

AN ENVIRONMENTAL POLICY FOR THE NATURAL AREAS OF KRUGERSDORP

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ABSTRACT

Development in the Krugersdorp region poses a threat to the existing natural areas. These natural areas need to be conserved, as they are all unique and have valuable resources to offer the community. Therefore, this study was undertaken in order to develop an environmental policy which could guide the management and conservation of the existing natural areas in Krugersdorp. The policy consists of goals, issues, policy objectives, policy statements and strategies - on how to obtain the stated goals. If this environmental policy is adopted, the natural areas of Krugersdorp will be effectively managed and therefore conserved.



Ontwikkeling in die Krugersdorp area hou 'n bedreiging vir die bestaande natuurlike gebiede in. Hierdie natuurlike gebiede moet bewaar word, aangesien elkeen uniek is en waardevolle hulpbronne aan die gemeenskap kan bied. Daarom is hierdie studie onderneem om 'n omgewingsbeleid te ontwikkel, sodat hierdie natuurlike gebiede effektief bestuur en bewaar sal word. Die beleid bestaan uit doelwitte, kwessies, beleidsverklarings en strategiee - oor hoe om die gestelde doelwitte te bereik. Indien hierdie omgewingsbeleid korrek toegepas word, sal die natuurlike gebiede van Krugersdorp effektief bestuur en gevolglik bewaar word.

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1. DEVELOPMENT IN THE KRUGERSDORP AREA.

Krugersdorp (30 kilometres to the west of Johannesburg) is a fairly large town on the West Rand with a population of approximately 198 000 (Census:1991). Krugersdorp shows distinct signs of industrial development which is manifested by an escalation in the number of factories and industries. During 1986 there were 1 411 factories within the Municipal boundaries, while in 1991 the number had increased to 2 018 (Department of Town Planning: Krugersdorp Municipality :1996). This was accompanied by a simultaneous population growth. 152 410 people resided in the region in 1986, but this increased to 196 212 in 1991 which is an increase of 22% within five years (Census 1991). This increase in the population can be ascribed to natural growth as well as the movement of people into the area to seek employment. This proliferation in the population led to an increase in the number of houses, from 15 682 in 1986 to 21 479 in 1991 (Department of Town Planning: Krugersdorp Municipality :1996). This population growth coupled with an increase in the number of factories and houses meant that more and more land was needed for development. This development in turn, led to an accelerated demand for land which meant that the natural areas within and surrounding Krugersdorp were threatened. A need therefore arose for the management and conservation of the natural areas in Krugersdorp. As a result the Municipality of Krugersdorp saw the necessity for the formulation of an environmental policy that would facilitate the management and conservation of these natural areas.

1.1. NATURAL AREAS IN THE KRUGERSDORP REGION THREATENED BY DEVELOPMENT.

The following natural areas in the Krugersdorp region may be threatened by development and they definitely need to be effectively managed to ensure their conservation. Figure 1 outlines the Krugersdorp Municipal Boundaries and indicates the location of all the natural areas in the region that need to be conserved and managed.

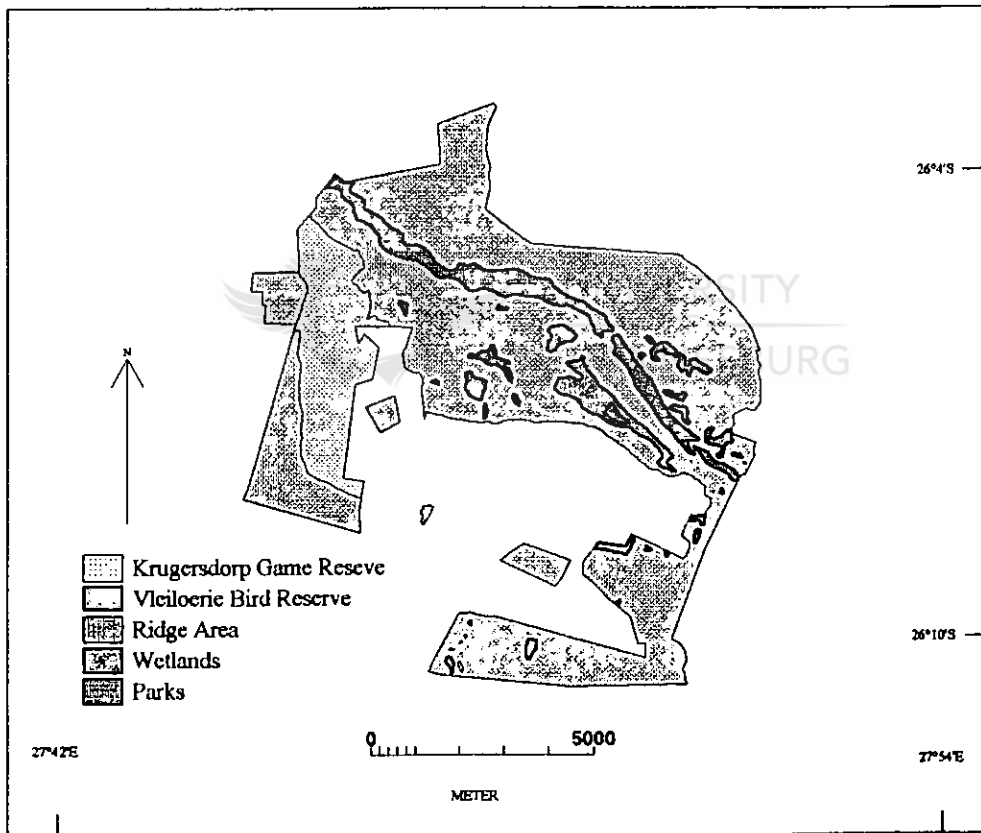


FIGURE 1. Natural areas in Krugersdorp (Krugersdorp Municipality: 1996).

1.1.1. THE KRUGERSDORP GAME RESERVE.

This Game Reserve covers an area of 1 400 hectares, and is partially owned by the Krugersdorp Municipality and partially by private owners (Figure 1). Because of the diverse nature of the vegetation - grassland, bush and small forests a great variety of animals are found within the Game Reserve. Table 1 is a list of the animals that are found in the Game Reserve.

TABLE 1. ANIMALS IN THE KRUGERSDORP GAME RESERVE.(Numbers counted: May: 1996)

NAME	COUNTED NUMBER
BLACK WILDEBEEST	90
BLESBUCK	479
BUFFALO	6
ELAND	30
GIRAFFE	5
HIPPOPOTAMUS	2
IMPALA	98
LION	9
MT REEDBUCK	62
OSTRICH	11
RED HARTEBEEST	101
ROAN ANTELOPE	4
SABLE ANTELOPE	14
SPRINGBUCK	126
TSESSEBE	10
WATERBUCK	22
WHITE RHINOCEROS	6
ZEBRA	35
KUDU	3
GEMSBUCK	8

The Krugersdorp Game Reserve is a major tourist attraction, as approximately 140 000 tourists visit the Game Reserve each year. There is no existing data on the number of overseas visitors to the Game Reserve as no distinction is made between local and overseas visitors. These visitors generate an income of approximately R4 million per year, for the Krugersdorp Town Council. In order to maintain this source of income the Krugersdorp Town Council needs to conserve and effectively manage the reserve.

A number of specific elements need to be managed in the Game Reserve and these include the following:

- conserve biodiversity and identify threatening processes,
- conserve indigenous plant and animal life,
- develop an effective management system for conserving the ecosystem of the Krugersdorp Game Reserve,
- restore and rehabilitate degraded ecosystems, and
- control and prevent the introduction of alien species.

1.1.2. THE VLEILOERIE BIRD RESERVE.

The Vleiloerie Bird Reserve lies to the north east of Krugersdorp (Figure 1.). It covers an area of 230 hectares and is owned by the Krugersdorp Town Council. During 1996 a bird count revealed that 62 species of birds were found within the borders of the reserve (Department of Sport and Recreation: Krugersdorp Municipality : 1996). The most important bird specie in this reserve is the Rainbird (an endangered species, Figure 2). This bird appears naturally in this reserve, and as a result of the almost perfect habitat (large trees, shrubs, bushes, streams, a dam and a wetland), a number of

other bird species also settled in this reserve. The great diversity of birdlife creates the need for effective management of the reserve, to ensure conservation and protection.

This reserve also has an important education centre, which is often visited by schools and churches in order to bring children closer to nature. In this regard the Reserve generates an income to help with the upkeep of the area. The amount generated each year is not known, as no record can be found. In this regard a major problem exists as no record is kept on the expenses of the reserve. Serious attention should be given to this matter.

As a result the following elements need to be managed in the Vleilorie Bird Reserve:

- identify important birdspecies and their threatening processes,
- conserve indigenous plants and animals,
- prevent and control alien species in the Vleilerie Bird Reserve,
- establish a representative system of protected areas, and
- rehabilitate plant and animal species.

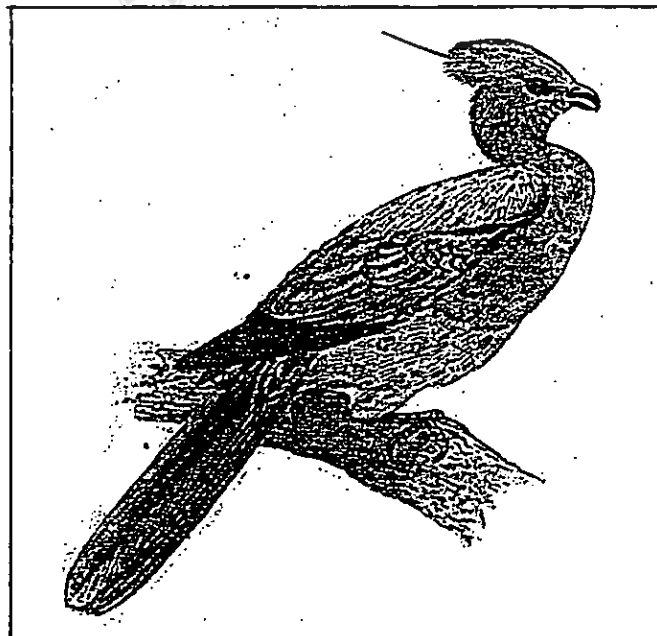


Figure 2. The Rainbird, an endangered specie. (Department of Sport and Recreation: Krugersdorp Town Council:1997)

1.1.3. THE RIDGE AREA.

To the north of Krugersdorp part of the Witwatersrand Ridge (Figure 1) passes through the region and influences the drainage as it forms part of the main watershed between the Atlantic and Indian Oceans. The ridge as a whole does not have a name but has local names associated with the suburbs through which it passes, namely: Noordheuwel, Breananda and Monument. The ridge consists of Quartzite, a very resistant rock that is very stable as no tectonic movement or faults have been recorded in these areas. This fact lures developers to build new housing projects on the ridge. The ridge area also serves as a habitat to a number of smaller mammals (for instance the small rock rabbit or “dassie”), and to varying bird species. As a result the ridge has a great ecological value and also serves as a landmark and recreational area - as a number of walking trails pass through the area (namely: Fanie Mulder Trail, Sterkfontein Trail and the Monument Trail).

A number of streams drain from the ridge and will be discussed in more detail in par. 1.1.4.

Management of the ridge area should include the management of the following elements:

- establish an effective system of terrestrial areas,
- promote sustainable development in areas adjacent to or within the Ridge area,
- prevent the intrusion of alien species, and
- integrate the Ridge area into land-use planning.

1.1.4. WATER RESOURCES (WETLANDS, STREAMS AND DAMS).

Water is one of the most important resources in any area, as no organism can exist without water. Three wetlands, a number of streams and five dams can be found in Krugersdorp (Figure 1) (Department of Parks and Recreation:Krugersdorp Municipality: 1996). Only some of the streams have names - Chamdor, Tudor and Factoria - the other streams interconnect with larger streams and rivers, namely: Boltonia; Klein Crocodile River, Crocodile River while some of the streams draining to the north flow into the Vaal River. Therefore this watershed (as mentioned in par.1.1.3.) including all these streams and rivers, has to be effectively managed as many of them flow into the Hartebeespoort dam (to the south west) as well as the Vaaldam (to the north east). The Hartebeespoort dam serves as the main water resource for the whole of the Brits area. Therefore any pollution problem in the dam actually has its origin in the Krugersdorp region. As a result effective management of these streams and rivers is essential. The streams and dams that flow into the Vaal River will not be discussed as they flow through many other areas that lie outside the Krugersdorp region.

A major problem causing pollution of the streams that drain into the Hartebeespoort Dam is pollution caused by agricultural wastes, namely: manure and pesticides. The origin of this pollution is the agricultural areas to the south east of Krugersdorp. These streams and rivers also have a cultural value to the community as they serve as areas where religious gatherings are held and the water is used for baptizing people. As a result these streams need to be free from harmful pollutants.

The five dams in the Krugersdorp area are the Centurion, Tudor, Pretorius Park, Impala and the Monument dams. These areas are of great importance to the residents of Krugersdorp as they not only serve as a water resource to plants and animals, but they are also used as recreational areas for water sports, fishing, windsurfing and canoeing.

The wetlands in the Krugersdorp area have no names. Nevertheless they play an important role as the reed beds in the water, act as filtering agents for pollution. One of the wetlands lies within the Vleilorie Bird Reserve and has an important task as it filtrates polluted water flowing from the Factoria industrial area. This cleaner water then flows into the Centurion dam - which is used mainly for recreation.

Another wetland is situated in Kagiso (a low class residential area). This wetland however will in the near future be destroyed as a major highway is being built across it. This road was approved in 1986 and therefore no procedure will now stop this project.

This is a major problem, as in the past radio-active waste was dumped into this wetland by the West Rand Consolidated Mines. It is estimated by the Department of Health (Krugersdorp Town Council:1996) that the workers building this road will suffer from lung diseases and cancer within five to ten years. This is a major problem that needs attention as well as a management plan.

Specific elements related to water resources that need to be managed are:

- conserve wetlands,
- stabilise population and reduce resource consumption,
- prevent and control alien species,
- restore and rehabilitate degraded water resources, and

- maintain and strengthen existing arrangements to conserve water resources.

1.1.5. PARKS.

Fifteen parks, which form important recreational areas can be found within the municipal boundaries of Krugersdorp(Figure 1). These parks are often visited by the residents and visitors of Krugersdorp. Three of these parks, namely Coronation, Monument and Pretorius Parks are cultural resources. Cultural resources are “the works of man that are of lasting cultural value and that serve to enhance the quality of the environment”(Fuggle & Rabie:1994). The Coronation Park serves as a landmark for the first hundred year existence of Krugersdorp. Pretorius Park and the Monument Park are associated with the Voortrekkers and their struggle for existence. Sufficient waste removal units, domestic services and “braai”-areas are to be found in these parks. Annually a West Rand Show is held at Pretorius Park and numerous visitors find themselves at this open air entertainment week, as the Show serves as an attraction not only for the residents of Krugersdorp but also to visitors to the area.

A number of elements associated with the parks of Krugersdorp need to be effectively managed:

- identify and manage cultural resources,
- identify components which pose a threat to parks,
- manage an effective system of the recreational areas in Krugersdorp,
- rehabilitate degraded areas, and
- prevent and control alien species to recreational areas in Krugersdorp.

2. STATEMENT OF THE PROBLEM.

From the foregoing it can be seen that Krugersdorp has a wide variety of natural areas which have certain environmental elements that need to be effectively managed in order to conserve them and to prevent the development of environmental problems. Therefore a synoptic and generic environmental policy is required for Krugersdorp in which rights relating specifically to the environment are stipulated. It is impossible to formulate one encompassing policy for all the natural areas, because each area is different from the other and each should, therefore, be managed as separate entities. As a result each natural area needs to have its own individualistic set of guiding principles which form the basis of any environmental policy (Government Gazette: 1997). Therefore the following will be undertaken, in order to draw up a policy:

1. Identification of all natural features that need to be managed.
2. Formulation of an environmental policy for the natural areas in Krugersdorp, that will focus on the following:
 - 2.1. Formulation of an encompassing goal for each natural area,
 - 2.2. Identification of all issues that might prove to have an influence on the relevant features,
 - 2.3. Formulation of policy objectives in order to ensure the conservation of the identified natural features, and
 - 2.4. Formulation of policy statements and strategies to guide management towards the conservation of the natural features.

Before a synoptic and generic environmental policy can be developed specifically for the natural areas of Krugersdorp, it is important to take a look at the main characteristics and contents of environmental policies in general. This will be undertaken in the following section.

3. THE DEVELOPMENT OF ENVIRONMENTAL POLICIES IN GENERAL.

3.1. INTRODUCTION.

Any environmental policy should give effect to the many laws in the Municipal Ordinances that relate to the environment (Fuggle & Rabie: 1994). These include laws relating specifically to the environment (no indigenous tree may be cut down without a letter of approval by the Krugersdorp Municipality), as well as those relating to governance such as locus standi (laws and rights predetermined by the government of a country), administrative justice and public participation. It should also seek to entrench sustainable development in policy and practice as an accepted philosophy of resource management and utilisation.

The purpose of policy development is twofold:

- * to inform the public what the municipalities objectives are and how it intends to achieve its objectives; and
- * to inform Municipal Departments what their objectives are and what they must do to achieve those objectives.

3.2. DEFINITION OF THE ENVIRONMENT.

As a starting point to the development of an environmental policy it is very important to define exactly what is meant by the concept “environment”, especially in terms of the specific study that is to be undertaken.

“The term environment is widely used, but it means various things to different people. The urban designer will understand the term to apply to the spatial structure of the city; the architect will envisage the fabric of buildings; the municipal engineer will relate it to essential services; the medical officer of health will think of living conditions and the horticulturist thinks of parks and gardens.” (Fuggle & Rabie: 1994: p.4). Miller(1993) on the other hand states that the environment consists of all external factors that may influence an organism or specified system within its lifespan. Section 24 of the Bill of Rights in the Draft Final Constitution of the Republic of South Africa guarantees environmental rights for the people of South Africa. Section 24 states that “...Everyone has the right:

1. to an environment that is not harmful to their health or well-being; and
2. to have the environment protected for the benefit of present and future generations,
 - 2.1. Through reasonable legislative and other measures that prevent pollution and ecological degradation;
 - 2.2. promote conservation; and
 - 2.3. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development...”(The Department of Environmental Affairs and Tourism:1996).

However, for the purpose of this study, the environment will be classified as the physical landscape within which the city is set, and upon which it has an impact, and it will include the following elements:

- Geology
- Topography
- Climate
- Soil
- Water
- Plants
- Animals

3.3. THE MAIN CHARACTERISTICS OF AN ENVIRONMENTAL POLICY.

An environmental policy is a set of principles and strategies used to guide effective management, the sustainable use of natural resources and the protection of natural areas.

Tisdell(1994) discusses the purpose of an environmental policy as safeguarding the natural areas in order to be able to improve the quality of life for existing and future populations. A policy applies to all government institutions and to all activities that impact on the environment (Government Gazette: 1997). According to Fuggle & Rabie (1994) the general policy must be applied with a view to:

- 3.3.1. the protection of ecological processes, natural systems and the natural beauty as well as the preservation of biotic diversity in the natural environment;
- 3.3.2. the promotion of sustained utilization of species and ecosystems and the effective application and re-use of natural resources;

- 3.3.3. the protection of the environment against disturbance, deterioration, defacement, poisoning or destruction as a result of man-made structures, installations, processes or products or human activities; and
- 3.3.4. the establishment, maintenance and improvement of environments which contribute to a generally acceptable quality of life for the inhabitants of the area.

Through this policy the Krugersdorp Town Council undertakes to give effect to the many rights in the Constitution that relate to the environment. They include rights relating specifically to the environment, as well as those relating to public participation. The policy furthermore defines the essential nature of sustainable development as the combination of social, economic and environmental factors.

The vision of this environmental policy is one of a society in harmony with its environment. It can only be achieved through a new model or paradigm of sustainable development based on integrated and coordinated environmental management that addresses:

- equitable access to land and natural resources;
- the sustainable use of social, cultural and natural resources; and
- public participation in environmental governance.

This policy emphasises that integrated and sustainable management of the environment, now and in the future, is the essential basis of sustainable development in all areas of human activity. It will seek to ensure that environmental sustainability, health and safety are not endangered.

3.4. ENVIRONMENTAL POLICY FORMULATION

The most promising strategy to ensure a sound environmental base upon which development may proceed is provided by the authoritative determination of an environmental policy with which all administrative bodies should comply. Steps in the formulation of such a policy for Krugersdorp are the following:

- * In November 1995 the Krugersdorp Town Council decided that the need for an environmental policy existed. A meeting was held by the Department of Sport and Recreation during which it was decided that during 1996 and 1997 an environmental policy for the natural areas would be formulated.
- * During 1996 research was undertaken by this department to determine the natural areas for which an environmental policy was needed.
- * During August 1996 the Department of Health put in a complaint against the Department of Sport and Recreation, as they felt that an invasion into their domain was made. A meeting was held during which it was decided that the policy research of this study and its formulation should continue.
- * During 1997 and 1998 the policy will be formulated and hopefully will be approved by all relevant Municipal departments.

3.5. THE CONTENTS OF AN ENVIRONMENTAL POLICY

According to the Government Gazette (no. 18164: 1997) any environmental policy should contain the following:

- * **Strategic Goal**

These goals chart the direction the Municipality will follow in meeting its commitment to sustainable development as well as a holistic system of environmental management.

- * **Supporting Objectives**

Objectives are something towards which efforts are directed for example “support efforts to stabilise human population and reduce resource consumption to achieve socially and ecologically sustainable development”(Government Gazette, no. 18163, 1997).

- * **Policy principles and strategy**

Principles are the fundamental premises the Municipality will use to apply, develop and test policy and subsequent actions including, decision making, regulation and enforcement. Where necessary the policy principles and strategies will identify priorities.

With the above in view an environmental policy for each specific natural area in Krugersdorp will now be formulated.

4. THE ENVIRONMENTAL POLICY FOR KRUGERSDORP

4.1. INTRODUCTION

There is much concern in Krugersdorp that human activities such as pollution, habitat destruction, over-exploitation and foreign plant and animal invasions are resulting in the ever-increasing loss of Krugersdorp's natural areas. The implication of this are considerable. If continued unabated, we stand to lose crucial areas through the loss of important habitats; to undermine rural livelihoods, with the degradation of the natural resource base on which people depend; and to diminish economic opportunities, as options for developing medicines and foods are reduced and the natural resource base for tourism is damaged. As previously stated, the Krugersdorp Game Reserve, is the largest tourist attraction in the Krugersdorp area; therefore an environmental policy for this natural area as well as the others that exist in Krugersdorp, will now be formulated.

4.2. THE KRUGERSDORP GAME RESERVE

4.2.1.

GOAL

CONSERVE THE DIVERSITY OF PLANTS AND ANIMALS, ECOSYSTEMS AND SPECIES IN THE KRUGERSDORP GAME RESERVE

This goal refers to those aspects of the policy concerning the conservation of biodiversity, within the Krugersdorp Game Reserve.

The term conservation has in the past been used broadly to include protection as well as use, maintenance, restoration and enhancement of the natural environment. However, the Convention on Biological Diversity (Government Gazette no. 18163 : 1997) uses conservation in a different way in that it refers both to the “conservation of biological diversity”, and the “sustainable use of its components.”

Krugersdorp Town Council’s approach to the conservation of the diversity of plants and animals, ecosystems and species in the Krugersdorp Game Reserve, has five main issues:

1. Identifying important components of biodiversity and threatening processes;
2. Maintaining and strengthening existing arrangements to conserve Krugersdorp’s indigenous plant and animal life, in the Krugersdorp Game Reserve;
3. Managing efficiently a representative and effective system of the Krugersdorp Game Reserve;
4. Restoring and rehabilitating degraded parts of the ecosystem, and strengthening and further developing species recovery plans where appropriate; and
5. Controlling, eradicating and preventing the introduction of harmful alien species which threaten biodiversity.

In pursuing this approach, the Krugersdorp Town Council recognises:

- that biological diversity is best conserved in the wild (in-situ), through the conservation and restoration of ecosystems and natural habitats, and the maintenance and recovery of viable populations of species in their natural surroundings (O’Neill : 1993).

4.2.2.

POLICY OBJECTIVE 1.1.

IDENTIFY IMPORTANT COMPONENTS OF BIODIVERSITY AND THREATENING PROCESSES.

POLICY AND STRATEGY

One of the most fundamental steps towards achieving the goals articulated in this policy requires the identification of important components of biodiversity, and threatening processes in the Krugersdorp Game Reserve. Considerable knowledge already exists in South Africa concerning aspects of the country's biodiversity, but this information needs to be gathered, ordered, and strategically used in the Krugersdorp Game Reserve.

To achieve the described objectives, the Krugersdorp Municipality will take a systematic approach towards the identification of important components of biodiversity and threatening processes, and will, through undertaking a survey of existing knowledge, focus upon addressing gaps in knowledge whilst continuing to support activities relevant to achieving the objective.

In particular, the Krugersdorp Municipality, in collaboration with relevant interested and affected parties, undertakes to:

1. Identify, using biological, social and economic criteria, components of biodiversity important for its conservation and sustainable use. These components will include:

- Ecosystems and habitats that contain high diversity;
 - Species and communities that are of economic value and that are wild relatives of domesticated or cultivated species.
- 2.1. Identifying processes or activities that have or are likely to have significant adverse impacts on terrestrial biodiversity;
 - 2.2. Monitor the effects of these processes and activities;
 - 2.3. Undertake the research necessary to improve the understanding of the consequences of threatening processes, and other components of terrestrial biodiversity;
 3. Develop a mechanism to manage and collate this information, to place it in public domain, and to ensure that decisions are taken based upon the best applicable knowledge available.

4.2.3.



MAINTAINING AND STRENGTHENING EXISTING ARRANGEMENTS TO CONSERVE KRUGERSDORP'S INDIGENOUS PLANT AND ANIMAL LIFE, IN THE KRUGERSDORP GAME RESERVE.

POLICY AND STRATEGY

To achieve this objective, the Krugersdorp Town Council, in collaboration with interested and affected parties, will:

- 1.1. Conserve components of biodiversity identified by Objective 1.1. through a variety of mechanisms such as legislation, controls, guidelines,

and protected area designations, giving priority to components of biodiversity requiring urgent protective measures;

- 1.2 Consolidate, coordinate and improve existing legislation and regulations wherever possible and appropriate in order to eliminate duplication and to avoid interpretations and implementation.
- 1.3 Facilitate the development of appropriate legislation to achieve uniform legal coverage for the protection of threatened species and the regulation of trade of all CITES-listed species in addition to threatened species listed nationally and provincially.
- 2.1 Strengthen existing support for research on the improved understanding of the structure, function and composition of the Krugersdorp Game Reserve's terrestrial ecosystems.
- 2.2 Improve knowledge of and take appropriate action to conserve poorly known groups such as invertebrates, fungi and micro-organisms.

4.2.4

POLICY OBJECTIVE 1.3

MANAGE EFFICIENTLY A REPRESENTATIVE AND EFFECTIVE SYSTEM FOR THE KRUGERSDORP GAME RESERVE.

POLICY & STRATEGY

In order to achieve the above mentioned objective, the Krugersdorp Town Council will :

1. Ensure the involvement of local communities and other interested and affected parties in decisions concerning the Krugersdorp Game Reserve. Such involvement is crucial to the development of an effective and integrated protected area system.
2. Manage the Krugersdorp Game Reserve in order to protect the existing ecosystem.

The existing legislation in connection with the management of protected areas is listed in Table 2. Where applicable these will be applied to the Krugersdorp Game Reserve.

TABLE 2. EXISTING LEGISLATION. (Government Gazette : no. 18163 : 1997)

TYPE OF PROTECTED AREA	LEGISLATION	ADMINISTRATION
National Park	National Parks Act 57 of 1976	National Parks Board
Lake Area	Lake Areas Development Act 139 of 1975	National Parks Board
Mountain Catchment Area	Mountain Catchment Areas Act 63 of 1970	Assigned to provinces
Protected Natural Environment	Environment Conservation Act 73 of 1989	Assigned to provinces
Special Nature Reserve	Environment Conservation Act 73 of 1989	Assigned to provinces
Limited Development Area	Environment Conservation Act 73 of 1989	Delegated to local authority / government institution
National Botanical Garden	Forest Amendment Act 1991	National Botanical Institute
State Forest	Forest Act 122 of 1984	DWAF: delegated to provinces
Forest Nature Reserve and Wilderness Area	Forest Act 122 of 1984	DWAF delegated to provinces
National Monument	National Monuments Act 28 of 1969	National Monuments Council and provinces
Conservation Area	National Monuments Act 28 of 1969	National Monuments Council and provinces
Defence Area	Defence Act 44 of 1957	South African National Defence Force
Marine Reserve	Sea Fishery Act 12 of 1988	DEAT : Directorate of Sea Fisheries, and provinces in respect of coastal zone and specified resources
Restricted Area	Sea Fishery Act 12 of 1988	DEAT: Directorate of Sea Fisheries, and provinces in respect of coastal zone and specified resources
Most South African islands	Sea Birds and Seals Protection Act 46 of 1973	DEAT: delegated to provinces in respect of sea birds
Provincial, Local and Private Nature Reserves	Various provincial ordinances	9 provincial administrations, numerous local authorities, private landowners
Ramsar Site	No legal status (Proposed Wetland Conservation Act)	DEAT and conservation authorities
Private Conservancies	No legal status	Farmers
Biosphere Reserves	No legal status	Conservation authority / neighbours
Sites of Conservation Significance	No legal status	Private landowners
Natural Heritage Sites	Not legally enforceable	Private landowners

4.2.5

POLICY OBJECTIVE 1.4.

RESTORE AND REHABILITATE DEGRADED ECOSYSTEMS AND STRENGTHEN AND FURTHER DEVELOP SPECIES RECOVERY PLANS WHERE PRACTICAL IN THE KRUGERSDORP GAME RESERVE.

POLICY AND STRATEGY

The Krugersdorp Town Council recognises that the rehabilitation of degraded ecosystems in the Krugersdorp Game Reserve is a major task, requiring the commitment of significant resources from both the Town Council and the private sector. Within this context, the Krugersdorp Town Council in collaboration with interested and affected parties, will:

1. Develop a program to rehabilitate degraded parts of the Krugersdorp Game Reserve. This will :
 - 1.1 Identify key sites for restoration, based upon biological and socio-economic criteria and in accordance with Objective 1.1;
 - 1.2 Support research to enhance techniques to restore biodiversity in areas where degradation exists;
 - 1.3 Monitor the effectiveness of rehabilitation measures;
 - 1.4 Continue to regulate and minimise adverse impacts of harmful activities on biodiversity in the Game Reserve.
2. Continue to conserve and restore populations of threatened species by :
 - 2.1 Developing appropriate legislation and undertaking additional measures where necessary;

- 2.2 Developing tools to enable their identification;
 - 2.3 Developing and implementing recovery plans for species at risk;
 - 2.4 Promoting the use and involvement of off-site (ex-situ) conservation facilities and expertise where necessary.
3. Require rehabilitation measures to be undertaken as an integral part of environmental impact assessment, to minimise potential negative impacts and to enhance possible positive impacts on biodiversity within the Krugersdorp Game Reserve.
 4. Address concerns relating to the generic contamination and loss of generic variability amongst populations.

4.2.6

POLICY OBJECTIVE 1.5

PREVENT THE INTRODUCTION OF POTENTIALLY HARMFUL ALIEN SPECIES AND CONTROL AND ERADICATE ALIEN SPECIES WHICH THREATEN THE ECOSYSTEM, HABITATS OR SPECIES WITHIN THE KRUGERSDORP GAME RESERVE.

Alien organisms are plants, animals and micro-organisms which do not naturally occur in the reserve, and which are deliberately or accidentally introduced by humans to ecosystems outside of their natural range(Goudie :1990). Alien organisms can be divided into (1.) Those that are problematic and harmful, in that they negatively impact on biodiversity; and (2.) Those that are benign and in many instances serve useful purposes(Ridge :1991). This policy focuses upon

alien organisms which threaten the ecosystems, habitats or species within the Krugersdorp Game Reserve.

POLICY AND STRATEGY

The Krugersdorp Town Council is acutely aware of the adverse impacts of harmful alien organisms in the Krugersdorp Game Reserve, and is committed to controlling and regulating the introduction and spreading of such organisms. Table 3 is a list of the alien plant and animal species found within the Krugersdorp Game Reserve (Witwatersrand Botanical Gardens : 1996).

TABLE 3. Alien plant species in Krugersdorp Game Reserve. (Witwatersrand Botanical Gardens : 1996)

NAME	SPECIE NUMBER
Cyperus eragrostis	459
Acacia dealbata	3446
Acacia mearnsii	3446
Solanum mauritianum	7407

Many past efforts at control have been unsuccessful, a major problem being the fact that responses have been reactive, with actions taken only after invasive alien species have become a problem (Mannion : 1992). This ad hoc approach has not been cost-effective, and has resulted in drastic impacts on biodiversity. To redress this the Krugersdorp Municipality will adopt a proactive, preventative and precautionary approach to control the introduction and spread of alien organisms. To achieve this objective, the Krugersdorp Town Council, in collaboration with

interested and affected parties, will:

1. Strengthen the enforcement and effectiveness of existing punitive measures to control the introduction and spread of potentially harmful alien organisms.
2. Develop control and eradication programmes, and provide ongoing support to existing programmes, based on a priority-rating system and in relation to costs and resources. This will consider threats posed to biodiversity, as well as social, economic, and environmental costs and benefits derived from using and removing identified organisms (Tietenberg : 1994). The planning of intensive mechanical clearing operations will provide for regular follow-up.
3. Prevent wherever feasible the unintentional introduction of alien organisms to the Krugersdorp Game Reserve.
4. Support and strengthen the development of biological and other control methods for alien organisms that threaten biodiversity.
5. Improve understanding concerning the impacts of alien organisms on biodiversity.
6. Improve public education and awareness concerning the risks posed by the planting or illegal importation of alien species, and such risks or to control the spread of alien organisms (Sandbach : 1980).
7. Negotiate and liaise with neighbouring areas to maximise commonalities and minimise conflicts between practices relating to alien organisms that threaten biodiversity in the Krugersdorp Game Reserve.

4.3. THE VLEILOERIE BIRD RESERVE

4.3.1.

GOAL

TO CONSERVE THE DIVERSITY OF BIRDS AND THE EXTINCTION OF THE RAINBIRD, IN THE VLEILOERIE BIRD RESERVE.

This goal refers to the conservation of bird species and in particular the Rainbird, within the Vleiloerie Bird Reserve. In order to obtain this goal (Goal 2) aspects such as plant diversity, water resources and alien organisms need to be taken into account (Meadows : 1985). Therefore the Krugersdorp Town Council's approach to conserving the diversity of birds in the Vleiloerie Bird Reserve has five main issues:

1. Identification of important birdspecies and their threatening processes;
2. Maintaining and strengthening existing arrangements to conserve indigenous plants, birds and animals in the Vleiloerie Bird Reserve;
3. Controlling, eradicating and preventing the introduction of harmful alien species which threaten the Rainbird.
4. Establishing and managing efficiently a representative and effective system of protected areas (Hileman : 1992).
5. Restore, rehabilitate and further develop species recovery plans where practical.

4.3.2.

POLICY OBJECTIVE 2.1

IDENTIFICATION OF IMPORTANT BIRDSPECIES AND THREATENING PROCESSES.

POLICY AND STRATEGY

The most fundamental step towards achieving this goal(Goal2), requires the identification of important bird species and their threatening processes (Decortis :1993). A list already exists of the different bird species in the Vleilorie Bird Reserve (table 2), but this list may not include all the different species and therefore needs to be regularly updated. In achieving this process the Krugersdorp Town Council will take a systematic approach towards the identification of more bird species in the Reserve.

In particular, the Krugersdorp Municipality, in collaboration with interested and affected parties, undertakes to:

1. Identify, using biological and social criteria, different bird species in the Vleilorie Bird Reserve. This identification process will also include the following components:
 - Ecosystems and habitats of the different bird species (Goriup : 1988);
 - Endangered species; and
 - Species that are of economic value.
2. Identify processes or activities that have an impact on the birds and their unique habitats.
3. Undertake the research necessary to improve understanding of the birds and their threatening processes.

4. Effectively manage and collate any information, to place it in the public domain, and to ensure that decisions are taken upon the best applicable knowledge available (Manji : 1991).

4.3.3. **POLICY OBJECTIVE 2.2**

MAINTAINING AND STRENGTHENING EXISTING ARRANGEMENTS TO CONSERVE INDIGENOUS PLANTS, BIRDS AND ANIMALS IN THE VLEILOERIE BIRD RESERVE.

POLICY AND STRATEGY

The Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Conserve components of the different bird species identified by Objective 2.1 through a variety of mechanisms such as legislation, guidelines and protected area designations, giving priority to endangered species requiring urgent protective measures.
2. Consolidate, coordinate and improve existing legislation and regulations (Baumol : 1975).
3. Improve knowledge of and take appropriate action to conserve the habitats and nutritional resources of the birds in the Vleiloerie Bird Reserve.
4. Strengthen existing support for research on the understanding of function and composition of bird species and their supporting plants in the Vleiloerie Bird Reserve.
5. Facilitate the development of appropriate legislation to achieve uniform legal coverage for the protection of the Rainbird and it's habitat.

6. Eliminate conflicting interpretations and implementations in legislation and regulations of the different Departments of the Krugersdorp Municipality.

4.3.4. POLICY OBJECTIVE 2.3

CONTROLLING ERADICATING AND PREVENTING THE INTRODUCTION OF HARMFUL ALIEN SPECIES WHICH THREATEN THE RAINBIRD AND OTHER INDIGENOUS BIRD SPECIES IN THE VLEILOERIE BIRD RESERVE.

Alien organisms as defined in par 4.2.6 are organisms which do not naturally occur in an area, and which pose a threat to the indigenous plants, birds and animals. Alien organisms found in the Vleiloerie Bird Reserve include the Acacia Mearnsii and the European Sparrow (Krugersdorp Town Council: Department of Sport and Recreation: 1997). These alien species pose a threat to the Rainbird and other indigenous bird and plant species. This policy focuses upon alien organisms which threaten the ecosystems, habitats or species within the Vleiloerie Bird Reserve.

POLICY AND STRATEGY

The Krugersdorp Town Council is aware of the impacts of harmful alien organisms in the Vleiloerie Bird Reserve and is committed to controlling and regulating the introduction and spreading of such organisms. To achieve this objective, the Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Strengthen the enforcement and effectiveness of existing punitive measures to control the introduction and spread of potentially harmful alien organisms in the Vleiloerie Bird Reserve.

2. Develop control and eradication programmes, and provide ongoing support to existing programmes, based on a priority-rating system and in relation to costs and resources. This will consider threats posed to the bird species, but especially the Rainbird.
3. Plan intensive mechanical clearing operations, that will take account of job creation schemes and will provide for regular follow-up, to clear the Vleiloerie from alien plant and bird species.
4. Prevent wherever feasible the unintentional introduction of alien organisms to the Vleiloerie Bird Reserve.
5. Improve understanding concerning the impacts of alien organisms on the Rainbird and other bird species in the Vleiloerie Bird Reserve.
6. Improve public education and awareness concerning the risks posed by the planting or illegal importation of alien organisms to the Krugersdorp area as well as to the Vleiloerie Bird Reserve.

4.3.5.

POLICY OBJECTIVE 2.4

ESTABLISHING AND MANAGING EFFICIENTLY A REPRESENTATIVE AND EFFECTIVE SYSTEM OF PROTECTED AREAS.

A “protected area”, as defined by the Grad, Rathjens and Rosenthal (1971) as well as the Convention is “a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives”.

Within this definition, the purposes for which protected areas are managed vary considerably, and different classification systems apply in different municipal areas.

The Vleiloerie Bird Reserve can be classified as a protected area, and therefore the Krugersdorp Town Council and all the interested and affected parties will following the ten Acts of Parliament and 13 provincial Ordinances which control protected areas.

4.3.6.

POLICY OBJECTIVE 2.5

RESTORE, REHABILITATE AND FURTHER DEVELOP SPECIES RECOVERY PLANS WHERE PRACTICAL IN THE VLEILOERIE BIRD RESERVE.

The Krugersdorp Town Council recognises that the rehabilitation of degraded ecosystems in the Vleiloerie Bird Reserve as well as the rehabilitation of the Rainbird, is a major task.

In achieving this objective (Objective 2.5), the commitment of not only the Krugersdorp Town Council is needed, but also the full support of the private sector.


Within this context, the Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Develop a programme to rehabilitate the Rainbird. This will:
 - 1.1. Identify key issues for rehabilitation, based upon biological criteria;
 - 1.2. Link remedial action to the provision of jobs, skills and opportunities for the poor and disadvantaged wherever possible;
 - 1.3. Support research to enhance rehabilitation techniques for the Rainbird;
 - 1.4. Monitor the effectiveness of rehabilitation measures; and
 - 1.5. Continue to regulate and minimise adverse impacts of harmful activities on the Rainbird and other bird species in the Vleiloerie Bird Reserve.
2. Continue to restore populations of the Rainbird in the Vleiloerie Bird Reserve by:

- 2.1. Developing tools to enable their identification;
 - 2.2. Developing and implementing recovery plans for the Rainbird; and
 - 2.3. Promote the use and involvement of off-site conservation facilities for the Rainbird.
3. Require rehabilitation measures to be undertaken as an integral part of environmental impact assessments, to minimise potential negative impact on the Rainbird and other bird species in the Vleiloerie Bird Reserve.
 4. Address concerns relating to the genetic contamination and loss of genetic variability amongst bird populations.

4.4 THE RIDGE AREA

4.4.1


GOAL
CONSERVE THE DIVERSITY OF LANDSCAPES AND TOPOGRAPHY, WHICH INCLUDE HABITATS AND ECOSYSTEMS, OF THE RIDGE AREA IN KRUGERSDORP.

The term “conservation” has been defined in section 4.2.1 and accordingly includes the conservation of biological diversity, and the sustainable use of its components. Therefore the conservation of the ridge area in Krugersdorp is of great importance, as it not only serves as a landmark, but also has the following issues:

1. Serves as a habitat to the Rock rabbit (“dassie”);
2. Serves as a recreational area, as a number of walking trails(mentioned in par. 1.1.3.) exist in this area; and

3. Has a very unique topography.

This goal refers to those aspects of the policy concerning the conservation of landscapes and topography. Therefore the Krugersdorp Town Council's approach to conserving its remarkable diversity of landscapes, habitats and topography, has four main components:

1. Establish and manage efficiently a representative and effective system of terrestrial areas (Armstrong :1994);
2. Promote environmentally sound and sustainable development in areas adjacent to or within the Ridge areas, with a view to further protection of these areas (Van der Merwe : 1991);
3. Prevent the introduction of potentially harmful alien species and control and eradicate alien species which threaten ecosystems, habitats, species and the Ridge area; and
4. Integrate the conservation of the Ridge area into land-use planning procedures and environmental assessments for the whole Krugersdorp region.

4.4.2.

POLICY OBJECTIVE 3.1

ESTABLISH AND MANAGE EFFICIENTLY A REPRESENTATIVE EFFECTIVE SYSTEM OF TERRESTRIAL AREAS.

The transformation of the Ridge area is perhaps the most visible dramatic evidence of loss of terrestrial areas in Krugersdorp. Comprehensive estimates are not available concerning the extent to which the Ridge area has been modified, although a conservative assessment

is that at least 42% of the Ridge has been transformed for purposes of cultivation and afforestation as well as for urban and industrial development. Areas which are not developed may be subjected to squatters and to infestation by alien plants and animals.

POLICY AND STRATEGY

The loss of biodiversity in the Ridge areas of Krugersdorp is considered by the Krugersdorp Town Council to be a matter of grave concern, requiring urgent action by diverse sectors at many different levels. The Krugersdorp Town Council recognises the important role played by urban sectors in the economic development of Krugersdorp, but believes that opportunities exist, through conserving and using biological resources sustainably, to optimise both conservation and development benefits, and to minimise the adverse impacts of various activities on the Ridge area.

To achieve this objective, the Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Investigate, formulate and implement integrated land-use planning approaches that include multiple natural resource activities which are compatible with and which complement the conservation and sustainable use of biodiversity.
2. Promote the conservation of biodiversity in urban areas by encouraging retention of habitat and wherever possible focusing future development on existing built-up areas.
3. Encourage the planting of indigenous plants and trees to build the local resource base and to improve living environments.

4.4.3

POLICY OBJECTIVE 3.2

PROMOTE ENVIRONMENTALLY SOUND AND SUSTAINABLE DEVELOPMENT IN AREAS ADJACENT TO OR WITHIN THE RIDGE AREAS, WITH A VIEW TO FURTHERING PROTECTION OF THESE AREAS.

Urgent attention is required to ensure that biodiversity is conserved not only on the Ridge area, but adjacent areas as well. This is a fundamental component which articulates the manner in which sustainable development is to be promoted throughout the whole of Krugersdorp.

POLICY AND STRATEGY

The Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Develop and introduce appropriate strategies, mechanisms and incentives to integrate the ridge area within the broader ecological and social landscape, and encourage conservation in adjacent private and communal areas. This may include the establishment of biosphere reserves; buffer zones; community-based wildlife management schemes; multiple use areas; development projects; or the introduction of conservation grants and other economic incentives.
2. Support and promote activities adjacent to the Ridge area that are compatible with and which complement the objectives of the Ridge area.
3. Support the development of a community-based Ridge area wildlife management initiatives as part of a broader set of approaches to land-use planning and developing local sustainable development strategies.

4. Enhance the capacity of communities residing in or adjacent to the Ridge area to participate in Ridge area management through providing appropriate training and education, and through recognising local expertise and traditional institutions.
5. Ensure the conservation of the Rock rabbit and its habitat on the Ridge area.
6. Activities that may harm or have a negative influence on the indigenous plant and animal life on the Ridge area must be banned.

4.4.4

POLICY OBJECTIVE 3.3

PREVENT THE INTRODUCTION OF POTENTIALLY HARMFUL ALIEN SPECIES AND CONTROL AND ERADICATE ALIEN SPECIES WHICH THREATEN ECOSYSTEMS, HABITATS OR SPECIES ON THE RIDGE AREA IN KRUGERSDORP.

Introduced animals have also reduced the Ridge area's biodiversity, a few of these animals are the house sparrow, the black rat and house mice.

POLICY AND STRATEGY

The Krugerdorp Town Council is aware of the impacts of the alien plants and animals on the Ridge area, and therefore in collaboration with interested and affected parties, will:

1. Review, streamline, and if necessary strengthen existing legislation to control the introduction and spread of potentially harmful alien organisms. Action will be taken to improve the effectiveness of legislation and regulations and ensure consistency;

2. Strengthen the enforcement and effectiveness of existing punitive measures to control the introduction and spread of potentially harmful alien organisms.
3. Develop a regulatory procedure for the introduction of alien organisms into the Ridge area, whereby the potential risks of introduction are comprehensively assessed against intended benefits prior to introduction. This assessment will be followed by the adoption of appropriate mitigatory or preventative measures.
4. Develop control and eradication programmes, and provide ongoing support to existing programmes, based on a priority-rating system and in relation to costs and resources. This will consider threats posed to the Ridge area, as well as social, economic, and environmental costs and benefits derived from using and removing identified organisms. The planning of intensive mechanical clearing operations will take account of job creation schemes and will provide for regular follow-up.
5. Prevent wherever feasible the unintentional introduction of alien organisms to the Ridge area.
6. Promote the use of local, indigenous species in rehabilitation and revegetation of the Ridge area.
7. Provide incentives to landowners to control or eradicate alien organisms identified as threatening the biodiversity of the Ridge area in Krugersdorp.
8. Strengthen, support and coordinate the efforts of existing institutions and programmes to detect the early establishment of invasive alien organisms, and to catalogue and describe such invasions.
9. Support and strengthen the development of biological and other control methods for alien organisms that threaten the Ridge area.

10. Improve understanding concerning the impacts of alien organisms on the Ridge area.
11. Improve public education and awareness concerning the risks posed by the planting or illegal importation of alien species, and identify actions which can be taken to avoid such risks or to control the spread of alien organisms on the Ridge area in Krugersdorp.

4.4.5.

POLICY OBJECTIVE 3.4

INTEGRATE THE RIDGE AREA INTO LAND-USE PLANNING PROCEDURES AND ENVIRONMENTAL ASSESSMENTS.

The Ridge area is often adversely affected by planning and development decisions and actions. This may be through a failure to incorporate the Ridge area considerations into physical planning documents, such as municipal plans and structure plans; through inadequate information and misguided decisions; or because of inappropriate policies. These concerns are well recognised in the Krugersdorp region, and have resulted in the development of a procedure known as Integrated Environmental Management (IEM), a process designed to incorporate the environmental considerations of development proposals within the planning process. Environmental impact assessment (EIA) is a step within the IEM procedure, and by international standards, the EIA strategy employed in Krugersdorp is relatively sophisticated. It is holistic and embraces both bio-physical and social considerations; requires public participation; provides for the inclusion of environmental concerns early in the planning process; calls for alternative proposals to be

considered; and continues through to monitoring, auditing and decommissioning. To this end, IEM is a useful tool for minimising the adverse impacts of development on the Ridge area in Krugersdorp.

POLICY AND STRATEGY

The Krugersdorp Town Council is well aware of the need to review land-use planning and environmental assessment procedures in Krugersdorp. Therefore the Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Support the incorporation of IEM principles and appropriate environmental procedures into all planning controls and legislation.
2. Ensure that potential impacts of projects, programmes, plans and policies on the Ridge area are assessed and reflected in planning processes (e.g. town planning and zoning schemes) and environmental assessments, and that decision-making seeks to avoid impacts, to minimise risks, and to mitigate adverse impacts wherever possible.
3. Investigate, formulate and implement integrated land-use planning approaches that include multiple natural resource activities which are compatible with and which complement the conservation and sustainable use of the Ridge area in Krugersdorp.
4. Integrate consideration of the cumulative and secondary impacts on biological diversity of development proposals, and the reversibility of proposed actions over time, into regional planning processes and environmental impact assessment procedures.
5. Ensure that potential impacts of projects, programmes, plans and policies on the Ridge area are assessed in an integrated manner and by competent professionals.

4.5

WATER RESOURCES

4.5.1.

GOAL

MANAGE AND CONSERVE THE WATER RESOURCES AND AQUATIC LIFE IN THE KRUGERSDORP AREA, IN RELATION TO POLLUTION AND EXTINCTION.

Adverse impacts on freshwater systems are of critical concern given both the scarcity of and increased demand for water in the Krugersdorp region. Salinisation, eutrophication, and pollution by heavy metals, mine dump effluents, pesticides, insecticides and herbicides have considerably reduced both surface- and ground-water quality (Lloyd : 1992).

Catchment changes through afforestation, alien plant invasion, irrigation and over-abstraction, and human settlement have reduced natural run-off and ground water levels substantially, and invasive plants and animals jeopardise indigenous plant and animal life in Krugersdorp (Hellowell : 1986).

Moreover, wetlands have undergone considerable alteration and degradation: through drainage for infilling for urban and industrial development and waste disposal; mining for the extraction of sand, clay and peat; as well as through a range of other activities (Vymazal : 1995). Wetlands play a crucial role in terms of providing clean water, maintaining biodiversity, protecting areas against floods, buffers against toxins, and providing areas for recreation, education and research (Dugan : 1993).

The Krugersdorp Town Council's approach to conserving the water resources and aquatic

life in Krugersdorp, has five main issues:

1. Conserve wetlands in the Krugersdorp region.
2. Support efforts to stabilise human population and reduce resource consumption to achieve socially and ecologically sustainable development.
3. Prevent the introduction of potentially harmful alien species and control and eradicate alien species which threaten water resources and in so doing prevent extinction of aquatic life.
4. Restore and rehabilitate degraded water resources.
5. Maintain and strengthen existing arrangements to conserve Krugersdorp's water resources and to prevent pollution of these resources.

4.5.2.

POLICY OBJECTIVE 4.1

CONSERVE THE WETLANDS IN THE KRUGERSDORP REGION.

The degradation of Krugersdorp's wetlands, and their vulnerability to human-induced changes in catchment, is a concern recognised by the Krugersdorp Town Council as requiring urgent action and cooperation between a diversity of sectors and institutions.

Wetlands represent some of our most threatened ecosystems, and as such their conservation and sustainable use is a crucial component of this policy. The Krugersdorp Town Council acknowledges that insufficient attention has been given in the past to secure the effective management of the regions wetlands, and it undertakes to ensure that the future management of such areas will take place in an integrated manner, in accordance with the objective of conserving and using biological resources sustainably, and to

minimise adverse impacts on aquatic biodiversity and to limit pollution. This approach will recognise and accommodate conflicting needs and values.

POLICY AND STRATEGY

Wherever possible and appropriate, the Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Support the principle that basic domestic needs and environmental needs will enjoy priority use of water, the latter through reserving quantity, quality and reliability of water required to maintain natural flow regimes and habitat complexity for aquatic and riparian ecosystems.
2. Facilitate the development of appropriate legislation to secure the conservation of Krugersdorp's wetlands, and to maintain their ecological and socio-economic function.
3. Promote the conservation of wetlands in Krugersdorp to form part of a National System of Protected Wetlands.
4. Prevent inappropriate activities and development around wetland, and that of linear development in particular. Ensure that adequate buffer strips are retained around wetlands, taking due cognisance of the 1:50 year floodline.
5. Through establishing appropriate mechanisms and procedures, recognise the functions and values of wetlands in resource planning, management and decision-making.
6. Ensure that considerations relating to the biodiversity of aquatic areas and wetlands are adequately incorporated into the national policy on integrated pollution control and waste management.

7. Determine the impact of aquaculture species and management practices on biodiversity, and develop appropriate guidelines for aquaculture developments.

4.5.3.

POLICY OBJECTIVE 4.2

SUPPORT EFFORTS TO STABILISE HUMAN POPULATION AND REDUCE RESOURCE CONSUMPTION TO ACHIEVE SOCIALLY AND ECOLOGICALLY SUSTAINABLE DEVELOPMENT.

POLICY AND STRATEGY

In collaboration with interested and affected parties, the Krugersdorp Town Council will:

1. Ensure that considerations relating to the conservation and sustainable use of water resources are adequately incorporated into the Krugersdorp's policy on population.
2. Develop comprehensive strategies to address population, production and consumption patterns and their impact on the water resources in Krugersdorp.
3. Support initiatives to reduce water consumption by promoting the elimination or reduction of waste at source, and its re-use, recycling, and recovery.
4. Through a review of the education system, and the use of such mechanisms as the media:
 - 4.1. Increase awareness about the links between human population growth, resource consumption, and water resources in Krugersdorp;
 - 4.2. Increase awareness about the lifestyle choices that affect water resources, and promote sustainable living based on the opportunities derived from the sustainable use of water resources.

4.5.4

POLICY OBJECTIVE 4.3

PREVENT THE INTRODUCTION OF POTENTIALLY HARMFUL ALIEN SPECIES AND CONTROL AND ERADICATE ALIEN SPECIES WHICH THREATEN WATER RESOURCES.

POLICY AND STRATEGY

To achieve this objective, the Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Develop control and eradication programmes, and provide ongoing support to existing programmes, based on a priority-rating system and in relation to costs and resources.
2. Prevent wherever feasible the unintentional introduction of alien organisms to the water resources of Krugersdorp.
3. Support and strengthen the development of biological and other control methods for alien organisms that threaten water resources.
4. Improve understanding concerning the impacts of alien organisms on water resources.

4.5.5.

POLICY OBJECTIVE 4.4

RESTORE AND REHABILITATE DEGRADED WATER RESOURCES AND IN SO DOING PREVENT EXTINCTION OF AQUATIC LIFE.

The Krugersdorp Town Council recognises that the rehabilitation of degraded water resources in Krugersdorp is a major task, requiring the commitment of significant resources from both the Town Council and the private sector.

POLICY AND STRATEGY

Within this context, the Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Develop a program to rehabilitate degraded water resources. This will:
 - 1.1. Identify key sites for restoration, based upon biological and socio-economic criteria.
 - 1.2. Support research to enhance techniques to restore degraded water resources in Krugersdorp.
 - 1.3. Monitor the effectiveness of rehabilitation measures.
 - 1.4. Continue to regulate and minimise adverse impacts of harmful activities on the water resources.
2. Require rehabilitation measures to be undertaken as an integral part of environmental impact assessments, to minimise potential negative impacts and to enhance possible positive impacts on water resources.

4.5.6.

POLICY OBJECTIVE 4.5

*MAINTAIN AND STRENGTHEN EXISTING ARRANGEMENTS TO CONSERVE
KRUGERSDORP'S WATER RESOURCES.*

POLICY AND STRATEGY

In collaboration of interested and affected parties, the Krugersdorp Town Council will:

1. Strengthen existing support for research on the improved understanding of the structure, function and composition of Krugersdorp's aquatic ecosystems.
2. Promote and support measures to manage conflict arising from the conservation and use of water resources.

4.6.

4.6.1.



***THE PROMOTION AND CONSERVATION OF RECREATIONAL AREAS IN
KRUGERSDORP.***

Parks and recreational areas in Krugersdorp serve a great purpose to the community of Krugersdorp and their visitors. . Therefore it is important that these areas are sufficiently managed to ensure that they are conserved and not in any way degraded for use by future generations. Some of these areas also serve as cultural resources and as a result need to be managed in such a way that these areas will be conserved for future generations.

In the line of this the Krugersdorp Town Council's approach to promote and conserve the recreational areas in Krugersdorp, has five main issues:

1. Identify and manage cultural resources found in recreational areas.
2. Identify important components which pose a threat to the recreational areas in Krugersdorp.
3. Efficiently manage a representative and effective system for the recreational areas in Krugersdorp.
4. Restore and rehabilitate degraded areas in the recreational areas of Krugersdorp.
5. Control and prevent the introduction of alien organisms into the recreational areas.

4.6.2.



IDENTIFY AND MANAGE CULTURAL RESOURCES FOUND IN THE RECREATIONAL AREAS IN KRUGERSDORP.

One of the most important steps towards achieving this goal (Goal 5), requires the identification and effective managing of cultural resources in the recreational areas in Krugersdorp. To achieve the described objective, the Krugersdorp Municipality will take a systematic approach towards the management of these cultural resources and their threatening processes.

POLICY AND STRATEGY

In particular, the Krugersdorp Town Council, in collaboration with relevant interested and affected parties, undertakes to:

1. Identify cultural resources.
2. Identify processes that have or are likely to have significant adverse impacts on these cultural resource areas.
3. Develop a mechanism to effectively manage these threatening processes.

4.6.3.

POLICY OBJECTIVE 5.2

IDENTIFY IMPORTANT COMPONENTS WHICH POSE A THREAT TO THE RECREATIONAL AREAS IN KRUGERSDORP.

The Krugersdorp Town Council is well aware of the fact that a number of components pose a threat to the continual existence of recreational areas. These areas are usually classified as an expense to the Municipality, as the upkeep of these areas is paid by the Krugersdorp Municipality.

POLICY AND STRATEGY

The Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Identify; using biological, social and economic criteria, components which pose a threat to the recreational areas in Krugersdorp.
2. Identify processes or activities that have or are likely to have significant adverse impacts on the recreational areas in Krugersdorp.
3. Monitor the effects of these (no. 2) processes and activities.

4. Undertake the research necessary to improve understanding of the consequences of threatening processes and other components of the recreational areas.
5. Develop a mechanism to manage these areas, to place it in the public domain, and to ensure that decisions taken upon the best applicable knowledge available.

4.6.4.

POLICY OBJECTIVE 5.3

EFFICIENTLY MANAGE A REPRESENTATIVE AND EFFECTIVE SYSTEM OF THE RECREATIONAL AREAS IN KRUGERSDORP.

POLICY AND STRATEGY

In order to achieve the above mentioned objective, the Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Manage the recreational areas in order to conserve and protect the existing ecosystems.
2. Ensure the involvement of local communities and other interested and affected parties in decisions concerning the recreational areas in Krugersdorp. Such involvement is crucial to the development of an effective and integrated recreational system.

4.6.5.

POLICY OBJECTIVE 5.4

*RESTORE AND REHABILITATE DEGRADED AREAS IN THE
RECREATIONAL AREAS OF KRUGERSDORP.*

POLICY STRATEGY

The Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Restore indigenous plants and animals in degraded areas in the recreational areas of Krugersdorp.
2. Develop a programme to rehabilitate the degraded systems of the recreational areas in Krugersdorp.
3. Require rehabilitation measures to be undertaken as an integral part of environmental impact assessments, to minimise potential negative impacts and to enhance possible positive impacts on recreational areas within the Krugersdorp Municipal boundaries.
4. Support research on rehabilitation processes for recreational and other protected areas.

4.6.6.

POLICY OBJECTIVE 5.5

CONTROL AND PREVENT THE INTRODUCTION OF ALIEN ORGANISMS INTO THE RECREATIONAL AREAS.

POLICY AND STRATEGY

The Krugersdorp Town Council is aware of the impacts of harmful alien organisms in the recreational areas in Krugersdorp. Therefore to achieve this objective, the Krugersdorp Town Council, in collaboration with interested and affected parties, will:

1. Develop control and eradication programmes, and provide ongoing support to existing programmes, based on a priority-rating system and in relation to costs and resources. This will consider threats posed to the recreational areas in Krugersdorp.
2. Prevent the unintentional introduction of alien organisms to the recreational areas in Krugersdorp.
3. Improve understanding concerning the impacts of alien organisms on the recreational areas in Krugersdorp.
4. Improve public education and awareness concerning the impacts of alien organisms on recreational areas in Krugersdorp.

5.

CONCLUSIONS

This research pinpointed the fact that in the Krugersdorp region, five different kinds of natural areas existed. Each area had its own natural characteristics that differed from each other. In view of this it was impossible to draw up one all encompassing environmental policy, therefore it was decided to investigate each area separately.

The Vleilorie Bird Reserve, Krugersdorp Game Reserve and the Parks in the Krugersdorp area have similar characteristics as far as fauna and flora is concerned. It also appears that no formal legislation towards the conservation and management of these natural areas exists. The only supporting rights are those South African Laws that affect Game Reserves and other declared nature reserves. The Ridge area and Wetlands have both been neglected, largely owing to the fact that the value of these natural areas is not known to the Krugersdorp Town Council and the residents of Krugersdorp. In the light of these facts the policy for the management and conservation of these natural areas was formulated.

Now that the overall procedure has been highlighted, it is possible to draw conclusions about each of the relevant steps outlined in the statement of the problem.

1. Five natural features which include the Krugersdorp Game Reserve, Vleilorie Bird Reserve, Ridge area, Wetlands and Parks exist in the Krugersdorp region. Each area has its own separate and distinct natural characteristics. Although one policy had to be drawn up, it was decided to formulate separate goals, issues, objectives, and policy statements for each individual area.

2. The environmental policy formulation for the natural areas in Krugersdorp focused on the following:
 - 2.1 An encompassing goal for each natural area was formulated in order to address the specific problem in each of these areas. These goals coincide as far as the conservation of plants, birds, animals and aquatic life is concerned, as the aim of an environmental policy is to protect and conserve the main features of these specific natural areas. No natural area in Krugersdorp is identical and therefore different goals for water resources, diverse landscapes and topography will occur.
 - 2.2 The identification of issues that have an effect on the relevant features prove to mostly coincide with one another. The main reason is that the goals are generally the same and a number of characteristics of different natural areas correspond. In spite of the concurrence each area has issues that differ according to that area's specific features.
 - 2.3 Policy objectives were formulated by using the different issues of each natural area and formulating specific objectives that need to be met in order to obtain the main goal of the natural area. Therefore the policy objectives differ as these objectives are only relevant for a specific natural area that has its own unique characteristics.
 - 2.4 Policy statements and strategies are unique for each objective and each natural area. These guidelines will only have a positive impact on an area to which it applies. In some instances the policy statement or strategy may appear to be the same, but it will have different effects on each natural

area if applied.

The following limitations exist within this policy:

- fragmentation;
- conflict of interests; and
- ineffective enforcement.

Gaps within this policy, refer to the following:

- lack of an integrated and holistic approach to natural areas; and
- conservation and management outside these natural areas.

Now that a policy for the natural areas in Krugersdorp has been formulated, it will hopefully be introduced and applied by the Krugersdorp Town Council during 1998.

This policy includes rights relating specifically to the environment, and will, with correct application, ensure the sustainable development and conservation of these natural areas in Krugersdorp.

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