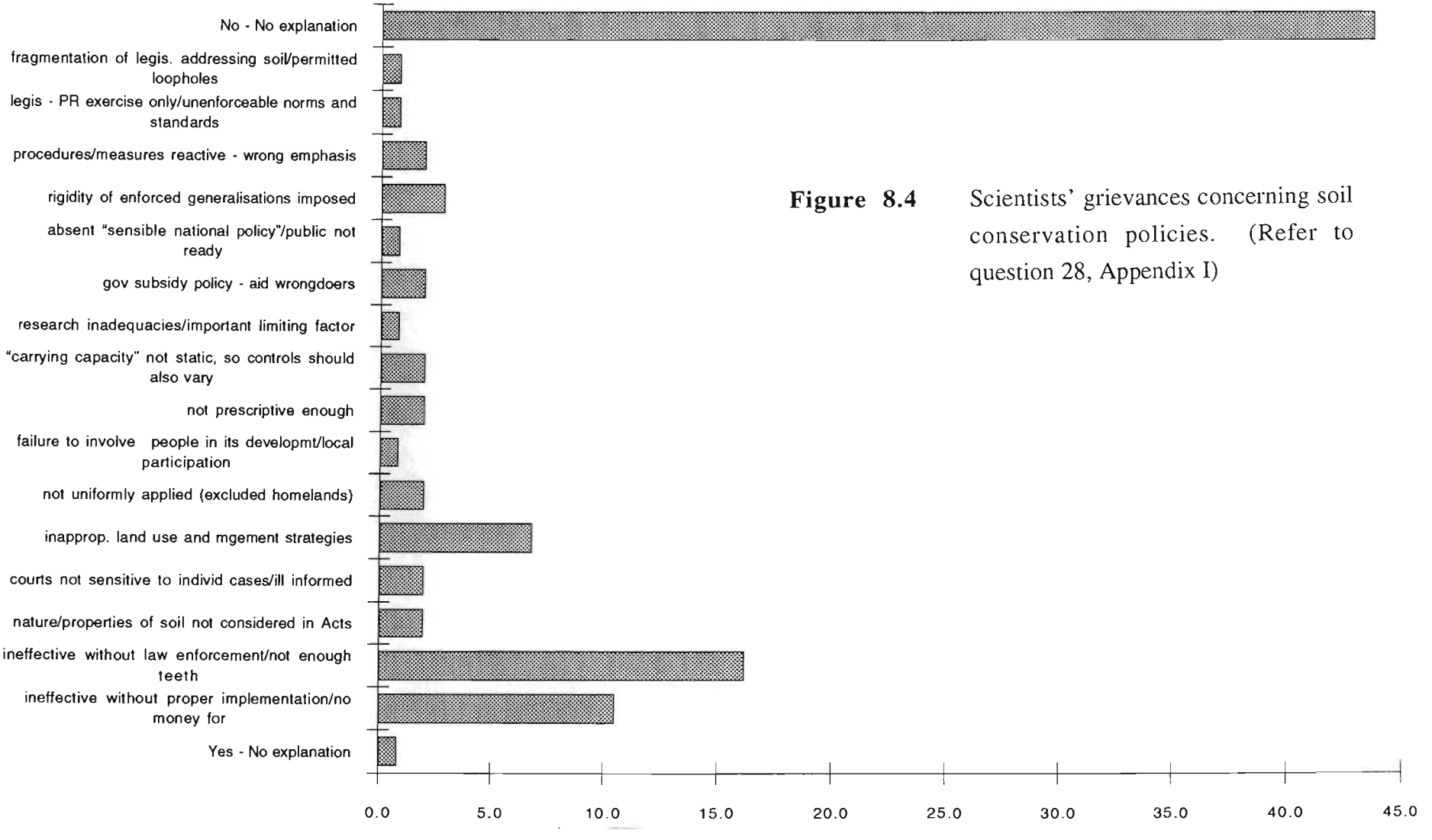


Figure 8.4 Scientists' grievances concerning soil conservation policies. (Refer to question 28, Appendix I)

8.6.5 The Extension Service

Respondents were asked to evaluate the performance of the Department of Agriculture's Extension Service, up to 1992, by indicating the extent to which they agreed or disagreed with a number of statements about the service extracted from the literature reviewed for this study.

All respondents concurred to a greater or lesser extent with the statements provided. The greatest proportion of respondents agreed that the Extension Service established by the Department of Agriculture provided a service which aided "predominantly the progressive, commercially efficient, sophisticated farmer and failed to address the needs of the resource-poor, small-scale farmer (subsistence and/or commercial). The neglect or inability of the service to "conduct follow-up activities or monitor developments", was the second most common statement with which respondents agreed. A belief that the service's "in-service training programmes were biased towards natural sciences and production technology", was followed by the criticism that the service provided to farmers "reflected the classical top-down approach", as third and fourth most commonly selected statements respectively.

8.6.6 Factors constraining farmer compliance

To determine perceptions regarding farmer compliance, a total of ten statements were presented to respondents. These contained factors identified either from the literature reviewed for this study, or from the preliminary results of the analysis of soil conservation policy, as represented in the study's working hypothesis (see Figure 7.1), as having the potential to influence farmer compliance with soil conservation legislative controls. Respondents were asked to select one or more of the ten statements to indicate the extent of their belief that such factors could significantly influence farmer compliance in terms of adopting soil conservation practices. Table 8.5 gives these responses.

Table 8.5 Factors perceived to be most influential in terms of farmer compliance (see question 31, Appendix I)

Category	Frequency (%)	Rank of influence*
ministerial authority	10,1	9/10
taxable subsidies	21,2	5
legislative ambiguities	19,2	6
remotely applicable strategies	29,3	2
conservation district subsidies	10,1	9/10
inadequate manpower	47,5	1
imposition of obligations	18,2	7
inadeq. support mechs & incentives	28,3	3
risk potential of soil conservation	14,1	8
balancing conservation & farm income	25,8	4

Note: * That is, the potential to influence farmer compliance.

The greatest majority of respondents (47,5 per cent) agreed that, in the absence of an adequate number of officials to enforce legislation, farmer compliance would be impaired. Over 29 per cent of respondents were of the opinion that the inability to translate conservation strategies and methods into accessible and practical advice for landusers, could conceivably influence farmer compliance, especially given the perception of many farmers that strategies are "remotely applicable" to their needs. The inadequate provision of support mechanisms and incentives and a failure on the part of government to recognise the importance of maintaining simultaneous farm income with soil conservation, were the third and fourth most highly rated factors believed by respondents to have had the potential to influence farmer compliance. When asked specifically to what extent respondents agreed or disagreed with the statement: "state incentives to encourage and motivate farmers to practise soil conservation were adequate", a majority (56,6 per cent) of respondents indicated that they did not believe incentives were adequate.

All of the following factors were perceived to have also significantly influenced farmer compliance and are listed in order of respondents' ratings:

- Grants and subsidies paid by the state qualified as "gross income" and were thus taxable;
- The ambiguous nature of many legislative provisions/controls;
- The imposition of obligations concerning land and resource utilisation;
- The perception that the adoption of conservation practices have a high risk potential;
- The extent of ministerial authority with regard to expropriation of land and imposed construction of soil conservation works (where maintenance costs were recoverable from the farmer and not the state).

8.7 PERCEPTIONS ON ATTAINING OPTIMUM COMPLIANCE

Respondents were then asked the question: "how best do you believe sustainable resource management policies should be enforced to ensure optimum compliance?" The suggestions proferred reflected great diversity of opinion concerning this matter. Of the 62 per cent of respondents who answered, the largest majority (26 per cent) placed an emphasis on the important role of education. In addition, the need to educate both agricultural and non-agricultural sectors, for example, mining, urban development and transportation sectors, was stressed by respondents, as they believed all contribute to the extent of the problem manifest and should therefore share the responsibility.

The second largest majority (18 per cent) of respondents referred to the imperative for improved enforcement mechanisms, a dedicated inspectorate and, in general, the need to adequately police legislative enactments. The suggestion was advanced by a number of respondents that this responsibility would be more effectively met by an independent, or "non-agricultural body". It was further recommended that non-compliance "must be seen as a crime" against future generations or inheritors of the land and dealt with "in the harshest terms".

A third school of thought was reflected in the recommendations of 11 per cent of respondents who in selecting the statement "enforcement will never encourage

compliance", were of the opinion that landusers should be persuaded to adopt soil conservation practices. Strategies identified by respondents to promote this policy of persuasion include the necessity to reward compliance, tax non-compliance and optimise the potency and potential of peer pressure. After 2 to 3 years of practicing "a cooperative/persuasive approach, then introduce and apply penalties" was the recommendation of one respondent. Expropriation of land as a consequence of non-compliance would be the most compelling deterrent of all, proposed another.

The need for grassroot involvement or participation in the formulation of conservation programmes, strategies and policies was presented as an equally important approach to deriving compliance. The importance of "enabling" communities to formulate their own problems and solutions, whilst simultaneously providing "legal support for local responsibility" was advocated by a number of respondents. They did also, however, stress the important role of the state "in providing information, education, awareness campaigns and policy incentives".

The fourth most commonly referred to approach (7 per cent) to ensuring optimum compliance stressed the importance of "a fundamental prerequisite" to be improvement in the support mechanisms available and the provision of regional incentives. The necessity to acknowledge conservation achievements was associated with this recommendation.

Other means by which compliance could be encouraged or ensured (in the order of popularity amongst respondents) are listed below.

(a) The need to establish conservation landuse principles in accordance with land capabilities and potential must be established as a matter of priority.
(b) Increase extension staff numbers and "revamp the nature of assistance offered" by the service. It is believed that soil conservation is achievable through intensive extension technology transfer.
(c) The need for "enhanced profitability, but with sustainable production systems".
(d) Stronger government commitment to soil conservation.
(e) A revision of focus on small-scale farmers, who are currently "trapped in a self-perpetuating poverty spiral" and "cannot afford soil conservation".

(f) Intensified research effort.

(g) Enhanced collaboration and cooperation between government departments, NGOs and organised agriculture.

(h) Catchment management - implemented by provincial authorities.

(i) Sound "marriage between drawing board issues, practical technical implementation, and sustainability.

(j) The necessity to manage soil and water holistically.

8.8 DISCUSSION

The numerous variables recognised and catalogued in Chapters 2 to 6 were used in the composition of a conceptual model (the South African Policy Model, Figure 7.1) which attempts to depict the complexity of factors, including those previously identified by researchers in South Africa which focussed mainly on the physical dimension of the problem and development of practical solutions, operative within the South African policy environment, which are assumed to have in some way influenced the relative non-success of that policy (and by implication, its formulation, implementation, administration and enforcement). This working hypothesis was subsequently tested using the perceptions of key individuals who either currently or at some time during the study period, were actively involved in soil erosion research and/or soil conservation policy.

Clearly there exists consensus, at least amongst this sample of respondents, that not only is soil erosion believed to be a significant problem in South Africa which requires priority attention, if not immediate and coordinated action, but it also poses a serious threat to the national resource base. It is acknowledged that the extent of the problem will vary both spatially and temporally throughout the country and this point was highlighted by a number of respondents. In retrospect therefore, this question should have indicated the imperative to consider soil erosion as a national resource problem and not merely within the context of the respondents' own frame of reference. This oversight gives rise to the potential to misinterpret the responses given, or at least their potential to be interpreted out of context. For example, respondents could have been referring to conditions within their own province and not at a national level. However, the fact that soil erosion was ranked, in the opinion of the greatest majority of respondents, as being the third most important national

priority, satisfactorily negates this concern due to the consistency reflected in the two responses.

There was considerable uncertainty with regard to whether or not contemporary rates of soil loss exceed those measured by scientists back in the 1950s. It is suggested that this uncertainty may be ascribed to one of three possibilities. Firstly, that knowledge concerning this particular aspect of the subject falls beyond the frame of reference of a proportion of respondents; or secondly, that information is not readily available to enable respondents to make comparisons in an educated or qualified manner; or thirdly, that the information is available, but due to a lack of scientific consensus on the subject, the respondent is unable to formulate an informed opinion. Given that an impression of the current status of soil erosion is fundamental to policy development, these responses, which highlight the diversity of opinion imply a lack of scientific information and thus ascribe greater importance to the need to 'inform' perceptions.

The extent to which respondents agreed with both statements concerning who should be responsible for soil conservation, suggest they are of the opinion that the matter should be jointly shared between the farmer and the state, with possibly the farmer being most accountable. With regard to with whom does the ultimate success of soil conservation policy remain, the farmer, the state or extension officers and technical advisors, whilst the majority of respondents for these three subjects believed all three had an important role to play, the overwhelming majority were of the opinion that farmers, the actual users/managers of the resource, were ultimately responsible. Extension officials and technical advisors as key individuals involved in the implementation of policy, that is taking the policy to the farmers, and responsible for explaining legislated directives and translating these into practical advice, were perceived to play the second most important function with regard to attaining policy objectives. The implications for environmental education, conservation awareness and information transfer are discussed further in Section 6.4.

It is worth noting that just over 50 per cent of respondents felt that the success of policy rests ultimately with the state, or in other words, a significantly similar proportion of respondents did not agree with the suggestion that the state is ultimately responsible for the success of soil conservation policy. This is particularly relevant

given that the state is the formulator of policy, but respondents do not necessarily believe they should also be accountable for its ability or capacity to attain its defined goals. [See Section 9.2.1 for a more detailed discussion regarding accountability for soil erosion.]

The analysis of six statements which took the form of a number of challenges to currently held dominant perceptions on the nature and causes of soil erosion (see Section 8.2, above), permits the proposition of three conclusions. The first is that respondents appear to unanimously agree with the following five suppositions.

1. Soil erosion *knows no political boundaries.*
2. Communal systems of land tenure, overgrazing and overpopulation on marginal lands *have inevitably exacerbated the soil eosion problem.*
3. Traditional farming methods practised in the former 'homelands' *cannot alone explain the extent of erosion manifest in these areas.*
4. Agricultural dualism and separate development *contributed significantly to the extent of soil erosion.*
5. The non-applicability of legislation to *all agricultural land has exacerbated the erosion problem.*

Secondly, with regard to claims that much of the gully erosion visible on marginal lands pre-dates the Union of South Africa (Broderick, 1987; Liggitt & Fincham, 1989; Watson, 1990), the even spread of responses across the three categories of answer: agreed, dont know, disagree, would seem to suggest that with regard to the historical dimension of soil erosion, there is not only a lack of consensus, but possibly also a dearth of information readily available to inform opinions (see sections 6.2 and 7.1.5).

And finally, this consensus of opinion surely highlights a contemporary recognition of the multidimensionality of soil erosion and of soil conservation policy in the country. The literature shows that soil erosion has for decades been defined as a physical and practical one to be redressed by technical solutions. In fact, 65,8 per cent of respondents, when asked to indicate the extent to which they agreed with the statement that: soil erosion has always been perceived to be a physical problem, indicated their agreement with it. Only 17,2 per cent disagreed. It is interesting to

speculate whether or not this consensus of opinion would have been present pre-1992, a highly significant year in the evolution of South African history, one that marked a move towards the institution of a representative and democratically elected government and of more relevance to the landuse issues raised by these statements, the abolition of most racially based land measures acts. Given the evidence to date regarding the non-applicability of soil conservation legislation to the former South African Trust Lands or "homeland" areas prior to 1992, and the former government's earnest pursuit of separate development policies and forced agricultural dualism up to 1992, three conclusions can be drawn.

(a) Soil erosion was not regarded as a national problem.
(b) The implications of landuse policies for soil erosion or soil conservation, were never contemplated as part of the equation, (and if they were these never made it as far as being considered at a policy level).
(c) As far as the government was concerned the erosion manifest on African lands was ascribable to traditional farming methods and nothing more. A number of attempts were made by the South African government in the past to examine possible "other" factors, besides the physical and practical ones, which may have contributed to the increased rates of soil loss manifest at that time. However, these investigations amounted to no more than a cursory appraisal of socio-economic factors.

The extent of agreement amongst the majority of all respondents with both statements referring to who should be responsible for soil conservation, suggests that respondents were of the opinion that the matter should be a jointly shared responsibility between the farmer and the state, with the farmer being ultimately most accountable: 90,0 per cent of respondents thought farmers should be responsible, 79,8 per cent indicated the state. It is suggested, however, that the debate concerning responsibility for soil conservation is purely an academic one in the South African context, given the failure of the former government to identify with any degree of satisfaction, the actual causes, extent or nature of the problem. It is unlikely that farmers will be persuaded (or otherwise) to comply with soil conservation legislated controls and regulations on land use, if (a) they do not believe soil erosion is a problem, (b) they do not understand the implications of their farming practices for soil conservation, and (c) government fails to recognise the importance of

maintaining simultaneous farm income with soil conservation (a factor identifed by respondents to strongly influence farmer compliance).

Nearly 75 per cent of respondents agreed that scientific consensus is important in enhancing the credibility of information on soil erosion. The results of respondents in this study who indicated the extent to which they agreed with the statement: "scientists agree on the actual extent and causes of soil erosion", in themselves reflect the lack of consensus which exists amongst scientists in South Africa and other key players on the subject: 34,3 per cent concurred with the statement, 38,4 per cent disagreed, and 23,2 replied "dont know". This accentuates once again the need for additional research to inform the data base currently in existence. Indeed, the participants in this study also support this proposition, in that 65,6 per cent of them were of the opinion that available data are "inadequate and incomplete", and 73,7 per cent believed the data on soils have been largely "underutilised" in the past. This is a critical area in terms of the potential of future policies to promote soil conservation and achieve their ideals. The transferability of information is another key area. A total of 80,0 per cent of respondents agreed with the statement: successful policy decisions depend ultimately on the transferability of information from the scientist to the decision maker; 11,1 per cent were in disagreement. See Section 9.2.5 for a more detailed discussion.

According to Turner and Michael (1996) and Durant *et al.* (1989), if it can be assumed that in an "informed" society the potential to increase awareness of environmental concerns (and further, the potential to mobilise support for these concerns, such as soil conservation) is enhanced, it then follows that where heightened levels of awareness have not been realised, reasons other than access to or availability of information must account for this. Turner and Michael (1996) suggest that it then becomes a matter of public choice. In the context of South Africa, it is suggested that either (a) awareness levels are not 'high' enough to increase the potential to mobilise farmers' support for soil conservation, or (b) that the information available to "inform" society is inadequate or inaccurate (refer to Table 1.3 which illustrates the value of new information in relation to its relative accuracy), or (c) that other elements have priority. This supports the contention that education and research aimed at informing educational and awareness campaigns could be an important means through which levels of soil conservation awareness may be

optimised. As indicated earlier in this chapter, a majority of 81,8 per cent of respondents believed policy decisions to be "informed" to "poorly informed" in South Africa.

In exploring, what the researcher has termed the 5 'P's of soil erosion, that is, practice, perceptions, physical studies, policy and politics, the interrelatedness of these five components must not be overlooked (Figure 1.4). As indicated earlier, respondents were of the opinion that perceptions played the most influential of roles in determining the ultimate effectiveness of policy, and by implication also, the control of soil erosion. This is of particular relevance given the principal proposition of this analysis, that it is variables within the perceptual environment which shape and influence ultimately the effectiveness of soil conservation policies. The majority of respondents (77,8 per cent) were also of the opinion that "policy formulation reflects the dominant perceptions of policy makers". [The manner in which perceptions are shaped was discussed in detail in Chapter 5.] Suffice for now to say, that the 'information' received about our 'real world' or in the context of this study, soil erosion, is interpreted and decisions are made regarding the matter through dynamics operative within the perceptual environment. The information received therefore by decision makers is as important in determining the decisions we make about, for example, soil erosion, as the perceptual filters through which the information is passed. This therefore justifies not only the importance of informing policy decisions adequately, but also the need for education. As the results of the study indicate, the largest majority of respondents placed an overwhelming emphasis on the important role of education and its potential or capacity to:

(a) facilitate and guide the development of a land ethic;
(b) make known the implications of specific land use practices;
(c) make known the costs of soil erosion and reduced productivity;
(d) illustrate the cost-effectiveness of legislative compliance.

When respondents were asked to rank 12 key social, economic, political, ideological and environmental areas in terms of individuals' perceived priority for the present government, education was ranked the number one priority by an overwhelming majority of respondents. Moreover, the vast majority of respondents, 80,8 per cent,

were in agreement that "a prerequisite for the success of soil conservation is an educated nation".

It is perhaps pertinent to note at this juncture that of a sample of 242 key players in South African soil erosion research and conservation policy, 103 completed questionnaires were returned to the researcher. This constitutes a 43 per cent return. Considering the time-consuming and comprehensive nature of many of the questions included in the survey (a number of respondents indicating that the 30 minutes the researcher had proposed it would take to complete the questionnaire was in fact a gross underestimate and for some it took one and a half hours), it could be inferred that such a high response rate is perhaps indicative of the level of contemporary concern (at least among these key players familiar with the soil erosion problem). It is furthermore proposed that this renewed concern affirms the timely and appropriate nature of this study and support for its principal assertion, that a refocussing of the attentions of organised agriculture, the farming community, the general public and the State combined in re-assessing the causes, nature and real extent of soil erosion, taking into account the complexities and multidimensionality of the problem: the extent of which has already emerged from the results of this study, is now required.

Respondents were asked to reflect on periods in the past (during the period 1910 to 1992), when in their opinion they believed the general public and farming community may have been most conscious of the extent of the erosion problem, nearly 39 per cent (the largest majority) believed that the awareness levels of farmers and the public to have never been as high as they are currently, that is, since the 1980s. The other significant periods of heightened awareness, according to the majority of respondents were between the years (a) 1940 to 1949, (b) 1950 to 1959 and (c) 1970 to 1979. It is pertinent to note that these periods coincide with the enactment of the Forest and Veld Conservation Act of 1941 (a), the Soil Conservation Act of 1946 which was not applied until 1948 (b), the Soil Conservation Act of 1969 (c), and finally the Conservation of Agricultural Resources Act of 1983 (post-1980s). Although legislation and its related strategies and schemes like the Stock Reduction Scheme (of 1969), were believed to have played some part in raising awareness levels, this factor, as Figure 8.2 would illustrate, was not one popularly referred to by respondents. In terms of the results presented here, it is suggested that the increased levels of concern did not in fact preceed legislative enactments, but conversely, that

the promulgation and enactment of legislation resulted in raising levels of soil consciousness and concern for the extent of degradation. When respondents were further asked "can you ascribe this heightened awareness to particular events?", a variety of answers were provided and foremost was the important inputs of the National Veld Trust, and state-initiated awareness and educational campaigns.

CHAPTER NINE

IMPLICATIONS FOR FUTURE SOIL CONSERVATION POLICY AND DECISION MAKING

9.1 INTRODUCTION

Chapter 2 described the framework within which South African soil conservation has been addressed in this study. It was concluded that soil erosion is a problem in South Africa, and that a largely unproven perception exists that this is due to a number of diverse factors, such as, topography, climate, utilisation of marginal lands for agriculture, racially discriminatory legislation, and communal land tenure, and furthermore that the problem is aggravated by traditional farming practices in the former black regions. Chapter 3 provided an overview of state soil conservation policy and legislative enactments formulated to address soil erosion over a period of approximately 100 years. The four acts which have most significantly contributed to the evolution of soil conservation policy in the country were then subjected to further analysis using the World Soils Policy as a baseline. From the analysis undertaken in Chapter 4 it was concluded that factors other than the provision of a legislative framework and institutional structures aimed at implementing legislative provisions and regulations, must account for the recorded inefficacy of conservation efforts and government initiatives in the country. Chapters 5 and 6 developed this supposition and explored a number of additional factors identified in the World Soils Policy to be important for the effective promotion of soil conservation. The general conclusion to be drawn from these explorations, was that while marked improvement was noted soil conservation policy formulated between 1910 and 1992, has generally fallen short in its attempt to realise the conservation ideal anticipated by the state. This is illustrated in its failure to harness the committed support of the farming community at large and further motivate the adherence to sustainable principles of agricultural resource management, in particular, with regard to the optimum utilisation of soil.

In accordance with the contention that perceptions ultimately influence the capacity of government policy and legislative enactments to effect their objectives (refer to chapters 1 and 5), the factors highlighted in the foregoing analysis constituted the

variables included in a working hypothesis (Figure 7.1), which took the form of a conceptual model of the South African soil conservation policy environment, which could be demonstrated to have influenced the relative non-success of this policy. The results of this survey are presented in Chapter 8 and demonstrate unequivocally that the real causes of soil erosion are the result of complex interactions between a multiplicity of factors, which collectively have combined to render successive attempts at soil conservation largely ineffectual. Moreover, it is argued that the previous neglect of the 'human dimension' of soil conservation policy, or in other words, the interrelatedness of factors operative within the political, economic, historical, and most particularly the perceptual environment, and not just the physical environment itself (as indicated in Section 1.2), has exacerbated the extent of the problem currently realised.

It is the aim of this chapter finally, by way of consolidating the conclusions derived in chapters 2 to 8, to discuss the implications of the overall findings of this study in terms of their potential to influence the future efficacy of soil conservation policies and initiatives. Given the complex nature of the problem and the results of the foregoing analyses and discussions, it would be futile to detail specific solutions to the problems of policy. Blaikie and Brookfield (1987) arrived at a similar conclusion in their examination of land degradation issues pertaining more specifically to "the north", that is, in a first world context. There are "no blueprints for success" they claim; but they do recommend that "future emphasis must be on the land manager, on the economic, social and political conditions under which they operate, and on the dynamism of the environment in which they work" (Blaikie & Brookfield, 1987). The results of this study of soil degradation in South Africa, support such a recommendation. The political-economic approach to soil erosion is better suited to explanation than policy making (Elliott, 1989) therefore, on this basis some important implications will now be discussed with due consideration to influencing future policy decisions, and scholarly endeavours, which seek to influence future planning and to indicate future imperatives to be incorporated in soil conservation policies which take into account the opinions, needs and insecurities of existing and 'emergent' land users, rather than outline a specific policy for soil conservation as such. Unless policies can articulate benefits for particular users, over a specified time period, real management is not being done (Gorden & Gorden, 1972).

To this end, the principal objective of this chapter is to establish the role of soil conservation in relation to proposed agricultural, socio-economic, political and environmental initiatives to be undertaken in striving to achieve the objectives of the present government's Reconstruction and Development Programme, which provides the basis of future economic and social policy in the 'New South Africa' (Meadows, in press) with particular emphasis on the necessary re-examination of the bases of decisions made within the soil conservation policy context.

Glaeser (1995) concludes that the more complex a system becomes, the more unclear it becomes to determine an appropriate method of control. As an instrument of power, "technology conflicts with the original goals of emancipation" (Glaeser, 1995). In other words, the effects of technological development are contradictory. Such a conclusion is justified as the results of this study would suggest. Not only has the previously overwhelming emphasis on technocratic approaches to soil erosion not yet solved the problem, but it could be argued that it has aggravated its degeneration. It is against this background that the author calls for a refocusing of thinking to incorporate the multidimensionality of the erosion problem in accordance with the South African policy environment model developed (Figure 7.1).

9.2 A PROBLEM OF VARIOUS DIMENSIONS

The FAO (1983), identified four basic reasons why soil degradation occurs globally:

(a) a lack of resources,
(b) defective organisation (institutional structures) or policy,
(c) lack of motivation, and
(d) lack of knowledge.

Generally, the main findings of this study concur with the above; and in the unique case of South Africa might be added the past political ideologies of the former government. Underlying many of the inadequacies and shortcomings of South Africa's soil conservation policy discussed in this study, are past political passions and antipathies. Their legacy may or may not be sufficiently powerful to affect future implementation of a national soil conservation policy, only time will tell. Of more significance is the pertinent reminder, however, of the success with which the former government regulated the use of land, that is, the spatial, and by implication, social

environment. It can therefore be proposed that there exists a powerful potential to realise similar success in future in the environmental use of land in accordance with conservation ideals through appropriate legislative regulation. (Indeed the majority of participants in this survey were of the opinion that conservation ideals could be realised by such means.)

A White Paper published in 1980 regarding a "National Policy on Environmental Conservation", stated "that a golden mean between dynamic development and the vital demands of environmental conservation should constantly be sought ... only by respecting the environment in any development action will a high quality of life be realised for South Africa and its people." The contemporary, manifest exploitation of the environment and its soil resources, highlights the shortcomings of past policies in applying these principles (Glavovic undated, in Rycroft *et al*, 1987).

The Reconstruction and Development Programme (RDP) forms the basis of South Africa's economic and social policy. This was the African National Congress (ANC)-led Alliance election manifesto in 1994 and was subsequently adopted by the Government of National Unity as the backbone of national policy (Nolan, 1995). In its task of tranforming South African society, the government stated as one of its priorities that the government "must ensure that all South African citizens, present and future, have the right to a decent quality of life through the sustainable use of resources" (Dept. of Environment Affairs and Tourism, 1996). Furthermore, "that environmental considerations must be built into every decision, and that existing legislation and administration should be "revised with a view to establish an effective system of environmental management in South Africa". It is against this background therefore that the ensuing implications regarding the inadequacies and shortcomings of past soil conservation policies should be understood, that is, within the context of dynamic change in the country, politically, economically and socially. There has possibly never before been a more appropriate time in the history of the country, to more effectively refocus the nation's attentions on soil degradation and its implications for the future. (Section 9.2.6 below expands on the timely nature of this work.)

Thus, broadly defined, the relative failure of South African soil conservation policy to realise the expectations anticipated by former governments, may be characterised chiefly as being ascribed to the following concerns.

9.2.1 A Problem of Accountability

A lack of a perceived "stake in the land" and its future has been shown to exacerbate the extent of degradation in that it "turns people into disinterested land managers" (Ferguson-Bisson, 1992), a situation which is not conducive to creating rational, forward-looking land managers. According to the opinions of the sample surveyed in this study, farmers in particular, but also the state, should be most responsible for the management and utilisation of soil. This is highly signficant because the results of this work highlight the discrepancy which existed between the farming community and the state (at least up to 1992) with regard to who was actually to blame for the extent of the problem (refer to Section 5.3.3.5). The farmers blamed the state for the emphasis it placed on, *inter alia*, economic priorities and imperatives, such as increasing levels of productivity, which focussed on the maximum utilisation of resources, not optimal, and the government's price assistance policy. Meantime, the state has consistently pointed blame at the farmers. Such a scenario cannot be conducive to promoting active support and participation in soil conservation programmes. If land-users are to be encouraged to adopt soil conservation practices without coercion (Shaxson, 1985) it will be necessary to change the factors, perceptions, or pressures to which the individual responds when making land use decisions. Shaxson (1985) identifies three such aspects (a) public incentives or restraints, (b) more or better information about the detrimental effects of erosion, and (c) decreasing or eliminating key constraints among those from which farming and land use system decisions are made. Only an inter- and multi-disciplinary research emphasis can meet these requirements for change.

This issue concerning 'who is to blame for soil erosion' is one that can logically be resolved, given the possession of the right information. Should it be possible for the South African scientific community (by inference and necessity including natural and social scientists), to prove that the factors previously understood to have attributed to the current extent of soil degradation and the rate of loss in the country, in fact represent only a tip of the iceberg and rather the causes are derived from a consequent

complexity in interactions between diverse factors operative within a number of dynamically interactive, predominantly human/social environments, then the question concerning accountability becomes redundant.

It could be argued that the reflexive nature of human interactions with components of the natural environment (that is, indicating that the 'action turns back upon the subject') is a condition poorly understood in South Africa and less represented in resource management policies. The manner in which environmental resources to date have been utilised largely reflects a one-way relationship between man and the environment. To illustrate, in an economic sense, individuals utilise the soil and anticipate a return, either as capital or in the case of subsistence users' food. Little consideration have been given to the potential impact of these interactions or the long-term sustainability of agricultural practices. There exists a need to expand this understanding or perception, to include the principles of sustainability in agricultural land use and to ensure that planning and policies incorporate complementary objectives for the attainment of both short- and long-term goals.

Moreover, the perception that soil erosion and land degradation are problems for which agriculture is solely responsible, precludes the view that it is in effect a national environmental management concern. Soil conservation legislation itself is not applied in the urban sector, yet studies have shown that domestic and industrial activities within towns and cities, together with road construction and infrastructural developments, all contribute to increased rates of soil degradation. This is an aspect which has been sidestepped and apparently overlooked by policy developers, and has resulted in soil erosion and the need for soil conservation to be implicitly classified as rural-specific. Whereas, the official policy of for example, the Australian Democrats, as adopted in the National Conservation Strategy for Australia, stipulates that unless the costs of constructing and maintaining soil conservation works are not met by the nation and "across the community, including those in the cities", and not left to individual farmers alone, the country's crisis in soils cannot be averted (Policy document, Internet). Indeed, respondents in this South African study were unanimous on the question of soil erosion being a national resource problem. However, it is only when the future formulators of policy are convinced this is so, will policies themselves reflect this. Until this time, it is argued, it will be impossible to influence the deeply entrenched perceptions and attitudes of the general public

nationally, and raise to conscious levels the reality that their inputs and their actions can make a difference to the overall state of the environment, or persuade either the private or public sectors, to provide much needed financial support for soil conservation initiatives.

O'Riordan (1976) discusses the role of social responsibility in environmentalism, which he defines as "the execution of social responsibility". Heberlein (1972, cited in O'Riordan 1976) proposes that socially acceptable behaviour is guided by three determinants. These are briefly discussed in the context of this study, that is, choosing either to adopt soil conservation practices or to not, or put differently, to comply or not to comply with soil conservation legislative regulations. The first, refers to the *knowledge component,* which involves an individual's attitude toward a behaviour itself, and the likely consequences of an action (or inaction). This attitude will be a function of an individuals' experience, education and cognitive ability to differentiate and discriminate. (See Heberlein, 1972, cited in O'Riordan 1976, for a detailed exposition.) The second, the *culpability component*, relates to the attribution of blame for one's actions and the identification of options that are less socially detrimental. For example, environmentally disruptive behaviour will be tolerated on occasions when individuals believe they "have no choice" or because "everyone else is doing it". The *normative component*, or third determinant of socially acceptable behaviour, centres on the relationship between what an individual personally believes is appropriate behaviour, what others in society (or significant others) feel about it, and beliefs regarding what should be done in the "communal interest". The decision or choice made will ultimately be influenced by the individual's motivation to comply with the "norm", that is the extent to which he/she does or does not do what he/she thinks they should.

This examination of "socially acceptable behaviour" illustrates the importance and powerful potential of peer or social pressure to derive desirable outcomes in terms of more generally, environmental management, or in particular, the utilisation of soil. If soil conservation was recognised as a national responsibility and by implication, impinging on the interests of the entire nation, not solely the farming community or the state, not rural dwellers or urban dwellers, not agriculture or industry, it may be feasible to expect social pressure in itself, to derive the outcome in terms of conservation compliance that legislative regulation failed to achieve.

There can be no doubt that the greatest challenge facing soil conservation today, is to convince the South African nation as a whole, that they have a stake in the future of soil, as a means of attaining a better quality of life for all.

9.2.2 A Problem of Focus

A number of foci have emerged as being central to South African soil conservation policy formulated between the years 1910 and 1992. The most pertinent are discussed below and their implications are considered in terms of the objectives of this study.

9.2.2.1 Soil erosion - a predominantly physical problem.

It is clear that such an emphasis has been one of the major downfalls in the approach of key individuals to the erosion problem and the developers of soil conservation policies to control it, and furthermore has exacerbated the contemporary problem currently manifest. To this end, the main thesis of this work has attempted to define the complexity of human interactions operative within the policy environment and the multidimensionality of the soil erosion problem in South Africa. In 1973, Sumner asserted that "in this age of specialists, few of us are capable of viewing the system as a whole". For example, ecologists and geographers, according to Christiansson (undated) in their study of human and social issues, take care to stop "at the edge of their disciplines". This may be true, but should not, however, preclude the possibility for the future, that through interdisciplinary cooperation and collaboration, problems of such diversity can be resolved. By the 1980s, explorations within an interdisciplinary context were increasing (Saarinen & Sell, 1980). According to Saarinen and Sell (1980) a review of developments and progress mainly within the discipline of human geography, outlined not only a continuing concern for planning and environmental issues, but also an increasing integration of disciplines, and an emerging cross-cultural component to research. Such developments in the context of examining soil conservation policy, were never adopted in South Africa. It is argued therefore, that only by examination of the political, economic, historical, perceptual, in combination with the physical dimension of soil erosion can the problems associated with ineffective soil conservation policy be diagnosed. A similar

conclusion was drawn elsewhere by Hudson (1988), and Bojo (1991), who in an economic evaluation of land degradation, emphasized the importance of understanding the matter as a socio-economic, as well as a physical process. No single discipline can adequately or holistically evaluate all six dimensions. South African scientists, decision makers and policy formulators need to acknowledge this and in the context of environmental resource management, to realise the benefits and potential of interdisciplinary interation. Brandstrom (undated) affirms the importance of realising the multi-dimensional character of ecological questions, "a fact making for the disqualification of uni-dimensional explanations and single-stranded development approaches". However, he further expounds on the need to develop a "formula" for interdisciplinary communication and exchange of insights and knowledge across disciplinary boundaries "beyond a stage of only good intentions". Such a formula should be encouraged in the new South Africa. Baker (1984) in a study of the historical roots of the "soil erosion orthodoxy" in the third world, concluded that in disguising politics as technology solves nothing except at the heavy price of oppression.

Indeed, the Environmental Scientific Association (ESA), a multidisciplinary team of scientists with a focus on science and technology, and who are concerned with land degradation and generally environmental management issues, from its inception in 1993, has sought to identify problem areas of concern and research needs, to establish norms and standards and create networks that aim to link scientists from within the country and internationally. To date it has identified four main objectives necessary if land degradation is to be addressed in the future. These include:

* the need for environmental and especially ecological awareness
* education and training
* research and monitoring
* scientifically based management of natural resources (Arbuthnot, 1995).

They further stipulate the critical necessity of three prerequisites, which need to be met and operational before the abovementioned objectives can be addressed.

(a) An independent, central coordinating, non-statutory body.

Such a recommendation has been made in the past in South Africa. In 1971 at a natural resources symposium in Johannesburg, T.C. Robertson suggested that until a "unifying" bureau, such as a Bureau of Ecological Standards (BEST) was established, soil conservation could not be achieved nationally, and furthermore, "a soil conservation campaign ... was an organisational impossibility" (Clarke, 1974). The government of that day was strongly opposed to such a recommendation. Perhaps, 25 years on, with the inherited legacy of environmental mismanagement, the present government may recognise the value of such a recommendation. (See Chapter 4 for further discussion). The need to establish an environmental commission has recently been discussed in parliament (Hansard 1994, col.1394). The current "lack of a national body with competence and powers to act as a public custodian ... with teeth to take action", has been acknowledged by some to be a major obstacle to attaining success with soil conservation. The fact that one government department cannot take action against another, and given the question of conflicting departmental norms and standards, conflicting agendas, and priorities, there can be no stronger justification for the need for an independent body, "not too bureaucratic, an ombudsman, able to act quickly and decisively when necessary" (Hansard, 1994, col.1394)

(b) An interdisciplinary approach and *modus operandi* between and within institutions to implement coordinated, interdisciplinary research, survey and monitoring.

The need for such a requirement is confirmed by the results of this study. The complexities of the soil erosion problem in South Africa were neither conceived of nor understood previously: a reality reflected in the inefficacy of related policies. A policy and research emphasis on the physical dimension of the problem and the development of practical solutions has been proven to have fallen short of its target. With reference to land degradation in general, ESA is of the opinion that "there are a substantial number of experienced and knowledgeable scientists and technologists who can be brought together on an interdisciplinary team. The effectively harnessed synergistic effects of such integrated teamwork create a force to be reckoned with

when it is applied to holistic planning and management projects" (Arbuthnot, 1995). This is no less legitimate in the context of managing soil erosion in particular. The National Veld Trust (1995) further supports a call for a multidisciplinary approach to resource conservation efforts. Such an acknowledgement demands that inputs are sought and derived from both professional and technical specialists over a broad spectrum of disciplines, including soil and water conservationists, ecologists, engineers, soil and grassland specialists, agronomists, hydrologists, geologists, resource economists, legal advisers and sociologists. The National Veld Trust (1995), acknowledge the difficulties in effecting multidisciplinary actions, however, continue to reinforce the need for such an approach as a prerequisite for successful land management and resource conservation.

(c) An effectively functioning system of implementing rational land-use planning and integrated resource management with all due weight given to sustainability as a non-negotiable consideration.

The question concerning the prospects for sustainability of agricultural resource management in general (with reference to soil conservation specifically) will be discussed below in Section 9.3 in greater detail. In section 29 of the Constituent and Formal Provisions of the new Constitution of the Republic of South Africa (Act No.200 of 1993), a revised emphasis is sounded which focusses no longer on the individual, but on the benefits to mankind as a whole (this could constitute a particular community, or distinct section of the population), and that the interests of future generations are to be valued and considered as important as those of the present generation. Current agricultural practices and policies do not permit consideration of third-generation rights or interests. This is an issue which requires political expediency in addressing.

9.2.2.2 **Emphasis on soil conservation on commercial agricultural land.**

One of the most serious deficiencies of policy and legislation, is when as a result of aiming to create a viable climate for commercialisation, they become conducive to increasing environmental degradation (Ferguson-Bisson, 1992). Such is the case in South Africa. This is confirmed by the findings of this study, where an

overemphasis on economic priorities has inevitably exacerbated the condition of land degradation. This study has not examined to any significant extent the role of economics in this issue, but would earnestly recommend that a need exists to pursue such a study.

According to Miltz' (1985) evaluation of South Africa's environmental problems, the racial disharmony which characterised South Africa at that time, under the former Nationalist government, was complicating the implementation of environmental protection. At the time, he attributed this to a prevalent "mistrust of political motivation". Environmental resource management, he elaborates, "appears to be dominated by myopic political objectives and the maximisation of current income streams at the cost of future generations" (Miltz, 1985); compounding the problem was the differential application of policies. To illustrate, the majority of respondents were of the opinion that soil conservation policy in South Africa has consistently failed to take into account the needs of the small-scale farmer and favours large-scale commercial interests. Given the most glaring differentiation of all, the non-applicability of soil conservation legislation to land in the former 'homelands, or South African Development Trust lands, (or for that matter in urban areas), confirms that the population targetted by such state policies, as the progressive, commercially efficient, more sophisticated farmer, to the detriment of and disrespective of the needs of the resource-poor, small-scale farmer (subsistence and/or commercial). In the words of Stocking (1981) "... if the small farmer and peasant of the Third World cannot or will not take conservation to heart, no amount of model-building, empirical plot studies, erosion risk assessment or legislation will result in the preservation of the soil resources". Likewise, if soil erosion knows no political boundaries, neither should the laws governing its regulation.

9.2.2.3 **Insularity in problem-solving**

According to the majority of respondents questioned for this study, the former government was non-receptive to the advice of international agencies on how to address its soil erosion problems. Indeed such an attitude could arguably be justified given the complex and possibly unique nature of the problem as presented in this study, within the context of policy. Hudson's (1979) exploration of research and training requirements in developing tropical countries illustrates the inappropriateness

of applying soil conservation measures formulated in developed countries in a developing country with their fundamental differences. Furthermore, Stocking (1981) is of the opinion that given the extent of the problems surrounding the implementation of soil conservation in less developed countries, alternative strategies [that is, to those formulated in a developed-world context], must be sought.

Given the budgetary constraints of the national Department of Agriculture, however, it is suggested that there is an opportunity to save time and resources by learning from the experiences of others internationally. This does not imply the direct application and adoption of conservation programmes uncensored or unamended from countries such as Australia, Canada, the United States of America and Zimbabwe, but rather an objective appraisal of the factors which constrained the adoption of conservation in these countries, so to potentially avoid making the same mistakes in South Africa. For example, an appraisal of a US government official document entitled "Oversight on proposed modifications in soil and water conservation policy", dated 30 March 1982, shows marked similarities on perceived problems with regard to, for example, promoting farmer compliance, the reduction in budgetary allocations, the necessity according to farmers to have a farmer at the "helm" to as far as possible ensure that the needs of the farmer would be addressed, concerns for the consequences of fragmentation in departmental authority, the debate whether soil conservation should be voluntary or involuntary, the need to prioritize soil conservation rather than a disproportionate focus on defence, overcoming manpower inadequacies, controversy over "heavy-handedness" in enforcement, are remarkable. Furthermore the proposed policy was to be implemented at a time when American farmers were facing the prospect of lowest real farm income since the Great Depression and low farm prices were a discouragement to farmers to implement long-term conservation programmes (US Government, 1982). This reflects a conspicuous correspondence with the South African situation as demonstrated in this study, although, it must be emphasized, it took place 10 years previously. Moreover, a critical need to adapt South African legislation to be in line with the requirements of international conventions, was voiced in parliament by the Deputy Minister of Agriculture (Hansard, 13 September 1994, col.2580). Whilst this would first require the determination of potential impacts on the existing structure of the department (Hansard September 1994, col.2580-2581) as a consequence of establishing diplomatic agreement with other countries, such a move has become imperative. In

the spirit of democracy, and in "striving for transparency" in the new South Africa, it is suggested that policy makers in this country could learn a great deal from the experience of other international agencies.

Mr W. Richards, chief of the U.S. Department of Agriculture's Soil Conservation Service, appointed in November 1990, spoke of the country's tremendous progress in terms of soil conservation but emphasized the weight of outstanding goals still to be met. The answer for effecting future conservation achievements and successes, he believed, prevailed in an appropriate balance between regulations and incentives, with "a first step" refocussing on education and research, followed by technical and financial support , with a further qualification "objectives need to achieved; and if it takes regulatory backup to achieve them, then that too is appropriate" (Editorial staff, JSWC, 1991). The results of this study have indicated that the former South African government tried a policy of 'persuasion', which proved ineffective. Regulations on enforcement were tightened, and the responsibility for this was shuffled between what is now the Directorate: National Resource Conservation, to the conservation committees and back to the national department again. All of these approaches failed to motivate farmer compliance.

It is therefore recommended, on the basis principally of this study's results, but also against the background of the above illustration, that the approach for future decision making and in particular policy formulation, must be that utilisation to optimum effect the advantages to be derived from increased education initiatives, which must by necessity by informed by research undertaken on a multidisciplinary basis. A study undertaken by Ogg (1992) on addressing information needs to support sustainable agricultural policies in the U.S.A., involved an analysis of the changes (in policy) after the compilation of the 1977 National Resources Inventory (NRI). It was concluded that dramatic changes in policy were effected as a result of the inventory, which furthermore illustrates the power of information in facilitating environmental policy innovation for agriculture. If policy makers are more willing to adopt changes when the benefits of the change are clearly documented, this reinforces the need to increase research efforts in South Africa, to establish the potential and constraints of the soils across the entire nation.

9.2.3 A Problem of Priorities/Commitment

Considerable uncertainty and ambiguity in opinions was expressed in the results presented in Chapter 8, on the subject of former state commitment to soil conservation. Whilst a small majority of respondents believed the matter was afforded the status of priority by the former government, a smaller majority were of the opinion, however, that policy decisions have not reflected a commitment to conservation in the past (see Section 8.5). Furthermore, a majority of 50 per cent of participants believed the legislative machinery, incentives and support mechanisms provided by the state to encourage and promote soil conservation farming, were insufficient to meet the needs of the farmer and extension official appointed to assist the farmer achieve such goals. Against this background the issue is further explored.

It has been argued that scientists are inclined to overstate the extent of the soil erosion problem in a country, and policy makers are inclined to minimise it, however, without the concerted efforts of the state to support its policies, and the political will of the leaders "to make it happen", they are destined to fail (Blaikie, 1985; Borlaug & Dowswell, 1995). Consistently throughout this study it has been shown that the problems of soil conservation policy lie not so much in the formulation of the policy but in its ineffective implementation, administration and enforcement (see sections 7.1.1 and 8.6). It has furthermore been suggested that this is as much to do with the perceptions of key players, including government officials, as it has to do with available financial resources, a factor which could, if not adequately taken into account, prove to be a serious constraint in achieving policy objectives. The interventions of the state are, however, essential in many aspects of soil conservation (UNEP, 1982). Technically, the state should be in a position to provide advice and assistance in the planning of conservation measures: as the results of this study show, however, deficiencies in, for example, the number of officials to provide this function, translates into the provision of inadequate technical support and largely an absence of supplementary or follow-up/maintenance assistance (see Section 6.4). Financially, loans and subsidies are necessary and must be sourced by the state: again the results reflect inadequacies both in the nature and the extent of such assistance. Economically, and socially, consideration of whether practices are economic to individual land users or to society in its entirety, even essential for its future welfare:

the results of the study suggest that little consideration was given either to the affordability of conservation measures by farmers, or to the potentially detrimental impact of the former government's economic priorities on the extent of soil degradation. Successes in reducing the rate of soil loss in certain areas and progress in terms of soil conservation, have been recorded and acknowledged (see Tables 4.7 and 4.9), however, there can be no doubt such successes exist mainly on commercial farmlands, the focus of former state policies and support mechanisms (refer to Section 6.4). If level of commitment can be measured using these indicators, then clearly the former South African government has proved itself to be less than committed to conservation ideals.

It could be argued that the success with which the former government commandeered the regulation of spatial landuse utilising the medium of the law and policies, such as that of separate development, to realise its ideological objectives, provides the prospect that with the same level of commitment and political will, conservation ideals could also be realised through the legislative regulation of environmental landuse?

One matter that needs to be urgently addressed is the current reality of fragmented administration dealing with environmental issues (see Section 8.6.2). For example, the National Health Ministry, Water Affairs and Forestry, Mineral and Energy Affairs, Environment Affairs and Tourism, and Department of Agriculture, all control aspects which more appropriately should be managed under the umbrella of one department, such as Environment Affairs. Fragmentation makes it difficult, if not impossible for the department to apply and enforce appropriate legislation. According to Scotney (pers.comm.) there exist more than 50 pieces of legislation on the statutes which currently in one manner or another exert some control over the utilisation of soil. The disparate nature of conservation legislation therefore, coupled with inadequate law enforcement (not an insufficiency of legislation!), the existence of policies which implicitly promote economic priorities (which by their very nature cannot be sustainable in the long-term), the promotion of soil conservation on cultivated, commercial lands (to the detriment of small-scale farmers who can "least afford soil conservation"), support the claim that the former government, despite its apparent support for soil conservation, was not truly committed to it. The results presented in Section 8.5 of this study confirm this.

A pertinent development which has emerged post-1992 is the promulgation of the Land Administration Act No.2 of 1995. This provides for: (a) the delegation of powers and assignment of the administration of all laws regarding land matters to the provinces; (b) the creation of uniform land legislation; and (c) matters incidental thereto. This also applies in the context of agricultural resource management and soil conservation. Given the current scenario of fragmentation and its proposed influence on policy efficacy, it could be argued that this development may aggravate the current extent of fragmentation nationally and the apparent lack of coordination of effort and cooperation intra- and interdepartmentally. The capacity of central government to fulfil currently its primary responsibility to formulate a national environmental policy, is hampered because of the extent of fragmentation and compartmentalisation prevalent within existing government structures (Schwella & Muller, 1992). The HSRC (1996) advises that unless a holistic approach to resource management is adopted and further that this is reflected in the structures established to manage given resources, the fragmentation currently characteristic of operations within the Directorate: Agricultural Resource Conservation, of the Department of Agriculture, would lead to "certain paralysis".

Agriculture currently employs an estimated 15 per cent of the economically active population (Hansard 1992, col.1101). Agriculture currently contributes approximately 5 per cent to GDP, but in effect supports 30 per cent of the GDP of the country (Hansard 1994, col.2569-2570). Without sound agriculture there can be no economic recovery (Blaikie, 1985; Blaikie & Brookfield, 1987; Hansard 1992, col.1091; Morse & Stocking, 1995). This reality alone ought to persuade future governments to place a high priority on agricultural resource management?

Watson (1990), in her evaluation of the contemporary extent of erosion in KwaZulu-Natal concluded that, should the "ambitious aspirations" of the former government concerning rural economic development be pursued into the next century under the new political dispensation, erosional processes currently active, unless expediently and effectively controlled, could potentially realise unprecedented levels. It is argued that should such a strategy be pursued, in accordance with the objectives of the RDP and its promise of social and economic reformation, further degradation seems likely.

One final consideration under this subsection concerns the ability of the state (or its policy developers) to make decisions regarding priorities when faced with contradictory measurements and/or information. As already stated, there is a conspicuous lack of scientific consensus on the actual causes, extent and nature of soil erosion in the country. The literature reviewed for this study supports this contention. Within such a context are decision makers to believe the assessment or measurement or opinion that coincides with their preconceptions or the most complicated and technically superior. Or the one that gives the neatest, cheapest or most satisfying solutions? (Blaikie & Brookfield, 1987). This re-emphasizes the need for an adequately informed data base, upon which to base future policy decisions. With some understanding of what motivates human behaviour, or more specifically the adoption of conservation practices, policy formulation and its effectiveness in achieving its objectives can be enhanced. [See Section 5.2 for a detailed discussion of landusers' needs, perceptions and knowledge, which according to Duvel and Afful (1994) are the three key intervening variables, or 'human factors' identified by Duvel (1975) important in determining the successful adoption of soil conservation.]

9.2.4 **A Problem of Situational Incompatibility**

It is further suggested that even if the South African nation as a whole was fully conscious of the problems of soil erosion and was willing to adopt practices concordant with conservation principles, unless a number of additional aggravating constraints are satisfactorily addressed, the anticipated benefits of having a soil-conscious, motivated nation, can but fail to be realised. The principal implication to be drawn in respect of each of the constraints highlighted, is simply the incapacity, due to factors beyond their control, of farmers to commit themselves to soil conservation.

(a) In parliamentary debates from 1992 it was reported that the debt crisis borne by farmers, believed to be in the region of R17 billion (Hansard 1992, col.1137), has reached such amplitude, "that it has now become unmanageable". Farmers continue to blame the government's agricultural policies and emphasis on maximum productivity. In terms of production credit, it was estimated that 50 per cent of present producers will be unable to repay debts in their lifetimes (Hansard 1992, col.

1105). Given such a situation, coupled with inflated input costs, stagnant produce prices and excessive interest rates (Hansard 1992, col. 1105), it is quite unrealistic to expect farmers to commit themselves to adopting soil conservation, a 'diversion' which to date is characterised by a belief that it is a "non-paying venture", from which only long-term benefits can be derived. If production systems are not in harmony with, and adapted to, sustainable levels of utilisation then it is not so much the unwillingness of farmers' or their indifference, but an inability to apply conservation farming that hampers progress. Economic factors, unfavourable climatic conditions (see (b) below), ignorance and lack of scientific knowledge of sustainable systems, *inter alia*, also aggravate the chances of adopting behaviour in accordance with conservation ideals (Department of Planning and the Environment, 1977).

(b) Drought, coupled with political uncertainty produces economic uncertainty (Hansard, February 1992, col.1131). Drought is most consistently viewed as an agricultural crisis, however, due to its extent and potential political, socio-economic and socio-political consequences (Hansard, February 1992, col.1103), it must now be considered a national disaster which "cuts across politics, colour and even international boundaries" (Hansard, February 1992, col.1134). Despite the fact that the results of this study have indicated that an ancilliary consequence of drought in the past has been raised levels of awareness of the manifest extent of soil degradation (see Chapter 5), it does not logically follow that farmers will, at such times, consider the adoption of soil conservation to be a priority issue. On the contrary, it is at such times, when farmers' financial resources are further constrained or pressurized, and furthermore, that the capability of the Exchequer is further limited, that it makes commitment to a soil conservation programme more remote. South Africa is currently experiencing such conditions (Department of Agricultural Development, 1991; 1992a), therefore due consideration must be afforded to such a constraint in future policy development.

Duvel (1994) in a novel approach to stock reduction and communal land management in a subsistence farming situation wherein human constraints to these practices are evaluated, asserts that in the context of an innovation such as stock reduction, the constraints and disadvantages may be perceived to be so strong that they in effect counterbalance, even suppress the positive forces (or their potential). A preoccuption

with constraints or negative forces may be such, that individuals become inaccessible to the positive forces. The results of this study have demonstrated that the same can be applied in the context of soil conservation practices. Duvel (1994) proposes that only by identifying, removing or at least reducing these negative forces or constraints, can the positive forces contribute to change. This conclusion in itself affirms the need to establish a broader, more comprehensive information base, which acknowledges the multidimensionality of the erosion problem, upon which future decisions can legitimately and authoritively be made. The need to establish the costs of erosion so to promote conservation as a cost-effective means of behaviour is imperative (refer to Section 9.2.5 for further discussion).

9.2.5 **A Problem of Misinformed Perceptions**

"Choice within a complex system such as this cannot be fully informed", and according to Loasby (1976) "partial ignorance is intrinsic to the problems of choice". In the context of soil conservation policy, its formulation, implementation, administration and enforcement, "partial ignorance" or a lack of appropriate information inevitably influences the final outcome; or in less abstract terms, the potential efficacy in achieving defined objectives.

Figure 9.1 illustrates the cyclical nature of four important elements in an ideal policy process (Ramm *et al*, 1988). In such a scheme, policy is not static but part of a cyclic process of monitoring the success of current policy, a seriously neglected aspect in the South African context, followed by research to determine shortcomings, followed by modifications of policy. In this respect, a study such as this might be regarded as part of the process, albeit an informal and unofficial part. This study suggests that whilst all four elements are important in effectively achieving management goals, the need for 'appropriate' research to adequately inform the decisions which will be made in the formulation of policy process, is paramount to its successful implementation. For example, if economic factors have motivated the low level of enforcement and implementation of policy objectives achieved in this country, and more specifically, have been perceived to be a major limitation in the implementation of soil conservation management plans, then it may be presumed, that if such plans could be demonstrated to be economically (whilst simultaneously environmentally) profitable,

that this factor could enhance the potential future adoption of strategies to promote soil conservation nationwide.

In Chapter 5 other factors were discussed which actively influence individuals' perceptions of soil erosion. With a less 'myopic', more multidisciplinary investigation of the causes of soil erosion and constraints to achieving policy successes, and a more integrated and holistic management approach, it is argued that the rate of progress could be escalated.

Just as the policy process does not occur within a vacuum, but within the total phenomenal environment, research endeavours to inform the policy process cannot, and do not, exist in isolation from the remaining elements of the environmental management cycle (Figure 9.1). The overwhelming majority of participants in this study were of the opinion that policy decisions were "informed to poorly informed". A smaller majority believe scientists are not adequately consulted prior to the formulation of policy, and a more significant majority are convinced that current policies reflect predominantly the perceptions of policy makers. If the foregoing scenario is a true reflection of the situation in South Africa, and given respondents' contention that perceptions have the most potential (in terms of the 5 P's of soil erosion, see Figure 1.4), to influence the effectiveness of policy, and furthermore, that they are also of the opinion that the country's information base is largely inadequate and/or incomplete, then the critical importance of the research element cannot be overemphasized. Herein lies one of the most valuable conclusions to emerge from the findings of this study. Public awareness may be indispensable for effecting changes in national policy, but it does not guarantee results (Marx, 1970). An educated nation, however, is a prerequisite for the success of soil conservation. How to ultimately achieve sustained soil conservation adoption and practice, will be discussed below in Section 9.3. "Lasting results can only be obtained by tackling the problem of human behaviour at its source, that is in the minds of men", is the opinion of the compilers of the Report of the Planning Committee of the President's Council on Nature Conservation in South Africa (1984). This reiterates the contention that such an effort requires ultimately the provision of educational programmes, to inform and raise awareness of the consequences of behaviour within the environment.

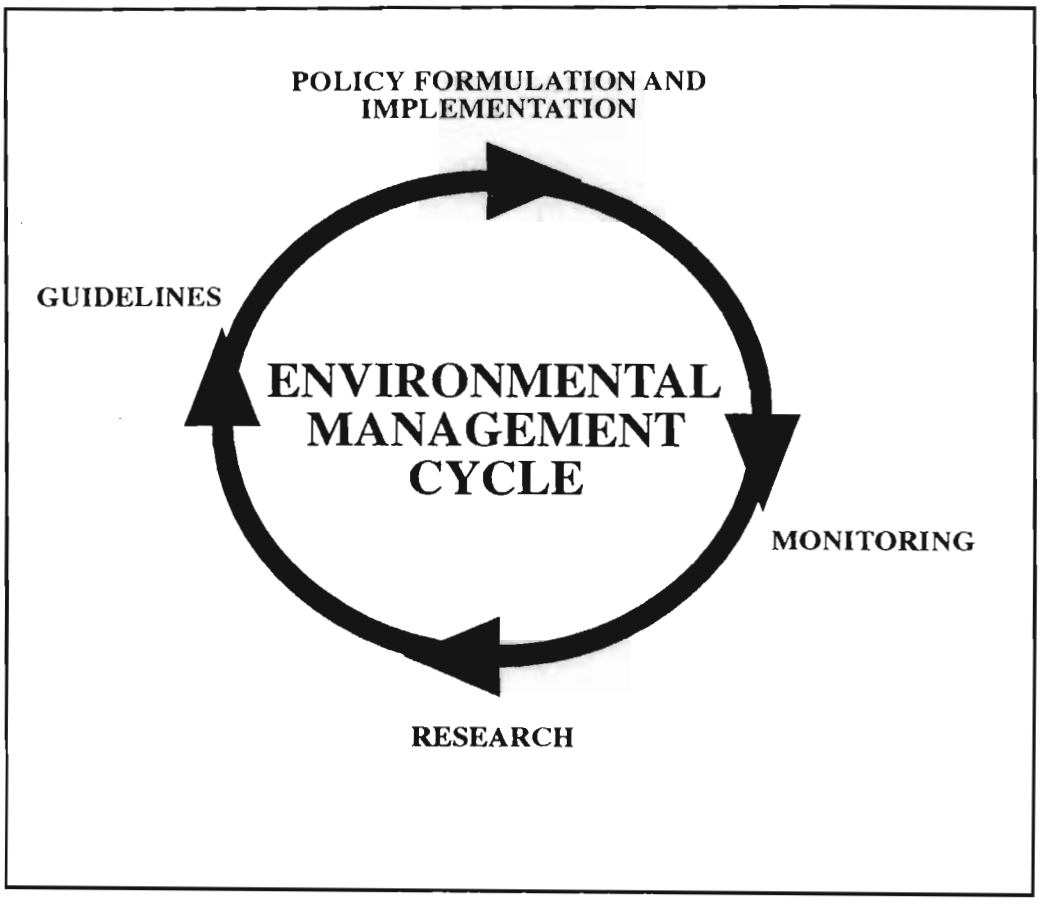


Figure 9.1 Conceptual view of policy as an iterative process involving ongoing monitoring, research and modification. (after Ramm *et al*, 1988)

In order to attain successful soil conservation through the formulation and implementation of State policy it is suggested that an iterative process similar to that illustrated in Figure 9.1, which conceptually sets out the cyclical aspects of information gathering and soil policy refinement, and Figure 9.2, a more generalised schematic representing the environmental management cycle, be adopted, bearing in mind that 'monitoring' and 'research' refer not only to the physical dimension of soil conservation, but the diverse aspects which have been discussed in this thesis. It is only by due consideration of each of these elements that effective soil conservation can be achieved. Soil conditions are constantly changing (Hudson, 1988), as do resource constraints and potential: therefore so too must conservation procedures.

General Smuts was reported to have said "there is only one solution [to soil eosion] and that is the education of public opinion" (Jacks & Whyte, 1939). If, as has been suggested "research remains one of the most important life supports of our agricultural development" (Hansard 1983, col.8139), then the nature of this research, should extend beyond the important ongoing physical and practical endeavours to improve technologies and scientific inputs. It has been argued that economic considerations tend to outweigh land users' desires to sustain conservation behaviour. If this is so, then economic analysis is vital in its potential to contribute to more rational decisions regarding land degradation and rehabilitation: For example, perhaps most important in the context of educating the nation and addressing "misinformed" perceptions, it provides the means by which national costs of on-going soil degradation, and both on- and off-site consequences, may be evaluated; a necessary prerequisite if preconceived notions of non-profitability of soil conservation are to be revised. If 'successes' can be presented as values in financial and economic terms, this permits the comparison of input costs with outputs or results. There is also the need for ongoing cost-benefit analyses to ensure efficiency in the utilisation of resources. Cost-benefit analysis is a well-established method of assessing project worth from a social point of view (Bojo, 1991). Despite the criticism of this method by predominantly non-economists, in the absence of a better alternative, Bojo (1991) recommends its potential contribution in interdisciplinary efforts to improve and consolidate the levels of understanding of land degradation yield and related processes. Soil conservation projects have never been evaluated in these terms, at least to the knowledge of this researcher, to the extent that conclusions can be drawn regarding their success or failure.

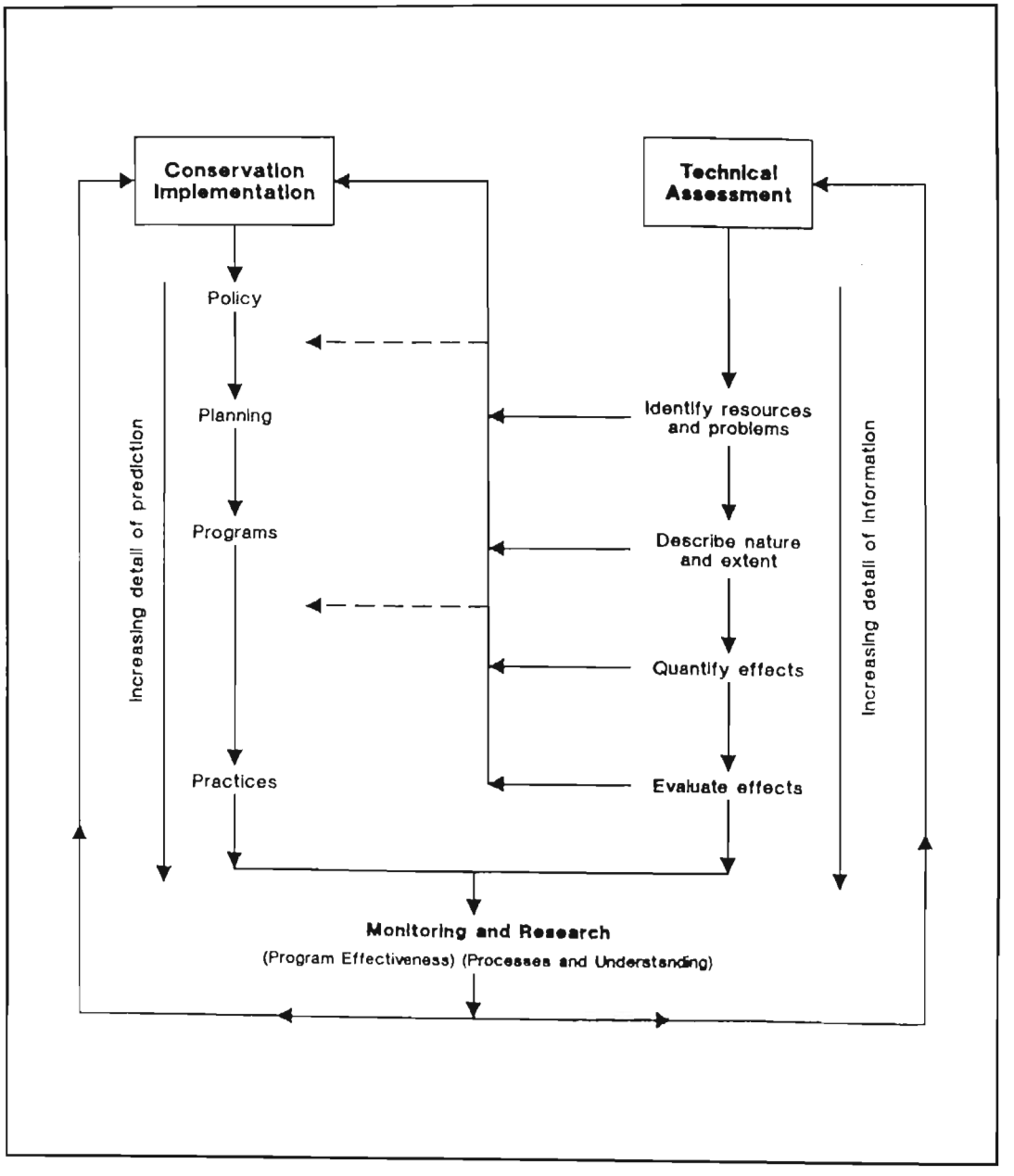


Figure 9.2 Cyclical aspects of information gathering and soil policy refinement. (Perrens & Trustrum, 1985).

9.2.6 **A Problem of Timing**

Prior to the promulgation of each of the four acts scrutinized in this study, government officials and parliamentarians were of the opinion that "the time was right" for new conservation legislation (see Section 3.4.2). This presumption was based on their perception that the public and farming community were suitably aware of the worsening extent of degradation and would therefore be responsive and amenable to the adoption of conservation practices. As the results of this study support, this judgement proved largely inaccurate on each occasion, at least with regard to the anticipated extent of mobilisation among land users (refer to chapters 3, 5 and 8 for details). Rather, it is proposed, legislative enactments in fact raised to conscious levels the extent of the soil erosion problem. The question that needs to be resolved then is: is there a right time to educate a nation on the merits of sustainable environmental management or resource conservation? Or more specifically, when is a society most likely to be responsive to legislative and regulatory controls in the utilisation of soil?

This study has revealed, at least in terms of the opinions of the participants involved in this study, two important points worth considering in this context. The first concerns the consensus that levels of soil erosion consciousness amongst the public and farming community have never been as high as they are currently, (possibly the consequence of, *inter alia*, concerns related to anticipated land reforms, redistribution and restitution), and secondly, that it was the initiatives of the National Veld Trust, Department of Environment, and awareness and environmental education campaigns organised by the Department of Agriculture, to which respondents attribute raised levels of concern in the past. Whilst "changing attitudes can cause disturbance and potentially destroy social stability" it has been noted that "constructive or positive change can in fact produce stability" (Anon, 1977). It is therefore reasonable to assume, that present conditions are ideal for refocussing attention on soil degradation. Further impetus to this assumption may be derived from the Department of Agricultural Development's conclusion that there currently exists greater environmental awareness amongst the general public, it was for this reason the Department now includes Agricultural Environmental Studies, a subject which

examines both the human and natural environments in the context of conservation problems (Department of Agricultural Development, 1991).

Hart (1992) claimed that South Africa (in 1992) was no different from many other countries in terms of giving increasing consideration to the social and political importance of environmental matters except that this period of heightened awareness coincided with a period of social and political transition. Hart (1992) proposed that such circumstances have 3 consequences for environmental management. The first concerns the difficulties of government involved in introducing new policies unilaterally, given the desire to avoid confrontation at a time when constitutional negotiations were in progress. Further, that the government is particularly sensitive to the weight of public opinion. Under the new constitution and in terms of the objectives of the RDP, it could be argued that these circumstances still prevail. Secondly, Hart (1992) refers to the fact that the breadth of political debate engendered by the transition process has drawn attention to the existence of divergent environmental viewpoints. This has given rise to discussions concerning "the notion of third-generation human rights and an environmental code of ethics". Previously, as is demonstrated by the propensity of the former government to focus on short term objectives in its agricultural policies, little, if any, consideration was afforded to future use of agricultural resources such as soil. Clearly therefore the current transitional government considers the sustainability of resources to be important (refer to Section 9.3 below). Hart (1992) refers to a third feature in his evaluation of the contemporary socio-economic environment during this time of transition, namely the apparent 'erosion' of many management systems with important environmental responsibilities such as the collapse of local government in many parts of the country, which further exacerbates the problem of fragmentation highlighted earlier in this work (see sections 7.1.2 and 8.5). Hart (1992) concludes by sounding a warning that current socio-political transformations signal uncertainty for environmental management. He proposes, however, that such circumstances also provide a unique opportunity to address divergent environmental agendas and to develop management systems that "enjoy the broadest possible support and legitimacy". Work conducted by Khan (1990a) on this matter support his contention and further coincides with that formulated in this study. By harnessing currently heightened levels of national soil consciousness within the prevailing context of political change wherein, according to the present government future policies will be formulated with a view to (a)

improving the well-being and quality of life for all South Africans, and (b) through extensive consultation and public participation at every level, this author proposes that by incorporating the various recommendations presented in this work in the formulation, administration, implementation and enforcement of soil conservation policy, the soil erosion problem manifest currently within this socio-political (and by implication economic) context, holds the potential to not only promote reconciliation, but more specifically enjoy the realisation of its objectives for sustaining the utilisation of soil. Policies that alter property and land tenure rights, according to Anderson and Thampapillai (undated), may be difficult to implement without drastic - "even revolutionary" - changes. Such a situation has been realised in South Africa.

9.3 SUSTAINABILITY OF SOIL CONSERVATION

According to IUCN, UNEP and WWF (1991) if sustainability is to be achieved, it is necessary for individuals to:

"*re-examine their values and alter their behaviour. Society must promote values that support the ethic [for sustainable living/agriculture] and discourage those that are incompatible with a sustainable way of life. Information must be disseminated through formal and informal education so that needed actions are widely understood*".

To achieve such a goal requires changing the attitudes and behavioural practices of individuals nationwide. IUCN, UNEP and WWF (1991) recommend that the means by which this change can be brought about is through an information campaign, which should be encouraged by governments and led by the non-governmental movement. Further, they suggest that a national plan to motivate, educate and equip individuals to lead sustainable lives should be prepared in all countries and all communication media should be harnessed to assist in this task.

The general conclusion which can be drawn from the analysis of soil conservation policy undertaken in chapters 3 to 6 concerns an acknowledgement that the South African government has to a greater or lesser extent throughout the period reviewed (1910 to 1992) gone some way towards meeting each of these conditions to promote sustainable utilisation of agricultural resources such as soil, but thus far the goal

remains unrealised. It is argued that factors operative within the perceptual frame of reference of individuals could account for this. In other words, as was discussed in Chapter 5, the perceptions of, for example, the land user (or more generally all decision-makers be they the farmers themselves, the scientists, the policy developers, the extensionists), regarding the fundamentals of the erosion concern, are ultimately responsible for determining the extent and rate of behavioural change and, by implication, policy compliance. Furthermore, it was demonstrated that the importance of individuals' needs and the compatibility of those needs with their perceptions of the erosion problem, together with individuals' 'knowledge' base upon which decisions are made (Section 5.2), also influence decisions to comply with legislated norms and standards in the utilisation of soil. To illustrate, Reardon and Vosti (1995) recommend that policy strategies should focus on conditioning variables such as those that affect market development, community wealth, infrastructure, household asset distribution and the affordability and appropriateness of natural resource conservation technologies. Without recognition and consideration of issues such as these in the formulation of policies, it can be argued that consequential incompatibility with land users' needs will render policies ultimately ineffective and in addition a failure to meet sustainable objectives of land use. An unfavourable perception of the relative advantages of an innovation such as soil conservation, for example, has been proven to negatively influence its adoption (Duvel, 1991). Similarly, Duff *et al.* (1991) propose that prior to successfully motivating farmers to employ soil conservation methods, policy makers and extension professionals need an "adequate framework that relates factors that can inhibit or enhance an individual's conservation behaviour", and as previously discussed in Chapter 5, this infers the acquisition of all relevant knowledge associated with the application of soil conservation, awareness of the innovation's relative advantages, in addition to basic knowledge or knowledge of the principles of the innovation (Duvel, 1991). This information would provide the foundation for policies targeted especially at complementing factors that encourage or enhance soil conservation efforts (Duff *et al.* 1991) and it can be logically assumed that in the absence of such a framework land use practices cannot meet the principles of sustainability.

MacVicar (1993) proposes that research and extension are essential in achieving a sustainable system of agricultural land use; to this should be added environmental

education. Given the deficiencies highlighted in this thesis in these three areas, it could be argued that unless more effort is expended on these the goals of sustainability cannot be achieved. This is particularly pertinent given that the essential moral vision of the principles embodied within the Reconstruction and Development Programme (RDP) as demonstrated in the statement which asserts the priority of the state to be "the pursuit of national unity, the well-being of all South African citizens and peace" (Department of Education, 1995). It has been asserted that, "the health and viability of our population is crucially linked to a healthy environment". Consequently, there has "never been a greater need for a broadening of the concept of sustainable environmental development in this country" (Hansard, August 1994, col.1393). Huntley *et al.* (1989) are of the opinion that the ideal of sustained development, can only be attained through sustained economic growth, as without which there can be little hope of improvement in either the health of the environment or the quality of human life; and furthermore that South Africa, in common with other countries, will by necessity have to develop its own dynamic model and consequently make its own trade-offs.

It is proposed therefore, that an alternative starting point from which to address previous shortcomings of soil conservation policies while simultaneously promoting sustainability in the utilisation of resources and concomitantly encouraging the prospect of the development of a national land ethic, might be the consideration of the "wellbeing" of the people of South Africa, as opposed to specifically the "environment" as the priority goal of the state. The central thesis of Huntley *et al*'s (1989) consideration of South African environments into the 21st century, is that human wellbeing is ultimately dependent on a positive interaction between economic development, quality of life and environmental health (Figure 9.3). It has been suggested on several occasions in this thesis that, apart from the possible misconceptions in an uninformed environment regarding the causes, nature and real extent of soil erosion, and the realisation of political agendas, economics was the motivation for many of the policies implemented and actions conducted by the South African government. Were this true, such a recommendation could satisfy these aspirations, whilst simultaneously attending to the remaining prerequisites for human wellbeing, that is environmental health and a sustainable quality of life for all its people.

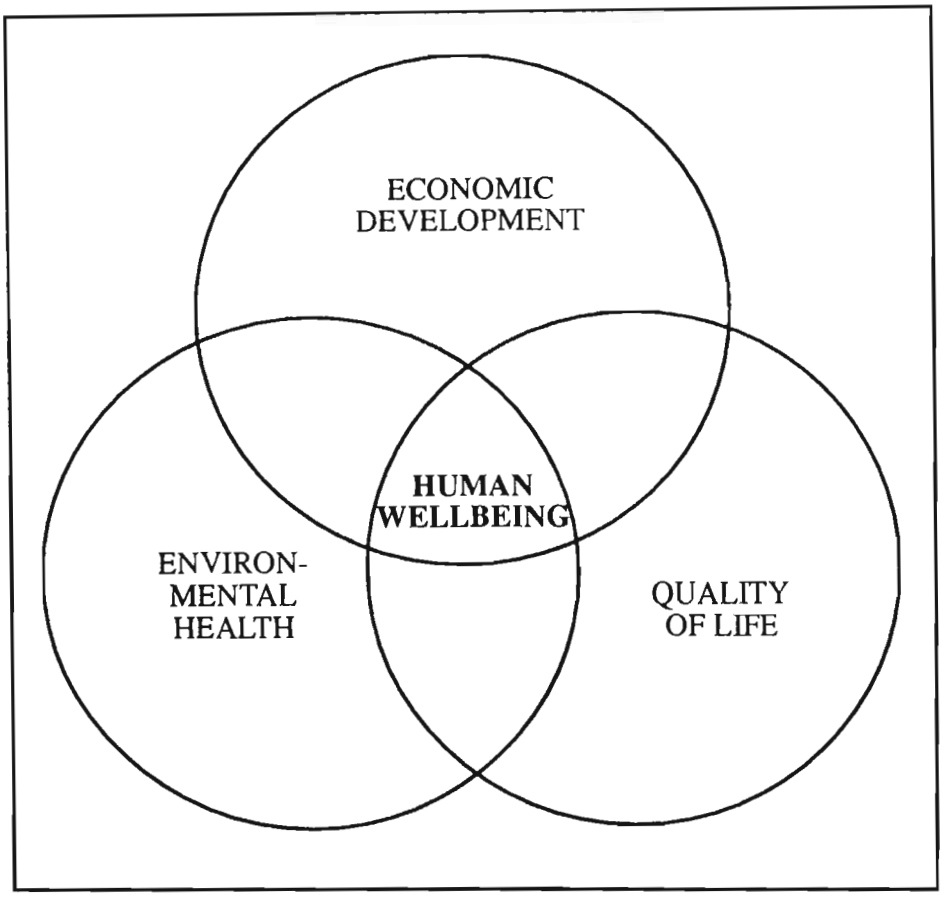


Figure 9.3 The three determinants of human wellbeing. (Huntley *et al*, 1989)

Glaeser (1995), in his consideration of sustainable development in a human ecological context, equates the policy of ecodevelopment with sustainable development and promotes it as "a cooperative approach to sustainable development that incorporates 'cooperation' with nature and the environment". [This concept was first proclaimed and supported by the United Nations Environment Programme (UNEP) in the 1970s.] It presents a strategy for socio-economic development constructed on three principal elements: self-reliance, need orientation (this includes participation), and environmental compatibility. The goals of such a strategy include: income redistribution (which focusses on the disadvantaged) and production, based on long-term sustainability of the environment and conservation of natural resources. This concept, born of human ecology, has particular significance for South Africa particularly during this time of transition where the focus would be on that sector representing the largest proportion of "disadvantaged", which in South Africa could arguably be agriculture, due to the disproportionately large and previously neglected rural population. A soil conservation policy based on the principles of ecodevelopment, specifically defined in terms of landusers needs, could go a long way towards providing the 'meat on the bones' of the dynamic model to which Huntley *et al* (1989) refer. With the correct political leverage such a complementary approach to national unity and well-being, which concommitantly addresses land degradation, could well be the solution to South Africa's social instability embodied in the statement that "there can be no social security without soil security" (Hansard 1946, col.8260).

Khan (1990b), in a recent exploration of the South African land question, asserts that the land issue is indivisible from environmental issues, particularly in South Africa. The legacy of alienation through previously insensitive environmental policies, discriminatory dualism and their inherent characteristics of dispossession, forced removals and resettlement, has had a powerfully negative impact on the environmental attitudes of those, who for decades, have been economically and politically marginalised. Khan (1990a) suggests that by acknowledging the centrality of the land issue to conservation and further, by recognising the political basis of environmental issues, the potential exists for "exciting possibilities for the environmental movement" in South Africa. By taking into consideration the needs and, in accordance with the principles of the new constitution, the rights of previously disenfranchised communities, environmentalists have a contribution to

offer to the formulation of a new South African environmental paradigm - one founded on liberation and a participatory democracy. Khan (1990b) recommends the adoption of a two-pronged approach which incorporates by necessity: (a) consideration of historico-political factors to assist understanding of present day land disputes: in this regard valuable lessons can be learnt from former colonial and post-colonial African experience; and (b) acceptance that the land-use issue versus conservation is more than an ecological issue: it is a question of social justice. Applied to and 'cultivated' within the context of soil conservation, it may be reasoned that the above principles are not only complementary to the recommended goals of ecodevelopment but are in effect encapsulated in the very paradigm proposed by Khan (1990b).

Koch (1991) asks the question "is conservation of agricultural resources possible while simultaneously utilising these resources to produce food and fibre?" The policy formulated in the 1970s of optimum resource utilisation (see Chapter 3) implied three requirements of agricultural production, that is:

(a) that it be in harmony with the natural environment;
(b) that it is not practised at the cost of other natural resources, and
(c) that it be based on sound economic principles.

In accordance with these goals Koch (1991) describes the objective of the South African Extension Service as "to reach and maintain a balance between utilisation and conservation above the point of total resource collapse". It is argued that such an objective not only implies the promotion of sustainability, but further defines it. If such an assumption is correct then it can be concluded as the results presented in this thesis indicate, and in accordance with Koch's (1991) conclusion "there is ample reason to believe that sustainable management is possible in South Africa".

Koch (1991) further points out that whilst science and technology can be engaged to conserve natural resources, they can also be used (and again as the results of this study confirm) "to disguise or camouflage resource degradation". It is logical to assume therefore that science and technology alone cannot provide for the attainment of sustainable agricultural systems. Such is the general conclusion of this work. A significant factor which could potentially complicate the attainment of these goals of sustainability relate to the fact that whereas previously efforts were focused mainly on

the commercial farming sector, these interests due to socio-political developments in the country, have been extended massively by the inclusion of priorities within small-scale enterprises (Hansard 1994, col.2603-2605). In Section 6.4 the increased demand for extension assistance and support from new and 'emergent' farmers was discussed and it was concluded that the problems which have prevailed in the past with regard to extension, will indisputably be magnified in the future unless addressed.

Cedara (1994) in evaluating the quality of support its institution provides to small farmers who have recently obtained access to land in KwaZulu-Natal, based on recent experience, propose a number of factors which have in the past contributed to or accounted for the successes realised to date when establishing small farmers on state land. These include the following:

1. Government and non-government organisations must fulfil the role of facilitator and not implementor.
2. Groups and communities must be closely homogeneous. [Differences among farms and farmers too and the decisions they make cannot be well served by universally prescribed policies and programmes. However, for the sake of practicality grouping will be necessary.]
3. Strong local, formal and informal leadership.
4. Social and economic proposals must be viable. [This will necessitate public and grass roots participation in the formulation of proposals and further in the definition of problems.]
5. Women must be involved.
6. A bottom-up approach to extension should be pursued. [This is to complement the objectives of public participation.]
7. An integrated approach should be followed. [Which assimilates the advantages of an inter- and multi-disciplinary approach to soil conservation.]
8. Incentives must be favourable. [To this could be added the necessity for incentives to be in accordance with individuals' needs and perceptions of the erosion problem].
9. Strong and functional institutions must be established.
10. Good infrastructure is necessary.
11. Input supplies must be guaranteed.

12. Security of tenure must be insured.
13. Financial sources must be available.
14. The ethic of paying for services and equipment (except for extension) must be established.
15. If income is greater than the minimum wages available elsewhere, there is motivation to succeed in agriculture.

Despite their generalised nature, these factors in effect constitute the challenges facing not only the Extension Service in the 'new' South Africa, but also the scientist and policy developer.

9.4 CONCLUSION

From the conclusions presented in the preceding discussion and chapters, it seems logical to assume that unless the factors identified in this study as responsible for this lack of achievement (refer to figures 7.1 and 7.2) are acknowledged as such and corrective initiatives are taken to rectify their negative consequences on the situation in the country, future conservation efforts will be in vain. In short, the conclusions reached in this thesis argue for a fundamental reassessment of state approaches to soil conservation. Government priorities under the new, democratically structured South Africa of the 1990s, will inevitably reflect overwhelmingly the need for socio-economic and political reform. It seems likely that any government faced with such challenges within a framework of limited resources to effect the desired changes, unless soil conservation goals can be reflected convincingly and authoritively to complement such reforms, the result will mean the delegation of conservation ideals to a status of reduced importance. In transforming the South African society, future governments must understand that soil conservation is one of the fundamental cornerstones to attaining one of its priorities "that all South African citizens, present and future, have the right to a decent quality of life through the sustainable use of resources". If this is not expediently acknowledged, land-use practices and soil conservation policies of the past century now applied uniformly, will undoubtedly be emulated into the next, a situation which, in effect, will serve to maintain the *status quo* in environmental management or mismanagement, as the case may be, in the country.

The principal conclusion in Blaikie's (1985) exposition of the political economy of soil erosion in developing countries, is that "unless soil erosion threatens the accumulation possibilities of the dominant classes [that is national and international agricultural bourgeoisie, industrial capitalists, various related groups such as export-import agents, commission agents and government officials themselves], it will not be substantially reduced." The most appropriate or strategic "choice" of soil conservation policy for a new South Africa, therefore, would be one which is "both feasible within an existing political economic context and in step with the *future* direction of social change *which is ideologically acceptable to policy-makers themselves*". The approach recommended in this thesis, as having the most potential to be the most appropriate, (in the dynamically transformational, transitional model of the South African political economy currently represented), potentially most acceptable to a majority of land users, and potentially sustainable, is one offered by a model of ecodevelopment. A compromise between sustainable development and ecodevelopmental models is an imperative if the formidable objectives of the nation's RDP are to be even partially realised. An important imperative of the ecodevelopmental model for environmental management requires that long term planning is implemented complementary to short term goals. Can such a challenge be met? According to Blaikie (1985), two routes forward exist, that of rhetoric, or 'deflected action'. The rhetorical choice demands no elaboration; it is in effect self-defining. The way of 'deflected action' holds more promise for South Africa, and refers to peripheral and support action rather than the "real business" of implementing soil conservation, which includes a collection of projects and programmes which *can* be implemented, but which must be by necessity provided in association with actual conservation programmes. Such actions include training programmes, institution building in soil conservation, mapping and monitoring projects, research projects, sedimentation gauging and other physical experimentation, satellite imagery, but above all, conferences - research and education. Such a proposition coincides with the findings of this study.

A necessary pre-requisite to soil erosion control requires the recognition nationally that existing efforts to contain soil losses are deficient (Whitlow, 1991). Such is the case in both Australia and the United States of America. Whilst Whitlow (1991) acknowledges the erosion problem is far from over, he remains optimistic for the future given the level of commitment realised in each of these countries. This

presents an enormous challenge to combatting South African soil erosion problems. Major political support stimulated by community concern over the adverse effects of erosion are, according to Whitlow (1991) what has placed soil erosion on political platforms, a move which has consistently been resisted throughout the evolution of soil conservation policy in South Africa.

Changing the attitudes and practices of the nation will require an information campaign, supported fully by the state and led by the non-governmental movement (IUCN/ UNEP/ WWF, 1991). With a credible information base, strategies can be developed with confidence to motivate, educate and equip individuals to lead sustainable lives, or in the context of this study, utilise the soil within its sustainable limits. According to Zube (1974) credibility and communication are essential ingredients in any decision process. Whether or not available data (to inform, for example, policy decisions) is considered in the decision-making process will be conditioned by their apparent credibility. Only research conducted (a) in accordance with the iterative process recommended in Figure 9.1 and (b) to address the complexity of variables specifically represented in Figure 7.1, can effectively meet the credibility criteria required.

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APPENDIX I

SOIL EROSION AND CONSERVATION POLICY IN SOUTH AFRICA, 1910-1992

It is imperative that respondents recognise at the outset that this exercise is NOT measuring right or wrong answers but is attempting to assimilate information on the opinions of decision makers involved in policy development, and scientists, regarding the extent and cause(s) of South African soil erosion. The exercise should take no more than 30 minutes to complete. Your inputs are vital to this research project and your participation is sincerely appreciated.

Name: (Prof/Dr/Mr/Mrs/Ms) .....

Name and address of institution/organisation.....

Tel. No.: ..... Fax No.: ..... Email address: .....

Unless otherwise indicated please circle the answer of your choice.

1. Which of the following categories describes most closely your involvement with soil erosion. (You may select one or more than one.)

   1. scientist 2. policy maker 3. technical advisor 4. extensionist 5. other .....

2. Do you believe you have personally influenced soil conservation policy decisions and/or development in the past?

   1. Yes 2. No

3. During which of the following decades were you personally most actively involved in any aspect of soil erosion and/or conservation research and/or policy development? (You may select more than one.)

   1. pre-1939 2. 1940-49 3. 1950-59 4. 1960-69 5. 1970-79 6. 1980-92 7. post-1992

4. How serious do you perceive the soil erosion problem to be?

   1. Very serious - requiring immediate and coordinated action
   2. Serious - requiring priority attention by farmers and state
   3. Potentially serious - we need more information before a commitment to action can be assured
   4. Not serious
   5. Other. Please comment: .....

5. Do you believe scientists agree regarding a definition of geological norms for soil loss and erosion?

   1. Yes 2. No 3. Please indicate why you think this is so. .....

   .....

6. Do you believe the rate of soil loss in South Africa has exceeded geological norms?

   1. Yes 2. No 3. Not enough information available to say for sure

7. Do you believe there is scientific consensus regarding the reasons for accelerated erosion?

   1. Yes 2. No

8. Do you perceive land degradation and concomitant soil erosion to be a serious threat to the national resource base?

   1. Yes 2. No

9. Do you believe South African soil conservation policy has failed to control soil loss and degradation of land?

   1. Yes 2. No

10. Please give the main reason(s) why you think this is so.

    Comments: .....

    .....

11. How scientifically informed do you believe policy decisions were prior to 1992?

    1. well informed 2. informed 3. poorly informed 4. no scientific foundation

12. Prior to 1992, do you believe policy makers adequately consulted scientists before making policy decisions?

    1. Yes 2. No

13. Which of the following approaches to soil conservation in your opinion has dominated policy formulation in the past? (You may select more than one.)

    1. proactive 2. reactive 3. preventative 4. curative 5. other .....

14. This investigator has identified 5 'P's of soil erosion. Please rank these 5 categories according to your perception of their potential to influence the effectiveness of policy (where 1 is most influential and 5 least influential).

    1. practice (landuse techniques, e.g. faulty veld and stock management) .....
    2. perceptions (of the decision maker and/or scientist and/or farmer) .....
    3. physical (field studies) .....
    4. policy (formulation, administration, implementation and enforcement) .....
    5. politics (e.g. role of ideology, priorities) .....

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

    1. lack of importance ascribed to soil ....
    2. national level control ....
    3. non-uniformity in application of law ....
    4. inadequacies in the implementation of policy ....
    5. paucity of information on real nature and extent of the problem ....

16. Rank the following areas in priority order (1 highest priority and 12 lowest priority) in accordance with the order in which you think the current government perceives the greatest needs of the people they represent.

1. education	....	7. water conservation	....
2. housing	....	8. soil conservation	....
3. defence	....	9. healthcare	....
4. reconciliation of people	....	10. self-determination	....
5. rural economic development	....	11. self-sufficiency	....
6. commercial agriculture/forestry	....	12. other (Please name.)	....

17. Rank the following areas in priority order (1 highest priority and 10 lowest priority) in accordance with the order in which you think the former government perceived the greatest needs of the people to exist.

1. education	....	7. water conservation	....
2. housing	....	8. soil conservation	....
3. defence	....	9. healthcare	....
4. reconciliation of people	....	10. self-determination	....
5. rural economic development	....	11. self-sufficiency	....
6. commercial agriculture/forestry	....	12. other (Please name.)	....

18. In your opinion which of the abovementioned areas should receive priority attention from the State? (You may select one or more than one.) ....

19. At what stage during the period 1910 to 1992, do you think the general public and farming community were most conscious of the extent of the soil erosion problem?

1. pre-1939 2. 1940-49 3. 1950-59 4. 1960-69 5. 1970-79 6. post-1980

20. Can you ascribe this heighted awareness to particular events? 1. Yes 2. No

Please elaborate:.....

.....

21. At which level do you think soil erosion could be most optimally controlled?

1. national 2. provincial 3. local 4. regional 5. other. Please name.....

22. Which NGOs, to your knowledge, have in the past actively promoted soil conservation?

Please name these:.....

23. Lack of interagency and interdepartmental cooperation and coordination of conservation efforts has been criticised in the past as contributing to ineffective implementation of policy. Do you agree with this claim? 1. Yes 2. No.

Please justify your claim. .....

.....

24. Some scientists have stated that the 1970s saw a decline in public interest in environmental issues, including soil conservation. Do you agree with this claim? 1. Yes 2. No

Please justify your claim. .....

.....

25. In this study, due to the wealth of legislation on the statutes pertaining either implicitly or explicitly to soil erosion, the researcher selected four pieces of legislation for analysis considered to be the most significant and influential in describing the evolution of conservation policy in South Africa. Which of these acts do you believe was most influential in raising public awareness of the soil erosion problem? (You may select more than one.) These acts are:

1. Forest and Veld Conservation Act 13 of 1941
2. Soil Conservation Act 45 of 1946
3. Soil Conservation Act 76 of 1969
4. Conservation of Agricultural Resources Act 43 of 1983.

Please justify your claim. .....

.....

26. To the best of your knowledge and expertise, are you aware of any other piece of legislation which may have exercised greater influence on the course of soil erosion in the past? 1. Yes 2. No

Please name it. .....

27. Are you aware of particular grievances raised by landusers in the past to the provisions of any one or more of the abovementioned acts? 1. Yes 2. No

If yes, please give details.....

.....

28. Are you aware of particular grievances raised by scientists in the past to the provisions of any one or more of the abovementioned acts? 1. Yes 2. No

If yes, please give details.....

.....

29. Which of the following statements do you believe applied to the Extension Service before 1992? (You may select more than one.)

1. sufficiently specialised to be able to identify specific needs on a single farm
2. lacked adequate supervisory capacity, a consequence of limited extension coverage
3. neglected or was unable (due to personnel shortages) to conduct follow-up activities or monitor developments
4. their in-service training programmes were biased towards natural sciences and production technology
5. reflected the classical top-down approach to extension (perceived by farmers to be dictatorial in nature)
6. provided a service which aided predominantly the progressive, commercially efficient, sophisticated farmer and failed to address the needs of the resource-poor, small-scale farmer (subsistence and/or commercial).

30. How receptive do you believe former government officials were to taking advice from international agencies?

    1. Very receptive 2. moderately receptive 3. not very receptive 4. explicitly averse to taking advice

31. Which of the following do you believe may in the past have influenced farmer compliance with soil conservation legislative controls? (You may select more than one.)

    1. The extent of ministerial authority with regard to expropriation of land and imposed construction of soil conservation works. (Incurred costs were recoverable from the landowner and not the state).
    2. Grants and subsidies paid by the state qualified as "gross income" and by implication were taxable.
    3. The ambiguous nature of many legislative provisions/controls.
    4. Inability of scientists/professionals to translate conservation strategies and methods into accessible and practical advice for the farmer. (Strategies were often perceived by farmers to be 'remotely applicable' to their needs.)
    5. Subsidies were allocated to conservation districts and not to individual farms. [Note: One conservation district may consist of hundreds of farms.]
    6. Inadequate number of officials to enforce legislation.
    7. The imposition of obligations on landusers negatively reinforced farmers' attitudes to state intervention.
    8. Inadequate support mechanisms and incentives.
    9. Farmers perceived the adoption of conservation practices to have a high risk potential.
    10. Failure of government to recognise the importance of maintaining simultaneous farm income with soil conservation.

32. How best do you believe sustainable resource management policies should be enforced to ensure optimum compliance? Please comment:.....
    .....
    .....

Please indicate the extent to which you agree with the following statements on the following scale of 1 to 5 (where 1 reflects strong agreement and 5 strong disagreement). (Statements are derived from various texts referenced in the study). Please note that unless otherwise indicated, all statements refer to South African conditions.

1. Agree strongly 2. Agree 3. Dont Know 4. Disagree 5. Disagree strongly

I Dominant perceptions concerning soil erosion:

1.	Soil conservation is the responsibility of the farmer.	1 2 3 4 5
2.	Soil conservation is the responsibility of the state.	1 2 3 4 5
3.	Success of soil conservation policy rests ultimately with the farmers.	1 2 3 4 5
4.	Success of soil conservation policyrests ultimately with the state.	1 2 3 4 5
5.	Success of soil conservation policy rests ultimately with extensionists and technical advisors.	1 2 3 4 5
6.	Policy decisions have reflected a commitment to conservation throughout the period 1910-1992.	1 2 3 4 5

7. The State has provided the necessary legislative machinery, incentives and support mechanisms to encourage and promote soil conservation farming. 1 2 3 4 5
8. Soil conservation was never a State priority. 1 2 3 4 5
9. Policies have failed in the past to take into account the means and needs of individual farmers. 1 2 3 4 5
10. Storage capacity in dams was reduced in the past due to soil loss in the catchments. 1 2 3 4 5
11. Some of the most badly degraded land is found on 'white' agricultural land. 1 2 3 4 5
12. The most badly degraded land is found in the former homelands. 1 2 3 4 5
13. Scientists are inclined to overstate the extent of soil erosion. 1 2 3 4 5
14. Policy-makers are inclined to minimise the extent of the erosion problem. 1 2 3 4 5
15. Current rates of soil loss are not significantly higher than those recorded by Midgely in 1952. 1 2 3 4 5
16. Soil erosion in South Africa mirrors that found in many other former European colonies in Africa. 1 2 3 4 5
17. Soil erosion knows no political boundaries. 1 2 3 4 5
18. There can be no social security without soil security. 1 2 3 4 5
19. Soil is one of the country's principal resources and must be conserved. 1 2 3 4 5
20. Communal systems of land tenure, overgrazing and overpopulation on marginal lands have inevitably exacerbated the soil erosion problem. 1 2 3 4 5
21. Traditional farming methods practiced in the former 'homelands' cannot alone explain the extent of erosion manifest in these areas. 1 2 3 4 5
22. Much of the gully erosion visible on marginal lands pre-dates the policies formulated after 1910. 1 2 3 4 5
23. Agricultural dualism and separate development have shaped the spatial economy of the country. 1 2 3 4 5
24. Agricultural dualism and separate development contributed significantly to the extent of erosion. 1 2 3 4 5
25. Non-applicability of legislation to <u>all</u> agricultural land has exacerbated the erosion problem. 1 2 3 4 5
26. The dominant perception amongst land-users is that conservation is a non-paying venture. 1 2 3 4 5

II. Soil erosion research and conservation policy:

1. Soil erosion has always been perceived to be a physical problem. 1 2 3 4 5
2. Scientists agree on the actual extent and causes of soil erosion. 1 2 3 4 5
3. Available data on soil are inadequate and incomplete. 1 2 3 4 5
4. Available data on soils have in the past been largely underutilised. 1 2 3 4 5
5. Available data on soils have in the past been misused (used inappropriately). 1 2 3 4 5
6. Credibility of erosion information and conservation strategies requires scientific consensus. 1 2 3 4 5
7. We can learn a great deal from the experience of our American counterparts. 1 2 3 4 5
8. America is internationally renowned as a leader in the field of soil conservation. 1 2 3 4 5
9. Holistic resource management has in the past been overlooked by policy makers. 1 2 3 4 5
10. A prerequisite for the success of soil conservation is an educated nation. 1 2 3 4 5
11. Land reclamation and resettlement was always considered to be a practical solution to the problem. 1 2 3 4 5
12. Successful policy decisions depend ultimately on the transferability of information from the scientist to the decision maker. 1 2 3 4 5

13. Information on soils has become less important than values and beliefs as a basis for policy-making. 1 2 3 4 5
14. International soil conservation programmes and policies assume the state to be neutral, able to mediate between competing interests and to intervene above them to apply rational policies for the maximum aggregate benefit. Prior to 1992, the same can be said of South Africa. 1 2 3 4 5
15. Policies formulated to influence land use will inevitably impact on political-economic relations. 1 2 3 4 5
16. Policy formulation reflects the dominant perceptions of policy makers. 1 2 3 4 5
17. Soil conservation policy has in the past reflected prevailing conservation thinking of scientists and policy makers in the U.S.A. 1 2 3 4 5
18. Indigenous knowledge and local farming practices have been considered by decision makers in the formulation of soil conservation policy. 1 2 3 4 5
19. Soil conservation policy in South Africa has consistently failed in the past to take into account the needs of the small-scale farmer to favour large-scale commercial interests. 1 2 3 4 5
20. Conservation policies in the past emphasised the management of on-site erosion and consequences. 1 2 3 4 5
21. Persuading farmers to comply with conservation controls is preferable to stringent enforcement. 1 2 3 4 5
22. South Africa already has the legislative capacity on the statutes to address soil erosion. 1 2 3 4 5
23. Since the promulgation of the Soil Conservation Act 45 of 1946, the country has had the legislative capacity to adequately address soil erosion. 1 2 3 4 5
24. South Africa does not need more laws to effect soil conservation objectives, only the political will. 1 2 3 4 5
25. Policy decisions require the balance of legal requirements, technical considerations and political consensus. 1 2 3 4 5
26. Economic forces in South Africa have reflected a tendency in the past to "defer and accommodate themselves to" the racial ordering of society. 1 2 3 4 5
27. Economic forces have expedited a revision of previous state agendas pertaining to landuse. 1 2 3 4 5
28. Economic needs in the past have been subordinated to political imperatives. 1 2 3 4 5
29. The regulation of spatial landuse was realised through legislative enactments. Likewise, it should be possible to regulate environmental landuse in accordance with conservation ideals. 1 2 3 4 5
30. The state placed unrealistic financial burdens on farmers in respect of conservation works. 1 2 3 4 5
31. State incentives to encourage and motivate farmers to practice soil conservation were adequate. 1 2 3 4 5
32. Environmental education is formulated at a national planning level in South Africa. 1 2 3 4 5
33. Legislative provisions formulated in the past enabled landowners/users a "large measure of say in regard to what should be done [concerning soil conservation and enforcement of legislation]". This researcher suggests that for such provisions to work, policy officials must have assumed 3 preconditions to exist amongst the farming community. These are:
    (1) that all farmers were equally aware of the causes, extent and consequences of erosion and therefore the imperative to comply with soil conservation legislation; 1 2 3 4 5
    (2) that all farmers were motivated and charged to execute such measures without question for the sake of conservation; 1 2 3 4 5
    (3) that all farmers were prepared morally and ethically to initiate the necessary prosecution proceedings against contravening neighbours. 1 2 3 4 5

34. For soil conservation to work in this country will require a massive injection of financial support. 1 2 3 4 5
35. Sustained behavioural change in farmers will require regular and ongoing financial state aid. 1 2 3 4 5
36. South Africa as a nation is financially capable of carrying the costs of erosion control. 1 2 3 4 5
37. Soil and water conservation should be addressed simultaneously as part of the same resource management problem. 1 2 3 4 5
38. Conservation management in South Africa entails a one-way process of information transfer from scientist to decision-maker to extension worker. Feedback from extensionist to scientist or decision-maker is negligible. 1 2 3 4 5

...oo0oo...

I sincerely thank you for taking the time to complete this questionnaire. Please use the self-addressed envelope attached to return this at your earliest convenience (ideally by June 30) to: A Cooper, c/o Professor G G Garland, Geographical and Environmental Sciences, University of Natal, P O Box 18091, Dalbridge 4014, Fax No: 031 260-1391.

Should you have any queries regarding this questionnaire, please do not hesitate to contact the researcher who will be at the following number (Tel. 031 - 260-2418/2416) until 13 July 1996 and thereafter at: 3 University Gardens, Coleraine, Co. Londonderry BT52 1JT, Northern Ireland, U.K. (Fax. 0944 - 1265 - 324911, c/o Dr JAG Cooper; Email: JAGC@sperrin.ulst.ac.za).

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

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The End

APPENDIX II

CODE BOOK- SOIL EROSION AND CONSERVATION POLICY IN SOUTH AFRICA, 1910 - 1992 : THE HUMAN DIMENSION

I.D. No: 01 - 103 (Sample size: n = 103)

[N.B. Space entered after ID and each question]

VARIABLE	CODES	CATEGORY OF RESPONSE	
SECTION 1 : General			
Q1	0	scientist	6 single cols
	0	policy maker/developer	
	0	technical advisor/engineer	
	0	extensionist	
	0	lecturer (college/university)	
	0	farmer	
Q2	0	no reply	
	1	yes	
	2	no	
Q3	0	pre-1939	7 single cols
	0	1940-49	
	0	1950-59	
	0	1960-69	
	0	1970-79	
	0	1980-92	
	0	post-1992	
Q4	0	no reply	
	1	very serious	
	2	serious	
	3	potentially serious	
	4	not serious	

Q5	00	no reply	
	11 - 49	yes	3 double cols
	51 - 99	no	3 double cols
	11	yes - no explanation	
	12	general agreement on definition	
	13	definition well documented	
	14	intervening complexities of socio-econ factors	
	15	= cornerstone upon which we base our strategies	
	51	no - no explanation	
	52	no standardization of norms	
	53	if agreement would be defined in laws	
	54	some interpret problem on emotional grounds	
	55	difficulty lies in quantifying the problem	
	56	no consensus/too much controversy/divergent views	
	57	definition dependent on background of perceiver	
	58	natural erosion can also be acceler. (climate cycles)	
	59	decisions often based on presupposition and bias	
	60	problem greater than definition of norms	
	61	recent geological past not taken into account	
	62	inadequate research to set thresholds, norms/uncertainties	
	63	standardization pointless, uniqueness each locality	
	64	definitions inevitably vary spatially and temporally	
Q6	0	no reply	
	1	yes	
	2	no	
	3	not enough information available	
Q7	0	no reply	
	1	yes	
	2	no	
Q8	0	no reply	
	1	yes	
	2	no	
Q9	0	no reply	
	1	yes	
	2	no	

Q10	00	no reply	
	11 - 49	yes	3 double cols
	51 - 99	no	3 double cols
	11	yes - no explanation	
	12	differential application; sm scale v commerc v communal l ten	
	13	literature, personal observation, prevalent and apparent today	
	14	lack political will, real commitment (gov)	
	15	inadeq funding, subsidies, incentives, no recog conserv status	
	16	emotionally charged issues - soil erosion and land tenure	
	17	politically motivated policies (betterment, maize, clt)	
	18	ineffect enforcemt, penalties, policy of persuasion	
	19	autocratic nature of enforcement, top down approach	
	20	consult land users, people centred policies	
	21	policy implementation, lack coordinated effort	
	22	no consideration economic realities, focus today	
	23	inadeq manpower to control land use	
	24	absence land stewardship, conserv ethic, custodianship	
	25	politician/public/land user ignorance of problem	
	26	lack monitoring, meagre research inputs, thresholds etc.	
	27	failure to recognise soil erosion as a problem	
	28	inapprop schemes, inapprop application	
	29	policy per se - loopholes, fragmentation, unintegrated	
	51	no - no explanation	
	52	after all govt. inputs - inevitable would be a success	
Q11	0	no reply	
	1	well informed	
	2	informed	
	3	poorly informed	
	4	no scientific foundation	
Q12	0	no reply	
	1	yes	
	2	no	
Q13	0	proactive	5 single cols
	0	reactive	
	0	preventive	
	0	curative	
	0	politically motivated	
Q14	0	no rank	rank
	1	practice	
	2	perceptions	
	3	physical	
	4	policy	
	5	politics	

Q15	0	no rank	rank
	1	lack of importance ascribed to soil	
	2	national level control	
	3	non-uniformity in application of law	
	4	inadequate policy implementation	
	5	paucity of information on extent and nature of the problem	
Q16	00	no rank	12 double cols
	01	education	
	02	housing	
	03	defence	
	04	reconciliation of people	
	05	rural economic development	
	06	commercial agriculture/forestry	
	07	water conservation	
	08	soil conservation	
	09	healthcare	
	10	self-determination	
	11	self-sufficiency/food production	
	12	job creation/employment	
	13	crime prevention/law and order	
	14	basic services (incl. sanitation, water and electricity)	
	15	national economic development	
	16	population growth/development	
	17	political empowerment	
Q17	00	no rank	12 double cols
	01	education	
	02	housing	
	03	defence	
	04	reconciliation of people	
	05	rural economic development	
	06	commercial agriculture/forestry	
	07	water conservation	
	08	soil conservation	
	09	healthcare	
	10	self-determination	
	11	self-sufficiency/food production	
	12	national economic development	
	13	job creation/employment	
	14	separate development	
	15	cultural protection	
	16	population growth/development	
	17	political empowerment	

Q18	00	no reply	5 double cols
	01	education	
	02	housing	
	03	defence	
	04	reconciliation of people	
	05	rural economic development	
	06	commercial agriculture/forestry	
	07	water conservation	
	08	soil conservation	
	09	healthcare	
	10	self-determination	
	11	self-sufficiency/food production	
	12	other	
Q19	0	pre-1939	6 single cols
	0	1940-49	
	0	1950-59	
	0	1960-69	
	0	1970-79	
	0	post-1980	
Q20	00	no reply	
	11 - 49	yes	3 double cols
	51 - 99	no	3 double cols
	11	Yes - no explanation	
	12	Ltd resources, bankruptcy, debt, insuffic yields (economics)	
	13	Drought/USA 'Dust Bowl' experience/alarm	
	14	Desertific/Karoo bush encroach/degrad more conspicuous	
	15	Media (TV 1975 SA), access news, gen env awareness	
	16	Post war awareness and donga doctor training	
	17	Post 1980 ownership private game farms	
	18	Storm damage 84/87, floods	
	19	Recession - gov pd workers to constr works - job creation	
	20	Education, awareness campaigns, NVT, publications	
	21	Enactment sc legislation, related schemes and strategies	
	51	No - no explanation	
Q21	0	national	6 single cols
	0	provincial	
	0	local	
	0	regional	
	0	catchment	
	0	farm	
Q22	22		

Q23	00	no reply	
	11 - 49	yes	3 double cols
	51 - 99	no	3 double cols
	11	yes - no explanation	
	12	Lack funding/motivation to make it work	
	13	Poor cooper homelands/lack of commitment	
	14	Dept. priorities/preocc own affairs/empire building/14 depts.	
	15	Frag responsibility/poor inter-/intra- deptl communication	
	16	Personal exper/observation/literature says so!	
	17	Frag legislation - >60 acts address soil/ diff standards etc.	
	18	Lack cohesive extension/inadequate manpower	
	19	Poor dissemination data/columnar/hierarchical structure govt.	
	20	Absence 'champion' leader to motivate	
	51	no - no explanation	
	52	Personal experience - not a problem	
	53	Local efforts shd supercede/rectify poor coord/interference	
	54	= Political decision not to effectively implement/apply policy	
	55	Policy has achieved its defined objectives	
Q24	00	no reply	
	11 - 49	yes	3 double cols
	51 - 99	no	3 double cols
	11	yes - no explanation	
	12	No public exposure to prob/no interest homeland problems	
	13	Env issues to fore in general at expense of specifics ie s cons	
	14	Other socio-political pressures/Preoccupation with politics	
	15	Preoccupation with technological advancement	
	16	Lethargy/sit reportedly improved/no perceived crisis	
	17	"SA always lags behind rest of dev'd world by 10-20 yrs	
	51	no - no explanation	
	52	Media/worldwide awareness/ reported progress re cons efforts	
	53	TV intro SA 1970s - logical issues to fore	
	54	1969 Conservation act promulgated	
	55	Veld Reclam Schemes launched	
	56	Grassroot groups/orgs got going e.g. Earthlife Africa	
	57	Personally observed increase in interest	
	58	Public never been suffic. interested so 1970s no different	

Q25		00	no reply	3 double cols
		11 - 19	Act 13 of 1941	
		21 - 29	Act 45 of 1946	
		31 - 39	Acts of 1941 and 1946	
		41 - 49	Act 76 of 1969	
		51 - 59	Act 43 of 1983	
		61 - 69	Acts of 1969 and 1983	
		71	All of the above	
		81	None of the above	
	1941	11	Yes - no explanation	
		12	New approach - signified new hope	
	1946	21	Yes - no explanation	
		22	Laid basis for future legislation/others admin. improvements	
		23	Made financial aid avail to farmers for erosion prevention	
		24	Could apply for recognition as soil conservation district	
		25	Novelty value	
		26	Set platform for creating awareness/incr publicity (NVT)	
		27	Caused major social changes	
	41/46	31	Yes - no explanation	
		32	More publicity associated with these two than others	
	1969	41	Yes - no explanation	
		42	Provided for active particip/interaction farmer/extensionists	
	1983	51	Yes - no explanation	
		52	Targeted spec. category ie land users/within partic time frame	
		53	Implementation by all players within agricultural sector	
		54	Provided for Inspection Service to monitor and control	
		55	Personal experience	
		56	Made provision for all players to cooperate against erosion	
		57	Provided for a decent subsidy scheme	
		58	First Act to be enforced/provision made to adeq. enforce	
		59	First to have wherewithall to implement effectively	
	69/83	61	Yes - no explanation	
		62	Use of media, newspapers, etc. public better informed	
	all	71	Yes - no explanation	
		72	All of the above Acts raised public awareness	
	none	81	Yes - no explanation	
		82	None of the above Acts raised public awareness	

Q26

00	no reply	
11 - 49	yes	3 double cols
51 - 99	no	3 double cols

11	Yes - no details
12	Environment Conservation Act 73 of 1989
13	Subdivision of Agricultural Land Act 70 of 1970
14	Glen Grey Act 1897
15	Group Areas Act
16	Land Acts 1913 and 1936
17	Betterment policies
18	Mountain Catchment Areas Act
19	Water Act
20	Fence Act
51	No - no details

Q27

00	no reply	
11 - 49	yes	3 double cols
51 - 99	no	3 double cols

11	Yes - no details
12	No uniform application (i.e. excluded homelands)
13	Interference own business/resistance to reduction in autonomy
14	Only applied to farming community - not e.g. urban areas
15	Inadequate funding for conservation projects
16	Prescriptive/autocratic (not facilitative)
17	Farmer limited/no money for conservation
18	Expropriation of degraded land
19	Inability sc committees to enforce Act against neighbours
20	Disagreement re. certain policies (stocking rates, veld burning)
21	Request for/dissatisfaction with law enforcement
22	No recognition for conservation efforts/achievements
23	Farmers committees used for political ends
24	Fragmentation of legislation (>60 apply to soil)
25	Inadequate extension support
51	No - no details

Q28	00	no reply	
	11 - 49	yes	3 double cols
	51 - 99	no	3 double cols
	11	Yes - no explanation	
	12	ineffective without proper implementation/no money for	
	13	ineffective without law enforcement/not enough teeth	
	14	nature/properties of soil not considered in Acts	
	15	courts not sensitive to individ cases/ill informed	
	16	inapprop. land use and mgement strategies	
	17	not uniformly applied (excluded homelands)	
	18	failure to involved people in its developmt/local participation	
	19	not prescriptive enough	
	20	"carrying capacity" not static, so controls should also vary	
	21	research inadequacies/important limiting factor	
	22	gov subsidy policy - aid wrongdoers	
	23	absent "sensible national policy"/public not ready	
	24	rigidity of enforced generalisations imposed	
	25	procedures/measures reactive - wrong emphasis	
	26	legis - PR exercise only/unenforceable norms and standards	
	27	fragmentation of legis. addressing soil/permitted loopholes	
	28	not consulted regularly-excluded by agriculturalists, engineers	
	51	No - no explanation	
Q29	0	sufficiently specialised	6 single cols
	0	lacked adequate supervisory capacity	
	0	poor on follow-up/monitoring	
	0	in-service training programmes biased	
	0	reflected top-down approach	
	0	aided predominantly progressive, commercial farmer	
Q30	0	no reply	
	1	very receptive	
	2	moderately receptive	
	3	not very receptive	
	4	explicitly averse to taking advice	
Q31	0	ministerial authority	10 single cols
	0	taxable subsidies	
	0	legislative ambiguities	
	0	remotely applicable strategies	
	0	conservation district subsidies	
	0	inadequate manpower	
	0	imposition of obligations	
	0	inadequate support mechanisms and incentives	
	0	risk potential of soil erosion	
	0	balancing soil conservation with farm income	
Q32	32		

SECTION 2 : Dominant perceptions concerning soil erosion

1	1 2 3 4 5	26 single cols
2	1 2 3 4 5	
3	1 2 3 4 5	
4	1 2 3 4 5	
5	1 2 3 4 5	
6	1 2 3 4 5	
7	1 2 3 4 5	
8	1 2 3 4 5	
9	1 2 3 4 5	
10	1 2 3 4 5	
11	1 2 3 4 5	
12	1 2 3 4 5	
13	1 2 3 4 5	
14	1 2 3 4 5	
15	1 2 3 4 5	
16	1 2 3 4 5	
17	1 2 3 4 5	
18	1 2 3 4 5	
19	1 2 3 4 5	
20	1 2 3 4 5	
21	1 2 3 4 5	
22	1 2 3 4 5	
23	1 2 3 4 5	
24	1 2 3 4 5	
25	1 2 3 4 5	
26	1 2 3 4 5	

SECTION 3 : Soil erosion research and conservation policy

1	1 2 3 4 5	38 single cols
2	1 2 3 4 5	
3	1 2 3 4 5	
4	1 2 3 4 5	
5	1 2 3 4 5	
6	1 2 3 4 5	
7	1 2 3 4 5	
8	1 2 3 4 5	
9	1 2 3 4 5	
10	1 2 3 4 5	
11	1 2 3 4 5	
12	1 2 3 4 5	
13	1 2 3 4 5	
14	1 2 3 4 5	
15	1 2 3 4 5	
16	1 2 3 4 5	
17	1 2 3 4 5	
18	1 2 3 4 5	
19	1 2 3 4 5	
20	1 2 3 4 5	
21	1 2 3 4 5	
22	1 2 3 4 5	
23	1 2 3 4 5	
24	1 2 3 4 5	
25	1 2 3 4 5	
26	1 2 3 4 5	
27	1 2 3 4 5	
28	1 2 3 4 5	
29	1 2 3 4 5	
30	1 2 3 4 5	
31	1 2 3 4 5	
32	1 2 3 4 5	
33	0	
34	1 2 3 4 5	
35	1 2 3 4 5	
36	1 2 3 4 5	
37	1 2 3 4 5	
38	1 2 3 4 5	

The End

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SOIL CONSERVATION POLICY SURVEY - MAILING LIST

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