

2004

State of the Environment Report



Ekurhuleni
Metropolitan Municipality
Department of Environment and Tourism





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Suggested Citation: Ekurhuleni Metropolitan Municipality (2004). Ekurhuleni State of the Environment Report 2004 Summary. Ekurhuleni Metropolitan Municipality.

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This document can be downloaded from the following websites:

www.environment.gov.za
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This project was funded by The Department of Environmental Affairs and Tourism and NORAD.

This document was designed and produced by Peace Profiles,
Tel +27 11 462-3363, 082 804 8558



Ekurhuleni, the industrial hub of SA, faces major challenges in ensuring a more equitable distribution of economic benefits, while managing the environmental impacts associated with its industrial, mining and related activities. Many of us live in close proximity to industrial nodes, and so our quality and enjoyment of life is negatively affected through the exposure to health and safety risks, increased competition for employment and limited access to open space recreational facilities.

Ekurhuleni, with its history based largely on mining, boasts a rich natural and cultural heritage which serves as potential for tourism development. Most notably is the network of wetlands and pans, and open spaces, which function to house a large diversity of fauna and flora and to conserve our precious water resources. Our Ramsar site is the flagship of our natural heritage and this heritage needs to be protected for our children's enjoyment and well-being.

A major force driving environmental change is the prevailing cultural values, norms and practices which currently lead to the over-consumption of finite resources. This is fuelled by business' focus on profits and continued access to productive resources. Our limited understanding of natural processes and lack of awareness in changing values and beliefs compound this situation. Sound environmental management requires an understanding and awareness of the detrimental effects of unsustainable patterns of consumption and production, as well as a growing interest in the preservation of natural and cultural heritage.

With this in mind, this First Year State of the Environment Report has been compiled with the purpose of providing information on the condition of the social, economic and natural environment to both decision makers and the public, in order for them to understand and manage environmental problems. The provision of this information is intended to set the basis for the development of policy and strategies. It is also intended to allow the monitoring of progress and performance of implemented policy and programmes, and to raise public awareness of environmental issues.

It is my privilege therefore as Mayor to present this First Year State of the Environment Report and I am confident that it will be an invaluable resource for all who use it.

DUMA MOSES NKOSI
Executive Mayor
Ekurhuleni Metropolitan Municipality



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1. INTRODUCTION

7he First Year State of the Environment Report for 2003/2004 was compiled to provide information to decision-makers to enable them to make informed decisions about the environment in Ekurhuleni. This document presents a summary of the above report, and functions to provide information on the condition of the existing environment in Ekurhuleni to the public, and to raise awareness of environmental issues. Therefore, both these documents will contribute to the progress toward the achievement of sustainable development.

Sustainable Development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

World Commission on Environment and Development, 1987

“In order to achieve sustainable development, environmental protection needs to be part of the development process & cannot be considered in isolation from it.”

United Nations, 1992

What is the environment?

Many people believe that the term “environment” relates to the natural environment only, for example animals, plants and wetlands. However, there are 3 main components to the “environment”: the **natural** environment, the **social** environment and the **economic** environment.

What is a State of the Environment Report?

A State of the Environment Report (SoER) is a tool to measure changes in the condition of the environment. It asks and attempts to answer the following questions:

- ▶ What causes environmental change?
- ▶ What is the current condition of the environment?
- ▶ How does this condition affect other components of the environment?
- ▶ What are we as society doing about the environment?



We use the **Drivers-Pressures-State-Impacts-Responses** (DPSIR) framework to organize our information, and we use indicators to describe each component of the DPSIR framework. This report reports only on the major indicators for Ekurhuleni.

| Component | Definition | Question Asked | Example |
|-----------------------|--|---|--|
| Driving forces | Are the human activities, that when combined with environmental conditions, cause environmental change | What causes environmental change in Ekurhuleni? | The use of coal and wood for cooking and heating, particularly in low-income areas, causes the release of air pollutants |
| Pressures | Are exerted on the environment as a result of human activities (driving forces) | | |
| State | Is the condition or quality of the environment | What is the condition of the environment? | There is a poor indoor air quality |
| Impacts | Are the consequences of the pressures (i.e. the environmental responses)? | How does this affect the environment? | This causes respiratory disease |
| Responses | Are the societal actions taken to address the changes in the state of the environment | What are we doing about it? | Government increases the access to electricity |

What are indicators?

The word 'indicate' means to make known or to point out. Indicators are measurements that give us information about the changes in the condition of something. Some specific examples of indicators are:

- ▶ Temperature and rainfall – these tell us about the weather conditions;
- ▶ Body temperature – this tells us about our health;
- ▶ Gross Domestic Product (GDP) – tells us about the strength of the economy; and
- ▶ The Consumer Price Index (CPIX) – tells us how affordable market goods and services are.

Because we cannot measure everything, a core set of indicators has been chosen to describe the condition of the environment in Ekurhuleni. These selectors were based on the following:

- ▶ Existing, accepted indicators detailed in the National Core Set of Environmental Indicators, Global Reporting Initiative, Commission on Sustainable Development Indicators, and other indicator programmes;
- ▶ The guidelines for the selection of indicators as set out by the Department of Environmental Affairs and Tourism;
- ▶ Indicators were selected by considering the issues identified through the stakeholder consultation workshops; and
- ▶ The availability of data.

The next review phase of this report will need to incorporate a more comprehensive indicator selection process.

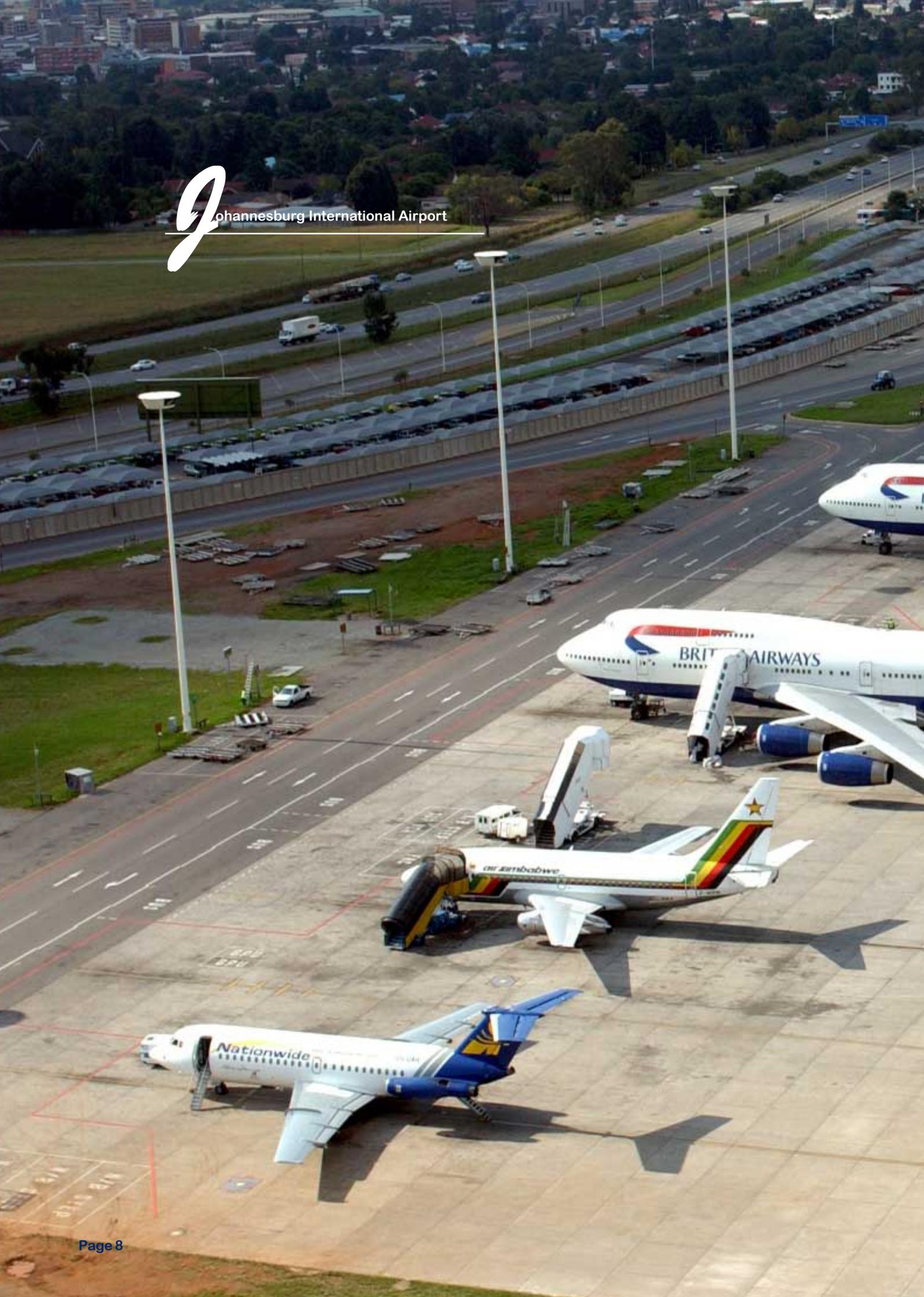
The table below provides a list of selected major indicators proposed for use in the SoE reporting process for Ekurhuleni. For the entire set of indicators used please consult the full document.

| THEME | INDICATOR |
|--|---|
| Human Environment | Highest education level of people older than 20 years |
| | Dependency ratio |
| | Unemployment rate |
| | Gini-coefficient |
| | Levels of access to water, sanitation, electricity and refuse removal services |
| | HIV/AIDS prevalence rate |
| | Incidences of respiratory tract infections |
| | Incidences of crime |
| Cultural Heritage | Number of proclaimed heritage sites |
| | Incidences of damage to heritage resources |
| | Number of visitors to heritage sites |
| | Number of heritage Impact Assessments undertaken |
| Land and Soils | Change in land use per land use category |
| | Percentage of high potential agricultural land lost per land use category |
| | Land degradation: levels of erosion and veld condition |
| | Condition of urban open space |
| | Levels of soil contamination |
| Water Resources | Surface water flow and runoff |
| | Electrical conductivity in relation to monitoring forum targets |
| | Ecological status of rivers |
| Atmosphere | Emissions of priority pollutants from scheduled processes |
| | Levels of transport and age of vehicles |
| | Trends in domestic fuel usage |
| | SO ₂ levels in industrial areas |
| | Soiling Index in residential areas |
| | Incidence of respiratory disease |
| Biodiversity & Conservation | Species diversity |
| | Number of threatened species per taxonomic group |
| | Area under formal conservation status |
| | Percentage of areas of conservation importance under formal conservation status |
| | Area invaded by invasive alien plants |
| | Status of wetlands and pans |
| Waste Management | Waste generation per income group |
| | Status and lifespan of landfill sites |
| | Waste disposal volumes (including hazardous waste at landfill sites) |
| | Number of illegal and communal waste dumps |
| Environmental Management | Incorporation and implementation of environmental considerations into the IDP process |
| | Staffing capacity |
| | Number of development applications commented on |
| | Number of businesses with certified environmental management systems (EMS) |
| | Number of policies and by-laws |





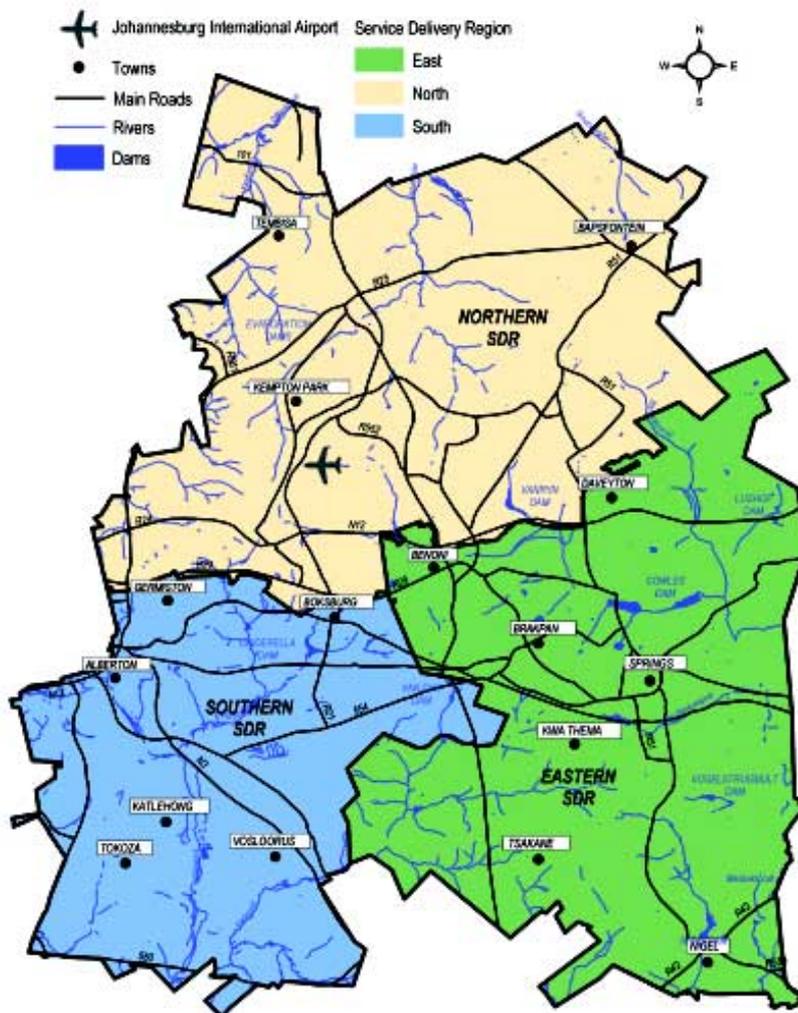
Johannesburg International Airport



2. WELCOME TO EKURHULENI

The Ekurhuleni Metropolitan Municipality (EMM) is a relatively new municipality that was formed in 2000 from the joining of several local municipalities of the former East Rand. It is one of 6 metropolitan municipalities in South Africa, and is known as the “industrial hub” of the country. It covers approximately 1923 km².

0 3 6 12 18 24 Kilometers



Climate

Ekurhuleni falls in the summer rainfall region of South Africa and experiences hot wet summers and cool dry winters. Rainfall is often characterized by intense thunderstorms that fall mainly in the late afternoon. Frost is common in winter.

Terrain

The EMM area covers the convergence of the Limpopo and Vaal river catchments, and has a flat terrain with elevations ranging from 1460 to 1760 metres. The most notable ridges are the quartzite ridges in the Meyersdal area on the western border of the metro.

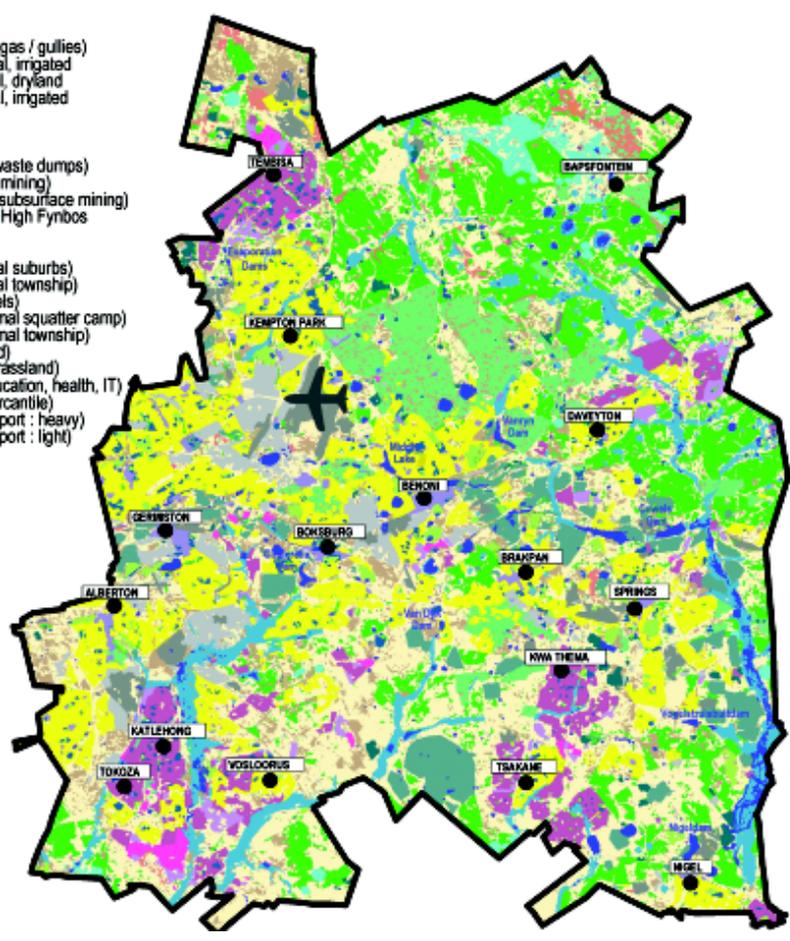






Land Cover

- Bare Rock and Soil (erosion : dongas / gullies)
- Cultivated, permanent, commercial, irrigated
- Cultivated, temporary, commercial, dryland
- Cultivated, temporary, commercial, irrigated
- Forest Plantations (Acacia spp)
- Forest Plantations (Pine spp)
- Improved Grassland
- Mines & Quarries (mine tailings, waste dumps)
- Mines & Quarries (surface-based mining)
- Mines & Quarries (underground / subsurface mining)
- Thicket, Bushland, Bush Clumps, High Fynbos
- Unimproved (natural) Grassland
- Urban / Built-up (residential)
- Urban / Built-up (residential, formal suburbs)
- Urban / Built-up (residential, formal township)
- Urban / Built-up (residential, hostels)
- Urban / Built-up (residential, informal squatter camp)
- Urban / Built-up (residential, informal township)
- Urban / Built-up (residential, mixed)
- Urban / Built-up (smallholdings, grassland)
- Urban / Built-up, (commercial, education, health, IT)
- Urban / Built-up, (commercial, mercantile)
- Urban / Built-up, (industrial / transport : heavy)
- Urban / Built-up, (industrial / transport : light)
- Waterbodies
- Wetlands



Biodiversity

Large numbers of threatened plant species occur in Ekurhuleni making it an important area for conservation. There is a large proportion of untransformed grassland, which includes 2 grassland types, the Moist Cool Highveld Grassland and the Rocky Highveld Grassland. Of particular note is the occurrence of the Bleskokspruit Ramsar Wetland, which is one of 17 internationally significant wetlands in South Africa.

Population and economics

There are 2.4 million people living in Ekurhuleni, three quarters of who are Black Africans. The predominant languages spoken include isiZulu, Afrikaans, English, Sepedi and Sesotho. Population densities are high especially in the former "townships" and informal residential areas. Approximately 22 % of the population resides in informal and inadequate housing. Despite having a large proportion of the population of working age, the unemployment rate is high, around 40 %.

Despite the area historically being one of the largest producers of gold, the major economic sectors now include manufacturing, wholesale and trade, energy, and services and finance, with manufacturing and industry in Ekurhuleni comprising 40 % of all activity in the Province. Mining contributes only 2 % to Ekurhuleni economy.





3. WHAT CAUSES ENVIRONMENTAL CHANGE IN EKURHULENI?

7 The driving forces of environmental change include the social and economic influences and activities, that when combined with environmental conditions, underpin environmental change. Drivers influencing change in Ekurhuleni occur at various levels including international, national, provincial and local scales. The major drivers applicable to Ekurhuleni are:

- ▶ **International conventions**, treaties and declarations including most notably the Ramsar Convention; Convention on Biodiversity, Montreal and Kyoto Protocols, CITES and NEPAD;
- ▶ **National and provincial policy and legislation** including the National Environmental Management Act; the National Water Act; the Development Facilitation Act; Mineral and Petroleum Resources Development Act; Provincial policy on Red Data species; Provincial policy on the protection of ridges;
- ▶ **Human settlements** – an increase in urbanisation results in the transformation of natural land, and the increased generation of pollution and waste;
- ▶ **Economic activities**, including past and present mining; industry and manufacturing; transport; energy; agriculture; tourism and recreation; the informal sector. These activities influence the environment in various ways: they transform and degrade natural lands; they cause pollution of water, air and soil resources; Tourism may promote the conservation of habitat;
- ▶ **Spatial planning** including the integrated development plan (IDP) and the spatial development framework (SDF) – land use planning is meant to conserve both the built and natural environments by the appropriate development of land
- ▶ **Waste generation** – the generation of domestic, industrial, mining and medical waste if not properly managed, causes contamination of water, air and soil resources, which in turn impact on human health.





4. HUMAN ENVIRONMENT

The relationship between the human environment and the natural environment is based on reciprocity and inter-dependence. Human activity brings about changes in the natural environment, and environmental conditions and change in turn influence human well-being, cultural activities, social networks and livelihood strategies. Because of South Africa's historical land allocation and planning policies, many settlements are located on unsuitable land posing safety and health hazards to the people who live there.

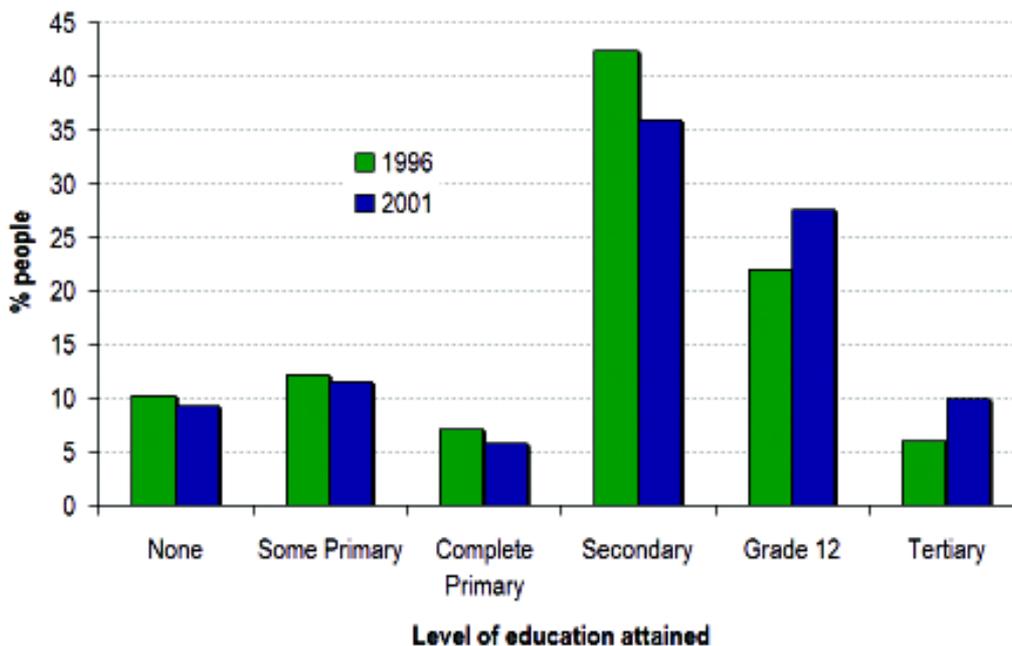
The indicators used to describe the human environment are:

- ▶ Level of education and literacy;
- ▶ Dependency ratio;
- ▶ Level of unemployment;
- ▶ Income disparity as described by the Gini co-efficient;
- ▶ Access to water, sanitation, electricity and refuse removal services;
- ▶ HIV/AIDS prevalence;
- ▶ Incidences of other notifiable diseases including respiratory tract infections and diarrhoea; and
- ▶ Crime rate.

Education and literacy

The EMM had a fairly high adult literacy rate of 84 %, slightly below the national figure of 86 % in 1996. The proportion of people older than 20 years who have reached Grade 12 and tertiary qualifications has increased from 1996 to 2001. The proportions with lower levels of education have decreased.

Highest education levels of people over 20 years old



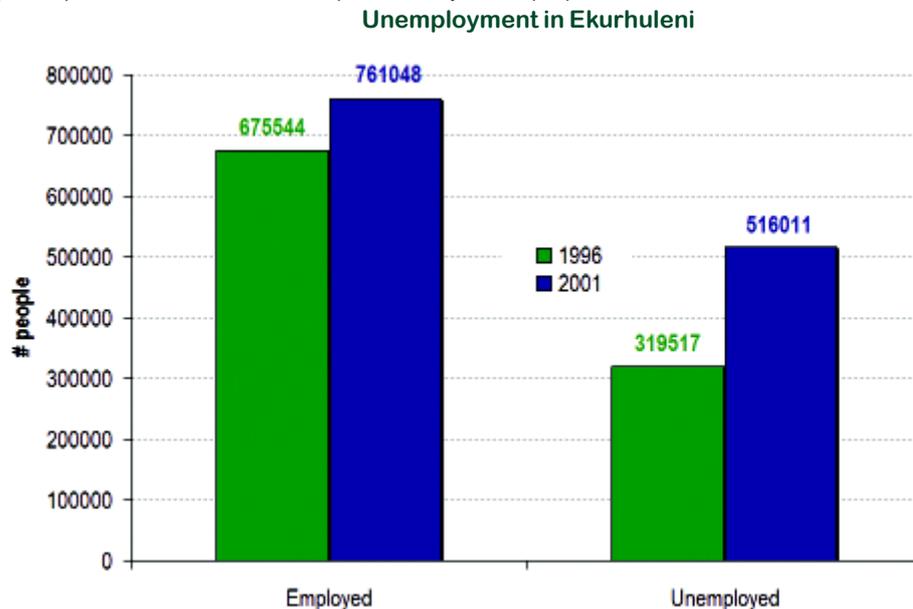
Source: Census 1996 and 2001 (Statistics South Africa)

Dependency ratio

The dependency was calculated as 39.1 %, which means that for every 100 working people, there are 39 dependent on them. This is an underestimate as a large proportion of the labour force is unemployed.

Unemployment

The unemployment rate has increased from 32.1 % in 1996 to 40.4 % in 2001. More Black Africans are unemployed than the other race groups while the unemployment rate amongst females (51.8 %) is marginally higher than that for males (48.2 %). The informal sector is an important safety net for people in Ekurhuleni.



Source: Census 1996 and 2001 (Statistics South Africa)

Income

The Gini-coefficient is a measure of income equality ranging from 0 (perfect equality) to 1 (total inequality). The Ekurhuleni Gini-co-efficient stands at 0.58 indicating an unequal distribution of wealth. Approximately 98 % of the population living below the poverty line are Black.

Basic needs

Water

In 2001 98 % of households had access to piped water while 42 % had access to piped water inside their dwelling.

Sanitation

In 2001 84 % of households had adequate sanitation facilities, while 5.1 % had no facilities at all. This is slightly higher than the Gauteng figure of 3.6 %.

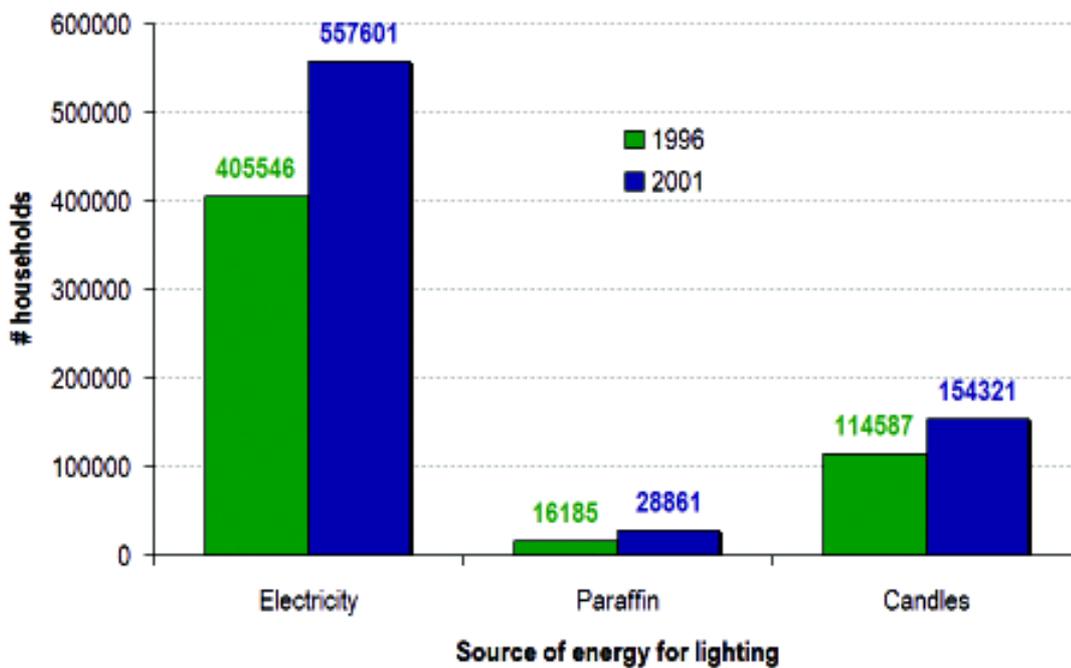
Refuse removal

The majority of households (82 %) have formal refuse removal by the local authority at least once a week.

Energy

Although the number of households with access to electricity for lighting has increased, the percentages of households with access have decreased slightly. The majority of households in 2001 had access to electricity for heating, lighting and cooking (61.73 %, 74.84 % and 65.63 % respectively). Of concern is that 19.12 % and 25.54 % of households are using coal for heating and paraffin for cooking respectively. Domestic coal usage mainly in informal residential areas is directly related to air pollution and the consequent health risks.

Number of households with access to various energy sources for lighting



Source: Census 1996 and 2001 (Statistics South Africa)

Health

HIV/AIDS

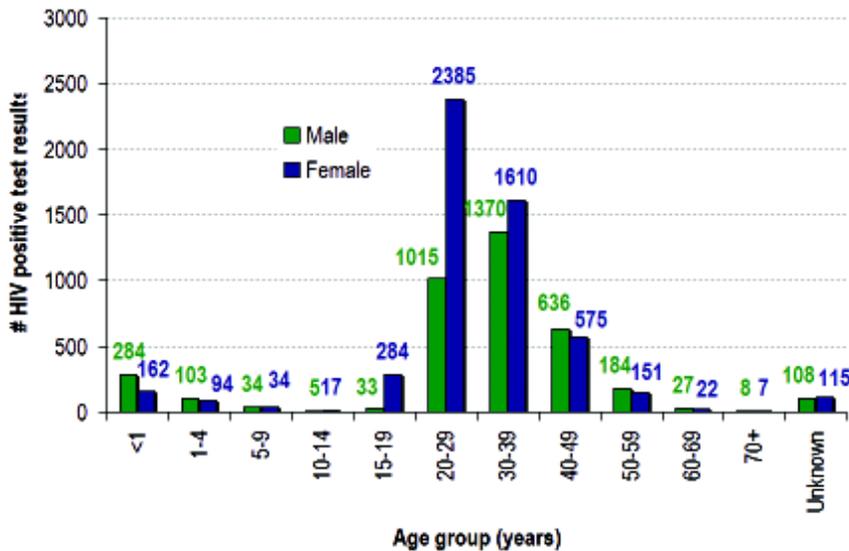
52.3 % of HIV tests conducted at public health institutions between July 2001 and June 2002 were positive. The prevalence is higher in females (58 %) as opposed to males (41 %). The age group 20 – 39 years is most at risk of infection, comprising 68.2 % of all positive cases.

A

ccess to a community water supply source



Comparison of male and female HIV positive test results (July 2001 to June 2002)



Source: National Health Laboratory Services (2002)

Other notifiable illnesses

There were 2 725 cases of lower respiratory tract infections in children younger than 5 years, in the first quarter of 2003, while the general incidence rate is 13 people per 1 000 of the population. Approximately 12.3 children out of every 1 000 have had diarrhoea.

Crime

There were 9 539 reported murders and 18 298 reported rapes in the 9 year period from April 1994 to March 2003. This is on average 1 060 murders and 2 033 rapes per year. Ekurhuleni had the third most reported murders and the fourth most reported rapes in 2001 out of the six metropolitan municipalities in South Africa.

Strategic priorities

The strength of the relationship between poverty and the environment needs to be considered in all developmental planning. The following need to be addressed:

- ▶ Inequality and poverty: areas of poverty are associated with low levels of access to water, sanitation, refuse removal services and electricity; these areas are often located near to unhealthy areas;
- ▶ HIV/AIDS: the high prevalence rate in Ekurhuleni should be addressed;
- ▶ Crime and unemployment: arguably the most important issues faced by South African society;
- ▶ Environmental education; and
- ▶ Tourism.

W

omen in traditional Ndebele dress



5. CULTURAL HERITAGE

Cultural heritage is an integral part of the environment and refers to archaeological and historical sites, national monuments, buildings and structures, works of art, literature and music, oral traditions and museum collections. The cultural heritage in Ekurhuleni has been shaped by almost continuous human occupation over the last 500 000 years. This began with human occupation during the Early Stone Age stretching through the Iron Age settlement to colonial settlement in the 1840s.

While human use of the area was focused on hunting, gathering and farming in pre-historical times, modern agriculture, mining and industrial development have played a large role in the changing landscape since the 1880s. The cultural heritage of Ekurhuleni is now dominated by manifestations in terms of mining, industry, commerce and urban settlement.

There is a lack of information regarding African heritage and archaeological resources in Ekurhuleni, however the Iron Age Archaeological sites in the Meyersdal/Klipriviersberg area are currently being destroyed, and it is recommended that the area be formally protected.

Recommended future indicators for cultural heritage include:

- ▶ Number of proclaimed heritage sites;
- ▶ Incidences of damage to heritage resources;
- ▶ Number of visitors to heritage sites; and
- ▶ Number of heritage Impact Assessments undertaken.

Strategic priorities

The priorities of the EMM include:

- ▶ Further assessment of the status of cultural heritage resources, particularly archaeological resources and those related to African heritage and history;
- ▶ Degradation of archaeological resources in the Klipriviersberg/Meyersdal area;
- ▶ Raising the public awareness of Ekurhuleni's cultural heritage;
- ▶ Developing public-private partnerships to restore architectural heritage; and
- ▶ Developing heritage tourism.





ultivation in Ekurhuleni



6. LAND & SOILS

Because of urbanization, a growing population and a flourishing industrial economy in Ekurhuleni, and also because of the presence of land of high agricultural and conservation value, there exists a great deal of development pressure on land in the metro. Furthermore, the legacy of mining and poor past land use planning has severely impacted upon the productivity of land and has rendered large areas unusable. In many areas there is widespread degradation of land and water resources and the sustainability of these resources is threatened. In many cases, no reliable data are available, and so general descriptions are given.

The indicators selected to monitor land and soils are given below:

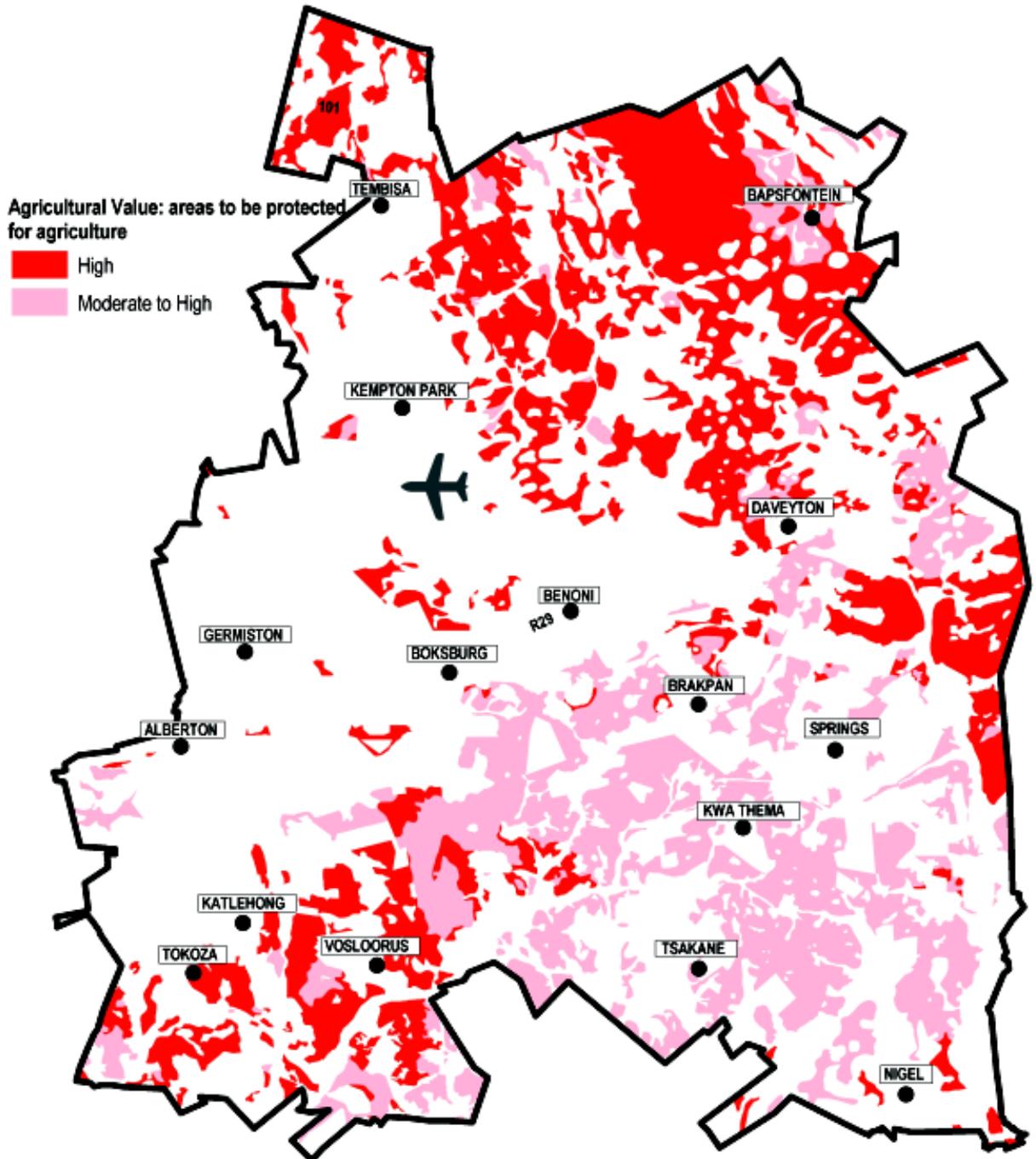
- ▶ Agricultural potential;
- ▶ Land use change; and
- ▶ Land degradation as described by veld condition and erosion.



Agricultural potential

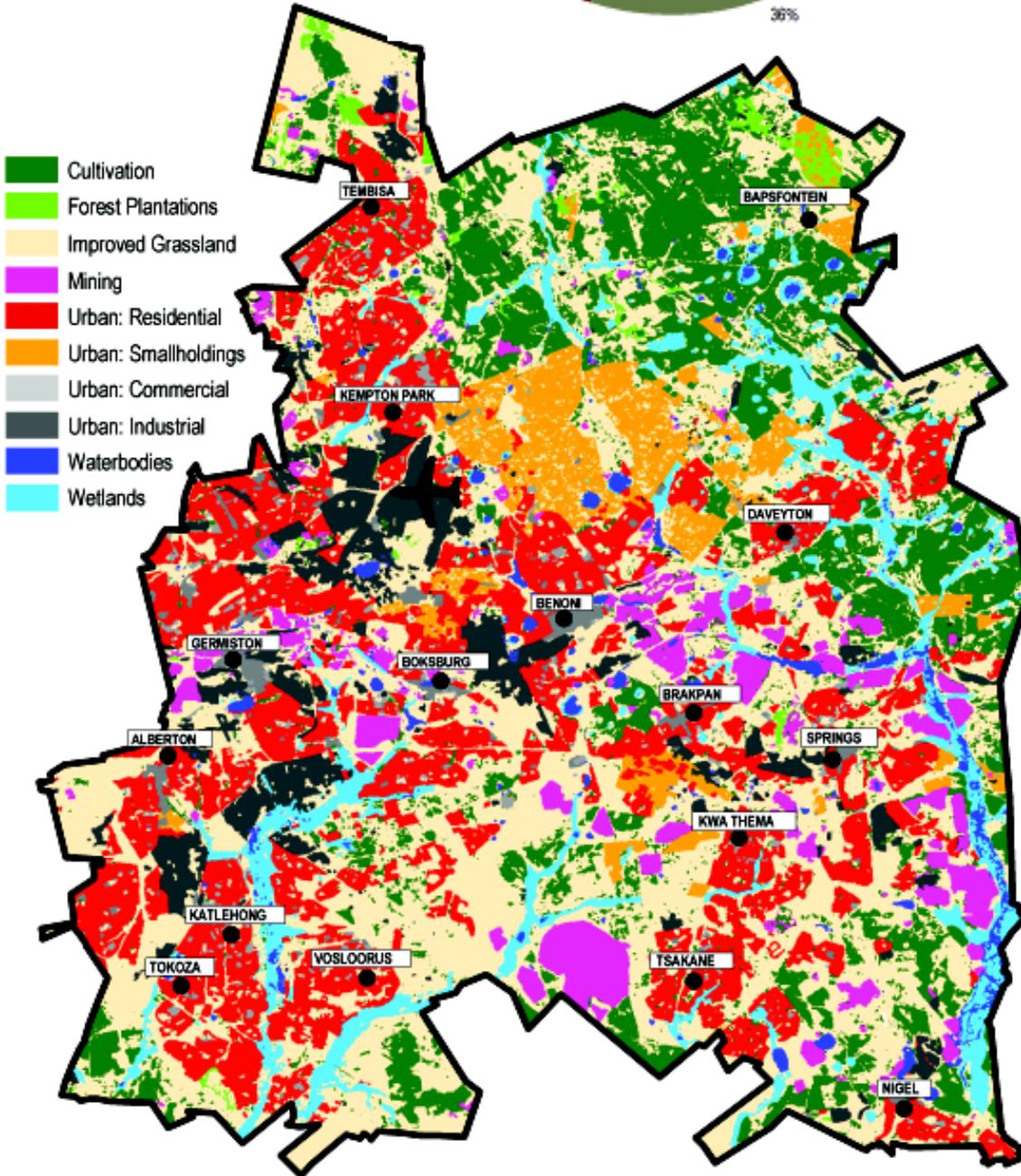
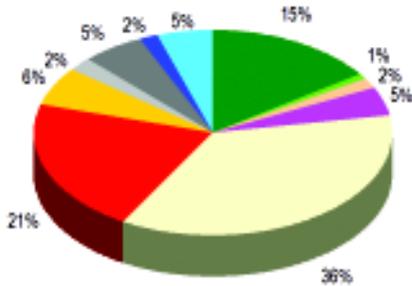
Approximately 13 % of the EMM is regarded as high potential land suitable for agricultural production, while 12 % is regarded as moderate to high. Furthermore, the Gauteng Agricultural Potential Atlas identified and mapped 41 % of the EMM as being of importance for protection for agriculture. 22 % of this is of high importance, while 19 % is of moderate to high importance. These areas need to be reserved and protected from development.

Areas to be protected for agriculture



Source: Gauteng Agricultural Potential Atlas (GDACE)

Land Use



Source: National Land Cover 2000 (CSIR and ARC) (data provided by DEAT)



Land degradation

Ekurhuleni, despite the obvious negative impacts of mining, mostly has a lower level of degradation than for Gauteng, which is one of the least degraded provinces in South Africa.

Veld condition

This indicator measures the condition of grasslands. Nearly 10% of the EMM has grasslands of poor quality that require attention.

| GRASS COVER | % OF AREA | Hectares |
|----------------|-----------|----------|
| Good condition | 31 | 59 816 |
| Intermediate | 9.2 | 17 641 |
| Bad condition | 3.1 | 5 696 |
| Very low | 2.9 | 5 488 |
| Bare soil | 0.7 | 1 358 |
| Alien trees | 2.8 | 5 439 |

Source: Calculated from the Gauteng Natural Resources Audit (Institute for Soil Climate and Water)

Erosion

The risk of erosion has been mapped for the grassland areas in Ekurhuleni. Most of the areas mapped (about 60 %) fall into the low to very low categories. In 2002, only 19 hectares were classified as degraded, indicating that soil erosion is not currently an important issue in Ekurhuleni.

| EROSION HAZARD | Soil Loss | % OF AREA | Hectares |
|----------------|-----------|-----------|----------|
| Very High | >60 | 0.2 | 418 |
| High | 25-60 | 2 | 3 874 |
| Moderate | 12-25 | 4.5 | 8 588 |
| Low | 5-12 | 6 | 11 626 |
| Very low | <5 | 55.5 | 106 489 |

Source: Calculated from the Gauteng Natural Resources Audit (Institute for Soil Climate and Water)

Strategic priorities

The priorities of the EMM include:

- ▶ The EMM is required by law to consider all environmental legislation and policy in all development planning and activities;
- ▶ Implementing programmes to address the unsustainable use of land and open spaces: of particular note is the loss of open space; loss of moderate to high value agricultural lands; illegal dumping; and rehabilitation of degraded derelict lands ;
- ▶ Initiatives to better control mining activities and address the rehabilitation of degraded mining areas; and
- ▶ The need for co-operative governance with respect to mining.





Marievale Bird Sanctuary at the Blesbokspruit Ramsar Wetland



6. WATER QUALITY

Water is a fundamental resource and is indispensable to life. Because SA is located largely in a semi-arid part of the world, SA's water resources are scarce. It is estimated that the total requirement for water use will double over the next 30 years. Water is highly susceptible to pollution from point sources like industrial discharges, and from non-point sources, like leachates from waste disposal, mining and agricultural wastes and from informal settlements. Mining and industry have contributed significantly to poor water quality in Ekurhuleni.

The indicators selected to describe Ekurhuleni's water resources are:

- ▶ Water quantity;
- ▶ Water quality as described by electrical conductivity; and
- ▶ The ecological status of rivers.

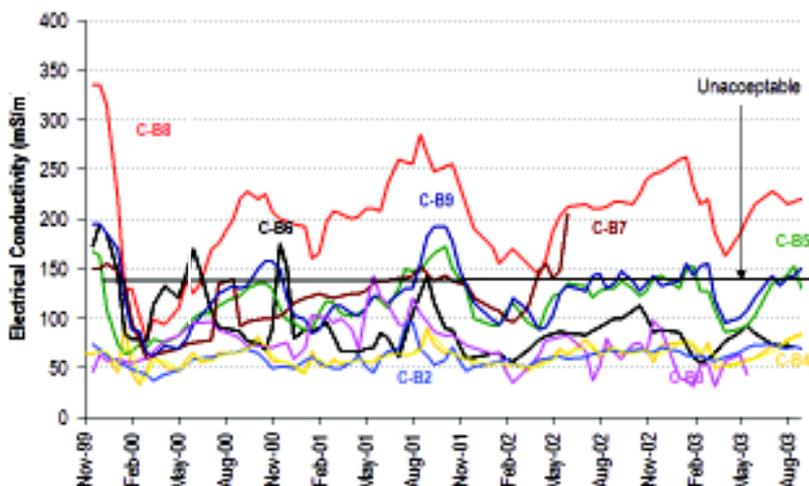
Water quantity and stormwater

Natural streamflows in Ekurhuleni are overshadowed by contributions from sewage works and mining. Due to increases in urbanisation, surface water runoff has increased by as much as 300 %. The higher river flood peaks and levels pose a flooding threat to all developments (mainly informal housing) within the designated flood zones. Many parts of Tembisa, Katlehong, Tsakane and Nigel are at risk.

Water quality

The quality of the Klip River, Natalspruit and Blesbokspruit rivers is generally poor. All three rivers show signs of significant salt loading as a result of excess minewater. The water quality of the Klip River improves as the river passes through the wetlands in Ekurhuleni. The majority of sampling points in the Klip River meet the monitoring forum targets, with the water at only one point having unacceptable quality throughout the period.

Electrical conductivity trends at different sampling points along the Klip River (1999-2003)

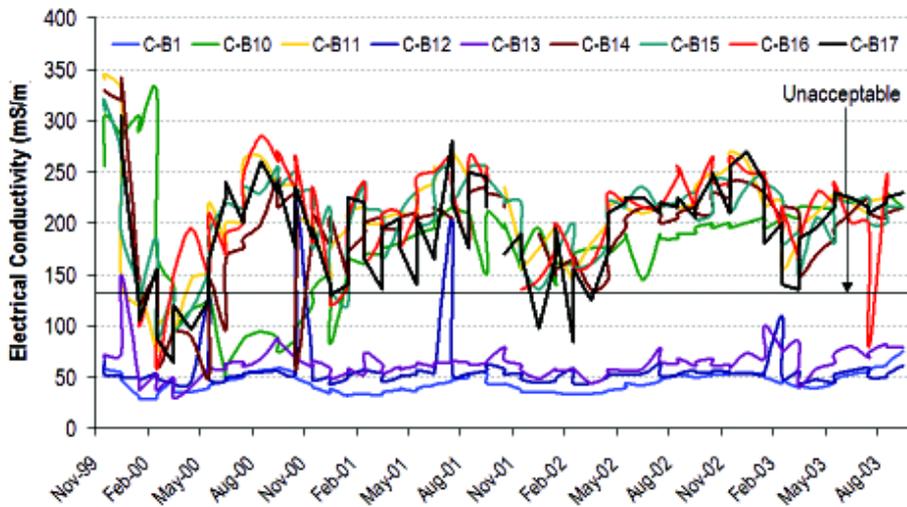


Source: Klip River Monitoring Forum (2003)

The Blesbokspruit has low water quality with respect to salt load, which indicates the negative influences of mining. Most areas have unacceptable levels of salts in terms of targets set by the monitoring forum.



Electrical conductivity trends at different sampling points along the Blesbokspuit (1999-2003)



Source: Blesbokspuit Monitoring Forum (2003)

The rivers and dams in the urban areas of Kempton Park, Brakpan, Springs and Nigel show evidence of elevated bacterial contamination resulting from sanitation problems.

Data regarding groundwater quality are generally not available and where available are unreliable and fragmented. An accurate picture of groundwater quality can therefore not be established at this time.

Ecological status of rivers

No rivers remain in their natural state, although the habitats and riparian vegetation remain largely intact in the Upper Klip and middle Blesbokspuit respectively. Aquatic biota and water quality are generally in poor to fair condition.

| River Health Indicator | Upper Klip River | Natalspruit | Lower Klip River | Upper Blesbokspuit | Mid Blesbokspuit | Lower Blesbokspuit |
|------------------------|------------------|-------------|------------------|--------------------|------------------|--------------------|
| Habitat | Good | Fair | Fair | Poor | Fair | Fair |
| Aquatic Invertebrates | Poor | Poor | Poor | Poor | Poor | Fair |
| Fish | Poor | Poor | Poor | Poor | Poor | Poor |
| Riparian Vegetation | Fair | Fair | Poor | Poor | Good | Poor |
| Water quality | Poor | Poor | Fair | Poor | Poor | Poor |

Source: River Health Programme

Strategic priorities

The priorities in terms of water in Ekurhuleni include:

- ▶ An improvement of flood management: this is associated with illegal developments within the 1:50 year floodline of rivers;
- ▶ The development of a wetland and water resource management policy in association with the relevant authorities;
- ▶ The involvement of the Working for Water Programme in Ekurhuleni;
- ▶ The dewatering of mines;
- ▶ The control of discharges from mines and industry;
- ▶ The assessment of discharges and dumping from informal settlements and townships; and
- ▶ The co-ordination of water resource management with disaster management.





Early morning brown haze over Ekurhuleni



8. ATMOSPHERE

Air pollution is arguably the most important environmental issue in the Gauteng province. It can be defined as the emission of chemical compounds into the air resulting from human activities and natural activities, and is associated with human health and global warming. Sources of air pollution vary in Ekurhuleni, and include heavy industry, a coal fired power station, mines and associated infrastructure, waste sites, transport, veld fires and domestic fuel combustion.

| Source type | Types of Emissions | % contribution |
|-----------------------|--|----------------|
| Industrial activities | Particulate matter (iron oxides, copper oxides, lead & chrome oxides) Gases (NO _x , CO ₂ , CO, SO ₂ , dioxins, formaldehydes, phenols) | 20 |
| Domestic fuels use | Particulate matter Gases (CO ₂ , CO, SO ₂) | 60 |
| Motor vehicles | Particulate matter Gases (CO ₂ , CO, SO ₂) | 7 |
| Mine dumps | Particulate matter (dust) | 9 |
| Veld fires | Particulate matter Gases (CO ₂ , CO, SO ₂) | 3 |
| Other | Particulate matter Gases (CO ₂ , CO, SO ₂) | 1 |

Source: Ekurhuleni Metropolitan Municipality (2003)

The indicators for air pollution are:

- ▶ Emissions from scheduled processes;
- ▶ Level of transport;
- ▶ Domestic fuel usage;
- ▶ Levels of sulphur dioxide (SO₂);
- ▶ Levels of smoke; and
- ▶ Incidence of respiratory disease.

Emissions of priority pollutants from scheduled processes

In 1995 there were approximately 327 scheduled processes in operation in Ekurhuleni. These industries contribute significantly to air pollution in Ekurhuleni.

| | |
|--------------------------|------------|
| Total Particulate matter | 20 417 |
| Sulphur dioxide | 48 326 |
| Nitrogen oxides | 56 132 |
| Carbon dioxide | 13 162 414 |
| Carbon monoxide | 567 700 |
| Non-methane hydrocarbons | 85 040 |

Source: Scheduled processes database (DEAT, 1995)

Transport

Exhaust emissions from motor vehicles is considered to be the most significant regional source of air pollution, particularly in urban areas. Vehicles emit greenhouse gases (including carbon monoxide, carbon dioxide and nitrogen oxides), particulate matter (carbon and lead) and sulphur dioxides. Given the strategic location of Ekurhuleni, its road, rail and air networks support high levels of traffic. Emissions from aircraft using Johannesburg International Airport result in hydrocarbon, nitrogen oxide, carbon monoxide and particulate pollution.

Domestic fuel usage

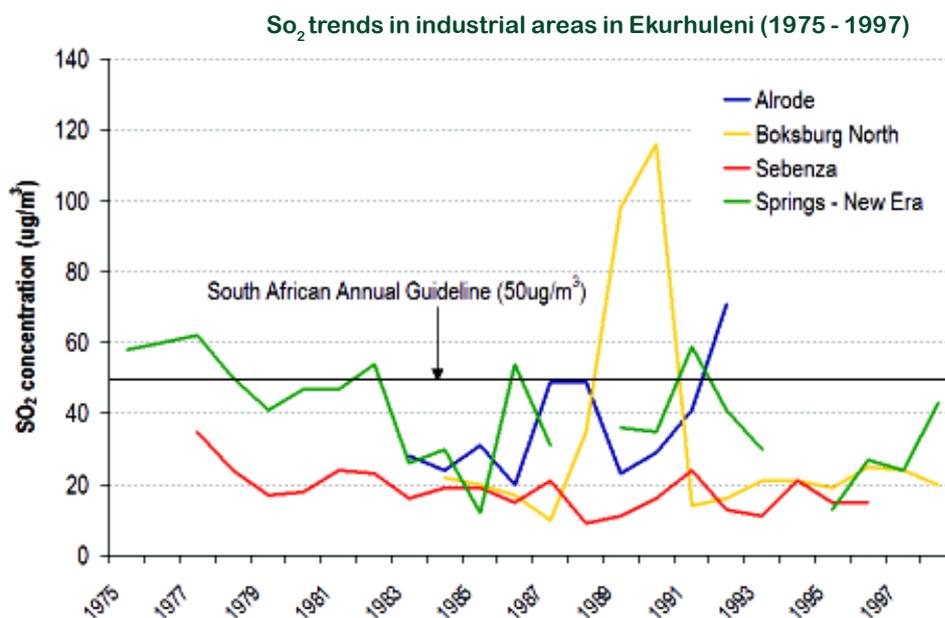
Indoor air pollution resulting from the use of coal and wood for lighting, heating and cooking has been shown to contribute to up to 60 % of the pollution load in winter. This is considered the most important environmental health-related issue, especially in low-income areas. It is most obvious during winter when there is a build up of pollution levels below 300 metres above ground level, due to inversion conditions. Many households in Ekurhuleni still use coal for heating and cooking.

| Energy source used | % Households | | | |
|--------------------|--------------|---------|---------|---------|
| | Lighting | Heating | Cooking | Average |
| Electricity | 74.84 | 61.73 | 65.63 | 67.4 |
| Gas | 0.21 | 1.62 | 0.97 | 0.93 |
| Paraffin | 3.87 | 13.32 | 25.54 | 14.23 |
| Wood | n/a | 1.44 | 0.33 | 0.89 |
| Coal | n/a | 19.12 | 6.39 | 12.76 |
| Animal dung | n/a | 0.14 | 0.22 | 0.18 |
| Solar | 0.15 | 0.15 | 0.23 | 0.27 |
| Candles | 20.72 | n/a | n/a | 20.72 |
| Other | 0.19 | 2.48 | 0.15 | 0.94 |

Source: Census 2001 (Statistics South Africa)

SO₂ levels in industrial areas

With the exception of the Boksburg North and Springs industrial areas in 1990, average annual sulphur dioxide levels have generally been below the South African annual guideline since 1975. This does not mean that SO₂ levels are acceptable, rather it is believed that the guidelines are insufficient and require revision.

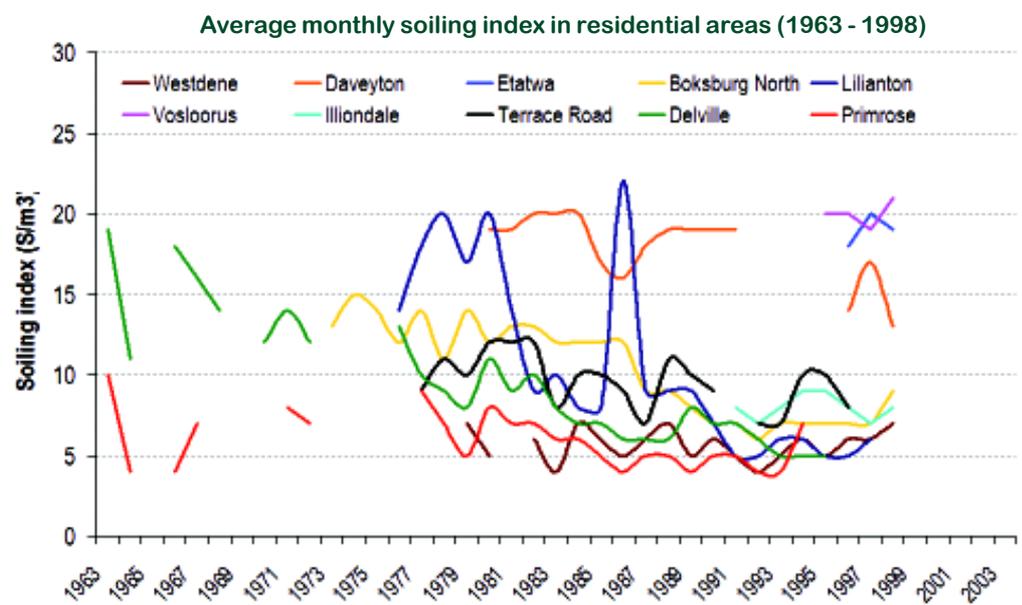


Source: Ekurhuleni Metropolitan Municipality (2003)



Smoke in residential areas

Smoke levels, as measured by the 'soiling index', are higher in industrial areas and low income residential areas like Daveyton, than in other residential areas and commercial areas. Certain areas for example Delville, Boksburg North and Daveyton have experienced decreases in smoke levels.



Source: Ekurhuleni Metropolitan Municipality (2003)

Respiratory disease

Although there is evidence throughout the world of the negative health effects of indoor air pollution resulting from domestic use of coal and wood for cooking and heating, specifically in children younger than 5 year old, there has been no causal link between the incidences of lower respiratory tract infections and indoor pollution in Ekurhuleni. The southern, eastern and northern service delivery regions of Ekurhuleni experienced an incidence rate in the first quarter of 2003 of 12, 14 and 13 per 1 000 children respectively. Respiratory incidence in relation to indoor air pollution needs to be investigated.

Strategic priorities

The priorities in terms of air pollution in Ekurhuleni include:

- ▶ The electrification and implementation of alternate energy sources for low-income informal areas in order to address indoor air pollution and related health problems;
- ▶ The improvement of air quality monitoring and enforcement of standards; and
- ▶ The development of an air quality management plan for Ekurhuleni.

9

Giant Bullfrog (*Pyxicephalus adspersus*)



9. BIODIVERSITY & CONSERVATION

Biodiversity refers to the variability among living organisms and the ecological complexes in which they occur. It includes different levels of organization, including genes, individuals, populations, species, communities and landscapes. Ecological processes are also included in this term. Given the high levels of economic and industrial activity active in Ekurhuleni and its surrounds, the biodiversity and natural ecosystems are increasingly threatened by a wide range of activities.

The indicators describing biodiversity are:

- ▶ Species diversity;
- ▶ Threatened species;
- ▶ Areas under formal conservation status;
- ▶ Areas of conservation importance under formal protection;
- ▶ Area invaded by invasive alien plants; and
- ▶ The status of wetlands and pans.

Species diversity

Ekurhuleni is an important area for biodiversity in the grassland biome and in Gauteng. A large proportion of biodiversity in the grassland biome and in Gauteng occurs in the Ekurhuleni.

| Taxonomic group | Number of species in Ekurhuleni | % of grassland total | % of Gauteng total |
|-----------------|---------------------------------|----------------------|--------------------|
| Plants | 1 644 | 49 | 54 |
| Mammals | Unknown | Unknown | Unknown |
| Birds | 255 | 73 | 78 |
| Amphibians | 14 | 38 | 56 |
| Reptiles | 41 | Unknown | 47 |
| Invertebrates | Unknown | Unknown | Unknown |

Source: various

Threatened species

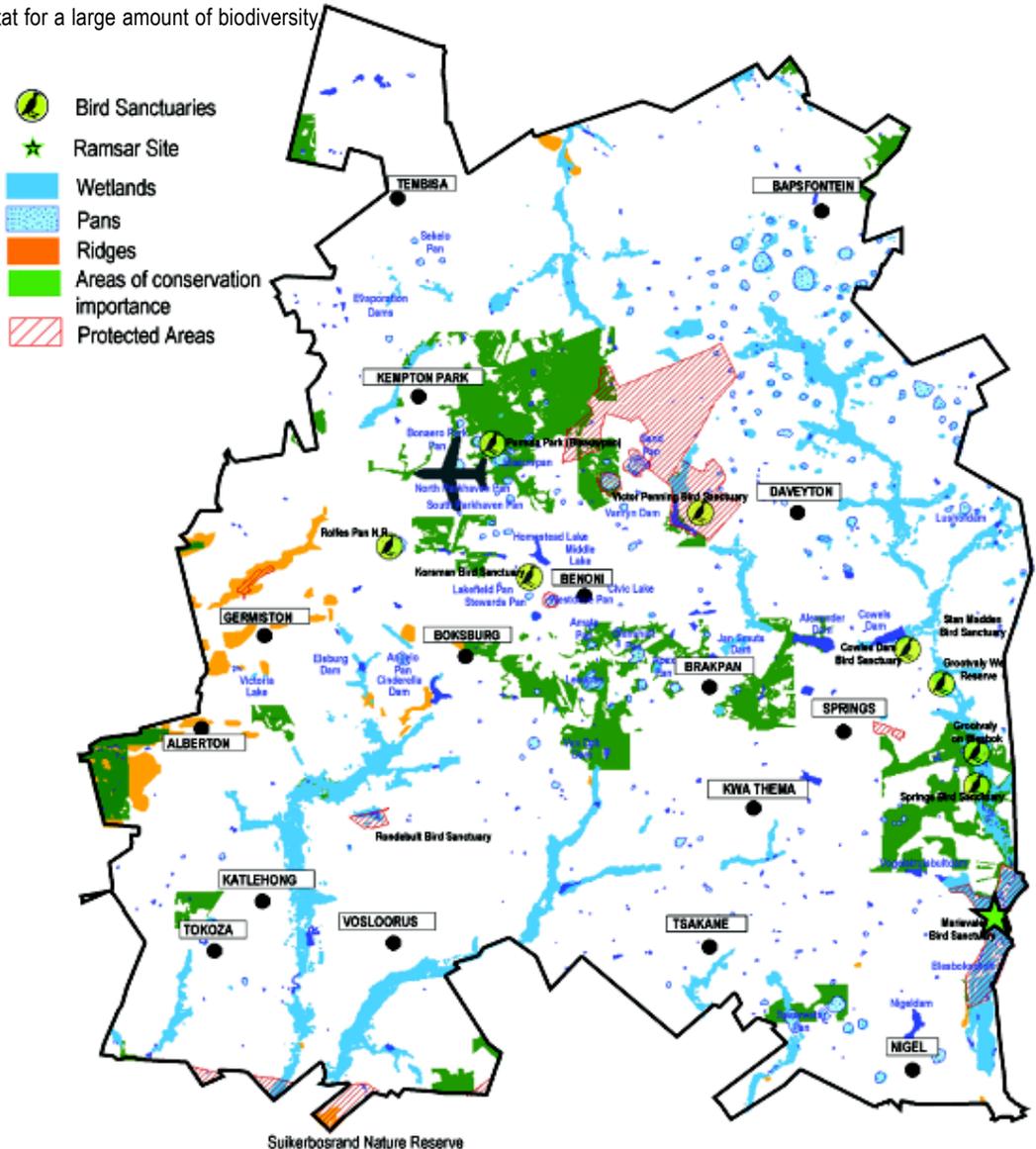
This indicator reports on the number of endangered species according to the IUCN categories. *Kadia beswickii* and *Delospermum pupureum* are the most important plants species to protect. There are no critically endangered or endangered bird species that occur in Ekurhuleni. Most of the threatened birds are near-threatened or vulnerable for example the African Marsh Harrier (*Circus ranivorous*), the Blue Crane (*Anthropoides paradiseus*) and Grass Owl (*Tyto capensis*). The Striped Harlequin snake (*Homoroselaps dorsalis*) is the only threatened reptile, while the Rough-haired Golden Mole (*Amblysomus hottentotus*) is the only threatened naturally occurring mammal. The Giant Bullfrog (*Pyxicephalus adspersus*) is the only threatened amphibian species although the Common River Frog, the Cape River Frog, Striped Stream Frog and Weel's Running Frog are restricted to Gauteng and their populations are reported to be declining.

| Taxonomic group | Number of Threatened Species |
|-----------------|------------------------------|
| Plants | 8 |
| Mammals | 1 |
| Birds | 21 |
| Amphibians | 1 |
| Reptiles | 1 |
| Invertebrates* | 21 |

* The IUCN status of invertebrates is still being established. This represents the number of species identified as priority species in Gauteng
Source: Various

Areas of conservation importance

GDACE has mapped all areas necessary to protect biodiversity in the Gauteng Conservation Plan and the areas are shown in the map below. These areas of conservation importance cover 9.79 % of Ekurhuleni, while only 0.97 % currently falls within formally protected areas. Conservancies do however cover a large area in the smallholdings north of Benoni. Few of the important areas including wetlands and pans are protected. Ridges are important as they provide habitat for a large amount of biodiversity



Invasive alien plants

Invading alien plants (IAPs) pose a serious threat to biodiversity through the degradation of habitat and disruption of ecosystem processes. There is a lack of data regarding the distribution and density of alien invasive plants in the Ekurhuleni, mainly because the Working for Water Programme is not currently active in Ekurhuleni. It is evident that the riparian and mining areas are heavily invaded by various woody aliens, most notably wattles and bluegums. Other important species include Lantana, poplars and bugweed. The EMM has a responsibility in terms of the IDP requirements to formulate and implement an alien clearing management plan.

Wetlands and pans

The wetlands and pans represent the most important habitat type in Ekurhuleni in that they play a vital role in the regulation of water and the harboring of biodiversity. The Blesbokspruit wetland near Springs has been declared a Ramsar site. Important wetlands also occur along the Natalspruit and the Kaalspruit.

There are many pans in flatter north-eastern part of Ekurhuleni of which approximately 96 % have been very severely impacted on by human activities. Housing developments, roads and alien vegetation pose the biggest threats to the integrity of the pans. The ecological state of the rivers in Ekurhuleni is generally poor.

Strategic priorities

The priorities in terms of biodiversity in Ekurhuleni include:

- ▶ Increasing the area under formal protection for conservation purposes;
- ▶ Gaining an understanding of the functioning and status of aquatic habitats including the associated open spaces, grasslands and agricultural areas;
- ▶ The consideration in land use planning and development of all applicable environmental legislation and policy, of particular note are the GDACE conservation policies; and
- ▶ The development of an alien plant management plan.





10. WASTE MANAGEMENT

Waste is defined in the Environment Conservation Act 73 of 1989 as “any matter, whether, gaseous, liquid or solid or any combination thereof, originating from any residential, commercial or industrial or agricultural area identified by the Minister of the Environmental Affairs and Tourism as an undesirable or superfluous by-product, emission, residue or remainder of any process or activity”.

It includes general, hazardous and health care risk waste. Although local authorities are expected to provide a waste management service to all sectors of the community, the DWAF has the mandate to manage waste disposal sites.

Waste is seen as a driver of environmental change in that it affects aesthetics, water quality, air quality and land.

Waste Generation

There are currently no figures to describe the volumes of waste generated in Ekurhuleni. Studies in South Africa show that waste generation varies according to socio-economic status. The average generation rates for low, middle and high income groups have been estimated to be 0.1, 0.3 and 0.4 tonnes per person per year.

Landfill sites in Ekurhuleni

| Landfill Site | Lifespan Available (Years) | Type of waste handled | | | | | | | | | Gas & Groundwater Monitoring | Classification |
|---------------|----------------------------|-----------------------|------------|---------------|---------------|-------|-----|-----------------|------------|---------------|---|-------------------|
| | | Domestic | Industrial | Garden refuse | Unsound Foods | Tyres | Ash | Building Rubble | Paper pulp | Sludge/Liquid | | |
| Platkop | 47 | X | X | X | X | X | X | X | | | 7 monitoring boreholes 12 gas probes 15 additional monitoring boreholes | GLB - |
| Simmer & Jack | 5 - 10 | X | X | X | X | X | X | X | | | No monitoring boreholes 14 probes, 4 wells 2 vent shafts | GLB - |
| Weltevreden | 42 | X | X | X | X | X | X | X | | | 7 monitoring boreholes 5 gas probes in southern & western area | GLB - |
| Rietfontein | 20 – 38 | X | X | X | X | X | X | X | | | 2 additional monitoring boreholes 5 gas probes | GLB + |
| Rooikraal | 38 | X | X | X | X | X | X | X | X | | 7 monitoring boreholes 7 gas probes | GLB (applied for) |

GLB: Waste Class: General Size: Large B: no significant leachate
 GLB*: Waste Class: General Size: Large B*: significant leachate
 GMB: Waste Class: General Size: Medium B: no significant leachate
 GMB*: Waste Class: General Size: Medium B*: no significant leachate
 GSB: Waste Class: General Size: Small B: no significant leachate



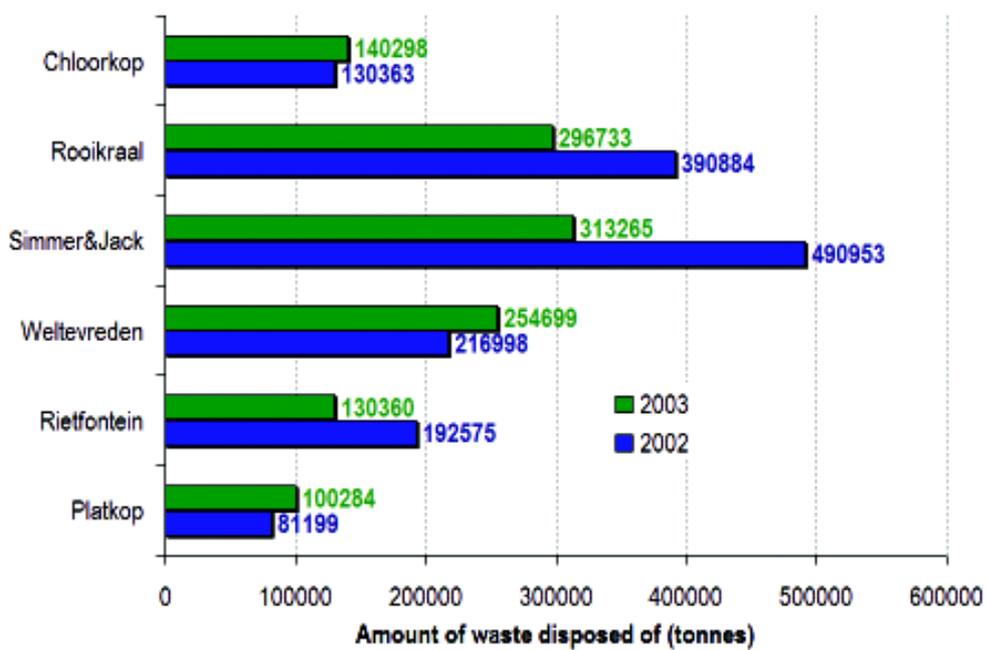




Waste disposal

A total of 1.235 million tones of domestic and industrial waste were disposed to landfill sites in 2003. Rietfontein, Simmer and Jack and Rooikraal have experienced a marked decrease from July 2002 to June 2003 in the volume of waste handled, while that for Platkop, Weltevreden and Chloorkop have increased slightly.

Waste disposal to landfill sites from July 2002 to 2003



Hazardous Waste

Little information exists on the volumes of hazardous waste disposed of to landfill sites in Ekurhuleni. Holfontein waste site, just outside Ekurhuleni is the primary hazardous waste facility in Gauteng. Municipal waste sites in Ekurhuleni are permitted as general waste sites; however Platkop and Weltevreden landfills are able to receive certain specified hazardous wastes. From the limited information available, it appears that 346 000 tonnes per year of hazardous waste is received by waste sites in Ekurhuleni.

Strategic priorities

The priorities for waste include:

- ▶ Provision of refuse removal services in low-income areas to address illegal dumping; and
- ▶ Promotion of waste minimization and recycling initiatives.

11. ENVIRONMENTAL MANAGEMENT

 Environmental management is the process of administering, supervising or handling the environment in order to achieve a desired outcome, usually the protection or conservation of the environment. The role of local government in environmental management has expanded substantially over the last decade. A key component influencing the success of environmental management at local government level is the principle of co-operative governance. Due to the fragmented nature of SA's legislation and the complex organizational structure of government departments responsible for the environment, and the general lack of capacity of local government, the need for co-operative governance is emphasized. The Gauteng Department of Agriculture, Environment, Conservation, and the co-operation and involvement of all relevant departments within the EMM are key to the success of Ekurhuleni's environmental management

Policies and by-laws

The following policies relating to environmental management have been developed:

- ▶ Agricultural development;
- ▶ Disaster management;
- ▶ Dolomite risk management; and
- ▶ Maintenance of open spaces.

The following by-laws have been developed:

- ▶ Solid waste;
- ▶ Waste water;
- ▶ Planting, pruning, removal and treatment of street trees; and
- ▶ Regulation of parks and open spaces.

IDP and environment

Many environmental considerations have not been taken into account in the formulation of the metro's IDP and SDF. The most significant omission of the IDP is that appropriate environmental legislation and policy has not been considered. This SoER will however function to close these gaps. It is planned that the SoE and IDP processes will be aligned such that the environment will be considered in all decision making.

Staffing

2003 saw the establishment of formal staffing structures for the environment and tourism department. Although capacity and resources are still lacking, the structures created will address this to some extent.

Development applications

Although formalised staffing structures have been recently instituted, a meaningful number of authorisations were commented on in the first quarter of 2003. 4 exemptions, 19 scoping documents, and 6 environmental impact assessments, and 10 environmental management programme reports were commented on.

Environmental management systems

There is a growing awareness the business and industry is required to manage the effect that their activities have on the environment, including the air, water, land, natural resources and biodiversity and people. Monitoring the number of certified environmental management systems (EMSs) provides a way to understand private sector commitment to environmental management and corporate sustainability. To date there are 25 business who have certified SABS ISO 14001 environmental management systems

Strategic priorities

Overall priorities for the management of the environment in Ekurhuleni include:

- ▶ Improving co-operative governance both internally within the departments of the EMM, and externally, particularly relating to mining and development planning;
- ▶ Improving the sharing and management of information between departments within the EMM;
- ▶ Incorporation of environmental legislation and policy into planning;
- ▶ Capacity building and training of EMM officials in environmental management;
- ▶ Involving business and industry in a co-regulatory framework of governance; and
- ▶ Improving civil awareness and involvement in environmental issues through awareness campaigns.

12. WHAT ARE WE DOING ABOUT THE ENVIRONMENT?

| SOCIAL ENVIRONMENT | |
|----------------------|---|
| International | <ul style="list-style-type: none"> • Millennium Development Goals • New Partnership for Africa's Development (NEPAD) • Johannesburg Plan of Implementation and Johannesburg Declaration |
| National | <ul style="list-style-type: none"> • The Constitution of South Africa Act 108 of 1996 • Housing Act No 107 of 1997 • Population Policy for South Africa • Working for Water Programme |
| Provincial | <ul style="list-style-type: none"> • The Gauteng Declaration • Blue IQ initiatives – Wadeville-Alrode corridor; Gautrain • Urban regeneration projects such as The Kathorus Special Integrated Presidential Project |
| Local | <ul style="list-style-type: none"> • EMM Integrated Development Plan and associated projects for water and sanitation, electricity, housing and transport • Local Economic Development Policy • Ekurhuleni Business Initiative |
| CULTURAL HERITAGE | |
| International | <ul style="list-style-type: none"> • UNESCO Convention protecting natural and cultural heritage |
| National | <ul style="list-style-type: none"> • National Heritage Resources Act 25 of 1999 • Establishment of the South African Heritage Resources Agency • National Environmental Management Act |
| Local | <ul style="list-style-type: none"> • Mapping of heritage sites as part of the Sports, Recreation Arts and Culture department masterplan |

| LAND AND SOILS | |
|-------------------------------|--|
| National | <ul style="list-style-type: none"> • Minerals Act 50 of 1991 • Minerals and petroleum Resources Development Act 29 of 2002 • Soil Conservation Act 76 of 1969 • Conservation of Agricultural Resources Act 43 of 1983 • Development Facilitation Act 67 of 1995 |
| Provincial | <ul style="list-style-type: none"> • Urban Edge delineation in 2000 • Gauteng Spatial Development Framework • Buffer zones project |
| Local | <ul style="list-style-type: none"> • Integrated Development plan and Spatial Development Framework • Northern Service Delivery Region's Environmental Management Framework |
| WATER RESOURCES | |
| National | <ul style="list-style-type: none"> • The National Water Act 36 of 1998 • Water Services Act 107 of 1997 • Water use licensing by DWAF • Wetland mapping initiative by DEAT |
| Provincial | <ul style="list-style-type: none"> • Update of the Water Management System • River Health Programme • The Working for Water Programme |
| Local | <ul style="list-style-type: none"> • Stormwater masterplan study • Klip River and Blesbokspruit Monitoring Forums |
| ATMOSPHERE | |
| International | <ul style="list-style-type: none"> • Montreal Protocol for ozone depletion • United Nations Framework Convention on Climate Change • Kyoto Protocol |
| National | <ul style="list-style-type: none"> • Atmospheric Pollution Prevention Act 45 of 1965 • National Environmental Management: Air Quality Bill |
| Provincial | <ul style="list-style-type: none"> • GDACE is setting up of ambient air monitoring network in Gauteng |
| Local | <ul style="list-style-type: none"> • Airkem Monitoring • Electrification of households |
| BIODIVERSITY AND CONSERVATION | |
| International | <ul style="list-style-type: none"> • Convention of Biodiversity • Ramsar convention on wetlands |
| National | <ul style="list-style-type: none"> • White paper on Biodiversity • National Environmental Management: Biodiversity Bill • National Environmental Management: Protected Areas Bill • Environment Conservation Act 73 of 1989 |
| Provincial | <ul style="list-style-type: none"> • Draft Development Guidelines for Ridges • Draft Red Data Policy for Environmental Impact Evaluations • Gauteng Nature Conservation Ordinance 12 of 1983 • Gauteng Biodiversity Gap Analysis |

| | |
|-------------------------|--|
| Local | <ul style="list-style-type: none"> • Blesbokspruit Management Committee • Klipriviersberg Nature Reserve Association • Bullfrog Pan Conservancy • Working for Wetlands |
| WASTE MANAGEMENT | |
| International | <ul style="list-style-type: none"> • Basel Convention • Bamako Convention |
| National | <ul style="list-style-type: none"> • National Environmental Management: Waste Management Bill • Environment Conservation Act 73 of 1989 • National Water Act 36 of 1996 • Hazardous Substance Act 15 of 1973 • National Waste Management Strategy • Minimum Requirements for Waste Disposal by Landfill 1998 |
| Provincial | <ul style="list-style-type: none"> • Bontle ke Botho competitions • Health Care Risk Waste project • Provincial Waste Recycling and Minimisation Strategy • Recycling initiatives |
| Local | <ul style="list-style-type: none"> • Integrated Development Plan • Integrated Waste Management Plan |

13. ACKNOWLEDGEMENTS

This project would not have been possible without the input of many individuals and organisations, specifically those who provided information and data, and also those who provided comments on the draft document.

We would like to acknowledge both the Department of Environmental Affairs and Tourism and NORAD for providing financial assistance for this project, the Department of Water Affairs and Forestry and the Klip River and Blesbokspruit monitoring forums for the provision of water monitoring data, the various sub-directorates within the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs for their co-operation in providing data and comment, Statistics South Africa who made an extra effort to release Census statistics for the area, and Airkem Monitoring Forum for the provision of air pollution information. Furthermore, the inputs and co-operation of various departments within the Ekurhuleni Metropolitan Municipality were gratefully received.

We would also like to thank the stakeholders who attended workshops including: various local councillors on the environment portfolio committee; various representatives from Ekurhuleni Metropolitan Municipality; Department of Minerals and Energy, AngloGold (ERGO) operations, Department of Water Affairs and Forestry; Gauteng Department of Agriculture, Conservation, Environment and Land Affairs, Aggregate and Sand Producers Association of South Africa, South African Heritage Resource Agency; Gauteng Department of Sports, Recreation, Arts and Culture; Kwa-Thema Working Group; Wildlife and Environmental Society of South Africa; Community Development Forum; Setshaba Community Services; East Rand Metropolitan Association; Airkem; Komanani Project; Gauteng Wetland Action Group; OBCF; Randwater; Bullfrog Pan Conservancy; Klipriviersberg Nature Reserve Association; Environmental Justice Networking Forum.

