COMMUNITY BASED SOIL CONSERVATION AS BASIS FOR LAND RECLAMATION IN THE EASTERN CAPE

by

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DECLARATION

I declare that this mini-dissertation describes my original work, except where specific acknowledgement is made to the work of others, and has not previously in its entirety or in part been submitted for a degree to any other university.

N.N. Maswana

Signature ..... Date 10.01.2002

DEDICATION

I dedicate this work to my grandmother, Mashugu, for being everything to me.

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1. My supervisor, Professor M.C. Laker, whose outstanding guidance, courage and patience throughout the study made my dreams a reality.

2. My parents, daughter and the entire family for their sacrifices, love and prayers during my studies

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ABSTRACT

Soil erosion is a hazard that is adversely affecting agricultural production in the Eastern Cape province. The climatic conditions and parent material (natural resources) are not conducive for the development of stable soil. This situation is, however, aggravated by amongst other things, poor planning, bad agricultural practices, land tenure, population pressures, overgrazing, etc.

Soil reclamation has become one of the Government's priorities. However, all their attempts have failed. On the other hand the interventions by NGO's have been successful.

This study has found that the most effective way to address the soil reclamation problems and ensure that the soil conservation initiatives are successful and sustainable, is to:

1. Involve the natural resource users (the local community). Community involvement entails the following:
    a. The community taking ownership and the lead in the initiative.
    b. Where there is a need they must be empowered to make informed decisions.
    c. For the participation to be effective, there must be technology transfer.
    d. The immediate beneficiaries must be the active participants.

2. Prevent soil degradation through development of sustainable farming systems for the poor soils. This is a process that needs detailed study of the natural resources as a first step. In this study it was learnt that poor planning as a result of lack of understanding or knowledge of the natural resource of the province, particularly the soil, is one of the key causes of soil erosion. A detailed study of the soils or soil survey of the Eastern Cape has become critically important in order to ensure that planning is based on facts rather than assumptions. This will pave the way for the development of sustainable farming systems.

However, without addressing the land tenure system in the Eastern Cape province (communal), by giving ownership of land to the people it becomes difficult to ensure that farmers will invest in the land through soil reclamation and soil conservation practices.

CHAPTER 1

INTRODUCTION

1.1 GENERAL

"The value of soil is rarely appreciated because of its seemingly universal abundance. Except where covered with buildings and roads, or in rocky places in spectacular parks, the entire land surface appears to be covered with soil. Only a small fraction of soil, however, is suited for cultivation. It is this small fraction upon which an ever-expanding civilization must depend most for food and fibre" (Follet, 1989).

Agriculture is regarded as the heart of African economies because a large percentage of the population earns their living from agriculture (Bruton and Gess, 1988). Provision of the staple food and even the food that is required to meet the basic dietary needs must be accomplished through sustainable farming on the limited resources. It is therefore important for the people to look after their agricultural resources in order to ensure sustainable agricultural production. It has been realized that far too little attention has been devoted by farmers to soil protection against erosion and maintenance of soil productivity through good cropping and grazing practices (Bennett, 1945). This has led to widespread erosion and denudation of the landscape. Generally people ignore soil erosion, they only see its destruction when they come across open dongas. Loss of soil through sheet or rill erosion is invisible to farmers. Through soil erosion both soil and water resources are destroyed as rivers and dams silt up, thus reducing their carrying capacity and large quantities of soil are wasted.

Soil erosion does not only leave the landscape with bad scars but it also reduces/lowers the fertility of the soil, reduces underground water supplies and silt up dams, and generally lowers farm income. Low farm income results in poverty and may lead to famine. Soil erosion is an unnecessary and unaffordable wastage of the productive land.

It is everybody's responsibility to increase agricultural production in order to meet the demands of the growing population and improve the rural income through trade with

urban markets, but the major problem facing the African continent is that the capacity of the land to support such production is in the jeopardy (IFAD, 1992). The major concern is the declining soil productivity and loss of whole productive areas, resulting in poor harvests, more work and less food for the farmers. This scenario is also true for the Eastern Cape, which is the province with by far the highest annual soil loss per unit area in South Africa (CSIR Environmental Services, 1992).

Soil degradation is worsening poverty and marginalization of the rural people in the Eastern Cape and hunger has gained territory in the region. Unfortunately very few members of the general public or farmers in the Eastern Cape province are really aware of the implications of this situation and committed to soil conservation. The current agricultural practices are not conducive to the conservation of these precious resources.

To reduce the acceleration of the decline in living standards of the rural population, soil conservation must therefore be central to strategies of agricultural and rural development in the province. Experience in other countries in Africa with soil erosion problems, e.g. Burkina Faso and Niger, has shown that community-based soil conservation approaches and strategies are the most efficient to combat soil erosion in traditional small scale farming areas (IFAD, 1992).

1.2 OBJECTIVES OF THE PRESENT STUDY

The three main objectives of the present study were:

a. To present an overview of the soil degradation/conservation status of the former Transkei and Ciskei areas in the Eastern Cape and the causes of soil erosion in these parts of the province (Chapter 2).

b. To compare the situation regarding soil degradation in three communities in the former Transkei and Ciskei characterized by different degrees of degradation and to identify reasons for the differences (Chapter 3).

c. To study the possibilities of using a community based approach to achieve successful soil conservation in seriously degraded rural areas (Chapter 4).

CHAPTER 2

OVERVIEW OF THE SOIL DEGRADATION SITUATION IN THE EASTERN CAPE

2.1 BACKGROUND ABOUT THE EASTERN CAPE

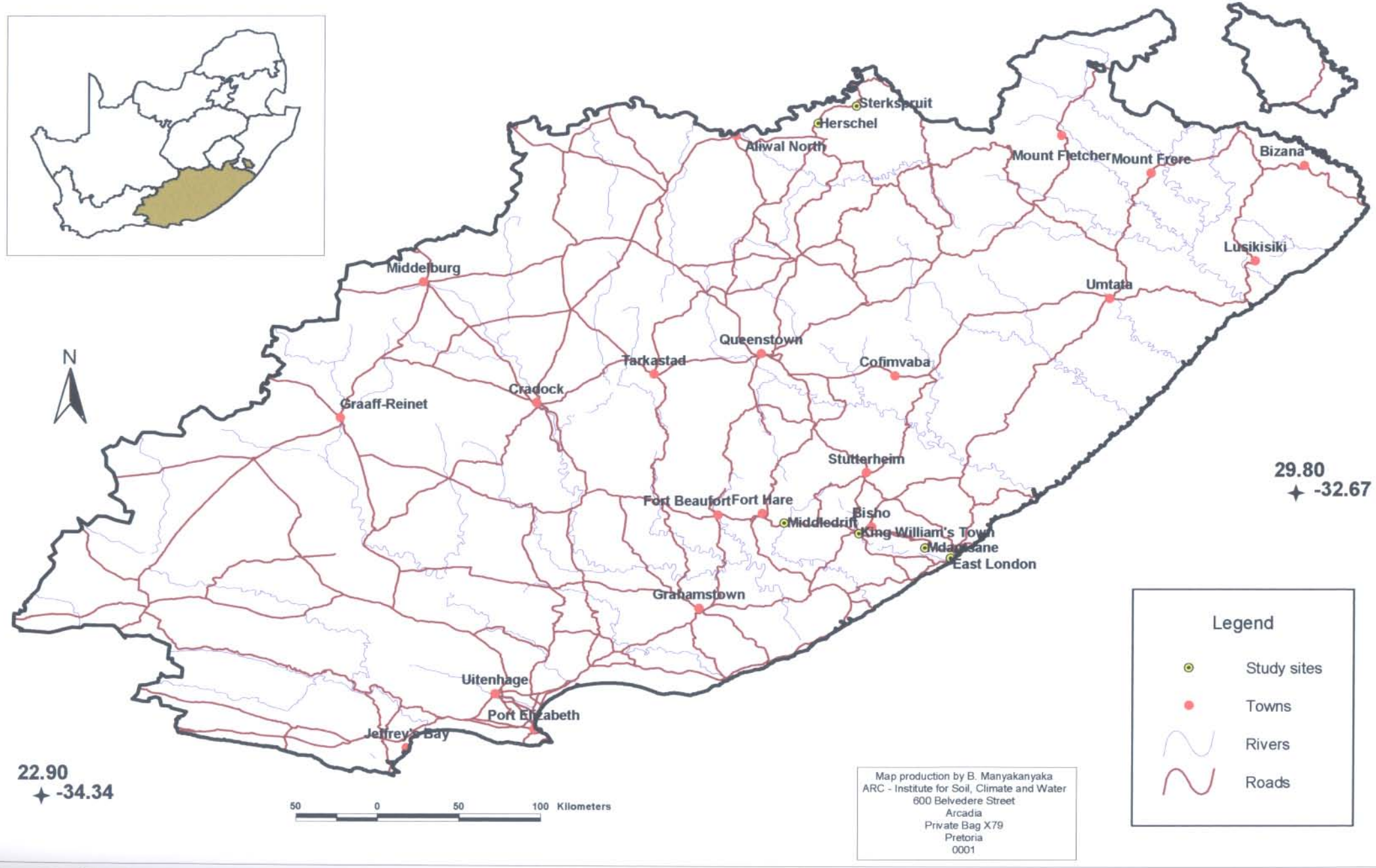
The Eastern Cape Province is situated in the southeastern part of South Africa and include the former homelands of Transkei and Ciskei and parts of "white" South Africa that used to be known as the Northeastern Cape, Border and Eastern Province as well as the eastern fringes of the Karoo (Figure 2.1).

The Eastern Cape province is the second largest and poorest province in South Africa. The incorporation of the former homelands of Ciskei and Transkei into the province has brought extreme poverty. Densely settled rural populations, which depend on external income, are characteristic of these parts of the province (Clarke and Dickson, 1996).

It is an overpopulated province with a high unemployment rate. Most able-bodied men and some young women have migrated to cities for jobs, leaving women and old age pensioners behind. Subsistence agriculture (extensive cultivation, stock farming - mainly of indigenous breeds) is the main activity in the highest potential parts of the province (De Wet and Van Averbeke, 1995). The semi-arid climate prevailing in a large part of the province, together with a fragile resource base have inflicted extensive damage on the Eastern Cape's environment. Another problem facing the Eastern Cape is lack of extension services to provide the necessary advice to farmers. The report edited by De Wet and Van Averbeke (1995) gives a comprehensive overview of the overall situation in the Eastern Cape.

2.2 THE NATURAL RESOURCES OF THE EASTERN CAPE

The Eastern Cape is a resource poor province in terms of natural resources. Poor crop yields and livestock conditions are clear indications of the quality of the resources in the region.



The Eastern Cape occupies a peripheral position in terms of economy within South Africa (Bruton and Gess, 1988). The main contributing factors to this are:

a. Resettlement, that is, people were moved from areas where their lives were stable to isolated areas, e.g. Glenmore, Thornhill etc.
b. Bad agricultural practices have led to poor yields and soil erosion, e.g. cultivation on steep slopes and/or frequent tillage that leads to exposure of the soil to erosion and loss of soil moisture. Bad agricultural practices can also lead to desertification.
c. Land ownership. Only few individuals own land and most people access land through communal land tenure.

Due to the above three factors, coupled with overpopulation, the efforts of farmers to produce good quality produce are in vain. The resource base gives an indication of the relationship between man and the environment. This is evident from the advancing desertification as a result of destruction of the natural vegetation exposing the soil surface, causing it to heat up (Ramphele and McDowell, 1991).

Aspects covered in this section are:

a. Climate
b. Soils
c. Vegetation

2.2.1 Climate

The Eastern Cape Province receives most of its rain between late spring and early autumn, but the biggest part of the province is not a true summer rainfall area. Rainfall peaks occur in late spring/early summer and late summer/early autumn (Marais, 1978). A mid-summer drought, which is of much longer duration than that described for the Northwest Province by Mbatani (2000), is characteristic for most of the province. A mid-summer drought has serious negative implications for the growing of summer crops, especially maize (Mbatani, 2000).

According to De Wet and Van Averbeke (1995) the mean annual rainfall in the province increases from a minimum of about 175 mm in the southwest to a maximum

of over 1000 mm in the northeast, with an average of less than 400 mm in the west and more than 1000 mm in the northeast, the coastal areas and some mountain regions (e.g. in the Winterberg and Amathole mountains).

Rainfall averages in the province vary dramatically over quite short distances. Two types of effects are found in this regard:

a. Orographic effects of moist winds from the ocean being forced up by the mountains, giving much higher rainfall in the mountains than a few kilometers away on the "coastal plateau". A striking example from the former Ciskei is the barely 500 mm average annual rainfall at Middledrift compared with 1500 mm at Wolfridge a short distance away in the Amathole mountains (Marais, 1978).
b. Rainfall in all the hot, narrow river gorges is much lower than on the surrounding plateau. An example from the former Ciskei is the average annual rainfall of less than 400 mm at Dank den Goewerneur in the Keiskamma river gorge near Middledrift, compared with more than 500 mm at Middledrift on the plateau (Marais, 1978). See Map 2.1.

Rainfall is very unreliable, both within and between seasons, and comes in the form of intense thunderstorms. Both of these are major contributing factors to the extreme soil erosion found in the province. (See Section 2.4.1.)

The poor rainfall conditions of the region adversely affect (a) soil formation and the quality of the soils (Section 2.2.2), as well as (b) the vegetation cover (Section 2.2.3) and (c) soil erosion (Section 2.4.1).

The Eastern Cape is blessed by having relatively mild temperatures compared to other parts of the country, e.g. Free State (very cold in winter), Northern Cape (cold winters and extremely hot summers). However, frost is common during winter months in high lying areas (like the Amathole mountains) and the areas bordering Lesotho and the Free State. The coastal belt is frost-free. Map 2.2 shows the longterm average temperatures.

Winds tends to be strong. Hot berg winds are common during dry months resulting in frequent veld and forest fires.

2.2.2 Soils

Rainfall and temperature are the dominant climatic factors affecting soil formation and soil stability (Laker, 2000). Rainfall in the province is unreliable and in most areas low, leading to very poor soils, which are highly unstable and thus prone to erosion. In areas with high or efficient rainfall and increased temperatures, deeper and more stable soils are produced (Laker, 2000). However, in the Eastern Cape there are limited areas with the ideal climatic conditions and hence most of the province is dominated by shallow, unstable and less developed soils or highly erodable soils.

In the majority of areas in the region the soils are fragile. Poor soils are as a result of low rainfall and poor parent material. The higher the rainfall, the faster the rate of weathering, the deeper the soil, and *vise versa*.

Shallow soils are less stable and wash away easily by rainwater. In most areas of the Eastern Cape the parent material is sandstone, mudstone or shale of the Beaufort Group, resulting in poor soil. Solonetzic soils derived from mudstone and shale of the Elliot formation and Tarkastad subgroup are extremely vulnerable (Laker, 2000).

However, there are few areas with good stable soils, e.g. Mdantsane, Butterworth, Katberg, Stutterheim, Bizana, Luskisiki, etc. In these areas the rainfall is high (>700 mm/annum) and the parent materials are dolerite and Ecca or Dwyka sediments, giving rise to deep stable soils.

Map 2.3 outlines the broad soil patterns of the Eastern Cape. The dominance of poorly developed highly erodable soils due to unfavourable climatic conditions and geology cannot be overemphasized. The coastal plateau of the province adjoining the Karoo is dominated by soils of the Glenrosa form, which consist of shallow soils (Laker, 2000). Laker (2000) describes the Glenrosa form soils in this area as soils associated with mudstones and shales of the Adelaide subgroup of the Beaufort formation. As the rainfall increases towards the east, moderately deeper soils are encountered.

The northern part of the province is dominated by solonetzic soils. Solonetzic soils are soils with structureless sandy topsoil overlying clayey subsoil with coarse angular blocky, prismatic or columnar structure (Laker, 2000). These soils are associated with mudstones and shales of the Tarkastad subgroup and the Elliot formation. Examples of the solonetzic soils that occur in the Eastern Cape are Estcourt, Sterkspruit and Valsrivier forms (Laker, 2000).

Hard plinthite is also found in the province. According to Laker (2000) in areas like the Tyhume and Amathole basins soils with extremely poor physical conditions and low fertility are developing from the weathering of the hard plinthite.

Scattered throughout the province high quality soils that are extremely stable against erosion are found in the vicinity of localized dolerite outcrops from which they have developed (D'Huyvetter and Laker, 1985; Laker, 2000).

In the northeastern part of the Eastern Cape (East Pondoland) deep, highly weathered, well-drained soils are found. The contributing factors are ideal climate (high rainfall and relatively high temperatures) and the presence of Ecca or Dwyka Group sediments as parent material (Laker, 2000).

2.2.3 Natural vegetation

Vegetation is the product of climate and soil (De Wet and Van Averbeke, 1995). This means that under a combination of ideal climate for growth and good soils, the vegetation will flourish and protect the soil. However, should one or both of the two factors not favour vegetation growth, the possibility is that the vegetation cover will be less, thus exposing the soil to the rainstorms and erosion.

According to De Wet and Van Averbeke (1995) Coastal Forest, Dune Thicket and Fynbos communities are found in the humid eastern parts of the province. In the dry western interior shrub-like Karoo, Spekboomveld and false Karoo vegetation occur.

In the arid river valleys, Valley Bushveld is the dominant vegetation (De Wet and Van Averbeke, 1995).

De Wet and Van Averbeke (1995) describe the vegetation in the central semi-arid and sub-humid areas as dominated by *Acacia* Savanna, Dune Thicket, Coastal Mixed grassveld, False Thornveld Grassland, False upper Karoo and Spekboomveld. Dohne Sourveld and Ngongoni occur in humid areas, whilst the Fynbos communities are found in the western part of the province (De Wet and Van Averbeke, 1995).

Afromontane forest occurs in the humid mountain areas, e.g. in the Amathole mountains, the Winterberg mountains, etc.

In grassland areas, sweetveld occurs in sub-humid areas and sourveld (e.g. Dohne sourveld) in higher rainfall areas. The sweetveld is more vulnerable to overgrazing and soil erosion than sourveld. Maps 2.4 and 2.5 show the Acocks veld types and the land cover of the Eastern Cape, respectively. On the land cover map the boundaries of former Transkei are clearly seen from its poor land cover due to overgrazing and over-exploitation. The poor land cover in most of the former Ciskei is also clearly seen. In the latter the boundaries are less clear because a number of well-preserved farms were incorporated into the Ciskei as part of the previous government's homeland consolidation programme.

2.3 DEGREE AND EXTENT OF SOIL EROSION IN THE EASTERN CAPE

Soil erosion is frightening and widespread in the Eastern Cape and has resulted in loss of thousands of hectares of land from production and tons of valuable topsoil. Water erosion is the biggest environmental and agricultural problem in the province. Soil erosion has resulted in closing down of "planned" irrigation schemes in the region and the abandonment of many cultivated areas. Widespread soil erosion has resulted in the silting up of dams, thus reducing the storage capacity of the dams. Plate 2.1 clearly shows the impact of soil erosion in the catchment of the Lubisi dam in the form of virtually total silting up of the Lanti weir.

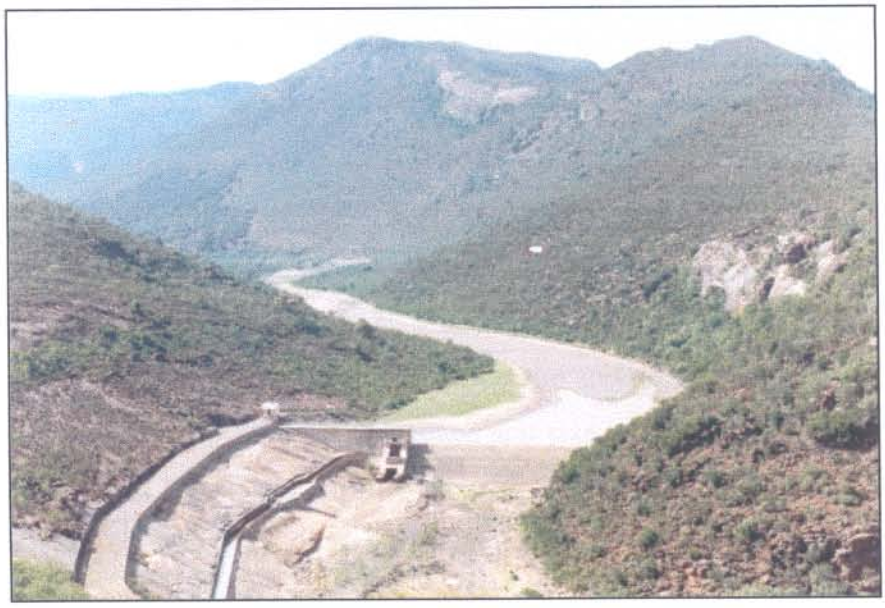


Plate 2.1 – Silted up Lanti weir (Photograph: Tracor, 1984)

The main contributing factors to the alarming rate of soil erosion in the Eastern Cape province are discussed in detail in Section 2.4.

2.4 CAUSES OF SOIL EROSION IN THE EASTERN CAPE

The exploitation and consumption of the natural resources are directly related to population pressures, meaning that even though the environment is extremely vulnerable, farming takes place even in sensitive areas leading to severe damage to the rather fragile resources. (Refer to section 2.2 for details.)

Low and erratic rainfall means that large areas of the province are arid and semi-arid, and unsuitable for agriculture. Farming takes place even in sensitive areas, leading to severe damage to fragile resources.

2.4.1 Climate and vegetation

Rainfall is one of the most important factors determining the degree of water erosion found in an area. Various aspects of rainfall, including amount, storm intensity and reliability, are important in this regard. On the one hand rainfall has direct effects on soil erosion, related to the erosivity of the rain and/or through the amount of runoff generated by intense storms.

On the other hand it also has indirect effects through its influence on the vegetative cover and on pedogenesis (soil formation and development).

As was indicated in Section 2.3, the rainfall of the Eastern Cape is in most areas characterized by very aggressive thunderstorms. This means that they have a very high-energy flux (Bloem, 1992). According to Lal (1994) rainfall erosivisity is the ability of the rain to detach and transport the soil as a result of raindrop impact and runoff generated by rainfall. The shape and size of the raindrop plays a major role in detaching and transportation of soil particles. In the Eastern Cape, even where the rainfall is low it is very erosive. The thunderstorms have high raindrop impact, which splashes soil particles apart. As a result of the aggressiveness of the thunderstorms, water does not infiltrate the soil, thus rainfall intensity exceeds the infiltration capacity of the soil, hence resulting in a high rate of runoff and the soil is washed away. The rate at which the soil is lost, is always accelerated by poor vegetation cover.

Low, unreliable and variable rainfall results in poor vegetation cover. Poor vegetation cover exposes the soil to the disastrous effects of soil erosion. More than two thirds of the Eastern Cape is dry. Long droughts with very dry and hot winds (berg winds) always aggravate the situation. These prolonged dry spells are always followed by torrential thunderstorms that are very erosive and devastate the soil left bare after the drought. In Transkei large areas were devastated when the prolonged droughts of the 1930's were followed by torrential rains and strong winds (Marais and Drewes, 1962). These effects seem to be most severe in the range where rainfall decreases from about 700 to 500 mm mean annual rainfall (Laker, 1990).

Low rainfall also leads to less pedogenesis, thus giving shallow and/or unstable soils, which are more vulnerable to erosion (D'Huyvetter and Laker, 1985), and also gives poor vegetative cover.

In a study in the central parts of the former Ciskei, Weaver (1988) obtained the "anomalous" result that erosion was less the higher the erosivity of the rain was. It was, in fact, not anomalous but one has to understand the balance between increased erosivity in the higher rainfall areas and on the one hand and the more dense and

stable vegetative cover and deeper and more stable soils given by the higher rainfall on the other hand, with the latter overriding the former in this case (Laker, 1990).

2.4.2 Soils

The Eastern Cape is dominated by poor quality, highly erodable soils (Laker, 2000). This is especially true for the western and southern parts with less than 700 mm mean annual rainfall, becoming worse as the rainfall decreases. The contribution of the soils to soil erosion is evident in the Herschel area, the southwestern parts of the former Transkei and various other areas where poor soils result from mudstones. Such soils are characterized by shallow sandy topsoil and impermeable unstable heavy clay subsoil, e.g. Sterkspruit and Estcourt forms. Such soils are unstable and are washed away very easily. Shallow soils with low water storage capacity, also become saturated with water very quickly and water is lost as run off which takes off the topsoil with it (D' Huyvetter and Laker, 1985).

Other factors that contribute to the erodibility of the Eastern Cape soils are the very low organic matter content, which resulted from poor farming practices, and erosion of the topsoil that has exposed the unstable subsoil.

Parent material has a very big influence on the stability of the soil against erosion. Very stable soils develop from dolerite, but unfortunately dolerite (and consequently also the soils developed from it) cover only small isolated areas throughout the province. In the northeastern part of the province (East Pondoland) a combination of Ecca and Dwyka sediments and high rainfall has led to the formation of high potential stable soils. On the other hand soils derived from mudstone and shale of the Beaufort Group, especially the purple/red mudstones of the Elliot Formation and Tarkastad Subgroup, are very unstable and highly erodable.

2.4.3 Topography

Four topographical features are important in regard to soil erosion, namely

- Slope steepness
- Slope length
- Slope form (plane, convex or concave)
- Slope aspect (i.e. the direction in which the slope faces)

Steep land is more sensitive to water erosion than flat land, if all other factors are constant (Hudson, 1971). On steep slopes the velocity of runoff is higher than on flatter slopes, thus increasing detachment and sediment carrying capacity of the runoff water. Because there is on steep slopes also less opportunity for infiltration, it leads to a higher runoff volume. On long slopes, especially if they are relatively steep, there is a progressive build up of both volume and velocity of water and more soil is washed away (D'Huyvetter and Laker, 1985). The extent of soil erosion on identical slopes differs much, however, and depends on the inherent stability of the soil against erosion, which is determined by factors such as parent material and climate (Sections 2.4.1 and 2.4.2). In the former KwaZulu, Liggitt and Fincham (1989) found that the most serous erosion, especially in the case of gully (donga) erosion, is mostly not found on the relatively steep middle and upper slopes in the landscape, but on the flatter lower slopes. In individual cases this is due to one or more of the following:

- The large volumes and high velocity of the water running onto these areas from steep upper slopes.
- More cultivation on the flat lower slopes.
- Inherently more unstable soils on the lower slopes.

Scenarios similar to that described by Liggitt and Fincham (1989) are common in the Eastern Cape also. A general feature in areas like Middledrift (Section 3.2) and Madliki (Chapter 4) in the former Ciskei is consequently that gullies start from the valley bottoms or foot slopes and eat their way upslope and, therefore, more erosion is visible on the valley bottoms and foot slopes. All three factors listed above contribute equally towards this situation.

In the Sterkspruit/ Herschel area of the former Transkei extremely severe gully erosion is found in the lowlands, while the high mountains are much more stable (Section 3.3). In the neighbouring Lesotho an identical scenario is found. In these cases the differences in degree of erosion are related to differences in parent material and rainfall and not primarily slope features.

In the high mountains the rainfall is high and the parent material is basalt, a combination conducive to the development of stable soils and a good vegetative cover. In the lowlands the rainfall is much lower and the parent material is purple mudstones of the Elliott Formation (previously known as the notorious "red beds"), a combination producing extremely unstable, highly erodable soils.

According to Hudson (1971) more soil is lost on plane slopes than on concave slopes, but less than on convex slopes. This generalization is normally true for natural erosion, but for human–induced soil erosion, especially under the injudicious cultivation, the reverse is usually true (D'Huyvetter and Laker, 1985). In the latter case the most severe erosion is on concave slopes, because (a) the concave slopes are usually the lower slopes in the landscape, thus receiving larger volumes of run-on water from higher slopes, (b) water is concentrated into higher volumes on such slopes because of the shape of the slopes and (c) the soils on the concave slopes are usually the least stable soils.

In the southern hemisphere slopes with northern aspects are hotter and drier, with shallower soils and sparser vegetation. To a somewhat lesser extent this also applies to the western slopes. Because the soils on these slopes are less leached the vegetation on them is more palatable, causing animals to concentrate more on them. They also warm up earlier in spring, causing the grass to start growing earlier than on cooler southern slopes. Both these factors promote overgrazing of the northern and western slopes. This means that the northern and western aspects are more vulnerable to erosion.

During the drought of the 1980's overgrazing and erosion of the northern slopes became severe in Lesotho, for example, while the southern slopes suffered much less erosion.

2.4.4 Population pressure and land tenure

"A rapidly increasing population, in the context of slow economic growth and inadequate development, could lead to even more rapid deterioration of the environment in the 1990's" (Ramphele and McDonald, 1991; citing Charles Simkin).

The demand for firewood, building materials, grazing and browsing by livestock, clearing for cultivation, i.e. deforestation, highlighted the role of the human factor as a catalyst in resource degradation in Africa (IFAD, 1992). Complete harvesting of the vegetation without planting back or replacement, that is, outstripping the capacity of natural generation, has exposed the vulnerable soil to the erosivity of raindrops or rain splash and eventually to soil erosion.

According to De Wet and Van Averbeke (1995) the pressure on land in the Eastern Cape is acute, and land is the most important resource for survival in the province.

In essence high ***population pressures*** on the fragile resources of the Eastern Cape has resulted in unsustainable utilization or overexploitation of the resources. In view of this soil erosion has gained territory in the province, especially in the areas which are vulnerable because of unfavourable soils and climate.

It should be kept in mind that "population pressure" and "population density" is not synonymous, since the "pressure" is a function of the ***human*** carrying capacity of an area. Many areas in the world with relatively low population densities are "over-populated", because the population is outstripping the low human carrying capacities of those areas (Knox, 1981). In his study in the central parts of the former Ciskei (now the central Eastern Cape), Weaver (1988) found no correlation between population density and degree of erosion. This is not surprising. On the one hand his study included high potential areas (high rainfall; stable soils), which could tolerate high population densities without being degraded. On the other hand it also included low potential areas (low rainfall; unstable soils), where even relatively low population densities could be in excess of the human carrying capacity, thus causing serious erosion.

In view of lack of alternative viable and affordable energy sources and construction material in the rural areas it may be unfair to criticize the local population too harshly for the overexploitation of their vegetative resources. Overexploitation of valuable species can be criticized, however.

Ignorance and lack of respect for natural vegetation as well as land has resulted in people cutting even yellow wood and olive trees for poles though they are aware of the importance and value of these tree species.

There is also an increase in the number of informal settlements throughout the province. This on its own is a threat to the limited natural resources. Some of these unplanned developments are initiated on prime agricultural land, steep areas, and forested land. Once people are settled in an area, they start impacting negatively on the environment through their basic survival activities like cultivating virgin land, thus making the soil more vulnerable to erosion. For an example, the impact of indigenous forest invasion near Port St Johns has resulted in landslides and erosion of the invaded area.

Land tenure systems also impact on land degradation. In large areas of the province the land tenure system is still the old traditional one, whereby individual families are allocated arable land by the chief or headman. Re-allocation of land took place during the introduction of the betterment schemes. (Refer to Section 2.4.6.) The grazing land is communal, meaning that it is a state land in which everyone in the community has equal access to rangeland. However, this type of land tenure has its limitations due to insecurity that goes with it and this results in reluctance from the community to invest in looking after the land, instead people end up overexploiting it. De Wet and Van Averbeke (1995) pointed out that before the change of government in South Africa in 1994, over 80% of the high potential land in the Eastern Cape province was already in the hands of traditional Black small-scale farmers. Yet, the average maize production in the former Transkei was only 0,5 t/ha and in the former Ciskei 0,2 t/ha, a situation that could largely be related to the traditional land tenure system. IFAD (1992) stated that solving of the land tenure system is one of the greatest challenges in Africa.

They point out that the present traditional system leads to under-utilization of high potential land, leading to unbearable pressure on marginal land and its degradation.

2.4.5 Overgrazing and uncontrolled veld fires

Overgrazing is the main problem causing soil erosion in most parts of the Eastern Cape province. Veld fires are the norm in all parts of the province, especially in winter. Both overgrazing and uncontrolled veld fires result in the removal of vegetation, which in turn results in rainwater running off instead of seeping into the ground. Indiscriminate bush-clearing by burning strips the land bare and leaves it highly susceptible to both water and wind erosion. Brush fires have been identified as the main cause of ground cover annihilation (Ouattara, Robinson, Morna, Ajayi, Anza, and Wainaina, 1993). Judicious burning is essential to maintain many types of veld in good condition. However, injudicious burning for the wrong reason is harmful. Ouattara *et al* (1993) stress that the elimination of vegetation and litter has a catastrophic effect on protection of soil against erosive rainfall and prevents the build up of protective organic matter. Undue trampling by livestock in overstocked areas results in bare areas and footpaths from which soil erosion starts. (Plate2.2, foreground). The situation is aggravated where surface sealing of the bare patches occurs (Plate 2.3).

Plate 2.2 – Sheet and gully erosion in overgrazed area (foreground) in former Transkei. (Photograph: Tracor, 1984)

Plate 2.3 – Bare patches with severe surface sealing due to overgrazing in former Transkei (Photograph: Tracor, 1984)

Overstocking or overgrazing is more serious in the sweetveld (low rainfall areas), becoming lesser in mixed veld and sourveld (Trollope and Coetzee, 1975). According to Trollope and Coetzee (1975) incorrect land use aggravates the problem where the grazing capacity of cultivated areas is incorrectly assumed to be equal to that of the veld, ignoring the low levels of crop residue being available due to recurring crop failures.

Overstocking is a very difficult problem to address, taking into account the traditional customs of the communities involved in the communal grazing system. In the case of traditional customs like *lobola* cattle are changing hands quite often and it is not easy (if not impossible) to sell cattle acquired through *lobola* as they have a traditional meaning to the family. Another complication in the traditional system is that cattle plays a very important role in the Xhosa culture, as men "imitate" the stature of the horns of their cattle when they are dancing in traditional ceremonies. Cattle are everything (wealth) in the Xhosa tradition. In terms of this, it is impossible to control or reduce livestock numbers in the traditional farming areas. Communal grazing or land tenure also has its complications as no one is really taking care of the land.

Another contributing factor is the "open veld system" as there are no camps at all, animals roaming around the veld without control throughout the year. Selective grazing by sheep also contributes to degradation of the species composition of the

veld. Where camp systems are in place, there is often over-utilization of "home camps", because animals are kept there more than in "away camps" because of problems with vermin and theft (Trollope and Coetzee, 1978). Trollope and Coetzee (1978) also indicated the negative impacts resulting from localized trampling and cattle tracks, leading to erosion, associated with night kraaling of livestock.

Bush encroachment into grassland areas is a major problem in the province (Trollope and Coetzee, 1978). It is a problem in areas where incorrect stock ratios exist, i.e. where the ratio of goats to cattle is too low. Injudicious elimination of burning may also result in bush encroachment (Trollope and Coetzee, 1978). Bush encroachment limits the carrying capacity of veld. Replacement of a dense grass sward by trees aggravates soil erosion, because the full ground cover and dense root system of grass protects and stabilizes the soil against erosion (Plate 2.4).

Plate 2.4 – Sheet and gully erosion due to overgrazing of sweetveld grassland and bush encroachment caused by injudicious elimination of goats and burning in former Ciskei. (Photograph: J.L.H. Williams)

Furthermore, the types of shrubs and trees involved in bush encroachment and bush densification in the province do not supply thick layers of leaf litter to build up the organic matter in the soil, as is the case under the deciduous forests in Europe, for example.

2.4.6 Betterment / resettlement

The so-called "betterment schemes" of the homeland system entailed the division of each Tribal authority (now called Traditional Authority) area into grazing land, residential land and arable land. Before the introduction of the homeland system in the Eastern Cape, people were scattered throughout and this offered flexibility in land use and therefore, even though over populated, there was less pressure on land resources. After the introduction of the homeland system people were brought closer together and started chopping each and every tree nearby residential areas for firewood and later started doing so in mountains and next to streams, leaving streams running dry.

Reduced use of cow dung as fuel, as cattle were grazing in isolated camps far from the homesteads, became a problem and this resulted in more stress on the natural vegetation. Betterment therefore resulted in less flexible land use and more ignorance without lessening the pressures on land resources (Shibane, Personal communication). Due to inadequate attention to the diversity of soils found in the area and because this was not taken into consideration during the resettlement, some of the worst soil erosion is found in so called "rehabilitated areas."

2.4.7 Incorrect land use recommendations by 'planners'

Soil erosion is widespread and very serious in "betterment schemes" and "rehabilitated areas" throughout the former Ciskei and Transkei. This is due to incorrect land use planning based on incorrect land suitability evaluation by the planners (D'Huyvetter and Laker,1985; Hensley and Laker, 1975, 1978). Due to lack of basic soil science knowledge the planners did not adopt different criteria that suited the inherent different erodibilities of the different types of soils and used a single inappropriate norm (Laker and D'Huyvetter, 1988). Many areas, which were set aside for cultivation by planners, should not have been cultivated and/or irrigated.

Those areas are heavily eroded and many have been abandoned. One of such areas is the Lubisi Dam catchment area, where the planners recommended cultivation and production of sorghum on Sterkspruit soils as indicated by Tracor (1984). See Plates 2.5, 2.6 and 2.7.

Plate 2.5-First signs of rill and gully erosion in an area incorrectly demarcated for cultivation by planners in the former Transkei (Photograph: Tracor, 1984)

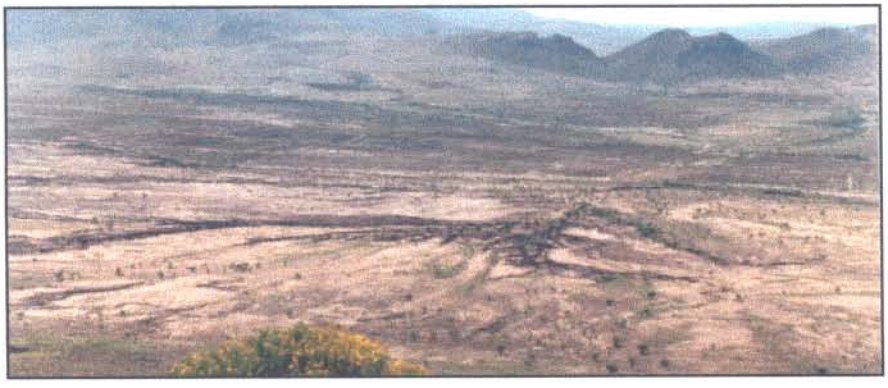


Plate 2.6 – Abandoned severely eroded cultivated field demarcated for cultivation by planners in the former Transkei. (Photograph: Tracor, 1984)

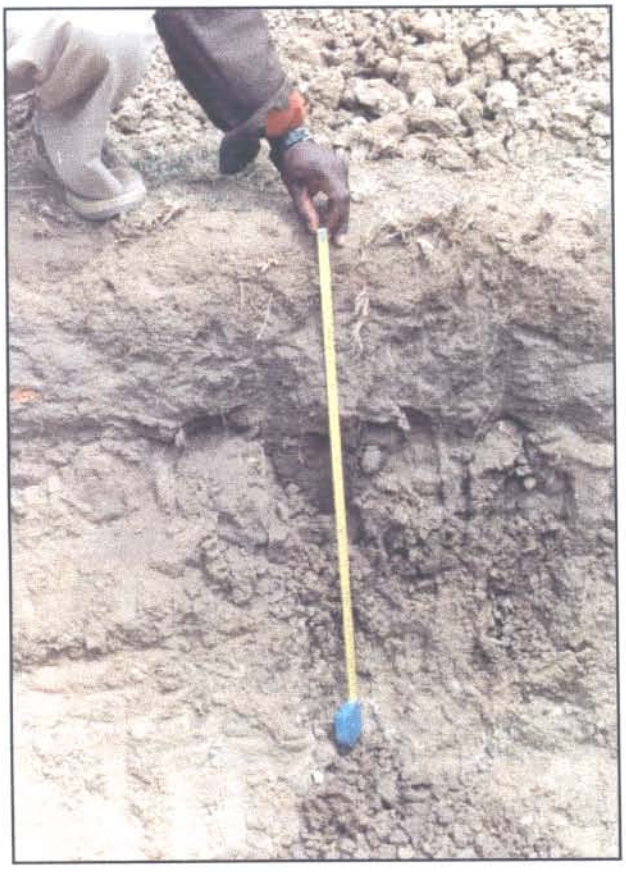


Plate 2.7 – Typical unstable Sterkspruit soil demarcated for cultivation by planners in the fields shown in Plates 2.5 and 2.6. (Photograph: Tracor, 1984)

The Lubisi Dam catchment area, where Plates 2.5, 2.6 and 2.7 were taken was ironically called a " rehabilitated" area. Instead of recovering, its condition deteriorated drastically because of the inappropriate rehabilitation measures and the Lubisi dam is silting up (Tracor, 1984).

A major problem is the low resilience (recovery potential) of the degraded cultivated areas. Laker (2000) gives an example of a degraded, abandoned cultivated area in the former Ciskei, which has not recovered more than 20 years after being abandoned (Plates 2.8 and 2.9). This is again an area that was demarcated for cultivation by planners during the 1960s. It was abandoned during the 1970s. Plate 2.8 was photographed in 1987 and Plate 2.9 in 1997. In both plates the contours are still visible. The important aspect is to look at the areas beside the gully. It is mainly bare patches with some small shrubs. This area used to be covered with excellent dense,

high quality grassland, which is simply not able to return. Plate 2.10 gives an idea of the enormous size of the gully, which developed in the lowest part of this area.

Plate 2.8 – Lack of recovery of abandoned planned cultivated area in Ciskei 10years after being abandoned. (Photograph: J.L.H. Williams)

Plate 2.9 – Lack of recovery of the same area as in Plate 2.8, but now 20 years after being abandoned. *Agave americana* hedges planted in an attempt to arrest further degradation (Photograph: J.L.H. Williams)

Plate 2.10 – Size of the gully in the lowest lying part of the area depicted in Plate 2.9 (Photograph: J.L.H. Williams)

Incorrect soil classification has also in some cases led to incorrect land use recommendations, which in turn led to disasters, such as severe soil erosion and failures of irrigation schemes in the province (Laker, personal communication).

CHAPTER 3

STUDIES IN SELECTED COMMUNITIES

Comparative studies were carried out in three diverse areas of the province, viz. Mdantsane, Middledrift and Sterkspruit/ Herschel. This was done to compare the factors that cause soil erosion.

3.1 MDANTSANE

3.1.1 General description of the area

Mdantsane is the second largest township in South Africa and is situated about 15 km southwest from the city centre of East London. Mdantsane is situated in a steeply undulating area with hills with broad crests and deep, narrow gorges with very steeply sloping sides. The township has developed on the crests, with no residential development in the gorges, including their sides. This township is overpopulated and has got a very high rate of unemployment, hence people have resorted to intensive crop production in the open areas throughout the township, including the sides of the gorges where the terrain is very steep (Plate 3.1).

Plate 3.1 – General layout of Mdantsane on hilltops (Photograph: N.N. Maswana)

There is a certain similarity between Mdantsane and a city like Antananarivo, capital of Madagascar, where all the urban development is on the crests of hills, with intensive rice and vegetable production on the wide, fertile valley bottoms of the valleys running through the city (Laker, personal communication). The difference is that Mdantsane has very narrow gorges, with insignificant narrow valley bottoms.

3.1.2 Research procedures

The research procedures used in information gathering was interviews of individual "farmers" or land users in the area. However, it was difficult to engage them in meetings because they are too many, they come from different units of the township and they are not organized. Some of the farmers did not open up with me, as they were suspicious that I was sent to investigate their activities.

Information was also gathered on the farming practices. This was done through interviews and field observations over three years (1997 –1999).

Studies of the soils and parent material were carried out through the study of soil profiles on road cuttings. Augering was also done.

3.1.3 Results and discussion

The people in Mdantsane mainly produce maize (for consumption as green mealies) and vegetables. Both crops are produced primarily for domestic consumption. However, any surplus is marketed locally in the township.

Cultivation takes place on slopes with gradients of more than 20%. However, the soils do not erode at all. There are not even slight signs of erosion. Reasons for this unexpected situation include:

a. The parent material of the soils is dolerite and the rainfall is high (800- 1200 mm per annum). The combination of high rainfall and dolerite results in a high rate of weathering, giving deep and stable red soils, i.e. soils of the Shortlands form and clayey soils of the Hutton form (Soil Classification Working Group, 1991). In other parts of the former Ciskei such red soils developed from dolerite, especially Shortlands soil, have been proven to be exceptionally stable against erosion (e.g. D' Huyvetter and Laker, 1985; Rapp, 1998).

b. Good agricultural practices are used by the cultivators. Due to the steepness of the terrain, the farming community of Mdantsane does not use mechanized farming implements. They cultivate their land by hand, using hoes. This type of farming results in less soil disturbance and soil moisture is retained. The soil organic matter is not destroyed. Cultivation only takes place in spring and summer. In winter the soil is left to lie fallow, thus leaving the stubble to rot and form good organic matter, which stabilizes the topsoil structure. The stubble also protects the soil from the destructive winds in winter and the intense spring rains. The retention of the stubble and its positive effect on soil organic matter is totally different from the situation in the traditional rural areas, where the stubble is used as winter grazing for the large livestock populations and very little organic matter is retuned to the soil. In earlier studies in Mdantsane it was found that some of the urban farmers even make compost from grass which they cut outside the city and apply it when they plant vegetables (Laker, personal communication).

In view of the above it was learnt that the slope alone is not the major cause of soil erosion. Stable soils can be cultivated safely even on steep slopes. It also became clear that good farming practices are keys to soil conservation.

The cultivated plots belong to the Municipality. However, individuals simply started cultivating certain areas and nobody chased them away. Although they do not own the land, the fact that there are no tribal systems involved according to which land is allocated and can be taken away at any time, seemed to be a plus point. Surprisingly theft did not appear to be a problem due to the coherent nature of the community. Mdantsane community is old, people have been living together for many years and therefore they respect each other. Local disciplinary structures or police forums exist throughout the township and they ensure stability in the area.

3.2 MIDDLEDRIFT

3.2.1 General description of the area

Middledrift is about 100 km west of East London and about 500–600 m above sea level (Hensley and Laker, 1975). According to Hensley and Laker (1978) the Middledrift pedosystem is produced by the tributaries of the Keiskamma River that dissect the Debe pedosystem at the western and southern peripheries. The two authors describe the Middledrift land type as steeply undulating.

The area is relatively dry with an average annual rainfall of 499 mm and evapotranspiration of about 829 mm resulting in a water deficit throughout the year (D'Huyvetter and Laker, 1985). It is a summer rainfall area with poorly distributed rainfall that comes in the form of intense thunderstorms.

Soil erosion is widespread throughout the land type. The vegetation cover is very poor due to overgrazing and some undesirable invader species exist.

3.2.2 Research procedures

The area was traversed a number of times looking at the soils, vegetation and, more importantly, soil erosion. Soil profiles were studied in open gullies and augering was also done. The soils were classified at series level, using the gullies as soil profiles.

The vegetation was also looked at, but in less detail.

3.2.3 Results and discussion

The soils of the area are young, shallow and mainly derived from mudstone (D'Huyvetter and Laker, 1985). These soils are predominantly unstable and unsuitable for cultivation. The main soil forms present are: Glenrosa, Valsrivier, Oakleaf and Shortlands (D'Huyvetter and Laker, 1985).

Out of the soil forms mentioned above Shortlands is the most stable and suitable for cropping. The Shortlands soils are derived from dolerite, which weathers into deep red soils with well-developed, stable structure.

Unfortunately dolerite outcrops are of very limited extent in the Middledrift area and consequently the Shortlands soils cover only very small areas.

Even though the Oakleaf soils in the area are much better than the soils of the Glenrosa and Valsrivier forms, they are not very stable and even with proper contouring cannot be cultivated at slopes of over 7,5% without causing serious erosion. The very unstable pseudoduplex (Valsrivier) soils, derived from grey to yellow mudstone, found on the footslopes and valley bottoms and the young, shallow and very unstable soils of the Glenrosa form are extremely vulnerable to erosion (D'Huyvetter and Laker, 1985). Even with proper contouring the Valsrivier soils and shallowest soils of the Glenrosa form cannot even be cultivated at slopes of more than 3,5%.

According to D'Huyvetter and Laker (1985) the planners of the "betterment schemes" overlooked the different sensitivity levels of the various soil types. Consequently they used a single threshold slope criterion of 12% for all soil types occurring in the area. This was a huge mistake by the planners as it resulted in widespread erosion in cultivated areas despite contouring.

Widespread serious soil erosion is a problem at Middledrift even in grazing land. This is due to overgrazing that leaves the unstable soils of the area exposed to the rainstorms. The vegetation in the area is very sparse due to the poor quality soils and low rainfall, but is very palatable and is consequently very easily overgrazed

The sharp contrast between Middledrift and Mdantsane came out clearly. There is very severe erosion of cultivated fields in Middledrift despite relatively flat slopes and contouring whilst in Mdantsane slopes as steep as 20% are cultivated without soil erosion. The betterment planning in Middledrift contributed a lot to the erosion of the area as people were moved closer together thus putting more pressure on the fragile resources. As a result of the betterment planning, the siting of arable lands was imposed on the people by the planners. However, in Mdantsane the people chose the plots they want to cultivate on their own without any form of pressure from outsiders. In Middledrift the stubble is used as winter grazing, whereas in Mdantsane it is left on

the land, thus protecting the soil from the desiccating winter winds and erosive spring rain. The stubble left in the cultivated areas also rots and forms good organic matter.

The differences in rainfall and parent materials between Mdantsane and Middledrift are also important. In Mdantsane the parent material is dolerite and the rainfall is high, thus resulting in a high rate of weathering which results in deep and stable soils, while the opposite applies in Middledrift.

Despite the low population densities in Middledrift compared to Mdantsane, poor planning, poor soil, low rainfall and poor agricultural practices have resulted in widespread erosion in Middledrift.

3.3 STERKSPUIT/HERSCHEL

3.3.1 General description of the area

Sterkspruit and Herschel are towns situated ± 100 km southeast of Aliwal North. The high-lying areas have high rainfall and the parent material is basalt. The combination of the two factors results in more stable soils. However, in the lowland areas the rainfall is much lower, averaging only ± 450 mm/annum (Herschel Development Trust, unpublished) and the parent material is purple/red mudstone, thus resulting in poor quality solonetzic duplex soils of the Estcourt and Sterkspruit forms. These soils are very sensitive to erosion, hence soil erosion is widespread throughout the low-lying areas of Sterkspruit and Herschel.

More than 70% of the area consists of rock outcrops and very shallow soils (Hensley and Laker, 1975). The area is overgrazed and that has resulted in the exposure of the fragile soils to the rainstorms that are often encountered in summer (Plate 3.2).

Plate 3.2 – A typical Sterkspruit/Herschel scene with rocky mountains and severely overgrazed and eroded lowlands (Photograph: N.N. Maswana)

3.3.2 Research procedures

Studies were conducted in Sterkspruit and Herschel between February 1996 and January 1997. The objective of the study in these areas was to gain an understanding of the reasons for the failure of soil conservation attempts by government, whilst the intervention by the two Non-Governmental Organizations (NGO's), Environmental Development Agency (EDA) and Herschel Development Trust (HDT) seemed successful.

Various soil conservation works were visited and the affected communities were interviewed. The extension officers from both NGOs and the Department of Agriculture and Land Affairs were interviewed.

A broad assessment of the vegetation, climate and the soils was also done, as they are the critical factors determining the resistance of the soil to erosion.

3.3.3 Results and discussion

As erosion is frightening in the areas, the Department of Agriculture initiated a soil conservation programme in the area. According to the informants the main emphasis was on an engineering approach. That is, stone packs and some concrete walls were constructed to close the gullies. Apparently local people were employed to do the work under the supervision of officers from the Department of Agriculture (Mehlomakhulu, personal communication).

It was learnt that:

a. In some areas the job was left unfinished and some of the stone packs were vandalized.

b The community identified those areas as "government areas".

c No effort was made to address the socio- economic problems of the area.

From the above it became clear that people perceived the initiative as a job creation programme and therefore sabotaged the programme by vandalizing the stone packs in order to continue doing the same thing over again, thus ensuring sustainable income through continued employment. This has led to dependency in various ways and has resulted in laziness within communities.

The communities were not given an opportunity to make inputs in the programme, hence the wrong perceptions. All this resulted in lack of continuity and the people didn't learn much from it. It is also assumed that a lot of money was wasted even though the intention was good.

In 1992 EDA and HDT started similar projects in the same area. However, their approach was different, as they involved the local communities from the start. Extension officers were identified within the communities and trained in environmental management (Tim Fenn, personal communication).

It was also observed that an old man, Mr. Shadrack, a Coville village (Herschel) resident has initiated soil rehabilitation in an eroded piece of land next to his homestead. Mr. Shadrack constructed a dam, which collects water that flows from a badly eroded hill. Everyone in the community has free access to the water from the dam. However, water is seeping continuously out of the dam and this has resulted in a permanent wet area below the dam (artificial wetland). It is on this 'wet land' where Mr. Shadrack has planted reeds that are not only perfect in the rehabilitation of the area, but are also used widely in the area in the construction of houses (old reeds) and ceilings (young reeds). The area is well reclaimed and the old man is also making money from selling the reeds, as the community believes that reeds are durable and easy to use as they are flexible enough to bend to the desired stature. From this it was learnt that a developer must not underestimate the effectiveness of indigenous knowledge in addressing local problems.

The product of the work by the two NGOs is still visible in the area even though HDT closed down due to funding problems. The trained extension officers are still serving their communities and this has ensured continuity of the work despite lack of funding (Shibane, personal communication).

It was also observed that the communities are taking turns in looking after the project areas and that fencing off of badly eroded areas has resulted in quick recovery or closing up of the gullies. It was also learnt that the approach ensured community participation and the communities took the lead in the project. However, in the government initiative, the Programme was run by the government with no input from the land users.

A study was consequently conducted in an equally eroded area where the traditional approach to soil conservation has failed, to establish whether a community- based soil conservation approach could succeed in the Eastern Cape and to develop a model for such approach. The study is described in Chapter 4.

CHAPTER 4

MADLIKI: A STUDY IN COMMUNITY-BASED SOIL CONSERVATION

4.1 SELECTION OF THE STUDY AREA

From Chapters 2 and 3 it is evident that soil erosion is a very serious and widespread problem in the traditional rural areas of the Eastern Cape. Conventional approaches to soil conservation have had little or no success in the province, as highlighted in Section 3.3. It was consequently decided to conduct a study to see whether a community-based approach to soil conservation could achieve success in the province and to develop a community-based approach, which could be used as a model in the province.

Preliminary studies were conducted in a number of communities in the Eastern Cape in order to find a suitable community in which to conduct a study testing a community- based approach. The ideal community had to have at least the following two characteristics:

a. It had to be an area with severe soil erosion problems.
b. It had to be a community that realized that they had a soil erosion problem.

After completing the preliminary investigations it was decided to select the Madliki tribal area for the study. The area was selected because it met both the above-mentioned requirements and in addition had two other advantages. Firstly, the conventional approach to soil conservation failed in the area, enabling a comparison between the two approaches. Secondly, although it was quite some distance from the researcher's office on a bad road, it was closer and easier to reach than other potentially suitable areas.

4.2 GENERAL OVERVIEW OF MADLIKI

Madliki is one of the rural villages of the Eastern Cape, in the former Ciskei homeland. This village falls within the boundaries of former Zwelitsha district - now part of King William's Town district. It is one of the most remote villages in the district, approximately 36 km from King William's Town on a bad gravel road. The mode of transport to town is mainly Mayibuye bus services or taxis.

As is a common characteristic of the Eastern Cape rural areas, it is overpopulated, with a low literacy rate and high a level of poverty, which is due to a very high unemployment rate. About 80% of the population is unemployed. (Refer to Appendix A - PRA summary). Most households are women headed due to labour migration, i.e. able-bodied men are working and looking for employment in cities in industries or in mines. However, many of them are currently being retrenched from mines and the unemployment rate may increase within the next few years. The main sources of income in the community are old age pensions and disability grants, both of which are not reliable due to the revisions that are being carried out by the Department of Health and Welfare. The level of poverty is visible in young children as most of them show clear signs of malnutrition.

Madliki is one of the villages that have been adversely affected by the betterment scheme. Through this process people were placed closer together, thus denying them flexibility in terms of access to the resources and thereby concentrating the utilization of the limited resources in certain areas.

According to the community, Madliki, was once a tribe under the chieftanship of chief Gcwabe and when Madliki, chief Gcwabe's son, was crowned as chief, the village was named after him. However, at the time of study the community no longer recognized the chief and the chairperson (a councillor, according to the new local government structures) was the head of the community.

Madliki is in a quite steeply undulating area. The village is situated on top of a relatively flat hill, where it was placed by the "betterment" plan for the area. The grazing camps and croplands are on all sides around the village.

The grazing camps are heavily overgrazed, eroded and denuded of vegetation. Overgrazed, degraded and denuded as they are, their grazing camps are still overstocked, continuously aggravating the situation.

Agricultural production is through dryland cropping. Poor yields are a norm due to poor resources (see Section 4.3) and bad farming practices. The croplands are typical of the drier areas of the Eastern Cape, i.e. severely eroded (with dense networks of big gullies), despite the fact that "betterment planning" determined their locality and contouring was done. As outlined earlier, this is due to the fact that the planners had inadequate knowledge of soils and did not adapt land suitability evaluation to the specific qualities of the different soils. Most people stopped ploughing and abandoned their arable lands due to soil erosion (Plate 4.1)

Plate 4.1 – Abandoned cultivated area, demarcated by planners for cultivation, at Madliki. Note contouring still visible (Photograph: N.N. Maswana)

The main problem in the village is soil erosion, which is prohibiting the keen community members from crop farming. Soil erosion is the threat to progress in this community no matter how hard they try. Since the highest percentage of the community are unemployed, subsistence farming is the only option to provide the basic staple food for them, but due to soil erosion they don't have enough land to

farm. Moreover the present study found that soil erosion is also threatening cultural beliefs or respect of the Xhosa nation. (See section 4.6.1).

4.3 NATURAL RESOURCES OF MADLIKI

4.3.1 Climate

The climate of this area is typical of the "coastal plateau" of the central Eastern Cape (former Ciskei). It is a summer rainfall area with low and erratic rainfall and a mean annual rainfall of only about 500 mm (Marais, 1978). It is not a true summer rainfall area, with rainfall peaks in spring and late summer/early autumn, with a decided midsummer drought because of low rainfall and high evaporation. This is a very unfavourable scenario for maize production (Mbatani, 2000). The rain mainly falls in highly irregular intervals with long dry spells in-between. The rain always falls in the form of thunderstorms, which are extremely erosive. The variability of rainfall has a negative impact on livestock rearing and dryland cropping.

4.3.2 Soil

The soils of the area are very poor and unstable, hence highly erodable. The parent materials are sandstone and dolerite. Generally, the soils of the area are young and very shallow with poorly developed structure, as is clearly shown by the gravelly nature of the soil and the presence of pebbles. This is closely related to the low rainfall in the area, combined with the hard rock parent materials, which resulted in slow rates of weathering or soil formation.

In high rainfall areas, where chemical weathering predominates, both these rock types (especially dolerite) give high quality deep soils, as is, for example in the case of Mdantsane (Section 3.1). Under low and inefficient rainfall, like in Madliki, it is a totally different scenario.

Shallow soils are highly erodable, because they are easily saturated with water during a rainstorm, after which runoff starts (D'Huyvetter and Laker, 1985). These poorly structured soils are also very prone to crusting (surface sealing), thus having low water infiltration, excessive runoff and erosion. This is aggravated by the very low

organic matter contents of the soils. In most areas the topsoil has been totally washed away (Plate 4.2).

Plate 4.2 – Area with total topsoil loss through sheet erosion at Madliki. Rills and gullies starting to develop. (Photograph: N.N. Maswana)

In addition huge dongas (gullies) have developed throughout the area (Plates 4.3 and 4.4).

Plate 4.3 – Gully erosion in rangeland (left) and cultivated area (right) at Madliki. Note virtual total destruction of the area on the left. (Photograph: N.N. Maswana)

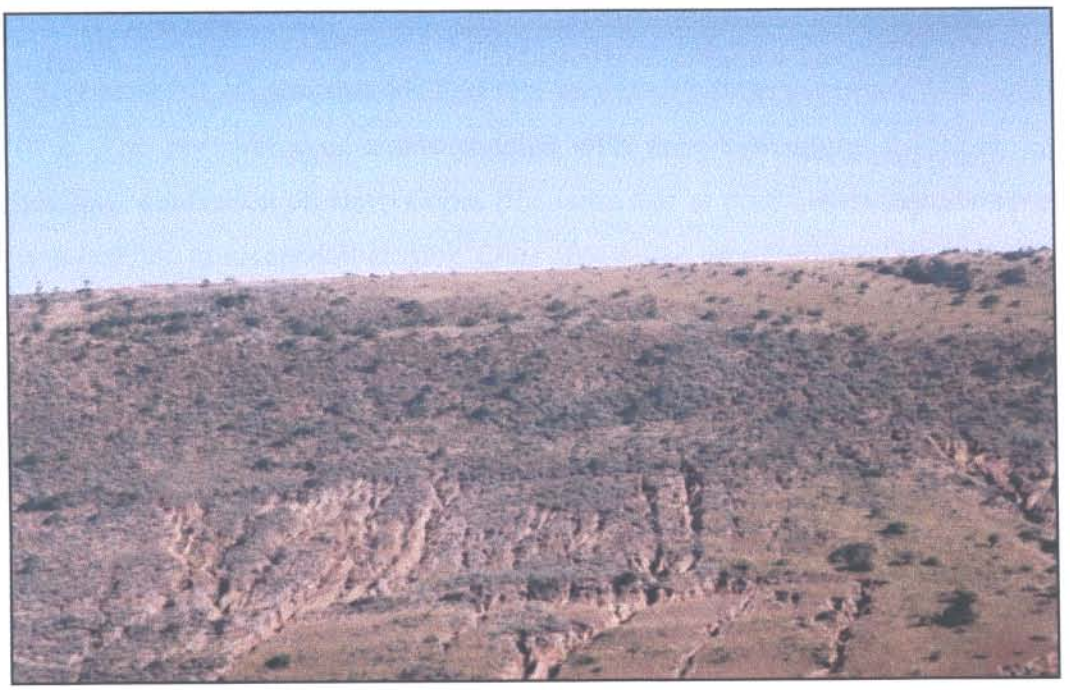


Plate 4.4 – Very dense network of gully erosion at Madliki. (Photograph: NN Maswana)

4.3.3 Natural vegetation

The vegetation of the area is mainly sweetveld grassland, with very few shrubs. Because of the low degree of leaching of the soils the grass is very palatable (even in winter) and highly nutritious, but because of the shallowness of the soils the amount of grass produced is low. This is the "ideal" combination for causing extreme overgrazing. The consequence is that the area is very highly overgrazed, resulting in a grass cover that is generally poor, i.e. the area is almost bare.

The poor vegetation cover results in less soil protection and therefore exposure of the soil to the erosivisity of raindrops. Overgrazed unstable soils with poor vegetation cover are easily washed away through thunderstorms. The combination of semi-arid climate, shallow soils, steep land and poor vegetative cover represent some of the worst attributes of fragile land.

4.4 PROBLEM STATEMENT AND OBJECTIVES

From Section 4.3 it is clear that Madliki is a very poor village in terms of its natural resources. The poor resource status coupled with poor agricultural practices, e.g. overstocking, cultivation on steep slopes (the latter due to poor betterment planning), etc. have resulted in severe soil erosion. Over 50% of the area has been lost due to soil erosion. Erosion is a problem in grazing camps, arable land and graveyards.

A second problem was that shortly before the commencement of the present study a previous attempt to bring about soil conservation in Madliki failed badly.

The objectives of this study were then to:

a. Establish reasons why the previous attempt of soil conservation at Madliki failed.
b. Establish whether a community-based approach to soil conservation could be developed which could be applied successfully and could possibly serve as a model for other areas in the Eastern Cape.

4.5 RESEARCH PROCEDURES

The research procedures followed a community-centered approach. This was done to ensure that the community's views were heard and the project focused on resolving their problems. Amongst other things, the ownership of the programme by the community was seen as key to its success and sustainability.

4.5.1 Information gathering regarding the previous failed approach to bring about soil conservation at Madliki

Two meetings were held and individual interviews were conducted at household level. This was done in order to get first hand information from as many people as possible. Household interviews were carried out to ensure a full coverage of individuals who do not attend meetings due to cultural barriers (e.g. youth, boys and girls), ill health, etc. and to get the opinions of those who are scared or shy to talk in meetings.

From this process a lot of information was gathered on the failed previous approach and the views of the members of the community were unanimous in all respects. The community felt that:

a. The government officials imposed the project on them because their priority area was not considered despite their plea to the officer concerned to start at the graveyard.
b. The initiative of the project was perceived as job creation since people were employed to do the job and hence there was no continuity. However, the community expressed concerns with regard to the unsustainable nature of the project.
c. Lack of ownership. The community didn't take ownership of the project due to (a) and (b) above.

4.5.2 Approach/ method used to develop a community- based strategy for soil conservation

The approach used in developing a community-based strategy was Participatory Rural Appraisal (PRA) and it was through this process that the needs of the community were identified and prioritized. This approach was found useful as it ensures active participation of the community and also ensures that first hand information from the community is heard.

Rapid Rural Appraisal (RRA) was also used as a research tool. Through this process 10% of the households in the community was sampled and interviewed. This was done to ensure that the views of the individuals who couldn't attend the PRA workshop and those who couldn't speak in public were heard.

The soils of the area were studied and classified through soil profiles from open gullies. The vegetation was also studied using the veld condition assessment. The grasses were studied using the nearest plant method, that is, the plants within 1,5m on each side of the line transect were recorded. For bush a line transect method was used, recording every plant within the 30m radius. Climatic records were obtained from the officers from the Department of Agriculture and Land Affairs in Zwelitsha.

4.6 PREVIOUS CONVENTIONAL APPROACH TO SOLVING THE SOIL EROSION PROBLEM AT MADLIKI

4.6.1 The initiative from the community

The initiative for the soil conservation exercise came from the Madliki community. In April 1996 the Madliki Community approached the Eastern Cape provincial Department of Agriculture and Land Affairs (soil conservation section) about their soil erosion problem. They needed an immediate and urgent solution to the soil erosion problem in their graveyard. At the time of the study they were using a third graveyard, the reason for that being the fact that the first and the second ones are badly eroded. The community's main concern and fear was that the skeletons of their ancestors were going to surface and be washed away.

They further stressed that despite the unacceptable exposure or experience (the surfacing of human skeletons, seen by particularly children), it is also unacceptable culturally since the graveyard is regarded as a respected place.

4.6.2 The reaction from the soil conservation officers of the Eastern Cape provincial Department of Agriculture and Land Affairs

According to the information provided, the whole background to the request from the Madliki community was discussed with the soil conservation officers from the Eastern Cape Department of Agriculture and Land Affairs (DALA). However, the officers ignored the community's priority (the reclamation of the graveyard) and unilaterally decided to start a soil reclamation project in the grazing camps.

This is a typical attitude of many government officials working in the less developed tribal areas of South Africa, namely, that they consider themselves to be the sole decision-making powers and that the communities are simply told by them what to do, without listening to inputs from the communities.

4.6.3 The reaction of the community

The community was not pleased by this as everything was imposed on them despite the fact that their request was specifically for technical advice and funds to reclaim their graveyard. In the process some of the community members were paid for work done through temporary employment by the DALA. Hence they allowed the project to go ahead. Even though they were happy with the 'jobs', they didn't take ownership of the project. Instead, they perceived it as only a job creation project in line with the Reconstruction and Development Programme (RDP). After two months the funds were exhausted and the project couldn't continue even though the work was not complete. (Only 83 holes for fencing were dug and one stone pack was constructed and this didn't even cover a quarter of the area to be reclaimed, let alone its effectiveness in addressing the problem.)

The community was very devastated by the approach and the short life span of the project. They were particularly concerned about the funds that were 'wasted' without achieving the desired outcome. They went back to DALA, but all in vain, as they were told that there were no funds.

In September 1996 an officer from the Community Forestry Section of the Department of Water Affairs and Forestry (DWAF) visited the community in connection with a school greening project at Langa Liphumile High School. The people became very interested when they heard about the tree-planting project. They expressed their grief about the condition of their soils, particularly the situation at their graveyard. The officer concerned was very sympathetic of the situation and approached me for assistance. At the time I was desperately looking for a suitable area in which to study the possible development of a community-based soil conservation approach for the Eastern Cape, so I decided to take Madliki as a study area.

4.7 APPROACH AND METHOD USED IN THE DEVELOPMENT OF A COMMUNITY- BASED APPROACH FOR SOIL CONSERVATION

Because of the community's previous negative experience I had to spend a lot of time working out an appropriate approach to tackle the problem. The members of the community at the stage were very suspicious and uncomfortable with outsiders and government officers. Hence I had to spend a lot of time in building their trust and ensuring acceptability to them. This was a tough challenge and I had to be patient.

Firstly, I had a meeting with the community leaders and I gathered as much information as possible. A general meeting was later held with the entire community. The high attendance rate was very encouraging, as this proved that the people were keen and committed to the reclamation of their denuded land, particularly the graveyard. Both these meetings were regarded as information sharing sessions.

At the second meeting it was agreed that a needs assessment must be conducted in order to gain a good understanding of the community, their needs and their activities.

The needs assessment methods used were participatory rural appraisal (PRA) and rapid rural appraisal (RRA) to ensure full coverage of all aspects that are important to the community. (See Appendix A.)

4.7.1 The actual participants

The Madliki community, like any other community, is divided into various interest groups. For example, a small percentage of the community, predominantly men, are working as migrant labourers in cities and therefore could not have a direct contribution to the soil conservation project. Another group is focusing on business related activities like selling fruit and vegetables in King William's Town, etc., and therefore do not have a direct interest in natural resource conservation. Only people who have a direct interest or the actual resource users could show full commitment to the process.

In view of differences in interests within the community, it was realized that we should focus on a user group for the following advantages:

a. To maintain focus and ensure that all participants are interested and this enhanced participation.
b. To encourage participation of women who were always left behind.
c. To ensure that direct benefits will go directly to the people who have actually worked.

4.7.2 Determination of priority areas for soil conservation

During the PRA exercise the community made it clear that their priority areas for soil reclamation are the graveyard sites and of the three existing sites work must start on the graveyard number two as the open gullies were extending at a very fast rate by eating their way up towards the graves. Both parties (extension officers from DWAF and the community) further confirmed this through site visits.

Graveyard No. 2 was really in severe danger, more so than the other two, and it was on this basis that this site was chosen as priority area for soil conservation in the village.

4.7.3 Reaction and participation of the community

The community was very relaxed and open in the meetings and individual interviews. Despite the fact that on the day of the PRA workshop it was raining, the turnout was very encouraging. This proved how desperate the community was to have their problem solved.

The reclamation method and species to be used were discussed and later agreed upon in meetings. The actual implementation strategy was also debated by all and people were assigned tasks with time frames. It was quite interesting to see active participation of women. Fortunately the conditions were conducive for their participation since meetings were held in a school hall (public place) and not next to a kraal at the chairman's place. In the Xhosa tradition women cannot go next to the kraal, as it is taboo to see a married woman next to a kraal.

The community took the lead in deciding on the actual species and methods to be used. All possible options were presented to them, including engineering techniques. However, they insisted that they prefer simple and straightforward methods. They were not keen to use stone packs because they felt that it was:

a. Costly, as stones were not readily available in the vicinity of the reclamation area, which meant that they had to be transported at high costs.
b. Labour intensive.
c. Time consuming.

Opinions b and c above were based on their resent experience with DALA 's soil conservation project.

4.7.4 Funding

Having had an understanding of the community's financial status, that is, the fact that they are very poor, a motivation was submitted for funding from the Department of Water Affairs and Forestry. It was, however, made clear to the community that funding was not meant for job creation or salaries, but to purchase material that was needed for the implementation of the project. The community welcomed the idea and when the actual funding of ± R10 000 was approved, an activity-based budget was compiled and agreed to (Table 4.1).

Table 4.1 Activity-based budget agreed to for community-based soil conservation in Madliki

Amount	Activity	By whom
R2 800	Purchase fencing poles	DWAF and the Community's Forest Committee
R5 000	Purchase fencing wire	DWAF and the Community's Forest Committee
-	Soil preparation	Community under the guidance of DWAF
-	Provision of seedlings and transport	DWAF
-	Provision of tools	Community
-	Planting	Community

The bulk of the money (R7 800-00) was used to purchase fencing material, i.e. poles and fencing wire. The remainder of the funds (R2 200) was kept for other small projects. This motivated the people to work harder. The fence was up within a week and only five men were responsible for the job.

4.7.5 Soil conservation techniques

The main objectives for the process were to:

a. Protect the soil from erosion.
b. Maintain and improve soil fertility.
c. Control rainwater so that it is absorbed into the soil so as to reduce runoff volume.

The following conservation methods were agreed to:

a. Exclusion of livestock.
b. Reduction of overland flow/runoff.
c. Stabilizing existing dongas in the graveyard.

4.7.5.1 Exclusion of livestock

It was agreed to fence off the Graveyard No. 2 area in order to exclude livestock, as overstocking was identified as one of the major causes of soil erosion. Fencing material (through the funding), seedlings and transport were supplied by the Department of Water Affairs and Forestry whilst the community provided manpower ***without demanding payment*** for it. This showed good working relationships between DWAF and the community and ***willingness of the community to contribute something towards the conservation of their resources if they have decision-making powers regarding priorities and methodologies.***

Because this was a decision by the community and not something imposed from outside, they assumed the responsibility to ensure that all members of the community adhered to the decision. Problems like the cutting of fences to let livestock in, therefore, do not occur. When grass is available community members are allowed to cut it and feed their animals outside the protected area. This type of "cut-and-carry" zero grazing technique is also applied successfully where it is a community-based decision making in other parts of Africa, e.g. in Burkina Faso (Kinwa, Ainslie, May, Ntsaba, Poonan and Fakir, 1996) and West Usumbara in Tanzania (Ngailo and Baruti, 1997).

Elimination of grazing due to exclusion of livestock encouraged natural growth of shrubs and grasses, i.e. it increased the amount of livestock fodder produced in the area, resulting in a tangible benefit to the community from excluding livestock from the area, apart from the erosion control of the sensitive graveyard area (Plate 4.5).

Plate 4.5 – Dense growth of grass and shrubs due to exclusion of livestock from the graveyard No 2 area at Madliki. (Photograph: N.N. Maswana)

4.7.5.2 Reduction of overland flow / runoff

The area is full of footpaths and small vehicle tracks leading to the graveyard. These footpaths and tracks form ideal channels for concentrated water flow. These accelerate soil erosion in two ways:

a. The concentrated flow in the footpaths and wheel tracks greatly accelerate the formation of big gullies (dongas) where they are.
c. The water flowing from these incipient gullies merge into bigger streams down-slope, which flood the graveyard areas and cause huge dongas.

The first step was to slow down the runoff by reducing the overland flow on all such routes. This was done by packing leaves from *Agave americana* longitudinally in the incipient gullies, pinning them down with stones and slightly covering them with soil.

Agave americana leaves have a strong fibrous network, which decompose extremely slowly (Laker, personal communication). The fibrous "nets" remaining after the soft material has been removed by decomposition, strongly resemble some of the synthetic "geotextiles" which are widely used for erosion control. Holding them in place by covering with soil and stones not only slowed down water flow through a direct action, but also resulted in a good substrate that enhanced grass growth.

Apart from its good and long lasting effects, the use of *Agave americana* also had the following advantages:

a. *Agave americana* trees were available in Madliki very close to the problem areas, which had to be reclaimed. It was, therefore, available free of charge. The only input required was the labour to cut the leaves and carry them to the gullies and put them in position.
b. *Agave americana* is well known amongst the Xhosa people of the central Eastern Cape (former Ciskei) as being a good "fertilizer" to apply to soils (Laker, personal communication). The Madliki community consequently were very comfortable with using it.

A year later, the community raised concerns with regard to too much water still flowing through the graveyard. I visited the area and discussions were held on-site. From my own observations I realized that the excess water was coming from the gravel road passing through the village. I shared my opinion with the community. However, they disagreed. I did not argue with them, but asked them to monitor the area when it rains again. A month later they phoned me and confirmed that they observed that the water was coming from the road. They then used *A. americana* leaves to reduce the water flow (as described above). This experience outlines the importance of giving the community an opportunity to make their own observations and decisions as that ensures that the idea is planted in their minds, thus ensuring continuity and sustainability of the programme after the researcher has left the area.

Contouring was seen as one of the effective ways of reducing runoff, whilst enhancing absorption of water. An 'A' frame, with a plumb line attached to its

horizontal bar and a stone as plumb bob was used to mark level contour lines (Plate 4.6).

Plate 4.6 –The community in action, measuring out contours. (Photograph: N.N. Maswana)

The work began from the top of the hill, working downwards to construct contours.

4.7.5.3 Stabilizing the existing dongas in the graveyard

It was discovered that the dongas were being extended by erosion as the soil was collapsing from their sides and they were also eating upslope. Then it was decided to plant *Agave americana* seedlings in such vulnerable areas to stabilize the dongas. This was very successful in stabilizing the soil (Plate 4.7).

Plate 4.7 – Establishing of *Agave americana* seedlings to stabilize vulnerable areas (Photo: NN Maswana)

4.7.6 Plant species selection

Species selection was done together with the community. The community stressed that ***"no edibles may be planted in the graveyard".*** Species were selected based on their potential to rehabilitate the soil and usefulness to the community. After long discussions it was agreed that the following species could be planted.

4.7.6.1 Vetiver grass (Vetiveria zizanoides)

Planting of this grass along contours in continuous hedges gives rainwater enough time to infiltrate the soil and reduces runoff. It takes a maximum of three growing seasons for the vetiver grass to be well established and thoroughly protect the soil. Vetiver grass offers the following advantages:

a. When young it can be cut and fed to the livestock (fodder).
b. It gives a good mulch to enrich the soil.
c. It does not invade cropped areas when planted in a crop field.

d. It forms a dense hedge, which traps the silt, thus enriching the soil (Ouattara *et al.*, 1993).

4.7.6.2 Agave americana

Agave americana is widely used in erosion control in the Eastern Cape and it has shown good results. It has the following advantages:

a. It is drought hardy.
b. It grows on very poor quality soils, especially shallow soils.
c. It can be used as fodder during drought.
d. It regenerates very easily (Le Houerou, 1994).
e. It is a very efficient and cheap means of erosion control (Le Houerou, 1994).
f. It is well known to the traditional rural people of the Eastern Cape, including Madliki community.

4.7.6.3 Saltbush (Atriplex spp.)

Various saltbush species are drought hardy fodder plants used for soil conservation in many arid and semi-arid areas in Africa, including many parts of South Africa (Le Houerou, 1994). Semi-arid areas of the Eastern Cape (e.g. in the vicinity of Middleton and Somerset East) are amongst the important areas where especially "old man salt bush" is used successfully. One of the advantages of saltbush is that it increases the carrying capacity of the semi-arid and arid rangelands, thus reducing over-grazing in such areas.

4.7.6.4 *Sour fig (Carpobrotu edilis)*

Sour fig is a creeper that can be planted between the lines of vetiver grass. It remains green throughout the year. Because it is a creeper and remains evergreen, it gives a very good protective ground cover. It is easy to propagate, spreading quickly but unlikely to become a weed, as it is indigenous. The fruit can be eaten by humans. It can also be dried and used for making jam. The juice from the leaves has medicinal properties (Haig, 1992).

4.7.6.5 *Trees*

" Too little emphasis is paid in South Africa on the value of trees and shrubs for the prevention and control of soil erosion. The judicious planting of trees can do much to arrest the advance of dongas by binding the soil and protecting its surface with mulch or litter. However where erosion is progressing very rapidly, tree planting should be undertaken in conjunction with other means of control such as construction of barriers and dams" (Poynton, 1984).

The following tree species were selected:

- HONEY LOCUST (*Robinia pseudoacacia*)
- BLACK LOCUST (*Gleditsia triacanthos*)

Both species have the following advantages:

a. Whenever their roots are exposed by erosion they throw up suckers and form new trees.
b. They are drought hardy.
c. They are fodder trees.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL

Soil conservation is an expensive and time-consuming exercise, hence soil losses must be avoided through prevention of soil erosion. That is, farmers must be committed to good farming practices and amongst other things exercise caution in handling the rather fragile resource, the soil.

There is no way that one can avoid the use of land, as the ever-increasing population requires sustainable food and fibre production. Hence it is a prerequisite to preserve and conserve the limited soil. Soil erosion is possible whenever raindrops strike an unprotected or bare soil and it is even worse when the soil is unstable (Agassi, 1996).

5.2 LESSONS LEARNT

5.2.1 Immediate economic/financial benefits should not be the only criteria for evaluating the value and/or success of soil conservation

It is often stated that rural communities will only participate in and/or be satisfied with soil conservation programmes if they can reap immediate economic benefits from them. The Madliki experience has shown that this is a gross over-simplification. In the community-based programme the members of the community did not reap any immediate economic benefits and yet they enthusiastically participated. They did not receive any remuneration for their work, neither in cash nor in kind. In contrast they were unhappy with the DALA's programme, from which they reaped immediate financial benefits in the form of being paid for their work.

The difference is that the community-based programme addressed the priority set by the community themselves, and the not a priority determined by outsiders. The community-based programme was not aimed at economic benefits, but at bringing about cultural/psychological/sociological benefits in the form of peace of mind and satisfaction that they succeeded in preventing the bones of their ancestors form being

washed away and in preserving the sacred graveyard area. It must be kept in mind that especially for traditional rural people land does not only have economic value, but also religious, cultural, psychological and sociological values.

Most rural communities are very poor and although no immediate benefits can often be reaped from soil conservation projects, they are long-term solutions to the poverty stricken nation. It is therefore imperative for service providers to intervene in terms of funding such projects in an effort to help people to help themselves. It is important to note that the funding must not be seen as job creation or handout or compensation for work done. It should be only seen as an initial injection to pay for the basic material that is required to start the project.

Extreme caution must be taken when funding projects in order to entrench ownership of the project by the actual owners. In terms of long term commitment or sustainability, the community that owns the project end up being the beneficiaries. At Madliki, for example, the reclaimed graveyard left the community satisfied and grass and other fodder is ready for cutting to feed their livestock, hence I discourage compensation for work done. Problems created by compensation for work done, were described for the case of Sterkspruit/Herschel in Section 3.3. In the IFAD video "Building on Traditions-Conserving Land and alleviating Poverty" the use of "food for work" is, based upon experience, in the West African Sahel, strongly discouraged. Instead providing "tools for work" is encouraged. Thus, incentives/compensation should be very carefully considered, because well-meant actions may have opposite effects to what was intended.

5.2.2 "Ownership" breeds sustainability of soil conservation programmes

Only when a community accept a programme as their own and assumes "ownership" of it, will the outcome of it be long-term sustainable. This was clearly observed at Madliki, when the community took the lead in implementation of projects because it addressed their priority. One of the interesting statements they made was that ***"We, the people of Madliki are the owners of this project and in order for it to work we must protect our resources. So we must be the watchdogs.***

The forestry committee and SANCO must draw up a strategy for looking after the fenced area. This proposed strategy must be presented to the community, modified where necessary and endorsed and implemented by all. Everybody is urged to look after their livestock, otherwise everything caught inside the fenced area will be impounded". The importance of social stability was also seen in Sterkspruit and Herschel where people were taking turns in looking after their cultivated pastures for soil reclamation.

5.2.3 Success and satisfaction breeds expansion of soil conservation

At Madliki the success achieved by the community with soil conservation in the graveyard area and their satisfaction with it, stimulated them to want to ***"replicate this throughout our area"***. They believed that only by doing this they would achieve sustainability. Most interestingly the first area, which they targeted for conservation after the graveyard, was the area with which they were so dissatisfied when DALA imposed it on them as highest priority. The community also now had the knowledge and the skills to replicate the project in other areas virtually on their own through the experience gained from the graveyard project.

The Madliki community quite correctly also stated that ***"Outsiders, including our neighbours will only benefit through learning from us"***. In the previously mentioned IFAD video emphasis is also placed on the importance of "farmer to farmer extension", with the emphasis on exchange visits by communities to others who have achieved success, so as to learn from them. They mention even across-border visits. In the case of Sterkspruit/ Herschel one could think of visits to successful projects in the neighbouring Lesotho.

Other communities in the vicinity of Madliki wanted to do the same as was done in Madliki – based on the success that they saw there – and that they wanted me specifically to guide them, on the basis of the way I handled Madliki. However, due to my work commitments, I had to decline and so far nothing has been done to address their need.

5.2.4 Social stability and sustainability is key to success of any community project

One needs to seek social sustainability in order to achieve positive and desired results. Social acceptance is crucial for conservation to be sustainable as people play a very important role in resource management (Borini-Feyerand, 1997). The values of local people and indigenous practices are also significant in conservation. In the Madliki project the community was not quite convinced that exotic trees can assist in reclaiming the land and were not pleased with the idea of using them. They insisted that only indigenous tree species must be planted but because it was a pilot study they agreed to have a few planted as outlined in the previous chapter. Only few beef wood trees survived amongst the exotics. The *Diosporos dichrophylla,* which is an indigenous bush, flourished and it reclaimed the area well. This bush is well established along the contours (Plate 5.1) and it is also used as live fencing. It is therefore time for professionals to realize that community projects will not succeed without the active participation of the resource users as they possess valuable and detailed indigenous knowledge of local bio-diversity and can be effective in suggesting suitable preservation methods.

Plate 5.1 Diosporos dichophilla well established along the contours

5.2.5 The importance of recognising and dealing with user groups

Rural communities are fragmented in terms of their interests and priorities. Even though at Madliki everybody showed interest and commitment to the project, there were those individuals who had other priorities. They managed to sieve themselves

out. That is, people who are interested in other activities focussed in their areas of interest. For example, the community members that are committed to agricultural production were quite active in the project, whilst those who have other survival means didn't show much interest in terms of active participation. As community developers we had to be careful when dealing with this situation in order to avoid creating conflict within the community. We remained impartial and encouraged debate around the issue until consensus was reached. The community at large agreed on who the user group is, and how abuse or exploitation by other groups could be avoided. The user group did the work and the following agreement was reached:

a. The project is owned by the whole community and therefore the user group is accountable to the community.
b. Direct benefits, e.g. income that might be generated from the project (for example through sale of fodder trees and grass which may be cut) will go to the user group, but indirect benefits, e.g. access to the graveyard, will be enjoyed by everybody.

This proved to be a very successful approach by the community. Hence the project is still working very well, as some community members are busy with other projects, e.g. poultry, water, etc.

Dealing with a user group encouraged active participation of women. Women identified themselves as the active users of land since many households are headed by women. They therefore have to shoulder the responsibility of feeding the rest of their families and the only option that is available to them is agriculture. However, the depletion of the soil resources was making things difficult for them. Hence their participation was crucial.

5.2.6 Lack of active participation by youths

Lack of active participation by youths has been observed as a threat to sustainability of any development or conservation project. The culture of the rural people in the Eastern Cape does not encourage youths to sit in meetings with elderly people. Meetings are perceived as a way of sharing ideas between old people. A boy in particular cannot stand up and talk to people. In Xhosa tradition a boy is a dog

(*inkwenkwe yinja*) so no one can listen to a boy. A girl must have respect and one of the ways of showing respect and dignity is to stay and work at home. Unfortunately the same applied at Madliki, despite efforts to bring everybody on board. This is a threat to the sustainability of soil reclamation or conservation since there might be not transfer of skills to the young ones. This was raised as a concern to the community, but they assured us that transfer of skills has been part of their culture, so they will definitely bring them in when it is the right time to do so.

5.2.7 Lack of incentives for culling livestock

From Chapters 2, 3 and 4, overgrazing is raised as one of the important contributing factors to soil degradation and soil erosion. However, the farmers are not prepared to cull or reduce their stock numbers, as there are no incentives for that. This is one of the areas that need immediate attention if rural development and food security is the priority of government and it can be addressed through ensuring a balance between the cultural needs and development. In my opinion improving the veld management in communal areas through rotational grazing should be the first step. Ensuring that there is a good and stable market for livestock might encourage the community to sell some of their stock. In order to achieve this the existing extension officers should be refocused and motivated.

5.2.8 A need for proper land use planning

From Chapter 2, it became clear that not much has been done in the Eastern Cape with regard to land use planning as numerous and serious mistakes were made by the planners. This is due to the fact that a lot of information on the soils of the Eastern Cape is still missing. An in-depth study of the soils of the province needs to be carried out as soon as possible in order to assist Local Authorities with their huge challenge of developing Integrated Development Plans for their areas.

5.2.9 Parent material and climate are keys to stable soils and erosion-free land

In Chapter 3, the contrasts between Mdantsane and Middledrift explain the importance of climate and parent material in the formation of soil and the stability thereof. This information is crucial in the planning process as it assists the planners to make informed decisions.

5.3 RECOMMENDATIONS

5.3.1 'Do with them not for them '

For the success of any development, the developer needs to ensure technology transfer to the local people through hands-on training or practical application. Through this approach sustainability can be achieved. Handouts are a short-term solution, therefore teaching a person to fish rather than providing it free will keep the whole generation healthy.

5.3.2 Understanding the natural resource base

It is recommended that the developer carefully study the resource base of the area prior to the implementation of the project (during the planning stage) in order to have a clear understanding of the potential and constraints of the area. This knowledge can assist the developer in making informed decisions and avoid errors such as those discussed in Section 3.2.3.

5.3.3 Understanding of and respect for cultural values

It is recommended that the developer should have a good understanding of the culture of the target community, as most African communities tend to be very sensitive about their culture. One should listen well to inputs that relate to the cultural values. An understanding of the people one is working with can be achieved by spending some time in the community. A basket of options must therefore be presented in order for them to be accommodated or strike a balance between cultural values and development objectives.

5.3.4 Winning and maintaining a community's trust is extremely important for the success of any development initiative

Any developer is viewed as an outsider by the communities irrespective of colour or ethnic group. It is therefore the developer's responsibility to ensure that he/ she is accepted and trusted by the community. This can be achieved through participatory tools. It is difficult to build trust. However, it is very easy to destroy it, hence, the recommendation that one should be cautious and open-minded at all times. 'Please do not make promises that you cannot fulfill'.

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APPENDIX A

SUMMARY OF THE PARTICIPATORY RURAL APPRAISAL AT MADLIKI

OBJECTIVES

a. To get first hand information from the community about their own situation.
b. To get the community's needs, fears and limitations
c. To facilitate the ownership of the project by the community through them making an input from the planning stages of the project, thus, ensuring their participation throughout the project.

APPROACH

A workshop or meeting was held with the writer being the facilitator. The meeting was conducted the traditional way, that is, the way the community usually conduct the meetings, however, specific questions were asked to ensure that everything that is entailed in the project was covered, and the facilitator had a task of ensuring that the community was relaxed and the discussions were open.

RESULTS

MEANS OF SURVIVAL, LIMITATIONS AND PROPOSED SOLUTIONS AS IDENTIFIED BY THE COMMUNITY

Survival Means	Limitation	Proposed Solution
Crop production–mainly rainfed, focusing only on summer crops, like maize, vegetables and legumes.	**Low rainfall** ***Tractors are expensive***	**Irrigation** ***Government must provide as it was done in the past***
Livestock-mainly cattle and lesser extent sheep and goats	**Poor veld conditions and diseases**	**Camp fencing and Rotational grazing**
Old age pension and		

disability grant		
Survival Means	**Limitation**	**Proposed Solution**
Income from migrant labour	**Retrenchments**	***Government must provide jobs***

NEEDS (PRIORITISED)

1. Jobs (approximately 80% of the community is unemployed)
2. Clinic
3. **Soil conservation**
4. Water- for drinking and irrigation
5. Fencing material for fencing camps and arable land
6. Agricultural extension service
7. Creche
8. More classrooms in the primary schools
9. Woodlot

FEARS

1.Soil erosion

2. Imposed development by government might affect their way of living: e.g., culling of livestock has been mentioned several times to them and is against their culture.

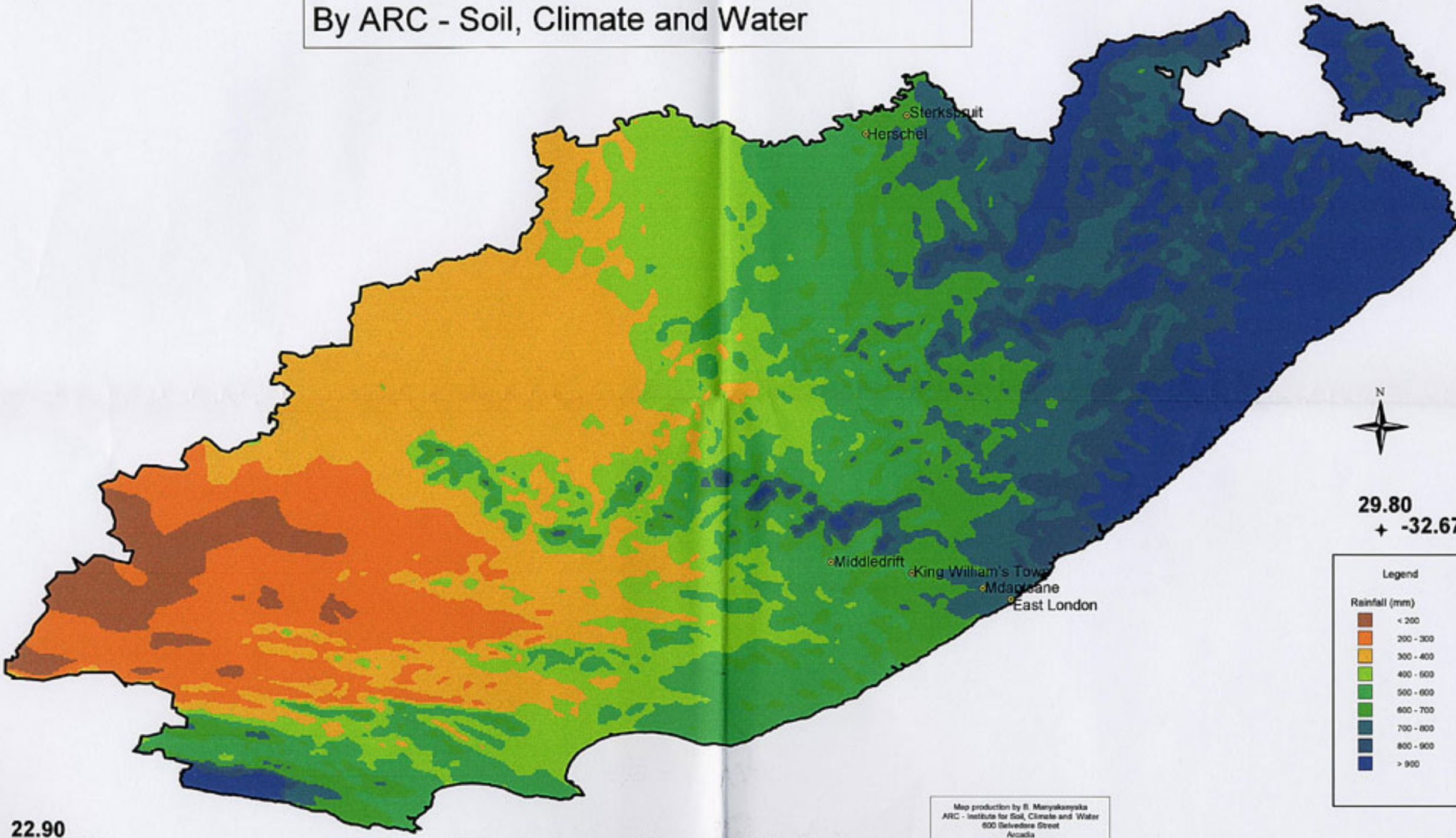
3. Job losses and low agricultural productivity, might lead to starvation.

Map 2.1 Average annual rainfall

By ARC - Soil, Climate and Water

22.90
-29.88

29.80
-29.88



N

29.80
-32.67

Legend

Rainfall (mm)

- < 200
- 200 - 300
- 300 - 400
- 400 - 500
- 500 - 600
- 600 - 700
- 700 - 800
- 800 - 900
- > 900

22.90
-34.34

50 0 50 100 Kilometers

Map production by B. Manyakanyika
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Arcadia
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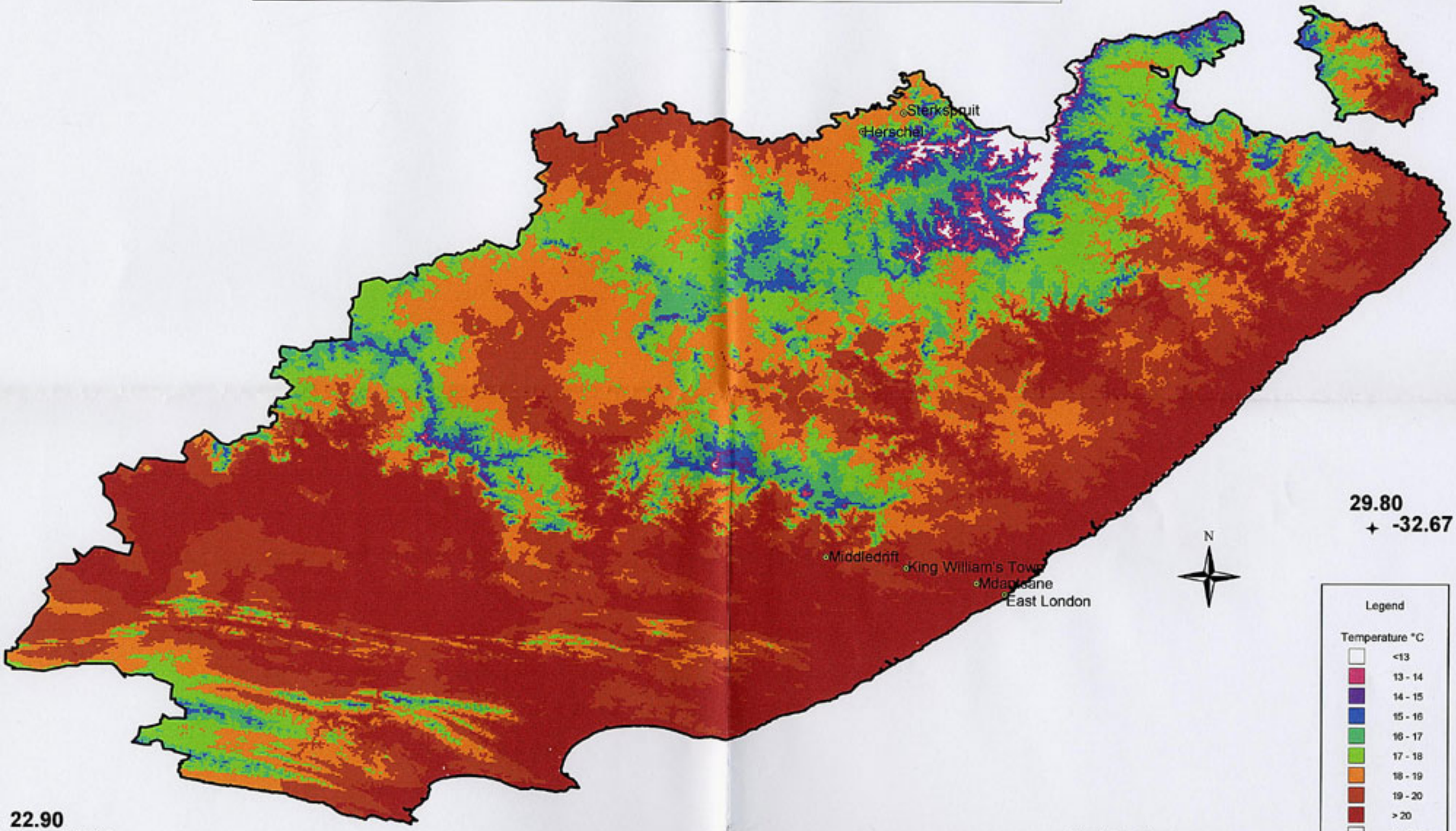
Pretoria
0001

Map 2.2 Longterm average temperature

22.90
+ -29.88

29.80
+ -29.88



29.80
+ -32.67

22.90
+ -34.34

Map production by B. Manyokanyaka
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Arcadia
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Pretoria
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Map 2.3. Broad Soil Patterns

By ARC - Institute for Soil, Climate and Water

24°
30°

30°
30°

Herschel
Queenstown
Middelburg
King William's Town
Mthatha
East London

24°
34°15'

SCALE 1 : 2 000 000

50 0 50 100 150 200 km

Map production by : A.J. Herring
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Pretoria

Legend

RED-YELLOW APEDAL, FREELY DRAINED SOILS

Aa - With a haplic horizon
Ab - Red, dystrophic and/or mesotrophic
Ac - Red and yellow dystrophic and/or mesotrophic
Ad - Yellow, dystrophic and/or mesotrophic
Ae - Red, high base status > 300 mm deep (no duplex)
Af - Red, high base status > 300 mm deep (with duplex)
Ag - Red, high base status < 300 mm deep
Ah - Red and yellow, high base status, usually < 15% clay
Ai - Yellow, high base status, usually < 15% clay

PLINTHIC CATENA, UPLAND DUPLEX AND MARGALITIC SOILS RARE

Ba - Dystrophic and/or mesotrophic; red soils widespread
Bb - Dystrophic and/or mesotrophic; red soils not widespread
Bc - Eutrophic; red soils widespread
Bd - Eutrophic; red soils not widespread

PLINTHIC CATENA, UPLAND DUPLEX AND/OR MARGALITIC SOILS COMMON

Ca - Undifferentiated

PRIMARY CUTANIC AND/OR PEDOCUTANIC DIAGNOSTIC HORIZONS DOMINANT

Da - Red B horizons
Db - B horizons not red
Dc - In addition, one or more of: vertic, melanic, red structured diagnostic horizons

ONE OR MORE OF: VERTIC, MELANIC, RED STRUCTURED DIAGNOSTIC HORIZONS

Ea - Undifferentiated

GLOSSIC AND/OR MESAPEDIC FORMS (other soils may occur)

Fa - Lime rare or absent in the entire landscape
Fb - Lime rare or absent in upland soils but generally present in low-lying soils
Fc - Lime generally present in the entire landscape

SOILS WITH A DIAGNOSTIC FERRIHUMIC HORIZON

Ga - Predominantly deep (Lamotte form)
Gb - Predominantly shallow (Hawthorndale form)

GREY REDIC SANDS

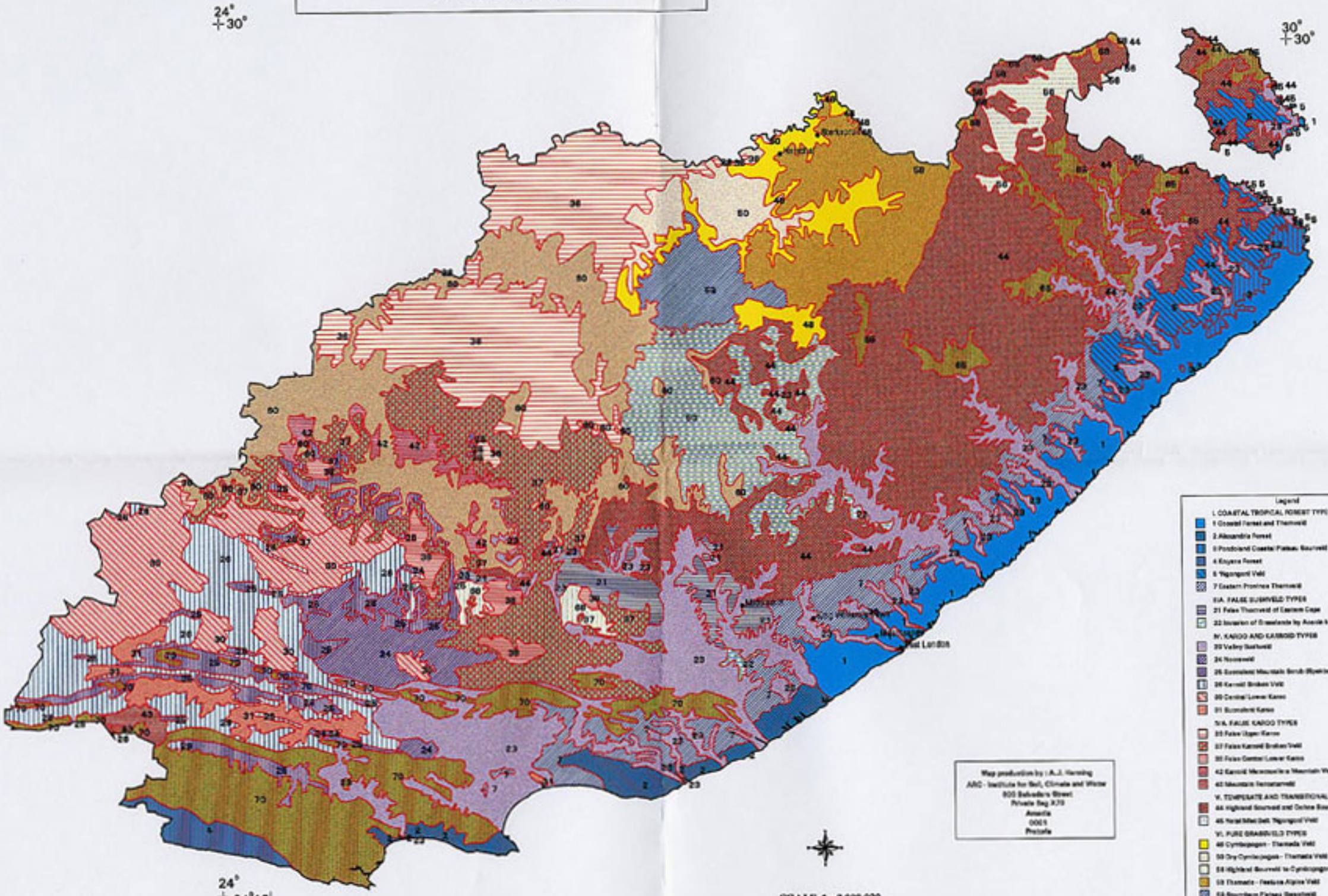
Ha - Regic sands dominant
Hb - Regic sands and other soils

MISCELLANEOUS LAND CLASSES

Ia - Undifferentiated deep deposits
Ib - Rock areas with miscellaneous soils
Ic - Rock with little or no soil

Map 2.4. Veld Types

By J.P.H. Acocks



Map 2.5 Land - Cover

By CSIR and ARC

22.90
+ -29.88

29.80
+ -29.88

Sterkspruit
Herschel
Middledrift
King William's Town
Mdantsane
East London

N

29.80
+ -32.67

22.90
+ -34.34

50 0 50 100 Kilometers

Legend

- Barren rock
- Cultivated: permanent - commercial dryland
- Cultivated: permanent - commercial irrigated
- Cultivated: permanent - commercial sugarcane
- Cultivated: temporary - commercial dryland
- Cultivated: temporary - commercial irrigated
- Cultivated: temporary - semi-commercial/subsistence dryland
- Degraded: forest and woodland
- Degraded: herbland
- Degraded: shrubland and low Fynbos
- Degraded: thicket & bushland (etc)
- Degraded: unimproved grassland
- Dongas & sheet erosion scars
- Forest
- Forest and Woodland
- Forest plantations
- Herbland
- Improved grassland
- Mines & quarries
- Shrubland and low Fynbos
- Thicket & bushland (etc)
- Unimproved grassland
- Urban / built-up land: commercial
- Urban / built-up land: industrial / transport
- Urban / built-up land: residential
- Urban / built-up land: residential (small holdings: bushland)
- Urban / built-up land: residential (small holdings: grassland)
- Urban / built-up land: residential (small holdings: shrubland)
- Urban / built-up land: residential (small holdings: woodland)
- Waterbodies
- Wetlands

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