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**THE IMPLEMENTATION OF D'MOSS :**  
**CASE STUDIES OF UMGENI SYSTEM**  
**AND UMBILO SYSTEM**

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THE IMPLEMENTATION OF D'MOSS : CASE STUDIES OF UMGENI  
SYSTEM AND UMBILO SYSTEM

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## GLOSSARY

■ **Biodiversity**

The variety of life in all its forms, levels and combinations.

■ **Conservation**

"An operational collection of ecological knowledge and skill applied in a way to understand and manage as many consequences of an environmental activity as possible in keeping with the expectations of all participants - plants and animals including man" (Havlick, in Owen, 1985).

■ **Ecology**

The study of interrelationships that exist between organisms and their environment (Owen, 1985)

■ **Ecosystem**

A system of plants, animals and other organisms together with the non-living components of the environment

■ **Stochasticity**

Forms of extinction due to occurrences such as natural catastrophes and genetic changes

■ **Trophic Level**

Levels of the food chain

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## CHAPTER 1

### 1.0 INTRODUCTION

It has long been recognized that the world is becoming more crowded, polluted and consumptive with regard to its utilization of renewable and non-renewable resources. As a consequence, natural systems which are essential to support life are being swallowed up by urban development and becoming ecologically less stable, thereby threatening the quality of human life.

In the light of the environmental crisis, international conferences have been held to establish guidelines for a future global environment and development policy. Government representatives attending The Rio Earth Summit in 1992 adopted the Agenda 21 Programme which provides an international blueprint for action on the environment and development into the 21st century. Cities and local authorities are recognized as being particularly important to its implementation because "so many of the problems and solutions being addressed by Agenda 21 have their roots in local activities and the cooperation of local authorities will be a determining factor in fulfilling its objectives" (United Nations Committee for Environment and Development (UNCED), 1992). The Global Forum '94 Conference held in England, acknowledged the special importance of cities and their role in achieving sustainable development for societies in all countries of the world (Walmsley and Botten, 1994). The World Commission on Environment and development defines 'sustainable development' as "improving the quality of human life while living within the carrying capacity of supporting ecosystems" (Walmsley and Botten, 1994).

The Durban Metropolitan Open Space System (D'MOSS) recognizes that the city functions as an urban ecosystem and relies on a balance between the human and natural components of the environment.

Open space planning is a means of achieving sustainable development as open spaces contribute to the optimum functioning of the urban ecosystems.

### 1.1 OPEN SPACE PLANNING IN SOUTH AFRICA

Open space distribution is of importance to town planners in the preparation of a Town Planning Scheme. The severity of topography, expensive earthworks, high acquisition costs, disruption to persons and a lack of financing from the City Council all impact on the identification of open spaces on a Town Planning Scheme. Although town planning in South Africa emerged as a control-oriented, physical planning system, since the 1960's planners have preferred to shake off their technocratic image and become more development-oriented, pro-active, process-oriented and people-oriented. Parallel with these developments, conservationists have called for greater State involvement in development projects to ensure that 'sustainable development' is implemented (Claasen and Milton, in Fuggle and Rabie, 1992).

The pattern of open space in South Africa has been determined largely by past economic, political and social trends - a pattern that is far from satisfactory in terms of biological viability (Poynton and Roberts, 1985). Before D'MOSS, open space constituted the space left over after development had occurred and disregarded the importance of factors such as size, location and biological quality. The townships established under Apartheid law lacked sufficient 'active' and 'passive' open space which tended rather to concentrate in the White group areas.

Violence, poor economic conditions and poor agricultural practices in former homelands adjacent to municipal areas have resulted in the in-migration of people to municipal areas where a consequent shortage of housing has led to informal settlements.

In these settlements, such as Cato Manor in Durban, overcrowding lowers the carrying capacity of the land and inappropriate shack building on slopes increases soil erosion as does poor urban agricultural practices. Thus the conditions in the informal settlements are threatening the ecological viability of open spaces.

The 'pioneer mentality' (Rabie and Erasmus, 1983), of most developing countries regards exploitation of resources as a norm and conservation as a hindrance to development (in Roberts, 1990). Walmsley and Botten (1994) note that South Africa is characterized by economic conditions applying to a Third World country and in this way experiences a 'pioneer mentality' causing cities to function inefficiently. Other factors that contribute to inefficient cities are : low density urban sprawl; the fragmented nature of cities; strong cultural divisions between residential areas and the separation of areas where work, shopping and public facilities are concentrated. This has led to wasteful technologies, underpriced resources and great disparities in resource consumption. Low density urban sprawl in South Africa consumes vast tracts of land (up to 30 000 ha) each year. Apart from intense competition between urban and rural areas for scarce land resources, food for an increasing population has to be produced on diminishing agricultural land (Walmsley and Botten, 1994).

Environmental legislation in South Africa dates back to a Cape Statute of 1888 when the first major forest legislation enabled State forests to be demarcated as the first formal protected areas in South Africa. This was followed by the establishment of several game reserves and the formation of conservation societies, one of which was the forerunner of the Wildlife Society of Southern Africa. The first statute relating to environmental conservation at national level was the Irrigation and Conservation of Waters Act No 8 of 1912.

The most important environmental function that was exercised at provincial level was fish and game preservation, the responsibility being specifically entrusted to the various provincial councils by the South Africa Act of 1909. Environmental control at local level related mainly to the control of environmental nuisances.

During the years 1940 - 1969, nature conservation legislation at both national and provincial level continued to grow. Most of the provincial legislation was consolidated into single nature conservation ordinances, except in Natal, where nature conservation was regulated by a variety of ordinances which addressed different aspects of nature conservation separately. More national and provincial nature reserves were proclaimed and the Southern African Nature Foundation was established in 1968. The Physical Planning and Utilization of Resources Act No 88 of 1967 sought to plan and promote better use of natural resources (Fuggle and Rabie, in Fuggle and Rabie, 1992).

Up until the 1970's the conservation of wildlife heritage was the overwhelming concern. Although attention was given to water, air, soil and human artifacts, this was often piecemeal and reactive. From 1970 South African perspectives on what elements should be encompassed by environmental legislation has broadened considerably. Numerous voluntary bodies, conferences, official publications and legislation raised environmental awareness. The Department of Environmental Affairs was formed and took control over a number of environmental statutes.

In 1980 a White Paper on a national policy regarding environmental conservation was published to formulate the government's policy on environmental aspects. A direct outcome of the Paper was the Environment Conservation Act No 100 of 1982 and in 1983, the establishment of the Council of the Environment to advise the Minister of Environmental Affairs.

In 1989 the Conservation Act was replaced by the Environment Conservation Act No 73 of 1989. In April 1992 a White Paper relating to a policy on a national environmental management system for South Africa was compiled by the Department of Environment Affairs (Fuggle and Rabie, in Fuggle and Rabie, 1992).

This brief historical account of environmental legislation in South Africa shows that in the last few years there has been an increasing recognition of the importance of environmental management and in line with this, open space conservation. Although South African cities are becoming more receptive to the international move towards greater environmental concern and have adopted the Local Agenda 21 Programme, fragmented legislation and a legacy of negative attitudes towards open space conservation present an obstacle to the implementation of conservation practices. During Apartheid 'black spot' removals resulted in land being forcibly removed from occupants for conservation purposes. Since the repeal of restrictive land laws preventing urban Africans from owning land up until the 1980's, landownership has become a highly politicised issue and is a high priority need for urban Africans. Open space planning is perceived as a threat to the satisfaction of housing needs and is consequently met with much scepticism. It is only when open spaces are regarded as a basic need and placed on the agendas of all tiers of government that **open space** planning will get the attention it deserves.

## **1.2 OPEN SPACE PLANNING IN THE DURBAN METROPOLITAN AREA**

In the Durban Metropolitan Area the topographical features which dominate the landscape have greatly influenced the form of the city. Rivers and river valleys, escarpments, ridges and coastal margins have encouraged preservation of extensive tracts of open land within the city limits.

The topography exhibits steep slopes and airless valley bottoms which are good for conservation, but a great deal of this land is privately owned (Nicolson, 1988). Studies by Cawood and Roberts, in 1981, showed that about 47% of the urban area was still undeveloped in 1980 (Poynton and Roberts, 1985). However, the undeveloped land did not coincide with land zoned as open space in the various Town Planning Schemes (Nicolson, 1988). Cawood's 1981 report also failed to regard ruderal vegetation (ie. vegetation characterizing disturbed areas such as wasteland and road verges) as essential for conservation, and the open space structure proposed would have comprised of islands of vegetation lacking the essential ecological links.

Durban experiences the urban sprawl effects of suburbanization and the effects of competing land uses that are characteristic of any First World city. It also faces the financial problems associated with land acquisition, management and maintenance in the face of competing demands on public finances. There is a lack of co-operation between local and regional levels of government at the metropolitan level (Nicolson, 1988).

The people living in the former homeland of KwaZulu experience poor economic conditions characteristic of Third World populations which have resulted in burgeoning informal settlements. The people living in these informal settlements are part of the Durban Functional Region (DFR) in that approximately 60% of the people work and shop in the Durban-Pinetown area. Until the recent political change whereby KwaZulu was reincorporated into South Africa and all residential areas are part of a municipality, the needs of these people were not incorporated into the DFR planning system. The poverty in informal settlements is an obstacle to open space planning as basic needs such as shelter and food take precedence over open space needs. The overcrowding in the informal settlements lowers the carrying capacity of the land and results in the degradation of natural resources in the informal settlements (Nicolson, 1988).

The segregated 'group areas' borne out of Apartheid reflect differing perspectives on the environment and differing commitments towards open space planning. The fragmentation of management of open spaces - a myriad of local authorities - has been a hindrance to the aim of achieving a coherent, unified open space system (Nicolson, 1988). With the amalgamation of KwaZulu and Natal and the formation of a Durban Metropolitan Council the management of open space planning in KwaZulu-Natal is likely to become more unified. The potential for an ecologically viable open space system in the Durban Metropolitan Area fares well in terms of topography and vegetation. The suitability of Durban for an open space system was investigated in the 1980's and resulted in the launch of the D'MOSS concept in 1990. The D'MOSS concept has incorporated social, political and economic needs of the Durban metropolitan area into a holistic approach towards open space planning and management.

### 1.3 THE ORIGINS OF D'MOSS

#### 1.3.1 Introduction

The MOSS (metropolitan open space system) concept is a total open space planning concept based on a holistic approach that recognizes the intrinsic value of open spaces and their place within the larger urban environment.

Although MOSS has been applied in other South African cities such as Johannesburg, it is the most well established in Durban. The application of MOSS in the Durban Metropolitan Area was an initiative of the Natal branch of the Wildlife Society of Southern Africa in the early 1970's. It is the Wildlife Society who have implemented the MOSS plan in conjunction with local municipalities. In the early 1980's the municipal authorities in Durban sought to establish an open space system on a more localized level and hence established D'MOSS (Durban Metropolitan Open Space System).



D'MOSS originally fell within the municipal boundaries of Durban but since the division of the metropolitan area into Local Councils (or substructures), D'MOSS is being extended to cover the North and South Central Local Councils.

The motivation for MOSS stemmed from a dissatisfaction with prevailing strategies of open space planning. The crisis-driven search for land in Durban (Dewar, 1991 in Roberts, date unknown) has resulted in open space being swallowed up by housing - some of which was ecologically valuable. Before the implementation of MOSS, open spaces were allocated according to fixed standards originating from British Town Planning standards and laid out in the Natal Town Planning Ordinance of 1949. These standards, which provide for two hectares of open space per 1000 of the planned population for each community district, took no cognisance of ecological principles. Research carried out by the former Durban City Council, in co-operation with the Department of Agriculture and the Botanical Research Institute, found that these planned densities have not been achieved because high-rise buildings have not been built and population growth rates have declined.

The result of this is a surplus of formal, public open space which includes poorly located sites, sites with lesser or greater than optimum size and those **where another** use would be more beneficial (Davies, 1993). **The Metropolitan** Draft Guide Plan of 1974 which guided open space planning at the time, dealt superficially with open space **and did not** create a coherent system which utilized open space to mould urban form (Nicolson, 1988). The location of open space **was ad hoc** and the substance of open space was largely 'sloap' land (ie. 'space left over after planning') and ecology **was not a determining** factor in the location of open space (MOSS Report, 1994).

It was the inappropriate location of open spaces that provided the rationale for D'MOSS : surplus open space lacking in ecological potential would be rezoned and sold for alternative purposes and the income thereby earned would finance the acquisition of ecologically valuable open space forming part of a coherent system. This is the intention of D'MOSS - the rationalization of open space location and quality.

In 1981, Antoni, Cooper and Leggo, wrote a report on behalf of the Wildlife Society of Natal to motivate for a strategy to establish an open space system. In 1983, the Natal Town and Regional Planning Commission, in consultation with the Natal Wildlife Society established a MOSS Steering Committee. The Steering Committee was formed as a result of the dissolution of the former Natural Areas Management Committee (NAMCO). The MOSS Steering Committee was established to oversee the implementation of the MOSS concept in the metropolitan area. It was represented by Durban City Council departments, the University of Natal, Durban, the University of Durban-Westville and the Natal Wildlife Society (Scarr, 1990 in MOSS Report, 1994).

It was at the same time that the MOSS Steering Committee formed that the Durban City Council, prompted by amendments to the Town Planning Ordinance as well as budgetary constraints, decided to develop a more localized open space system. The amendment to the Town Planning Ordinance reduced the permitted acquisition period for land from 25 years to either 5 - 10 years (Town Planning Branch, 1985 in Moss Report, 1994). If land was already zoned open space at the time of amendment, the Council had 10 years to purchase the land. All subsequent zonings had a 5 year acquisition deadline (Bond, 1996, pers comm).

This decision to develop a localized open space system led to a joint investigation during 1985-1989, by the Durban City Engineers Department and Dr Debra Roberts to re-evaluate open space needs in the Durban Municipal Area.

The study took the form of an extensive phytosociological survey of the plant communities within the municipal area. The data collected was used to estimate the minimum spatial requirements necessary to ensure long-term ecological viability for each of the eighteen plant community types identified and to produce the first vegetation maps for a city in South Africa (MOSS Report, 1994).

The direct result of this research was a D'MOSS report outlining a new approach to the provision of public open space. The report led to the devising of a D'MOSS plan which was officially approved by the Durban City Council on 7 December 1990. A Technical Working Committee was formed by the Steering Committee, under the chairmanship of Director of Parks, to implement the D'MOSS plan over the next five years, beginning in July 1991.

### **1.3.2 Goal of D'MOSS**

The goal of D'MOSS is to be an integrated, coherent network of open spaces to cater for the needs of people by promoting conservation, recreation, education, health and amenity (Nicolson, 1988).

D'MOSS aims to link established, proposed and potential nature conservation areas, natural and modified open space areas and/or parks within the municipal area and in turn link up with other municipalities. After the completion date of 5 years was up, it was intended that it would be possible for one to walk from one end of the city to another (Nichols, 1993). It also the goal of D'MOSS to achieve a totally integrated metropolitan open space system as part of Durban's Urban Structure Plan (Cooper, 1991).

### 1.3.3 Objectives of D'MOSS

The objectives of D'MOSS are biological conservation, river protection and stormwater management, amenity, recreation, trail building, education and community participation (D'MOSS Report, 1989).

These objectives will be further examined in chapter 4.

## CHAPTER 2

### 2.0           **METHODOLOGY**

#### 2.1           **SCOPE OF STUDY**

The scope of this dissertation will be to analyze the implementation of D'MOSS in order to ascertain what the obstacles to implementation are. The case study areas include areas of Umgeni North, Umgeni South and the Umbilo/Umhlatazana River Park. The focus will be on the acquisition, development and management of D'MOSS land, rather than the research and design aspects.

The study areas of Umgeni North and Umgeni South serve to demonstrate the procedures of land acquisition, while the already established Umbilo/Umhlatazana River Park forms a basis for analyzing the development and management aspects of D'MOSS.

#### 2.2           **GOALS AND OBJECTIVES FOR THE STUDY**

The goal of this dissertation is to investigate to what extent the implementation of D'MOSS has fulfilled the goals and objectives of the D'MOSS plan and to identify the problems encountered in acquiring, developing and maintaining D'MOSS land.

The objectives for the study are to investigate :

- How much of the land set aside for D'MOSS in the original plan has been acquired in the study areas ?
- Does the amount of land set aside need to be rationalized ?
- What has the cost of acquisition been ?
- How is the land acquired ?
- How is the land developed and maintained ?

In order to meet the goals and objectives for the study, certain assumptions must be made and a hypothesis must be developed. The hypothesis of this dissertation is that the constraints to implementing D'MOSS are due largely to land acquisition procedures and costs and management strategies.

The formulation of this hypothesis is based on certain assumptions. The first assumption is that there is a need for D'MOSS. Secondly, D'MOSS **needs** to be re-evaluated in the current climate of local/metropolitan government restructuring. Thirdly, the costs and delays incurred in the processes of acquiring land impede land acquisition and finally, there is a lack of clarity as to the future management of D'MOSS under a new metropolitan Council. Assumptions that are not explored in this dissertation are, that open space planning will differ across geographical and social contexts; squatter invasions threaten to overrun D'MOSS land; there are problems of dumping and fire hazards on D'MOSS land; urban agriculture and private gardens are an important component of D'MOSS.

### 2.3 THE ORGANIZATIONAL FRAMEWORK OF THE DISSERTATION

The research commences by looking at the background to open space planning on a national and metropolitan scale, and the factors responsible for leading up to the official launch of D'MOSS. Most of the background information is well documented in books such as Fuggle and Rabie (1992) and the origin and aims of D'MOSS are detailed in the D'MOSS 1994 Conference Report and in articles by Dr Debra Roberts and Guy Nicolson who were both involved in developing the D'MOSS concept.

Once the scene has been set, the informing ideas on which D'MOSS is based are outlined in chapter 3.

The first two sections identify what is meant by a metropolitan open space system and why it is important, on the basis of principles of sustainable development developed by the World Conservation Union, the International Union for the Conservation of Nature and Natural Resources, and on articles written by the Council for the Environment (1989) and Poynton and Roberts (1985). The section thereafter traces the development of open space planning throughout history, in order to give an insight into the ideas that shape perceptions of open space and hence the impacts of those perceptions on open space planning. The historical account is taken primarily from the thesis of Roberts (1990) and books by Ramade (1981), Botkin and Keller (1995) and Fuggle and Rabie (1992).

The ecological and town planning principles underpinning D'MOSS have their roots in the Theory of Island Biogeography, the substance of which is derived from the theses of Nicolson (1988) and Roberts (1990) and is examined in section 3.4.

Section 3.5 deals with government management structures, ecosystem management and management techniques. Implicit in the Theory of Island Biogeography is a management technique that has been harnessed by the D'MOSS planners. Data on the management strategies underpinning D'MOSS was found in articles written for the MOSS 1994 Conference (eg. Nichols, 1994) and by Roberts (1990) and Nicolson (1988). The management of D'MOSS is influenced by the powers of government and as such the environmental functions at different tiers of government is of relevance to D'MOSS. The role of government in environmental management is postulated in the works of O'Riordan (1995) and Fuggle and Rabie (1992) and section 19 of the New Constitution. The ecosystem approach that D'MOSS adopts is found in the works contained in Fuggle and Rabie (1992), O'Riordan (1995) as well as Botkin and Keller (1995).

D'MOSS advocates the use of community participation in developing an open space system and the necessity for participation is widely acclaimed in works by Khan and Wong in the MOSS 1994 Conference Report. The final section of the conceptual framework outlines the possible funding methods described by the World Conservation Union in its book, Caring for the Earth, which create possibilities for D'MOSS.

The D'MOSS Structure Plan follows next in order that the actual implementation can be compared to the intentions of the plan. The plan is described in the D'MOSS Report (1989) and Nicolson (1988). Interviews were conducted with Guy Nicolson and Kerry Seppings during the initial stages of the dissertation research to gather information on what the D'MOSS concept entailed. Nicolson was a founder of the D'MOSS concept and a former member of the D'MOSS Steering Committee while Seppings was involved in the D'MOSS botanical research and is currently an environmental officer in the Physical Environment Unit of Central Council. Map 1 of the substructures was found in the Sunday Tribune July 1996 issue and map 2 of the structure plan of D'MOSS comes from the D'MOSS 1994 Report.

The purpose of the case studies is to demonstrate the implementation of D'MOSS, with different areas highlighting different aspects of implementation. In the case of the Umgeni River Park, implementation is still in its initial stage with land acquisition as yet incomplete. The case study data came from interviews with a number of people involved in land acquisition. All the interviews were conducted through open-ended questionnaires. The interviewees included Kevin Meyer and Roy Klein of the Real Estate Department who answered questions on the different procedures, costs and problems of land acquisition. Willie de Klerk of the Land Transactions Department of the Central Local Council was interviewed on the procedures, costs and problems associated with the sale of surplus open space.



Steve Bond of the Town Planning Department for the Central Local Council gave insight into the role of town planning in the acquisition of land for D'MOSS and the influence of structure plans and town planning schemes on D'MOSS. Dr Debra Roberts was approached for an explanation of the rationale for the open space identified for D'MOSS, as it is Dr Roberts who to a large extent identified the open spaces on which D'MOSS is based. Data on the North Bank case study area came from reports by Davis, Bristow and Associates, ZAI Town Planners Incorporated and Monte J Rosenberg Incorporated.

In the case study of Umbilo/Umhlatazana River Park, research focused on the development and maintenance aspects of D'MOSS. As the development phase of the system is complete, data about the development phase came from secondary material as opposed to interviews. A detailed report of the development of Umbilo Park has not been written (Scarr, 1996, pers comm), and as such the information was accessed from random articles found in the William Poulton Library of the Parks Department and to a lesser extent from interviews. Primary information was collected by means of open-ended questionnaires with questions focused on the interviewees' relative area of expertise. The information was collected largely through interviews with Linton Lauderdale, Mike Oxlands and Andrew Davidson who are Parks Department area managers for the Umbilo System. Questions revolved around issues of management tasks, labour, development and maintenance costs, and community participation.

Ross Croutch, conservationist for Natural Areas Division of the Parks Department was interviewed on issues of community participation in the Umbilo System, general problems of management and Parks Department funding. Also on the issue of management and maintenance, the director of Parks Department, Errol Scarr, proved helpful with his experiences of managing D'MOSS since its inception.

Dr Debra Roberts, Director of the Environment Department of Physical Environment Unit of Central Council, in the two interviews conducted, gave insight into the policy aspects of D'MOSS as well as general insights into how D'MOSS is operating in Umbilo Park. Telephonic interviews were conducted with members of the Wildlife Society and of the Ramblers Club in order to ascertain to what extent these organizations utilize the Umbilo Trail for recreational purposes. A telephonic interview was conducted with a teacher, Mr Heron, of Brettonwood High School, which is adjacent to the Umbilo System, to discover whether teachers used the Umbilo System for fieldwork purposes.

In chapter 7 the 'Research Findings' provides a summary of the case studies. It is essentially a summary of the problems of implementing D'MOSS and what the possibilities for D'MOSS are.

Chapter 8 lays down recommendations for D'MOSS regarding possible modifications to the plan and ideas for future research.

Finally, chapter 9 reaches a conclusion as to whether the research goals and objectives for the study have been reached and what the outcome of the hypothesis is.

## CHAPTER 3

### 3.0 CONCEPTUAL FRAMEWORK

The Durban Metropolitan Open Space System is based on a number of concepts, theories and precedents which are cited in the literature. It is these ideas that inform the implementation of D'MOSS and as such, any controversy undermining their credibility needs to be addressed.

The first section of this chapter defines a 'metropolitan open space system' for the purpose of this dissertation. Section 2 deals with those concepts and theories that justify the need for open space planning. Section 3 proceeds to trace the development of open space planning as influenced by people's perceptions of the natural environment. With a greater emphasis on ecological factors in the environment, the Theory of Island Biogeography has become a useful tool for determining criteria for open space systems as set out in section 4. The Theory of Island Biogeography implies a particular management approach dealt with in section 5, including ideas on community participation and funding which are pertinent to the management of D'MOSS. Section 6 deals with the methods of land acquisition that are used to acquire D'MOSS land.

### 3.1 WHAT IS A METROPOLITAN OPEN SPACE SYSTEM ?

Metropolitan regions occur when two or more towns have grown into one large urban conglomeration. **Certain development** problems are therefore the concern of all the towns in the region (Claasen and Milton, in Fuggle and Rabie, 1992).

Definitions of open space depend on **the perspective** from which it is being defined. Biologists **such as Poynton and Roberts** (1985) define open space as 'any vegetated area in the city' (in Nicolson, 1988), thus denoting its biological importance.

This includes private gardens, parks, recreational grounds, cultivated land, derelict land, undeveloped land, road and rail verges. The Natal Town and Regional Planning Commission divides open space into 'active' and 'passive'. 'Active' refers to sports grounds, golf courses and racecourses, while 'passive' refers to natural areas such as formal parks and nature reserves. The terms 'active' and 'passive' denote the functional use of open space. Open space is also referred to as 'green space' (Kekey, 1978 in Nicolson, 1988), which enhances its conservation value. Bryant, Russwurm and McLellan (1982) take a more neutral stance and define open space as 'unbuilt on land' (in Nicolson, 1988). Open space may also refer to 'hard' spaces such as plazas, or to 'soft' spaces which are vegetated. There is no holistic notion of what open space should be. For the purpose of this dissertation, open space will take on the definition of Poynton and Roberts (1985) as 'any vegetated area in the city'.

An open space 'system' refers to the linking up of isolated pockets of urban open space until a continuous, interdependent and interactive network of open space exists. Systems may be open - factors in the system may be exchanged with factors outside the system; or closed - factors are not exchanged. Systems respond to inputs and outputs and a special response called feedback occurs when the output of a system **also** serves as an input and leads to change in the opposite direction from the output.

### 3.2 WHY DO WE NEED OPEN SPACE ?

D'MOSS is part of a global approach towards tackling the problems of increasing urbanization, **particularly in** the Third World. The impacts of urbanization on the **biosphere** and on the quality of life of urban inhabitants are so severe that the viability of cities is in question.

Cities are urban ecosystems responding to inputs and outputs and the presence of vegetation is critical to the effective functioning of urban ecosystems in order to achieve sustainable development (Roberts, 1990).

Principle 4 of the Earth Charter notes that "In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it" (Roberts, date unknown : 3) Sustainable development has been defined by the World Commission on Environment and Development (WCED) as, "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Walmsley and Botten, 1994 : 5). The principles of sustainable development as defined by the World Conservation Union (1993) include :

- respecting and caring for the community of life
- improving the quality of human life
- conserving the earth's vitality and diversity
- minimizing the depletion of non-renewable resources
- keeping within the earth's carrying capacity
- changing personal attitudes and practices
- enabling communities to care for their environment
- providing frameworks for integrating development and conservation
- creating alliances at all levels

(Walmsley and Botten, 1994)

In meeting the challenge of sustainable development open spaces have an important role to play. D'MOSS recognizes the importance of open spaces in respect of **the following** functions : biodiversity; protection; quality of life; recreation; education and economy.

### 3.2.1 Biodiversity

The concept of biodiversity has three components : genetic diversity; habitat diversity and species diversity. All of these components are essential to the proper functioning of ecological processes, which in turn are essential for sustainable life on earth (Environmental Monitoring Group, 1992). In 1980, the International Union for Conservation of Nature and Natural Resources (IUCN) proposed a statement to form an ethical basis for conserving biological diversity :

- the world is a whole, made up of interdependent parts
- humanity is part of nature and subject to the same ecological laws
- All life depends on the functioning of natural systems to supply energy and nutrients
- Human culture must be built on a respect for nature
- All species have an inherent right to exist
- 'sustainability' is the principle of all social and economic development
- the well-being of future generations is a social responsibility
- diversity in cultural outlooks towards nature must be encouraged by promoting relationships that respect diversity of life, irrespective of political, economic or religious ideology in society.

### 3.2.2 Protection

Open spaces can function to protect human beings from natural disasters such as floods and landslides. This is because they provide adequate natural areas to facilitate absorption of stormwater run-off, with controls on erosion, sedimentation, water pollution and overutilization of surface and subterranean water.

By preventing the undercutting of unstable slopes and soil types and limiting development to the carrying capacity of the land, open spaces can reduce the threat of landslides and soil erosion (Council for Environment, 1989).

Open spaces also protect species in that they are an essential link in the food chain. Without this link, certain species could become extinct.

### 3.2.3 Quality of life

Vegetation in the city has a moderating effect on urban climate as it helps to reduce temperature extremes. Green open spaces can reduce urban temperatures by up to 10% and in light of the thousands of deaths due to 'heat stress' each year, this is an important consideration (Roberts, in KFC Developer, 1993). The heatwave in America in July 1976 was blamed for the deaths of over 1 100 people in New York (Davies, 1993).

Trees and shrubs in open spaces help to purify the air by reducing smoke and dust pollution and absorbing gaseous wastes eg. sulphur dioxide. Open spaces also serve as buffers between less desirable land uses which may generate pollution such as noise eg. airports/industries/highways (Roberts, in KFC Developer, 1993).

As well as its functional value, open spaces enhance quality of life through visual amenity. The Council for Environment (1989) states that topographic features such as ridges and hills contribute to the character of urban places and use the elements of diversity, uniformity, textures and colours of nature to contrast and blend with urban forms and structures. Nicolson (1988) points out that visual amenity of open space varies according to differing perceptions of what is pleasant.

Quality of life is also increased through recreation. Recreation provides for the social interchange between people as well as for relaxation which contributes to the mental health of people (Council for Environment, 1989). Marans (MOSS Report, 1994) argues that man has an intrinsic **need to** experience nature. He points to studies in the USA that show evidence of the importance of open space in residential areas. Wilson (1962) found residents wanted a neighbourhood that was countrylike, while Peterson (1967) found 'harmony with nature' was a preference in the visual appearance of neighbourhoods (in D'MOSS Report, 1994). In agreement with Marans is the late Dr James Whitney who says that without open spaces a community is spiritually undernourished. An undernourished society is weaker and less wise and thus less able to cope with its challenges (Kent, in Coates, 1974). Coates (1974) highlights the values of shade, privacy and silence in reducing the stress of urban living by bestowing calmness and tranquillity on the beholder.

Recreation facilities can generate income as a supplementary source of financing the development and maintenance of open space. Popular nature reserves such as Stainbank Nature Reserve in the Umhlatazana System, charge entrance fees thereby generating a source of income for the nature reserve.

Recreation types should reflect the recreational preferences of the local community, obtained through research on the recreation needs of the local community. Recreation facilities should take cognisance of the carrying capacity of the land through scientific analysis. 'Passive' open spaces serve a low carrying capacity, while 'active' open spaces are suited to a high carrying capacity. Recreation facilities should also account for the safety of users (Council for Environment, 1989). Trails help to spread the load of people **over a wide** area instead of concentrating them in a single small **reserve and** thus reduce the negative impact of population pressure (MOSS Report, 1994).



Schlemmer (in Poynton and Roberts, 1985), in a study of Pietermaritzburg, found that there **was a** correlation between low socio-economic status, low ethnic status and a low level of recreational use of urban open spaces. Attitudes are changing, though, as Piagram points out: "In past times leisure was the privilege of the elite, but today it has become the prerogative of the masses" (in Poynton and Roberts, 1985 :36). Attitudes towards open spaces in South Africa have been infused by the impacts of Apartheid. There is still a low level of use by African population groups who perceive open spaces as products of 'black spot removals' under an Apartheid government (Khan in MOSS Report, 1994). Such attitudes demonstrate the need for **education** of the public on environmental issues, and community participation in D'MOSS projects.

#### 3.2.4 Education

Open space can be developed and managed to enhance environmental awareness by means of educational trails, centres, exhibitions and activities. Educational Institutions should be harnessed to encourage this process (Council for Environment, 1989). Environmental education should be incorporated into the formal education system, in the form of lessons and fieldwork, while informal environmental education **could take** the form of site visits as an extra-curricular **activity**. Lowe (1974) argues that children between the ages of **seven** and twelve years think in concrete terms and thus **fieldwork is** an excellent form of education for this age group (in D'MOSS Report, 1994). Christian (1988) also points out the **advantages of fieldwork** as a means of education as opposed to classroom **lessons**. In a survey of school teachers, Christian (1988) found **that the most** pressing problem for environmental education was **the lack of teacher** training and confidence in fieldwork.

Other constraints in order of priority were : travel costs; teacher interest; disrupts school timetable; fieldwork not compulsory in syllabus; **unsupportive education departments**; difficult to assess in exam form; lack of time and unsuitable areas.

### 3.2.5 **Economy**

The economic benefits of open space may come from major regional and national sporting events, well managed tourist facilities and city beautification projects which all attract large numbers of tourists to a city and thereby generate income (Davies, 1993).

Conserving open space is essential for the conservation of 'muthi plants'. These are the plants which African people have been using for centuries to cure themselves. Muthi chemistry has been actively pursued by the Universities of Natal and Durban-Westville, with the aim of discovering a new drug as well as contributing to the scientific information available. The department of Botany at the **University of Natal**, Pietermaritzburg, concentrates its **research** on the conservation of indigenous plants, their potential for horticulture and their associated uses, and chemistry (University of Natal Focus, 1996).

### 3.2.6 **Summary**

In summary, the functional values of open space described above clearly justify the need for providing a viable open space system in the Durban Municipal Area. With the principles of sustainable development underpinning D'MOSS, it can **be seen** that D'MOSS is set up to further the aims of those principles.

### 3.3 THE ROLE OF OPEN SPACES IN TOWN PLANNING HISTORY

Throughout history there have been fundamental shifts in the motivation for preserving natural areas. Different values which have been attached to the environment have determined social ethics and in turn influenced the role of open space planning in urban areas. In primitive societies, religious taboos have often been at the root of measures to preserve open spaces, while in modern times, these measures result from the population explosion of the twentieth century and its detrimental impact on ecosystems (Ramade, 1981).

Attempts to control the misuse of the environment can be traced back to biblical times. Attempts to plan towns with, rather than across the grain of natural processes dates back to the First Century AD when Vitruvius wrote about spacing and orientation in relation to the sun and wind (Roberts, 1990). In the Fourth Century, classical writers such as Plato were referring to the pre-eminent role of forests in regulating the water cycle and protecting the soil against erosion (Ramade, 1981).

Formal city plans date back to the Fifteenth Century whence from cities have been planned either with or without the natural environment in mind. Two dominant themes in city planning have been that of defence and beauty. In Roman times, cities were typically designed along geometric patterns that had practical and aesthetic benefits (Botkin and Keller, 1995). The relationship between man and nature was one of total domination by man (Jellicoe and Jellicoe, 1975 in Roberts, 1990). After the fall of the Roman Empire, the earliest planned towns in Europe were walled for defence, but planning still considered the aesthetics of the town. The Medieval city exhibited a sharp distinction between town and country, the latter being the exclusive domain of nature (Roberts, 1990).

During the Renaissance period the gap between town and country was further entrenched by the walled cities (Tunnard, 1951 in Roberts, 1990). The Renaissance did spark an interest in the ideal city and spurn the development of parks and gardens. Up until the Seventeenth Century, the absence of 'green forms' in urban planning can be attributed to a number of reasons. The city was seen as a separate entity from wild nature; small city size facilitated access to the countryside; buildings included interior gardens and the Renaissance cities epitomized the aesthetics of perfectly controlled form.

The second half of the Sixteenth Century, characterized by Baroque Urbanism, ushered in a new era in garden and natural open space design with the Seventeenth Century seeing an emphasis on the ornamental and geometric (Mumford, 1961 in Roberts, 1990). Baroque Urbanism lost favour as a planning tool in the late Eighteenth Century and was replaced by Romanticism which witnessed a transition from garden design based on geometric styles to gardens as "works of art rather than of nature" (Repton, 1752 in Roberts, 1990). A branch of Romanticism, called Gardenesque, underlies the pattern of most parks today. Edward Kemp said this about gardens, "a garden is for comfort and convenience and luxury and use as well as for making a beautiful picture ...it is for the growth of choice flowers and the preservation and culture of exotic trees and shrubs" (Chadwick, 1966 in Roberts, 1990). The implication of this in South Africa was a rejection of 'darkest Africa' in its wild and native form and a disregard for its biological importance, in favour of a more orderly and controlled park design (Botkin and Keller, 1995).

With the Industrial Revolution, came a utilitarian rationale for open space planning. Open spaces were seen as a means to decrease social unrest and thereby increase economic gains (Nicolson-Lord, 1987 in Roberts, 1990). Nature was highly controlled and preserved for the use of people and not for nature's own sake.

The Industrial Revolution initiated environmental laws directed at specific forms of pollution and at protecting natural areas for privileged groups (Fuggle and Rabie in Fuggle and Rabie, 1992).

The origin of modern town planning is often ascribed to British efforts to cope with unhealthy living conditions in cities, created by the Industrial Revolution. The growing concern with the plight of humankind led to greater control measures over development and land-use control (Claasen and Milton in Fuggle and Rabie, 1992). The notion that there should be public control of private land and developments on private land should be controlled for the common good finds legislative expression in town planning legislation in the first few decades of the twentieth century. However, the prevailing concept related to discreet resources and not to holistic environments (Fuggle and Rabie in Fuggle and Rabie, 1992). It was in the United States of America that a nature reserve for public use and recreation was proclaimed by a national government in 1864 and in 1872 the first National Park was proclaimed. The USA has been a forerunner in conservation legislation and set an environmental ethic in motion that has infiltrated into South Africa.

Early regional planners such as MacKaye, identified the central issue of regional planning as the control of the metropolitan invasion into the domain of the countryside. MacKaye and Geddes worked on one of the earliest ecosystem approaches to planning a metropolitan region. Based on careful analysis of the entire landscape, valuable and fragile parcels of land were identified for protection from development. Watersheds, ridges and wetland should be undeveloped and act as natural levees controlling metropolitan invasion (Nicolson, 1988).

Although the desires of early regional planners such as Mackaye and Geddes to plan with nature were suppressed by economic planners, they reemerged in the 1960's with the writings of Ian McHarg, a landscape architect.

In his book, Design With Nature, in 1969, he advocated an ecological basis for planning. Important natural areas should be protected and should influence development. McHarg put emphasis on the hydrological cycle and said open spaces could be justified on the basis of the natural processes of water purification, storage, floods and erosion.

In the twentieth century the notion of limited city size and garden cities was based on an assumption that rapid, uncontrolled urbanization leads to far reaching ecological and social damage. Ebenezer Howard's concept of a 'garden city', coined in 1902, was a reaction to the unhealthy living conditions and urban sprawl created by the Industrial Revolution. Howard's plan was to create healthy living conditions, enhance social interaction and preserve the countryside. The concept of a greenbelt around the city and around smaller towns was the mechanism used to achieve his aims (Claasen and Milton in Fuggle and Rabie, 1992). After Howard, greenbelts were adopted by city and regional planning movements and became a standard part of planning vocabulary (Roberts, 1990).

Despite these early attempts at planning with nature, western thought has been dominated by the Judaeo-Christian archetype of the human being as master of creation. It is a creed that sees progress as characterized by an uncontrolled exploitation of natural resources (Ramade, 1981). An epitome of this creed is the utilitarian ethic, 'conservation is for man' whereby nature has no intrinsic value (Fuggle, in Fuggle and Rabie, 1992).

In the last couple of decades, as the detrimental effects of urbanization proliferated, biologists (such as Passet, 1979) began to question this mistaken **view of humanity** as independent of ecological factors (Ramade, 1981). **Research** in the field of 'human ecology' provides for an integrative science of man in relation to his urban environment.

International research under the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Man and Biosphere Programme is being developed to rationalize the conservation of resources of the biosphere and improve the relationship between man and the environment (UNESCO, 1983). This approach reflects a recognition that urban man and the natural region are mutually beneficial, an idea originating back to authors such as Mackaye, Geddes, Olmstead, Mumford and McHarg (Nicolson, 1988). Open space is now perceived as a life-support system (MOSS Report, 1994) and there has been a shift from a wildlife-centred preservationist approach to conservation towards a holistic, socially responsive environmental ideology (Khan, in MOSS Report, 1994). The need to conserve nature for nature's sake reflects the philosophy that nature sustains life on earth and maintains a balanced urban ecosystem (Fuggle in Fuggle and Rabie, 1992).

The result of these changing ethics and perceptions of open space is a management approach to open space that follows the principles of ecology and regards biodiversity as the most important attribute in an open space system. In accordance with this, the Theory of Island Biogeography has been used as a basis for acquiring, developing and managing open space systems in South Africa.

#### 3.4 THE THEORY OF ISLAND BIOGEOGRAPHY

The Theory of Island Biogeography is outlined due to its influence on the design and implementation of D'MOSS. Thus its credibility as a theory is of particular relevance to an analysis of whether D'MOSS has been successful in achieving its goals and objectives to become a viable open space system. The relevance of the Theory of Island Biogeography to open spaces, is that in a metropolitan area open spaces are regarded as being residual islands in an altered habitat.

Thus it seems appropriate when making biological assessments of these islands, to examine data of biogeographers who have studied communities on true offshore islands, since - whatever the cause of isolation - one may expect many relationships to hold between the biology of an isolated area and its size, shape and remoteness (Poynton and Roberts, 1985).

Current biogeographical thinking has its origin in the work of two biogeographers, MacArthur and Wilson. They developed an equilibrium theory which suggests that natural open space surrounded by a different environment is an 'island' which can hold in dynamic equilibrium a certain number of species. This number is a function of its area and the distance of removal from other islands supporting similar species. An equilibrium is established between immigration and extinction rates. The danger of extinction on an island is greater due to the fluctuation in numbers of immigrating species (Preston, 1962 in Nicolson, 1988). These remaining natural habitats, owing to their isolation and levels of disturbance at the perimeter, have important considerations for spatial design and management of open space.

#### 3.4.1 THE GEOMETRIC DESIGN PRINCIPLES

A realization that nature reserves behave as habitat islands led Terborgh to suggest that certain principles for the design of conservation areas could be derived from the MacArthur-Wilson Equilibrium Theory. Diamond (1975) proposed a set of geometric design principles with the aim of optimizing the function that reserves have in saving species. The principles are : 1) size; 2) connectivity; 3) proximity; 4) distribution; 5) linkages and 6) shape.

##### 1. Size

A large reserve is better than a small reserve as it will hold more species at equilibrium and have slower extinction rates.



This principle addresses the issue of species composition in relation to reserve size. It is the central theme of nature reserves to preserve those species most at risk of extinction. This is known as target species conservation. The importance of this lies in the fact that species do not exist in isolation, but within systems and are linked by the flow of energy, recycling of nutrients and a variety of competitive, predatory and mutualistic interactions (Botkin, 1982 and Diamond, J M, 1982 in Nicolson, 1988). Open spaces are described as ecosystems; "the plants and animals living on land and in the water, interacting together and with the inanimate substances of air, water and soil. 'System' indicates that these are dynamic interactions, constantly changing with each element and species having an impact on the others, directly or indirectly" (O'Riordan, 1995 : 83). Reserve design should consider these interactions. Putman, (1984) found "a constancy of trophic design, of trophic structure, in communities of similar type wherever they may occur" (Roberts, 1990 : 106). Within this community structure some species are functionally more significant than others and the disappearance of one has detrimental effects on the others. Habitat fragmentation can have a deteriorating ecological chain reaction of disrupted ecological interactions and lead ultimately to secondary extinction (Gilbert, 1980 in Roberts, 1990).

This is an essential aim of the broader aim to preserve a diverse and self-perpetuating example of the original fauna and flora. Smaller patches, when compared to larger patches of the same biotype are found to have a higher proportion of those communities consisting of abundant generalists that are often the smaller species. Although smaller reserves may effectively preserve more species (Higgs and Usher, 1980, Simberloff and Abele, 1982 in Nicolson, 1988). These represent the fraction of the original species pool that is least in need of protection.

Species should be weighted according to their conservation value and not just counted, with the greatest emphasis placed on species and habitats threatened by human activities (Diamond, 1976 in Roberts, 1990).

Isolated and small natural communities have a larger edge-to-area effect which leads to more frequent disturbances and the predominance of ecologically generalised resident and short distance migrant species (Lynch, J F and Wingham, 1984 in Nicolson, 1988). The 'edge effect' serves to preserve the rapidly dispersing edge species while losing the sedentary species of mature habitats which are usually the goal of conservation (Williamson, 1975 in Roberts, 1990). In the metropolitan context, because islands are surrounded by urban development they are vulnerable to invasion by exotic species of plants and animals such as cats and dogs (Bourquin, 1977 in Nicolson, 1988).

The validity of the edge-area effect has been criticised from the perspective that plants with windborne seeds can be dispersed great distances. They do not invade far from the edge of a natural area but will colonise any suitable spot. Within the metropolitan open space system, distances are so short that the whole open space system can be regarded as an edge (Nicolson, 1988).

Species can generally be said to have minimum area requirements, known as the 'minimum critical area' (Diamond, 1978 in Roberts, 1990). Large species and those at higher trophic levels therefore require extensive areas of continuous habitat for survival. Different species have different area requirements for survival (Diamond and May, 1976 in Roberts, 1990). For any reserve to be ecologically effective, it must be large enough to counter all forms of stochasticity, such as demographic, environmental, genetic and natural catastrophes (Gilpin, 1987 in Roberts, 1990).

Disturbance is now a factor in explaining species diversity (Abele, 1976 and Connel, 1978 in Roberts, 1990). Pickett and Thompson (1978) propose that internal disturbance dynamics should become a critical design feature of future reserves and reserve size should exceed the largest disturbance patch size to avoid extinction. Managed disturbance should be carried out in small reserves in order to maintain vulnerable species. As small reserves have less built in homeostasis, reserves require more management efforts per unit area and this is a costly process (Foster, 1980 in Roberts, 1990). The implication of this is that there should be large core areas to retain optimum biological potential. The question is, how large? Although there is no definite precedent for determining the 'minimum critical size' there will have to be an approximation by field workers.

Conservation areas in excess of 10 000 ha have been recommended (Edwards, 1974 in Nicolson, 1988) and areas of over 1 million ha (Bannikov, 1975 in Nicolson, 1988). Although there is no consensus on exactly how big a conservation area should be, it is agreed that the bigger the better.

## 2. Connectivity

A homogenous habitat should be divided into as few disjunctive pieces as possible. Any species has a higher chance of survival in a single large area (May, 1975 in Nicolson, 1988).

Simberloff (1982) and Kitchener et al (1980) argued that a series of smaller reserves will preserve a wider habitat diversity and so preserve more species (in Roberts, 1990).

However, although it is desirable to maximize species number by locating it in areas of high habitat diversity, a high division of species in areas of limited extent is that many species concerned are represented by small populations with a high probability of extinction. Large reserves are the optimum choice for any habitat regardless of diversity (Diamond, 1982 in Roberts, 1990).

Diamond (1976), Higgs (1981) and Willis (1984) point out that several smaller reserves may protect species by preserving mutually exclusive guilds, thereby preventing disease and the entry of alien species as well as creating habitat diversity through high edge-area ratios. However, Pickett and Thompson (1978) argue that it is unlikely for an entire population to be destroyed by epidemics (in Roberts, 1990).

### **3. Proximity**

If a large reserve must be broken into several disjunctive reserves, these should be as close as possible, assuming a homogenous habitat, because immigration rates increase with proximity (Nicolson, 1988).

### **4. Distribution**

Several disjunctive reserves should be arranged equidistant from each other, rather than linearly. This facilitates the ready recolonization of reserves (Nicolson, 1988).

### **5. Linkages**

Disjunctive open spaces should be connected by corridors of protected habitat.

This allows for species in the **protected** habitat to disperse between reserves without having to cross the 'sea' of intervening habitat, **especially in** the case of sedentary species with restricted habitat preference (Diamond, 1975 in Nicolson, 1988).

The quality and dimensions of the corridor determine the type and potential of species migration brought about through vegetation management.

Disadvantages of corridors include increased poaching, exposure and transmission of **disease**, colonising alien species and the spread of fire. These impacts may lead to extinction (Frankel and Soule, 1981; Diamond, 1984 in Roberts, 1990).

Simberloff and Cox (1987) note that corridors bear economic costs. For example, a bridge that would maintain a riparian corridor costs about thirteen times as much per lane mile as would a road that would sever the corridor (in Roberts, 1990).

## 6. **Shape**

Any given reserve should be as circular as possible to minimise dispersal distances within the reserve.

Osman (1977) and Game (1980) dispute this by suggesting that the size of an island and thus the probability of colonization will be more a reflection of the islands linear dimensions perpendicular to the direction of travel. Thus while departure from circularity may adversely affect extinction rates, this may be ameliorated by an increase in the immigration population (Whitehead and Jones, 1969 in Roberts, 1990). This only holds when the major route of species dispersal runs perpendicular to the long axis of the reserve (Roberts, 1988).

No matter how much rates of immigration are increased by high edge-area ratios, there **must be** a point where thin refuges are not useful as they contain 'all edge' (Means and Simberloff, 1987 in Roberts, 1990). Another obstacle to circular reserves is **that** competing land-uses play a major role in determining the shape of open spaces (Roberts, 1990).

Since MacArthur and Wilson's (1967) book The Theory of Island Biogeography, there has been no consensus regarding the validity of the Equilibrium Hypothesis, and its basic assumptions (Diamond, and May, 1976 in Roberts, 1990). The relevance of the theory to urban open space planning has been noted in only a small section of the literature. Douglas (1983) and Kelcey (1978) accept the notion of corridors as one of the more practical uses of the theory.

Davis and Glick (1978) also advocate retaining patches of natural habitat and their dispersal corridors, even where corridors exhibit an unstable environment (in Poynton and Roberts, 1985). Simberloff pointed out that "any patch of habitat isolated from similar habitat by different, relatively inhospitable terrain traversed only with difficulty by organisms of the habitat patch" could be considered to be an island (in Roberts, 1990). In this way, Island Biogeography models would have value in the conservation of urban 'natural' systems where abiotic, biotic and cultural variables have produced a range of habitat islands that show variety in size, degree of disturbance and isolation (Douglas, 1983 in Roberts, 1990).

Although the similarity between true islands and nature reserves has resulted in the Equilibrium Theory being promoted as a theoretical basis for nature reserve design (Diamond, 1975), considerable debate surrounds the application of the theory to conservation practice (Diamond, 1972 in Roberts, 1990).

Types of species, for example butterflies require a diversity of habitats to complete their lifecycle and small islands may not provide this diversity (Muggleton, 1975 in Nicolson, 1988). Critics argue that area alone cannot be a precise indicator of species diversity (MacArthur and Wilson, 1967 in Roberts, 1990). A review of the species-area relationship must be cognisant of the fact that factors such as habitat diversity, resource availability, differences in species-specific colonization probabilities and species-abundance relations may interact with area to influence species diversity (Johnson et al, 1968; Haas, 1975 in Roberts, 1990). Although species number would be approximately constant over short periods of time, biotic composition varies continually (Preston, 1960, 1962 and MacArthur and Wilson (1963, 1967 in Roberts, 1990).

The rates of immigration and extinction are related to separate parameters : immigration is inversely proportional to the distance from source regions; while extinction is viewed as a stochastic process, the probability of which decreases as island area increases. Genetic changes take place more rapidly within small and isolated gene pools so that occupants of the island are not only physically, but genetically isolated from their continental antecedents (de Vos and Petrides, 1966 in Nicolson, 1988).

Despite the controversy surrounding the Equilibrium Theory where critics call for validation of its application to conservation and the need for 'falsifiability and repeatability' (Gilbert, 1980 in Roberts, 1990), no workable alternatives have been suggested by the critics. This leaves conservationists with no alternative but to use the only theoretical tool available to them (Roberts, 1990). Conservationists need to distinguish between Reticular Biogeography and Island Biogeography, the former being the study of viable conservation networks in a fragmented landscape and useful in suggesting scientifically based guidelines for conservation.

The theory provides a useful point of departure by allowing one to see the pattern of insular disturbance and the ecological and evolutionary processes that have produced them (Brown, 1986 in Roberts, 1990). As Williamson (1981) states, "All theories have strengths and limitations; the science of Biogeography will best be advanced by taking advantage of the strong points of MacArthur and Wilson's theory and replacing and restructuring the rest" (in Roberts, 1990).

As the D'MOSS structure plan is based on Diamond's (1975) principles it comprises a structure of nodes, corridors and buffers utilizing large tracts of land where possible and interlinking into a single open space system. The D'MOSS structure plan will be dealt with in chapter 4.

Inherent in the Theory of Island Biogeography and the application of Diamond's Reserve principles to open space management is a particular management approach that necessitates a knowledge of ecology and the application of scientific concepts. This management approach is dealt with in the subsequent section.

### **3.5 MANAGEMENT APPROACHES TO OPEN SPACE PLANNING**

According to Nicolson (1988), the term 'management' denotes the attainment of long-term objectives in order to meet the potential of an area. This involves effective design, planning, implementation and maintenance. It entails the use of theories, scientific concepts, developing systems and formulating guidelines for implementation of that design. Inherent in this process of management is decision-making : an environmental manager decides 'what' goes 'where' to ensure that land uses can be mutually supportive or in the least conflict possible.

Decision-making is the responsibility of government departments at all tiers of government, non-government organizations and local communities.



Different departments and organizations have different aims and functions and the environmental tasks of these departments and organizations will fluctuate accordingly.

### 3.5.1 LEVELS OF GOVERNMENT MANAGEMENT

#### 3.5.1.1 Global and National

Natural areas are a global resource and as such should be managed in co-operation between First and Third World countries to achieve sustainable development. As First World countries exploit Third World countries in the search for rapid economic gain causing degradation of Third World environments, they have a social responsibility to contribute to environmental restoration in the Third World (O'Riordan, 1995).

Institutions such as the World Conservation Union, the International Union for Nature and Natural Resources and the United Nations have formulated policy guidelines for environmental management (eg. the Earth Charter). The International Council for Local Environmental Initiatives (ICLEI) has proposed a Local Agenda 21 programme which provides a framework for sustainable development. Local Agenda 21 has particular relevance for cities as it regards urban local authorities as an important channel for implementing the policies of Local Agenda 21.

Global policies infiltrate down to national level governments which in turn determine regional and local policies (Scott, 1982 in Roberts, 1990). The Department of Environmental Affairs and Tourism is responsible for policy-making on issues of national importance and the development of a nature conservation plan to provide for acquisition, protection and management of areas of national importance.

Other national departments such as the Water Affairs and Forestry Department, the Department of Agriculture and Department of Land Affairs who control the expropriation of land (Schwella and Muller in Fuggle and Rabie, 1992), also have a top-down influence on open space planning.

The guide plans provided for in the Physical Planning Act of 1991 determine which land may be utilized for a specific purpose (Page and Rabie, 1983 in Roberts, 1990). Roberts (1990) points out the ineffectiveness of guide plans in that they differentiate between rural areas which are considered to serve a conservation function and urban areas which are meant to be functional, static structures and do not account for conservation (Scott, 1982 in Roberts, 1990).

Hart (in Fuggle and Rabie, 1992) argues that Third World governments do not have the institutional capacity to undertake complex tasks. There is strong international support for spreading the load of environmental management as widely as possible within a country. A decentralization to regional and local government must entail the support of the community and thus requires that government institutions be legitimate. However, the Apartheid government lacked the necessary legitimacy and conservation efforts have been perceived as Apartheid measures (Khan, in Moss Report, 1994).

#### **3.5.1.2 Metropolitan Level**

D'MOSS advocates the importance of a metropolitan level of government as MOSS covers the entire metropolitan area. Without a Metropolitan Council, MOSS must rely on the varying abilities of different Local Authorities in charge of specific MOSS areas.

The New Constitution for South Africa states that "the Transitional Metropolitan Council shall, in conjunction with the Local Councils and with any other relevant bodies within and without local government, be responsible for the implementation of overall metropolitan environmental management and conservation policies and action plans (inclusive of appropriate environmental controls and incentives). The Transitional Metropolitan Council shall also co-ordinate and guide the implementation of already established metropolitan environmental initiatives such as MOSS and the Local Agenda 21 Programme. The Transitional Local Councils shall be responsible for the development and implementation of local policy and action plans provided they are within the overall parameters set by the Transitional Metropolitan Council" (section 19).

### 3.5.1.3 Regional and Local Level

The KwaZulu-Natal Provincial Administration, through the application of the Natal Prevention of Environmental Pollution Act no 21 of 1981, has the function of establishing provincial nature reserves and those located on privately owned land. These reserves are administered by the KwaZulu-Natal Conservation, formerly the Natal Parks Board.

The most important function at regional level has traditionally been the conservation of wild animals, indigenous plants and freshwater fish. Functions at local level include town planning; air pollution; noise control; water management; seashore management; outdoor recreation; waste removal and managing local nature reserves (Schwella and Muller in Fuggle and Rabie, 1992).

The legal framework for the formulation of town planning policy set out in the Natal Town Planning Ordinance of 1949 is lacking in environmental and ecological considerations. The Ordinance provides for town planning schemes which indicate the legal use to which land can be put, the degree of development permitted and the protection of sensitive areas where necessary.

Town planning schemes, based on a broader Structure Plan which prescribes policy, procedures and action for conservation in sensitive areas (Claasen and Milton in Fuggle and Rabie, 1992), are accused of hampering efforts at conservation (Scott, 1982 in Roberts, 1990).

The validity of this comment for D'MOSS is explored in section 5.2.3.

### 3.5.2 THE MANAGEMENT STRATEGY

Adopting the notion that open spaces are ecosystems within a global ecosystem, and applying the principles of the Theory of Island Biogeography requires particular strategies of managing the environment.

At the MOSS conference in 1994 Geoff Nichols presented a paper on how urban natural areas should be managed and used. His main theme was 'with the resources I have under my control, how much of the total hectarage can I effectively maintain?'. Nichols expanded on 5 points for a manager to follow : plants; pollution; people; participation; and politics.

Durban is characterized by an alien/exotic plant problem that costs R3000 per annum to contain. In keeping the alien plant population down the money can better be spent on other aspects of maintenance. Even indigenous species can be invasive and a manager must decide what plants should exist in a particular area. Do not waste too many resources on replanting programmes as nature is most equipped to replant natural species. Follow the principles of Island Biogeography and look for the links in the system. Manage entrances and approaches to reserves in such a way as to introduce the wild image gradually.

Roberts (1990) also points out the importance of alien plant removal. Management of an open space system must include the concepts : control; clearing; replanting and naturalization.

The first three relate to the removal of alien plants and weeds (eg. *chromolaena odorata* and *lantana camara*) as they are regarded as the second biggest threat to nature conservation on a global basis, the biggest threat being the destruction of habitats (Macdonald, 1989 in Roberts, 1990). Plants can be controlled through manual techniques, herbicides, biological means such as predators or integrated methods which include two of the above. Follow up operations and regular monitoring as well as some replanting are essential to ensure that the objectives of plant eradication are fulfilled.

Naturalization is a form of landscape management whereby there is an emphasis on indigenous and endemic species. The ecological advantages of indigenous plants include the increased buffering function of many of the more formal open space areas thereby improving the ecological effectiveness of the city landscape. Naturalized areas also have lower establishment and maintenance costs as those species which colonise an area naturally are specifically adapted to the site conditions and are those best able to withstand continual wear with minimal maintenance (Lond, 1983 in Roberts, 1990). Indigenous plants also use less water. Perimeter planting around sportsfields using indigenous tree species, and allowing the development of shrubs/grass, increases the buffering effect by promoting habitat diversity (Roberts, 1990).

On the issue of pollution, educating the public on the consequences of littering will reduce the problem. Through fighting the concept of 'waste areas' the public will hopefully stop seeing derelict areas as dumping grounds. If these areas are kept clean there will be a reduction of dumping in these areas (Nichols, 1994). Roberts (1990) verifies that wastelands should be incorporated into an open space system as they provide temporary habitats for species.

People are important and have certain needs and perceptions. It is the duty of the manager to work with the local community in order to identify their needs and to give them what they want and not what the manager thinks they want.

Managers should approach politics as a matter of daily management and routine necessity. It is necessary to lobby at the highest level possible in order to get funds. If Councillors are resistant to disbursing funds, take them into the field to show them what will be done with the funds. If the councillors are not supportive the local community could be called upon for lobbying purposes.

Although Nichol's paper is not exhaustive of the management tasks necessary, it gives an indication of the role environmental managers should play, such as a monitoring and development role. The accessing of data is also fundamental to environmental management. Roberts et al (1992) points out that data necessary for open space planning such as land ownership, land use and zoning are controlled by local/provincial authorities who are reluctant to hand over data. This is compounded by the fact that there is inadequate ecological data available.

Hart (in Fuggle and Rabie, 1992) points out that of the resource issues that confront environmental managers in South Africa, land is the most emotionally and politically charged. Environmental managers need to enter the land reform debate and expose and resolve the tensions between their entrenched positions.

It is an inescapable fact that human beings depend on the global ecosystem. Human beings have the capacity to change the dynamics of that ecosystem and feel they have the power to exploit the environment through a competitive drive to acquire material resources for short term gain. A precautionary principle applies in ecosystem management which states that where there is uncertainty about the long term effects of current management use, we should err on the side of caution.

A precautionary principle applies in ecosystem management which states that where there is uncertainty about the long term effects of current management use, we should err on the side of caution. Nevertheless, competitive materialism continues to underpin prevailing attitudes towards resource management.

Fuelled by increased demands for higher standards of living by increasing numbers of people, the consequences are the exploitation of ecosystems and decreasing options for future use. Attempts to restore damaged ecosystems are costly, time-consuming and lack the necessary level of scientific knowledge (O'Riordan, 1995). Keeping humanity alive depends on new levels of co-operative behaviour in relation to the use of natural resources and the plight of the less fortunate (O'Riordan, 1995).

If management of a species is based on market forces alone, the species will become extinct. Hence, ethics is an important consideration in ecosystem management (Botkin and Keller, 1995). Fuggle and Rabie (1992) agree that a sound environmental management strategy must regard the political, ethical and social norms of a society. As open space planning is influenced by ethics and how we value the world, environmental managers need to cultivate a strong environmental ethic.

Legislation cannot be counted upon to promote an environmental ethic, therefore environmental education in schools should be the mechanism for instilling an environmental ethic in children. Huntley et al (1989) propose that, in the long run a strong economy is dependant on a strong environmental ethic. However, a strong ethic presupposes an element of constraint and long term investment horizons and during periods of socio-political change the most popular route is that which offers immediate rewards and satisfies immediate needs. This route is exhibited in the present South African context where communities seek the satisfaction of basic needs first and foremost (Huntley et al, 1989).

Ecosystem management thus seeks to implement the concept of sustainable development. According to the Brudtland Commission, 'sustainable' implies "development that meets the needs of the present without compromising the ability of future generations to meet their own needs " (O'Riordan, 1995 : 22). It involves maintaining the productive capacity of ecosystems; ensuring that species richness is maintained; and not maintaining resources only at the expense of other essential resources. Sustainable development depends on the interplay between the individual, community and government structures. Conservation development cannot succeed without a hand in glove relationship with 'basic needs' delivery programmes. This should occur on an international level through international commitment to environmental change. It is the goal of the World Conservation Strategy to satisfy genuine human needs in ways compatible with the healthy survival of the global ecosystem (O'Riordan, 1995).

There needs to be co-operation between the economist and the ecologist. The economist can place a value on the usefulness of ecosystems and help society to manage them in a sustainable manner (Botkin and Keller, 1995). South Africa's future depends on the ability of policy-makers to interrelate decisions on the economy, environment and society. Wise management of two elements without the third will be inadequate for sustainable development (Fuggle and Rabie, 1992).

The management of open space as an ecosystem draws upon scientific ecological principles and knowledge to guide decision-making. The reserve principles related to the Theory Of Island Biogeography are an example of such scientific ecological principles. To influence where future development occurs, habitats are ranked using a value system based on combined land and ownership analyses. Botkin and Keller (1995) explain the relevance of science and the necessity of ecological research for sound environmental management. Science has a tradition of thinking critically about the natural world, with the goal of understanding how nature works.



It begins with careful observation of the natural world, from which scientists formulate hypotheses. Knowledge may be acquired through inductive reasoning whereby general conclusions are based on specific statements. If the specifics are true then the generalizations are probably true, but conclusions can never be proved with certainty. Hypotheses can be disproved, but not proved with a hundred percent certainty. Deductive reasoning is also used, in which conclusions follow from premises, providing that the rules of logic are followed. True premises lead to true conclusions.

Botkin and Keller (1995) question how, in the face of incomplete information, scientific controversies, conflicting interests of different groups and emotionalism, can environmental decisions be made? Managers must begin with scientific evidence from all relevant sources, with estimates of the uncertainties in each. Where scientists disagree on the interpretation of data, it may be possible to develop a consensus of predictions based on the different interpretations. The impacts of the scenarios must be identified and the risks in association, analyzed in comparison with the benefits. Avoiding emotionalism and resisting propaganda are essential to developing sound approaches to environmental issues.

Environmental policy decisions are ultimately negotiated in the political process by political leaders who are not scientists. Thus scientific education in government, business and the community are crucial elements of environmental management. Conflict in decision-making may be resolved through the use of theory where special groups, such as scientists analyze the problem, develop systems representing the problem and provide guidelines for its resolution. This approach has been the mainstay of the development of environmental policy in Britain. It does not imply, however, that only scientists are worthy of taking part in the debate. The lack of scientific evidence may be accepted in the face of anecdotal evidence from the community to ignore a particular problem.

Voluntary organizations may play a significant role in this respect (O'Riordan, 1995).

### 3.5.3 COMMUNITY PARTICIPATION

Theories on how community participation should work may vary, but why planners need it, is widely accepted in the literature. The long-term success of development projects is dependent on the support of the communities affected by the development. As early as 1928, Mackaye saw the need for a wide representation in planning issues. He points out that any regional plan should reflect a composite mind and reflect a consensual view (in Nicolson, 1988).

Support for conservation projects is not automatic, but rather, depends on the attitudes of a local community towards the environment. Farieda Khan, in her analysis of non-white perceptions towards open space in South Africa, noted attitudes of apathy and scepticism stemming from the poor location and conditions of townships. Scepticism also results from the perceived conflict between housing and open space. The youth felt that open spaces detracted from the opportunity of getting jobs and housing but if open space did not replace housing they would consider it as one of their needs. Khan points out the importance of changing the concept of housing as a structural unit to encompass the view of housing delivery as creating liveable environments which include open spaces (in MOSS Report, 1994).

Khan found the apathy to be rooted in a fear of crime as well as past experiences under the Apartheid government. Conservation projects, in some cases, necessitated the eviction of Africans from their land, people who had already been relocated in terms of the Group Areas Act (in MOSS Report, 1994). According to the Environmental Monitoring Group (1992), "Conservation in South Africa has historically reflected the interests of white urban based middle and upper class minorities. It has often ignored and even worked against the interests of other groups".

Judy Ling Wong found that people will only participate in a project if they feel that they are directly affected and if socio-economic aims at a personal level coincide with community aims and in turn with regional, national and global aims (in MOSS Report, 1994). To feel affected, it is necessary for the community to understand how the environment affects them. This understanding will come with a concept of environment that expresses the continuity and interrelationships between man and nature and an ecosystem view of the world. The implementation of open space systems needs to spell out this continuity of nature in the urban environment.

In South Africa, the environmental crisis needs to be seen in its political context. Poverty, population and the environment need to be interlinked in practice and policy formation. This necessitates communication between managers and the community regarding what the community wants. These ideas on community participation underpin D'MOSS which advocates that participation in implementation is essential to the success of the project.

#### 3.5.4 TYPOLOGY OF FUNDING

The sound management of open spaces coincides with a successful funding strategy. The World Conservation Union, in its book Caring for the Earth has proposed five ways of funding open spaces, some of which have been supported by successful international experience. This presents possibilities for alternative means of funding D'MOSS.

##### 1. Transfers from military budgets

Land degradation, deforestation, competition for water and increasing population growth all pose a threat to national security and yet security budgets do not account for these risks. The Military should be made to take financial responsibility.

## 2. Private sector investment services

These could provide a service similar to that of an investment bank ie. gathering long-term capital; spreading risks; arranging access to technology and improving incentives for investments in sustainable development of biological resources.

## 3. Bonds and taxes

Redeemable or non-redeemable bonds are aimed at individuals and organizations wishing to make an affordable contribution to conservation. Proceeds from the sale go to build up capital funds for investment and yield modest returns to bond holders. The MOSS Report, 1994 notes that bonding has been successful in the state of New Jersey, USA, since its initiation in 1961. The programme goal is to permanently protect 20% of New Jersey's land area. A constraint is that bonds must be approved by local citizens who are not always agreeable. In the state of New York, voters defeated the 1990 Environmental Quality Bond Act which would have provided a funding mechanism for implementing a statewide open space conservation plan.

Several innovative taxing schemes have shown success in generating income for the purchase of open space lands. The state of Maryland, USA, has had an open space programme since 1969 that relies on a real estate transfer tax whereby 0.5% of a property's purchase price is collected from most real estate transactions. The goal is to protect 10% of the state's land in the form of public recreation and conservation use (MOSS Report, 1994).

#### 4. **Non-Government Organizations and Corporate Contributions**

Corporations in ten of the major commercial industries (including clothing, textiles, food, chemicals, paper and wood) depend on plant/animals for their raw materials. As these are often wild plants and animals, corporations benefit from the their conservation and as such should contribute to funding their conservation.

#### 5. **Lotteries**

Tickets at national events could be taxed. In Iowa, USA, lottery money is used for open space acquisition. Around 98% of land is privately owned and so an Open Space Bill was passed in 1987 with the goal of placing 10% of the state in public ownership and protection by the year 2000 (Wilson, 1991 in MOSS Report, 1994). The Resource Enhancement and Protection Act (REAP) was passed in 1989 designating monies from the state lottery and general funds to help finance the programme.

43% of REAP funds are dedicated to open space. 15% of total funds are allocated to city parks and open space acquisition and development and 28% of total funds are allocated to the Department of Natural Resources for land and water acquisition and development. The remaining funds are allocated broadly for conservation purposes among several state and county agencies.

### 3.6 **METHODS OF LAND ACQUISITION**

#### 3.6.1 **Private Treaty**

land under private ownership may be purchased by a method of Private Treaty, in terms of section 240 of the Local Authorities Ordinance.

Prior to resolving to purchase land, the Council must advertise its intentions to do so to allow for the lodging of complaints. Parcels of land cannot be bought until the objections have been investigated or until the Administrator has approved the purchase or where the purchase price exceeds the value of the land. The duration of acquisition usually varies from 3 - 12 months, depending on whether or not objections are received to a purchase price exceeding R 100 000.

The procedure is outlined on the following page.

1. Establish that Council has authorized the acquisition and the budget is sufficient to cover the costs.
2. Obtain plans from the acquiring service unit.
3. Establish the name and address of the registered owner of the property.
4. Value the property.
5. Open negotiations with the owner and endeavour to obtain early occupation if urgently required.
6. Conclude agreement.
7. Instruct for survey if only a portion of the property is affected.
8. Instruct City Attorney's to register transfer in favour of Council.
9. Arrange payment of purchase price on registration.
10. Ownership passes in favour of the Council on registration (Kevin Meyer, 1996, pers comm).

### 3.6.2 Expropriation

Expropriation is resorted to when mere control of actions of the landowner concerned would not suffice to achieve the desired goal, and where the State's use of the land would be so extensive that it would require all the rights of ownership in order to serve the public interest effectively. Expropriation is governed by the Expropriation Act No 63 of 1975. The Act provides for the process of expropriation and the principles upon which compensation is to be paid to the person deprived of property. 'Property' refers to both movable and immovable property. Although expropriation is a simple and effective means of getting control over land-use, it is an expensive mechanism. Although South African law recognizes no constitutional right to compensation for expropriation, the Expropriation Act and other Acts provide that compensation should be paid (Claasen and Milton, in Fuggle and Rabie, 1992).

Land may be expropriated in terms of section 5 of the Expropriation Act and section 190 of the Local Authorities Ordinance. This method is employed in the case of a deceased estate, a project affecting a number of properties or occupation is urgent. A decision to expropriate is not valid except under authority of a resolution passed by a majority of the total number of councillors for the borough. The duration for this method is approximately 8 - 24 months, depending on whether or not objections to the expropriations are lodged.

The procedure is outlined below.



1. Establish that Council has authorized the acquisition and the budget is sufficient to cover the costs.
2. Obtain plans from the acquiring service unit.
3. Report to the Council for authority to expropriate.
4. Establish the name and address of the registered owner of the property.
5. Conduct a Deeds Search at the Deeds Registry for information in respect of Bonds and/or interdicts.
6. Serve a Notice of Intention to Expropriate on the owner. Objections may be lodged within 30 days with the Town Clerk, who in turn submits them to the Administrator.
7. Investigate any objection and submit a report to Council.
8. Apply for the Administrator's consent to expropriate.
9. Once the Administrator has approved the expropriation, the Council may proceed to expropriate in accordance with the provisions of the Expropriation Act no 63 of 1975.
10. Ownership passes in favour of the Council and occupation can be taken.
11. Value the property.
12. Negotiate compensation and arrange payment.
13. Instruct the City Attorney to register transfer in favour of Council.
14. Instruct for survey if only a portion of the property is affected (Kevin Meyer, 1996, pers comm).

### 3.7 SUMMARY

This chapter has given an insight into the conceptual material upon which D'MOSS is based. The need for open space in urban areas is the ultimate justification for D'MOSS in metropolitan Durban. Funding ideas have been based on the ideas of the World Conservation Union as well as on international experiences of funding open space. The community participation approach of D'MOSS is based to a large extent on surveys of people relating to open space issues (eg. Khan and Wong in MOSS Report, 1994), which highlight the importance of including the community in open space planning. The design and management of D'MOSS is rooted in the Theory of Island Biogeography (MacArthur and Wilson, 1967), Landscape Ecology (Formon and Godron, 1986) and the concept of metapopulations (Simberloff et al, 1992). The work of conservationists and biologists, such as Geoff Nichols (1994), and Roberts (1990) has also informed the management strategies of D'MOSS. The land acquisition methods described in section 3.6 underpin the land acquisition strategies of D'MOSS and provide a useful basis of analysis in the case studies.

Based on the informing material in this chapter, the structure plan of D'MOSS was formulated and is outlined in chapter 4.

## CHAPTER 4

### 4.0 THE D'MOSS STRUCTURE PLAN

#### 4.1 INTRODUCTION

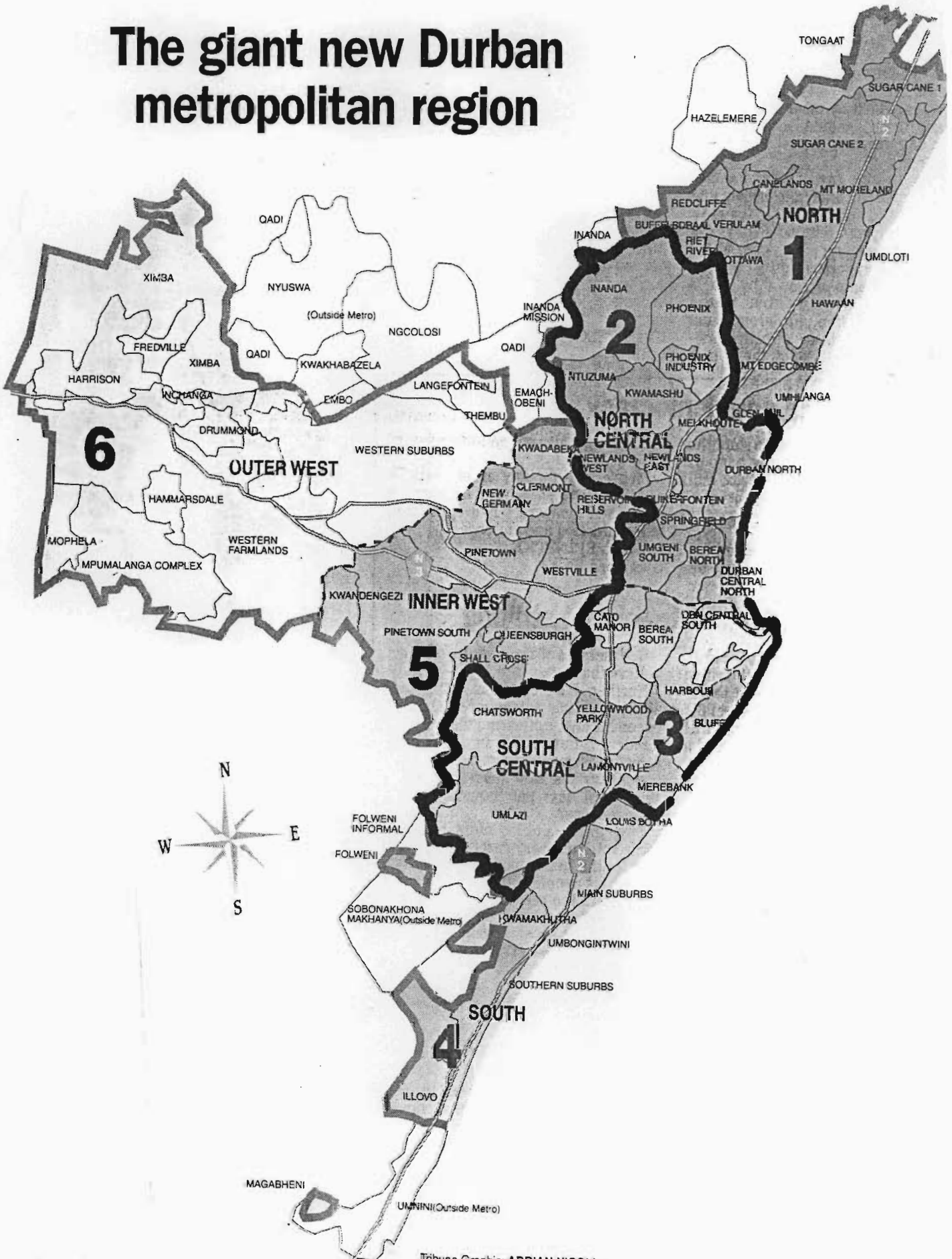
The jurisdiction of D'MOSS, although originally the municipal area, now covers the North and South Central Local Councils. The D'MOSS links link up with MOSS areas in the greater metropolitan area. Map 1 shows the Local Councils of metropolitan Durban with areas 2 and 3 denoting the jurisdiction of D'MOSS.

The structure of D'MOSS is based on the principles advocated by Diamond in section 3.4 as well as the ideas of Landscape Ecology and Metapopulations (Roberts, 1990). The open space system forms a grid covering municipal Durban, with the principal axes following the coast and perpendicular to the coast. This forms three distinct types of links : coastal links; riverine links; and inland linkages which cross the ridges between catchments so as to join riverine links. These are divided into nine D'MOSS parks. The coastal links are the Northern and Southern Coastal Parks. The riverine parks are the Umgeni Park, Umbilo Park, Umhlatazana Park, Ohlanga Park, Umhlangane Park and Umlaas Park. A traverse link is the Cato Manor Park (D'MOSS Report, 1989). The structure plan of D'MOSS, showing the linkages of the system, is depicted on map 2.

Most of the park systems follow Durban's rivers so as to utilize the floodplains extending to the 1 : 50 floodline. Floodplains are suitable open space areas as they are unsuited to residential and industrial development. The varying ecological value of the land selected is reflected in a structure of core conservation areas (nodes), dispersal corridors and buffers, with complimentary nodes linking up with one another.

MAP 1 : SUBSTRUCTURES OF METROPOLITAN DURBAN

# The giant new Durban metropolitan region



Tribune Graphic: ADRIAN NICOLL



Core areas are usually large parcels of land and are either dominated by a particular community type or showing significant signs of active regeneration to that form. Examples of core areas are Burman Bush, Silverglen Nature Reserve and Virginia Bush. As the species source or potential species source within the system, core areas represent the non-negotiable sites where conservation is the primary function. As far as possible the core areas should reflect the intrinsic relative abundance of the natural communities and replication of floristically representative examples is also considered necessary as natural catastrophes such as fire could result in a community complex being lost from the open space if it was only represented once (Microviro, vol 10 No 3).

As most urban reserves once formed part of a continuous landscape the provision of effective dispersal corridors between the core areas may provide a means of maintaining landscape connectivity by alleviating threats from factors such as inbreeding depression. The development of corridors also allows for a compromise to be achieved between the provision of large core areas favouring wildlife and linear visual surfaces favouring human amenity in areas where development pressures are high. Corridors need not be dominated by indigenous vegetation (Microviro, vol 10, no 3). Corridors run mainly along river valleys, natural drainage courses and steep ridges and connect existing nodes (D'MOSS Report, 1989). The Umgeni River System constitutes a corridor.

In order to maximize the viability of indigenous populations remaining within the open space system, advantage must be taken of the open spaces that exist in developed areas eg. sportsfields, cemeteries, road verges and derelict land. (Microviro, vol 10, No 3). The vegetation in these disturbed areas is preserved through naturalization and natural habitat recreation programmes, in order to lessen the biological isolation of the natural areas and maximize options for the incorporation of the disturbed areas into the system.

Several quarry sites along the Umhlatazana River between Clairwood and Stainbank Nature Reserve constitute derelict land that is included in the system and will be rehabilitated (D'MOSS Report, 1994).

As D'MOSS is a resource-based system, the objectives of biological conservation, visual amenity and river protection have the most influence, with biological conservation assuming a priority. D'MOSS looks beyond the ecological status of an open space pocket to the potential of that open space in relation to the whole open space system. D'MOSS also recognizes that human needs must be incorporated into an ecologically sound open space system for the system to be successful (Roberts, 1990) and recreation, education and trail systems have a modifying, rather than a determining effect on open space selection (Nicolson, 1988). Near Stainbank Nature Reserve is an old waterwheel which has been restored and a small dam to collect water for the wheel. D'MOSS proposed convert the area around the wheel into a picnic site (D'MOSS Report, 1989). Also in the Umbilo/Umhlatazana system, the old Drive-In site in Oliver Lea Drive was converted into a pond and picnic site for D'MOSS (D'MOSS Report, 1989). These spatial and non-spatial criteria interact to determine the ideal choice of open space for inclusion in D'MOSS.

#### 4.2 LAND ACQUISITION POLICY

It is recommended that land should be acquired according to a clearly defined phased order of priority. D'MOSS advocates a rationalization of land-use whereby open spaces are reserved in environmentally sensitive and undevelopable areas while land more suitable to development and city densification is zoned accordingly.

Funds should be used to acquire land identified as being of high worth or under immediate threat. Land should be purchased using public funds only when other avenues explored prove fruitless.

Other avenues of acquisition include forming an urban conservancy (see 4.3.6), leasing land, increasing densities on one part of a site to allow more natural vegetation on another part of the site, and design of public land to enhance open space functions. Identified areas should all fall inside Environmental Protection Zones until the final status of the area is determined, planning proposals implemented and development occurs (Nicolson, 1988).

#### 4.3 DEVELOPMENT POLICY OF D'MOSS

The nine D'MOSS parks are established one at a time by implementing the design through tasks including trail building, erecting signboards, benches, braai areas etc. in formalized park areas, the removal of alien vegetation and replanting programmes. Establishment may only commence once all the land identified for the D'MOSS system has been acquired (Roberts, 1996, pers comm). The Umbilo Park System was chosen as the pilot project for the establishment of D'MOSS because a large proportion of the land was Council owned and development could thus proceed quickly. Thereafter, the parks would be developed in accordance with need or if a park system came under threat from a development proposal, as is the case with Umgeni Park System (Roberts, 1996, pers comm).

The development policy is to fulfil the objectives alluded to in 1.3.3.

##### 4.3.1 The Objective of Biodiversity

The D'MOSS system is based on the premise that an open space system should maintain the most representative natural communities and the greatest species diversity, in the face of habitat destruction, due to competing forms of competing land use (Nicolson, 1988). Of the principles to be incorporated into the system, one is to retain as many trees as possible (Nichols, 1993).



The plan applies biogeographic principles to urban open space design in order to provide the means for establishing ecologically resilient and diverse open space systems. These systems combine low maintenance costs with high scientific, educational, aesthetic and recreational potential. An evaluation of open space in terms of its suitability for biodiversity (eg. an effective dispersal corridor) may be impeded by a lack of scientific knowledge and have to rest largely on guesswork (Poynton and Roberts, 1985).

In accordance with conserving the biodiversity of open spaces, watersheds are used as the boundary lines (Nicolson, 1988) for the nine systems as this leads to the least disruption of the natural landscape.

#### **4.3.2 The Objective of River and Stormwater Management**

The natural approach to stormwater management follows the principle that flowrates are reduced in a water course if they follow natural design principles. In a natural channel the combined effects of a porous soil in the flood plain to soak up excess flow, a wide flood plain to allow storage of excess flow and vegetation in the river to slow the flow and trap silt, all act together to slow the formation of a peak and decrease maximum intensity. This means downstream channels do not have to cope with peaks and thus do not require compensatory hardening. The use of a floodplain should be public open space along the length of a water course in the form of a continuous strip.

The plan advocates that private property be fixed back some distance from the centre of a river in order to create a river reserve. Communal services eg. sewers must be constructed and maintained by a local authority within a 5 - 10m servitude along a river. Flood control works must be within a 50 - 100 year floodline. In this way maintenance is made easier by not having to gain access to private property. The planting of riverine trees will decrease topsoil loss (D'MOSS Report, 1994).

The plan allows for floodlines to cater for future urban growth. Flood attenuation dams create opportunities for open space planning. Natural vegetation is retained at river banks to stabilize and decrease the flow at bank surfaces (D'MOSS Report, 1989).

#### **4.3.3 The Objective of Education**

The D'MOSS plan is to set aside suitable areas where pupils and students can study natural systems, ecology and conservation. The qualities necessary for an open space to be used for educational purposes are as follows (Nicolson, 1988):

- exhibit the diversity necessary to show the range of habitats and species communities and the operative ecological factors
- not be liable to irreplaceable damage by heavy use.
- not contain rare species which ought to be conserved for research
- easily accessible, either through sharing a common boundary with a school or college or being located nearby.
- have paths and other accessible routes for safe, rapid movement of parties within the area
- contain a field museum or similar centre
- have a qualified warden

#### **4.3.4. The Objective of Trail Systems**

School pupils are also to be responsible for helping the Wildlife Society and Parks Department in establishing trails in D'MOSS areas. The effect of trail systems will be to further the public interest in the outdoors and the state of KwaZulu-Natal's land. It is desirable that groups of hikers be under the guidance of a competent leader such as a nature conservation officer, scoutmaster or wildlife naturalist (Cooper, 1991).

A hiking trail should be influenced by the aesthetics of the area, the accessibility of the trail and the connectivity of the trail with other areas (Nicolson, 1988).

#### **4.3.5 The Objective of Recreation**

The location of open space for recreational use should to some extent be based on population thresholds and not resource characteristics alone. The requirements for recreational open space are as follows :

- easily accessible
- contain features that promote recreation eg. ponds for fishing
- provide a pleasant background

(Schlemmer, 1977 and Cottrell, 1978 in Nicolson, 1988).

The monitoring of trails and picnic sites carried out by the Research section of the Town Planning Department should indicate where facilities could be developed in the future (D'MOSS Report, 1994).

#### **4.3.6 The Objective of Community Participation**

The use of community participation is recognized as a commitment to the maintenance of open space. The broad framework within which open space occurs is created by economic, social and political forces which place extrinsic values upon an area. Management proposals should be devised in conjunction with the community in order to take cognisance of the socio-economic and political forces acting upon that area (D'MOSS Report, 1994).

Community participation entails increasing environmental education in order to create proper environmental behaviour. The community, especially school and youth groups, would be used for the development of trail systems and removal of alien vegetation.

Participation in its own right would increase environmental awareness and possibly lead to private funding. The Durban City Council is expected to oversee public participation (Municipal Engineer, 1995).

In 1990 the Wildlife Society initiated the 'Friends Scheme' as a strategy for safeguarding the MOSS network. These groups, often called urban conservancies, adopt parts of the MOSS network and are responsible for the care and management of those areas (Municipal Engineer, 1995).

#### 4.4 D'MOSS MANAGEMENT POLICY

The plan advocates a properly constituted organizational framework within which the D'MOSS Steering Committee and The MOSS Action Committee can operate. The Steering Committee, under the auspices of the KwaZulu-Natal Town and Regional Planning Commission would deal with matters of general policy. The Committee should be represented by members of the following groups : the Wildlife Society of Natal; Department of Development Aid; KwaZulu Bureau of Natural Resources; Natal Parks Board; Game and Fish Preservation Board; Natal Town and Regional Planning Commission and the boroughs of Pinetown, Westville and Durban. This reflects the notion that D'MOSS is a composite mind in accordance with the ideas of the regional planner, Mackaye, that development should reflect composite viewpoints (see 3.3).

Under the Steering Committee a technical Working Group is needed, with representatives from various departments such as the Parks Department, City Engineers Department, Associate Town Clerk Department, City Treasurer, City Valuer and Real Estate Department and Natural Science Museum. The role of the Working Group would be to prepare design concepts, management strategies, implement a timetable and preparation of cost estimates and development proposals. A sub-group of the Steering Committee would implement public awareness programmes and media exposure (Scarr, 1990).

The Action Committee, under chairmanship of the Wildlife Society, comprises voluntary members of environmentally concerned organizations. Functions include agitating, lobbying and establishing trails. The Committee is a link between the community and public authorities and is a mechanism for the local community to become involved in open space planning issues (Nicolson, 1988).

Each park is to have its own management strategy which incorporates issues of staffing, plant and machinery, vegetation rehabilitation policy, public participation and linkages between natural area management and recreational management. D'MOSS advocates that permanent supervisory staff in all the parks is essential to the success of the project.

#### 4.5 FINANCING OF THE D'MOSS PLAN

D'MOSS is a self-financing project with respect to the acquisition of land. D'MOSS advocates a rationalization of land whereby open space identified as being surplus to D'MOSS needs in terms of ecological viability or location, is rezoned and sold. The monies received from this are used to purchase open space identified for inclusion in D'MOSS. The market value of the open space to be sold and the savings in not having to purchase privately owned surplus sites is estimated to be greater than the cost of developing the entire D'MOSS area (Davies, 1993). It is estimated that R9 864 000 will be required to purchase land for D'MOSS and R7 298 401 will be required during 1991 - 1996 to develop it.

Against this expenditure will be balanced a capital saving of R22 900 000 realised from two sources : rezoning and sale of Council owned open space and rezoning of public open space not in Council ownership surplus to D'MOSS needs. Operating the new facilities provided in the system will cost R2 943 664 per annum over current expenditure in the system area.

This will be offset by savings on operating costs of R378 000 per annum due to disposal of public open space no longer requiring maintenance and R1 018 000 income generated by rates revenue on the land thus sold (Muniviro, vol 10 no 3).

The Council for the Environment (1989) proposed that a long-term financial strategy, formulated by each local authority, form the basis of D'MOSS implementation. There should be an increased priority for D'MOSS in local authority budgets. In order to make D'MOSS more affordable there should be : efficient organization of recreation departments; trained personnel; alternative methods of acquiring land; public assistance in maintaining land; low maintenance facilities; exchange of privileges to the owner of private land for the use of their land.

Implicit in the financial estimates is that D'MOSS will be characterized by a policy of indigenization rather than manicured parks. In this way the costs of development and maintenance are reduced. The cost of developing natural open spaces is approximately 1/3 of the cost of developing formal parks. For eg. the cost of developing and maintaining 500 ha of natural areas in the city was R7 400 per hectare while for a formal park, the cost was R25 000 per hectare (Davies, 1993). Also implicit is that the community will help with the maintenance of D'MOSS areas and thus reduce maintenance costs.

#### **4.6 SUMMARY**

D'MOSS advocates a holistic approach to the management of an open space system in that it incorporates ecological viability, economic feasibility, recreation and community participation into the planning and management of the open space system. The subsequent chapters are a case study of the actual implementation of the structure plan in two different parks. Following on from this it will be assessed to what extent the structure plan was implemented and to what extent the goals and objectives outlined in section 1.3 were met.

## CHAPTER 5

### 5.0 CASE STUDY OF UMGENI RIVER SYSTEM

The case study areas of the Umgeni River System will demonstrate land acquisition processes and their impact on the implementation of D'MOSS. The case study will be divided into two areas : a section of the north bank of the Umgeni River and a section of the south bank. The chapter will follow under the major headings of : Location and Physical Context; Land Acquisition Processes and Financing of land Acquisition. The information was gained largely from open-ended interviews and secondary material obtained from Kevin Meyer and Roy Klein of the Real Estate Department, Central Council. Dr Debra Roberts of the Physical Environment Unit, Central Council was also instrumental in accessing information on the Umgeni Park land acquisition processes. Errol Scarr, Director of the Parks Department provided insight into the problems of acquisition, while Steve Bond of the Town Planning Department explained the relevance of the Town Planning Scheme to D'MOSS. Willie De Klerk of the Land Transactions Department explained the procedures and problems of selling off surplus open space.

Maps 3 and 4 of the Umgeni case study areas were obtained from the D'MOSS Report 1994. Maps 5, 6, and 7 pertaining to the South Bank study area were accessed through the Real Estate Department of the Central Council. Maps 8, 9 and 11 of the North bank comes from a valuation report by Davis, Bristow and Associates. Map 10 comes from a report by ZAI Town Planners INC. Map 12 of the North Bank comes from the Real Estate Department of Central Council.

## 5.1 LOCATION AND PHYSICAL CONTEXT

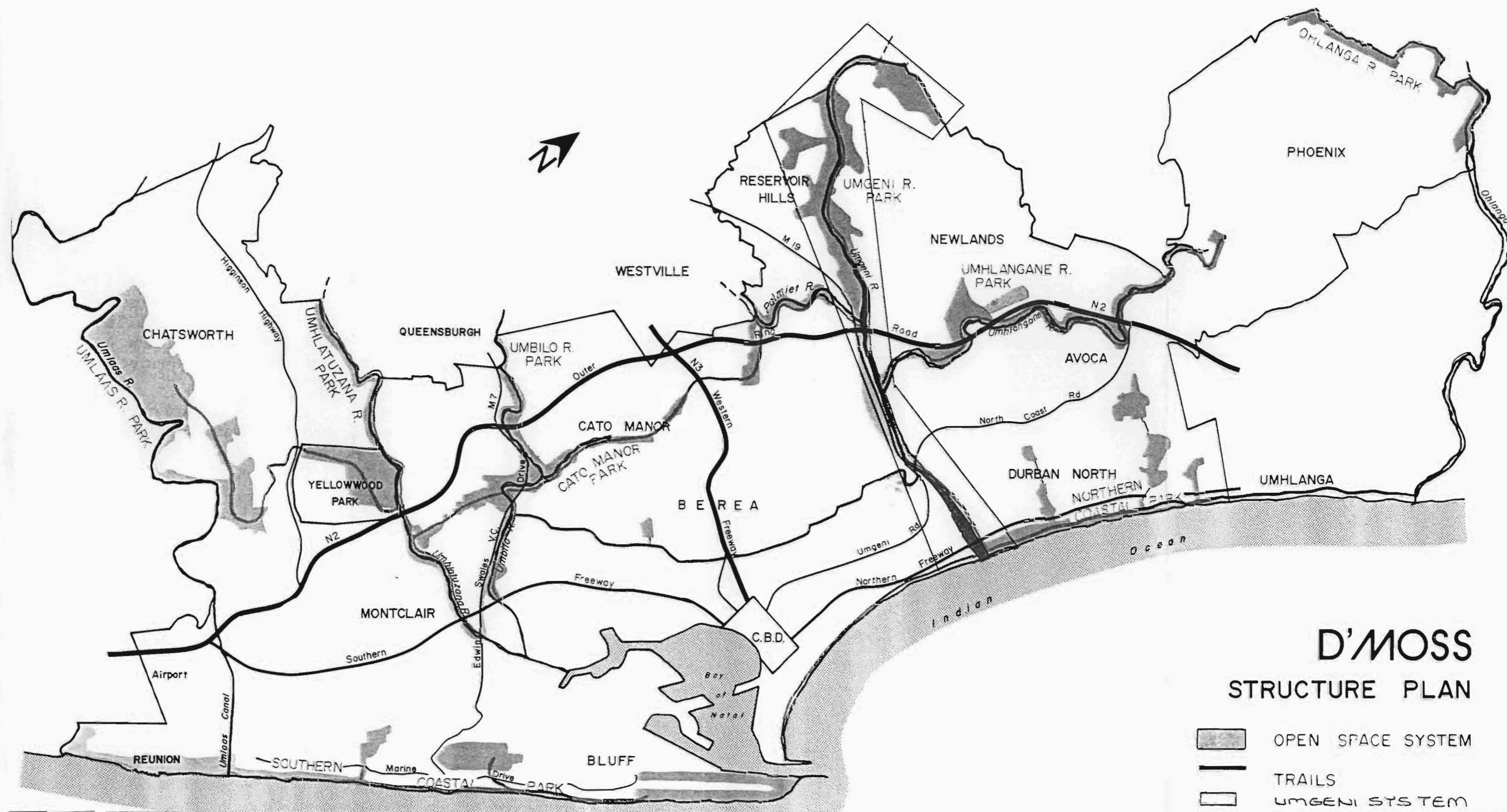
Map 3 shows the location of the Umgeni Riverine Park (enclosed in a border) in relation to the rest of D'MOSS. The Umgeni River System comprises the Umgeni Valley and the land immediately adjacent to it, from the point at which the river passes beneath the Outer Ring Road to the former Durban Municipal boundary. The Umgeni River rises in the hills of Dargle in the Midlands, passes through four major dams and several conservation areas to arrive in Durban at the Newlands West/Ntuzuma boundary. Along its route, the Umgeni River links with the Berea walking trail, the Palmiet River and the Umhlangane River. The Palmiet trail links the Umgeni Park with the Cato Manor Park.

The Cato Manor Park in turn is a traverse link joining the Umgeni Park to the Umbilo catchment area (D'MOSS Report, 1994). The structure plan of the Umgeni River Park is depicted on map 4, with the case study areas shaded respectively.

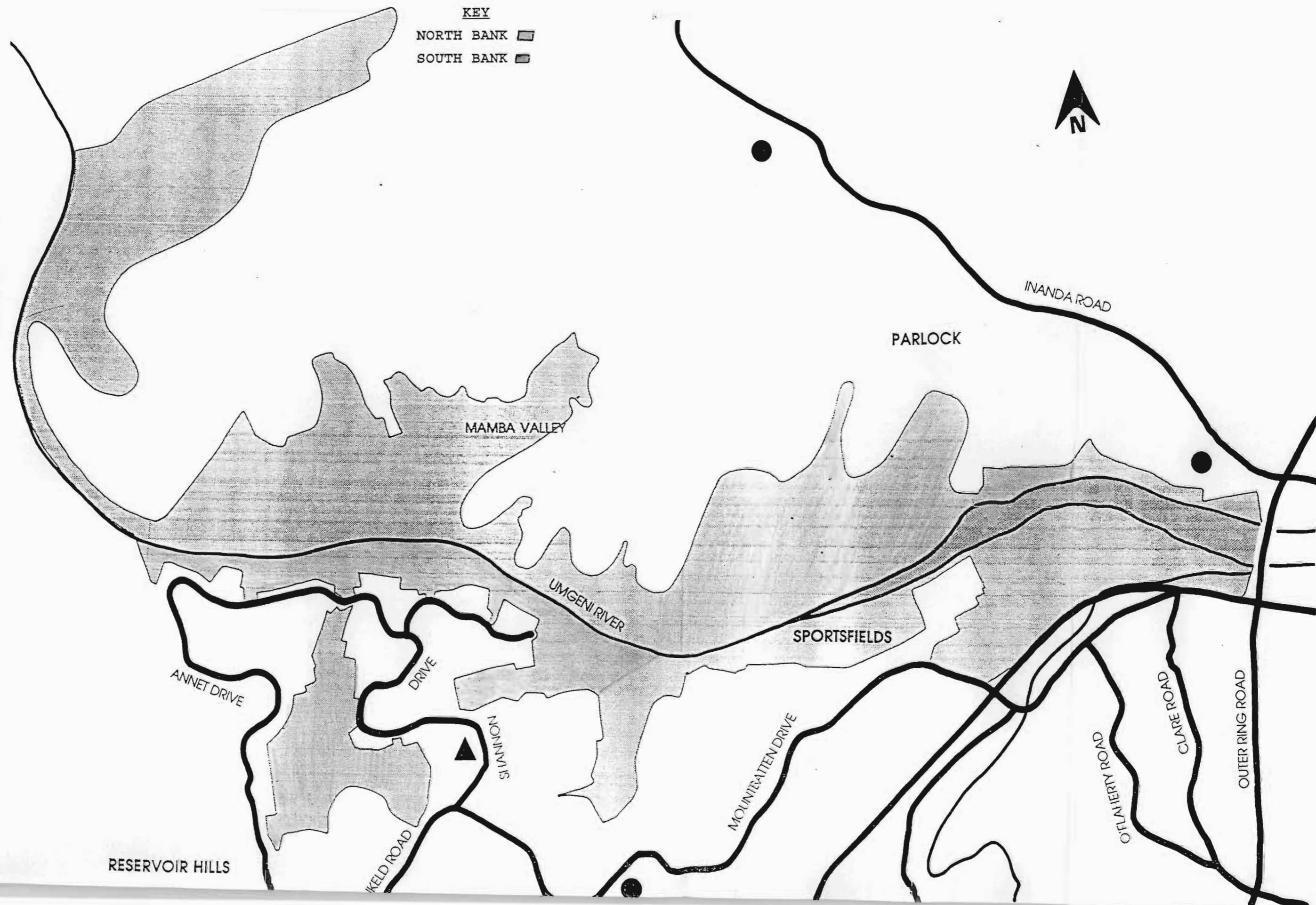


MAP 3

THE UMGENI RIVER PARK IN RELATION TO THE D'MOSS STRUCTURE PLAN



MAP 4  
THE CASE STUDY AREAS IN RELATION TO THE UMGENI RIVER PARK  
STRUCTURE PLAN



### 5.1.1 Southern Bank

The Southern bank case study depicted on map 4 is shown in more detail on map 5. Map 5 shows how the land identified for D'MOSS relates to the surrounding residential land use. The Umgeni South Town Planning Scheme shows the open space to be zoned largely as special residential (400 and 900 square metre plot sizes). The precise zonings are shown on map 6. The nature of the open space was investigated by Roberts and Allan in a survey in 1983. The survey showed that the Umgeni Valley is a potential urban corridor connecting several areas of considerable ecological value, namely the Beachwood Mangrove Nature Reserve, the Burman Bush Reserve, the proposed Aller River Nature Reserve, the proposed Mzinyati Nature Reserve and the Krantzkloof Nature Reserve. Furthermore the vegetation of the Umgeni Valley, although secondary in nature, is still largely indigenous, making the valley a potential conservation area in its own right. As such it can function as a 'source' area of indigenous species for the small open spaces remaining in the nearby suburbs.

The 1983 survey divided the South Bank of the Umgeni River into areas E - I in order to ascertain the differences in vegetation types and topography across the Umgeni System. Areas E - H correlate with the South Bank study area and are shown on map 7. Area E comprises moderately steep land with a slope of 10 - 20 degrees. The plant community is a mixed one consisting of dense scrub described by Moll (1976) as a Semi-Deciduous Scrub. The grass understorey is heterogenous and similar in species composition to that of the North Bank. Due to disturbance in the area, namely residential and road development, there has been a severe invasion by exotic plants and the area would need a clearing programme for it to be ecologically viable (Roberts, 1990).

S-  
Bank

MAP 5

SOUTH BANK CASE STUDY AREA

scale: 1:6000



KEY  
CASE STUDY AREA  
AREA

MAP 6

LAND USE ZONES OF THE SOUTH BANK CASE STUDY AREA

scale:  
1:6000

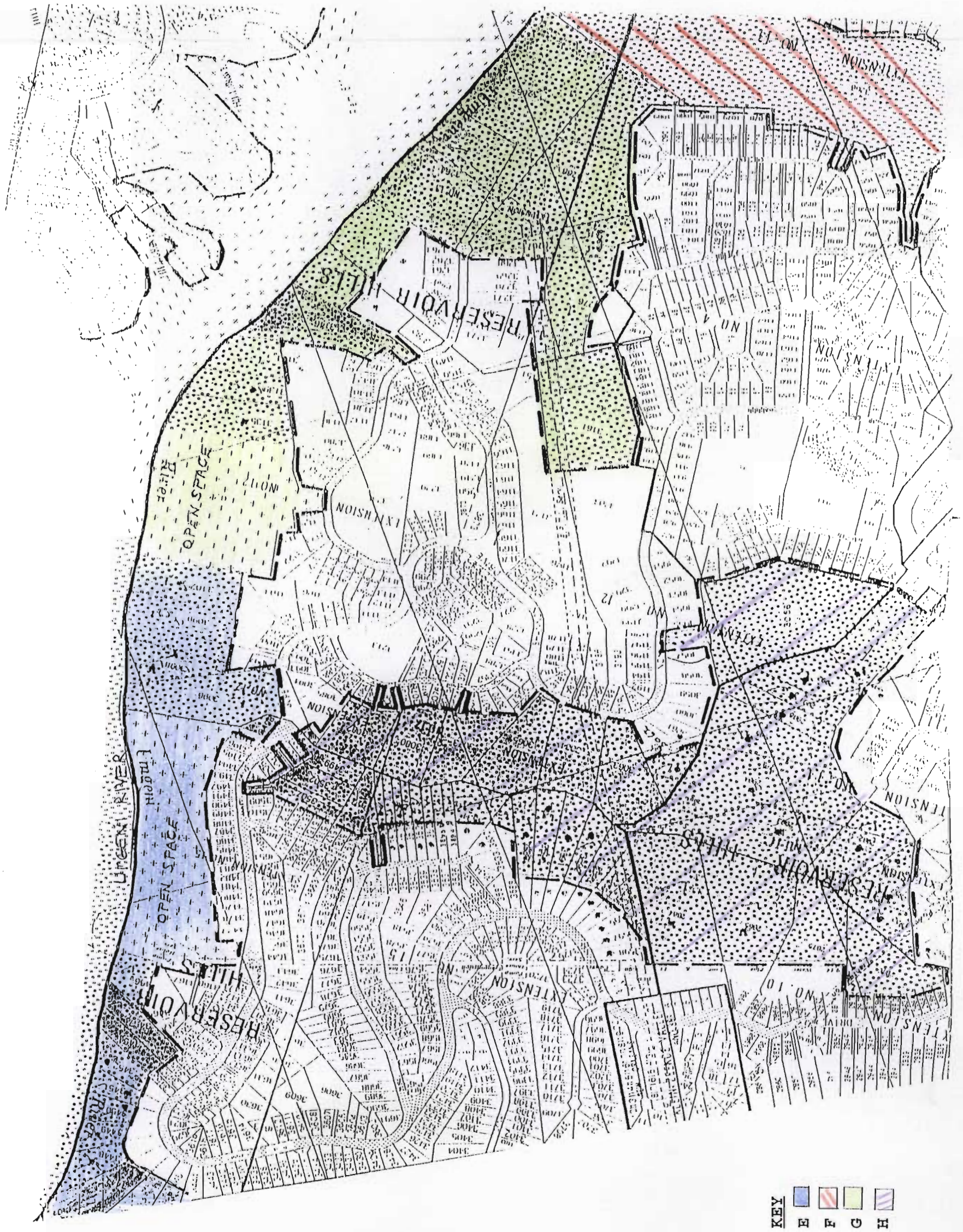


- KEY
- SPECIAL
  - RESIDENTIAL
  - GENERAL
  - RESIDENTIAL
  - SCHOOL
  - DUPLEX
  - OPEN SPACE

Areas F, G and H are rockier than the North Bank and comprise Scrub and Woodland Mosaic, although the species composition differs significantly. Structurally the community is closed bushland with grass understorey. Although the community types are widespread in less developed areas, their continued existence in an urban area increases their ecological and biogeographical value significantly. The vegetation along the valley floor of area H is dense and forest-like as a result of a daily backwash of water from the Durban Heights Treatment Works. Areas G and H exist in their natural state but a pipe and path construction through the valley in area H has increased the level of invasion by exotic plants and noxious weeds along these lines of disturbance. Area F has a greater degree of disturbance because; it is bordered on all sides by residential development, sandwinning operations occur nearby, and because the area is small and thus more prone to species extinction. In the valley below Annett Drive there are opportunities for nature conservation.

At the time of the survey, land on the southern bank was covered largely by market gardening - a source of disturbance and hence exotic plant invasions. A pipeline bridge across the river also increases the invasion of exotic plants. Despite the alien vegetation, there is a significant bird community encouraged by the exotic plant food source. Due to the reduction in indigenous vegetation in metropolitan Durban, Cawood (1980) points out the necessity of conserving the existing scrub and woodland mosaic in metropolitan Durban. He proposed that areas F,G and H be rezoned from residential to public open space in order to serve this purpose (Roberts, 1990).

MAP 7  
SURVEY AREAS E - H OF THE SOUTHERN BANK CASE STUDY AREA



### 5.1.2 Northern Bank

The North bank study area as seen on map 4 is seen in more detail on map 8. The area is located at the eastern end of the Newlands West area and is bordered by the Hillgrove Township to the west, the Umgeni River to the south, Parlock Township to the east and Newlands West Drive to the north. The study area is the largest undeveloped area on the eastern side of Newlands. The land comprises subs of Lots 226, 227 and 230 Newlands and Lot 329 of Zeekoe Vallei. The total gross area is 139,55 hectares (Davies et al, 1995).

Lots 226, 227 and 230 consist of a complex of large broad spurs intermingled with sharply incised drainage lines falling away towards the Umgeni River and forming high bluffs adjacent to the river. 42% of the site comprises land steeper than 1:3. Vegetation consists of grassland and scrub heavily invaded by invasive alien plants. The site is largely vacant. Two powerlines occur on the site, running from the north-east to the south west roughly midway across the site and from north-east to south-west towards to eastern side (ZAI Report, 1994). In certain areas the soil conditions are classed as unstable and fall within 'controlled areas'. The large area roughly in the centre of the site lends itself to the development of conservation-oriented facilities (eg. nature trails and interpretive centre). There are 1:50 floodlines adjacent to the left bank of the Umgeni River and flanking the FOSA stream in the north eastern sector of the site (Davies, 1995).

Lot 329 of Zeekoe Vallei comprises a very long narrow area of land mainly forming the north bank of the Umgeni River. As most of the land is in excess of 1:3 or forms part of the flood plain of the Umgeni, the land is largely undevelopable save a flat portion at the western end of the property.



**MAP 8**

**NORTH BANK CASE STUDY AREA**

Proposed Subs of Lots 226, 227, & 230  
Newlands and Lot 329 Zeekoe Vallei.

**Cadastral Description**

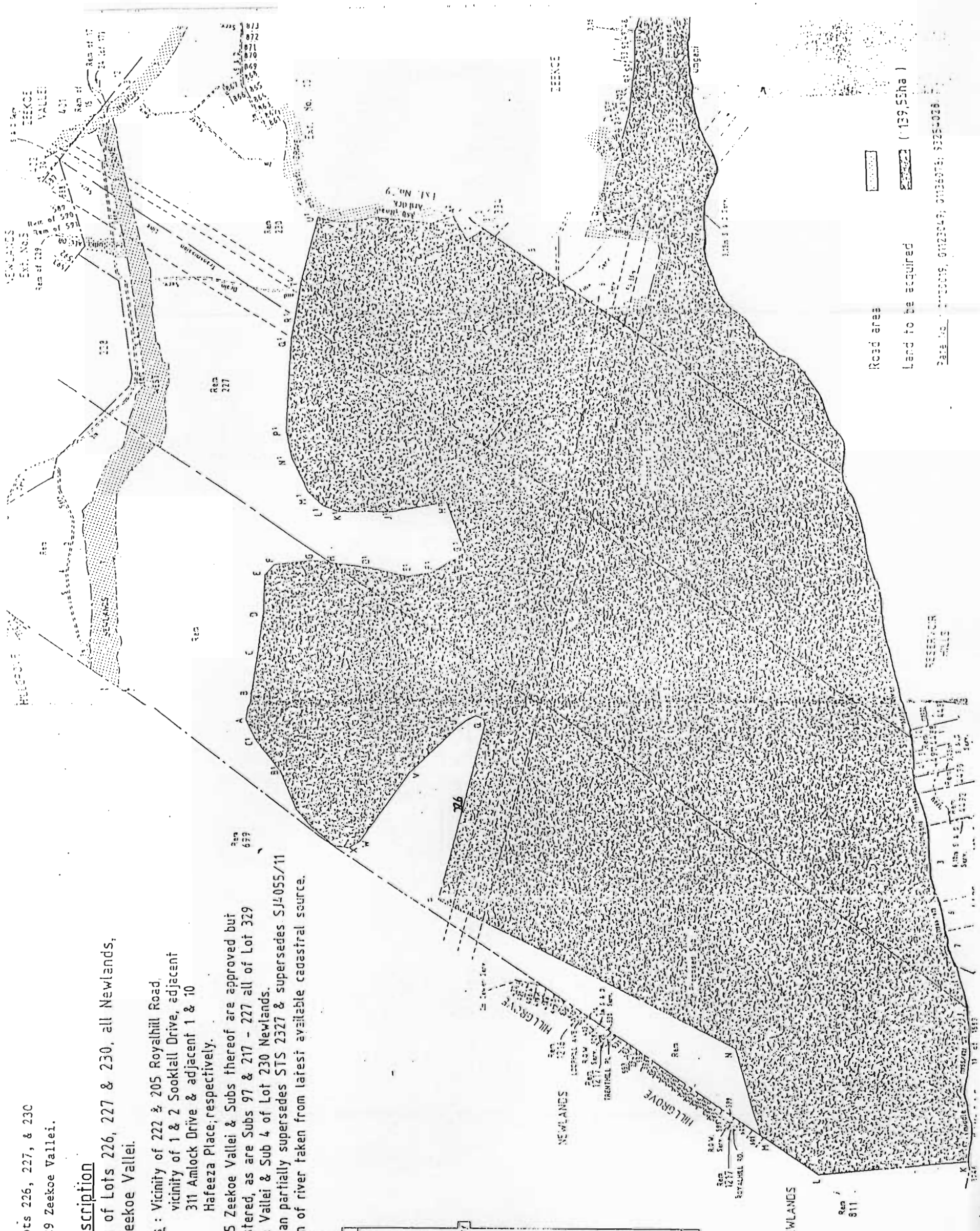
Proposed Subs of Lots 226, 227 & 230, all Newlands,  
and Lot 329 Zeekoe Vallei.

Postal Addresses : Vicinity of 222 & 205 Royalhill Road  
vicinity of 1 & 2 Sookhail Drive, adjacent  
311 Amlock Drive & adjacent 1 & 10  
Hafeeza Place, respectively.

- Note : i) Lot 335 Zeekoe Vallei & Subs thereof are approved but  
unregistered, as are Subs 97 & 217 - 227 all of Lot 329  
Zeekoe Vallei & Sub 4 of Lot 230 Newlands.  
ii) This plan partially supersedes STS 2327 & supersedes SJ4-055/11  
iii) Position of river taken from latest available cadastral source.

Prop. Sub of Lot  
226 Newlands

Subs	Metres
AB	50.0
BC	57.0
CD	76.0
DE	77.0
EF	22.0
FG	65.0
GH	27.0
HJ	2335.0
JK river boundary	
KL	251.2
LM	121.0
MN	158.0
NP	530.0
QO	317.0
QR	10.0
RS	14.0
ST	20.0
TU	16.0
UV	105.0
VW	144.0
WX	27.0
XY	24.0
YZ	50.0
ZA	35.0
A-B	70.0
B-C	70.0
C-A	40.0
A-B-C	43.0228



Road area  
Land to be acquired (139,53ha)  
Scale 1:5000, 01/02/2010, 01/02/2010, 9325-008

## 5.2 LAND ACQUISITION IN THE UMGENI SYSTEM

### 5.2.1 UMGENI NORTH

The purpose of selecting a portion of Umgeni North as a case study is to highlight the processes associated with acquiring privately owned land where the landowner is unwilling to sell. The case study will show that the topographical state of the land, the value of the land and alternative proposals for developing the land all impact on whether or not the land is acquired.

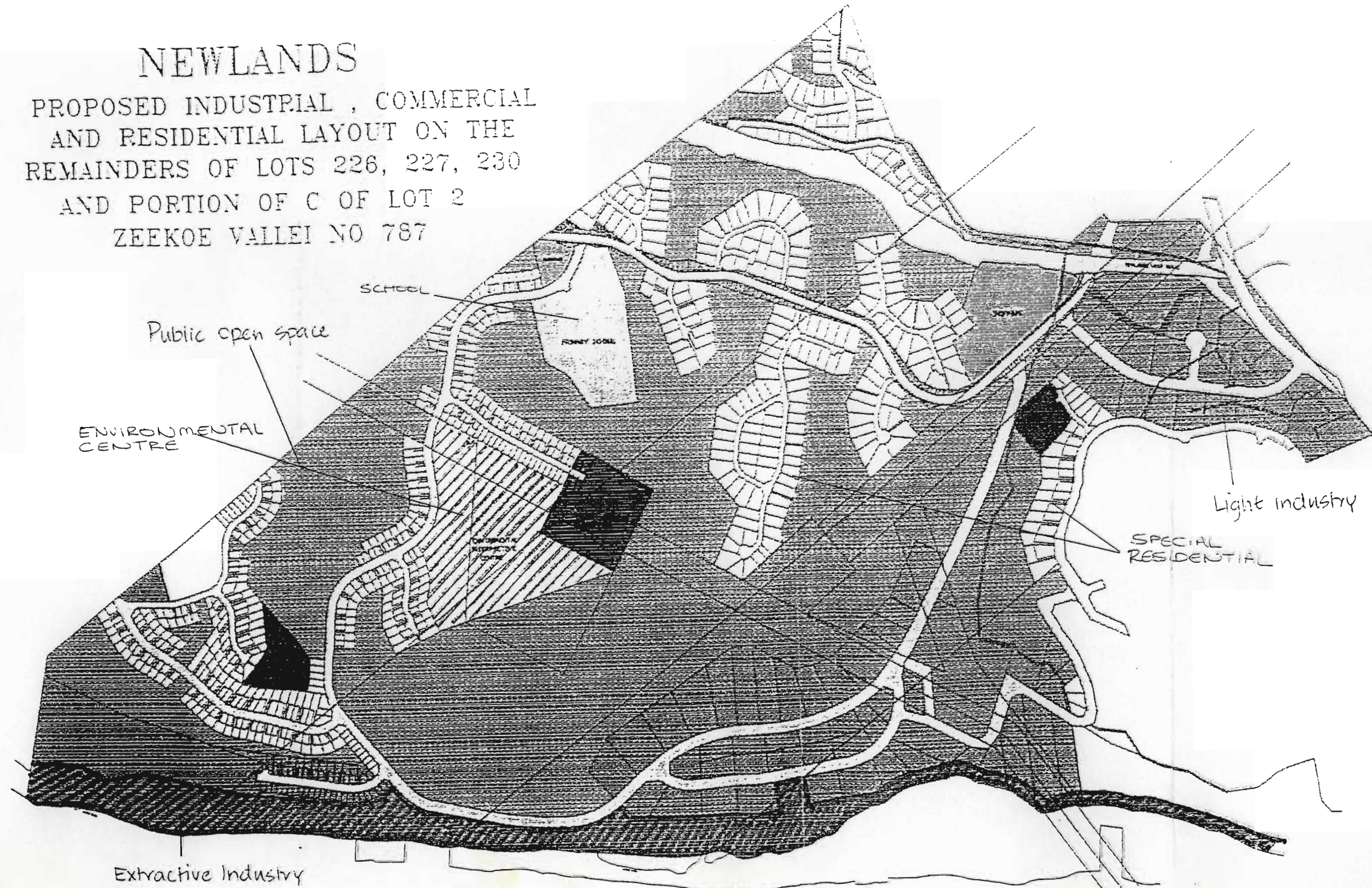
The acquisition process in the Umgeni Valley began as a crisis-response to a development proposal submitted by the landowner to the Town Planning Department of the former Durban City Council. The proposal motivated to change a special residential zone of 900 square metres to a special residential zone of 400 square metres. The proposed layout, designed by Metroplan in 1994 on behalf of the owner, Commercial Properties, is shown on map 9. The submission of the structure plan initiated a counter-response by the Parks Department of Durban City Council to negotiate for the purchase of the site. Commissioned by the Real Estate Department of the Durban City Council, the valuation firm of Davies, Bristow and Associates compiled a report which analyzed the development proposal submitted (Meyer, 1996, pers comm).

The structure plan motivated for industry in line with the industrial corridor concept. It was suggested that industry would promote job creation in the area. The residential land use was motivated in terms of providing people with easy access to employment opportunities.

MAP 9  
PROPOSED LAYOUT OF THE UMGENI NORTH AREA SUBMITTED TO CENTRAL  
COUNCIL

# NEWLANDS

PROPOSED INDUSTRIAL , COMMERCIAL  
AND RESIDENTIAL LAYOUT ON THE  
REMAINDERS OF LOTS 226, 227, 230  
AND PORTION OF C OF LOT 2  
ZEEKOE VALLEI NO 787



**metroplan**  
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PROJECT NO: 101/102/103/104/105/106/107/108/109/110/111/112/113/114/115/116/117/118/119/120/121/122/123/124/125/126/127/128/129/130/131/132/133/134/135/136/137/138/139/140/141/142/143/144/145/146/147/148/149/150/151/152/153/154/155/156/157/158/159/160/161/162/163/164/165/166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500/501/502/503/504/505/506/507/508/509/510/511/512/513/514/515/516/517/518/519/520/521/522/523/524/525/526/527/528/529/530/531/532/533/534/535/536/537/538/539/540/541/542/543/544/545/546/547/548/549/550/551/552/553/554/555/556/557/558/559/560/561/562/563/564/565/566/567/568/569/570/571/572/573/574/575/576/577/578/579/580/581/582/583/584/585/586/587/588/589/590/591/592/593/594/595/596/597/598/599/600/601/602/603/604/605/606/607/608/609/610/611/612/613/614/615/616/617/618/619/620/621/622/623/624/625/626/627/628/629/630/631/632/633/634/635/636/637/638/639/640/641/642/643/644/645/646/647/648/649/650/651/652/653/654/655/656/657/658/659/660/661/662/663/664/665/666/667/668/669/670/671/672/673/674/675/676/677/678/679/680/681/682/683/684/685/686/687/688/689/690/691/692/693/694/695/696/697/698/699/700/701/702/703/704/705/706/707/708/709/710/711/712/713/714/715/716/717/718/719/720/721/722/723/724/725/726/727/728/729/730/731/732/733/734/735/736/737/738/739/740/741/742/743/744/745/746/747/748/749/750/751/752/753/754/755/756/757/758/759/760/761/762/763/764/765/766/767/768/769/770/771/772/773/774/775/776/777/778/779/780/781/782/783/784/785/786/787/788/789/790/791/792/793/794/795/796/797/798/799/800/801/802/803/804/805/806/807/808/809/810/811/812/813/814/815/816/817/818/819/820/821/822/823/824/825/826/827/828/829/830/831/832/833/834/835/836/837/838/839/840/841/842/843/844/845/846/847/848/849/850/851/852/853/854/855/856/857/858/859/860/861/862/863/864/865/866/867/868/869/870/871/872/873/874/875/876/877/878/879/880/881/882/883/884/885/886/887/888/889/890/891/892/893/894/895/896/897/898/899/900/901/902/903/904/905/906/907/908/909/910/911/912/913/914/915/916/917/918/919/920/921/922/923/924/925/926/927/928/929/930/931/932/933/934/935/936/937/938/939/940/941/942/943/944/945/946/947/948/949/950/951/952/953/954/955/956/957/958/959/960/961/962/963/964/965/966/967/968/969/970/971/972/973/974/975/976/977/978/979/980/981/982/983/984/985/986/987/988/989/990/991/992/993/994/995/996/997/998/999/1000

The valuation report showed that the proposed industrial belt, motivated in terms of the industrial corridor concept, was rejected by municipal officials. The reasons included an inappropriate location; unsuitable topography; and environmentally sensitive land. With respect to the residential proposals, the plan is not feasible because of the interrupted service runs and higher costs of sewerage disposal.

**TABLE 1**  
**UMGENI NORTH CASE STUDY AREA SIZE IN HECTARES AND VALUE OF RESPECTIVE PLOTS**

	AREA NORTH OF POWER LINE	SOUTH OF POWER LINE	SOUTH OF LOT 230
NET DEVELOPABLE AREA (HA)	11,6610	23,5656	10,5
PROPERTY VALUE PER HECTARE (R)	60 000	20 000	35 000
TOTAL PROPERTY VALUE (R)	669 660	261 492	367 185


The topographical state of the site is an important consideration in the analysis of land acquisition. The davies Report noted that the usable areas are limited to the tops of spurs and the flat area on the north bank of the Umgeni - a net usable area of 25% of the total gross area. The powerline running north-west to south-east divides the site into north and south. The area north of the powerline servitude is the best land to acquire for housing purposes as it has more moderate slopes and is elevated to offer excellent views. The net developable area north of the power line is 11,6610 hectares and has a property value of R60 000 per hectare, a total value of R699 660.

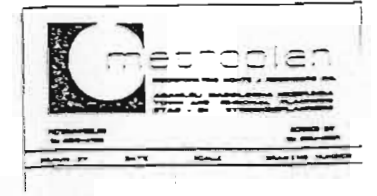
The land below the power line is generally of a poor quality and has a total usable area of 23,5656 hectares which is badly fragmented. The land that is usable is valued at R 20 000 per hectare thus giving a total value of R261 492. The southern part of lot 230 contains flat land and has a usable area of 10, 5 hectares, valued at R35 000 per hectare - a total value of R 367 185. This gives a total land value of R 1 300 000 (Davies et al, 1995). The location of the developable land is shown on map 10.

With respect to vegetation, Dr Roberts identified an area of grassland on rem of lot 227 which is rare in Durban and in need of conservation. It is this grassland which makes the site very valuable in terms of biodiversity. In the south west corner of the site the slopes have been invaded by common exotic plant species. This invasion represents past disturbance of the vegetation cover probably as a result of residential development on land above the slope. There are signs of continuing disturbance through dumping of household litter by residents and the erection of shacks by migrant workers. Despite the disturbed nature of the area there are scattered nuclei of indigenous vegetation scattered along the slope which has been described as a scrub and woodland mosaic. These patches of indigenous vegetation warrant the restoration of the area by the removal of exotic vegetation and the replanting of indigenous vegetation. The area is too steep for further residential development and restoration would increase the aesthetic and biogeographical value of the area (Roberts, 1990).

The site has a blanket zoning for special residential, mainly 400 square metres. The land use zones, taken from the Rem of City Town Planning Scheme, are depicted on map 11.

MAP 10  
LOCATION OF DEVELOPABLE AREAS RELATIVE TO  
UNDEVELOPABLE AREAS OF THE NORTH BANK STUDY AREA




KEY  
DEVELOPABLE  
AREAS 

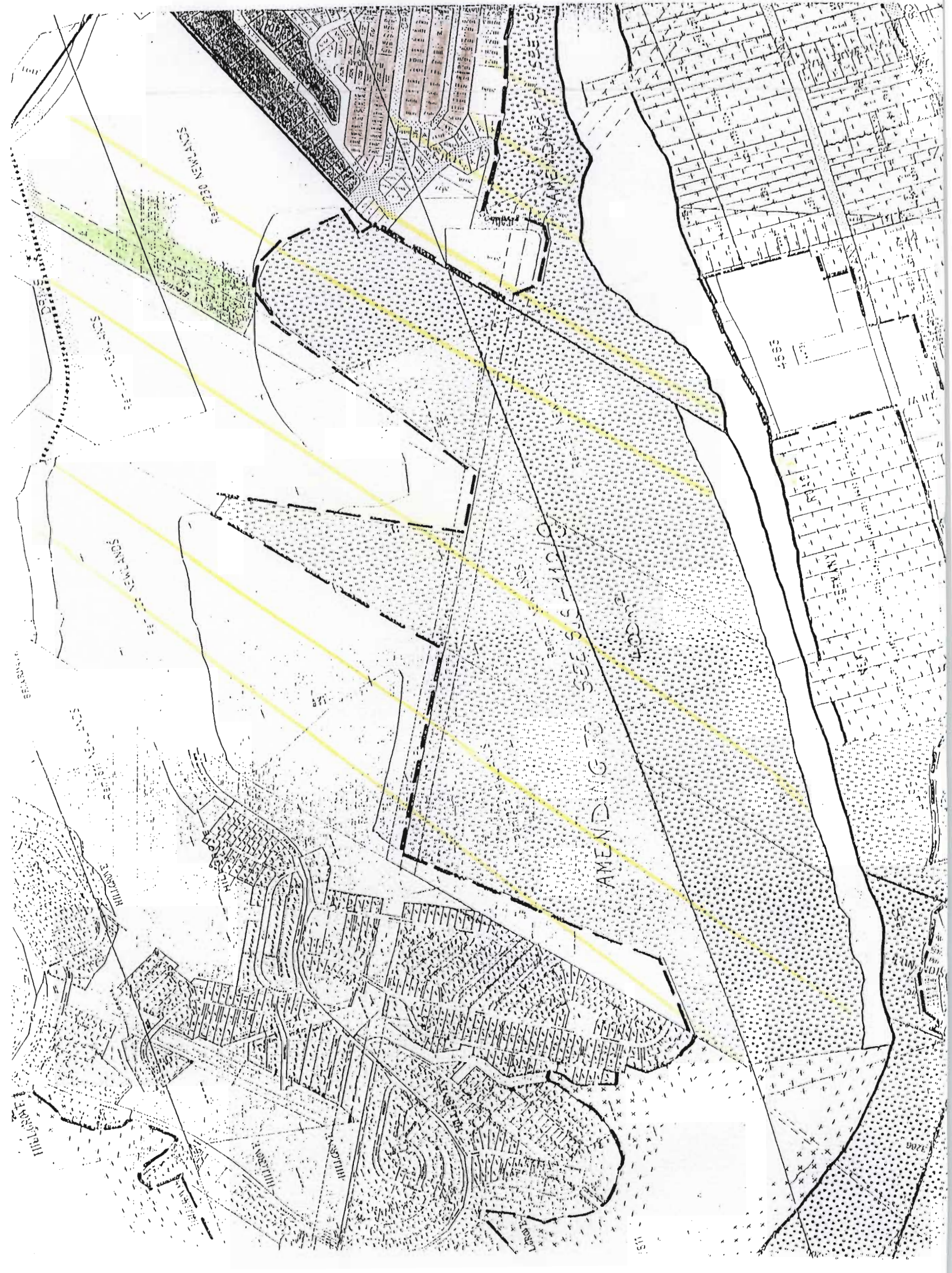


MAP 11

LAND USE ZONES FOR NORTH BANK CASE STUDY AREA scale:1:6000

KEY

- SPECIAL RESID 
- GENERAL RESID 
- OPEN SPACE 



An analysis of this area raises the issues of competing land uses, the prohibitive costs of acquiring land valuable in terms of alternative land uses and the time constraints involved in the land acquisition process.

There is intense competition for open space land to be developed for residential and industrial purposes. Where land is better suited to industry it will fetch a higher sale price and thus a landowner will be more willing to sell to industry. Any State owned or Council owned land will be under pressure to sell for residential purposes in the light of the new Metropolitan Council's budget emphasis on township establishment and upgrading. The budget, released in late August 1996, reveals a sum of R500 000 000 to be set aside for township development and township upgrading (Natal Mercury, Monday 28/8/96). Open space land-use is perceived as being antagonistic to these development issues and it seems likely that future development in Durban will see more open space being conceded to the needs of housing in accordance with a metropolitan development policy geared towards township development and upgrading.

The success of the land acquisition process has important implications for the biogeographical development and management of the Umgeni System. It is vital to D'MOSS that the rare grassland type is acquired. This does not imply that the entire site needs to be acquired. Although the bigger the site, the better the conservation opportunities will be, it is necessary to rationalize the land identified in the light of competing land uses. In this case study the land is not well suited to competing land uses thus facilitating the establishment of open space. The landowner, however, feels that the total valuation amount of R1 300 000 is an undervaluation and will not sell to D'MOSS. The owner has gone through preliminary stages of planning and thus added monetary value to the land. Negotiations have been underway with the landowner for several months and show no sign of reaching a resolution. It seems likely that the issue will go to court (Bristow, 1996, pers comm).



This section has demonstrated the issues involved with purchasing land for D'MOSS, namely alternative land use proposals, high land values and landowners unwilling to sell. In this case the land value of R1 300 000 is beyond the budget of D'MOSS (Roberts, 1996, pers comm). Although it seems unlikely that the structure plan will be accepted by the Central Council, the landowner has gone through those stages of planning which increase the land value and make it increasingly difficult for D'MOSS to afford the site. The current impasse shows no signs of lifting and possibly only a court decision will get the ball rolling.

### 5.2.2 UMGENI SOUTH

The purpose of including sections of Umgeni South in the case study is to demonstrate the procedures and associated problems associated with land acquisition for D'MOSS.

The table below depicts the land ownership in the Umgeni River Valley prior to the initiation of land acquisition for D'MOSS.

**TABLE 2**

**LAND OWNERSHIP IN UMGENI RIVER VALLEY IN 1990**

PARK (HA)	DURBAN CITY COUNCIL	STATE	PRIVATE
Umgeni	490.89	0.00	112.89

Source : Parks Department, 1990

This table shows that nearly 1/3 of the open space is privately owned and will entail purchase of the land through Private Treaty or Expropriation or the acquisition of development rights to that land.

Map 12 shows phase 1 - private properties which have been acquired for D'MOSS, and phase 2 - properties which are outstanding. Apart from the public open space, labelled on map 12, all the open space is privately owned and zoned for alternative land uses (see map 6). A total of 38,4657 hectares have been acquired at a cost of R688 027 (see appendix 1). Whether land is acquired through Private Treaty or through Expropriation depends largely on the extent of the scheme. When an isolated property needs to be acquired and if the landowner specifically requests it, Private Treaty may be used. However, when a large scheme of properties need to be acquired it is more feasible to expropriate. This is because in the case of one landowner refusing to sell under Private Treaty, it could reduce the viability of the open space system in terms of ecological linkages. Where open space is Council owned it merely needs to be rezoned where necessary (Meyer and Klein, 1996 pers comm).

In the case of Umgeni South case study area all the private properties that have been acquired to date, except one (indicated on map 12), have been expropriated. This is because the properties adjoining the Umgeni are all linked and form part of an extensive scheme. It is simpler to expropriate all the properties at once rather than negotiating Private Treaty sales on individual properties which would entail time-consuming objections from a large number of individuals. In the case of properties which have not been acquired it is usually due to high land values or refusal by the landowner to sell the property (Meyer, 1996, pers comm).

MAP 12

PHASE 1 AND PHASE 2 OF ACQUISITION



Of the land which is outstanding for the D'MOSS plan, some of the land is necessary to acquire and other land may be compromised in order to speed up the land acquisition process. Those properties where non-acquisition would disrupt the continuity of the system are marked A, B and C on map 12. Connectivity and linkages are two fundamental principles underpinning D'MOSS. Linkages are essential because they promote immigration rates and breeding which are necessary for biodiversity (Diamond, 1975). In the case of A, B and C the non-acquisition of these properties will affect the dispersal capabilities of the corridor and reduce the biodiversity of the open space system.

The non-acquisition of other properties will have a less profound impact of D'MOSS. If the properties marked D and E on map 12 are not acquired it will not detract from the dispersal capabilities and essential linkages of the system, but it will reduce the size and circularity of the open space. A large reserve is better than a small reserve as it will hold more species at equilibrium and have slower extinction rates (Diamond, 1975). May (1975) points out that any species will have a higher chance of survival in a single large area. Circular reserves minimize dispersal distances within the reserve (Diamond, 1975). Section 3.4.1 deals in more detail with the impacts of breaking linkages in the open space system. Unless properties E and D have rare vegetation types in need of conservation, it may be rational to compromise these and save on the limited funds available. The vegetation types of the respective properties are detailed in section 5.1.1 and D and E do not contain such rare species.

### **5.2.3 Land Acquisition Problems in Umgeni North and South Case Study Areas**

The main problems underpinning the acquisition process in Umgeni North and South case study areas are the financial constraints emanating from time delays incurred in selling off surplus open space, the delays involved in the acquisition procedures, and town planning regulations applying to the Town Planning Scheme.

In an open-ended interview with Willie de Klerk of the Land Transactions Department, Central Council, it was found that the main problem with the sale of surplus open space is the time taken to get the land sold. Opinions on how long it takes vary from 18 months (de Klerk, pers comm, 1996) up to 5 years (Bond, pers comm, 1996). The rezoning procedure can take from 7 months up to 2 years, depending on the time taken to circulate through affected departments and whether or not objections are lodged. There has been an inquiry by the KwaZulu-Natal Town and Regional Planning Commission into the number of rezonings of public open space and a call for the rationalization of rezoning (Bond, 1996, pers comm). Their argument is based on the lack of an overall policy within which the rezoning occurs. If the Town Planning Division of the Urban Development Department must gain approval from the Commission for each rezoning, the sale of land would be severely impeded (de Klerk, pers comm, 1996). Since 1983, if land is zoned as open space it must be acquired within 5 years and if it is not acquired then D'MOSS has no recourse to that land if a development proposal is submitted with respect to that land (Bond, 1996, pers comm).

As well as the time delays incurred in selling land, the actual composition of the land often hinders a sale. Surplus open space is largely 'sloap' land (Space Left Over After Planning) and as such has a poor topography and is undevelopable (de Klerk, 1996, pers comm).

Staffing is perceived as another obstacle to the sale of land. Due to the lack of staff members certain land sales are given priority according to the ease of sale. There are some sites that take a permanent back seat if for example, they require major service extensions.

The motivation for much of the land sales appears to come from individuals and when those individuals move elsewhere so does the motivation.

A similar problem has occurred in the Parks Department where individuals of great expertise have left and have not been replaced (Scarr, 1996, pers comm).

As mentioned in section 3.5.1.3 of the conceptual framework, town planning schemes may be a hindrance to the acquisition of land, because they are rigid in their design and are amended without cognisance of environmental considerations. In terms of the Town Planning Ordinance of 1949 the function of the town planning scheme is the statutory control of land-use within the framework of the planning policy developed in the Structure Plan. The scheme zones land for a particular land-use and controls the development of that land-use. The Town Planning Scheme of Durban presently applies to the former Durban municipal area but is in the process of incorporating new areas now falling under the North and South Central Local Councils (Bond, pers comm, 1996).

The Town Planning Scheme of Durban does not reflect the D'MOSS proposals and land is only zoned open space for D'MOSS if the Council is in a position to acquire the land within 5 years (Bond, 1996, pers comm). Where land is zoned for open space on the Town Planning Scheme it does not fall into an environmental protection zone until final acquisition as was proposed in the D'MOSS plan (Roberts, 1996, pers comm). When town planning schemes are amended, the amendments are not carried out in terms of the D'MOSS plan. The D'MOSS plan is borne in mind but not strictly adhered to. When a rezoning application is submitted to the Planning Department that concerns an environmentally sensitive area, the Environment Department is informed of the proposal and asked for comments. If the rezoning in question pertains to land identified for D'MOSS and the Environment Department can justify its claim to the land, the rezoning proposal may be rejected (Bond, 1996, pers comm).

However, environmental considerations are often overridden by Council in favour of other land-uses considered to be of more benefit to the area (Bond, 1996, pers comm).

The sale of surplus land is taking so long that the funds available for purchasing land are limited and once the 5 year period is up the likelihood of zoned open space being rezoned is high.

Delays to the acquisition of open space are inherent in the process of expropriation which may take up to 24 months. Part of the reason is that an application to expropriate must go to the Provincial Premier's office for approval where it may sit for 6 - 18 months. A proposal has been submitted to the Premier requesting that the Premier's approval not be required for an expropriation application. In this way the delay would be eliminated and the process of acquisition would be speeded up. As the cost of expropriation exceeds the market value of land it may not be financially viable to acquire the land. The costs include the market price of land which is valued either by Central Council or by independent valuers, depending on the degree of contention. It also includes solatium - a form of compensation calculated according to a fixed schedule whereby the percentage of compensation decreases in proportion to the decreasing value of land. Relocation costs may also be paid to the expropriatee (Meyer, 1996, pers comm).

The problem with using Private Treaty as a method of acquisition is that the Estates Department is dealing with private landowners who are reluctant to sell and who value their land at a higher price than the Council valuers. Although the costs only comprise the market price of the land, the land takes longer to acquire as it is necessary to negotiate with individual landowners who are often unwilling to sell (Meyer, 1996, pers comm). This is the reason why the Real Estate Department chooses to expropriate as a first option of acquisition (Klein, 1996, pers comm).

### 5.3 FINANCING OF LAND ACQUISITION

With respect to the financing of land acquisition, D'MOSS is self-financing and no other funds, other than from the sale of land, are used. It was proposed in the D'MOSS plan that public funds be used to finance D'MOSS, but this has not been the case. The amount of money in the D'MOSS account is a crucial factor in that the acquisition of land cannot proceed without financial details from the D'MOSS account to prove there are sufficient funds. Any report submitted to Council motivating for acquisition of a particular property in order to gain Council approval necessary for the acquisition to proceed requires proof of funds (Meyer, 1996, pers comm). At the moment the sale of land is slow and thus the funds available for purchase of land are low.

The problem with the original financial projections is that it was estimated that prime residential sites would sell for high prices which would finance poor quality open spaces that cost far less. What they did not consider was that these prime sites might not be so easy to sell and the time it would take to sell them. The time delays incurred in the negotiation process delay the acquisition of land and in turn delay the development of the Umgeni Park. The D'MOSS policy to develop the Umgeni River System, which includes alien plant removal and trail building, only once all the land in that system is acquired, is restricting the potential of the area in terms of biodiversity and recreation. The negotiations over this property could continue over many months and the energies of the Parks Department and Real Estate Department are channelled into acquiring one property when it may be easier to acquire the same extent of open space through expropriation at a lower cost.



#### 5.4 SUMMARY

This case study serves to demonstrate the procedures and costs involved with land acquisition in the Umgeni Valley. It can be seen that the success of land acquisition is to a large extent area-dependent. The acquisition method used, the value of the land, competing proposals for the land to be rezoned as an alternative use, all affect the ease with which land is acquired. Depending on the interplay of these factors in an area, the land identified for D'MOSS will or will not be successfully acquired.

## CHAPTER 6

### 6.0 UMBILO/UMHLATAZANA RIVER SYSTEM

The case study of the Umbilo/Umhlatazana River System is primarily to demonstrate the development and management aspects of D'MOSS. The process of land acquisition is not a primary concern for the purpose of this case study. The chapter will follow under the headings of : Location and Physical Context; Land Acquisition; Development of Umbilo system and Management of Umbilo System. The information obtained came from a series of open-ended interviews as well as from parks Department reports. Interviews were held with Linton Lauderdale and Mike Oxlands, area managers for the Umbilo System falling under Parks Department Southern Division and Central Division, respectively. They provided information on the maintenance tasks involved in the Umbilo System, the costs of maintaining the Umbilo System and the problems of managing open space systems. Marius van Rooy of the Landscape Architecture Department, who was responsible for implementing the design of the Umbilo System provided information on the degree of success of implementation. Mickey Govender of the parks Department Accounts Department supplied the data on the financial aspects of developing the Umbilo System. Ross Crutch, of the Parks Department Natural Areas Division, provided information on community participation, recreation and education aspects of D'MOSS.

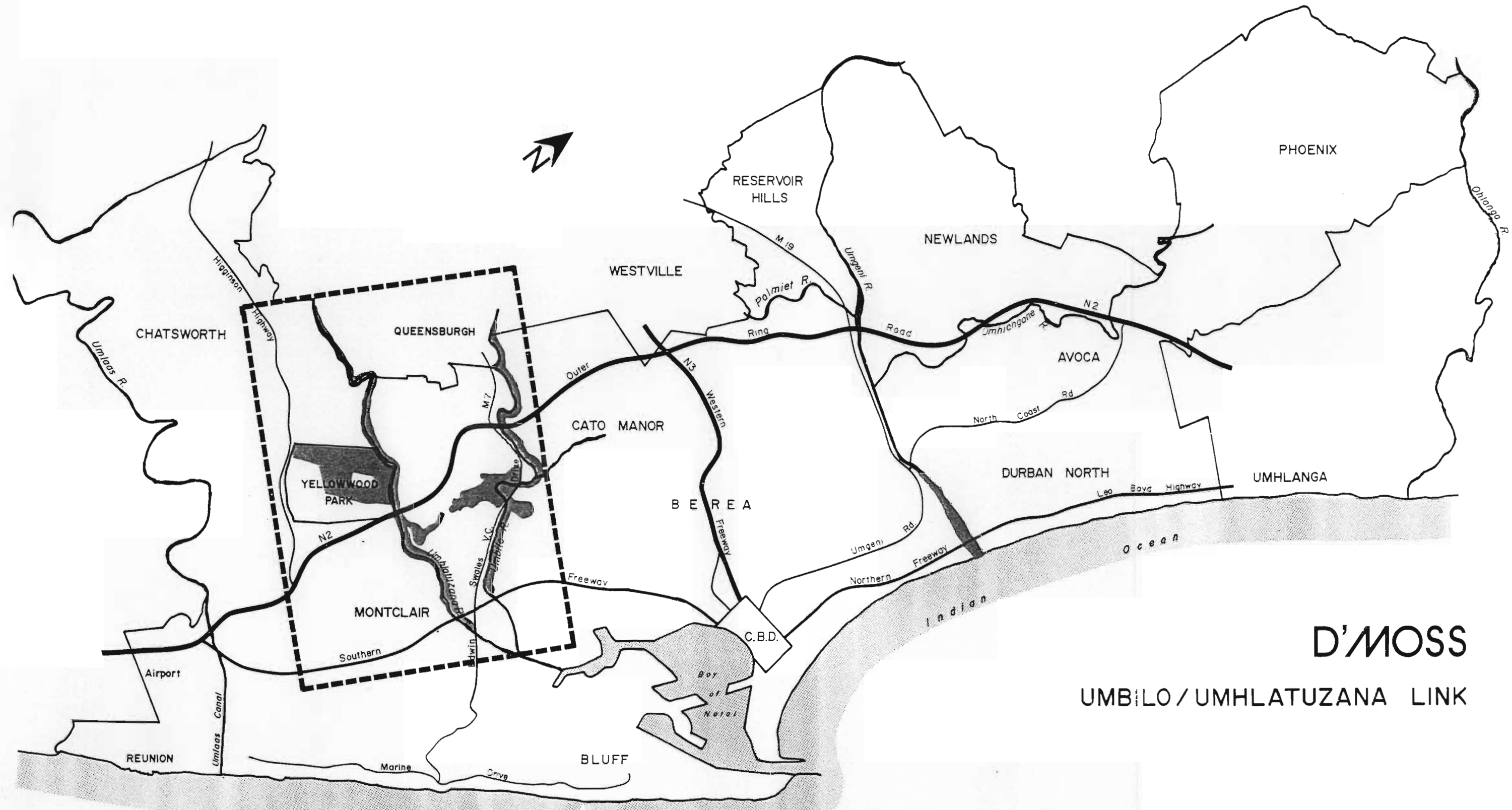
Maps 13 and 14 come from the D'MOSS Report (1994). Map 15 comes from the Umbilo Trail brochure and map 16 comes from the Mapping Department of Central Council.

## 6.1 LOCATION AND PHYSICAL CONTEXT

The position of the Umbilo System relative to the rest of D'MOSS is shown on map 13. Although the Umbilo and Umhlatazana River Systems are separate systems, they are often referred to as a single system due to their linkage by the Bellair Ridge. The case study, however, will focus on the Umbilo River System.

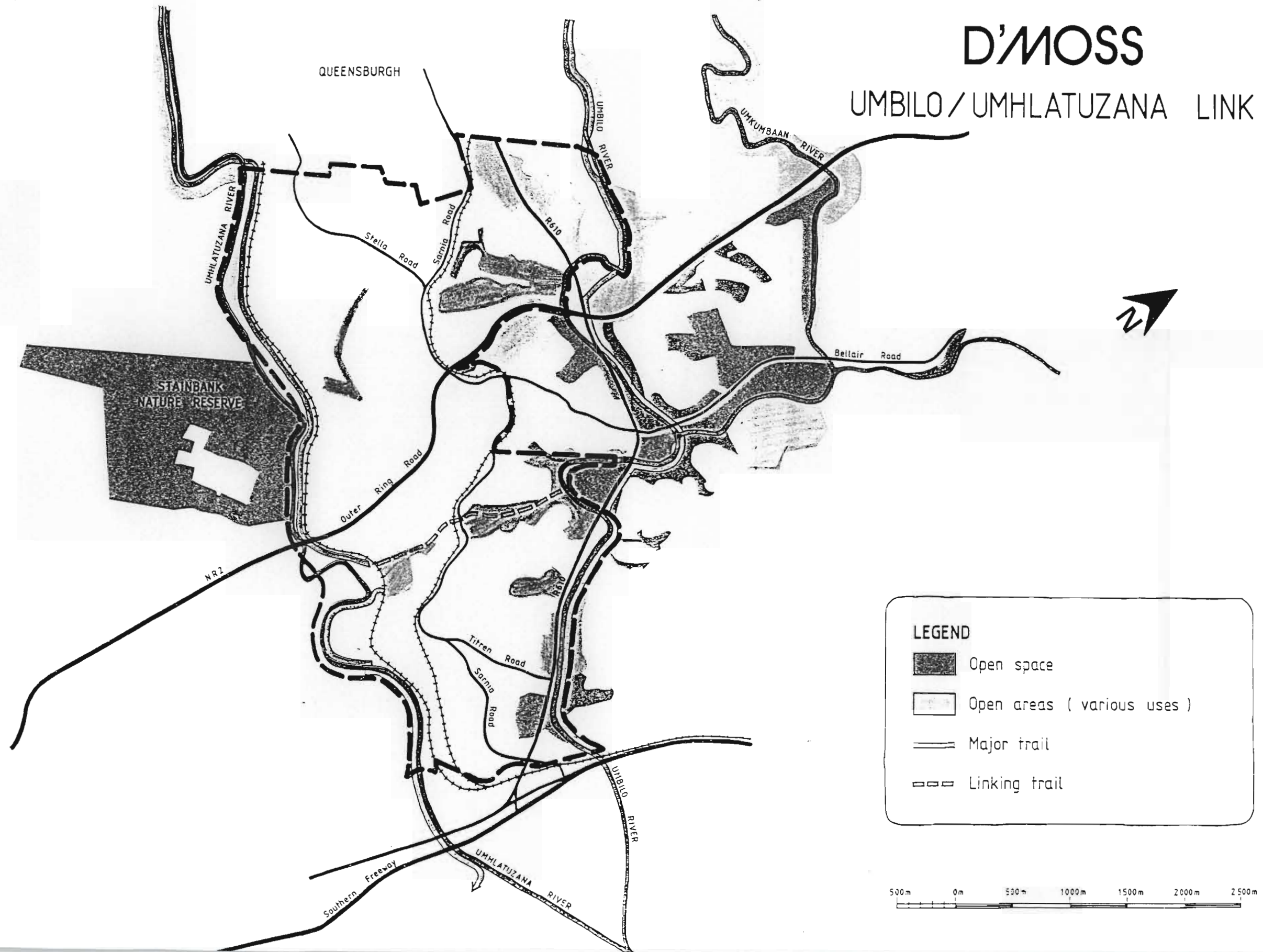
MAP 13

THE CONTEXT OF THE UMBILO SYSTEM IN RELATION TO D'MOSS



**D'MOSS**  
UMBILLO / UMHLATUZANA LINK

MAP 14: UMBILO/UMHLATAZANA RIVER SYSTEM STRUCTURE PLAN



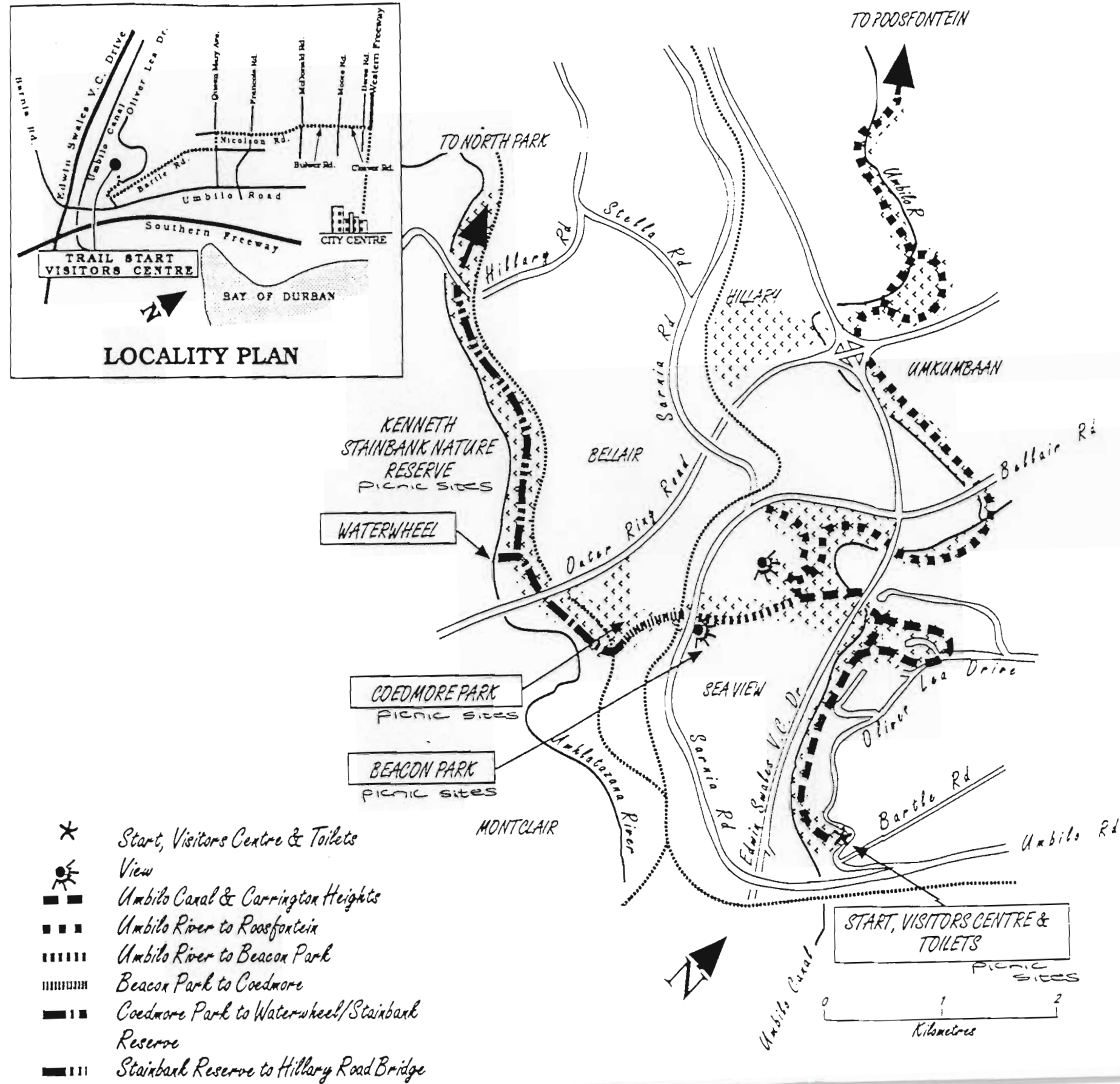
Map 14 shows the structure plan of the Umbilo/Umhlatazana System. The Umbilo River System starts at the formalized Umbilo park in Oliver Lea Drive with a trail which leads to a bend in the river below Carrington Heights. In the river bend between Carrington Heights and Bellair, the area is valued as a bird sanctuary based on the existence of a reedbed about 5 hectares in extent. At this point the Umbilo River is crossed and the trail continues up the hill to Beacon Park on Sarnia Road. Along the way another loop leads to a look out point in Bellair and to other valleys in Bellair. From Beacon Park the trail goes down the valley towards Coedmore Park before passing under the railway line and joining the Umhlatazana river valley. The path continues upstream past the Stainbank nature reserve and the Umhlatazana township to the City boundary. Beyond the boundary lie North Park Nature Reserve in Queensburgh and the nature reserve in Shallcross. Beyond that are possible connections via Pinetown to the Ingweni Trail system in Winston Park and Giba Gorge near St Heliers. The Umhlatazana System extends from Clairwood to Stainbank Nature Reserve. The total hectarage is approximately 160 hectares (Lauderdale and Oxlands, 1996, pers comm).

The Umbilo system comprises largely coastal and dune forest and to a lesser extent further up the river, bush and grasslands. In the Umbilo System the forested areas are regenerating coastal bush (Umbilo/Umhlatazana System brochure). Wetland areas occur along the lower Umbilo River, on the south bank of the Bellair trail and along the Umhlatazana River. The wetland areas are scarce in Durban and thus are of high conservation value. There are small patches of wetland and marsh at the start of the system which attract marsh loving birds, wading birds and other birds occurring in riverine thickets near the river as well as different types of water plants. The upper west side of the Bellair trail comprises a small patch of Coastal Forest and the northern valley is restored to Coastal Forest.

From the Umbilo canal to Carrington Heights there are swamp and marsh loving birds, mongoose and leguwaan. Alien plants have been cleared and pioneer trees such as the White Pear have established. From the Umbilo River to Beacon Park, the vegetation is of a secondary nature ie it is not the original flora of the area. Beacon Park itself has been formed out of a derelict site used as a dump yard. On the Umbilo River to Roosfontein stretch there are trees such as the red beech, Natal wild banana and the Cape Blackwood. A quarry of the trail has been partially screened with indigenous plants (Umbilo/Umhlatazana River Park brochure). Map 15 shows the Umbilo trail system and associated features.

MAP 15

UMBILCO SYSTEM TRAILS AND ASSOCIATED FEATURES





## 6.2 LAND ACQUISITION IN THE UMBILO RIVER PARK

The Umbilo System was selected as the pilot project for D'MOSS because most of the land was already Council owned and only required rezoning in those cases where it was not already reserved for public open space. Where land was State owned it was bought cheaply, and the 8.97% of the land that was privately owned was expropriated.

**TABLE 3**

**LAND OWNERSHIP SUMMARY FOR THE UMBILO/UMHLATAZANA PARK IN 1990**

PARK (HA)	DURBAN CITY COUNCIL	STATE	PRIVATE
	55.01	37.32	8.97







Source : Parks Department, 1990

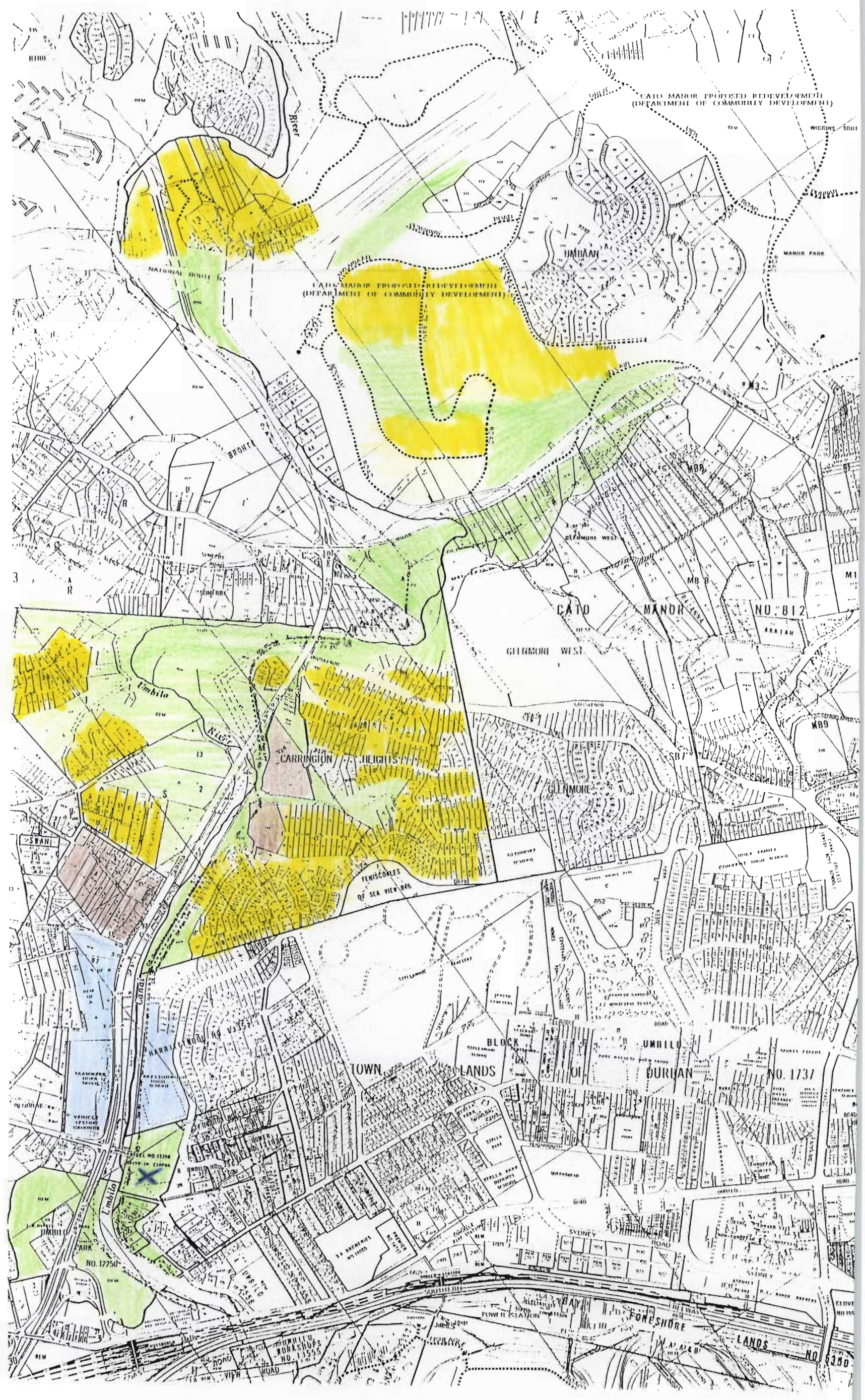
The majority of the Southern valley above the Umbilo River was undevelopable State owned land and thus purchased by the Real Estate Department at low prices for D'MOSS. The Northern valley in Bellair was privately owned but only required narrow pedestrian passageways and not purchase of properties. Further down the valley a few vacant plot were expropriated but the developable areas of the plots were sold. A large site at the head of the Umbilo valley and the the remainder of the land to the Umhlatazana River was Council owned. The financing of land acquisition occurred by selling approximately 12 hectares of surplus public open space at a market value of around R2.3 million. In addition, approximately 4.9 hectares of existing zoned open space outside the Old Line Suburbs Scheme boundary, but lying adjacent to the Umhlatazana River, was rezoned for special residential use - a nett value of R147 000. To complete the system approximately 46.3 hectares of additional land needed to be purchased at an estimated market related cost of R1 388 000 (D'MOSS Report, 1994). Thus it can be seen that the sale of surplus open space covered the costs of acquiring D'MOSS land.

MAP 16

THE UMBILO D'MOSS SYSTEM WITH ASSOCIATED LAND USE ZONES

KEY

- SPECIAL RESID 
- GEN RESID 
- EDUCATION 
- OPEN SPACE 
- OPEN AREAS 
- UMBILLO PARK 



Map 16 of the Umbilo System shows the land use zones associated with the system, with the open space depicting the D'MOSS system.

### 6.3 DEVELOPMENT OF UMBILO RIVER SYSTEM

Although development work was underway in the mid 1980's, the official development phase commenced in 1991 and according to an annual report of the Natural Areas Division, Parks Department for July 1993 - June 1994 "the Umbilo/Umhlatazana Rivers programme was more or less complete". Development was a combined effort between the Natural Areas Division and the Southern Division of Parks Department. The Umbilo Park is actually an integration of two park systems through the linkage effected by the Bellair trail which consists of 2 bridges and a boardwalk. There is a network of trails that link Blairmont Road, Jourbert Road and Louch Road to the rest of the D'MOSS System. On this network of trails 3 bridges have been constructed which facilitate the crossing of streams and dongas (Bodenstein, 1992). The Umbilo trail links the Umbilo park with Stainbank Nature Reserve - a total walking time of 3 - 4 hours. The entire system includes conservation areas, recreation opportunities and historical features such as the old watermill site in Yellowood Park. There is a formal park - Umbilo Park - at the start of the trail in Oliver Lea Drive with braai facilities and a pond. There is a pair of sports clubs integrated into the system at the Umbilo and Umhlatazana Rivers (D'MOSS Report, 1994). The Coedmore Park comprises braai sites and plenty of open space for ball games. There is also floodlighting to make the park accessible at night (Bodenstein D'MOSS Report, 1992).

The professional planning and implementation of the plan was carried out by existing horticultural staff in the Parks Department under the guidance of the D'MOSS project team. Apart from a few minor discrepancies, the design of the system was implemented according to plan (Scarr, 1996, pers comm). What was a deviation from the plan was the extent of labour used to implement the plan.

The plan advocated the use of twenty labourers who were existing staff of the Parks Department to develop the trail system. The ten most suitable labourers would then remain to develop the parks under the management of the D'MOSS project team. The Park assistant and the labourers would be housed in the Truro Road Southern Division depot as this was the nearest depot to the park. Of the maintenance team, one man would be selected to live in each river valley - Umbilo and Umhlatazana - in order to patrol and observe people/animals in non-working hours and to prevent squatters entering the valley (Parks Department, 1992). The plan also advocated the use of community participation in the development of the system as a means of reducing costs.

In reality, the Parks Department had the use of 5 environmental assistants - 2 from the Southern Division and 3 from the Central Division of Parks Department. The assistants did not live in the Truro Road depot and 2 assistants were not selected to live in the river valleys.

At present there is only 1 assistant working in the Southern Division area and 3 in the Central Division area (Lauderdale, 1996, pers comm). The environmental assistants are responsible for the clearing of alien vegetation, keeping the trails open and litter removal. The Central Division covers approximately 961 000 square metres of land and the Southern Division covers approximately 70 000 square metres. As a means of raising productivity they operate on incentive schemes whereby they are given time off in lieu of tasks completed. There is a policy of replanting trees and shrubs in conjunction with the clearing of alien plants so as to re-establish the original indigenous flora and fauna of the area. Near Edwin Swales Drive, the bush is being cleared away to make way for a greater emphasis on grasses and to allow for greater views of the path ahead (Oxlands/Davidson, 1996, pers comm).

### 6.3.1 Biogeography, Trail Building and Stormwater Management

According to Scarr (1996, pers comm) the initial development of the Umbilo System was successful in meeting the objectives of biogeography, trail building and stormwater management as expressed in the D'MOSS plan. All the land identified in the D'MOSS plan was acquired for D'MOSS. The implication of this is that biogeographically, the most viable land in that area has been incorporated into the system. Even where derelict land exists in industrial areas and in quarry sites, this land still has ecological potential for the system as a whole in terms of linkages. Where invasive plants exist in the system these can be eradicated and the area rehabilitated (Roberts, 1990). Thus despite the fact that the land constitutes regenerating coastal forest which is common in Durban, the land is still ecologically valuable.

### 6.3.2 Recreation

The objective of recreation has been less successful than the objectives of trail construction, biogeography and stormwater management. In an interview with Ross Croutch, conservation officer for Natural Areas Division of Parks Department, it was found that guided trails along the Umbilo Trail are not conducted by the Parks Department. The organization of guided trails is meant to be the prerogative of the area managers. However, in interviews with the area managers it appeared that they felt it was the responsibility of the conservation officers. Telephonic interviews revealed that the Wildlife Society do not conduct trails along the trail and the Ramblers Hiking Club only conduct walks twice yearly along the trail.

The recreational use of an open space system is dependent on the location and layout of that system.

For example, the formal Umbilo Park in Oliver Lea Drive is used by the public on weekends because it is open and visible, easily accessible from the road, has parking facilities and there are public ablutions. It meets the requirements of Schlemmer, 1977 (in Nicolson, 1988) of being easily accessible, contains features that promote recreation, namely the pond, benches and braai areas and provides a pleasant background, despite the pylons in the park and the noisy road adjacent to the park.

However, participation with respect to recreational use of the park and trails is not being monitored by the Town Planning Department as advocated in the plan (see 4.3.5) and there is no visitors book or permanent area supervisor to monitor the trail use. The trail section in the area from Oliver Lea Drive is more popular than the second section of the trail because it is accessible to the road and trail-users feel safer on this stretch. Linton Lauderdale noted that he had observed a few people using the trail for recreation, however, most of the trail use was for thoroughfare purposes from Umbilo park to Edwin Swales Drive. The trail from Edwin Swales Drive up to Coedmore Park is far from the road and leads deep into the bush where overgrown bush obscures the trail-user and allows creates conditions conducive to muggings (Lauderdale, 1996, pers comm). Mike Oxlands, area manager for this section of the trail noted that he had not seen anyone using the trail for recreation on weekdays while he was working on the trail. There had only been a few people using the trail for thoroughfare purposes. The overgrown and inaccessible trail section facilitates the establishment of squatter settlements and the area managers have had to inform the Security Department of the Central Council to evict squatters from the trail (Lauderdale and Oxlands, 1996, pers comm).

It is the perception of danger that obstructs the use of these trails by individuals and in turn reduces the popularity of the D'MOSS system. Public support for D'MOSS hinges on what the public get out of it (Oxlands and Lauderdale, 1996, pers comm).

It would be more popular as a trail if the grass was kept short and there was a greater degree of bush clearance to make the trail more open and visible. According to Oxlands, the shortage of labour is problematic in this respect.

### **6.3.3 Community participation**

Parks Department reports show that the first few years of development were successful in terms of putting the plan into action. The initial development of The Umbilo Park System was aided by groups of school children and conservation/horticulture students with respect to the cutting of trails and removal of alien plants. Parks Department reports show that on Arbour Day, August 1992, 100 trees were planted at Umbilo Park utilizing all the resources of the Natural Areas Division including the students, while 12 trees were planted at Coedmore Quarry. An annual report for Natural Areas Division July 1993 - June 1994 points out that the water lettuce and other vegetation had been brought under control at the Umbilo ponds.

Community participation in the on-going maintenance of the trail system is non-existent (Lauderdale and Oxlands, 1996, pers comm). The area managers see the responsibility for initiating community participation as lying with the conservation officers, while the conservation officers see the responsibility as being that of the area managers.

### **6.3.4 Education**

The visitor centre at Umbilo Park was constructed as planned and was initially used as a resource centre. In October 1992 the visitor centre was reported as being "a hive of activity as it is constantly snatched up for meetings, planning sessions, conferences and party functions" (Bodenstein, 1992). In the first few years of development, the Umbilo Park did get a lot of media attention (eg. Durban Focus, March 1986 and July 1991) and there have been trail guides published (appendix 2).

However, the visitor centre is no longer used for educational lectures, meetings and conferences, despite the fact that it can hold 30 people. It houses displays of reptiles and birds and charts of butterflies, snakes, invasive plants and the Umbilo structure plan. There are chairs supplied. It is hired out to the public for party functions as it has a kitchen and toilets. The centre, although open during the day, is not supervised by a Parks Department employee as was advocated in the Umbilo Park plan. It is shown in table 5 that the projected costs allowed for an employee at the visitors centre. The visitor centre is no longer used for educational purposes largely due to the resignation of Geoff Nichols and Johan Bodenstein. These former conservation officers of Parks Department were responsible for co-ordinating school groups to use the centre. Under the former system the conservation officers had the portfolio of educating the public with respect to all D'MOSS areas. Once D'MOSS was divided into areas with area managers, the area managers assumed the role previously played by the conservation officer, in their area. The conservationists, Ross Croutch and Julien Kringer, headed by Danny Lanferno, belong to the Natural Areas Division of Parks Department and are responsible for core areas such as Burman Bush and Silverglen, but not Umbilo Park. Thus the education programmes conducted by the conservationists do not include Umbilo Park.

A telephonic interview with Mr Heron of Brettonwood High School revealed that teachers do not use the system for fieldwork purposes, despite the fact that the system meets most of Nicolson's criteria for education purposes (see 4.3.3). This is because fieldwork is not included in the syllabus and it is an effort to organize trips. This coincides with the survey done by Christian (1988) as shown in the literary review.



The Parks Department conservation officer, Danny Lanferno, is working in conjunction with the Environmental Office, a branch of the KwaZulu-Natal Education Department, in order to get environmental education incorporated into the school syllabus (Croutch, 1996, pers comm).

#### 6.3.5 Financing

The financing of development came out of the Parks Department operating budget. Although there was a budget specifically allocated to the Umbilo/Umhlatazana Park, in the years 1990 -1992 funds came largely out of the Southern Coastal Park budget. Table 4 shows the capital estimate for the two Parks during the development phase of the Umbilo/Umhlatazana Park. The financial tables displayed in this section are the only financial records available from the Accounts Division of Parks Department.

**TABLE 4**  
**ESTIMATED CAPITAL EXPENDITURE**

PARK	YEAR	ESTIMATED CAPITAL EXPENDITURE (RANDS)
Umbilo	1988/1989	30 000
Umbilo	1989/1990	50 000
Umbilo	1990/1991	No estimate given
Southern Coastal	1990/1991	1 000 000
Southern Coastal	1991/1992	1 200 000

Source : Parks Department; Capital Estimate file for the years 1988 - 1992 : Accounts Department

The capital estimates have been included as a base for comparing the actual annual expenditure. The projected costs are shown in table 5 to compare the annual costs to the budget allocated.

**TABLE 5****UMBILO/UMHLATAZANA SYSTEM PROJECTED DEVELOPMENT COSTS**

Development Task	cost
Surface Preparation and grassing st R 5,70/sq metre	140 000
Post and rail fencing	52 000
Removal of alien/bush vegetation	125 000
Irrigation, groundtaps and water meters	50 000
50 braais at R 800 each	40 000
Excavation of proposed lakes	250 000
Waterproofing of lakes	250 000
Material for signage	6 000
cutter for signage	14 000
Bridges, entrances, signage stands, kerbing etc	250 000
Car parks : Coedmore (2) Umbilo (0.5)	95 000
Electrical department - special feature lighting	50 000

<u>Labour costs :</u>	
Park assistant	34 007
20 labourers at R14 669 ea	293 380
employee at Umbilo Park education centre	R 8,09 x 20 hrs/week
temporary core of 8 people	7 767
chief clerk 2	31 050
charges, uniforms, transport,	50 000
one-tonne truck	65 000
Fencing at R20/metre x 10km	200 000
Publicity brochures and display material	30 000
Landscaping and trees, compost, topsoil	80 000
<b>TOTAL</b>	<b>2 113 204</b>

Source : Parks Department; D'MOSS Project Schedule and Costs, 1991.

The capital estimate of R 2 113 204 ties in favourably with the capital budget for 1991/1992 - the main development phases.

The development costs of the Umbilo River System are displayed in table 6 for the period July 1991 - November 1991 as an indication of the development expenditure over a 5 month period. The expenditure on the Umbilo River System came out of the budget allocated to Southern Coastal Park. Under the new substructure system budgets cannot be transferred as was the case in 1991/1992. Although the table does not show a comprehensive list of all the costs associated with the development of the System, it does give an indication of how the estimated costs compare with the actual costs.

**TABLE 6****ESTIMATED AND ACTUAL COSTS OF DEVELOPMENT IN UMBILO/UMHLATAZANA PARK**

<b>DEVELOPMENT TASK</b>	<b>ESTIMATED COST (Rands)</b>	<b>ACTUAL COST (Rands)</b>
Feasibility Study to construct water retaining features at Umbilo/Coedmore	12 000	12 797,14
Design of Parking area at Coedmore, Beacon and Umbilo Parks		25 963,33
Ground taps for Umbilo Park	6 124	5 609,33
Water meter connections at Umbilo Park and Beacon Park	30 000	30 000
Car park and access road at Coedmore Park	145 000	149 621,27
Excavation of lake at Coedmore Park	50 000	58 233, 53
Construction of weir at Coedmore Park	25 000	22 062,93
Excavation of lake (phase 1) at Umbilo Park	50 000	47 884,98
Park entrance to Umbilo Park	12 540	17 712

Removal of alien vegetation at Coedmore and Umbilo Parks and the Portuguese Hall site	150 000	142 598,90
5 concrete braai units for Umbilo Park	3 300	3 300
5 concrete picnic tables	3 630	3 630
Manufacture and installation of 7 timber frames and signboards for Umbilo and Coedmore parks	10 919	10 918,60
260 cubed metres of compost for Beacon Par	13 000	13 187,02
Post/rail/fencing for Umbilo Park	16 835	16 824,96

Source : Parks Department - Accounts Department Ref. 59. 620.07

CA 6511 1991/1992

#### 6.4 MANAGEMENT OF UMBILO RIVER SYSTEM

The metropolitan region of Durban comprises six substructures made up of 48 Local Authorities, in addition to which is a Metropolitan Council which co-ordinates local government in the metropolitan region. The Parks Department is responsible for the management of D'MOSS. The Parks Department has jurisdiction over areas of the North and South Central substructures which were previously the Durban Municipal area. The Durban Municipal Area is being extended to include the area included in both substructures.

The Umbilo River System is divided into 2 management areas, each with an area manager. One area is managed by Mike Oxlands and the other area is managed by Linton Lauderdale.

The Parks Department has a substructure function/metro function and has the function of implementing conservation policies. The Parks Department is responsible for the implementing the development of D'MOSS and for the on-going maintenance after development is completed. Policy-making is a function of the Metropolitan Council and development proposals for D'MOSS are approved by the Metropolitan Council.

The management structure of D'MOSS under the newly formed Durban Metropolitan Council and the Local Councils that fall within it, is unclear. The mandatory role of the Metropolitan Council is to formulate the environmental policy pertaining to the metropolitan region while the local councils are meant to put that policy into practise. In reality, the Local Councils have little effective power over environmental concerns in their substructures. Although the literature points to the advantages of environmental education programmes within a council, there has been no formal education programmes for council members charged with making decisions affecting the environment (Roberts, 1996, pers comm).

As the Metropolitan Council is still in a stage of transition, the ultimate structure and staffing has yet to be decided, Whether the present staff at the Environmental department of the Physical Environment Unit of the former Durban City Council will become the new Metropolitan department or whether there will be a new staff is still undecided. At present the former Durban City Council Environmental department performs a metropolitan role (Roberts, 1996, pers comm).

Since the inception of D'MOSS new Councillors have been voted in periodically and each time D'MOSS needs to be justified to the new Councillors. Nichols (1993) alludes to this problem in a D'MOSS report. This is the case with the new Councillors voted in during the 1996 Local Council elections. On the 15 December 1995 the Central Executive Committee of the Durban City Council approved the names of 3 councillors for the Steering Committee. It was only in early May that those names were received by the Parks Department with a suggestion to review the representation of the Committee. The review and the acceptance of the Committee by the Metropolitan Council's Town Clerk's Department is still pending as of August 1996 (Scarr, pers comm). Although the Steering Committee only assumed a watchdog role, it acted as a guiding force to ensure that the policies of D'MOSS were implemented. Since its disbandment there has been no unified committee to watch over the interests of D'MOSS with the result that D'MOSS has taken a backseat to the self-interest of Local Councils.

Management problems were alluded to in a September 1993 monthly report in which Geoff Nichols is reported as having attended 2 meetings to try and "get the implementation back on track" (Parks Department file, source unknown). Each time a new Council is voted in the Council Steering Committee representatives must be re-elected. The Steering Committee established in 1990 last convened in 1994. The Steering Committee members did not perform the functions they were elected to perform (Roberts, 1996, pers comm).



When the new Steering Committee is elected it will need to redefine its role in managing D'MOSS.

From a conservationist perspective, a problem with management seems to be a lack of motivation on the part of area managers more interested in the horticultural aspects of open space management. The interests of D'MOSS tend to be subsumed in the power struggles within and between departments implementing D'MOSS (Croutch, 1996, pers comm).

On the maintenance side, a common problem for both area managers in the Umbilo/Umhlatazana System is the shortage of labour. Since the resignation of one environmental assistant in the Southern Division there has been no replacement. The ability of one assistant to keep up with the rate of alien plant regrowth is limited. Similarly, the 3 assistants in the Central Division are also limited in their ability to maintain 96 hectares of bush as well as the formal park in Oliver Lea Drive which requires more maintenance tasks.

Another problem for the area managers is the squatters that invade D'MOSS land. The trail in area 2 runs directly through a community of squatters next to Coedmore Park. It is difficult to move the squatters and the rate of growth of these settlements is enormous (Lauderdale, 1996, pers comm).

The main problem with the management of D'MOSS is the lack of finances and resources. A hindrance to the maintenance of D'MOSS is the low operating budget available from the Metropolitan Council. The budget is R 1 500 000 per year. At present there is R 3 000 000 in the Parks Department account. The budget for D'MOSS is R 700 000 of which R 450 000 is being spent on the Southern Coastal Parks development project (Scarr, 1996, pers comm). In order to receive funds the area managers must submit a motivation for the funding to the Central Council. If the motivation is approved, the funds are given over to parks Department.

In previous years, Trevor Coleman, in his capacity as Manager of Special Services for Parks Department, administered the budget available to D'MOSS. He acted as a go-between the Council and the area managers in order to prioritise the funding applications that were sent to Council for approval. Since his retirement he has not been replaced and thus applications for funds go directly to Council members who have no knowledge of the D'MOSS area or its needs. Approval of funds based on this system is inadequate for the making of environmentally beneficial decisions. With a Parks Department budget cut of R 30 million for the year 1996/1997 and the freezing of positions (Lauderdale, 1996, pers comm), the opportunities to rectify these problems are few.

After looking at the role played by Dr Debra Roberts, Trevor Coleman, Geoff Nichols and Johan Bodenstein, it seems that the initial success of D'MOSS has been based largely on the input of these few people. In the absence of the latter three people, the impacts on the D'MOSS system have been noticeable. In terms of the marketing of D'MOSS and the active participation of the community there has been a noticeable decline since the resignation of Nichols and Bodenstein. As all the research on which D'MOSS is based, was carried out largely by one person - Dr Roberts - there is the possibility that her resignation would have irreparable damage on D'MOSS. In the face of competing development issues that are high on the agenda of Councillors, there is an urgent need for enthusiastic and environmentally educated employees in the Metropolitan Council to motivate for the continuation of D'MOSS and market it to the public in order to gain public support.

## 6.5 SUMMARY

The case study of the Umbilo River System is an example of a park system which is established. It has demonstrated the processes involved in the development, maintenance and management of D'MOSS.

The land identified for the system was easily acquired as it was largely Council and State owned and in the case of the latter, purchased at low cost. The development of the trail has been successful in terms of trail establishment and the development of recreational areas. The problem is a lack of use of the recreational areas and the trails. The management of the system is impeded by the lack of manpower and financing.

It is the aim of the following chapter to summarise the findings of the case studies.

## CHAPTER 7

### 7.0 RESEARCH FINDINGS

In looking back at the goal of D'MOSS to achieve a multi-use, ecologically viable open space system linking up one part of the city with another and forming part of Durban's structure plan, it has been found that this goal has not altogether been achieved. The reasons for this may be found in the processes of land acquisition, development and management.

#### 7.1 Land Acquisition

What is most striking when comparing the D'MOSS plan to what has happened on the ground, is that six years since the official launch of D'MOSS in December 1990, the project is far from complete. The estimated implementation period of five years has been delayed to a large extent by problems encountered in acquiring land for D'MOSS. In the case of Umgeni System, properties are not being acquired due to a lack of finances to purchase highly valued land. The main problems are the delays incurred in selling off surplus open space outside D'MOSS which in turn restricts the funds available to purchase open space for D'MOSS. The delays incurred in the procedures of Expropriation and Private Treaty also impede the purchasing of land. In this way, the goal of an integrated, coherent system that links different parts of the city has been obstructed.

The North bank case study area comprises ecologically viable grassland areas and steep topography conducive to the formation of an open space system. However, the high value of the land and the competing land use claims restrict the opportunities to purchase this land. If part of the land is conceded to other land uses, and part is acquired for D'MOSS it will still be possible to link up the D'MOSS system. In the South Bank case study area, where non-acquired properties break the linkage of the system, this is detrimental to D'MOSS (map 12).

Where properties have not been acquired it is usually because the value of that property is too high or the landowner is unwilling to sell.

Land acquisition occurred successfully in Umbilo System because land was largely Council owned and did not need to be purchased or State owned and purchased cheaply. The implications of this is that the system was developed according to the biogeographic principles of the plan and development could be implemented quickly as the land had been acquired.

D'MOSS has been self-financing in terms of the original aim but the continuation of this process looks dubious in the face of a slow market for the sale of surplus open space and the threat of greater delays caused by the Town Planning Commission's request for rationalization of every open space sale that goes through.

With respect to the Umgeni case study area, not all the land identified for D'MOSS is zoned as open space on the relevant Town Planning Schemes. This puts in jeopardy the security future of D'MOSS in the city.

## **7.2 Development of D'MOSS**

Although planned as a multi-use system fulfilling the needs of recreation, conservation, education, stormwater management and community participation, the actual implementation of some of these objectives has not been totally fulfilled.

In the case of the Umbilo trail, it appears to be used more as a thoroughfare than for recreational purposes. There are no organized trails along the route led by the Parks Department and the Ramblers Hiking Club only lead trails twice yearly.

Although the Umbilo trail was well advertised when it was first established (eg Durban Focus, July 1991, No.27), advertising has been minimal in the last few years.

However, I believe that the lack of advertising is not the main problem. The main deterrent for trail users is the lack of safety. During an enquiry regarding the use of the Umbilo Trail I was warned by the Parks Department secretary not to walk along the Umbilo trail alone. Unless there are guided trails, people are loathe to use the trail for fear of safety. Observations by the area managers of the system and by myself noted that few people use the trail which seems to substantiate the statement about safety.

Environmental education of the public about D'MOSS trails is reserved for those core areas under the management of Natural Areas Division, such as Burman Bush. School teachers do not use the Umbilo System for fieldwork even though the open space is in close proximity to the school. This is largely because fieldwork is not part of the syllabus.

Although community participation was active in the initial development of the Umbilo System, there is minimal community participation in the maintenance of the system. This is because community participation is not being initiated rather than the lack of co-operation from the community. The community participation and education aspects of D'MOSS have in the past been based, to its detriment, on the expertise and enthusiasm of a few individuals. 'Capacity without structure' is what I would call it. When the capacity was removed, there was no structure to continue the projects.

Stormwater management is being achieved, except in areas where the shortage of funds prevents repair of damaged dam walls, such as Coedmore Park. River protection is also successful in that D'MOSS utilizes the 1:50 floodline and no development can occur next to a river.

? Pipeline

The objective of visual amenity is difficult to assess because it depends on the perspective of the person viewing the system. However, in terms of making use of the special features of an area, such as ridges, the Umbilo trail does this in its utilization of the viewpoint at Beacon park.

### 7.3 Management of D'MOSS

The management structure of D'MOSS in the form of the Steering Committee has been non-existent since the last committee meeting in 1994. The implications of this is that there has been no guiding force and watchdog for D'MOSS in the last couple of years.

The future of D'MOSS is threatened further, when Council members who have no formal environmental education, are held responsible for approving or disproving D'MOSS applications. Botkin and Keller ( 1995) have pointed out the importance of using scientific concepts in management and this is only achieved through environmental education.

The present uncertainty in the Metropolitan and Local Councils makes it difficult to ascertain the future of D'MOSS. What is certain is that D'MOSS is not advocated as a priority issue in the new South Africa. Although lip service is given to the importance of open space, hard-core support in the form of a significant budget has not been forthcoming. The fact that the Parks Department was rated as the tenth most important department in the Council (Oxlands, 1996, pers comm) is an indication of its place in the new South Africa. The lack of funds and the shortage of manpower facing D'MOSS are symptomatic of a deeper issue on the agendas of the new Metropolitan and Local Councils. The issue at stake is the reallocation of Council funds to development projects outside the ambit of open space planning. In conjunction with this, financial cut-backs in non-priority departments result in a shortage of manpower in these departments.

D'MOSS has succeeded in meeting the broader aim of urban metropolitan planning which is to regard the city as an ecosystem. In the Umbilo River Park the necessary linkages are in place that allow the open space system to function as an ecosystem and provide the city with the vegetation it requires to function effectively in accordance with the literature in section 3.4. The concept of D'MOSS is particularly relevant in a city such as Durban where open spaces are in danger of being swallowed up by the new Metropolitan Council for housing projects.

At the level of area managers, the management techniques proposed by Nichols have been implemented and alien plant removal is well underway. The problems are a lack of funding, a lack of manpower and poorly defined job descriptions. At a higher management level, that of Metropolitan Council, the problem is a lack of environmental knowledge. If environmental concerns and their relevance to city planning were better understood, then D'MOSS would find itself at the top of the political agenda where it belongs.



## CHAPTER 8

### **8.0 RECOMMENDATIONS**

The recommendations of this study are aimed at reviewing possible amendments to the D'MOSS plan as well as providing a springboard for future research. The case studies dealt with in chapters 5 and 6 are a pilot project in terms of identifying the problems inherent in D'MOSS and the recommendations apply specifically to the systems studied. As each D'MOSS system is characterised by factors which are unique to that system, it is recommended that systems should be reviewed on an individual basis within the framework of the entire D'MOSS system.

#### **1. Rationalize the Acquisition Process of the D'MOSS Plan**

The D'MOSS plan needs to be rationalized in the light of the problems summarised in chapter 7. Where prohibitive land values impede acquisition and where alternative land-uses threaten the long term feasibility of acquiring certain land, this land should be reassessed in terms of its value to D'MOSS. The Theory of Island Biogeography is the basis against which to evaluate the importance of the land within D'MOSS. D'MOSS land needs to be reassessed in terms of its cost and the ease with which it can be acquired and the impact that non-acquisition would have on the linkages in the system. In the case of the North Bank case study area, the land value of R 1 300 000 is an impediment to the acquisition of this land by the City Estates Department. (see map 7). As the property is around 139,55 hectares and the net developable area is almost 46 hectares it seems that the developable area should be given up to developers while the areas less suited to development should be retained for D'MOSS (see map 10).

Although the biological value of this land is important in terms of the resident species, the compromise of some of this land to development need not break the linkages of the system vital to conservation.

In the Umgeni South case study area there are isolated plots that can be compromised without breaking the linkages. Plots D and E shown on map 12 are the plots which can be compromised without breaking the connectivity, although the reduced size and altered shape will have adverse effects of the ecological viability of the area. The sooner the land is acquired, the sooner the park system can be developed.

## **2. Modification of the Objectives**

In light of the Findings of this research it seems that some of the objectives need to be modified in certain areas.

The functions of recreation and trail systems need to be re-evaluated in terms of their value to a particular system. In the case of the Umbilo System, the trail systems are not contributing to the success of the system. It is recommended that the section of the Umbilo trail from Beacon Park to Stainbank be eliminated and allowed to grow over with indigenous grassland and bush. As there is a squatter community inbetween Coedmore park and the waterwheel, this section of the trail is hardly used. Eliminating this section would also reduce the task of maintaining a trail which is hardly used. The formal park in Oliver Lea Drive and the trail section leading up to Beacon Park should be maintained. There should be guided walks along this trail, led by the conservation officers as people are sceptical of walking the trail alone. The turnout to the guided trail would give an indication of the popularity of the trail and the Steering Committee could then decide whether to maintain the trail section or allow it to become a natural area. In this way the objective of recreation and trail use would be compromised for a greater emphasis on conservation.

This is in line with the environmental trend of 'preserving nature for its own sake' (see 3.3). As the objective of conservation has been the most successfully achieved, it should be emphasised.

It has been stated in section 3.5.3 that without the inclusion of people's needs in an open space system it cannot be successful. This means that people must be made to realize that conservation of open space is one of their basic needs. In accordance with this, it is recommended that increased education of the public can resolve this. Education can be achieved in a cost-effective manner within budget constraints and thus it promotes the financial feasibility of D'MOSS. Educating the public on D'MOSS should be done largely through school visits by the conservation officers of the Parks Department. The cost of a school visit is minimal and the target group is receptive to hearing about D'MOSS. Danny Lanferno should be the man behind a lobbying force for the inclusion of environmental education in the formal school syllabus.

Education should coincide with a redefining of the roles of those people involved in D'MOSS by the Parks Department. There has been a lot of restructuring within the Parks Department over the last couple of years and there seems to be a lack of clarity as to who is responsible for what (Croutch, 1996, pers comm).

In accordance with the redefining of roles, the objective of community participation should become the portfolio of the area managers. Individual area managers are the people most suited to understanding where the community can be of use in maintaining the system. Community participation should be initiated through the channels of the Wildlife Society and other conservation societies.

### **3. Greater Emphasis on Marketing**

Guided trails along the Umbilo Trail from Umbilo park to Beacon park need to be advertised in the 'What's On' section of the Sunday Tribune as well as in environment-centred magazines. Hiking clubs and conservation related societies should be approached and encouraged to use the trail. Promotion of the trail system requires time rather than money, and should constitute a large part of the D'MOSS agenda.

D'MOSS needs to market itself to the Metropolitan Council. Debra Roberts needs to approach the Metropolitan Councillors and give a presentation on what D'MOSS is and why it is fundamental to the effective functioning of Metropolitan Durban. Without educating the Councillors on D'MOSS, the concept cannot expect to gain Council support.

### **4. Enhance the Economic Functions of Open Space**

D'MOSS needs to recognize that while indigenized open spaces serving purely conservation functions are important in a city, open spaces that do not serve economic functions may be seen to lack a meaningful place in the city. With a high priority on housing and job creation it seems more appropriate to have open space serving an income-generating function. An example of this is urban agriculture and medicinal plants. Cultivation could be undertaken in the powerline and pipeline servitudes as well as adjacent to conservation corridors alongside rivers as these areas are usually suitably level and thus maintenance costs incurred in the clearance of overgrown servitudes and streams would be reduced.

It is necessary that cultivation is concentrated into nodes of activity so that the naturalized watercourses retain their flood attenuation properties and continue to function as conservation and dispersal corridors for indigenous plants and animals. With market gardening, human waste, like sludge, could be used in a composting operation. The skills learned from the gardening activity could help provide not only food, but extra income by selling the surplus produce to the people. Once again, Parks Department employees need to be given the function of co-ordinating a city-wide campaign to implement such a scheme. Although this dissertation has not dealt with these aspects of D'MOSS they have an important role to play and it is recommended that this be an area of further research.

#### **5. Management of D'MOSS**

In terms of management, the Parks Department needs to co-ordinate management meetings between the roleplayers in D'MOSS so that all the departments know what one another are doing. It is recommended that the Steering Committee be reformed as soon as possible and that their functions be redefined. The Committee needs to assume a watchdog role to oversee that surplus open space is being sold off. Regular meetings need to be held with the real Estate, land Transactions and town Planning department in order to keep abreast of current developments regarding proposed D'MOSS land. Any initiative needs a powerful guiding force to steer it towards the meeting of goals and objectives. The Steering Committee, once formed, needs to enforce a division of labour whereby different people are responsible for aspects of D'MOSS according to their level of expertise. For example, a sub-committee should form to take on the role of education.

The management of D'MOSS should also be the responsibility of the public. By this I am referring to homeowners, especially those adjacent to D'MOSS, who should be educated on how to maintain their private gardens so as to promote ecological diversity.

The accomplishment of this would increase the ecological viability of the entire system as homeowners take an active role in looking after the environment right on their doorstep. This plan should be devised by the Steering Committee and implemented by the Parks Department conservation officers in conjunction with the Steering Committee.

#### **6. Financing the D'MOSS Plan**

In the face of immense budget cuts, the Parks Department should be spending money on the systems that the public want to visit. Develop multi-use systems conducive to recreation and trail use where it is appropriate and reserve the other systems purely for conservation purposes or for urban agriculture. It is necessary to look at what works on the ground and adapt the D'MOSS plan to the relative conditions.

In this way not all the D'MOSS park systems will be multi-use systems, but rather optimum use will be made of their relative strengths. In South Africa's economic climate, it will be the financial feasibility of D'MOSS that will enable D'MOSS to survive and should thus be borne in mind at all times.

## CHAPTER 9

### 9.0 CONCLUSION

The goal of this dissertation was to ascertain to what extent the implementation of D'MOSS has fulfilled the goals and objectives of the D'MOSS plan and to identify the problems encountered in acquiring, developing and managing D'MOSS land. Chapter 7 has summarized the findings and it can be concluded that the D'MOSS goal has only been partially achieved. Although the D'MOSS plan advocated that after 5 years it would be possible to walk from one end of the city to another, this is far from realization. The main obstacles to this fulfilment have been the processes of land acquisition and management of D'MOSS. In terms of fulfilling its objectives, D'MOSS has been successful in terms of biodiversity, stormwater management and river protection. The recreation, education and community participation aspects of D'MOSS have been less successful due to a lack of marketing and the perception that the trails are unsafe.

In accordance with these findings, the research hypothesis can be proved correct - the problems of D'MOSS are related largely to land acquisition and management. While the findings show the hypothesis to be true, it must be noted that issues of land acquisition, development and maintenance of D'MOSS are largely context-specific. Although there are common problems pertaining to all D'MOSS areas, research findings in one system may not correlate with findings in another D'MOSS area.

The future of D'MOSS looks uncertain. Unless Local Agenda 21 and metropolitan open space planning are recognized by the new Metropolitan Council as priority development issues in metropolitan Durban, there is a possibility that D'MOSS may come off the tracks. Open space planning in South Africa has always met with resistance from communities who regard open space planning as elitist - designed by a select few for a select few (Kahn, in MOSS Report, 1994).

Council officials regard housing development as more urgent than, and in conflict with, open space needs. It is likely to be a difficult task to convince the new Metropolitan Council, in light of its policy on housing development and township upgrading, that D'MOSS should be a priority development issue in the metropolitan region. However, a reconstructed Steering Committee could be the saving grace of D'MOSS if it puts into practice the tasks of acting as watchdog and marketing D'MOSS to the Council in order to gain more funds.

Although D'MOSS has sought to further the aims of sustainable development by integrating the needs of the physical and human components of the environment through the multi-use approach, there is still unexploited potential. Such potential finds expression in the form of urban agriculture and medicinal herbs. D'MOSS can bring economic benefits to the city if these avenues are further researched and implemented.

The hilly topography of Durban lends itself to the implementation of an open space concept. As Durban is characterised by hilly land it has a large proportion of unusable land which is conducive to fulfilling the aims of D'MOSS. The open space in the D'MOSS areas studied have the potential to increase biodiversity for conservation purposes. While Durban has the ecological potential for a viable open space system, what is lacking is an environmental ethic to promote the D'MOSS concept. The lack of community participation in D'MOSS hinders its acceptance by the community and hinders the aims town planning to 'bring planning to the people'.

Although the conservation value of D'MOSS promotes sustainable development and the optimum functioning of the city, the plan needs to be rationalized in order to make it workable on the ground. In conjunction with this rationalization, there needs to be a comprehensive presentation of D'MOSS to the Central Council and an intensive awareness campaign to the public in order to gain support for D'MOSS and get the wheels set back in motion.



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	PROPERTY	EXTENT	PURCHASE PRICE (R)
1	PORTION OF LOT 3525 RESERVOIR HILLS	1320	2700
2	" " " 2983	2,3900	28100
3	" " " 2985	1,2500	16980
4	" " " 2986	5078	7160
5	" " " 2991	3561	4900
6	" " " 2992	7138	11560
7	" " " 2995	3430	6290
8	" " " 2984	2,1800	22670
9	" " " 2982	8262	11500
10	" " " 2953	6345	7590
11	" " " 2952	6395	7670
12	" " " 2956	2650	9020
13	" " " 3141	9300	19580
14	" " " 3147	9800	57200
15	" " " 3260	1,1400	
16	" " " 3151	8920	12505
17	" " " 3275	3800	4560
18	" " " 3161	2,4900	28550
19	" " " 3445	1500	2115
20	" " " 3446	3720	4570
21	" " " 3466	5660	6900
22	" " " 3465	172	790
23	" " " 2951	240	920
24	" " " 3593	4510	5500
25	" " " 3598	28	535
26	" " " 3597	429	1210
27	" " " 3594	2626	3415
28	" " " 3595	1740	2405
29	" " " 3596	970	1595
30	" " " 3099	1,2800	31710
31	" " " 3098	1,5900	40500
32	" " " 3102	1,4500	35530
33	" " " 3135	1,6200	49960
34	" " " 3139	8660	
35	" " " 3524	1431	2910
36	" " " 3895	1401	2800
37	" " " 3894	1496	2975
38	" " " 3591	6506	7640
39	" " " 3589	5826	6925
40	" " " 3532	1789	3470
41	" " " 3531	6363	7600
42	" " " 3528	1333	2700
43	" " " 2875	1,5000	17130
44	" " " 3527	1346	2690
45	" " " 3452	5330	6515
46	" " " 2451	3740	4685
47	" " " 3450	4300	5290
48	" " " 3449	4536	5575
49	" " " 3448	6770	8040
50	" " " 3592	5252	6425

PROPERTY

51	PORTION OF LOT	3062	RESERVOIR HILLS
52	"	"	"
53	"	"	"
54	"	"	"
55	"	"	"
56	"	"	"
57	"	"	"

<u>EXTENT</u>	<u>PURCHASE PRICE (R)</u>
4346	5330
262	975
6512	7715
1552	3075
1,7000	19360
1222	2545
2,2160	109467
38,4657	2688,027
HA	



APPENDIX 2

Continuing up the valley towards Sarnia Road the vegetation improves and trees like the red beech (*Protorhus longifolia*), Natal wild banana (*Strelitzia nicolai*) and the Cape blackwood (*Maytenus peduncularis*) begin to be quite common. Birds here are the tambourine dove, sombre bulbul, buffspotted flufftail and the Natal robin.

**BEACON PARK TO COEDEMORE PARK**  
(1.5 km) - 20 minutes

Cross Sarnia Road and follow the trail to Coedmore Park on the banks of the London Spruit where there are picnic sites, playgrounds and a sports field.

**POINTS OF INTEREST:**

From the look-out point at Beacon Park there is a view across two valleys, to the north, towards the Umbilo River, and to the south, the Umhlatuzana River valley, which the trail follows. Beacon Park, which up until June 1991, was a derelict piece of land used as the local dump site, has been transformed into a formal park area for picnicking as well as a semi-natural area with a pond which attracts birds such as the hamerkop, woollynecked stork as well as the occasional grey heron. Crossing Sarnia Road at the traffic lights, turn first left after the intersection and walk down a steep bank along the pipeline servitude to the Coedmore Park picnic area. Due to the servitude being only six metres wide the natural flora and fauna is not that abundant.



Collared Sunbird  
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**COEDEMORE PARK TO THE WATERWHEEL/STAINBANK RESERVE**  
(1.5 km) - 30 minutes

To get to the waterwheel on the Umhlatuzana River cross the London Spruit and follow the markers to the railway underpass. (which looks like an entrance to a tunnel) When through the underpass turn right and follow the pathway under the outer ring road bridges to the banks of the Umhlatuzana River. Cross the river via the stepping stones and on the south bank the old waterwheel can be seen.

**POINTS OF INTEREST**

At Coedmore Park is a large impoundment of shallow water which has been dug out of the Londonspruit. It contains a population of Mozambique tilapia which provide food for hordes of reed cormorants as well as many species of heron. The trail crosses the Londonspruit at the head of the dam and winds through the trees, mainly gum and mangoes. Travelling south under the arch bridge that carries the main railway line to Durban follow the trail leading along the banks of the Umhlatuzana River next to the large quarry. The birds that are generally associated with this water are dusky and paradise flycatchers. Botanical speaking the trail is not that exciting till it reaches the Outer Ring Road (N2) bridges. Starting down the bank to the river there are some very large specimens of the umzimbeet (*Millettia grandis*) to be seen, which give a fine display of mauve flowers during the summer. The trail now leads to the old waterwheel on the south bank of the river. Fording of the river is done by utilising the stepping stones

*Do not attempt the crossing when the river is in spate.*

The waterwheel was built by the Stainbank family in the 1870s to grind maize for food and bones for fertilizer.



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