

3. STRATEGIC ISSUES AND PRIORITIES

The State of Environment Report demonstrates a very clear relationship of differences between the affluent and poorer communities in Midrand. It also illustrates a close correlation between the availability of infrastructure and services provided and the types of environmental problems being faced by the different communities. Ivory Park, consisting of a high density, low-income community with inadequate infrastructure and services, has resulted in a degraded and sensitive environmental situation. While some environmental problems can be dealt with by the MMLC directly, others require the co-operation of national and provincial government. These are outlined in the gaps and recommendations in the different sections of the SoER. Ivory Park became the main focus for many of the sections because of it containing more than three-quarters of Midrand's population with at least half living in informal housing.

Pollution is a dominant theme in the SoER. For poor households, air and water pollution is the main feature, exacerbated by poor infrastructure networks and limited services. In Ivory Park, the domestic use of coal fires is essentially the main source of air pollution in Midrand, and the illegal dumping of waste and poor sanitation are the major concerns regarding water pollution in the area. For more affluent homes, noise and air pollution from traffic are the main considerations.

The environmental issues covered in the different sections have been represented graphically below (Figure 14 and 15) to identify the types of management responses to the different environmental issues in Midrand, to indicate their sustainability status, and to determine areas of priority for MMLC focus. Land pollution has been identified as the area that has received the least response. The study shows that land pollution is poorly understood both in terms of its extent, and its impacts, and it is an area which needs clarification. This is apparent both at a local and national level. Air and water pollution have received some response, but this is often reactive, which appears more due to limited capacity and resources within the MMLC, rather than a lack of interest and concern. Water pollution in the area, however, must also be dealt with at provincial level, as it cannot be confined to Midrand area alone due to water having no jurisdictional boundaries. Noise pollution is the only environmental issue that is adequately managed by the MMCL (and is also an area where some EHOs are well trained for). This could be explained by the fact that noise pollution is the only pollution issue that falls under the exclusive legislative competence of the MMLC (See under the legal and institutional framework section).

Biodiversity, waste and energy issues have received some attention but again limited resources and capacity within the council inhibit effective management. The growing number of informal settlements within Ivory Park, which seems out of the control of council, exacerbates the poor existing environmental and health conditions, and prevents adequate solutions to the situation, especially with the lack of financial resources within the community. These areas need electrification, improved design and structure of housing, adequate waste management strategies, and economic upliftment programmes to enable the community to pay for what services are potentially available to them.

Recycling initiatives provide a way for a community to earn some income from recycling enterprises and at the same time improving a highly problematic waste management situation. Poor communities like Ivory Park need input from council in terms of infrastructure and resources to get this type of programme off the ground and ensure its success. Awareness and

participation programmes are first required to ensure the success of any waste and energy management strategies.

Figure 14: Graphic representation of management responses to environmental issues in

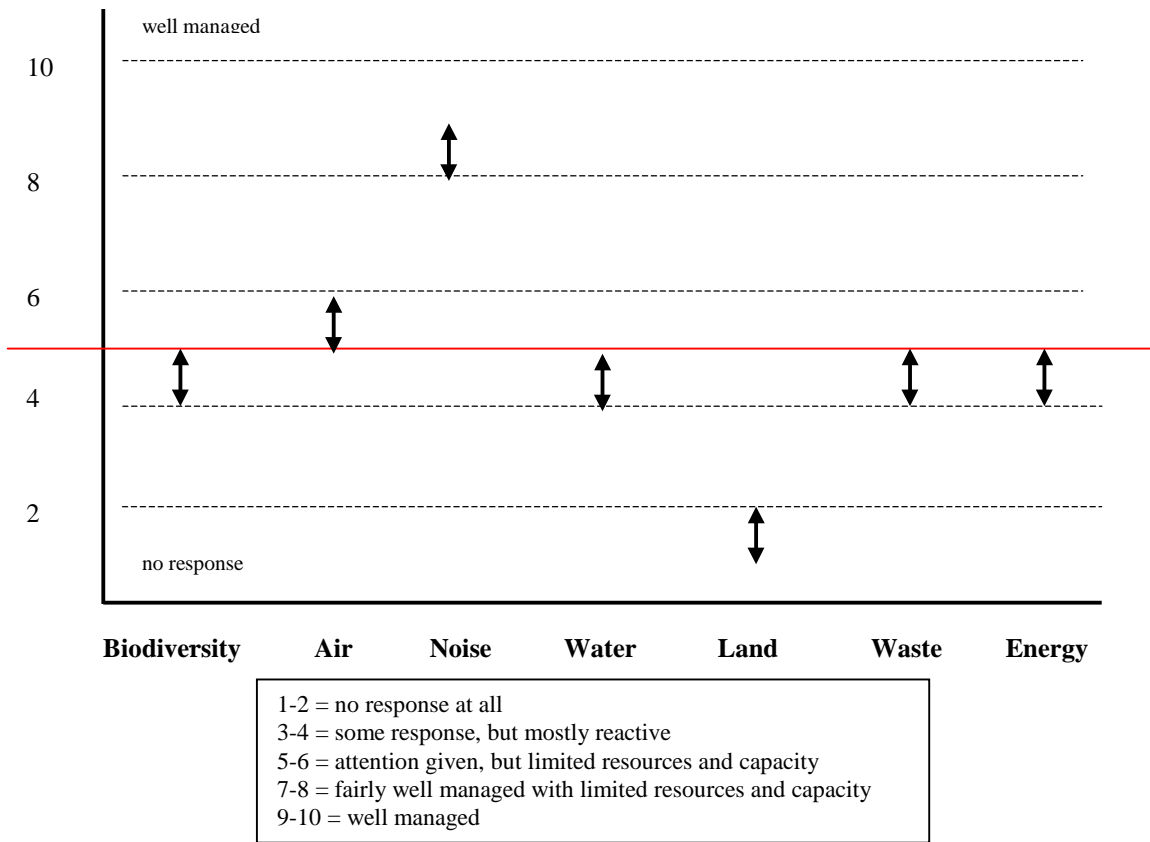
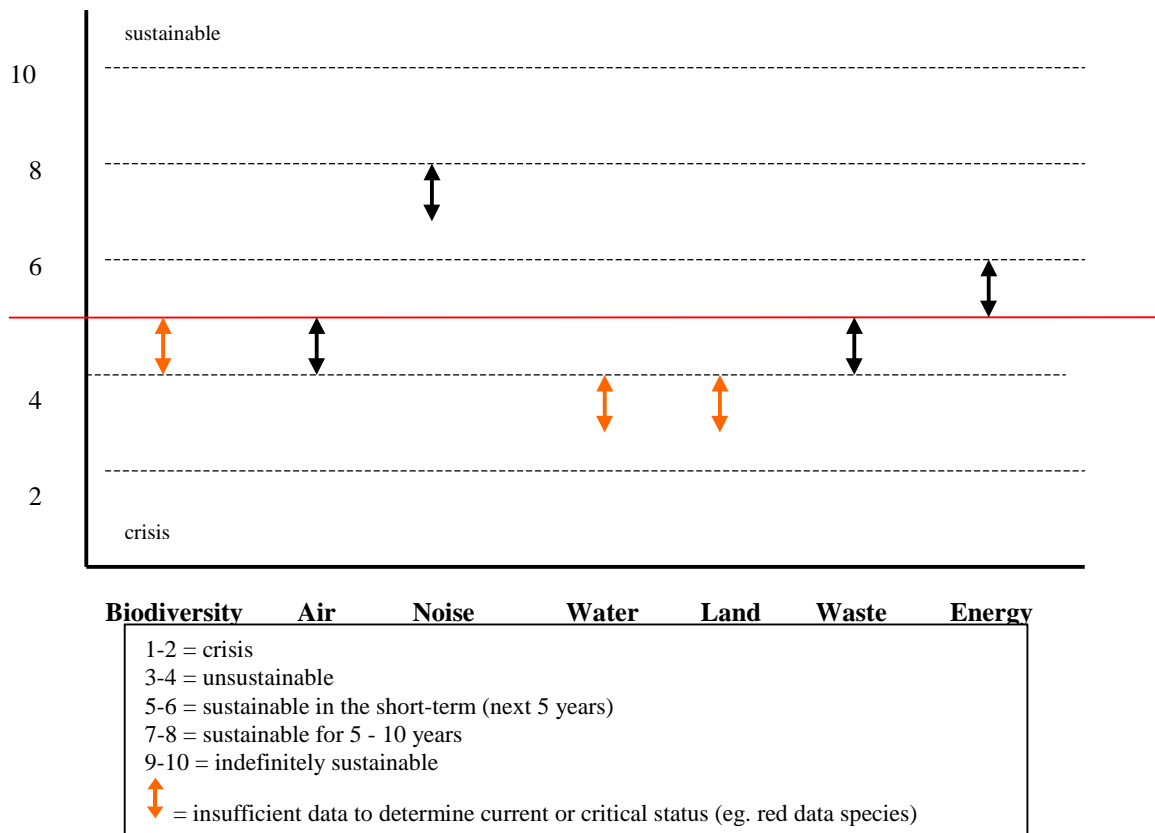


Fig 15: Graphic representation of environmental priorities as determined from current state of



With regards to energy use, in these poor communities, the immediate problem of household pollution, impacting on health, is associated with inadequate sources of energy. Although electrification will alleviate this problem somewhat, the energy study shows that there is set of issues that determine choice of energy, and has to do with supply and cost. Energy impacts on poor households, and poorer people tend to pay more for energy than affluent households. Tackling the problem of energy has both social and environmental benefits and can assist in alleviating poverty by increasing income disposability.

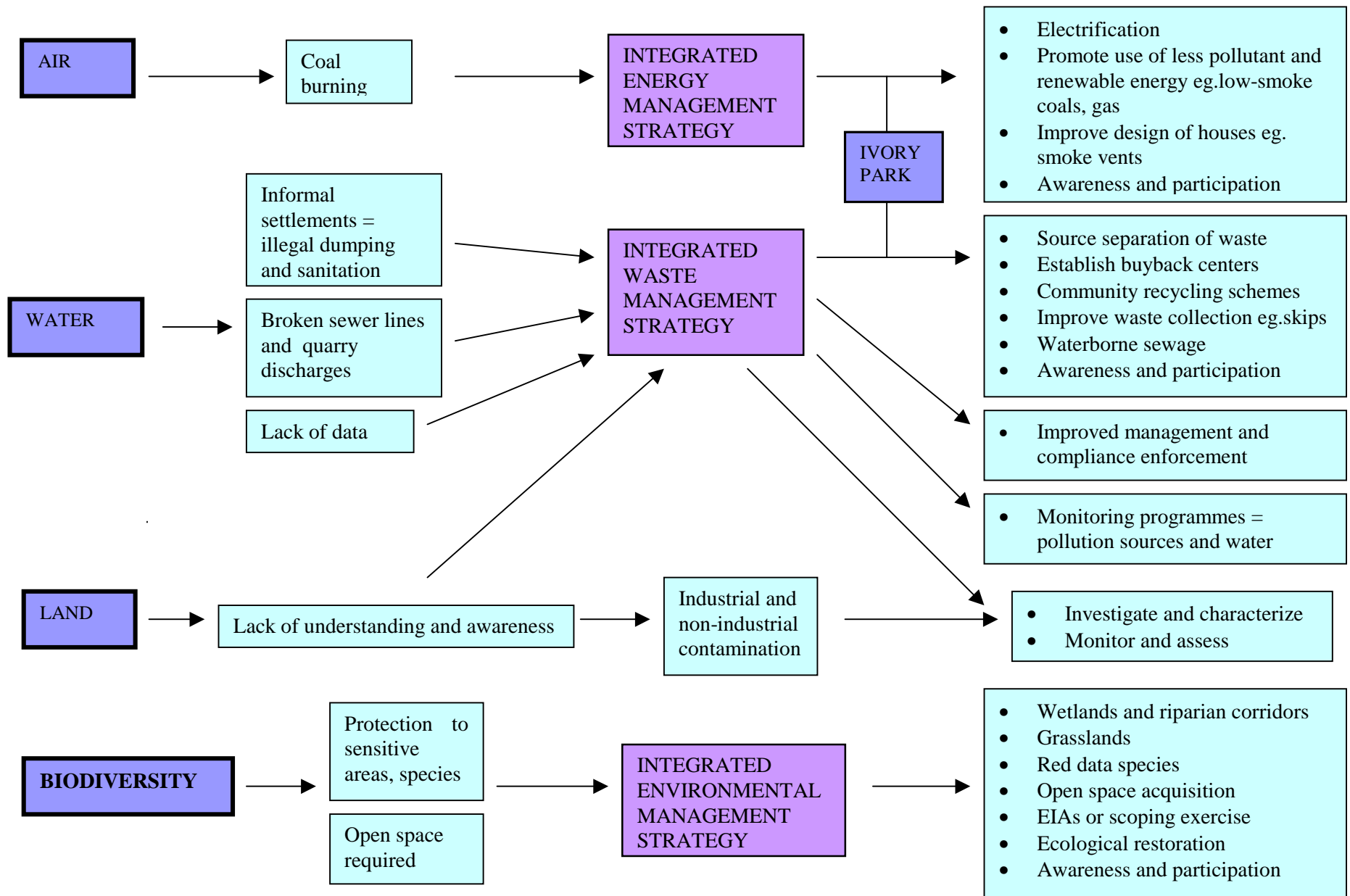
Although these poorer community areas require particular attention, the long-term minimisation of waste in both high and low-income areas should be a priority as Midrand's population and economic growth continues to increase. Emphasis should be placed on sorting of domestic waste, and facilities should be created for handling this waste both for purposes of recycling and land-filling. An experiment in this direction is being carried out by the Benoni Town Council from which the MMLC can learn a great deal. For some wastes, Midrand could set a target of 0% land-filling, an immediate waste problem that lends itself to this target is organic waste. The presence of waste creates an impression that the MMLC and the Midrand community is disinterested in its own environment. Midrand should seriously pursue an 'adopt a river programme' involving partnerships between poor and affluent segments of the Midrand community.

Attention to biodiversity is imperative in granting sensitive areas/species within Midrand protected area/species status. The SoER perhaps shows, however, that the fight to preserve all of Midrand's biodiversity is a lost one. Some minimum standards, however, must be established in striving to reach a minimum target of open spaces which incorporate biodiversity criteria; ensuring that all new developments are subject to EIAs or scoping exercises to prevent negative impacts; and identifying red data species and implementing a management plan to protect these. The need for open spaces is evident from all communities, and will do a great deal to uplift the standard of living for all of the people of Midrand. Those areas that are under private sector control should also be encouraged to form partnerships with the MMLC around open space. There is a potential to create within the vicinity of the CBD an open, or green space corridor, which can become an important feature of the Green City project.

Fortunately none of the issues discussed appear to be in crisis condition, they are however mostly unsustainable and areas like coal burning and water pollution will begin to have serious impacts on human health if these issues are not dealt with. Continued lack of sufficiently caring for and managing wetlands, riparian corridors and sensitive species, could have disastrous impacts on the long-term stability and protection of the environment.

The final figure (Figure 16) below summarises the main priority areas and recommendations that could be included in future integrated management strategies to improve the current environment situation in Midrand. An environmental policy also needs to be established and documented by the MMLC, considering new national environmental policies and legislation, which will lay the foundations for setting out an integrated development framework. This should include the identified areas of priority and set out short and long-term strategies to meet the goals for these priority areas. It is recognised in the various reports that the MMLC's ability to fast track change in environmental management is dependent on financial resources and management capacity. Midrand is doing well under the circumstances, and staff would like to do more, but feel constrained by the lack of resources. This is another area that requires attention, and it would appear that specialist staff training would be needed on various issues.

Fig 16: Schematic representation of environmental priorities and practical recommendations to improve long-term sustainability in



The Green City project is an opportunity that needs to be built on. Water is a useful theme to present a holistic approach to the Green City concept because it has connotations of dynamism, flow and interlinkages with environment and life. The thematic paper on “Water concept of a Green City” provides useful insights on how this can be done, and the principles that should govern such an approach. In certain areas, however, there is need for new thinking, approaches and creativity, which may assist in identifying innovative and least cost approaches. The SoER shows that there is still a great deal of room in mobilising of resources from civil society that has not been fully tapped. There is a lot of emphasis on informal settlements and townships, when in fact a great deal of goodwill can be tapped from more affluent parts of Midrand. In focusing on poorer parts, the MMLC seems to have lost sight of opportunities that business and affluent communities may offer. Perhaps undertaking programmes that have less of a focus on who you are, or where you come from, but tackling the issues by making diverse communities work on a common problem, may open up a new sense of ownership and spirit amongst all communities in Midrand.

GLOSSARY OF TERMS

The Green City Concept

Anomaly point of water

Water at 4°C and at its densest.

Afforestation

Planting of a forest, where there was none before.

Aquatic plants

Plants growing in flooded environments

Parenchyma

Porous tissue in vascular plants that have large air filled spaces and thin cell walls. This allows gaseous diffusion between above-ground and below-ground plant structures, thus permitting plants to grow in flooded conditions.

Biomass

The total mass of living tissues (plant and animal).

Constructed wetland

A wetland that has been engineered to receive water for the purpose of reducing concentrations of one or more pollutants.

Ecological reserve

Refers to "the quantity, quality and reliability of water required to maintain the ecological functions on which humans depend"(new SA water law).

Evaporation

The process, by which water in a lake, river, wetland or other water body becomes a gas.

Evapotranspiration

The combined processes of evaporation from the water or soil surface and transpiration of water by plants.

Groundwater

Water that is located below the ground surface.

Hydrology

A science dealing with the properties, distribution, and circulation of water on the land surface and in the soil, underlying rocks and atmosphere.

Hydrological cycle

The full balanced and regulated natural cycle of water from deep within the earth to the upper regions of the atmosphere and back, in which rainwater is able to percolate into the ground and the amount of atmospheric water is more evenly distributed and maintained at a more or less constant level.

Half-hydrological cycle

A truncated version of the full hydrological cycle in which no rain water infiltrates the ground, but either drains away over the ground surface or re-evaporates into the atmosphere with unnatural rapidity, leading to excessive agglomerations and the uneven distribution of water vapor.

Riverine

Associated with rivers.

Riparian

Pertaining to a stream or river.

Reafforestation

Replanting of a forest.

Salinity

A measure of the total salt content of water or soil, reported as ppt (parts per thousand). The salinity of normal seawater is about 35ppt.

Swales

Ditches on contour for rain water harvesting and infiltration into the soil.

Symbiosis

Mutual dependence of two or more elements.

Temperature gradients

Temperature gradients are principally related to the direction of movement of temperature within and between the respected temperatures of the ground, water and atmosphere, which can either take a positive or negative form. A positive temperature gradient occurs when the direction of temperature movement is towards the anomaly point of water, i.e. +4°C. A negative temperature gradient occurs when the direction of temperature movement is either upwards or downwards from +4°C.

Biodiversity & Open Spaces

Aforestation

Planting exotic trees for purpose of commercial timber harvest

Alien invasive species

Plants that do not naturally occur in an area under question. Exotic plants refer to non-endemic species, whereas the term, 'alien invasive' tend to species that are aggressive in their ability to replace indigenous vegetation.

Aquatic habitats

Includes rivers, riparian zones , wetlands, vleis and dams. They contain some of the most environmentally sensitive areas in Midrand.

Bankenveld

The veld type in the Pretoria, Johannesburg, Midrand area. It consists of rolling grasslands, often on shallow leached soils with rocky outcrops of shale, granite, chert or dolomite. Because Bankenveld is a transition zone between the grassland biome and the bushveld savanna biome, it has a relatively high species diversity with both the typical highveld and bushveld plant and animal species occurring.

Biodiversity

The variety of all life forms (plants, animals and micro-organisms), the genes they contain and the ecosystems of which they form a part of.

Biodiversity issues

Those factors that impact on biodiversity.

Biome

The largest ecosystem unit of classification integrating a number of environmental factors into a easily recognisable unit of classification. It consists of a dominant vegetation type (e.g. forest, grassland, woodland etc) with a relatively consistent climate and geology.

Ecolitracy

Understanding and practise of the principles of ecology.

Ecological process and life support systems

Essential mechanisms that maintain the normal functioning of a healthy environment. They may include water cycles, nutrient cycling, air and water purification etc. They are essential for the maintenance of sustainable resource use.

Ecosystems

Communities of organisms (plants animals , microganisms),interacting with each other and there physical environment in which they live. The basic unit of ecology.

Ecology

The study of the interaction between living organsims, and living organisms and there physical environment.

Ecozone

A smaller scale classification than a biome. It consists of an area, relatively homogenous with respect to vegetation type, geology and climate. In South Africa the veld type classification is often used as ecozones (for example Bankenveld)

Endemics

Species restricted to a particular habitat or range, i.e. they are only found in that area.

Endoric water bodies

Such as pans, that have no above ground outlet. Important wetland areas. Highly sensitive to pollution, due to lack of external drainage and tendency for pollutants to accumulate

Environmental awareness

Involves understanding the interdependence and links between the natural , social and the economic environment.

Environmental costs

Usually refers to the environmental impacts of a project. Because environmental costs are difficult to factor into a cost/ benefit analysis, they are considered as 'externalities', and all users of the common resource carry the cost. Examples include factory pollution emissions into a river or the atmosphere. The environmental damages are considered as environmental costs and the potential damages to human health are considered as social costs.

Environmental control area

Areas that may be affected by direct and/ or indirect human development action, due to its physical, ecological and cultural characteristics.

Environmental impact assessments (EIA)

A process of examining the effects of potential development activities (building, mines, agriculture, industry etc), on the state and functioning of the natural and social environment. The process culminates in an EIA report, which includes the expected impacts and the proposed mitigation measures that will minimize these impacts. Forms an essential input into the process of Integrated Environmental Management.

Extrinsic driving variables

Those factors that can result in change in the social/economic/ecological environment , but are not specific to the Midrand environment and arise from international or national pressures. They may also be more difficult to control or to predict. Extrinsic driving variables may include, world economic trends (gold price, cost of leading money etc), political stability, unemployment, government spending and wild cards such as the impact of AIDS on regional and national economy.

Eutrophication

Results from the artificially high nutrient enrichment of aquatic ecosystems. Unnaturally high nutrient levels lead to excessive growth (blooms) of certain plants, such as algae. This leads to decline in dissolved oxygen, changes in water pH. Usually caused by agricultural fertilisers and effluent run- off into rivers and dams.

Fragmentation

Occurs when habitat loss results in the separation and isolation of natural habitats from other natural habitats. Many species need minimum size areas to survive; they also need genetic exchange with other populations of the same species. Natural corridors, like riparian habitat can connect isolated habitats and thus mitigates against the negative effects of fragmentation.

Global climate change

The earth's climate is predicted to change because human activities are altering the chemical composition of the atmosphere through the build up of greenhouse gases—primarily carbon dioxide, methane, and nitrous oxide. These gasses act to trap in heat thus forming the so-called 'green house effect'.

Grasslands

One of the worlds vegetation biomes. Characterised by a dominance of grasses and shrubs (few trees). High in herbaceous plant diversity. Important as grazing lands. Have been severely impacted by mono-crop agriculture and forestation through out South Africa

Habitat loss

The clearing of natural vegetation for agriculture, urbanization, mining or industry—usually irreversible.

Habitat integrity index method

Habitat integrity index measures the degree of disturbance that a habitat has experienced (usually due to the activities of man). This approach has been used primarily on aquatic habitats, where the index is based on diversity of various indicator species, such as fish diversity.

Indicator/key indicator

An indicator is a measurement of something that points to a problem or condition. Its purpose is to show you how well a system is working. If there is a problem, an indicator can help you determine what direction to take to solve. Indicators should measure sustainability. An indicator is something that helps you understands where you are, which way you are going and how far you are from where you want to be. A good indicator alerts you to a problem before it gets too bad. A key indicator can be considered as a 'meta indicator' that may reflect changes across a broad spectrum of variables.

In-stream flow

This is the amount of water entering a river and allowed to flow through a catchment area. It is important for the maintenance of aquatic biodiversity and for down stream water users

Impacts

The effects of certain, activities on the environment (usually of human origins and usually negative).

Integrated Environmental management (IEM)

The procedure of integrating economic, social and ecological considerations into sustainable development planning

Intrinsic driving variables

Those factors that can result in change in the social/economic/ecological environment are specific to the Midrand area, they are factors that can usually be manipulated at the level of local authority. For example: development policies, land use change, level of environmental awareness (ecoliteracy).

Medicinal plants

Are indigenous plants used as traditional medicines by native cultures.

Pollution emission

The discharge of contaminants (chemical substances) , usually the by- products of mining, industry, agriculture, fuel burning and transportation, into the atmosphere, water systems or ground. Most pollutants will have negative impacts on biodiversity and human health

Red data species

Are plant or animal species whose natural, wild populations have been reduced, (usually by the activities of humans), such that their survival may be threatened. Their continued survival may be dependent on special protection. Depending on various factors they have been classified according to IUCN standards as endangered, rare, threatened or indeterminate.

Rangeland degradation

Said to occur when plant species composition and density have changed to the detriment of the inherent productivity and ability of the rangeland to resist the potential negative effects of grazing. Loss of topsoil due to erosion, and loss of biodiversity are the end consequences of rangeland degradation.

Riparian corridors

Are the strips of vegetation along rivers and wetlands, usually demarcated by the high water flood mark. These areas represent transition zones between the aquatic and terrestrial habitat. These areas are important as connecting corridors between fragmented habitats. They also prevent bank erosion and sedimentation going into rivers, they provide habitat for many different organisms.

South African Scoring System (SASS)

A standardized biological index, used to assess the water quality of rivers. The index uses the occurrence of sensitive families of invertebrate fauna (insects, worms, snails, crabs) as a measure of water quality. South African Scoring System or SASS

Permaculture

A design system for creating sustainable human environments. Permaculture is based on ecological concepts of recycling, mutualism (when two species provides benefits for each other), use of renewable resources, sustainability , self-sufficiency, low input costs, and low impact on the environment. It is based on multi-cropping synergies and holistic design principles. (see for example: 'Introduction to Permaculture by Bill Mollison, 1991, Tagari publications)

Rangelands

Natural vegetation areas that are used for livestock production, game farming and conservation

Scoping

Preliminary to a full scale EIA, this process involves identifying issues, alternatives and relevant stake holders (interested and affected parties). Stakeholders are provided with information and involvement

Soil erosion

Loss of topsoil, resulting from the reduction in vegetation cover as a result of heavy disturbances such as overgrazing, trampling and poor cropping practices. Some soils are more susceptible than others.

State of the Environment report

Aims at condensing information on current condition and trends for the ecological, social and economic environment of a defined area. The form should be easily accessible to the general public and policy makers. It uses a systems approach of identifying key issues, pressures and impacts on current state variables. Changes in the system are measured using indicator variables.

Terrestrial habitats

Habitats that are land-based as apposed to water (aquatic) based.

Unsustainable use of bio resources

The use of a resource (plant animal water or mineral) that exceeds the inherent capacity of that resource to renew, replace or maintain itself at constant levels over the long term.

Veld type

Each of the seven biomes occurring in South Africa has been sub-divided into veld types (Acocks, 1975), also known as vegetation types (Low & Rebelo, 1995). Although very similar, the earlier classification of Acocks places more emphasis on agricultural potential, whereas that of Low & Rebelo emphasis lies in the conservation of vegetation diversity. This vegetation classification system is based on communities that share common species, with a similar vegetation structure (vertical profile), and similar ecological processes. They have similar uses, management programmes and conservation requirements. Veld types are increasingly used as vegetation conservation units, i.e. according to the Rio convention on biodiversity, signatories should set aside at least 10 % of each vegetation type for pristine or near –pristine use.

Wetlands

Areas that are inundated with water on a temporary or permanent basis. They are terrestrial / aquatic habitat transition zones. For the Midrand area they include vleis, rivers, flood plains and pans.

Air Pollution

Ambient

The surrounding environment.

Climatology

Study of a region's prevailing conditions of temperature, wind, humidity

Diurnal

Referring to a daily cycle.

Inversion

An increase of atmospheric temperature with height.

Pollution

The introduction of substances, including harmful substances into the environment at concentrations that cause them to be isolatable and identifiable.

Scheduled processes

Industrial processes as identified in the Atmospheric Pollution Prevention Act of 1965.

Stable conditions

Conditions under which the atmosphere tries to suppress or oppose disturbances introduced into it.

Temporal

Denoting a time significance or dependence.

Noise Pollution

Ambient noise

The general noise that exists in a specific area, and which includes all the noise sources that are normally present.

Broad band noise

Noise that contains a broad spectrum of frequencies. A typical example is the noise generated by an air conditioning system.

Continuous noise

Noise which, although its level may be changing as a function of time, creates a continuous presence. Although single events form an integral part of this noise, there are so many of them that they are indistinguishable in measurement terms. The average level only slowly changes with time.

Decibel (dB)

A postfix indicating 10 times a logarithmic ratio between two quantities with the same physical units. It is most often used in applications where a physical quantity covers a very large range, which needs to be compressed into a more manageable scale.

dBA (A-weighting)

Indicates that the sound was measured using the A-weighting network. Human hearing is not equally sensitive to sound at all frequencies; i.e. it is less sensitive at low frequencies. The A-weighting is an electronic network that simulates the frequency characteristics of human hearing.

Equivalent noise level

A noise level energy averaged over a given period of time. It is a single value used to describe a noise of which the level varies over time.

Frequency

The characteristic of a time varying signal that describes the number of cycles per second.

Impulse, impulsiveness

A sound signal that changes its level very abruptly, whether as a single or repetitive number of events of very short duration. Example: hammering.

Isolation of sound

The characteristic of a material to reflect the sound back to where it comes from, i.e. its ability to keep sound in or out an enclosure. Not to be confused with sound absorption, which is the ability of a material to absorb the sound.

LAeq

A noise descriptor that indicates that the A-weighting network has been applied.

Level

The property of a noise signal that expresses its magnitude as 10 times the ratio of the signal to a reference value.

Low frequency noise

A noise with a high content of energy at low frequencies. Example: Diesel earth moving equipment, particularly listening at a larger distance.

Maximum noise level (temporary)

The maximum level that a noise may reach at any given instant.

Noise

Unwanted sound

Noise contours

Lines on a Map that represent values of equal noise impacts or absolute levels.

Noise emission

The process through which a source radiates noise energy into the environment.

Noise footprint

The noise pattern caused by a particular source of noise on the ground averaged over a given period of time. Example: An aircraft taking off from a runway causes a certain noise footprint in the area surrounding the airport.

Noise impact

Either the total noise contribution provided by a noise source at a specific point, or the increase in ambient noise level that it causes.

Noise immission

The process through which noise impinges on a receiver, e.g. a residential building.

Noisiness Index (NI)

A noise descriptor, which describes the cumulative effect of noise events at a point on the ground, caused by aircraft in the vicinity of airports.

Periodic noise

Noise that displays a discernible periodic pattern. Example: A noise source that is on for a given period of time and off for another, e.g. a compressor plant.

Single noise event

A noise event, which can readily be discerned from the general ambient noise. Example: an aircraft fly-over.

Sleep disturbance

The disturbance caused by noise when sleeping. This may include an actual awakening and the time required falling asleep again, as well as changes in the pattern and stages of sleep.

Speech intelligibility

The ability to understand speech in the presence of noise, as a function of the noise level and distance between speaker and listener.

Water Pollution

Chemical oxygen demand

Measurement, in milligrams per litre, of the organic matter present in a water sample and is represented by the letters COD

Effluent

Flowing out of waste water which is often contaminated or polluted by biological (sewage) or industrial processes

Electrical conductivity

Measurement, in milliSiemens per metre, of the ability of water to conduct an electrical current and is a result of the presence of dissolved matter in the water (such as salts) – it is represented by the letters EC

Grey water

Domestic waste water not including sewage e.g. washing water and bath water

Leachate

Water which has percolated through a waste site usually containing organic and inorganic contaminants

Microbiological

Relates to bacteria, viruses and single celled plants or animals usually not visible to the naked eye

Non-point source pollution

Pollutants enter the watercourse over a diffuse area, such as stormwater and agricultural run-off

Point source pollution

A specific pipe, culvert etc. allows a direct discharge to the water course, such as the treated sewage effluent

Land Pollution

Anthropogenic

Of man made origin

Denudation

Stripped of covering

Effluent

Flowing out of waste water which is often contaminated or polluted by biological (sewage) or industrial processes

Remediation

Removal or counteraction of damage done to the land

Rehabilitation

Restoration to a proper condition following damage

Waste Management & Recycling

Pollution

The introduction into the environment of any substance caused by the action of man, which has, or results in, significant harmful effects to man or the environment.

Hazardous waste

Any waste, other than radio-active waste, which by reason of its chemical reactivity, ecotoxicity, explosive character, corrosivity, carcinogenic qualities, or other characteristics, may cause significant danger to, or impact negatively on human health or the environment.

Heavy metal

Term used to describe a class of metals which persist in the environment many of which are toxic.

Sustainability

The ability to continue indefinitely, at current and projected levels, without depleting social, cultural and natural resources required to meet present and future needs.

Waste

An undesirable or superfluous by-product, emission or residue of any process or activity which has been discarded, accumulated or stored for the purpose of discarding or processing. It may be gaseous, liquid or solid or any combination thereof and may originate from a residential, commercial or industrial area. This definition excludes industrial wastewater, sewage, radio-active substances, mining, metallurgical and power generation waste. (Minimum Requirements, Department of water Affairs and Forestry, 1992).

Household Energy

Renewable energy

Energy that is sustainable and unlimited such as wind energy, solar energy and hydropower. Other energy forms are fossil energy (oil, gas, etc), nuclear energy and geothermal energy.

Electrification

The process of connecting end-users to the electric grid

Thermal energy use

The use of energy for processes involving heat such as cooking, ironing, etc. The production of heat is much more energy-consuming than for instance lighting, consumer electronics, etc.

Respiratory diseases

Diseases affecting the breathing tract including lungs, such as bronchitis, asthma, sinusitis, etc.

Asphyxiation

Open fires consume oxygen from the air and produce carbon oxides. In case open fires are used without sufficient ventilation, people can sometimes get too little oxygen resulting in asphyxiation.

Solar water heater

A normally roof-mounted device that heats up water using the sun as energy source. A good solar water heater can keep water hot during the night to allow usage the next morning. Many models are also equipped with electric heating elements so as to ensure that hot water is also available during extended spells of bad weather or during times of extensive usage. There are also small mobile solar water heaters on the market.

SEED

Sustainable Energy, Environment, and Development programme (a research and training programme aiming at the development of skills and awareness in the field of clean energy supply)

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