



2010

# The Biodiversity Sector Plan

for the **Saldanha Bay, Bergrivier, Cederberg**  
and **Matzikama Municipalities**

Kerry Maree and Deborah Vromans



South African  
NATIONAL PARKS



CapeNature



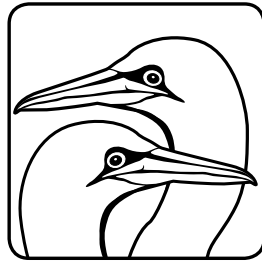
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**biodiversity is all of nature**

# **The Biodiversity Sector Plan**

for the Saldanha Bay, Bergrivier, Cederberg and Matzikama  
Municipalities

2010



Supporting land-use planning and decision-making  
in Critical Biodiversity Areas and Ecological Support Areas

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**promoting sustainable development**

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## HANDBOOK DEVELOPMENT

This handbook and associated information were prepared by the C.A.P.E. Fine-Scale Biodiversity Planning Project (CapeNature) and the Garden Route Initiative (SANParks). Both projects were funded by the Global Environmental Facility through the Cape Action for People and the Environment (C.A.P.E.) programme.

## FURTHER INFORMATION

The Geographical Information Systems (GIS) shapefiles<sup>9</sup> used to prepare the Critical Biodiversity Areas Map, as well as the digital version of this handbook, wall maps and technical reports are available on the DVD attached to the back of this handbook. Copies of the DVD can be obtained from the South African National Biodiversity Institute: Biodiversity GIS Unit – Tel: (021) 799-8698; email [BGIShelp@sanbi.org](mailto:BGIShelp@sanbi.org) or alternatively, download the handbook, maps and technical reports from [www.bgis.sanbi.org](http://www.bgis.sanbi.org).

## ACKNOWLEDGEMENTS

This handbook is based on the municipal biodiversity booklets compiled by Nancy Job and Amanda Driver for the *Putting Biodiversity Plans to Work Project (2006)* and modified to align with the contents of a bioregional plan<sup>9</sup> in terms of Chapter 3 of the National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004). Other literature sources consulted are referenced.

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## DISCLAIMER

The Critical Biodiversity Areas Map associated with this handbook is not guaranteed to be free from error or omission. Consequently, the authors and designers hold no responsibility for any inaccuracies or financial loss resulting from the information in this handbook or its associated information. The map, together with the guidelines, serves as the primary biodiversity informant for land-use planning and decision-making, and does not claim to address other land-use or town and regional planning policy.

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## MAP DEVELOPMENT

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**Note:** Superscript<sup>9</sup> denotes that a particular term is defined or further explained in the glossary.

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# Acronyms

<b>BGIS</b>	Biodiversity Geographical Information Systems
<b>CBA</b>	Critical Biodiversity Area/s
<b>C.A.P.E.</b>	Cape Action Plan for People and the Environment
<b>CESA</b>	Critical Ecological Support Area/s
<b>CFR</b>	Cape Floristic Region
<b>DEADP</b>	Department of Environmental Affairs and Development Planning
<b>DME</b>	Department of Minerals and Energy
<b>DoA</b>	Department of Agriculture
<b>DEA</b>	Department of Environmental Affairs
<b>DWA</b>	Department of Water Affairs
<b>EIA</b>	Environmental Impact Assessment
<b>EMF</b>	Environmental Management Framework
<b>EMP</b>	Environmental Management Plan
<b>ESA</b>	Ecological Support Area/s
<b>GIS</b>	Geographical Information Systems
<b>IDP</b>	Integrated Development Plan
<b>LED</b>	Local Economic Development
<b>LUPO</b>	Land-use Planning Ordinance
<b>NEMA</b>	National Environmental Management Act (Act No. 107 of 1998)
<b>NEMBA</b>	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
<b>NEMPAA</b>	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
<b>NSBA</b>	National Spatial Biodiversity Assessment
<b>NWA</b>	National Water Act (Act No. 36 of 1998)
<b>OESA</b>	Other Ecological Support Area/s
<b>PSDF</b>	Provincial Spatial Development Framework
<b>SANBI</b>	South African National Biodiversity Institute
<b>SANParks</b>	South African National Parks
<b>SDF</b>	Spatial Development Framework
<b>SPC</b>	Spatial Planning Categories
<b>STEP</b>	Subtropical Thicket Ecosystem Programme
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organisation
<b>WMA</b>	Water Management Area



Land-use planning and decision-making<sup>9</sup> is obliged to strive towards sustainable development<sup>9</sup> and therefore requires relevant and up-to-date biodiversity<sup>9</sup> information. This Biodiversity Sector Plan<sup>9</sup> is intended to be the biodiversity informant for these various multi-sectoral<sup>9</sup> planning and decision-making procedures as it represents current and detailed spatial information, which is adequate to execute informed decision-making as required by the National Environment Management Act (NEMA) (Act No. 107 of 1998). Furthermore, the Biodiversity Sector Plan serves as the framework for the compilation of a bioregional plan<sup>1</sup> and <sup>9</sup> in terms of Chapter 3 of the National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004).

This Biodiversity Sector Plan<sup>9</sup> is comprised of three components: a) this handbook with land and resource-use guidelines (section 4) and a biodiversity profile (section 2); b) the Critical Biodiversity Areas Maps<sup>9</sup> for the Saldanha Bay Municipality, the Bergrivier Municipality, the Cederberg Municipality and the Matzikama Municipality (introduced in section 3); and c) a DVD with technical reports and GIS shapefiles (attached to the back of this handbook).

The Critical Biodiversity Areas (CBA) Map divides the landscape into the following seven categories: Protected Areas; Critical Biodiversity Areas – Terrestrial; Critical Biodiversity Areas – Aquatic (which includes buffers); Critical Ecological Support Areas<sup>9</sup> (which includes buffers); Other Ecological Support Areas<sup>9</sup> (which includes buffers); Other Natural Areas; and No Natural Remaining Areas. The first five mentioned categories represent the biodiversity priority areas. These should be maintained in a natural to near natural state. The other categories are not considered as priority areas and a loss of biodiversity within these areas may be acceptable. The network of CBA reflected on the CBA Map indicates the most efficient (i.e. least land-hungry) selection and classification of land portions requiring safeguarding in order to meet national biodiversity objectives (termed biodiversity thresholds<sup>9</sup>). Furthermore, wherever possible, the selection has attempted to avoid conflict with other land-uses.

*This handbook and accompanying Critical Biodiversity Areas Map together provide a common point of reference for officials in all three spheres of government, environmental and planning professionals, landowners, developers and the general public with respect to biodiversity and its role in development planning and decision-making.*

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<sup>1</sup> The term, bioregional plan<sup>9</sup>, should be understood in terms of Chapter 3 of the National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004) and not in relation to the provincial Bioregional Planning<sup>9</sup> Manual for the Western Cape (Moss, 2003). Both promote the principles of bioregional planning which encourages the protection of our biodiversity, thereby promoting sustainable development.



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**Box 1: The Piketberg mountain** is a geological "island" (inselberg) of Table Mountain Sandstone in the sea of shale and acid sands that characterize this area of the Swartland. As the botanical complexity of the Cape Floristic Region is partly linked to the region's varied geology, this leads to a high number (more than 20) of endemic plant species on the mountain. Another botanical oddity is a small "lost" population of the small tree *Pseudoscopalia polyantha*, far away from its home range in the Eastern Cape and Southern KZN region. As a result of the ecological significance of the mountain, conservation agencies have focused on protection of the vegetation through various mechanisms including both Business and Biodiversity Initiatives and establishing Stewardship agreements with private landowners on the mountain.

Renosterveld on the lower slopes of Northern Piketberg





National policy is underpinned by the principle of sustainable development<sup>9</sup> which aims to ensure that all development serves both present and future generations. Key to achieving this is the safeguarding of critical natural services such as clean and adequate water supplies, nutritious veld for grazing livestock, and stable healthy soils which are resilient to flood damage and erosion. It follows then, that the prerequisite for sustainability is the safeguarding of biodiversity<sup>9</sup> (i.e. the variety of local plants and animals, their habitats, and the natural processes that sustain them).

Spatial planning and land-use management decisions must by law, take into account the biodiversity of an area. To enable this, scientists have been researching South Africa's biodiversity over the past decade, and have been determining the spatial arrangement of plants, animals, rivers, wetlands and their interactions and functioning in different regions. Based on this information, areas were categorised and prioritised according to their biodiversity value and requirement for safeguarding.

An outcome of this is that scientists have identified priority areas (Critical Biodiversity Areas<sup>9</sup> and Ecological Support Areas<sup>9</sup>) requiring special safeguarding in order to ensure sustainable development. They have also identified areas of lesser biodiversity importance (Other Natural Areas), as well as those sites which have insignificant biodiversity remaining (No Natural Remaining Areas) as a result of intensive land-use such as urban development or cultivation.

### 1.1 PURPOSE OF A BIODIVERSITY SECTOR PLAN

The Biodiversity Sector Plan provides planners and land-use managers with a synthesis of biodiversity-related information that should be integrated into land-use planning and decision-making<sup>9</sup>. By identifying those sites that are critical for conserving biodiversity, this Biodiversity Sector Plan supports 'mainstreaming'<sup>9</sup> or the proactive consideration of biodiversity in planning and decision-making. Mainstreaming<sup>9</sup> is crucial to overcoming the misperception that we need to choose "either conservation<sup>9</sup> or development", and for ensuring sustainable development (National Biodiversity Framework, 2009).

The overall aim is to avoid the loss of natural habitat in Critical Biodiversity Areas (CBA) and prevent the degradation of Ecological Support Areas (ESA), while encouraging sustainable development in Other Natural Areas. The broad objective is to ensure appropriate land-use for the best possible sustainable benefits to society, and to promote integrated use and management of natural resources.

The CBA Map should be used as the biodiversity informant by all sectors involved in municipal and multi-sectoral planning procedures<sup>9</sup> (see Figure 1). These include planning and environmental professionals, national and provincial departments of environment, agriculture, water affairs, forestry, minerals, energy, land affairs, local government, housing and public works as well as catchment<sup>9</sup> management agencies, and all organs of state preparing guidelines in terms of section 74 of the Environmental Impact Assessment regulations. Programmes such as Working for Water, Working for Wetlands, LandCare and CoastCare, as well as private landowners, estate agents, developers, the general public and conservation Non-governmental Organizations would also benefit from consulting the Plan.

*All organs of state are obliged to account for biodiversity in their decision-making (National Environment Management Act (NEMA) (Act No. 107 of 1998)). Furthermore, all spheres of government and all organs of state must co-operate with, consult and support one another.*

*The Biodiversity Sector Plan, comprising the CBA Map and guidelines, provides a framework for the compilation of a bioregional plan<sup>9</sup> in terms of Chapter 3 of the National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004) and, in so doing, supports the National Biodiversity Framework (2009). This Biodiversity Sector Plan has followed the guideline regarding the determination of bioregions and the preparation of and publication of bioregional plans.*



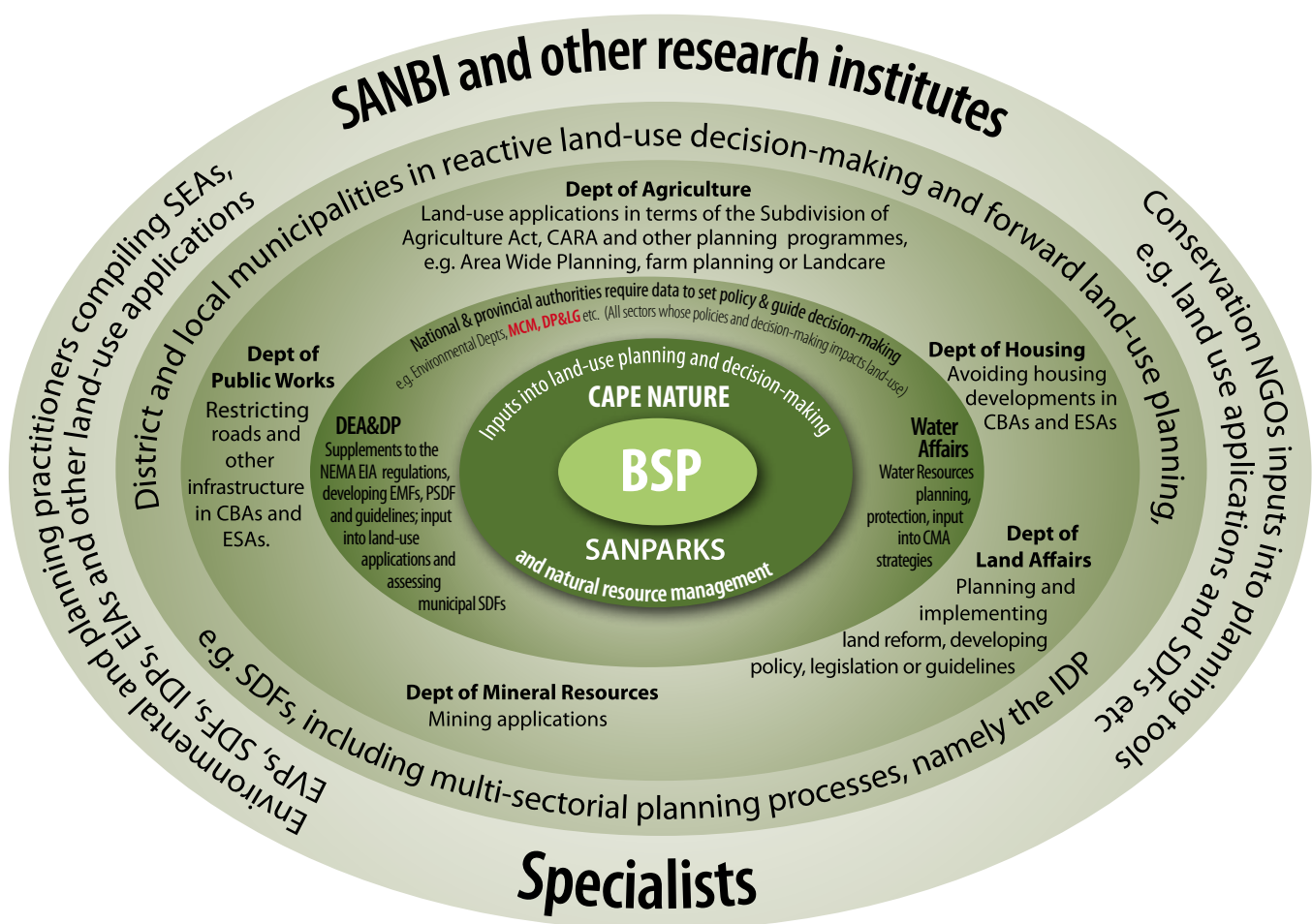


Figure 1: Intended users and uses of the Biodiversity Sector Plan (adapted from Job and Driver, 2006).

## 1.2 WHAT IS BIODIVERSITY?

Biodiversity<sup>9</sup> is a relatively new, technical term for nature. Biodiversity encompasses the diversity of all living things (such as plants, animals, insects and micro-organisms), their habitats, and the processes and interactions by which they are sustained and allow them to persist over time.

The way in which the components of biodiversity are arranged is referred to as biodiversity *pattern*<sup>9</sup>, while the series of actions and interactions are termed *ecological processes*<sup>9</sup>. Biodiversity pattern can be expressed as different vegetation<sup>9</sup> types (such as forest, grassland, shrubland), or habitats<sup>9</sup> (the natural home of a living organism, such as a wetland), or specific features (populations of rare plants which grow in a specific area and nowhere else).

Ecological processes are those actions and interactions that enable natural systems to function<sup>9</sup> and run as healthy, working systems. Evolutionary processes are a subset of ecological processes and are represented by those actions that enable new species<sup>9</sup> to evolve in response to changing conditions over extended time periods.

Biodiversity is maintained by ecological processes at the micro-scale (such as in pollination, nutrient cycling via microbial action) through

to the mega-scale (natural events, e.g. fire, tidal movement, floods, migration of species along river valleys or coastal areas, the quality and quantity of water feeding rivers and estuaries, marine sand movement, and the seasonal to-and-fro inland mountain-to-coast migrations of birds that pollinate plants).

Although described above as two separate components of biodiversity, 'process' and 'pattern' are essentially interdependent. Processes are dependent on the health and integrity of the pattern component of biodiversity (species, habitat etc.), while pattern is essentially maintained by processes or the functional aspects of biodiversity.

The maintenance and functioning of both biological pattern and ecological process is in turn, determined by a variety of factors, which are termed ecological drivers<sup>9</sup>, and which can encompass rainfall, temperature, fire, herbivory, etc.

The systems in which these living components of biodiversity and the non-living environment (soil, water) relate to and interact with each other are termed ecosystems<sup>9</sup>. Such ecosystems can operate at any scale from very small (e.g. a small pond) to an extensive landscape (an entire mountain water catchment<sup>9</sup> area). As biodiversity is so complex and many-faceted, scientists have

developed surrogates for representing it in a more simplified fashion. In South Africa, vegetation types are most commonly used as such a 'stand-in' for biodiversity (i.e. biodiversity surrogate).

These ecosystems deliver a number of ecosystem services<sup>9</sup>, most of which we simply take for granted. All social and economic sectors are dependent on ecosystem services. Every aspect of our livelihoods depends on these services. Healthy ecosystems provide us with water, foodstuffs, wood fuel, medicines, clean air, stable landscapes, grazing for livestock, food-crop pollination and safeguarding against flooding. As a result biodiversity becomes the mainstay of our economy.

With climate change, farmlands may no longer be able to support some of our current crops such as wheat. The only source of plants suited to cover bare fields may be the natural vegetation occurring as small strips or patches in between the ploughed lands. These small remaining patches can also function as corridors<sup>9</sup>, providing natural highways for animals and plants to migrate, thereby enhancing their ability to adapt to changes in temperature and rainfall.

*Because of our total dependence on natural systems for food and water, it is essential that land-use decisions are guided by biodiversity considerations and the maintenance of healthy functioning ecosystems, now and in the future. This is the essence of sustainable development.*

### 1.3 WHAT ARE CRITICAL BIODIVERSITY AREAS (CBA) AND ECOLOGICAL SUPPORT AREAS (ESA)?

Critical Biodiversity Areas<sup>9</sup> (CBA) are those terrestrial (land) and aquatic (water) areas which must be safeguarded in their natural state as they are critical for conserving biodiversity pattern and maintaining ecosystem functioning. These areas include:

- (a) Areas requiring safeguarding in order to meet national biodiversity thresholds<sup>9</sup>;
- (b) Areas required to ensure the continued existence and functioning of species<sup>9</sup> and ecosystems<sup>9</sup>, including the delivery of ecosystem services<sup>9</sup>; and/or
- (c) Special Habitats or locations where Species of Special Concern occur.

Ecological Support Areas<sup>9</sup> (ESA) are supporting zones or areas which must be safeguarded in order to prevent degradation of Critical Biodiversity Areas (CBA) and formal Protected Areas<sup>9</sup>.

Although biodiversity pattern and process are interdependent (as explained in 1.2 above), there are situations where even though pattern is disrupted, certain processes are still able to continue functioning. In the case of rooibos cultivation, for example, rows of planted rooibos shrubs alternate with strips of natural veld that have been retained as windbreaks. These strips of veld disrupt the biodiversity pattern but enable the process of insect pollination to persist by providing suitable habitat for the insects. In Ecological Support Areas, the ecological processes need to be maintained while in Protected Areas and Critical Biodiversity Areas, both pattern and process need to be safeguarded against degradation.

### 1.4 WHAT IS A BIODIVERSITY SECTOR PLAN?

A Biodiversity Sector Plan (BSP) provides a way forward in reconciling the conflict between exploitative activities and the maintenance of natural systems. It provides biodiversity information needed for land-use planning and decision-making and other multi-sectoral planning processes. It also forms the precursor to a published bioregional plan<sup>9</sup> and is comprised of A Critical Biodiversity Areas Map (central to the BSP);

- A Biodiversity Sector Plan Handbook (this handbook), which includes a Biodiversity Profile for these municipalities, and land and resource-use guidelines;
- GIS (Geographical Information Systems<sup>9</sup>) shapefiles; and
- Technical reports.

This BSP includes the following GIS shapefiles:

- Critical Biodiversity Areas (CBA) (terrestrial);
- Critical Biodiversity Areas (CBA) (aquatic) and their buffers;
- Critical Ecological Support Areas (CESA) and their buffers;
- Other Ecological Support Areas (OESA) and their buffers;
- Other Natural Areas;
- No Natural Remaining Areas;
- Fine-scale vegetation maps;
- Alien vegetation maps;
- Summarised land cover<sup>9</sup> maps; and
- Aquatic ecosystem layers

The Biodiversity Sector Plan is provided on DVD (attached to this handbook) and is also available from the BGIS Unit on (021) 799 8738 or downloadable from their website [www.bgis.sanbi.org](http://www.bgis.sanbi.org) (South Africa's biodiversity portal).

### 1.5 WHAT THE BIODIVERSITY SECTOR PLAN CAN AND CANNOT DO

The Biodiversity Sector Plan can:

- Serve as the primary source of information on biodiversity for land and resource-use decision-making and forward planning processes, such as Environmental Management Frameworks and municipal Spatial Development Frameworks (SDFs) and municipal Integrated Development Plans (IDPs);
- Provide detailed information and therefore largely replace broad-scale biodiversity plans<sup>9</sup>, e.g. STEP, SKEP and C. A. P. E.;
- Provide the spatial framework and policy recommendations for the drafting of a bioregional plan<sup>9</sup> by identifying priority areas for conservation action and the establishment of Protected Areas, as required in terms of Chapter 3 of the NEMBA;
- Identify a network of Critical Biodiversity Areas whose safeguarding is a requirement in order to meet national biodiversity thresholds<sup>9</sup>;
- Provide regional biodiversity priorities, thereby creating a strategic framework for sustainable development;

- Assist municipalities to comply with environmental and planning legislation that promotes the protection and management of biodiversity, acting as the spatial framework and policy for sustainable development set by international and national environmental and planning legislation and policy; and
- Act as an early warning system to developers/environmental consultants, highlighting potential red flags to development.

Every effort has been made to produce a useful and accurate map. However, it is important to be aware that:

- The CBA Map does not replace on-site assessments for land-use applications. Therefore, the CBA Map must be used in conjunction with a site visit to inform site level decisions;
- Only biodiversity information that was available at the time of the assessment has fed into the CBA Map;
- The Biodiversity Sector Plan simply provides information on biodiversity (i.e. provides only one information layer of the many layers required in land-use planning), and must be used in conjunction with other land-use or town and regional planning application procedures; and
- The Biodiversity Sector Plan is the forerunner to any future bioregional plan<sup>9</sup> in terms of Chapter 3 of the NEMBA. It must undergo further legal, administrative and public consultation

procedures in order to qualify as a formally published bioregional plan<sup>9</sup>.

*The CBA Map provides the information needed for three broad categories of day-to-day land- and resource-use decisions: 1) Reactive decision-making, such as environmental impact assessment (EIA), agricultural land-use decisions, water-use licensing and other development control decisions through the Land Use Planning Ordinance (LUPO) or other land-use legislation; 2) Proactive forward planning, such as Integrated Development Plans (IDPs), Spatial Development Frameworks (SDFs), Environmental Management Frameworks and Zoning<sup>9</sup> Schemes; and 3) Proactive conservation, such as stewardship, land acquisition and clearing of invasive alien plants.*

**Box 2:** Inland from the secluded harbour of Saldanha Bay is the RAMSAR listed, Langebaan Lagoon, focal point of the **West Coast National Park**. The West Coast National Park is home to thousands of seabirds which roost on islands within the Langebaan Lagoon. Some of the more charismatic species include the Cape Gannet, Jackass Penguin, Flamingos and Black harriers. The salt marshes within the Park support vast concentrations of migrant waders from the Northern Hemisphere during the summer months while the spring months bring the colourful floral blooms which support a lucrative eco-tourism industry.



## 1.6 BIODIVERSITY, THE ECONOMY AND POVERTY ALLEVIATION

As described in Section 1.2 above, our livelihoods in the Western Cape are entirely dependent on biodiversity which delivers ecosystem services<sup>9</sup> that are vital for our survival. These services include a regular supply of clean water, flood control, the prevention of erosion, insect pollination (vital for the fruit industry), carbon storage (to counteract climate change) and clean air. The province's economic growth and development, and its sources of food, fuel, fibre, cut-flowers and medicines are provided by its biodiversity. Furthermore, our natural environment also provides the basis for a thriving eco-tourism sector and film industry, not to mention locations for traditional and modern rituals and ceremonies.

*The fruit industry in the Western Cape is entirely dependent on bees for its crop production. Outside of the fruiting season, as much as 80% of bee colonies survive on nectar and pollen provided by the natural veld. Safeguarding natural bee habitat is critical to the success of the fruit industry which employs significant numbers of people in rural areas.*

The loss of biodiversity through disturbance or development has impacts on ecosystem functioning, thereby reducing the delivery of ecosystem services. For example, the destruction of vegetation leads to erosion and heavy silt loads entering our river and wetland systems. This in turn necessitates increased municipal spending on chemicals required to treat the water. As water becomes more costly to supply, finances for the delivery of other services are reduced. Furthermore, after the removal of plant cover, heavy rainfall results in flooding and the subsequent washing away of homes and roads, with the rural poor often being the most severely affected. The loss of this natural vegetation can also impact on nearby agricultural crops as it results in a reduction in habitat for insect pollinators, thereby leading to smaller harvests with fewer jobs and greater poverty.

*Future generations will face significant ecological, economic, social and cultural costs if we do not acknowledge that our well-being is dependent on protecting biodiversity.*

*Safeguarding biodiversity includes activities such as removing invasive alien plants from natural areas. Such initiatives not only provide employment and training opportunities, but also lucrative economic gains. It is estimated that invasive alien clearance in the Western Cape could 'earn' about R700 million per year through enhanced cut-flower production for the wildflower industry, improved water supply through enhanced runoff, and increased tourism.*

Despite great progress, scientists do not know enough to be able to predict the full impacts of human activities on natural systems. However, it is known that natural systems can bear increasing burdens without revealing any decline in their own functioning before they reach a critical point, after which they collapse. Because this critical point cannot always be predicted, the National Framework for Sustainable Development of 2008 recommends that two principles be adopted. The *precautionary principle*<sup>9</sup> states that the absence of scientific certainty should not be used as a reason to postpone cost-effective measures to prevent environmental degradation. The *preventative principle* states that decision-makers should foresee and avert adverse impacts, or minimise these impacts on ecosystems, and restore or fix these effects.

In South Africa, the total value of ecosystems is conservatively estimated at R27 billion per annum. This estimate includes the production of biological resources as well as the final consumption of ecosystem services. The calculated value of biodiversity-dependent industries in the greater Cape region amounts to approximately R9,4 billion. In 2000 it was estimated that the pollinating services of bees to the fruit and honey industries amounted to R594 million, while in 2003, bird-watching tourism generated R16 million.

In essence, our rich biodiversity provides for nature-based community initiatives that support poverty alleviation by creating jobs in industries such as ecotourism, wild cut-flowers, honeybush tea, professional nature guiding, and bee farming. Some existing initiatives are good examples of collaborative programmes involving a range of national agencies that include municipalities at the local level e.g. the SANParks initiative, "People and Conservation".

*The craft sector in the Western Cape generates over R100 million annually, while providing employment to 18 000 – 28 000 people.*

## 1.7 BIODIVERSITY AND ECOSYSTEM SERVICES

Human survival is entirely dependent on the delivery of ecosystem services. The maintenance of these ecosystems and their supporting 'ecological infrastructure' is a key socio-economic imperative and the degradation or destruction of the natural environment can lead to high socio-economic costs.

Although this is not an exhaustive list, the following services are examples of those which may be delivered by terrestrial ecosystems:

- Buffers against natural hazards such as fire and floods;
- Regulation of water supply;
- Forage for grazing livestock and wild animals;
- Provision of food, fibre, medicinal and cosmetic plants;
- Provision of cleaner air;
- Improved resilience against climate change by storage (above- and below-ground) of excess carbon released as carbon dioxide through burning fossil fuels;
- Support of the horticultural and wildflower industries;
- Provision of natural spaces for recreation and tourism; and
- Contribution to natural and cultural heritage.

Human welfare and economic development is also heavily reliant on our natural aquatic ecosystems. These water systems and their adjoining buffer of natural vegetation, deliver a number of services associated with improved water quality and ensuring supplies. They serve to:

- Improve water quality through filtering and purifying water, trapping sediment, protecting shorelines, controlling erosion (thereby minimising excessive sedimentation) and recharging aquifers;
- Increase water quantity through storing flood waters and supporting stream base flow during the dry season;
- Provide a wildlife habitat for amphibians, birds, fish and mammals for all or portions of their life cycles;



- Provide water for agricultural, industrial and domestic use;
- Attenuate and regulate floods;
- Provide food and medicinal plants;
- Transport and/or purify biodegradable wastes;
- Support tourism, recreational and cultural use; and
- Enhance property values.

In addition to those services delivered by terrestrial and aquatic ecosystems, our coastal and marine ecosystems provide opportunities for:

- Subsistence and commercial fisheries;
- Medicinal and cosmetic resources e.g. kelp and microscopic plants for the food, cosmetics, animal feed and pharmaceutical industries;
- Mining (sand and heavy minerals);
- Recreational and tourism use (sport and fishing); and
- Enhancing property values.

The rich biodiversity and associated ecosystem services of the Cape Floristic Region<sup>9</sup> (CFR) contribute significantly to the regional and national economy. The total economic value of all of the ecosystem services flowing from the natural resources and biodiversity in the CFR has been estimated to be at least R10 billion per year, equivalent to over 10% of the Regional Gross Domestic Product of the Western Cape (Turpie *et al.*, 2003).

A breakdown of these services is as follows. Harvests of marine resources such as line fish, rock lobster, abalone and bait species, are worth over R1.3 billion annually. Fynbos products such as wildflowers for the cutflower industry and thatching reed are worth a total of R78 million per year. Nature-based tourism which relies on biodiversity is one of the greatest income generators in the region with an estimated overall contribution of R7.4 billion per year. Furthermore, the region's ecosystem services also contribute indirectly to the economy: bees reliant on fynbos contribute to commercial agricultural production, and mountain catchments covered in fynbos vegetation provide the region's main water supply.

*The sustainable use and management of the natural environment is vital, not only for the sake of biodiversity, but for social and economic survival. Furthermore, any ill-considered development resulting in the destruction of natural landscapes will reduce the tourism potential of an area. Instead, wise and well-informed land-use planning and management will enhance the region's capacity for tourism.*

## 1.8 BIODIVERSITY, CLIMATE CHANGE AND BIODIVERSITY SECTOR PLANS

Climate change<sup>2</sup> is one of the biggest challenges facing humankind. Even if we achieve significant reductions in emissions of greenhouse

gases, global climate change is inevitable. It poses significant threats to the basic provisions of life: water, health, food production and the environment, with the poorest communities likely to be the hardest hit.

*Climatologists predict a 50% reduction in rain-fed agricultural yield in some African countries by the 2020s (Intergovernmental Panel on Climate Change, 2007). In South Africa, the 'business as usual' approach to climate change will cost as much as between 5 and 20% of global Gross Domestic Product every year.*

Scientific predictions of future climate change suggest that the Western Cape could experience more drought periods. Coupled with increased evaporation and temperatures, this will negatively impact water supply. Regional predictions suggest a drying trend from west to east, with a weakening of winter rainfall, possibly slightly more summer rainfall (mainly in the eastern regions associated with the mountains), a shift to more irregular rainfall of possibly greater intensity, and rising temperatures everywhere. It is likely that the greatest impacts will be on water supply (Midgley *et al.* 2005). This highlights the importance of protecting our water resources from over-abstraction, degradation and the spread of invasive alien plants (which 'drink' more water than indigenous<sup>9</sup> plants). Management of mountain catchment<sup>9</sup> areas is critical in this regard, as they are the primary source of our water supply. For example; a fynbos mountain catchment<sup>9</sup> can lose up to 68% of its water yield due to a dense cover of invasive alien shrubs or trees. In the face of climate change we cannot afford these losses. The CBA Maps have identified priority sub-catchments and other areas such as aquatic CBA and their buffers that are especially important for protecting our water resources in the face of climate change.

The increase in temperatures anticipated with climate change may result in increased fire frequencies. Invasive alien plants are often highly flammable and with their large volumes, are likely to fuel more frequent fires. The combination of more frequent and more intense fires will have a devastating impact on the region. To avert this, an integrated invasive alien plant and fire management plan is essential to ensure both the removal of invasive alien plants as well as controlled burns. These interventions will result in an increased water supply, optimum regeneration of our veld, and a reduction in erosion and sediment deposition during times of severe rain.

The West Coast is especially vulnerable to two of Climate Change's most severe impacts, i.e. sea level rise and freshwater flooding. To prevent flooding of vulnerable coastal properties, the natural defences in the form of primary dune systems, estuarine mudflats and sand dunes must be protected from further conversion through urban development or agricultural practices. The CBA Maps therefore include coastal corridors and buffers to rivers and estuaries. These areas can be important for safeguarding both the environment and human property and life.


At the local level, one of the most effective ways to mitigate against the impacts of climate change is to safeguard Critical Biodiversity Areas and Ecological Support Areas. In order to allow range shifts in species, the CBA Map has identified a network of important biodiversity areas linking the inland mountains to the coast, as well as along the coast. Accompanying development guidelines assist in integrating

2 'A climate change strategy and action plan for the Western Cape' has been developed by the Department of Environmental Affairs and Development Planning, Western Cape (DEADP, 2007) and in preparation is a report 'A guideline for incorporating climate change adaptation and mitigation measures in Environmental and Spatial Development Planning and the development and environmental authorization processes'.

climate change into land-use planning and decision-making. Crucial management guidelines relevant to the Western Cape include:

- maintaining intact riparian (river bank) vegetation;
- restricting building to above the 1:100 year floodline;
- establishing a coastal set back line (i.e. a set distance inland from the coast);
- protecting major landscape corridors with biodiversity-compatible land-uses;
- protecting water resources;
- appropriate fire management;
- removal of alien invasive plants; and
- restoring and maintaining biodiversity for carbon storage.

Decision-makers and planners can reduce the effects of global climate change by integrating the CBA Map and guidelines into land-use planning and decision-making, and by adhering to wise management guidelines. These guidelines also assist with Disaster Management, using preventative rather than costly reactive measures.



*To ensure resilience against the impacts of climate change, landscape corridors need to be kept intact<sup>9</sup> to function as large-scale ecological process areas. These corridors enable the migration of plants, animals and birds, and thereby enhance their ability to persist despite changing climatic conditions. Examples of corridors are river valleys extending from inland mountains to the sea, along parts of the escarpment (the step where the inland plateau drops to the coastal plain), and also along the coast.*





Nancy Job

### Upper Verlorenvlei Estuary

**Box 3:** The RAMSAR site (site deemed to be of global significance to wetland bird species), Verlorenvlei, which flows into the Atlantic Ocean at Elands Bay, is one of the most important estuarine systems in the Western Cape and represents one of the largest systems of the West Coast.

The estuary is considered to be one of the ten most important wetlands for wading birds in the south-western Cape, providing feeding, nesting and resting facilities to at least 189 bird species, two of which are nationally threatened, three globally threatened and six nationally near threatened. The greater Verlorenvlei wetland area is also believed to support the Critically Endangered Verlorenvlei Redfin and Endangered mammals such as Grant's Golden Mole, De Winton's Golden Mole and Van Zyl's Golden Mole. Furthermore, due to its geographical position at the karroid/ fynbos vegetation types interface, the region supports a high floral diversity.

In addition to the ecological importance of the estuary, the estuary also has economic value in that it supports, amongst others, lucrative bird-watching and water-sports industries such as angling, sailing and kite-surfing while the greater wetland area is also used for cattle-grazing.

Unfortunately, the estuary is severely threatened by: extensive groundwater abstraction; urban and agricultural encroachment; escalating degradation of land and vegetation cover, as a result of grazing and clearing of land for agriculture and rural settlement; manipulation of flows / water levels for irrigation purposes; and fragmentation as a result of road crossings.

Land-use planning and related decision-making should aim to reduce the impacts of these threats by protecting a large buffer area around the estuary and ensuring that ecological functioning of the system is maintained. A healthy, intact and functioning estuarine and associated wetland system will also help increase the resilience of the area against two of Climate Changes most devastating impacts: frequent flooding and sea-level rise.



## 2.1 THE INTERNATIONAL, NATIONAL AND REGIONAL IMPORTANCE OF THE AREA

South Africa is extraordinarily rich in biodiversity, and in terms of plants and animals, it is the third richest country in the world. It is home to three “biodiversity hotspots”. Biodiversity hotspots<sup>9</sup> are defined as areas with high concentrations of different plant and animal species whose survival is threatened by unwise human activities.

These four West Coast municipalities (Saldanha Bay, Bergrivier, Cederberg and Matzikama) lie within two of South Africa’s internationally acclaimed biodiversity hotspots, namely, the Cape Floristic Region (CFR) and the Succulent Karoo (see Figure 2). The CFR extends from Nieuwoudtville southwards to Cape Town and eastwards to Grahamstown. This area contains about 9 000 plant species, of which over 6 000 are endemic<sup>9</sup> to the region, meaning they are not found anywhere else in the world. It also has high animal diversity including both vertebrates and invertebrates (animals with backbones and those without) and is especially rich in lizard, amphibian and insect species. Furthermore, the CFR is a priority area for freshwater fish endemic to the region, and also for birds endemic to South Africa. The Succulent Karoo is one of only two semi-arid biodiversity hotspots in the world, and exhibits the highest plant diversity for a semi-arid ecosystem. The Succulent Karoo extends along the north-eastern margin of the Western Cape, and north-westerly into Southern Namibia. It is characterised by succulent plants which are serviced by specialist insects.

## 2.2 TERRESTRIAL ECOSYSTEMS

As described earlier in section 1.2, ecosystems<sup>9</sup> comprise living organisms and their relationships and interactions, as well as their non-living environment (e.g. soil type). Furthermore, ecosystems can operate at different scales. Terrestrial ecosystems include living organisms and the substrate or land on which they occur, and a useful way of categorising them is according to vegetation type (e.g. forest, grassland, shrubland), and then further classifying them according to their specific habitat.

In the Saldanha Bay, Cederberg, Bergrivier and Matzikama Municipalities which all fall within the Cape Floristic Region, there are two major vegetation types; fynbos and renosterveld which are both low-growing shrublands. In these West Coast municipalities, the vegetation has been further subdivided into 45 types. Refer to Table 1 for a list of vegetation types found with each local municipality. The vegetation types are described in the botanical report: Fine-scale vegetation mapping in the Saldanha Peninsula and in the North-west Sandveld (Helme, 2007 and Helme and Koopman, 2007).

It is apparent from Table 1 that many of these vegetation types occur only along the West Coast and are thus endemic to these municipalities. In effect, the percentages in Table 1 indicate the degree to which a vegetation type is endemic to a particular municipality. A high percentage indicates a high level of endemism. Some vegetation types are near-endemic to only one local municipality, e.g. 99.2% of Citrusdal Vygiveld is found in the Cederberg Municipality. Other vegetation types are spread over a few of these municipalities, but occur nowhere else, e.g. Piketberg Quartz Succulent Shrubland.



In addition to these high levels of endemism, many of these ecosystems are also considered threatened<sup>9</sup> (Vulnerable, Endangered or Critically Endangered) as a result of extensive loss and degradation of natural habitat. The identification of threatened ecosystems can be done at local, provincial or national level. The ecosystem status<sup>9</sup> of the vegetation types along the West Coast has been determined as the result of three recent assessments (NSBA 2004 (Driver *et al.*, 2005); the National list of threatened terrestrial ecosystems<sup>9</sup>; and this C.A.P.E. Fine-scale Biodiversity Planning Project). The C.A.P.E. Fine-scale Biodiversity Planning Project ecosystem status formed important criteria in the delineation of a feature on the CBA Map (see Table 6 below).

Figure 2: Biodiversity Hotspots of Saldanha Bay, Bergrivier, Cederberg and Matzikama Municipalities.

**Table 1:** Vegetation types in the Saldanha Bay, Bergrivier, Cederberg and Matzikama Municipalities and the percentage of each vegetation type occurring in each municipality. The values also indicate the degree of endemism of each vegetation type (i.e. 100% indicates that a vegetation type occurs in only one municipal area and nowhere else in the world).

VEGETATION TYPE	SALDANHA BAY MUNICIPALITY	BERGRIVIER MUNICIPALITY	CEDERBERG MUNICIPALITY	MATZIKAMA MUNICIPALITY
Agter-Sederberg Shrubland			62.88%	
Arid Estuarine Salt Marshes			9.70%	37.49%
Bokkeveld Sandstone Fynbos			16.83%	35.41%
Cape Estuarine Salt Marshes	3.00%	49.55%	8.71%	
Cape Inland Salt Pans	25.01%	9.84%	9.98%	4.41%
Cape Lowland Freshwater Wetlands	1.28%	26.80%	37.15%	1.11%
Cape Seashore Vegetation	2.14%	1.39%	6.07%	1.07%
Cape Vernal Pools	33.97%	61.57%		4.47%
Cederberg Sandstone Fynbos		1.15%	50.34%	
Central Knersvlakte Vygieveld				37.72%
Citrusdal Vygieveld			99.20%	
Doringrivier Quartzite Karoo		0.16%	64.57%	19.70%
Graafwater Sandstone Fynbos		6.59%	89.85%	3.52%
Hopefield Sand Fynbos	34.19%	52.22%	1.19%	
Kamiesberg Mountains Shrubland				4.06%
Klawer Sandy Shrubland			1.30%	98.70%
Knersvlakte Dolomite Vygieveld				100%
Knersvlakte Quartz Vygieveld			0.05%	58.66%
Knersvlakte Shale Vygieveld				46.38%
Lambert's Bay Strandveld			71.17%	28.81%
Langebaan Dune Strandveld	27.04%	15.22%	6.61%	
Leipoldtville Sand Fynbos		27.43%	68.22%	4.35%
Namaqualand Klipkoppe Shrubland				2.59%
Namaqualand Riviere			0.88%	11.82%
Namaqualand Salt Pans				1.18%
Namaqualand Sand Fynbos			5.39%	24.00%
Namaqualand Spinescent Grassland			0.11%	99.89%
Namaqualand Strandveld				23.63%
Northern Inland Shale Band Vegetation		8.95%	29.09%	
Northern Knersvlakte Vygieveld				0.19%
Olifants Sandstone Fynbos		13.97%	75.83%	
Piketberg Quartz Succulent Shrubland	9.13%	90.87%		
Piketberg Sandstone Fynbos		100%		
Saldanha Flats Strandveld	51.80%	32.12%	1.73%	
Saldanha Granite Strandveld	91.89%			
Saldanha Limestone Strandveld	86.70%			
Southern Afrotropical Forest			0.23%	0.52%
Swartland Alluvium Renosterveld	10.64%	11.58%		
Swartland Shale Renosterveld	3.93%	28.09%	0.12%	
Swartland Silcrete Renosterveld	6.48%	16.12%		
Swartruggens Quartzite Fynbos			31.07%	
Swartruggens Quartzite Karoo			26.26%	
Tanqua Karoo			3.56%	
Tanqua Wash Riviere			0.18%	
Vanrhynsdorp Gannabosveld			1.98%	82.14%
Vanrhynsdorp Shale Renosterveld			0.01%	74.14%
Western Altimontane Sandstone Fynbos		2.77%		
Winterhoek Sandstone Fynbos		22.75%	0.01%	

## 2.3 AQUATIC ECOSYSTEMS

An aquatic ecosystem comprises the living organisms and the non-living components in the surrounding water system. Aquatic ecosystems include wetlands (or 'vleis'), estuaries, lagoons, lakes, rivers and groundwater<sup>9</sup> ecosystems. These systems have been reclassified according to function and position in the landscape into the following eight subtypes: floodplain wetlands, valley bottom wetlands, seeps, depressional wetlands, estuaries, mountain streams, foothill rivers and lowland rivers. The first five represent the wetland ecosystems (see 2.3.3 below) and the latter three represent the river ecosystems (see 2.3.1 below). For the purpose of this document however, the estuaries (see 2.3.2 below) will be addressed as a separate ecosystem as their management guidelines differ considerably to those of the other wetland types. These eight subtypes have in turn been further subdivided into 98 different aquatic ecosystem types along the West Coast (refer to Job *et al.*, 2008): 3 estuary types, 78 river types, and 17 wetland types.

Because aquatic ecosystems are usually inter-related systems, activities which impact on one part of an ecosystem have consequences elsewhere. For example, activities impacting the source of a river in the mountains, can affect the entire stretch of the river to the point where it enters the ocean. For this reason, two management zones have also been defined. These are the wetland clusters (see 2.3.3 below) and sub-catchments (see 2.3.1 below).

*South Africa is a water-scarce country and our aquatic ecosystems are under severe pressure as a result of many competing demands on our limited water resources. All indications are that South Africa will reach its limit of potentially accessible water supplies between 2020 and 2030. For this reason, it is crucial that efficient water-use is encouraged, for example through demand control, recycling, re-use and rainwater harvesting.*

### 2.3.1 Catchments and Rivers

A catchment is the area (a geographical region) where water from rain or snow is concentrated and drains downhill into a river or lake. The term includes all land surface, streams, rivers, and lakes between the water's source and where it enters the ocean. It follows, therefore, for the management of an aquatic ecosystem, the entire catchment must be managed as the management unit.

In the management of aquatic ecosystems, the catchment should be managed as a whole. Refer to Appendix C of Job *et al.*, 2008 for sub-catchment management guidelines. Page 13 – 15 for sub-catchments that have been categorised as Critical Biodiversity Areas and Page 46 – 47 for sub-catchments that have been categorised as Ecological Support Areas.

The Saldanha, Bergrivier, Cederberg and Matzikama Municipalities fall within the Olifants-Doorn and Berg River water catchment areas. These primary water catchment areas also represent the overall management areas for water resources administered by the Department: Water Affairs (DWA), and are commonly referred to as a Water Management Areas<sup>9</sup> (WMA). Central to each WMA is a main river system. The main rivers feeding these WMAs include the Berg, Olifants, Doring, Papkuils, Verlorenvlei, Langvlei and Jakkals Rivers. The Olifants-Doorn WMA has been subdivided into smaller, logical management units, namely the Knersvlakte catchments, the Sandveld Coast Catchments (Rocher Pan, Verlorenvlei, Langvlei and Jakkalsvlei), the Olifants River catchments and the Doring

River catchments. The Berg WMA is comprised of the Berg River catchments only. Refer to Figure 3 for catchments and main rivers of the Saldanha Bay, Bergrivier, Cederberg and Matzikama Municipalities.



**Figure 3:** The Aquatic Map of the Saldanha Bay, Bergrivier, Cederberg and Matzikama Municipalities indicating catchments and river systems.

Most of these major rivers have been modified through heavy use and regulation to improve water security. Biodiversity in most of these rivers has been impacted by modification of river banks, and the spread of invasive alien plant and fish species. Generally the smaller tributaries are less regulated and are in a healthier condition than the main rivers.

The well-being of a river ecosystem is largely dependent on the health of the adjacent natural vegetation, which is termed the riparian or riverside habitat. This vegetation filters pollutants, helps maintain natural water temperatures, contributes organic matter which supports aquatic life and acts as a buffer against the impacts of adjacent land-use activities. Furthermore, the rooting systems of the indigenous riverside vegetation bind the river banks, reducing the effects of floods, preventing erosion and increasing water storage in the soil by slowing run-off during floods.

The vegetated terrestrial areas surrounding and supporting the aquatic features<sup>9</sup> have been categorized as buffer areas in the CBA Maps. It is critical that any new land-use, development or activity should be separated from the river by a buffer area. Buffer widths have been recommended for different river types depending on their ecological importance, i.e. Critical Biodiversity Area rivers have buffer widths of 100 m, Critical Ecological Support Area rivers have buffer widths of 50 m and Other Ecological Support Area rivers have buffer widths of 32 m.

However, specific buffer widths should be considered on a case-by-case basis and should depend on the CBA Map category plus a specialist assessment of the impacts to the ecosystem of the existing and proposed adjacent land-use. This assessment should incorporate an understanding of the current condition of the aquatic ecosystem and existing and proposed buffer, as well as the functioning of the system in the broader landscape.



Refer to Appendix C of Job et al., 2008 for guidelines on river management. These guidelines are arranged per river type (mountain stream, foothill rivers and lowland rivers) and according to the CBA Map categories (rivers that have been categorised as Critical Biodiversity Areas (pages 2 – 13) or rivers that have been categorised as Ecological Support Areas (pages 37 – 46)). These guidelines also distinguish between the actual aquatic feature and the surrounding buffer area.

The National Water Act (NWA) requires that potential users acquire a license application from DWA for abstraction and other activities. The Act also lists certain rivers for protection against ad hoc abstraction and other activities. The NWA stipulates that studies must be undertaken to identify the ecological reserve requirements of a river, wetland, groundwater or estuary. The NEMA protects all rivers in terms of the listed activities.

### 2.3.2 Estuaries

Estuaries are water bodies or partially enclosed aquatic ecosystems that are permanently or periodically connected to the ocean, influenced by tidal fluctuations and where ocean water is at least occasionally diluted by fresh water derived from surface land drainage.

Estuaries are categorized on the basis of tidal exchange and can be classified as either permanently open or temporary closed estuaries. These subtypes are then further subdivided according to landform features and the tidal regime or depth class evident within each subsystem.

There are a total of six estuaries found within the Saldanha Bay, Bergrivier, Cederberg and Matzikama Municipalities (refer to Table 2 for estuary names and types found within these local municipalities). Two of the estuaries found within this area, namely the Berg River Estuary and the Olifants River Estuary, have been ranked as 3<sup>rd</sup> and 4<sup>th</sup> respectively as Estuaries of Conservation Importance within South Africa (Turpie and Clark, 2007). (Conservation Importance is based on size, habitat, zonal type rarity and biodiversity importance.) In the same study, the Berg River estuary was identified for partial Estuarine Protected Area status. This means that at least one side of the system should be managed as a sanctuary, to be protected from all activities

that use up a resource (e.g. fishing). Although the Langebaan lagoon was not assessed in this earlier study, the Ramsar<sup>9</sup> Status of this site and the fact that it falls within a Protected Area (the West Coast National Park), should afford it at least equal conservation status with the selected Estuarine Protected Areas.

Refer to Appendix A of Job et al., 2008 for site-specific information for each of these six estuaries. This information includes ecological significance, socio-economic significance, threats, etc.

For further information on the estuarine types and classifications, refer to Job, N., Snaddon, K., Day, L., Nel, J., Smith-Adoo, L. and Kotze, I. 2008. The Freshwater Consulting Group and CSIR. C.A.P.E. Fine-scale Biodiversity Planning Project: Aquatic Ecosystems of the Sandveld-Saldanha Planning Domain.

The estuaries of this region are vulnerable to a wide range of impacts. The greatest threats include: groundwater<sup>9</sup> abstraction (e.g. for potato farming in the Sandveld); salt mining and processing plants, diamond mining; urban development (e.g. road and rail infrastructure); encroachment of cultivated fields; escalating degradation of soil and vegetation cover (e.g. through overgrazing and alien vegetation invasion); overexploitation of fish; increased siltation from erosion in the catchment; reduction in freshwater inflows into the estuary; rising sea levels; sedimentation from upstream erosion; the artificial closure or bisection of estuaries severely limiting connectivity<sup>9</sup> to the sea; and manipulation of flows / water levels for irrigation purposes. Central to the health of these estuaries is the proper management of upstream rivers and wetlands. Ongoing loss of peat wetlands upstream results in increased sedimentation, nutrients and food flows and decreased perenniality in the estuary. Therefore, estuarine health is endangered by threats to these and other wetlands, such as agricultural encroachment, road construction through wetlands, dykes and drainage ditches.

### 2.3.3 Wetlands

Wetlands or vleis are those areas where water covers the soil permanently or periodically, at or near the surface. Resident plant and animal species must be able to tolerate periods of waterlogged soils. A more detailed definition as provided by the South African National Wetland Inventory Classification System (Ewart-Smith et

**Table 2:** Estuary names, types, sizes, protection and priority status of the Saldanha Bay, Bergrivier, Cederberg and Matzikama Municipalities (adopted from Job et al., 2008). The priority ranking is based on size, habitat, zonal type, rarity and biodiversity importance (from Turpie and Clark, 2007).

Estuary Name	Municipal jurisdiction	Estuary Type	Approx. size (ha)	Protection status	Priority rank in SA	Recommended status
Olifants River estuary	Matzikama	Estuarine channel Estuarine depression	1 992	None / Ramsar site	4th	Partial Estuarine Protected Areas
Jakkalsvlei estuary	Cederberg	Estuarine channel and Estuarine depression	78	None	Not ranked	Estuarine Management Area
Langvlei estuary	Cederberg	Estuarine depression	287	None	Not ranked	Estuarine Management Area
Verlorenvlei	Cederberg	Estuarine channel	1 667	None / Ramsar site	Not ranked	Partial Estuarine Protected Areas
Berg River estuary	Berg River / Saldanha Bay	Estuarine channel Estuarine Depression	7 770	None / Ramsar site	3rd	Partial Estuarine Protected Areas
Langebaan lagoon	Saldanha Bay	Estuarine bay	1 770+	West Coast National Park	Not ranked	Existing Estuarine Protected Areas

al., 2006) and adopted by the Ramsar<sup>9</sup> Convention on Wetlands (listing wetlands of international importance) is “an area of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tides does not exceed ten metres”. The inland wetlands of the West Coast have been classified as isolated or non-isolated systems, depending on the connection or proximity to riverine systems and further subdivided into functional, structural and habitat units (i.e. floodplain, valley bottom, seeps and depressions).

Within the four local municipalities, there are 22 wetland groups. The wetland types which have been mapped are mostly floodplain and valley bottom wetlands, although depression and seep wetlands are also present. In total, the wetlands of the Saldanha Bay, Berggrivier, Cederberg and Matzikama Municipalities amount to approximately 1.5% of the entire planning domain. Refer to Table 3 for a list of wetland types found within each local municipality.

For further information on the wetlands of these West Coast municipalities refer to Snaddon, K., Job, N., Day, L., Nel, J., Smith-Adoa, L. and Kotze, I. 2008. The Freshwater Consulting Group and CSIR. C.A.P.E. fine-scale biodiversity planning project: Surface freshwater ecosystems. Phase 1 report: methodologies for collection of base layer data. Report for CapeNature, and to Job, N., Snaddon, K., Day, L., Nel, J., Smith-Adoa, L. and Kotze, I. 2008. The Freshwater Consulting Group and CSIR. C.A.P.E. fine-scale biodiversity planning project: Aquatic Ecosystems of the Sandveld – Saldanha Planning Domain.

*Refer to Appendix C of Job et al., 2008 for management guidelines on wetland types. These guidelines have been arranged according to wetland type (i.e. floodplain, valley bottom, seeps and depression wetlands) and CBA Map category (i.e. wetlands that have been categorised as Critical Biodiversity Areas (page 15 – 31) or wetlands that have been categorised as Ecological Support Areas (page 48 – 64)), and also differentiate between the wetland feature itself and the buffer surrounding it. Furthermore, they include management guidelines for significant wetland clusters (page 32 – 36).*

**Table 3:** Summary of the inland wetlands and estuaries occurring within the Saldanha Bay, Berggrivier, Cederberg and Matzikama Municipalities (as adopted from Job et al., 2008).

Sub-system	Wetland Type	Total number	Total area (ha)	Number/ hectares of wetlands where more than 75% of the wetland remains intact	Number/ hectares of wetlands which are classified as CBA Aquatic	Number/ hectares wetlands which area already protected	Number/ hectares of wetlands classified as CBA Aquatic which are already protected
<b>SALDANHA BAY MUNICIPALITY</b>		269	13406	56/9632	103/12488	7/1902	7/1902
Estuarine		2	9620				
Non-isolated	Floodplain	3	1680				
Non-isolated	Valley Bottom	56	1267				
Non-isolated	Seep	48	269				
Isolated / non-isolated	Depression	160	558				
<b>CEDERBERG MUNICIPALITY</b>		633	18868	339/10756	398/12514	159/5336	148/5090
Estuarine		3	2083				
Non-isolated	Floodplain	22	5732				
Non-isolated	Valley Bottom	127	6858				
Non-isolated	Seep	329	2532				
Isolated / non-isolated	Depression	152	1140				
<b>BERGRIVIER MUNICIPALITY</b>		534	19453	125/11379	219/16446	64/3340	58/2838
Estuarine		1	6987				
Non-isolated	Floodplain	26	6455				
Non-isolated	Valley Bottom	40	1674				
Non-isolated	Seep	224	1761				
Isolated / non-isolated	Depression	243	2574				
<b>MATZIKAMA MUNICIPALITY</b>		298	8429	62/4274	90/4503	4/9	4/9
Estuarine		1	19				
Non-isolated	Floodplain	27	2564				
Non-isolated	Valley Bottom	52	2271				
Non-isolated	Seep	34	252				
Isolated / non-isolated	Depression	184	1349				



Together with their other important functions, wetlands also serve as stepping-stones for birds, reptiles, invertebrates and amphibians moving across the landscape. The role of wetlands as stepping stones is dependent on the permeability of the surrounding area. Generally, this decreases as the landscape becomes more degraded. Development of the surrounding area limits movement of animals, so that wetlands are no longer able to function as stepping stones. If an area supports several wetlands that together are greater than 500 ha in extent and no more than 1.5 km apart; and if more than 80% of the land cover is natural vegetation; then this should be recognized as a significant cluster to be prioritized for protection and proper management.

### 2.3.4 Groundwater ecosystems

Groundwater is the term for any water found subsurface in the saturated zone below the water table, i.e. the water table marks the upper surface of the groundwater systems. In the Cape West Coast region, groundwater is an important determinant of biodiversity. The area has low river flows and very large underground water in the form of aquifers<sup>9</sup>. Surface water systems are largely dependent on the groundwater, both in terms of its depth below surface and its quality. As a consequence, protection of groundwater is vital to ensure the healthy functioning of above-ground natural systems.

For further information on the groundwater ecosystems of the West Coast and its proper management, refer to Conrad, J., and Munch, Z., 2006. Groundwater Assessment of the North-West Sandveld and Saldanha Peninsula as an Integral Component of the Component 5.1, C.A.P.E. Fine-Scale Biodiversity Planning Project. Consultancy Report submitted by GEOSS to CapeNature. November 2006. Cape Town.

## 2.4 MARINE AND COASTAL ECOSYSTEMS

South Africa's coast is 3000 km long and stretches from Ponto do Ouro on the Mozambique border to the Orange River, which separates Namibia from South Africa. The West Coast is washed by the Atlantic Ocean and the east coast by the Indian Ocean. These are two large current systems that have major influences on the ecology of the South African marine environment. The cold Benguela current flows up the West Coast while the warm Agulhas current flows down the east coast.

The great differences in the physical oceanography of the South African marine environments have resulted in major differences in both the type and number of organisms that are found along the coast. As a result, the National Spatial Biodiversity Assessment (NSBA) 2004 defined five distinct marine bio-geographic zones in the country: Namaqua Bioregion<sup>9</sup>, South-Western Cape Bioregion, Agulhas Bioregion, Natal Bioregion and the Delagoa Bioregion. These West Coast municipalities lie within the Namaqua Bioregion (from Cape Columbine northwards) and the South-western Cape Bioregion (from Cape Columbine southwards to Cape Point).

The key feature of the West Coast is the cold Benguela current with its nutrient-rich waters, upwelling from the depths mostly in the summer season between September and April. This productive current supports one of the world's richest fishing grounds. Overall, it is an area of extraordinarily high productivity which supports very large volumes of fish, and plankton comprising tiny plants and animals.

*Approximately 90% of South Africa's fishing industry occurs off the Western Cape coast.*

Unfortunately, these marine ecosystems are in a highly threatened state. This is attributed to human activities including diamond and petroleum mining, pollution, trawling, over-abstraction of marine resources, coastal developments, non-extractive recreational activities, invasive alien species<sup>9</sup>, climate change and mariculture (cultivation of marine organisms for food or other use). Formal protection of the marine resources is largely lacking (besides a 12 km stretch in the extreme south and the Langebaan Lagoon), and little is known about the marine animals and plants that occur there.

All sectors, especially those involved in industry along this coast, should make every effort to safeguard the marine resources and to ensure their sustainable use. (Refer to 1.7 above for ecosystem services provided by marine and coastal habitats.) The protection of the coastal zone is becoming increasingly important in the view of climate change and rising sea levels.

**Box 3: Van Zyl's Golden Mole** (*Cryptochloris zylii*) belongs to the golden mole family which is comprised of 18 species, all endemic to the African continent. Van Zyl's golden mole differs from the other species in the same genus, in that it is a smaller mole with a total length of approximately 8cm and is darker and browner with a purplish sheen. Very little is known about this Critically Endangered species as it spends most of its life underground in shallow sandy soils of the temperate, Strandveld Succulent Karoo.

This golden mole is mainly threatened due to habitat loss through overgrazing, crop cultivation, irrigation and mining. Today, there is only 1 locality known to have the Van Zyl's golden mole, i.e. Compagnies Drift, 16 km inland from Lambert Bay.

Conservation initiatives should aim to conserve this species through the establishing of more Private Conservation areas such as Conservancies and Private Nature Reserves and statutory conservation areas, thereby protecting the golden moles habitat.

## 2.5 SPECIAL HABITATS AND SPECIES OF SPECIAL CONCERN<sup>9</sup>

Special Habitats include areas that are rare within the region, or which support Species of Special Concern, as well as ecosystems or ecological processes. They include those Listed Threatened Ecosystems in terms of the NEMBA and other habitats protected by legislation, namely wetlands, estuaries and indigenous forests. The most prominent Special Habitats occurring within these municipalities include coastal forests, rocky outcrops along the coast, wetland mosaics, inselbergs (isolated mountain peaks) and rocky coastal gorges. Refer to Table 4 for descriptions of the most prominent Special Habitats occurring within the region.

Species of Special Concern are Red Data<sup>9</sup> listed species<sup>9</sup>, some of which are listed in the NEMBA Threatened or Protected Species. Listed below is a selection of the most important Species of Special Concern located within these West Coast Municipalities.

All these species contribute to the biodiversity of the West Coast and should be safeguarded. The best way to achieve this is to protect the habitats against disturbance.



Nick Helme

**Box 4: Leipoldville Sand Fynbos** (also referred to as Sand Plain Fynbos) is a medium to tall shrubland with prominent Restionaceae, Proteaceae, Fabaceae (*Aspalathus*), Polygonaceae (*Nylandtia*) and no real trees. This vegetation type is restricted to the West Coast and due to its deep, acid, sandy soils, has been heavily targeted for agriculture, i.e. rooibos and potatoes (mostly seed) cultivation. This vegetation type is exceptionally rich in Species of Special Concern (no less than 37 known Species of Special Concern) and when coupled with the high development pressures, makes it a major conservation priority for the region. No more transformation of this vegetation type should be permitted and proper management thereof should be encouraged and possibly incentivised.



Luca Galuzzi

**Box 5: Leopard** (*Panthera pardus*): The leopard has suffered extensive range loss in the Cape and is now extinct in many areas where it formerly occurred. They have nonetheless, in the recent years, been recorded in the Groot Winterhoek, Cederberg Nature Reserves as well as in the vicinity of Het Kruis, Citrusdal and Leipoldville and as a result thereof, receive a lot of attention from the eco-tourism industry in the area.

The leopard is the largest predator in the Western Cape and it fills the role of the apex predator in the local ecosystem. It acts as an umbrella species whose protection, will effectively help in the protection of smaller predators thereby keeping food chains in these ecosystems intact.

Unfortunately, the Cape leopard populations remain threatened due to habitat loss as well as the persecution of the leopard in order to protect domestic stock. Often, in the latter instances, the leopards are removed from the farms without gathering data on the population or genetic status, or establishing the true factors giving rise to the apparent conflict.

As a result thereof, the Cape Leopard Trust has been established to optimally facilitate conservation of the Cape's predator diversity through simultaneously implementing conservation strategies, research projects and tourism initiatives aimed at the Leopard. The Trust also aims to educate and encourage the youth of disadvantaged communities to have a vested interest in the natural environment.

It is believed that the local survival of the species in the Western Cape can be attributed to three main factors; 1) the leopards diverse diet, 2) the declaration of the species as a protected species in 1974, and 3) the addressing of perceived problem animals through education and public awareness, trapping and relocation programmes, and the promotion of Anatolian shepherd dogs as livestock guards. Despite these efforts, the conservation status remains uncertain and science and research is to continue focusing on the species in order to ensure its local existence in the Western Cape.

**Table 4: The priority Special Habitats of the Saldanha Bay, Bergrivier, Cederberg and Matzikama Municipalities. Adapted from Helme, 2007 and Helme and Koopman, 2007 and Job *et al.*, 2008.**

<b>Coastal Forests:</b>	There are two unique forest patches on the cool south facing granite cliffs and outcrops of the Postberg Peninsula and SAS Saldanha land. These are fire and climate refugia as they are south facing and exposed to the prevailing summer winds blowing off the cool sea. These factors give rise to mesic microclimates and the development of small forest patches with species not otherwise found in the region, and more typical of mesic regions about 150 km to the south.
<b>Calcrete Vlei:</b>	A single, tiny calcrete vlei in the West Coast National Park was singled out as it is the only one of its kind in the region. Calcrete is a cement-like layer formed through calcium carbonate deposits
<b>Coastal Limestone/Granite mosaic:</b>	This habitat occurs in at least four coastal areas (Postberg, Jacobsbaai, Trekoskraal and Columbine to Paternoster). The close association of the different plant communities supported by these two geological substrates is highly unusual. Furthermore, the high species diversity and number of rare species are of great biodiversity value and are of high conservation value. The coastal habitats are important as climate refugia (sites where the climate remains habitable when the surrounding climate changes).
<b>Dune Strandveld Wetland Mosaic:</b>	This unusual combination of Langebaan Dune Strandveld and permanent wetland occurs only at the head of the Langebaan lagoon, within the National Park.
<b>Olifants, Oorlogskloof and Biedouw River Gorges:</b>	<i>The Upper Olifants, Oorlogskloof and Biedouw Rivers have spectacular and relatively unique river gorges. The gorges are in a near pristine condition and contain highly conservation-worthy fish assemblages.</i>
<b>Kliphout forest and sandstone inselbergs of Lambert's Bay area:</b>	The sandstone inselbergs (koppies) occur along the coastline from Wadrif Soutan to north of Donkin's Bay. They are surrounded by Lambert's Bay Strandveld and range in size from 0.5 ha to 3 ha. The inselbergs support unique assemblages of plant species, including localized species such as the vygie, <i>Oscularia cremnophila</i> .
<b>Baboon Point:</b>	Baboon Point is the most significant coastal outcrop falling within these local municipalities. It lies south of Elands Bay about 300 m from the coast. It is exposed to regular sea fogs and the elevated moisture level coupled with the stable substrate has allowed for the development of extremely rich succulent and bulb communities, including a number of local endemics <sup>9</sup> .
<b>Lowland acid sand wetlands:</b>	There are very few of these wetlands on the coastal plain, comprising permanently damp acid sands and supporting a group of plant species more typical of Sand Fynbos about 100 km to the south. Many of the component species have not been recorded so far north and are therefore of major geographic interest and biodiversity value.
<b>Graafwater Flats:</b>	This habitat is special as the meeting point of several different vegetation types and plant communities. Unique species occur here and there are unusual habitats, such as rocky flats.
<b>Noordhoek River:</b>	This tributary of the Olifants River contains the highest diversity of indigenous fish species (six species) found in any river within this region.
<b>Kanonpunt (Donkin's Bay):</b>	This is one of the few rocky points on this coast and it supports a sensitive plant community.
<b>Strandfontein Gorge:</b>	Stretching from the railway bridge to the ocean, just south of Strandfontein is the most significant rocky coastal gorge in the study area. It is rich in succulents and bulbs which are sustained by the occurrence of dense coastal fog.
<b>Olifants River railway bridge area:</b>	At the point where the Spoornet Sishen railway crosses the Olifants River there is a significant north-facing shale cliff. On the north bank is one of the few intact sandy alluvial terraces on this part of the river. The cliffs support a group of special succulents and bulbs.
<b>The Sout River:</b>	The Sout River is an important tributary to the Berg River and has been highlighted for conservation. The Sout River is considered a special type of river as it is a saline system which probably supports a unique fish species of Cape galaxid, endemic to the area.



## PLANTS

The area is home to many endemic<sup>9</sup>, rare or threatened plant species. The Leipoldtville Sand Fynbos for example has no less than 37 special plant species found within the vegetation type. For a list of the Species of Special Concern within each vegetation type, refer to Helme, 2007 and Helme and Koopman, 2007.

## BIRDS

Several endemic bird species occur in this area, e.g. Barlow's lark (*Certhilauda barlowi*). Other species in the region include the vulnerable black harrier (*Circus maurus*), which has the most restricted range of the world's 13 harrier species, Karoo bustard (*Eupodotis vigorsii*), Ludwig's bustard (*Neotis ludwigii*), Karoo chat (*Cercomela schlegelii*), dune lark (*Certhilauda erythrochlamys*), and dusky sunbird (*Nectarinia fusca*). Moreover, thousands of sea birds roost on sheltered islands or rest on the beaches along the West Coast. Some of these include the Cape Gannet, Flamingos, African Penguins and Waders

## MAMMALS

Mammal species that are endemic or near endemic to the area are Van Zyl's Golden Mole (*Cryptochloris zylii*), Cape Dune Mole ( *Batyergus suillus*), Cape Gerbil (*Tatera afra*) and Grant's Golden Mole (*Eremitalpa granti*). The diversity of reptile species is relatively high in the drier Succulent Karoo area along the West Coast. Seven species of girdled lizards of the genus *Cordylus*, including the armadillo girdled lizard (*Cordylus cataphractus*) are endemic to the area. Two endemic tortoise species occur in the area, namely the Namaqualand tent tortoise (*Psammobates tentorius trimeni*) and the Namaqualand speckled padloper (*Homopus signatus signatus*).



Dr. Ernst Baard

**Box 5: Geometric Tortoise (*Psammobatus geometricus*)** occurs only in the Western Cape and nowhere else in the world. Geometric tortoises are attractive, medium-sized tortoises with a beautiful yellow starred pattern on a dark brown to black background. This tortoise has lost more than 90% of its natural habitat, and it only occurs in what is collectively known as shale Renosterveld and the alluvium fynbos.

Regrettably, these habitats are also favoured agricultural land and most of it has been transformed into wheatfields and vineyards. Because of the extent of habitat destruction, geometric tortoises are classified as a Critically Endangered species. They enjoy complete legal protection and nobody may collect or disturb, have in their possession or export from the Western Cape any specimens without special permission. They are primarily threatened by habitat destruction and fragmentation, illegal collection for the international pet trade and invasive alien species (including plants and feral pigs that damage remaining habitats significantly).

Geometric tortoises are now only found on a handful of properties, mostly privately owned. Good news is that most of the sites are either already signed up or are in the process of being signed up as conservation stewardship sites. Private landowners hold the future of the geometric tortoise in their hands and need all the support from CapeNature to keep these remaining sites ecologically functioning and healthy.

## INSECTS

The northern reaches of the West Coast constitute the southern-most tip of an area of endemism for darkling beetles (tenebrionid family, which includes toktokkies). Another group, found almost exclusively in southern Africa, are the monkey beetles which are concentrated in this area. Along with many types of wasps and bees, these beetles pollinate the West Coast's immense range of plant species. Perhaps the most unusual invertebrates found here are the long-tongued flies (Memestrinidae), which can have mouthparts up to 50 mm long. The level of richness and endemism in insect species is likely to be similar to the extraordinary richness exhibited by the plant life. Preliminary studies show that more than half of the species in some insect groups are endemic to the area, occurring nowhere else in the world.

## FISH

The primary catchment of the Olifants-Doring river system is critical in terms of freshwater fish conservation. It has the highest number of endemics in southern Africa, earning it the title of a freshwater fish hotspot. The area is home to 10 endemic fish species of which five are Endangered and an additional two are Critically Endangered according to IUCN criteria. The main threats to these fish are the presence of alien invasive fish species such as three bass (*Micropterus* spp.) species, unsustainable levels of water abstraction and habitat degradation mainly as a result of agricultural activities.

In addition to the endemic species of the Olifants-Doring system, the Berg River system is home to the Berg River redbfin (*Pseudobarbus burgi*) which is endemic to the system and presently considered a Critically Endangered species. Recent genetic research has indicated that the redbfin occurring in the Verlorenvlei is genetically distinct from the Berg River redbfin and is therefore a separate species. Other indigenous fish of this area include the Cape kurper (*Sandelia capensis*) and the Cape galaxias (*Galaxias zebratus*). Genetic studies also show that the Cape galaxias, originally believed to be a single species with a fairly large distribution range, is in fact a number of separate and undescribed species. The Berg-Breede whitefish (*Barbus andrewi*), one of the larger species, has become extinct in the Berg River, and its long-term survival is dependent upon conserving populations in the Breede River catchment.



Dean Impson

**Box 6: Clanwilliam yellowfish** (*Labeobarbus capensis*) is only found in the Olifants-Doring River System and is the Western Cape's largest indigenous freshwater fish. This magnificent gamefish, which in breeding colour looks like a bar of gold, has sadly undergone major declines in its distribution range and abundance since the 1930s. These declines have been caused by invasive fishes (primarily smallmouth bass) and habitat degradation due to excessive water-use from rivers, bulldozing of rivers and the inappropriate use of fertilizers and pesticides.

Clanwilliam yellowfish are currently listed as Vulnerable by the IUCN and breeding populations are only found in the Olifants Gorge and some tributaries where alien fishes are absent and aquatic habitat is healthy.

Several recent conservation and water resource management measures hold substantial promise for the future of the species, including the establishment of the Greater Cederberg Biodiversity Corridor, the development of a freshwater conservation plan for the Olifants-Doorn Water Management Area, and planned eradication of alien fishes from designated priority rivers. There also needs to be a focus on establishing aquatic stewardship agreements with riparian land-owners on priority tributaries (Thee, Noordhoek, Ratels, Rondegat, Biedou, Kobee, Matjies) to improve conservation of its habitat. Current obstacles include low levels of awareness amongst riparian landowners and anglers, unsustainable levels of water abstraction and the continuing illegal stocking of fishes into dams and rivers, leading to new introductions of harmful alien species such as carp and sharptooth catfish in the river system in the last 10 years.



Rupert Koopman

#### Treitjieskraal, Cederberg

**Box 7: The Cederberg Wilderness Area** stretches from the Middelberg Pass at Citrusdal to north of the Pakhuis Pass at Clanwilliam. The 71 000ha of rugged, mountainous terrain was proclaimed a Wilderness Area in 1973. Local landowners have since joined CapeNature in setting up the Cederberg and Biedouw Conservancies bordering the Wilderness Area and bringing the total area of state and private conservation areas up to 312 000 ha. Additional conservancies are also envisaged for the Olifants River valley and Wupperthal areas. Together with the adjacent 12 000 ha Matjiesrivier Nature Reserve, this Wilderness Areas is managed as the Greater Cederberg Conservation Area.

The Cederberg Wilderness Area forms the main catchment area for the Olifants River system. This system is home to the richest variety of endemic fish species south of the Zambezi (occurring in the Olifants River and its tributaries and nowhere else on earth). Unfortunately, this system also forms the main water source for human settlement and development in the area and as a result thereof, is under threat from over-abstraction; river bed excavations and damming; pesticide pollution; and invasive alien plant (e.g. black wattle and blue gum) and fish (e.g. bass) infestation.

Resultant degradation of the riverine habitat is so severe that the eight species of fish endemic to the Olifants River all face extinction. Fish inhabiting the lower, unprotected reaches of the Olifants River system (Clanwilliam yellowfish, Clanwillian sandfish and Clanwillian sawfish) are particularly at risk.

In addition to its rich endemic fish diversity, the Wilderness Area is home to the increasingly rare, Clanwilliam cedar tree (*Widdringtonia cedarbergensis*). The Clanwilliam cedar grows against cliffs and overhangs at altitudes of more than 1 000m above sea level. From 1903 to 1973, exploitation of natural products was rampant in the Cederberg and large amounts of cedar trees (amongst others) were felled to satisfy the growing demand for construction wood (e.g. 7 200 trees were used for telephone poles between Piketberg and Calvinia alone!). Fires have added to their destruction and cedar trees are now on the brink of extinction. In 1967 the removal of dead cedar trees was halted and other forms of exploitation ended in 1973. Despite the protection offered by the Wilderness Area, Cedar trees appear to be dying out. A cedar reserve of about 5 250ha was established in 1987 in an attempt to prevent the extinction of these trees and about 8 000 year-old trees are planted within the Wilderness Area each year by volunteers. Other special conservation measures implemented to protect the cedar tree include more frequent, cooler burning and limiting the extremely hot fires that kill the mature trees.

The Wilderness Area also contains, amongst others, over 100 bird species, 16 snake species and a vast array of mammals including the Cederberg's largest predator, the leopard. The Wilderness Area actually forms the core of a leopard management area which was established in 1988 and includes private land which is managed in collaboration with the landowners. The main aim of this initiative being to promote the existence of leopards by minimising the conflict between stock farming and nature conservation.

The Wilderness Area is however most renowned for its landscapes and rock formations with over 180 caves and overhangs where San rock paintings, ranging between 300 and 6000 years old, can be found. These painting are very sensitive to damage and intensive monitoring and conservation thereof has been implemented by the National Heritage Resources Act. The Cederberg Wilderness Area has also grown into a popular destination for hikers and mountain climbers thereby contributing significantly to the local economy of the area. These traditional activities remain encouraged by the managing agents, CapeNature, as long as the rock surfaces and surrounding vegetation remains undamaged.



## 2.6 ECOLOGICAL PROCESSES

As described earlier in section 1.2, biodiversity encompasses not only all living things, but also the series of actions and interactions that sustain them, which are termed ecological processes.

An example of an ecological process is nutrient recycling whereby a plant grows by absorbing elements from the air and nutrients from the soil, and after its death, these enhanced products are released into the soil. The spinoffs from the process are improved soil fertility and carbon storage. Such spinoffs from ecological processes benefit humans and are known as ecosystem services (see section 1.8 above).

In the case of evolutionary processes, these seem far removed from our everyday lives. We perhaps forget that new species are evolving all the time and, with impending climate change, it is even more important that we ensure that the areas where species generate are safeguarded. For example, in areas where different soil types meet, this juxtaposition enables certain plant species to become adapted to different soils, and new plant species are able to generate.

These processes are not obvious to everybody, but scientists are able to identify and locate critical examples which are often associated with landscape features. Among the largest ecological process areas are landscape corridors comprising large tracts of natural habitat, such as major river systems or mountain ranges. They serve as landscape-scale "highways", allowing plant and animal species to migrate along them in response to any changes in climate. These highways usually run along river courses from the high inland mountains, across the lower coastal plain and to the coast, or else along mountain ranges in an east-west gradient.

An identified landscape corridor may cover a variety of habitats such as pristine<sup>9</sup> fynbos vegetation, and of necessity, to ensure connectivity, may include patches of disturbed and/or degraded habitats. It may cover Special Habitats or even the alternate narrow strips of natural vegetation growing between rooibos tea strips. If such degraded, disturbed or agricultural lands are identified as components of a landscape corridor, no further hardening of the surface should be allowed as this poses threats to the functioning of the corridor.

The objective of sustainability is to ensure the persistence of critical processes along a number of gradients and for these to interlink where possible. For example, a river corridor following the gradient from inland mountains to the sea serves to link areas of different soil types as well as coastal corridors spanning an east-west gradient. Such a network of corridors provides the best design in enabling biodiversity migrations.

These large-scale landscape corridors which often extend beyond local municipal and provincial boundaries, also serve to protect the source of rivers and ensure water yield from mountain catchments. They contribute to the protection and preservation of Critical Biodiversity Areas and Ecological Support Areas, and support rare or threatened species. They deliver invaluable ecosystem services that are too costly or impossible to produce artificially. For example, mountains absorb rainfall over immense areas, and act as vast sponges storing the water and then releasing it slowly through the

dry season. These are services which function at scales impossible for humans to replicate.

The most important ecological process areas or landscape corridors falling within the West Coast are the coastal corridors and the coast-to-interior corridors.

Coastal corridors buffer the land from the impacts of climate change (both sea level rise and freshwater flooding) and provide valuable ecosystem services (see 1.7 above). As a consequence, their long term integrity and functioning must be protected. Any natural or near-natural land falling within 1km from the coastline should be maintained in its current condition and any degraded land falling within this zone, which could feasibly be rehabilitated<sup>9</sup>, should be restored<sup>9</sup> to a natural or near-natural state. Maintaining this landscape connectivity along the coast is easier to achieve within the Bergrivier and Matzikama municipalities where large tracts of intact vegetation remain along these coastlines. Within the Saldanha Bay and Cederberg municipalities however, it is more difficult to achieve these connections due to already high levels of land transformation<sup>9</sup> that have occurred. The majority of this transformation can be attributed to urban settlements and resort developments.

Coast-to-interior corridors allow for plant and animal species to migrate towards the higher, cooler and wetter mountainous regions thereby increasing the resilience of the ecosystems to the impacts of global warming. It is difficult to achieve these connections throughout all of the West Coast as a significant proportion of the low-lying vegetation has already been lost to agricultural activities (and the coastal regions, to resort and urban settlements as explained above).

The following West Coast landscape corridors remain vital and their protection must be prioritised:

- SAS Saldanha, northwards along the coast towards Tietiesbaai;
- West Coast National Park northwards towards the Berg River estuary;
- West Coast National Park north-westerly towards Tietiesbaai via south Vredenburg;
- The Berg and Doring River corridors;
- Rocher Pan Nature Reserve eastwards;
- Elandsbaai Nature Reserve and Verlorenvlei, eastwards towards the Cederberg Wilderness Areas via the Sandveld corridor (as identified by CapeNature's Greater Cederberg Biodiversity Corridor Project);
- North of Lamberts Bay, eastwards towards the northern section of the Cederberg Wilderness Area;
- Matjiesrivier Nature Reserve northwards towards Biedouvallei (these North-South corridors provide similar functions as the coast to interior corridors allowing for species in the north to migrate to the cooler south during warmer times); and
- The Protected Areas in the north of Matzikama should be connected to each other, connected to the coast and to the interior via the mountains.

*In the face of escalating water needs, it is vital that landscape corridors are safeguarded against the loss of intact habitat and natural landscape is not fragmented into disconnected portions.*



Lamberts Bay Bird Island, with gannet flying overhead

Kevin Shaw

**Box 8: Lamberts Bay Bird Island** is the northernmost of the seabird islands on the west coast of South Africa. Apart from some small cormorant colonies on rock stacks, this island represents the most northern large seabird breeding colony off of the South African west coast. The rocky island, almost three hectares in size, is connected to the mainland via a breakwater, which helps create the storm shelter for the small harbour at Lamberts Bay. The causeway makes it easy for visitors to get on and off the island thereby aiding the successful bird watching industry of the area. Unfortunately, this causeway also makes it easy for predators such as dogs, cats, rats and mongooses to cross over to the islands, thereby threatened the sea bird populations.

Bird Island is one of only six sites world-wide where Cape Gannets breed, and it is also the only breeding site easily accessible to the public thereby supporting a lucrative bird watching industry. Without the protection of this breeding colony, the Lambert's Bay tourism industry will suffer losses which are likely to run into the millions, as was the case in December 2005 when the entire gannet colony left the island due to unusual attack by a few individual seals.

The numbers of breeding gannets on the island has fluctuated over the decades. This is due to a) the scraping and collection of guano from the island between 1888 and 1990 for use in fertilizers; and b) the various conservation initiatives which have focused on protecting this population. One of the most successful of these conservation initiatives included the use of decoys to encourage gannets to land on the island once conservation agencies had successfully managed to keep the seals at bay by creating buffer zones and actively patrolling the area. Today's population stands at approximately 5 000 breeding pairs per year, an indication of success of these conservation initiatives.

Originally, Bird Island was predominantly an African Penguin breeding colony. Their numbers declined severely during the period when guano was collected as this resulted in the collection of penguin eggs as a delicacy. In the past penguins would burrow into the guano and lay their eggs in these holes. This protected the eggs and chicks against extreme temperatures and predators. Today, artificial structures are provided for the penguins to encourage them to breed. Despite these initiatives and the illegalization of collecting of penguin eggs, this population has dwindled down to about 50 breeding pairs, and remains at risk of going extinct.

## 2.7 PROTECTED AND CONSERVATION AREAS

Protected Areas<sup>9</sup> are areas of land or sea that are formally protected by law and managed mainly for biodiversity conservation. Formal Protected Areas allow for long term security of tenure and are gazetted in terms of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEMPAA). The NEMPAA distinguishes between several categories of Protected Areas: Special Nature Reserves, National Parks, Nature Reserves, and Protected Environments. It also recognises World Heritage Sites declared in terms of the World Heritage Convention Act (Act No. 49 of 1999); Marine Protected Areas in terms of the Marine Living Resources Act (Act No.18 of 1998) and/or the NEMPAA; specially protected Forest Areas declared in terms of the National Forests Act (Act No. 84 of 1998); and Mountain Catchment Areas declared in terms of the Mountain Catchment Areas Act (Act No. 63 of 1970). Note that this can include privately-owned areas if they have been formally declared as National Parks, Nature Reserves or Protected Environments under NEMPAA.

Conservation Areas<sup>9</sup> are those areas of land not formally protected by law, but informally protected by the current owners and users, and managed at least partly for biodiversity conservation. Conservation Areas are therefore not considered formally Protected Areas as they are not gazetted in terms of the NEMPAA and do not allow for long-term security of tenure. They could include areas covered by Biodiversity Agreements in terms of the National Environmental Management: Biodiversity Act (Act No.10 of 2004) (NEMBA), as well as non-declared Private Nature Reserves and conservancies<sup>9</sup>, which are agreements for co-operation among neighbouring landowners and require no legal long-term commitment from the landowners.

A total of 143 379 ha of land within these municipalities is afforded some level of formal protection. This amounts to approximately 7.5% of the land. Much of the Protected Areas is however Mountain Catchment Areas, which, although they are recognized as formal Protected Areas, they do not have promulgated regulations outlining allowed and disallowed developments, nor do they have stipulated management obligations. Therefore, Mountain Catchment Areas cannot be considered secure. Furthermore, these tracts are vulnerable to threats such as alien invasion and increased fire

**Box 9: Baboon Point** is the most significant rocky outcrop along the coastline of these West Coast municipalities. Due to its exposure to regular sea fogs (resulting in more available moisture) and its stable substrate, an extremely diverse succulent and bulb community, including a number of local endemics, has developed on this outcrop. Unfortunately most of the deeper soils have been ploughed up, but the remaining plant communities are of major regional interest and land-owners should thus be encouraged to conserve remaining intact areas.

View from top of Baboon Point, looking towards Eland's Bay and Vlorenvlei, with Olifants River Mountains in the background

frequencies and reduced moisture availability which is likely in the face of climate change.

An additional 16 117 ha (0.8%) is deemed Conservation Area. It is important to note that this does not imply formal protection, but highlights the recognition of conservation worthiness of the area.

Currently, the range of Protected Areas does not adequately conserve representative samples of the full spectrum of the region's biodiversity. The reason is that historically, areas were placed under conservation for a variety of unrelated reasons. For example, an area might have been incorporated into a reserve because it was saline or waterlogged and unsuitable for farming or development. The net result is that the existing conservation estate does not include representatives of all the region's habitat types. Some habitats have high levels of protection while others have been completely overlooked.

As explained earlier, in order to achieve the objective of national biodiversity thresholds, all Critical Biodiversity Areas (CBA) and all Ecological Support Areas (ESA) need to be safeguarded through appropriate land-use management. Although the CBA and ESA network represents the long-term conservation goal, this does not imply that all CBA or ESA need to become formal Protected Areas. Rather, their Desired Management Objectives (see section 4.1 below) should be met. Meeting the Desired Management Objective will require all degraded CBA or ESA or those with invasive alien plants to be rehabilitated and restored.

In addition to meeting the Desired Management Objective of a site, some ecosystems should also be targeted for proactive conservation. Proactive conservation involves the declaration of land as a formal Protected Area and its proper management. Because it is not possible to target the entire CBA and ESA network for proactive conservation all at once, certain ecosystems or species will need to be prioritized above others. This prioritization is a relative exercise and almost directly correlates to the rarity or degree of threat to the ecosystems or Species of Special Concern, i.e. threatened ecosystems and species should be targeted for proactive conservation before those non-threatened ecosystems are targeted. PLEASE NOTE: From a biodiversity perspective, this does not imply that threatened ecosystems are more important than non-threatened ecosystems.



Nick Helme

The following CBA and ESA have been identified as sites which need to be considered for proactive conservation action:

- **FYNBOS:** Large intact patches of Hopefield Sand Fynbos bordering existing public or private conservation areas; Leipoldtville Sand Fynbos around Aurora, between Redelinghuys and the Engelsman se Baken area; the area from Redelinghuys to Paleisheuvel and from Paleisheuvel north to Alexandershoek due to the likelihood of endemic plant species; all remaining Graafwater Sandstone Fynbos patches, especially those containing wetlands or special species.
- **STRANDVELD:** All remaining Saldanha Flats Strandveld in the Vredenburg area as it may still support small undiscovered populations of the bulb *Romulea elliptica* (thought to be extinct); the drier form of the Saldanha Granite Strandveld close to Olifantskop near Langebaan and the large area south of Stompneusbaai and St Helena as many localized plant species occur in the remaining patches of Saldanha Limestone Strandveld – these are within Postberg, a small patch north east of Mykonos, the main Prospect Hill and Holvlei Ridge, Jacobsbaai, Trekoskraal, Cape Columbine and the area just south of Paternoster; ecotonal examples of Langebaan Dune Strandveld e.g. near Yzerfontein Soutpan and Langebaan lagoon; the entire remainder of Varkvlei Shale Strandveld as it is a unique feature within the region occurring nowhere else; large contiguous patches of Bergrivier Flats Strandveld, especially those patches with known occurrences of Red Data listed species; all remaining large patches of Graafwater Flats, Bergrivier Flats and Lamberts Bay Strandveld.
- **RENOSTERVELD:** Because most areas of Renosterveld have been cleared for agricultural crops, all Graafwater Shale, Citrusdal Shale, Swartland Silcrete Shale and Swartland Shale Renosterveld patches are of conservation importance. Especially important areas include the Swartland Shale Renosterveld on the slopes of the Piketberg, Weltevrede-Kleigat area north of Engelsman se Baken and north west of Aurora.
- **SHRUBLAND:** Kobee Pass and Gifberg Pass portions of Kobee Succulent Shrubland; portions of Klawer Sandy Shrubland north of Gifberg which are rich in rare species and have high bulb densities; all remaining Piketberg Quartz Succulent Shrubland (the Otterdam site being the best known example) should receive the highest conservation priority rating owing to its limited extent and large number of rare, localised or undescribed species (not yet given a scientific name).
- **VYGIEVELD:** All Vanrhynsdorp Gannabosveld within these municipalities, as it is already highly fragmented and is situated between Knersvlakte and Fynbos vegetation types.
- **AQUATIC VEGETATION TYPES:** Alongside the Berg River mouth is found Cape Estuarine Saltmarsh vegetation, which urgently requires safeguarding owing to its high biodiversity value and vulnerability to continuing development pressures. Other conservation-worthy areas include: the undisturbed saltmarshes on SAS Saldanha land (South African National Defence Force owned) as they lie within interesting cool microhabitats close to the sea; the extensive saltmarshes north of the Berg River and along the Sout River, both of which are

home to a number of rare and threatened plant species; the Rocher pan area, parts of the Wadrif Soutpan and the edges of the Verlorenvlei; the Soutpan area north of Paternoster is partially worked as a salt pan but remains regionally important; all Arid Estuarine Saltmarshes owing to their limited occurrence and high ecological value; intact Namaqualand rivers below the Doring-Olifants confluence, Holgat River and Troe Troe river.

- **FRESHWATER AQUATIC ECOSYSTEMS:** The Cederberg Area is a priority freshwater fish conservation area and as a result has several aquatic Critical Biodiversity Areas. Rivers and wetlands in the region provide essential socio-economic services and those that are ecologically healthy are usually vitally important for conserving remnants of what was once a much more widespread and abundant indigenous aquatic biota.
- **MARINE AQUATIC ECOSYSTEMS:** Well-located, Marine Protected Areas can play an important role in ensuring sustainable use of marine resources. Such areas serve to protect habitats, breeding stocks and nursery grounds, and these in turn, assist in replenishing fish resources in adjacent exploited areas. Key priority areas or Special Habitats for extension of the existing Marine Protected Areas should be identified and conserved to provide better protection of intertidal habitats, areas of high reef fish abundance, coastal dunes and sub-tidal geology types. Although the Critical Biodiversity Area Maps have not identified these sites, it would make most sense to align these marine areas with terrestrial CBA located along the coastline.
- All remaining patches of healthy vegetation units which had an original extent of 5 000 ha or smaller (original extent is obtainable from the vegetation shapefile attribute table provided on the DVD). Although their ecosystem status may be “not threatened”, the smaller ecosystems are far more vulnerable than their larger counterparts. A single extensive development can convert a small unthreatened ecosystem to remnants which are Critically Endangered. Therefore, special attention should be given to small endemic vegetation types.
- All ecosystems that are listed on the National list of threatened terrestrial ecosystems<sup>9</sup> or categorised as Endangered or Critically Endangered by either the NSBA 2004 or FSP analysis (the National Spatial Biodiversity Assessment ecosystem status and the FSP ecosystem status are both obtainable from the vegetation shapefile attribute table provided on the DVD).

*The areas which should be proactively targeted for formal protection or management need to be verified according to the CBA Map and list of ecosystems provided above. Then an implementation strategy should be developed in collaboration with the key stakeholders in the area. Stakeholders, including conservation agencies, should be urged to develop a catchment planning approach for the implementation strategy.*

*The establishment, maintenance and proper management of Marine Protected Areas ensures not only the conservation of biodiversity but also the sustainability of the fishing industry.*



## 2.8 LAND COVER INDICATING LAND-USE PRESSURES

Land cover is a term which refers to the covering of the land, e.g. natural vegetation, roads, factory, or bare ground. Land cover cannot always be equated to land-use, e.g. bare land can be the result of borrow pits (where the land-use is mining) or naturally bare soil in very arid areas (where the land-use may be conservation). In this document, land cover provides an indication of the level of change or transformation of the natural systems and this level can range from pristine land, to areas which have been irreversibly transformed.

In developing the CBA Map, scientists assessed the extent of natural areas as well as those which have been impacted to varying degrees by human activities. The resultant land cover maps indicate areas classified as Natural, Degraded or Transformed by i) intensive agriculture, ii) forestry plantations, and iii) urban development and infrastructure such as roads, dams etc., or poor management such as heavily alien plant invaded lands. This mapping was done at a scale of 1:10 000 and is available as a non-summarized (40+ classes) raster file or a summarized (5 classes) raster or vector file from BGIS.

The land cover maps give an indication of the economy of the region. The main towns in these municipalities include: Saldanha, Langebaan, Vredenburg, Hopefield, Clanwilliam, Citrusdal, Elands Bay, Velddrift, Klawer, Vanrhynsdorp and Vredendal. About a third of the extent of the Saldanha Bay and Bergvriervier Municipalities has been classified as 'natural' or 'near-natural', while the Cederberg and Matzikama Municipalities still have more than two-thirds of their area in this state. It is important to note however, that this includes areas invaded by alien plants, and may not be in pristine condition. There are many more production lands in the Saldanha Bay and

Bergvriervier Municipalities, where environmental conditions are suited to agriculture. These higher productivities are mirrored by a more extensive land cover of urban and infrastructure development. Refer to Table 5 below for comparative land-cover values for the region.

For more detailed information on the land cover of the West Coast municipalities, refer to Thompson, 2007.

The West Coast boasts some of the world's most prized biodiversity, and also contributes significantly to the country's Gross Domestic Product through a wide variety of economic sectors. Important and highly lucrative economic activities include mining, fisheries, potato and rooibos tea production, as well as ecotourism and 4X4 trails. When practised unsustainably, these land-uses pose as threats to the West Coast's biodiversity. Many industry-related 'best-practice' guidelines have been produced to assist the industries in operating sustainably through minimizing impacts on biodiversity. Most relevant for this area include the Biodiversity Best Practice Guidelines for Potato Production in the Sandveld (Knight *et al.*, 2007) and Biodiversity Best Practice Guidelines for the sustainable production of rooibos (Pretorius, 2008)

A significant threat to biodiversity is poor land management. The ecosystems of the West Coast require informed management for their healthy maintenance. Neglect or unwise management can result in invasive alien plant infestation, soil erosion, overgrazing of veld and inappropriate fire regimes, any of which can have devastating impacts on the natural environment.

### White quartz gravel of the Knersvlakte

**Box 10: Knersvlakte:** The Knersvlakte region is situated in the north-west corner of the Western Cape Province. It consists of a hilly terrain covered with quartz gravel. The climate is semi-arid with long dry summers. The vegetation is Succulent Karoo and dominated by leaf succulents (Mesembryanthemaceae, Crassulaceae) and shrubs spread amongst them. Many succulents are confined to the white quartz gravel, which reflects the sunlight, and is not as hot as the darker rocks and soil.

Many of the succulents here are usually dwarf and compact; which represents an ideal proportion to absorb thermal heat for the short cool winter growing season when rain occurs. The Knersvlakte represents one of the richest succulent plant diversity centres and is also the southernmost distribution of the quiver tree (*Aloe dichotoma*).



Rupert Koopman



A Critical Biodiversity Areas Map is a fine-scale systematic biodiversity plan<sup>9</sup> that delineates, on a map, Critical Biodiversity Areas and Ecological Support Areas, which require safeguarding to ensure the continued existence of biodiversity, its ecological processes (e.g. animal migration, pollination) and its ecosystem services e.g. water supply. The map also delineates formal Protected Areas, Other Natural Areas and No Natural Remaining Areas.

The Critical Biodiversity Areas (CBA) Map aims to guide sustainable development by providing a synthesis of biodiversity information to decision-makers. It serves as the common reference for all multi-sectoral planning procedures<sup>9</sup>, advising which areas can be developed, and which areas of critical biodiversity value and their support zones should be protected against impacts. The broad objective is to ensure appropriate land-use and planning for the best possible long-term benefits and to promote integrated management of natural resources.

Refer to Figure 4.1, 4.2, 4.3 and 4.4 respectively for the Critical Biodiversity Areas Maps of Saldanha Bay, Bergrivier, Cederberg and Matzikama Municipalities and to Table 6 for the selection criteria which were used to delineate and define the map categories.

### 3.1 THE DEVELOPMENT OF THE CRITICAL BIODIVERSITY AREAS (CBA) MAP

The Critical Biodiversity Areas Maps for the Saldanha Bay, Bergrivier, Cederberg and Matzikama local municipalities were produced through a systematic biodiversity planning process conducted at a fine-scale<sup>3</sup> (1:10 000). Systematic biodiversity planning<sup>9</sup> identifies those areas which are most in need of conservation (i.e. safeguarding against irreversible loss of biodiversity and ecological degradation). The aim of this planning approach is to assist land-use management in aligning it with the biodiversity priorities and thereby ensuring sustainable development – which is especially important in the face of climate change. It is a scientifically defensible plan that prioritises conservation actions by setting quantitative thresholds<sup>9</sup> for biodiversity features (e.g. vegetation types). It aims to identify a representative sample of biodiversity patterns<sup>9</sup> for safeguarding, including species and habitats, as well as areas for ecological and evolutionary processes that maintain biodiversity. In systematic biodiversity plans, such as these CBA Maps, the network of areas on the CBA Map is designed to represent the most spatially efficient way of meeting the twin goals of pattern and process - i.e. to meet biodiversity thresholds<sup>9</sup> within the least amount of land possible. These areas have been selected to avoid, where possible, conflict between biodiversity objectives and other land-uses. Refer to Pence (2008) for further technical detail on the systematic biodiversity planning approach adopted.

*Earlier biodiversity plans were produced at a much broader scale (1:250 000 to 1: 50 000) which made them less useful for guiding land-use planning than the latest generation of fine-scale plans.*

### 3.2 DEFINITIONS OF THE CRITICAL BIODIVERSITY AREAS MAP CATEGORIES

#### Protected Areas

These are terrestrial or marine areas that are formally protected in terms of the National Environment Management: Protected Areas Act (Act No. 57 of 2003) and/or Marine Living Resources Act (Act No. 18 of 1998). The Mountain Catchment Areas are however not displayed as PA on the CBA Maps. Although they are recognised as formal Protected Areas, they have neither promulgated regulations outlining allowed and disallowed developments, nor stipulated management obligations, and therefore have not been considered secure into the long-term in this systematic biodiversity planning process.

#### Critical Biodiversity Areas

Critical Biodiversity Areas are those areas required to meet biodiversity thresholds. They are areas of land or aquatic features (or riparian buffer vegetation alongside CBA aquatic features) which must be safeguarded in their natural state if biodiversity is to persist and ecosystems are to continue functioning. These Critical Biodiversity Areas incorporate: i) areas that need to be safeguarded in order to meet national biodiversity

3 In order to be compatible with the Guideline regarding the determination of bioregions and the preparation of and publication of bioregional plans. Government Gazette No 32006, 16 March, fine-scale biodiversity plans/bioregional plans need to be prepared at a scale of 1:3 000 – 1:50 000. See glossary for further explanation of a Bioregional Plan.



pattern thresholds<sup>9</sup> (target area), ii) areas required to ensure the continued existence and functioning of species<sup>9</sup> and ecosystems<sup>9</sup> (including the delivery of ecosystem services<sup>9</sup>); and/or iii) important locations for biodiversity features or rare species. The CBA network represents the most land-efficient option to achieving all biodiversity targets.

### Ecological Support Areas

Ecological Support Areas (ESA) are supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an aquatic feature, e.g. a specific river reach<sup>9</sup> that feeds into an aquatic Critical Biodiversity Areas; or a terrestrial feature, e.g. the riparian habitat surrounding and supporting Critical or Other Ecological Support Area rivers or wetlands.

Ecological Support Areas can be further subdivided into Critical Ecological Support Areas (CESA) and Other Ecological Support Areas (OESA). Critical Ecological Support Areas are those aquatic features (with their terrestrial buffers) which fall within priority sub-catchments, whose protection through wise management is required in order to support the aquatic and terrestrial CBA. An example might be a river reach which feeds directly into a CBA. Other Ecological Support Areas are all remaining aquatic ecosystems (not classed as CESA or CBA) (with their terrestrial buffers) which have a less direct impact on the CBA, e.g. an isolated and degraded wetland which although geographically separated from a CBA, still contributes to ecological processes such as groundwater recharge which indirectly impacts on CBA downstream.

### Other Natural Areas

Other Natural Areas are those areas of natural or near-natural vegetation identified on the map whose safeguarding is not required in order to meet national thresholds. A site can only be classified as an Other Natural Area if the extent of the ecosystem represented by that site exceeds its threshold. In such cases, some loss through conversion of the natural state of that ecosystem may be allowed. It is important to note that if all earmarked Critical Biodiversity Areas are not protected it will result in certain Other Natural Areas having to be reclassified as Critical Biodiversity Areas in order to meet thresholds. Therefore, in all decision-making, the precautionary principle needs to be applied.

### No Natural Remaining Areas

No Natural Remaining Areas are those sites identified on the CBA Map, which have been irreversibly transformed through development (e.g. urban development, plantation, agriculture) or poor land management (e.g. erosion) and as a result, no longer contribute to the biodiversity of the area.

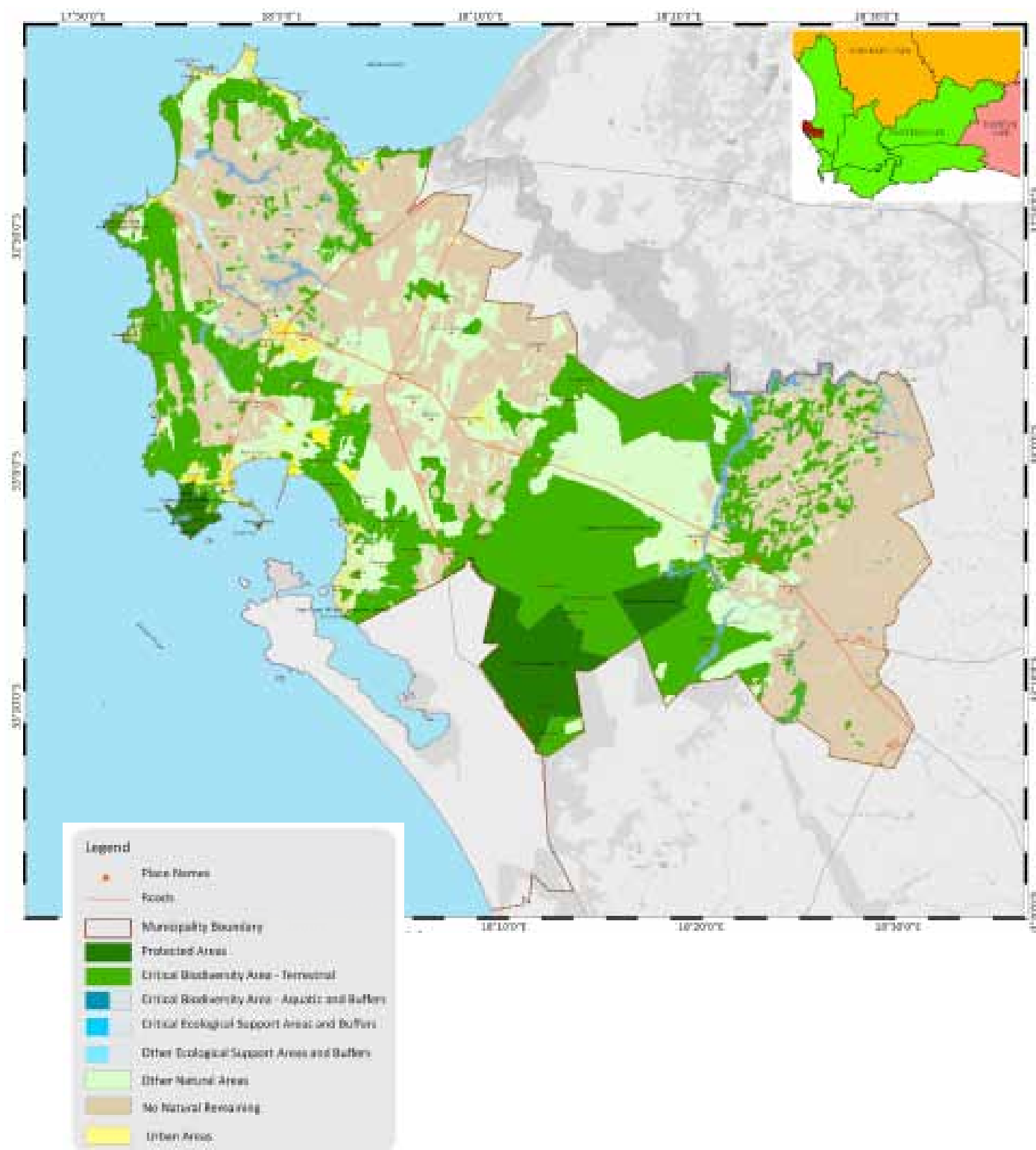
However, there are a few exceptions to the classification of transformed lands. Some small patches of cultivated or otherwise disturbed land have been classified as ESA or even CBA. The reason is that these areas still support biodiversity in some way (e.g. strips of natural veld growing between rooibos shrubs can still form important stepping stones for species to migrate, which means that this kind of land-use provides a corridor which is classified as a Critical Biodiversity Area). Such areas (transformed or degraded lands which have nonetheless been classified as CBA) require some form of safeguarding, e.g. no further hardening of surfaces should be permitted.

**Table 5:** Summarized land cover categories for the Saldanha Bay, Bergrivier, Cederberg and Matzikama Municipalities. Natural, refers to pristine natural vegetation and aquatic features. Near-natural includes those areas where some degree of degradation is evident but where restoration and / or rehabilitation should be considered, e.g. moderately disturbed vegetation, moderately infested with invasive alien plants. Degraded lands are those areas which are severely impacted (usually due to dense invasive alien plants) and which can be rehabilitated, but at great cost. It is important to note that alien invasions were not mapped at a high accuracy for the entire domain. It is therefore likely that the actual levels of invasion are far higher than recorded below. Furthermore, degraded areas are likely to increase in extent over time, while natural and near-natural are likely to decrease. Production areas are agricultural lands which are currently under production (including fallow fields less than 10 years old). Transformed refers to land which has undergone irreversible development, and includes the urban built-up environments and infrastructure (such as dams) and mining areas.

	SALDANHA BAY	BERGRIVIER	CEDERBERG	MATZIKAMA
Natural	36.67%	40.43%	74.16%	71.78%
Near natural	7.96%	3.91%	3.91%	9.56%
Degraded	13.30%	6.32%	3.30%	1.10%
Production	39.34%	48.02%	18.09%	16.94%
Transformed (excluding urban)	1.09%	1.191%	0.44%	0.50%
Urban	2.72%	2.03%	0.52%	0.60%

SALDANHA BAY MUNICIPALITY

## Critical Biodiversity Areas Map



**Figure 4.1:** The Critical Biodiversity Areas Map for the Saldanha Bay Municipality. Approximately 32% has been identified as a CBA terrestrial and CBA aquatic while 5% is already formally protected. ESA amount to approximately 4%, Other Natural Areas 21% and No Natural Remaining Areas and Urban Areas, 38%.

# Critical Biodiversity Areas Map

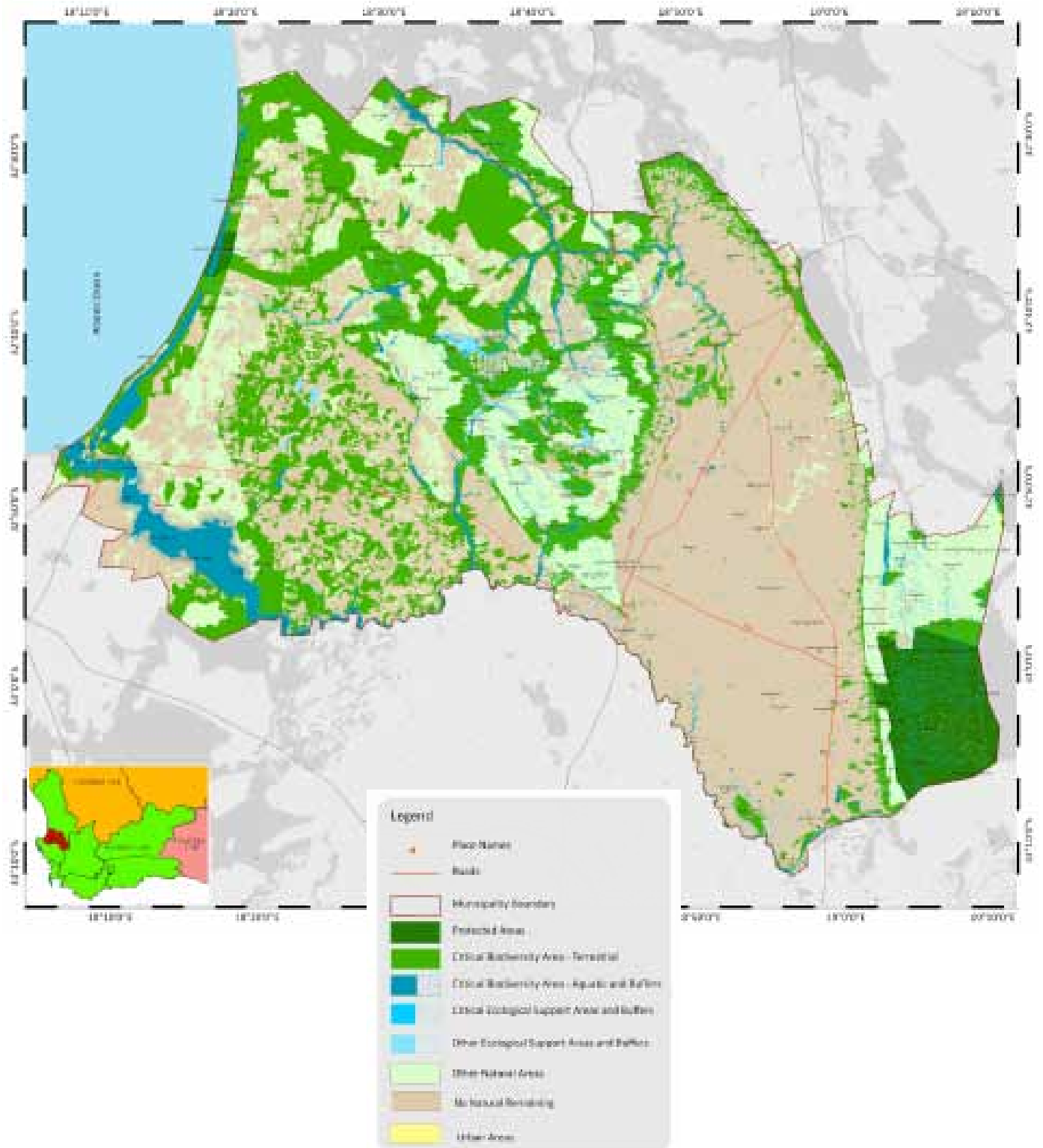
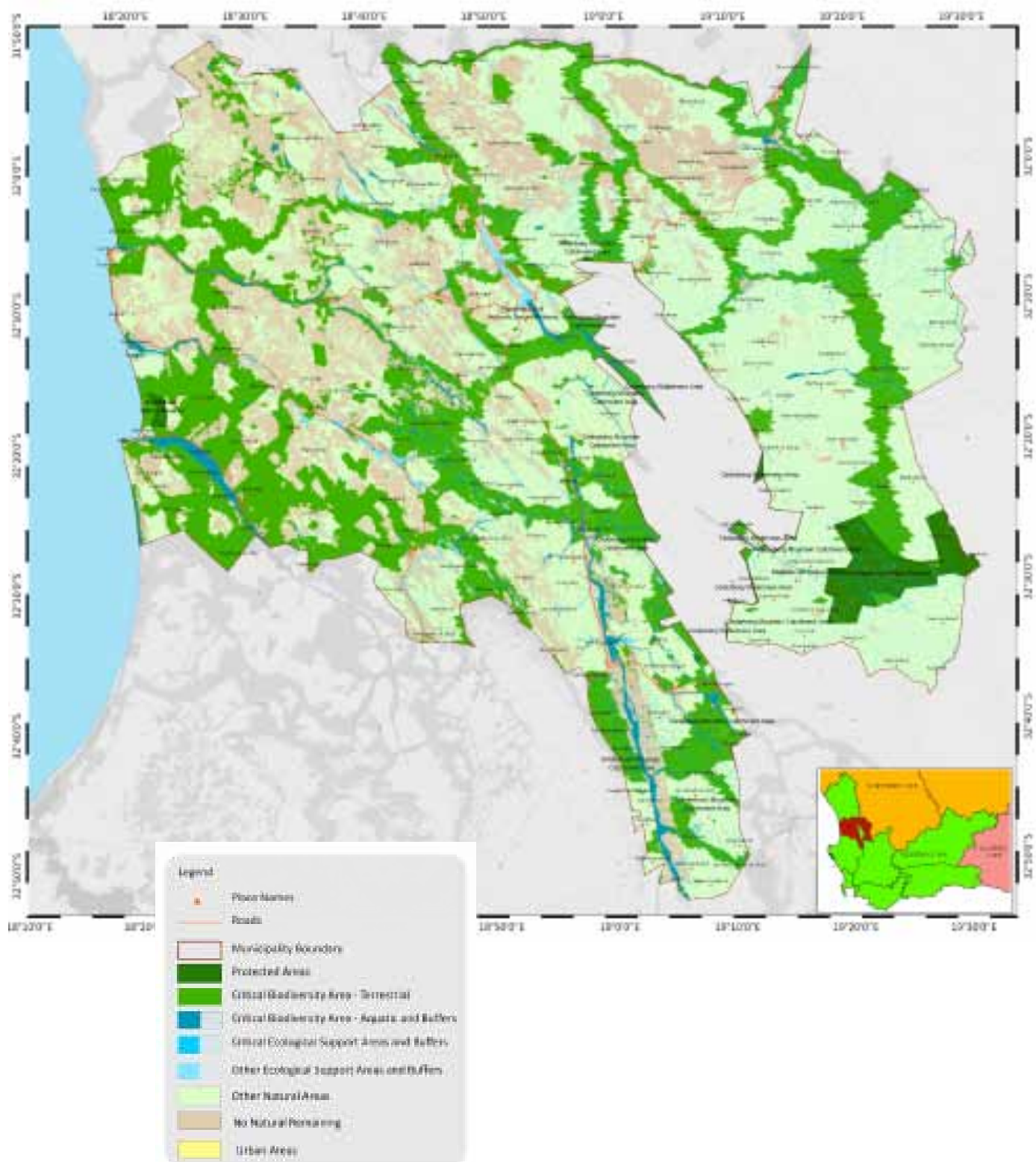


Figure 4.2: The Critical Biodiversity Areas Map for the Bergrivier Municipality. Approximately 30% has been identified as a CBA terrestrial and CBA aquatic while 4% is already formally protected. ESA amount to approximately 10%, Other Natural Areas 16% and No Natural Remaining Areas and Urban Areas, 40%.

CEDERBERG MUNICIPALITY

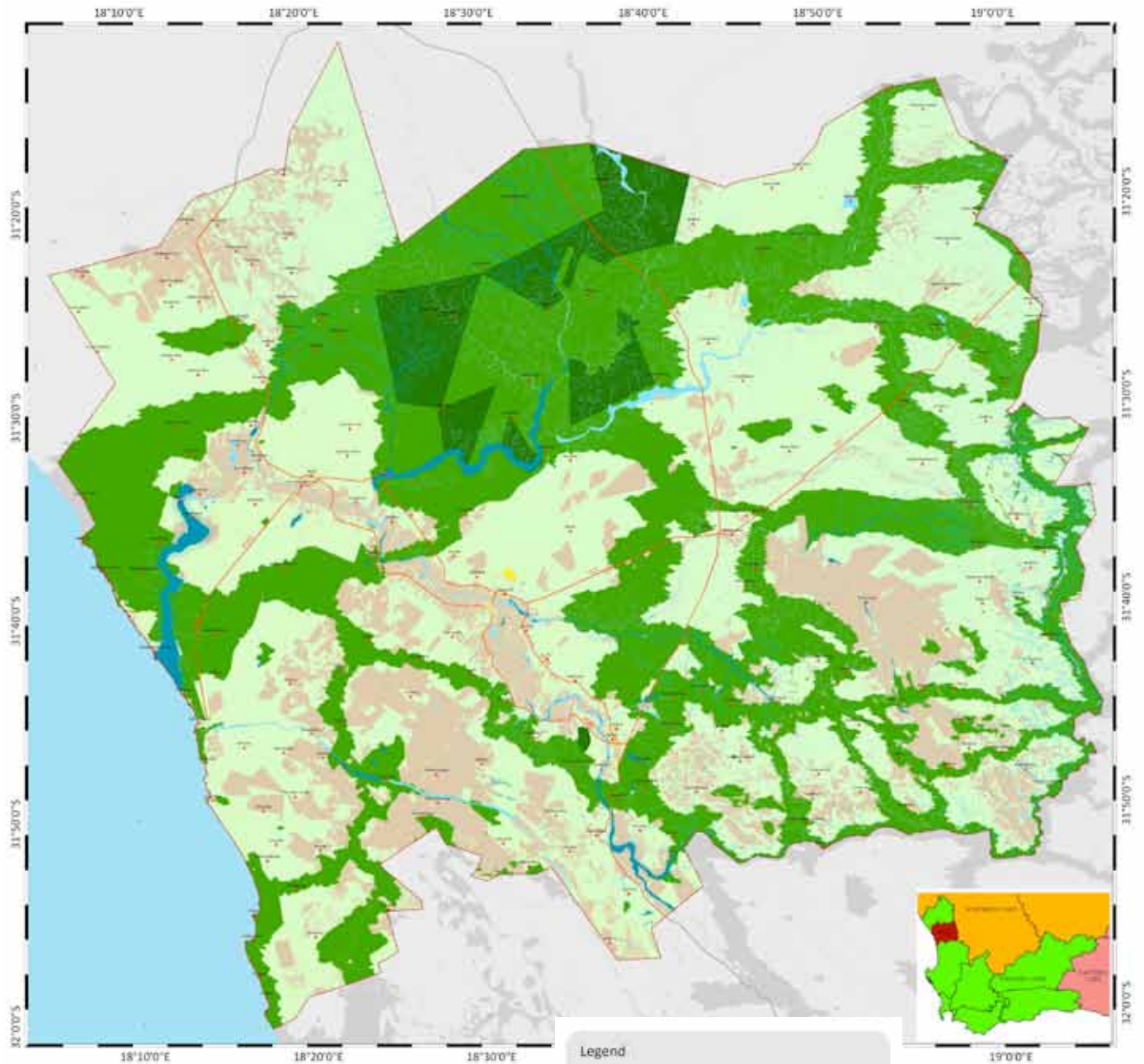
## Critical Biodiversity Areas Map



**Figure 4.3:** The Critical Biodiversity Areas Map for the Cederberg Municipality. Approximately 30% has been identified as a CBA terrestrial and CBA aquatic while 5% is already formally protected. ESA amount to approximately 10%, Other Natural Areas 39% and No Natural Remaining Areas and Urban Areas, 16%.



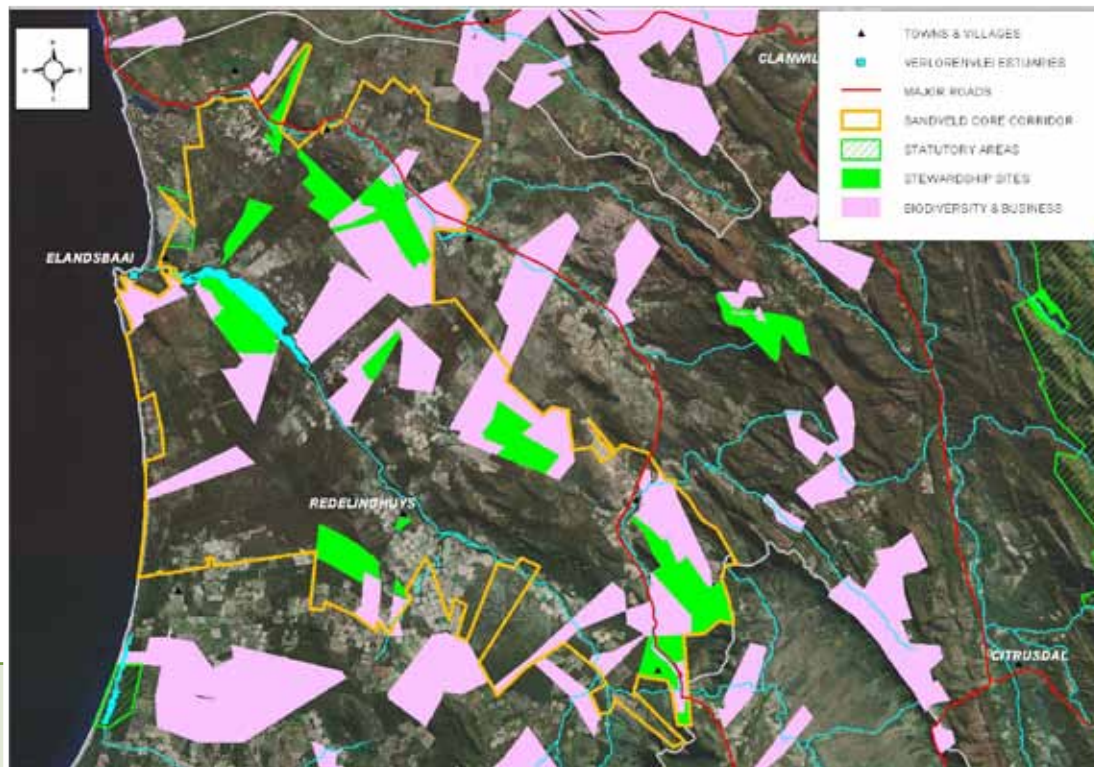
# Critical Biodiversity Areas Map



**Figure 4.4:** The Critical Biodiversity Areas Map for the Matzikama Municipality. Approximately 37% has been identified as a CBA terrestrial and CBA aquatic while 5% is already formally protected. ESA amount to approximately 11%, Other Natural Areas 35% and No Natural Remaining Areas and Urban Areas, 12%.

Table 6: Criteria used to define the CBA Map categories.

CBA MAP CATEGORY	CRITERIA DEFINING THE CATEGORY			
<b>Protected Areas</b>	<p><b>Any formally Protected Area (except for Mountain Catchment Areas)</b></p> <ul style="list-style-type: none"> <li>Nature Reserves and National Parks protected by the National Environment Management: Protected Areas Act</li> <li>Forest Nature Reserves protected by the National Forest Act</li> <li>Ramsar Sites protected by the Ramsar Convention</li> <li>World Heritage Sites protected by the National Environment Management: Protected Areas Act</li> <li>Marine Protected Areas protected by the National Environment Management: Protected Areas Act or Marine Living Resources Act</li> </ul>			
<b>Critical Biodiversity Areas</b>	<p><b>Any terrestrial or aquatic area required to meet biodiversity pattern and/or process thresholds</b></p> <ul style="list-style-type: none"> <li>all ecosystems listed in terms of the National Biodiversity Act</li> <li>All 'best design' sites in terms of meeting the pattern and process thresholds. 'Best design' refers to an identified network of natural sites that would meet pattern and process thresholds in all vegetation and aquatic types in a spatially efficient and ecologically robust way.</li> </ul> <table border="1" data-bbox="325 824 1481 1323"> <tr> <td data-bbox="325 824 849 1323"> <p><b>Critical Biodiversity Areas - Terrestrial</b></p> <ul style="list-style-type: none"> <li>all remaining patches of Critical Endangered vegetation</li> <li>all known point localities of Species of Special Concerns</li> <li>Endangered, Vulnerable or Least Threatened vegetation required to meet national thresholds</li> <li>landscape corridors required to meet the predefined thresholds for spatially explicit ecological processes (e.g. upland-lowland corridors, coastal-and-sand movement corridors, etc.)</li> </ul> </td> <td data-bbox="849 824 1481 1323"> <p><b>Critical Biodiversity Areas – Aquatic</b></p> <ul style="list-style-type: none"> <li>river reaches required to meet 20% threshold of each river type (where preference was given to rivers of a higher integrity and irreplaceability, i.e. A, AB and B classes)</li> <li>river reaches required to meet a predefined threshold of two sanctuaries per indigenous fish species</li> <li>sub-catchments required for achieving river type conservation thresholds</li> <li>sub-catchments required to meet a predefined threshold of two sanctuaries per indigenous fish species</li> <li>wetlands required to meet a 24% threshold of each wetland types. These were chosen based on having a selection of significant (any cluster of wetlands that once buffered by 750m, is greater than 500 ha in size and has more than 80% natural vegetation within that buffer area) wetland clusters, known habitat for Red data listed hydrophytic (water) plant species, known habitat for focal amphibian species and good condition wetlands.</li> <li>all estuaries</li> </ul> </td> </tr> </table>		<p><b>Critical Biodiversity Areas - Terrestrial</b></p> <ul style="list-style-type: none"> <li>all remaining patches of Critical Endangered vegetation</li> <li>all known point localities of Species of Special Concerns</li> <li>Endangered, Vulnerable or Least Threatened vegetation required to meet national thresholds</li> <li>landscape corridors required to meet the predefined thresholds for spatially explicit ecological processes (e.g. upland-lowland corridors, coastal-and-sand movement corridors, etc.)</li> </ul>	<p><b>Critical Biodiversity Areas – Aquatic</b></p> <ul style="list-style-type: none"> <li>river reaches required to meet 20% threshold of each river type (where preference was given to rivers of a higher integrity and irreplaceability, i.e. A, AB and B classes)</li> <li>river reaches required to meet a predefined threshold of two sanctuaries per indigenous fish species</li> <li>sub-catchments required for achieving river type conservation thresholds</li> <li>sub-catchments required to meet a predefined threshold of two sanctuaries per indigenous fish species</li> <li>wetlands required to meet a 24% threshold of each wetland types. These were chosen based on having a selection of significant (any cluster of wetlands that once buffered by 750m, is greater than 500 ha in size and has more than 80% natural vegetation within that buffer area) wetland clusters, known habitat for Red data listed hydrophytic (water) plant species, known habitat for focal amphibian species and good condition wetlands.</li> <li>all estuaries</li> </ul>
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<b>Ecological Support Area</b>	<p><b>Supporting zone required to prevent degradation of Critical Biodiversity Areas and Protected Areas.</b></p> <ul style="list-style-type: none"> <li>All remaining wetlands or river reaches and their terrestrial buffer area (riparian habitat) surrounding these ecosystems, which have not been deemed a CBA</li> <li>Sub-catchments containing: a) significant groundwater recharge and discharge sites; b) upstream management zones; or c) connections for fish sanctuaries</li> </ul> <table border="1" data-bbox="325 1473 1481 1823"> <tr> <td data-bbox="325 1473 849 1823"> <p><b>Critical Ecological Support Areas</b></p> <ul style="list-style-type: none"> <li>Wetlands: non-significant wetlands or wetland clusters which either a) support a CBA river or CBA wetland or b) are in a good condition and fall within a CBA or CESA sub-catchment</li> <li>Rivers: a) river reaches which are important for connectivity between CBA river reaches, b) major rivers that support CBA river segments or wetland or c) minor rivers situated within priority sub-catchments</li> <li>Sub-catchments not containing CBA rivers or wetlands but rather maintaining the integrity of the downstream CBA</li> </ul> </td> <td data-bbox="849 1473 1481 1823"> <p><b>Other Ecological Support Areas</b></p> <ul style="list-style-type: none"> <li>All remaining wetlands</li> <li></li> <li></li> <li>All remaining river reaches</li> <li></li> <li></li> <li>Sub-catchments containing: a) significant groundwater recharge and discharge sites; b) upstream management zones; or c) connections for fish sanctuaries</li> </ul> </td> </tr> </table>		<p><b>Critical Ecological Support Areas</b></p> <ul style="list-style-type: none"> <li>Wetlands: non-significant wetlands or wetland clusters which either a) support a CBA river or CBA wetland or b) are in a good condition and fall within a CBA or CESA sub-catchment</li> <li>Rivers: a) river reaches which are important for connectivity between CBA river reaches, b) major rivers that support CBA river segments or wetland or c) minor rivers situated within priority sub-catchments</li> <li>Sub-catchments not containing CBA rivers or wetlands but rather maintaining the integrity of the downstream CBA</li> </ul>	<p><b>Other Ecological Support Areas</b></p> <ul style="list-style-type: none"> <li>All remaining wetlands</li> <li></li> <li></li> <li>All remaining river reaches</li> <li></li> <li></li> <li>Sub-catchments containing: a) significant groundwater recharge and discharge sites; b) upstream management zones; or c) connections for fish sanctuaries</li> </ul>
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<b>Other Natural Areas</b>	<p><b>Natural areas not required to meet national thresholds (on condition that all CBA are protected)</b></p> <ul style="list-style-type: none"> <li>Remaining patches of Endangered, Vulnerable or Least Threatened ecosystems not required to meet national thresholds</li> </ul>			
<b>No Natural Remaining Areas</b>	<p><b>These areas no longer contain natural areas and their safeguarding would not result in any biodiversity protection.</b></p> <ul style="list-style-type: none"> <li>cultivated areas</li> <li>plantations</li> <li>mined areas</li> <li>urban areas</li> <li>infrastructure</li> <li>dams</li> <li>areas under coastal development</li> </ul>			



Sandveld Corridor Planning domain with statutory Protected Areas, Stewardship sites and Biodiversity and Business areas.

**Box 11: The Sandveld Corridor** occupies the western part of the Greater Cederberg Biodiversity Corridor (GCBC), a landscape corridor initiative which aims to link the coast to the mountains by creating a natural vegetated passage for plant and animals species to migrate. Upland-lowland landscape corridors such as this one are of vital importance as they increase the resilience of the system to adapt to the possible impacts of Climate Change by providing corridors for species to migrate to cooler areas (southern areas, higher altitudes or south-facing slopes). The Sandveld Corridor is being administered by the GCBC Initiative, headed-up by CapeNature, and is framed by the cold Atlantic Ocean to the west, the foothills of the Olifants River Mountains to the east, the Berg river in the south and Lamberts Bay in the north.

The Sandveld area boasts at least 12 vegetation types representing three major biomes: Fynbos, Succulent Karoo and Southern Afromontane Forest. Leipoldtville Sand Fynbos, which grows widely in the acidic sands of the central plains, sports at least forty endemic plants. In the south Leipoldtville Sand Fynbos merges with Hopefield Sand Fynbos, a similar vegetation type but with different plants. Graafwater Sandstone Fynbos is also extensive in the area. This vegetation type harbours its own suite of fynbos plants while the fire-protected, rocky habitats within this vegetation type nurture forest plant species. Two Succulent Karoo vegetation types occur along the coast where it is more arid, i.e. Lamberts Bay Strandveld and Langebaan Dune Strandveld, both growing in the alkaline sands. A feature of this arid habitat is the presence of many fleshy-leaved plants as well as succulents.

A special feature of these Sandveld lowlands is an impressive wetland system of seasonal rivers and ground water-fed seeps, including the Verlorenvlei with its vast array of bird and fish species. Numerous kinds of mammals have made the Sandveld their home, and the area has a unique assemblage of reptiles, amphibians and insects.

The area is farmed for grazing and cash crops such as potatoes and rooibos tea. However, ecological sustainability of these practices is of concern due to extensive transformation of virgin veld for agriculture, and the extraction of groundwater for potato crops that are so well suited to these sandy soils. Global climate change (through increased droughts), coupled with ground water extraction, has led to diminished ground water levels which threaten the future of both agriculture as well as the habitats so vital to the Sandveld's unique plants and animals. As many of these vegetation types are already classified as threatened in terms of the National Spatial Biodiversity Assessment, proactive conservation efforts were intensified since 2005 in an attempt to secure conservation worthy areas through Stewardship agreements. Appropriate planning and management, as well as the setting aside of areas for conservation, is urgently needed in order to prevent the continued loss and fragmentation of these threatened ecosystems, hence the efforts put forward by the GCBC. CapeNature's stewardship program is used to secure private land into conservation. Other conservation efforts include the Biodiversity and Best practice initiative with both the rooibos and potato industries to help producers address land use in a sustainable manner.





The aim of these guidelines is the effective management of biodiversity as required in Section 41(a) of the Biodiversity Act (Act No. 10 of 2004) and in terms of the National Environment Management Act (Act No. 107 of 1998).

*These guidelines were derived from the biodiversity sector and identify activities which are biodiversity-compatible. As such, they consider information from only one sector in the multi-sectoral process of spatial planning and land-use management. For further land-use policy recommendations applicable to areas outside of the urban edge<sup>9</sup>, refer to the Provincial Spatial Development Framework Rural Land Use Planning and Management Guidelines (in prep.) and the Western Cape Provincial SDF itself.*

#### 4.1 DESIRED MANAGEMENT OBJECTIVES

The Desired Management Objective for a parcel of land or aquatic feature refers to the ecological state or condition in which it should be maintained. Different categories require specific management objectives according to their biodiversity priority. In broad terms, the important biodiversity areas need to be maintained in a healthy and functioning condition while heavily impacted or transformed areas can be further developed.

The Desired Management Objective provides the broad direction for appropriate land or resource-use activities and management guidelines. Only land or resource-use activities that are compatible with maintaining the Desired Management Objective should be encouraged. Refer to Table 7 for the Desired Management Objectives of CBA Map categories. The Desired Management Objective refers to both biodiversity pattern and/or ecological process (see section 1.2). In formal Protected Areas and Critical Biodiversity Areas, it is important to maintain both biodiversity pattern and ecological processes, while in Ecological Support Areas the emphasis is on safeguarding ecological processes. There are some instances where the process is maintained while the pattern is compromised, e.g. natural veld strips between rows of planted rooibos still serve as 'short-term passages' for certain pollinators. In this way important processes are able to continue even though habitats for sensitive plant species are impacted, and pattern is compromised.

*Terrestrial and aquatic resources are interdependent, with one affecting the other. For example, to ensure the healthy functioning of rivers, wetlands and estuaries, it is essential to protect Mountain Catchment Areas (as this is where the water originates) and to safeguard the buffering riverine vegetation (the plants prevent soil erosion, sedimentation and water pollution).*

**Table 7:** Desired Management Objectives for CBA Map categories.

CBA MAP CATEGORY	Critical Biodiversity Areas (terrestrial), Critical Biodiversity Areas (aquatic feature and buffer) and Protected Areas	Ecological Support Areas (Critical Ecological Support Area: feature and buffer; and Other Ecological Support Area: feature and buffer)	Other Natural Areas and No Natural Remaining Areas
DESIRED MANAGEMENT OBJECTIVE	Maintain natural land. Rehabilitate degraded to natural or near natural and manage for no further degradation.	Maintain ecological processes.	Sustainable development and management within general rural land-use principles. Favoured areas for development.

#### 4.2 THE USE OF CBA MAPS IN REACTIVE LAND-USE DECISION-MAKING

The Biodiversity Sector Plan, comprising the CBA Map and guidelines, provides a summary of the best available biodiversity information for use in the decision-making process. The information should be used in conjunction with the municipality's SDF and zoning<sup>9</sup> scheme, as well as other non-spatial biodiversity information. Refer to frequently asked questions to clarify and understand the information on the CBA Map below.



A wide range of authorities can benefit from consulting the Biodiversity Sector Plan. These include, amongst others:

- Local municipalities;
- National and provincial environmental and agricultural departments when i) assessing land-use applications in terms of the Land-use Planning Ordinance, the National Environment Management Act (Environmental Impact Assessment Regulations) and the Subdivision of Agricultural Land Act; or ii) in processing applications for the cultivation of virgin land in terms of the Conservation of Agricultural Resources Act;
- Department of Minerals and Energy to inform mining applications; and
- Department of Water Affairs when processing water use licenses.

Municipalities in particular have a specific role to play in ensuring that appropriate environmental authorisations are in place and that correct procedures are followed before any change in land-use is approved. It is the obligation of the municipality to:

- issue an approval only once the other required authorisations are in place (e.g. environmental authorisations or water licences); or
- make it explicit that work can begin only once other authorisations are in place.

In most situations, a full investigation into the biodiversity importance of a site is only triggered when a “listed activity” in terms of NEMA is proposed<sup>4</sup>, and circumstances therefore warrant a specialist investigation.

The CBA Map serves as an early warning signal that a biodiversity assessment needs to be undertaken prior to any decision about the proposed change in land-use. In general, though, planning should aim to steer development away from CBA and into areas that are more resilient to environmental degradation. However, if consultation of the CBA Map indicates that a proposed activity (i.e. not only activities controlled by the EIA regulations) is located within a Critical Biodiversity Area or Ecological Support Area, further investigation is essential before any decision can be made regarding land-use change.

Given that CBA Maps were based on best available data, and that it was not possible to survey all land within the municipalities at a fine enough scale, it is possible that the presence of important biodiversity features (e.g. Species of Special Concern) have not been fed into the maps. For this reason, specialist assessments should also be carried out in the Other Natural Areas that are known to harbour Species of Special Concern.

4 Environmental impact assessments may be prescribed by national legislation or may be required by the Municipal Council where it is of the opinion that a proposed land-use or activity is likely to have a significant impact on the environment. The Provincial Zoning Scheme Model By-law creates the mechanism and procedure whereby the Municipal Council may require and manage an environment impact assessment not provided for in other legislation.

*Refer to the Fynbos Forum Ecosystem Guidelines<sup>9</sup> for Environmental Assessment in the Western Cape (De Villiers et al., 2005) for guidance on how to undertake a biodiversity screening exercise, and terms of reference for a basic biodiversity assessment. Note that the CBA Map represents the most accurate and up to date information, i.e. it supersedes the NSBA, STEP and C.A.P.E.*

It is important to note that while the map can assist with a desk-top preparatory assessment of the site at a local and strategic level, it should not, under any circumstances, replace a site assessment by a relevant biodiversity specialist.

*If a site is located within a CBA or ESA, a specialist assessment of the biodiversity is essential. A full set of guidelines to assist with planning and decision-making has been prepared by the Department of Environmental Affairs and Development Planning (DEADP) and is available at [www.capegateway.gov.za/deadp](http://www.capegateway.gov.za/deadp). The Biodiversity Sector Plan should be used to support the approaches outlined in the available DEADP guideline documents when making land-use decisions.*

## How To Use The CBA Maps

Below are the steps to follow when using the CBA Map to inform decisions regarding land-use applications.

### **STEP 1 Determine the biodiversity category of the property in question (i.e. the site) by consulting the CBA Map and the GIS data on the DVD:**

- Does the proposed development fall within a Protected Area, Critical Biodiversity Area, Ecological Support Area, Other Natural Area or No Natural Remaining Area?

### **STEP 2 Consult other information provided to gain an overview of the biodiversity of the area and the Desired Management Objectives of the site:**

- Determine detailed biodiversity information of the site (vegetation type, Species of Special Concern etc) by referring to the biodiversity GIS data on the DVD. The layers include: vegetation type, aquatic feature type (wetland, estuary or river types), presence of Special Habitat or Species of Special Concern, etc.
- Determine the Desired Management Objective and the recommended Spatial Planning Category (SPC) of the site by referring to Table 7 and 10 respectively.

### **STEP 3 Confirm the land-cover by cross-checking what you see on the ground against the land-cover map provided on the DVD:**

- There is a mismatch between verification and land-cover category:

It can happen that a site visit or photographic assessment reveals that the land-cover map has incorrectly depicted a “degraded, production or transformed” site as “natural or near-natural”, in which case it may have categorised the site as a CBA or ESA in the CBA Map. This kind of error may arise owing to a change in land-cover subsequent to the mapping exercise

is in dispute and although the map may still provide a good indication of the landscape context of the site, the continued processing of the land-use application should be processed in terms of its actual biodiversity attributes.

- There is a match between verification and land-cover category:

If the site has been correctly classified in the land-cover map as near-natural, degraded, production or transformed land, the classification of the site in the CBA Map is appropriate, and the application must be processed accordingly.

In very rare cases, certain degraded areas (i.e. infested with invasive alien plants) or production sites (i.e. ploughed agricultural land) have been categorised as CBA or ESA. This prioritisation may occur for a particular reason, e.g. the site forms a vital link in an ecological process area. The CBA or ESA status is a pointer that such an infested site should be cleared and restored or rehabilitated<sup>5</sup>, and in the case of production lands, no further hardening of the surface should be permitted. If, for example, former fields have not been cultivated for 10 years or more, and a new application for cultivation becomes necessary, the land's CBA status – and, particularly, Desired Management Objective – needs to be taken into account by the authority processing the application.

#### STEP 4 Site Assessment:

The next essential step should be a site assessment to ground truth and verify that the CBA Map and GIS input layers (vegetation type, presence of aquatic features, Special Habitats or Species of Special Concerns, ecological process area, etc) used to develop the CBA Map have been correctly depicted, i.e. they are spatially accurate. Refer to Frequently Asked Questions in Section 5 when verifying the information on these maps. The physical site assessment should be conducted by a specialist consultant and, if possible, a CapeNature, DWA and/or SANParks official. Available supporting tools include the Fynbos Forum *Recommended Terms of Reference<sup>5</sup> for the Consideration of Biodiversity in Environmental Assessment* (for site screening and Basic Assessments) and DEADP's Guidelines for Involving Biodiversity Specialists available at [www.capecapegateway.gov.za](http://www.capecapegateway.gov.za). These aim to improve specialist input into EIAs and to promote the early consideration of potentially significant impacts in project planning and design. In addition to the above recommended Terms of Reference, the specialist should assess the site according to the biodiversity features present on the site which resulted in the site being selected as a CBA or ESA. These features or 'criteria for selection' can be established by interrogating the attribute table of the relevant shapefiles.

#### STEP 5 Assess compatibility of proposed land-use with CBA category by referring to the guidelines offered in Table 8:

- If the proposed development falls within Critical Biodiversity Areas (aquatic features and their buffers as well as the terrestrial features) or Ecological Support Areas, refer to Table 8 below for guidance on which land-use activities should be encouraged or discouraged. If the proposed land-use activity is not listed in this table, or if the proposed development definition differs from that specified in Table 9, then assess the proposed land-use activity against the Desired Management Objective (Table 7) to determine the compatibility of the proposed land-use activity with that objective. It may also be important to understand why a site has been selected as a CBA as this may influence the assessment of the possible impacts. This can be determined by interrogating the attribute table of the relevant shapefile provided on the DVD.
- If the proposed development falls within a Protected Area, refer to the National Environmental Management: Protected Areas Act (NEMPAA) and the relevant Protected Area Management Plan for guidance on appropriate land-use activities.
- If the proposed development falls within Other Natural Areas or No Natural Remaining Area, this means that, from a biodiversity perspective, these areas are favoured for sustainable development. Note that in Other Natural Areas a botanical survey would be necessary if Species of Conservation Concern may be present.

NOTE: Table 8 has been guided by (1) the Desired Management Objective (described above) of the land; and (2) the likely impact of various land- and resource-use activities on biodiversity. Refer to Table 9 for definitions of these land-use activities. These provide information from only one sector in the multi-sectoral process of spatial planning and land-use management. For further land-use policy recommendations, refer to the Provincial Spatial Development Framework Rural Land-use planning and Management Guidelines (in prep.) and the Western Cape Provincial SDF (2005).

*These guidelines seek to ensure that activities associated with land- and resource-use avert or minimise impacts on biodiversity, especially in Critical Biodiversity Areas and Ecological Support Areas. Land-use that maintains intact natural habitat and has very low impact on biodiversity is considered to be biodiversity-compatible (e.g. appropriately managed grazing by livestock or game, sustainable harvesting of natural products from the wild). In contrast, land-uses that result in the irreversible loss of natural habitat and have the highest impact on biodiversity are biodiversity-incompatible land-use activities (e.g. cultivation, afforestation, urban development and mining).*

<sup>5</sup> Recommended Terms of Reference for the consideration of biodiversity in environmental assessment and decision-making. Botanical Society of SA Conservation Unit, Private Bag X10, CLAREMONT, 7735 \* Tel: 27-21-799-8824 \* Fax: 27-21-761-5983 \* Inquiries: [paisley@botanicalsociety.org.za](mailto:paisley@botanicalsociety.org.za) and available at [www.botanicalsociety.org.za](http://www.botanicalsociety.org.za)

**Table 8: Recommended biodiversity compatible land and resource use guidelines matrix. Yes = encouraged; No = Discouraged; Restricted = Land-use possible under strict controls only in order to avoid impacts on biodiversity. Further details on land-use activities are given in Table 9 below.**

CBA Map Category:	Protected Areas	Critical Biodiversity Areas			Ecological Support Areas (Critical Ecological Support Areas and Other Ecological Support Areas)		Other Natural Areas		No Natural Remaining Areas
		Terrestrial	Aquatic		Aquatic Feature	Buffer	large intact remnants, especially adjacent to CBA/ESA	located in an agricultural/trans-formed matrix	
Desired Management Objective:	Maintain natural land. Rehabilitate degraded to natural or near natural and manage for no further degradation.			Maintain ecological processes					Sustainable development and management within general rural land-use principles. Favoured areas for development.
Recommended PSDF Spatial Planning Category:	Core 1			Core 2		Buffer 1	Buffer 2	Intensive Agriculture and Settlement	
1) CONSERVATION	REFER TO THE NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT (NEMPAA) AND THE PROTECTED AREA MANAGEMENT PLAN	YES	YES		YES		REFER TO PROVINCIAL RURAL LAND USE PLANNING AND MANAGEMENT GUIDELINES FOR GUIDANCE IN IDENTIFYING APPROPRIATE LAND-USE ACTIVITIES  ALWAYS MANAGE FOR SUSTAINABLE DEVELOPMENT WHEN CONSIDERING LAND AND RESOURCE (WATER) USE APPLICATIONS IN NATURAL AREAS.		
2a) AGRICULTURE: INTENSIVE AGRICULTURE OR HIGH IMPACT (includes nuisance and space extensive agricultural enterprises)		NO	NO		NO				
2b) AGRICULTURE: EXTENSIVE AGRICULTURE OR LOW IMPACT		RESTRICTED	RESTRICTED		RESTRICTED				
3) HOLIDAY ACCOMMODATION		RESTRICTED	NO	RESTRICTED	NO	RESTRICTED			
4a) RURAL HOUSING (RH) Low Density RH: Consolidation of rural erven for conservation		RESTRICTED	NO	RESTRICTED	NO	RESTRICTED			
4b) RURAL HOUSING On-Farm workers Settlement		NO	NO	RESTRICTED	NO	RESTRICTED			
5a) TOURIST AND RECREATIONAL FACILITIES - LOW IMPACT: Lecture rooms, restrooms, restaurants, gift shops and outdoor recreation)		RESTRICTED	RESTRICTED		RESTRICTED				
5b) TOURIST AND RECREATIONAL FACILITIES - HIGH IMPACT: golf, polo, and housing eco-estates		NO	NO		NO				
6a) RURAL BUSINESS-Place Bound		RESTRICTED	RESTRICTED		RESTRICTED				
6b) RURAL BUSINESS-Non Place Bound		NO	NO		NO				
7) RURAL INDUSTRY		NO	NO		NO				
8) SMALL HOLDINGS		NO	NO		NO				
9) COMMUNITY FACILITIES & INSTITUTIONS		NO	NO		NO				
10) INFRASTRUCTURE INSTALLATIONS		RESTRICTED	RESTRICTED		RESTRICTED				
11a) EXISTING SETTLEMENTS (URBAN EXPANSION)		NO	NO		NO				
11b) NEW SETTLEMENTS		NO	NO		NO				

Refer to Table 9 for the land-use activity definitions

### 4.3 THE USE OF CBA MAPS IN DEVELOPING ECOSYSTEM OR ENVIRONMENTAL MANAGEMENT PLANS (EMPS)

When developing EMPs for a site, the first step is to identify the ecosystem in question by referring to the vegetation and aquatic maps (provided as GIS shapefiles on the DVD). They may be terrestrial (e.g. lowland fynbos) or aquatic (e.g. mountain stream or floodplain wetland) ecosystems. Once the ecosystem has been identified, the next step is to obtain the relevant guidelines for its efficient management as each ecosystem requires its own set of management guidelines to ensure its optimal functioning.

#### FOR TERRESTRIAL ECOSYSTEMS:

1. Identify the vegetation type from the vegetation GIS shapefile on the DVD provided.
2. Cross-check the vegetation type with the six Fynbos Forum ecosystem types (De Villiers *et al.*, 2005), namely: Coastal, Lowland Fynbos, Midland and Mountain Fynbos, Renosterveld, Succulent Karoo or Mainland Thicket.
3. Apply the relevant Fynbos Forum Ecosystem Management Guidelines (De Villiers *et al.*, 2005). It is important to note that these management guidelines are to be applied to the ecosystem independently of the biodiversity rating (i.e. whether a CBA, ESA or Other Natural Area) given in the CBA Map.

#### FOR AQUATIC ECOSYSTEMS:

4. Identify aquatic feature type from the aquatic GIS shapefiles on the DVD provided.
5. Cross-check the aquatic feature with the nine C.A.P.E. Fine-scale Biodiversity Planning Project Aquatic Ecosystem types or management zones (Job *et al.*, 2008), namely: floodplain wetlands, valley bottom wetlands, seeps, depressional wetlands, mountain stream, foothill rivers, lowland rivers, priority sub-catchments or wetland clusters.
6. Apply the relevant C.A.P.E. Fine-scale Biodiversity Planning Project Aquatic Ecosystem (Job *et al.*, 2008) guidelines. It is important to note that these ecosystem-specific management guidelines differ according to their CBA Map categories.

### 4.4 THE USE OF CBA MAPS IN DEVELOPING SPATIAL DEVELOPMENT FRAMEWORKS (SDFS)

The SDF is a legally binding spatial framework that promotes sustainable environmental, economic and social development in a municipality. Municipalities are obliged to develop maps, termed Spatial Development Frameworks<sup>6</sup> (SDFs), which indicate desired patterns of land-use and provide strategic guidance in the location and nature of development and conservation. An SDF is the spatial depiction of an Integrated Development Plan (IDP). Such a plan and framework must ensure sustainability (Section 26 of the Municipal Systems Act (Act No. 32 of 2000)). Refer to Figure 5 and Table 11 which show the alignment of the IDP and SDF processes with this Biodiversity Sector Plan.

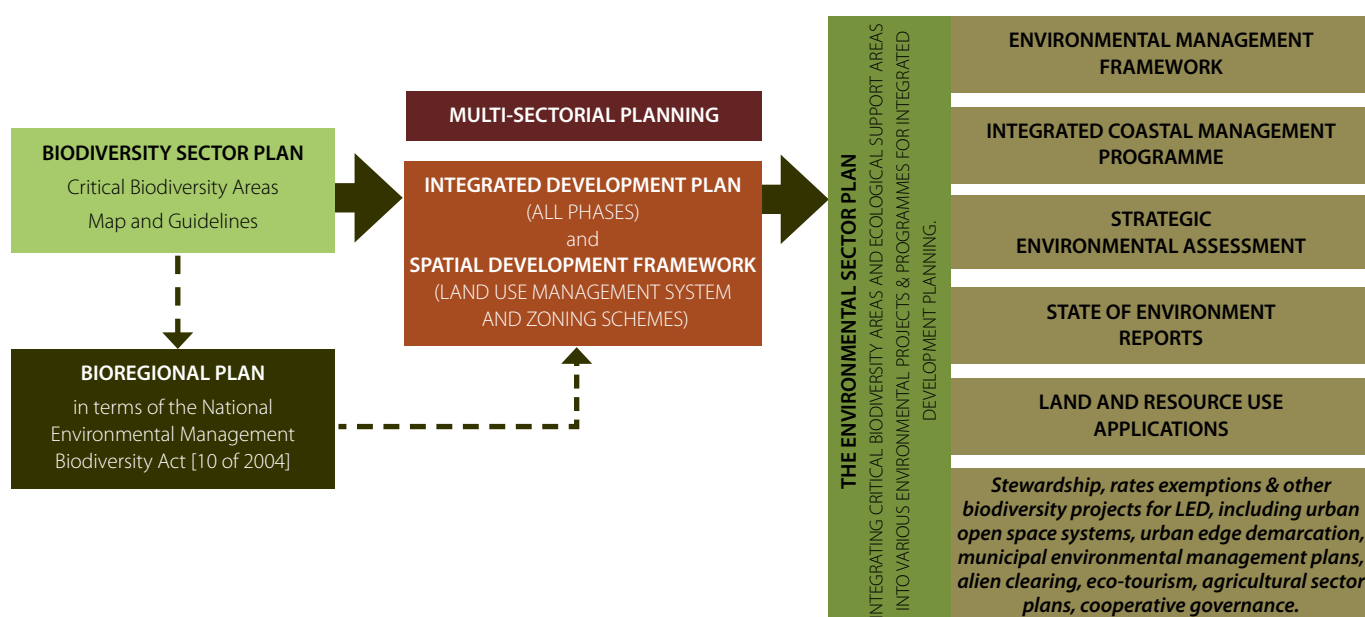


Figure 5: Use of the Biodiversity Sector Plan in municipal planning.

6 Section 26 of the Municipal Systems Act stipulates: An Integrated Development Plan must reflect - (e) a Spatial Development Framework, which must include the provision of basic guidelines for a land-use management system for the municipality.



According to the Western Cape Provincial Spatial Development Framework<sup>7</sup>, local SDFs should divide the entire landscape into Spatial Planning Categories<sup>9</sup> (SPCs) “to reflect a vision of how the area should develop spatially, so as to ensure sustainability”. The SDF also provides policies, management objectives and guidance for appropriate land-use within each SPC.

The SPCs defined by the Western Cape PSDF are:

- Core;
- Buffer;
- Intensive Agriculture; and
- Human settlement.

The Core and Buffer categories have, in turn, been sub-divided to reflect biodiversity priorities:

- Core 1 represents Protected Areas and Critical Biodiversity Areas (terrestrial and aquatic)
- Core 2 represents Ecological Support Areas
- Buffer 1 represents Other Natural Areas adjacent to CBA and ESA
- Buffer 2 represents Other Natural Areas in an agricultural or otherwise transformed matrix of land-uses.

From a biodiversity perspective, SPCs indicate areas where limitations to land-use need to be applied in order to protect biodiversity. The two SPCs most relevant to biodiversity conservation and the CBA Map are those referred to as “Core” and “Buffer”.

The “Core” includes areas that are currently protected as well as areas that need protection because they are important areas for biodiversity, i.e. Critical Biodiversity Areas. Within the province, we can achieve consistency in mainstreaming biodiversity<sup>9</sup> priority areas into municipal spatial products, by aligning the CBA Map categories with the PSDF’s SPCs as recommended in Table 10.

The CBA Map and the guidelines provide crucial information which assist in the development of an SDF, namely:

- **Strategic Environmental Assessment:** In terms of the Local Government: Municipal Planning and Performance Management Regulations 21 (published in terms of section 120 of the Municipal Systems Act), SDFs should include a Strategic Environmental Assessment which must be aligned with those of neighbouring municipalities. A municipal Strategic Environmental Assessment identifies areas where particular development types can occur and “red-flags” or cautions against development in sensitive areas. The CBA Map provides detailed spatial information and policy guidelines for incorporation into an Strategic Environmental Assessment map.
- **Urban Edge Demarcation<sup>8</sup>:** The SDF must delineate urban edges around existing urban nodes to protect the rural environment from urban sprawl and to encourage efficient settlement patterns. The CBA Map should be used when delineating the urban edge.

- **Zoning<sup>8</sup> Schemes** identify areas where development should not take place, “to protect the special natural and environmental characteristics of an area... and to promote sustainable development”. Furthermore, their “implementation has to be consistent with, and give effect to, the SDF” (adapted from the Western Cape Provincial Zoning Scheme Model By-Law, 2004). When zoning schemes are revised or where rezoning or subdivision applications are being processed, the CBA Map should be consulted in order to avoid development in environmentally sensitive areas.
- **Environmental Management Frameworks<sup>9</sup> (EMFs)** designate areas on a map where development can or cannot occur without an authorization, thereby streamlining the process of authorising development. EMFs also provide management priorities. The CBA Map can inform both these aspects.
- **Urban Open Space Systems** provide ecosystem services at local level e.g. clean air, fresh water, wastewater purification, flood protection and recreational space. The CBA Map assists in identifying certain areas that provide ecosystem services within urban settlements.
- **Policy guidelines:** The land and resource use guidelines (section 4) provide key policy recommendations for input into an SDF Land-use Management System.

*The CBA Map and guidelines can be used to guide the location and nature of development and conservation, while ensuring alignment with adjacent municipal SDFs. These products also promote the establishment of ‘Sustainable Human Settlements’<sup>9</sup> by encouraging nodal development and protecting ecosystem services.*

#### 4.5 THE USE OF CBA MAPS IN DEVELOPING INTEGRATED DEVELOPMENT PLANS (IDPS)

The Integrated Development Plan (IDP) reflects multi-sectoral planning at municipal level. It must comply with the ‘Environmental Right’ of the Constitution (Section 24) and the NEMA principles (Section 2). In order to ensure environmental sustainability<sup>8</sup>, it usually includes an Environmental Sector Plan (or Integrated Environmental Management Programme). The Environmental Sector Plan can comprise a range of environmental management tools to promote sustainability and compliance with the various pieces of legislation. These tools are to address many environmental issues such as control of waste water discharge, air pollution, biodiversity protection, etc. For the Saldanha Bay, Bergrivier, Cederberg and Matzikama Municipal Environmental Sector Plans, this Biodiversity Sector Plan (or the published Bioregional Plan which might arise from it in time) should form the spatial focus of the biodiversity protection projects to be identified in the IDP project phase (see Table 11).

*For additional information on managing for environmental sustainability at the municipal level, refer to Section 4 of the Putting Biodiversity Plans to Work Booklets (Job and Driver, 2006) (Contact the BGIS Unit: 021 799 8738).*

8 Refer to ‘The Western Cape: IDP Environmental Toolkit Handbook: Making the IDP Sustainable’ and ‘A Pathway to sustainability: Local Agenda 21’ Prepared by the Environmental Evaluation Unit (University of Cape Town) for the Department of Environmental Affairs and Tourism.

7 Available from [www.capegateway.gov.za](http://www.capegateway.gov.za) or DEADP Branches.

#### 4.5.1 THE ENVIRONMENTAL SECTOR PLAN OF THE INTEGRATED DEVELOPMENT PLAN (IDP)

The Environmental Sector Plan of the IDP comprises projects or programmes that aim at achieving environmental sustainability. These can be mechanisms or tools for ensuring the protection of Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA). The following are examples of projects or programmes which could be implemented through the Environmental Sector Plan component of the IDP to assist with biodiversity protection. Note: that this is not an exhaustive list of all potential projects.

##### 4.5.1.1 Municipal Coastal Management Programmes

In terms of the Integrated Coastal Management Act (Act No. 24 of 2009), each coastal municipality must secure public access to coastal public property, compile a municipal coastal management programme (which may form part of their adopted IDP and SDF), and may establish a Coastal Zoning Scheme. The CBA Map defines the one kilometre coastal buffer zone which forms part of municipal SDFs and zoning schemes; and, as a consequence, informs municipal coastal management programmes, and identifies formally Protected Marine Areas and potential coastal access land.

##### 4.5.1.2 State of the Environment Reporting

A key mechanism in monitoring the state of biodiversity in a municipality is a State of the Environment Report. The State of the Environment Report uses indicators to monitor improvement or deterioration of environmental conditions, and provides recommendations for areas of concern. The Biodiversity Sector Plan can be used to inform the State of the Environment Report as it provides information on the extent of CBA and ESA. Municipalities are therefore encouraged to record the conservation or loss of CBA and ESA.

Other indicators<sup>9</sup> could include:

- protection levels of CBA and ESA (how many hectares / what percentage are formally protected);
- how effectively CBA and ESA are protected in the municipal zoning scheme (i.e. what portion of CBA and ESA are appropriately zoned);
- the extent (in hectares) of invasive alien plant species clearing; and
- the number or proportion of threatened or extinct species, and threatened ecosystems listed by NEMBA.

Furthermore, the biodiversity indicators identified in the published bioregional plan which might arise from this Biodiversity Sector Plan, must be used in municipal State of the Environment Reports.

##### 4.5.1.3 An Environmental Management Plan for municipal-owned land

The management of natural resources is a cross-cutting exercise, requiring the collaboration of a range of agencies and departments

(e.g. SANParks, CapeNature, DWA and DoA). They should assist municipalities in developing management plans for all municipal-owned land included in CBA and ESA. In addition, projects with biodiversity benefits (e.g. invasive alien plant clearing, eco-tourism, sustainable harvesting of medicinal plants) can be identified and implemented as part of IDP and LED processes.

##### 4.5.1.4 Municipal Invasive Alien Species Control Plan

Infestations of invasive alien plants pose serious threats to municipal infrastructure and functioning, as well as to biodiversity. Their massive fuel loads often lead to uncontrollable fires, and they reduce water supply and spoil scenery, impacting negatively on tourism and agricultural potential. Municipalities are responsible for preparing an invasive species control plan for municipal-owned land as part of their IDP and for controlling listed invasive species on municipal land (in terms of NEMBA Sections 76(2) and 73(2) respectively). They are encouraged to form partnerships with agencies involved in clearing invasive species, such as SANParks, DWA, CapeNature and DoA.

##### 4.5.1.5 Area Wide Planning

The Biodiversity Sector Plan can be used as the biodiversity informant to Area-wide Plans in which existing farm lands, potential agricultural expansion areas and important natural areas are mapped to identify possible conflict areas and to ensure biodiversity is protected for sustainable agricultural development. Although the LandCare Area-wide Planning process is a DoA process, municipalities which have a strong agricultural economy could request Area Wide Plans as part of their agricultural sector plans. Area-wide Plans that are informed by CBA Maps can provide the basis for rural EMFs that introduce more predictability and sustainability assurance to agricultural land-use planning.

##### 4.5.1.6 Using Financial Measures to Protect Biodiversity and Promote Sustainable Development

Opportunities to promote the protection of biodiversity are presented by the Municipal Property Rates Act<sup>10</sup> (Act No. 6 of 2004). In terms of Chapter 2, the council of a municipality must adopt a policy consistent with the Act on the levying of rates on rateable property in the municipality (Section 3). In the case of private land that includes CBA and ESA, municipalities can encourage sound management of biodiversity by applying the following:

- Rates Exemption: this may be applied on land where there is a conservation management plan, a contractual agreement and title deed restrictions (i.e. not a formal Protected Area in terms of the Protected Areas Act, which is subject to 'rates exclusions').
- Rates Rebate: where there is a conservation management plan, the rebate agreement is short-term (e.g. 5 years) and is at least on a par with the agricultural rebate extended to landowners in some areas.
- Rates Re-evaluation: where the valuation system reflects a reduction in property value (for rates purposes) if the land is managed for conservation. The municipality can approach a landowner with a proposal for an environmental servitude and

<sup>9</sup> Refer to the National DEAT Guidelines: National Core Set of Environmental Indicators for state of environment reporting in South Africa (CSIR, 2001).

<sup>10</sup> See also Botha, M. 2004. Environmental analysis of the Property Rates Act (Act no. 6 of 2004). Botanical Society Conservation Unit.

re-evaluation. If the land owner agrees, a notarial deed is drawn up, and upon signature, the municipality can revalue the land.

- Not reducing value (and therefore rates) where land is infested with invasive alien species; nor increasing rates where land contains CBA and ESA.

*CBA and ESA could be used to inform municipal biodiversity rates exemptions, rebates and re-evaluations, including the valuation of land. They should be accurately delineated by municipalities (in consultation with conservation agencies) to prevent indiscriminate applications for rebates or exemptions. The Income Tax Act (Act No. 58 of 1962), as amended 2008, sets out income tax deductions for landowners who preserve biodiversity on their land through formal statutory conservation agreements.*

#### 4.5.1.7 Protecting Biodiversity through Stewardship

The National Environmental Management: Protected Areas Act (NEMPA) (Act No. 57 of 2003) provides for any land, including private, communal or municipal land, to be declared a formal Protected Area, and allows for co-management of such a Protected Area by the landowner(s) or any suitable person or organisation. CapeNature and SANParks' Stewardship Programmes work with private landowners and municipalities to secure CBA and ESA as formal Protected Areas, namely Contract Nature Reserves, National Parks or Protected Environments; or through other suitable stewardship options. Significant benefits and incentives are available to landowners of formal Protected Areas. Municipalities should facilitate stewardship in CBA and ESA through rates exclusions etc., (see point 4.5.1.6 above).

*All formal Protected Areas are eligible for rates exclusions in terms of the Municipal Property Rates Act (Act No. 6 of 2004). The National Biodiversity Framework promotes the establishment and strengthening of provincial stewardship programmes and identifies local authorities as one of the lead agents. CBA and ESA are an important focus for stewardship programmes.*

#### 4.5.1.8 Co-operative management measures for protecting Biodiversity

**Catchment Management Agencies (CMAs):** The delegation of water resource management and protection from central government to catchment level is being achieved through the establishment of CMAs<sup>11</sup>. These agencies comprise all relevant water users. According to the National Biodiversity Framework (2009), the Biodiversity Sector Plan should be incorporated into the work of CMAs.

**Fire Protection Associations (FPAs):** FPAs are voluntary associations that may be formed by landowners to prevent, predict, manage and extinguish veldfires under the National Veld and Forest Fire Act (Act No. 101 of 1998). Municipalities are obliged to be members and should encourage landowners to join their local FPA. The DWA assists with developing area-specific Fire Action Plans. The Biodiversity Sector Plan can be used to inform Fire Action Plans (visit [www.firewisesa.org.za](http://www.firewisesa.org.za)).

**Co-operative Governance:** Conservation agencies such as CapeNature, SANParks and provincial authorities (DWA, DEA, DoA and DEADP), together with municipalities, should investigate possible structures for this purpose. Such co-operative management measures are promoted by Section 4.2.6 of the National Biodiversity Framework (2007); and the NEMA Principle which states that there must be intergovernmental co-ordination and organisation of policies, legislation and actions relating to the environment. The CBA Map and guidelines serve as the common reference point for co-operative governance.

*The craft sector in the Western Cape generates over R100 million annually, while providing employment to 18 000 – 28 000 people.*

#### 4.5.1.9 Protecting Biodiversity and Supporting Local Economic Development (LED)

Biodiversity-compatible LED includes a range of activities which should be focused in CBA and ESA, such as invasive alien clearing, wetland rehabilitation, community-based tourism projects, craft markets based on sustainable harvesting, wildflower harvesting, bee farming, natural product sector (medicinal herbs, aromatherapy oils etc.), the protection of ecotourism assets and Protected Areas. The Biodiversity Sector Plan also provides a mechanism for streamlining land-use decision-making outside of CBA and ESA, thereby contributing to ASGISA<sup>12</sup> whilst ensuring that economic growth does not compromise our natural capital.

There are programmes that assist with protecting biodiversity while creating jobs, and that are implemented by various government agencies. Some of these are:

- People and Conservation (SANParks)
- LandCare (Department of Agriculture, Forestry and Fisheries)
- Working for Water (Department of Water Affairs, SANParks)
- Working for Fire (Department of Water Affairs)
- Working for Wetlands (Department of Water Affairs and SANBI)
- CoastCare (National Department of Environmental Affairs)

Most of these programmes fall within the Expanded Public Works Programme led by the Department of Public Works (visit [www.epwp.gov.za](http://www.epwp.gov.za)). Municipalities, with the assistance of other agencies, could encourage the development of small scale community projects that provide benefits for poor rural and urban communities and the environment.

*Projects related to the safeguarding or restoring of biodiversity should be located in CBA and ESA. In this way, the CBA Map enables the identification of IDP projects and supports LED and poverty alleviation, while promoting sustainable economic growth.*

11 Refer to the Guidelines for the development of Catchment Management Strategies <http://www.dwaf.gov.za/>

12 The 'Accelerated and Shared Growth Initiative for South Africa' is a national initiative supported by key groups in the economy that aim to halve unemployment and poverty by 2014 by achieving 6% growth per year by 2010.

**Table 9:** Land-use activity descriptions adopted from the Provincial Spatial Development Framework Rural Land Use planning and Management Guidelines (in preparation), including additional biodiversity-related conditions/controls.

1. Conservation	<p>This is a land-use activity where conservation is the major objective. Subject to stringent controls the following biodiversity-compatible land-use activities (i.e. those of very low impact) may be accommodated in Critical Biodiversity Areas:</p> <p><b>1a) Conservation management activities</b> such as the clearing of invasive alien species, research and environmental education.</p> <p><b>1b) Low intensity eco-tourism activities</b> such as recreation and tourism (e.g. hiking trails, bird and game watching, and visitor overnight accommodation) with limited access points.-</p> <p><b>1c) Sustainable consumptive activities:</b> Harvesting of natural resources (e.g. wild flowers for medicinal, culinary or commercial use).</p> <p><b>Assumes the following conditions/controls:</b></p> <ul style="list-style-type: none"> <li>• These land-uses are limited to very low transformation levels for infrastructure development. Unless existing infrastructure already exists, this should be used. Alternatively transformed areas should be utilized.</li> <li>• Environmental Management Plans are required to ensure appropriate protection of the receiving environment e.g. harvesting volumes, periods etc.</li> <li>• Green technology and architectural design principles have been adopted.</li> <li>• The entire property or a part thereof (depending on the land-use activity above) is under some form of conservation agreement or mechanism. These mechanisms would include formal Protected Areas in terms of NEMPAA, appropriate zoning (in terms of the Land Use Planning Ordinance) and other Conservation Areas, such as stewardship agreements or conservancies.</li> </ul>
2. Agriculture	<p><b>2a) Intensive agriculture, including:</b></p> <ul style="list-style-type: none"> <li>• All areas of High Potential and Unique Agricultural Land, together with areas of lower agricultural potential where particular agricultural practices may themselves contribute to the character of the environment, the agricultural working landscape or the local economy</li> </ul> <p><b>Forestry or Timber Plantations (Timber Production) -</b>  <b>Includes:</b> all timber plantations, mainly <i>Pinus</i>, <i>Eucalyptus</i> and <i>Acacia</i> plant species;  <b>Assumes the following conditions/controls:</b> monoculture of alien timber species with heavy impact on hydrology and soil erosion and introduction and spread of a variety of the most aggressive alien invasive plants.</p> <p><b>Irrigated Crop Cultivation -</b>  <b>Includes:</b> all irrigated crops (vegetables) and irrigated tree crops (orchards);  <b>Assumes the following conditions/controls:</b> intensive production activity with high nutrient and agro-chemical inputs and often two crops per year (but even just ploughing, with no chemicals etc., results in irreversible loss of natural habitat).</p> <p><b>Dryland Crop Cultivation -</b>  <b>Includes:</b> all tillage cultivation of non-irrigated crops, mostly single-season annuals, but including perennial and orchard-type tree crops if cultivated with an indigenous grass layer;  <b>Assumes the following conditions/controls:</b> crop production methods that conserve water and protect against soil erosion; limited and responsible use of fertilisers, pesticides and other agrochemicals and genetically modified organisms.</p> <p>Space extensive agricultural enterprises (e.g. intensive feed-lots, poultry battery houses) -  <b>Includes:</b> all intensive animal production systems, that are dependent primarily on imported foodstuffs and confinement; includes dairy farming and all areas in production support for dairy, including pastures, fodder and grain crops, much of which is usually irrigated;  <b>Assumes the following conditions/controls:</b> To be located in close proximity to regional routes (including rail) to facilitate product and requisite (e.g. feed) movement and supply</p> <p><b>2b) Extensive agriculture, including extensive livestock or game farming</b>  <b>Includes:</b> livestock or game production and related tourism activities on extensive land portions of natural land cover. Could include private game reserves, sustainable commercial hunting along with other consumptive and non-consumptive use of natural resources. Private game reserves to be officially protected through various mechanisms (e.g. NEMPAA or other conservation agreements), with strict limits on the level of development considered acceptable for lodge and other accommodation infrastructure.  <b>Assumes the following conditions/controls:</b> application of minimum size criteria for economic sustainability as are applied to rangeland livestock farming; strictly limited development for revenue generating purposes such as intensified tourism or sectional ownership. Stringent management conditions applied, such as –</p> <p>Faunal specialist to undertake carrying capacity study for game reserves/production.      Ensure riparian and wetland buffer areas are protected.      Strict adherence to stocking rates for extensive agriculture.      For game reserves, indigenous species only to be stocked      Environmental Management Plan, including fire management measures, if necessary.      These land-uses are limited to very low transformation levels for infrastructure development.      Location of infrastructure, either within disturbed/transformed areas or in existing buildings, where possible.</p>



### 3. Holiday Accommodation

Provides tourist/holiday accommodation in rural areas.

**Includes:**

- B&B establishment, backpackers accommodation, guesthouse, boutique hotel, lodge;
- Resort;
- Camping Sites; and
- Farm rental units

**Assumes the following conditions/controls:** *All forms of holiday accommodation are encouraged within existing structures or on existing disturbed or transformed areas and within close proximity to existing infrastructure (e.g. roads and electricity). Although encouraged for resort developments too, this is not always possible given the unique nature of the setting required, which will most likely be place-bound. Most holiday accommodation should be provided in or adjacent to existing towns and rural settlements, although it can be accommodated in the rural landscape. However, the form and scale of facilities should be aligned with the character, quality and environmental sensitivity of the rural landscape. Certain norms (e.g. number of guesthouses or B&B per farm) must be applied, as per the Rural Land-Use Planning and Management Guidelines.*

These land-use activities are restricted to small footprints and will be subject to the Western Cape Rural Land-Use Planning and Management Guidelines, which restricts the number of new structures etc., within the larger landscape and encourages densification to reduce cumulative impacts. Resort developments are subject to a density norm or formulae and the resort units are restricted to 120m<sup>2</sup> footprints in terms of these guidelines.

### 4. Rural Housing

#### 4a) Low density rural housing (consolidation of rural erven for conservation)

This land use facilitates residential development rights outside the urban edge, is of a low density and occurs on extensive pieces of land thereby increasing the size of the conservation area or land under conservation, i.e. consolidation of the conservation estate or area in hectares that is conserved through various mechanisms (e.g. NEMPAA or other conservation agreements), within the province. The following density norms, in addition to other land-use factors, environmental constraints and strategic context, including the desirability to consolidate erven, shall be used to establish the maximum number of units permitted on land units outside the urban edge, namely:

Divide the total extent in hectares of the to-be-consolidated cadastral units by 1 000 and multiply the answer by the number of cadastral units to be consolidated. Refer to the Rural Land-Use Planning and Management Guidelines (in prep.), if this calculation yields a number of dwelling units that is less than or equal to, or less than one-third more than, the total number of individual cadastral units to be consolidated.

**Includes:** *development for 'lifestyle' or investment-type recreational ownership such as share-block schemes, multi-ownership reserves, but only for extensive land portions with limited development (NB: excludes golf estates or residential eco-estates).*

**Assumes the following conditions/controls:**

Maintenance of a large measure of natural land cover and biodiversity-friendly management; the development footprint should be extremely limited in relation to the property size.

Individual footprints to be limited to 250m<sup>2</sup> with maximum permissible floor space of 120m<sup>2</sup>.

Clustered layout, sensitively placed to limit the transformation impact, development within already transformed or disturbed areas or use of existing buildings or built on timber piers (this will also ensure corridor linkages throughout the cadastral area).

Sustainable water supply (within the allocated Reserve of the water resource).

Use of off-grid services (solar power, rainwater harvesting, grey water recycling, urine diversion/environmentally friendly toilet facilities) and built from local recyclable materials.

No formal gardening.

Development outside of ecologically sensitive areas e.g. river-beds and their riparian zones, wetlands and their natural buffers, flood-lines.

Areas not developed are under some form of agreement or mechanism. These mechanisms would include formal Protected Areas in terms of NEMPAA, appropriate zoning (in terms of the Land Use Planning Ordinance) and other Conservation Areas, such as stewardship agreements or conservancies.

#### 4b) "On-Farm" Settlement of Farm Workers

**Includes:** *This land-use includes residences for farm workers and retirees "on-farm" i.e. where housing is available to farm workers who currently live on the farm and will be living there in future, either due to personal preference (e.g. their tenure rights, rural surroundings, place for retirement etc.) or because circumstances require it (e.g. working hours etc.).*

**Assumes the following conditions/controls:**

(a) Fragmentation<sup>9</sup> of agricultural landscape and land for agricultural purposes is not being threatened by the "urbanization" of rural areas.

(b) Where possible, clustering of units in distinct housing precincts located in visually unobtrusive locations and existing footprints, but enjoying convenient access to the rural access network.

<b>5. Tourist and Recreational Facilities</b>	<p><b>Includes</b> a broad range of rural tourist and recreational facilities in support of sustainable rural tourism, rural businesses and communities, as well as to provide for the rural recreational and leisure needs of urban dwellers, namely:</p> <p><b>5a) Low impact facilities</b> Lecture rooms, restrooms, restaurants, gift shops Outdoor recreation (e.g. 4x4 trails and hiking trails) Non-place bound tourist and recreational activities and facilities (e.g. water parks, paint ball); and</p> <p><b>5b) High impact facilities</b> Golf Courses, Golf Estates, Polo Fields and Polo Estates (with or without residential component)</p> <p><b>Assumes the following conditions/controls:</b> Non-place bound tourist and recreational activities and facilities located in or peripheral to existing rural settlements Rural tourist and recreational activities and facilities to be linked to a natural setting or feature. Location of infrastructure either within disturbed/transformed areas and existing buildings, where possible. Restricting large-scale recreational developments including a residential component to a location in the “urban fringe”, allowing for their longer term inclusion inside the urban edge. Development outside of ecologically sensitive areas e.g. river-beds and their riparian zones, wetlands and their natural buffers, flood-lines. High impact facilities outside of priority ecological or landscape corridors i.e. CBA and ESA.</p>
<b>6. Rural Business</b>	<p>This land-use broadens tourist and visitor demand and strengthens rural and settlement economies. It includes Rural businesses ranging from a curio-shop in a National Park to a conference venue on a game farm, namely:</p> <p><b>6a) Place-bound business -</b> Farm stall and farm shop Restaurant/tavern Venue facility (e.g. conference/ wedding) AND</p> <p><b>6b) Non-place-bound business</b> e.g. agricultural co-operative, filling station/petro-port, tourist retail outlet, plant nursery, hotel/motel, tourism office, commercial kennel.</p> <p><b>Assumes the following conditions/controls:</b> Farm stall restricted to selling products produced and processed on the farm to the general public, located either in the farmstead precinct or abutting a tourist route, if present. Restaurant, tavern and venue facility located within the farmstead precinct. Non-place-bound business located in and peripheral to rural settlements, outside of environmentally sensitive areas i.e. CBA and ESA. Location of infrastructure either within disturbed/transformed areas and existing buildings, where possible</p>
<b>7. Rural Industry</b>	<p>This land-use accommodates a range of industry types serving rural areas, and includes:</p> <p><b>7(a) Non-place-bound rural industry, for example:</b> Manufacturing agricultural requisites such as pallet making, bottle labeling; Processing of regionally sourced product such as fruit cannery, meat processing plant, abattoir; Transport contractors, dairy depots, builder’s yards; and Processing rural sourced materials (e.g. pottery manufacturing from kaolin).</p> <p><b>7(b) Extractive industry which is place-bound</b> given that it depends on the location of the mineral resource i.e. quarrying and mining; including secondary beneficiation (e.g. cement block manufacturing plants, concrete batch plants, pre-mix asphalt plants). Includes all strip and opencast mining excavations or quarrying (sand mining); plus the visual, physical and chemical impacts of these activities, particularly on ground water reserves; all mine waste and refuse dumps, urban waste sites and landfill sites for whatever purposes.</p> <p><b>Assumes the following conditions/controls:</b> All non-place-bound industry (i.e. rural industry and service trades) to be located in and peripheral to rural settlements outside of environmentally sensitive areas e.g. CBA and ESA. Extractive industry to be located at the mineral source within the rural area, and informed by environmental considerations and post mining rehabilitation.</p>

## 8. Small-holdings

This land-use accommodates smaller agricultural properties which may be used for agriculture, but may also be occupied as places of residence by people who seek a rural lifestyle, and usually includes agriculture, dwelling house, home occupation.

**Assumes the following conditions/controls:**

New smallholding developments for rural lifestyles to be restricted to inside the medium to long term urban edge.

Bona-fide small-scale agricultural properties (e.g. agricultural allotments) should be located outside the urban edge within areas of intensive agriculture (existing or potential).

Minimum smallholding unit size: 8 000 m<sup>2</sup>.

Compilation of a Management Plan for new and existing smallholding areas.

## 9. Community facilities and institutions

This land-use provides facilities in support of rural community socio-economic development and well-being; including:

schools, places of assembly, churches;

primary and secondary health care;

institutions requiring extensive land or isolated location (e.g. infectious disease recovery facility); and

institutions requiring an agricultural production location, servicing such production (e.g. agricultural research stations and agricultural schools).

**Assumes the following conditions/controls:**

Facilities located within existing towns and rural settlements; in close proximity to a settlement or located on a regional route, outside of environmentally sensitive areas e.g. flood-lines, river and wetland buffers and Special Habitats.

In the absence of public land, establish facilities "on-farm", utilizing existing farm structures or existing footprints.

Location of facilities to target disturbed areas and areas of low agricultural potential in order to avoid fragmentation of super-blocks.

## 10. Infrastructure installations

This land-use accommodates infrastructure installations serving both the urban and rural areas where such installations include:

(i) Wastewater treatment works, airports, water extraction purification plants, safety and security (e.g. police) stations, irrigation infrastructure, roads, power lines, railways and pipelines;

(ii) Nuclear power stations, wind farms or other alternative energy technologies requiring large areas of undeveloped land; and

(iii) All substantial impoundments, reservoirs or dams and weirs, with associated pipelines, canals, access roads and bulk water transfer schemes).

**Assumes the following conditions/controls:**

- Installations to be located on transformed, disturbed or low-value agricultural land, where possible.
- A shared location and/or facility (e.g. police and clinic in a community service centre).
- Infrastructure installations requiring a location outside the urban edge is restricted to extensive agricultural areas peripheral to settlements in close proximity to regional routes to facilitate access and restrict fragmentation of the agricultural landscape.
- Installations in intensive agricultural areas are restricted to essential services (e.g. irrigation infrastructure, safety and security).
- Energy generating developments (i.e. nuclear power, wind farms, etc) are associated with large areas of land left undeveloped thereby maintaining low transformation levels relative to the property size.
- Avoidance of sensitive areas such as floodlines, river and wetland buffers and Special Habitats.

All water-use developments should be subject to the Ecological Reserve in terms of the National Water Act.

## 11. Settlement

This category includes all human settlements, consisting of the following two sub-categories:

**11.a) Existing settlements (and urban expansion), which include:**

Metropolitan areas, cities, larger towns, small towns, villages and hamlets.

It comprises all physical, residential, educational, recreational elements (e.g. sports facilities, fields, parks), cemeteries, industrial and business development, including associated infrastructure etc., which are commonly known as urban land-use activities (or the built environment). Existing settlements are frequently under significant pressure to expand due to in-migration and population increases, which require the provision of housing and services etc., therefore causing urban expansion.

**Assumes the following conditions/controls:**

The control of urban expansion through the delineation of an urban edge to prevent urban sprawl.

The delineation process is guided by the provincial urban edge guideline document and informed by a fine-scale biodiversity plan or map, for example: a Critical Biodiversity Areas Map is used to delineate a boundary of the urban edge.

The promotion of compact urban settlements, whilst maintaining an open space system (where possible) that is informed by a fine-scale biodiversity plan or map.

**11.b) New settlements include areas that will -**

Service geographically isolated farming areas (i.e. agri-village);

Service rural resource exploitation (e.g. mines) and significant infrastructural developments (e.g. power plants); or

Proclaim the urban component of existing Act 9 and church settlements.

**Assumes the following conditions/controls:**

New settlements located in the rural area when necessitated by unique circumstances (e.g. servicing of isolated large infrastructural projects outside the servicing sphere of existing settlements) or in order to proclaim the urban component of *existing* rural church, forestry or conservation settlements (i.e. Transformation of Certain Rural Areas).

**Table 10:** Categories on the CBA Map and their recommended corresponding Western Cape Provincial Spatial Development Framework (2005) Spatial Planning Category. \* The two categories of Other Natural Areas are not provided as separate layers. The distinction of those large intact remnants versus those located within agricultural matrices lies at the discretion of the Town and Regional planners.

CBA Map Category → SPC ↓	Formally Protected Areas	Critical Biodiversity Areas (includes CBA Terrestrial and CBA Aquatic and their buffers)	Ecological Support Areas (includes Critical ESA and their buffers and Other ESA and their buffers)	Other Natural Areas *(large intact remnants, especially adjacent to CBA/ESA)	Other Natural Areas *(located in an agricultural/transformed matrix)	No Natural Remaining Areas
CORE 1						
CORE 2						
BUFFER 1						
BUFFER 2						
INTENSIVE AGRICULTURE						
SETTLEMENT						

**Box 12: Heerenlogenent:** In 1682, Olaff Bergh led an expedition north in search of precious metals. Close to present day Graafwater, they over-nighted in a cave which had a permanent spring nearby. This “gentleman’s lodge” became an established camping site for people travelling north. Many of the early explorers inscribed their names and initials on the rock overhang and this has left a valuable record. This sandstone outcrop has a shale base and thus has fynbos on its upper slopes and a succulent dominated shrubland on the lower slopes.



Nick Helme

Certain Graafwater Sandstone Fynbos outcrops have prominent shale bases, as seen here near Heerenlogenent.



**Table 11:** A guide to incorporating the Biodiversity Sector Plans into Integrated Development Planning (IDP) and Spatial Development Frameworks (SDF); as adapted from the STEP Handbook (Pierce and Mader, 2006).

IDP Phases	Basic elements in developing the SDF	Use of the Biodiversity Sector Plan (CBA Map and guidelines)
<b>Phase 1: Analysis</b>		
<p>Gather all information.</p> <p>Analyse information for -</p> <p>i) trends; and</p> <p>ii) issues that can be shown on a map.</p> <p>Identify needs, including normalisation after apartheid, transport etc.</p> <p>Draft report for public comment.</p>	<p>Biodiversity importance of land (or category on the CBA Map), current land-use, agriculture, the built environment, infrastructure, transport routes, watersheds, geology etc., heritage sites, State of Environment Reporting, Strategic Environmental Assessment.</p> <p>i) trends (e.g. the direction in which the town is growing, land suitable for development);</p> <p>ii) issues (e.g. a need for housing, schools or a clinic in a certain area; protecting ecosystem services).</p>	<p>Planners and decision-makers use this Biodiversity Sector Plan (Critical Biodiversity Areas Map and guidelines) to identify which areas to develop and which to leave undeveloped and conserved.</p>
<b>Phase 2: Strategy</b>		
<p>Identify vision, mission, objectives, strategies for dealing with needs, problems and issues, such as Local Economic Development, poverty alleviation, the natural environment, possible projects.</p> <p>Draft reports for public comment.</p>	<p>Critical Biodiversity Areas Map indicates: Priority areas for conservation, opportunities and constraints on developments.</p> <p>Draft report(s) for public comment.</p>	<p>Plan which areas to develop and which to leave undeveloped and conserved.</p>
<b>Phase 3: Projects</b>		
<p>Identify priorities, refine projects. Prioritise projects and finances, which together influence the SDF. Assess environmental impacts of projects.</p>	<p>Critical Biodiversity Areas Map indicates areas where restoration projects or other biodiversity related projects for poverty alleviation can take place e.g. SANParks People and Conservation, Working for Water etc.</p>	<p>Identify areas for restoration projects, or other biodiversity related projects.</p>
<b>Phase 4: Integration</b>		
<p>5-yr financial plan and programmes for capital investment, integrated Local Economic Development, environment (including biodiversity), poverty alleviation, gender equity etc.</p> <p>Draft IDP report for public comment.</p>	<p>Draft SDF report and map based on the Critical Biodiversity Areas Map with overlying infrastructure and land-uses, sites for integrated projects (e.g. large scale housing development, poverty alleviation projects e.g. restoration), open spaces, urban edge, development nodes, corridors, cemeteries, waste sites, social and emergency services.</p> <p>Draft SDF report and map for public comment.</p>	<p>Provincial officials, Non-governmental organizations and public to ensure that the Biodiversity Sector Plan is taken into consideration and upheld.</p>
<b>Phase 5: Approval</b>		
<p>Final IDP report approved based on the Critical Biodiversity Areas Map and other Biodiversity Sector Plan information.</p>	<p>Final SDF report and map approved based on the Critical Biodiversity Areas Map and other Biodiversity Sector Plan information.</p>	<p>Councilors, municipal officials, provincial officials, Non-governmental organizations and public to ensure that the Biodiversity Sector Plan is upheld.</p>

\* The IDP and SDF should be integrated both from a time-line and content perspective, as indicated above.



### **1 What if the CBA Map indicates that the property is located within a CBA but the site visit reveals that the site is degraded or that no natural habitat occurs on the site?**

This can be explained as follows:

- The site, although degraded is still contributing to the biodiversity of the area and has thus been correctly classified as a CBA. In such instances, the site should have been classified as degraded or transformed on the summarised land cover map and the management guideline is to rehabilitate if possible, and to discourage land-use activities that have any further impact on biodiversity, and especially ecological processes; or
- Disturbance to the site has occurred subsequent to the development of the CBA Map, or the summarised land cover map which fed into the CBA Map was erroneous. If this is the case, the classification of the land cover on the site will differ to that which is reflected by the summarised land cover map and as a result, it is possible that the site should not have been classified as a CBA. In such instances, the summarised land cover maps will differ to that which is found on site. However, the site needs to be assessed for its potential to be rehabilitated and/or its role as part of a corridor. In the case of the latter, ecological processes must be maintained or restored.

The bottom line is that a suitably qualified specialist is needed to interpret the site in relation to the CBA Maps. Confirmation through a site visit i.e. ground-truthing is essential in all cases. Refer to step 3 and 4 of Section 4.2 above for more guidance on the matter.

### **2 What if natural habitat is found on a site but this is not indicated on the land-cover map (and therefore not classified as a CBA or ESA)?**

Such inaccuracies may result from inconsistencies in scale or a classification error. If the map shows that no vegetation remains, but a site visit reveals the presence of natural habitat, refer to the vegetation GIS data to determine the vegetation type and then determine its ecosystem status. If the vegetation type is Critically Endangered (CR), it is automatically a CBA and should have been classified as such. If the vegetation type is Endangered (E), the site is most likely a CBA. If the vegetation type is Vulnerable (V) or Least Threatened (LT), it may either be a CBA or an Other Natural Area. The site must then be assessed for the presence of features that would make it important for biodiversity conservation (e.g. wetlands, Special Habitats or Species of Special Concern), which would classify it as a CBA. By identifying these biodiversity features (selection criteria) in Table 5, it may be possible to determine the correct CBA status. The precautionary principle<sup>9</sup> and all applicable objectives and recommended policies (Section 4 of this handbook) should still be applied during decision-making.

### **3 Do 'Other Natural Areas' still require a biodiversity assessment?**

In Other Natural Areas it is important to check for special biodiversity features, e.g. wetlands or Species of Special Concern. Knowledge of special features or species is incomplete, therefore it is critical to verify that they do not occur on the site.

### **4 How does ecosystem status<sup>9</sup> relate to the CBA Map?**

All natural intact patches of Critically Endangered (CR) ecosystems or features are included as CBA. For Endangered (E), Vulnerable (V) or Least Threatened (LT) vegetation types, the most efficient areas to meet national biodiversity thresholds have been classified as CBA, while the remaining are Other Natural Areas. This is done to ensure that an optimal layout of E, V and LT ecosystems are conserved and to prevent fragmentation<sup>9</sup> of these ecosystems over time.

It is also important to keep in mind that different ecosystem statuses may exist for each ecosystem type. This happens when different land cover maps (1994 land cover vs. 2005 land cover) or vegetation maps (national scale or fine-scale) are used in the assessment. Only the C.A.P.E. Fine-scale Biodiversity Planning Project ecosystem status assessment has fed into these CBA Maps. When land-use decision-making occurs however, a conservative approach must be adopted and the most threatened ecosystem status should be applied.

## 5 Can the CBA Map assist in the selection of land for Biodiversity Offsets<sup>9</sup>?

Critical Biodiversity Areas are ideal biodiversity offset receiving areas<sup>9</sup> and CapeNature and/or SANParks officials should be consulted for their input. If sustainable development is to be achieved, no CBA or part thereof should be impacted or disturbed in any way. If this is unavoidable, the loss of the CBA should be offset. The 'Provincial Guideline on Biodiversity Offsets' is available at [www.capegateway.gov.za/deadp](http://www.capegateway.gov.za/deadp).

## 6 How do CBA and ESA affect existing land-use rights?

CBA Maps do not grant or take away existing land-use rights. They are intended to inform proposed land-use changes.

## 7 Will all CBA become Protected Areas?

It is not feasible for all CBA to be formally conserved in Protected Areas. Nonetheless, it is extremely important that they are all afforded some protection through an appropriate mechanism. In addition to formal Protected Areas in terms of NEMPAA, other mechanisms include appropriate zoning (in terms of the Land-use Planning Ordinance) and the establishment of other Conservation Areas, such as stewardship agreements or conservancies. CBA Maps will be used to inform the ideal location of future Protected Areas, priority landscape corridors, conservancies etc.

## 8 What does it mean if a CBA is lost?

The CBA Map identified the most land-efficient option to meeting all national biodiversity thresholds. Any disturbance or conversion of habitat within a CBA means either 1) the irretrievable loss of an important ecological feature or part or whole of a corridor or 2) more land will be required in order to meet the same threshold.

## 9 Will the CBA Map ever change?

Land-use is dynamic and all maps need updating. The CBA Map will need updating owing to inconsistencies and changes in the land-cover information; any unavoidable loss of CBA and ESA; and improved biodiversity knowledge (e.g. the discovery of Species of Special Concern). Nonetheless, the current map will form the basis for future updates. Note that if the map is used as the basis for a bioregional plan<sup>9</sup>, it would have to be updated every five years in terms of NEMBA.

**Box 13: Saldanha Limestone Strandveld** is restricted to the exposed limestones (calcrete) of the Saldanha Peninsula. This vegetation type is characterized by shallow soils and is rich in endemic plant species. Cracks and pockets in the rock provide micro-habitats which allow for specialist plants to colonise them. Prominent Limestone ridges adjacent to the coast are a familiar feature of this area, such as at Saldanha, Jacobsbaai and Paternoster. New species are constantly being discovered within the area with 5 new species being described by one volunteer (for SANBI's Custodians of Rare and Endangered Wildlife Programme) alone within the last four years.



Nick Helme

Saldanha Limestone Strandveld at Trekoskraal. Typical pocketed pavement with annuals, succulents (the reddish creeping succulent is *Cephalophyllum rostellum*), and bulbs, and the taller *Thamnochortus spicigerus* on the deeper soils behind.



The management of natural resources and healthy ecosystems is a cross-cutting exercise that requires the co-ordination and collaboration of a range of conservation agencies. Their input is required for detailed assessments and consideration of proposed impacts to biodiversity on specific sites. Agencies able to assist with biodiversity related inputs are listed below:

**South African National Parks (SANParks):** The national authority for Protected Areas and involved in incorporating biodiversity into land-use planning and decision-making, stewardship, park planning and expansion; community projects and the management of National Parks ([www.sanparks.co.za](http://www.sanparks.co.za)) – West Coast (022) 772 2144

**CapeNature/Western Cape Nature Conservation Board:** This is the principal managing authority for biodiversity in the Western Cape, involved in commenting on decision-making where biodiversity may be impacted, as well as providing guidance on the incorporation of biodiversity concerns into land-use planning and decision-making and stewardship agreements ([www.capenature.co.za](http://www.capenature.co.za)) – Scientific Services: Land-use Advisory Unit in Jonkershoek on (021) 866 8000.

**South African National Biodiversity Institute (SANBI):** This national body is responsible for the management and conservation of South Africa's biodiversity. It is involved in the implementation of bioregional programmes (e.g. C.A.P.E.), policy development, invasive plant eradication, research and monitoring, including other conservation initiatives, such as the Custodians of Rare and Endangered Wildflowers ([www.sanbi.org](http://www.sanbi.org)) – Pretoria Head Office (012) 843 5000, or Kirstenbosch (021) 799 8738.

**The Biodiversity GIS (BGIS) Unit:** This unit is responsible for the management of SANBI's spatial biodiversity planning information. It supports the South African portal for the provision of biodiversity information in an easily accessible and freely available format on its website. All information relating to the biodiversity planning projects in South Africa can be downloaded or obtained from BGIS ([www.bgis.sanbi.org](http://www.bgis.sanbi.org)) – Cape Town (021) 799 8738.

**Department of Environmental Affairs and Development Planning (DEADP):** The principal decision-making authority for development activities that impact on natural habitat in the Western Cape, including spatial planning, integrated environmental management, waste and pollution management, promoting sustainable resource use and developing policy in this regard. The DEADP has developed a series of guidelines to assist with environment decision-making, which is available at [www.capecapegateway.gov.za](http://www.capecapegateway.gov.za) – Cape Town (021) 483 2700.

**Department of Water Affairs (DWA):** The principal national decision-making and managing authority for aquatic ecosystems, it is also involved in land-use decisions, rehabilitation of rivers and wetlands and the removal of alien invasive species ([www.dwaf.gov.za](http://www.dwaf.gov.za)) – Cape Town (021) 950 7100. The protection of forests and listed trees and the development of Fire Action Plans are forestry functions and reside with the Department of Agriculture, Forestry and Fisheries.

**Department of Agriculture: LandCare/Area Wide Planning:** This department supports farm planning, the clearing of invasive alien species, and encourages communities to adopt an ecologically sustainable approach to the management of the environment and natural resources, while improving quality of life ([www.nda.agric.za](http://www.nda.agric.za) or [www.wcape.agric.za](http://www.wcape.agric.za)) - Cape Town (021) 873 3523; National Branch (021) 799 8790.

**Botanical Society of South Africa (BotSoc):** The Conservation Unit of the Botanical Society undertakes strategic conservation projects, often in partnership with other organisations, to achieve long-term conservation and sustainable use of the greater Cape Floristic Region ([www.botanicalsociety.org.za](http://www.botanicalsociety.org.za)) - Cape Town (021) 799 8824.

**Cape Action for People and the Environment (C.A.P.E.):** A bioregional programme that aims to protect the biodiversity of the Cape Floristic Region while delivering significant benefits to the people of the region. The programme includes a long-term strategy and vision for biodiversity conservation in the region. Key executing agencies include CapeNature, SANParks, DEADP, DEA and the Provincial DoA, as well as SANBI and several Non-governmental Organizations ([www.capeaction.org.za](http://www.capeaction.org.za)) – Cape Town (021) 799 8866.



The CBA Map should be used by all the agencies mentioned above as the common reference for Critical Biodiversity Areas and Ecological Support Areas in land-use planning and decision-making, including other multi-sectoral planning procedures.

The Biodiversity Sector Plan is intended to inform not just SDFs and other municipal planning tools. It can also be used by local, provincial and national authorities to implement national and provincial policies, strategies and guidelines. The information provides support for spatial and policy recommendations for promoting sustainable development, in terms of South African developmental and environmental policy and legislation. This demonstrates its usefulness as a common reference point for policy developers, planners and decision-makers at all levels.



Rupert Koopman

**Box 14: SAS Saldanha:** Because the military-owned SAS Saldanha has limited access, it boasts interesting examples of endemic habitats which are largely transformed and degraded elsewhere in the region. A large portion of the property is covered by the endangered, Saldanha Granite Strandveld and the previously cultivated flat lands in between the koppies, are splashed with colourful spring displays of annuals. The cool southern faces of the granite outcrops are covered by dwarf coastal forest which is characterized by species (such

as *Erica tristis*) associated with cooler, wetter habitats (mainly found 150km away). In addition to the pristine terrestrial habitats, the inland salt pans occurring within in SAS Saldanha are also among the best conserved on the entire Saldanha peninsula.

SAS Saldanha with Langebaan Dune Strandveld in the foreground and pristine Saldanha Granite Strandveld in the background, on the koppies.

**Box 15: St. Helena Bay Koppies:**

This chain of hills represents the last substantial expanse of the drier form of Saldanha Granite Strandveld which is closely aligned to Renosterveld. Many rare species are found here but it is most notable as being the final stronghold for the critically endangered Blou viooltjie (*Lachenalia viridiflora*). This spectacular flower is found in pockets of humus and soil derived from the granite outcrops that it grows on and adjacent to.

St. Helena Bay Koppies



Rupert Koopman



## Glossary

**Aquatic features or ecosystems** refer to rivers, wetlands, estuaries or any other natural water features.

**Aquifer:** Underground water-bearing areas of sand, gravel or porous rock.

**Biodiversity:** The wide variety of plant and animal species in their natural environment. It not only refers to species (plants, animals and micro-organisms), but also to ecosystems and landscapes, and the ecological and evolutionary processes that allow biodiversity to persist over time. It includes the diversity within species, between species, and of ecosystems.

**Biodiversity Offsets:** Conservation activities intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects. It usually involves setting aside land in a similar ecosystem elsewhere, at the cost of the developer. See 'biodiversity receiving areas' below.

**Biodiversity offset receiving areas:** These are areas in the landscape that are selected to compensate for the residual negative impacts of proposed development that are unavoidable. They are usually of equal or greater biodiversity importance than those areas which are being impacted on or being lost.

**Biodiversity Pattern** is the term for the way in which the components of biodiversity are spatially arranged. In this document, it refers to specific vegetation types or habitat types, e.g. forest or fynbos; a population of rare and endemic species; or other biodiversity features, e.g. a river or wetland (vlei). The habitat type or feature is home to specific animals, plants, birds, insects and other organisms, for example Blue Duiker in forests.

**Biodiversity Plan(ning):** A map of information about biodiversity features (species, ecosystems, ecological processes); existing Protected Areas; current patterns of land-use; and potential and conflicting patterns of land-use. These mapped features can be linked for further analysis using Geographic Information Systems (GIS) to identify areas of highest biodiversity importance and to determine priority areas for action. Also see 'Systematic biodiversity plan' below.

**Biodiversity Sector Plan:** A tool which feeds into a range of multi-sectoral planning and assessment processes to inform land-use planning and decision-making. As a minimum, products should include a Biodiversity Sector Plan handbook including the land-use management guidelines and biodiversity profile for the municipality; a Critical Biodiversity Areas Map; and all relevant GIS shapefiles. The Biodiversity Sector Plan is the precursor to a gazetted bioregional plan. See 'Bioregional Plan' below.

**Biodiversity Threshold** (also referred to as a target): A threshold (target) is that point at which the existence of an ecosystem or biodiversity feature becomes threatened. It can be represented by a number (e.g. 52 individuals of a species) or size (e.g. 102 hectares of an ecosystem type) and represents the absolute minimum of that ecosystem or species which is required to be safeguarded in order to ensure the continued persistence of the ecosystem or species. If the threshold for a feature is exceeded (i.e. the extent of the feature is reduced through human activities), the threat arises that ecosystems will deteriorate/collapse, which will severely impact on the delivery of ecosystem services. These thresholds are determined through robust scientific calculations.

More recent literature will differentiate between thresholds and targets as follows: Thresholds represent that point at which irreversible breakdown occurs (above definition) and targets represents the desired extent of protection (aim or target). In such instances, the 'target' must exceed the thresholds.

**Bioregion:** A land and water territory, the limits of which are not politically bound, but which are defined by the geographical boundaries of human communities and ecological systems. Also a geographical space that contains one whole, or several nested, ecosystems characterised by landforms, vegetative cover, human culture and history (as identified by local communities, governments and scientists).

**Bioregional Plan** (published in terms of the NEMBA): A bioregional plan is based on a systematic biodiversity plan (ideally at a scale of 1:50 000 or less), and includes a Critical Biodiversity Areas Map and land- and resource-use guidelines. The purpose of a bioregional plan is to inform land-use planning, environmental assessment and authorisations, and natural resource management by a range of sectors whose policies and decisions impact on biodiversity. Refer to 'Guideline regarding the determination of bioregions and the preparation of and publication of bioregional plans'. Government Gazette No 32006, 16 March 2009.

**Bioregional planning** refers to land-use planning and management that promotes sustainable development by recognising the relationship between, and giving practical effect to, environmental integrity, human-well-being and economic efficiency within a defined geographical space, the boundaries of which are determined in accordance with environmental and social criteria. It is an internationally recognised planning concept aimed at achieving sustainable development.

**Cape Floristic Region (CFR):** The Cape Floristic Region is a region of 90 000 km<sup>2</sup> that extends from Nieuwoudtville southwards to Cape Town and then eastwards to Grahamstown. Most of this vast region is covered in fynbos, while the remaining areas are covered in renosterveld, forest, succulent karoo or thicket. The region holds close to 9 000 plant species, most of which grow in fynbos vegetation. The region coincides with the area known as the Cape Floral Kingdom that originates from an old system of classification which divided the world into six major plant kingdoms, based on their number of endemic plant families, genera and species, and which recognised the Cape as the smallest in area, yet one of the richest in species. The Kingdom concept is considered outdated by modern botanists, but it still holds charm amongst plant enthusiasts.

**Catchment:** A catchment is the area (a geographical region) where water from rain (or snow) becomes concentrated and drains downhill into a river or lake. The term includes all land surface, streams, rivers and lakes between the source and where the water enters the ocean.

**Connectivity:** "Functional" connectivity refers to the ability of connective corridors to sustain ecosystem processes common to linked patches (it is the opposite of fragmentation).

**Conservancy:** Agreements for co-operation among neighbouring landowners for conservation purposes, and which require no legal long-term commitment from landowners.

**Conservation:** The safeguarding of biodiversity and its processes (often referred to as biodiversity conservation).

**Conservation Areas** (In the context of this document): Land under some form of conservation agreement other than those via the National Environmental Management: Protected Areas Act (NEMPAA). They are not considered formally Protected Areas, as they are not gazetted in terms of the NEMPAA and do not allow for long term security of tenure. For example Private Nature Reserves declared in terms of provincial ordinances, Biodiversity Agreements in terms of the Biodiversity Act, and conservancies.

**Corridor/s:** See ecological corridors.

**Critical Biodiversity Areas** (CBA): These are terrestrial and aquatic features (e.g. vleis, rivers and estuaries), and the buffer areas along these aquatic CBA features, whose safeguarding is critically required in order to meet biodiversity pattern and process thresholds. They are identified through a systematic biodiversity planning approach (see below) and represent the most land-efficient option to meeting all thresholds.

**Critical Biodiversity Areas Map:** A map, based on a systematic biodiversity planning approach that indicates Critical Biodiversity Areas, Ecological Support Areas, Other Natural Areas and No Natural Remaining Areas.

**Critical Ecological Support Areas:** See Ecological Support Areas.

**Ecological Corridor** (also known as ecological process areas or landscape corridors): Habitat, ecosystems or undeveloped areas that physically connect habitat patches. Small patches of surviving habitat can also serve as “stepping stones” that link fragmented ecosystems by ensuring that certain ecological processes (see below) are maintained within and between groups of habitat fragments.

**Ecological Drivers** are the natural activities or processes which contribute to the maintaining the ecosystem function, pattern or structure. Examples include natural fires, ocean currents, herbivory, quantity of inflow water etc.

**Ecological Process:** Natural operations which occur within ecosystems and maintain them as working systems. Ecosystems work because they are kept “alive” by ecological processes such as pollination, nutrient cycling, natural disturbance (e.g. fire, grazing), migration of species, and soil maintenance. Other examples of processes include plant-herbivore processes, lowland to upland gradients, predator-prey relationships, migration and exchange between inland and coastal systems (often along river corridors), seasonal migration of animals, and hydrological regimes.

**Ecological Reserve:** The ecological component of the Reserve refers to a particular water quality and quantity which is to remain in the river in order to ensure the sustainable healthy functioning of aquatic ecosystems before water users such as industry or agriculture should be permitted to abstract. Implementation of the Reserve would have a significant impact on the potential yields of existing and future schemes, with most estimates of the ecological component being provisional at this stage. Current provisional assessments indicate that, as a national average, about 20% of the total river flow is required as an ecological reserve which needs to remain in a river to maintain a healthy biophysical environment. DWA must determine the Reserve for all rivers in South Africa, as per the National Water Act.

**Ecological Support Area** (ESA): A supporting zone or area required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. They can be aquatic features, e.g. specific river reaches which feed into aquatic Critical Biodiversity Areas;

or terrestrial features, e.g. the riparian habitat surrounding and supporting aquatic Critical Biodiversity Areas. They are further subdivided into Critical Ecological Support Areas or Other Ecological Support Areas.

**Ecosystem:** The system of relationships and interactions between living components of biodiversity and the non-living environment (soil, water). An ecosystem can operate at any scale from very small (e.g. a small pond), to an extensive landscape (an entire mountain water catchment<sup>9</sup> area).

**Ecosystem Services:** The benefits that people get from nature (ecosystems), such as a regular supply of clean water, flood control, prevention of erosion, pollination (important to the fruit industry, for example), carbon storage (to counteract global warming), stone and sand for building, and clean air vital for our survival. In other words, ecosystem services is ‘what nature does for us’.

**Ecosystem Status:** This describes the condition of an area’s biodiversity relative to past, present and future threats, and is an indicator of the level of safeguarding required for the continued existence of the biodiversity occurring in that particular area. The ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving the majority of species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to the loss of species associated with that ecosystem. Four Ecosystem status classifications types exist, namely Critically Endangered, Endangered, Vulnerable and Least Threatened.

**Endemic** (vs. Indigenous): A plant or animal species, or a vegetation type, which is naturally restricted to a particular defined region. Endemism implies a level of restrictivity, i.e. found nowhere else but in that region. The term ‘endemic’ should however not be confused with the term ‘indigenous’. Indigenous implies that the plant or animal species, or a vegetation type is originally/naturally from that area. For example, if a plant occurs naturally only within South Africa, it implies that the plant is endemic to South Africa (restricted to here) as well as indigenous (naturally occurring here) to South Africa. If however a plant grows across the entire African continent, the plant will be indigenous to South Africa but not be endemic to South Africa.

**Environmental Management Plan** (EMP): The EMP provides specifications that the landowner shall adhere to in order to minimise adverse environmental impacts associated with a land-use activity, e.g. invasive alien plant management on land for conservation. In terms of proposed developments, an EMP can be defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced”. EMPs are therefore important tools for ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented through all phases of the project life-cycle.

**Fine-Scale Biodiversity Plans** are more accurate maps of biodiversity prepared at a scale of 1:5 000 – 1:50 000 (or finer) and which identify important areas for conservation and sustainable management. (See ‘systematic biodiversity plan’ below.)

**Fragmentation** (of habitat): The breaking up of a continuous habitat, ecosystem, or land-use type into smaller fragments.



**Function/functioning/functional:** Used here to describe natural systems working or operating in a healthy way (opposite to dysfunctional which means working poorly or in an unhealthy way).

**Fynbos Forum Ecosystem Guidelines:** A handbook that provides a set of guidelines prepared for several Western Cape ecosystem groups, e.g. Lowland Fynbos, Coastal Ecosystems. Its aim is to assist all stakeholders involved in land-use planning and environmental assessment with integrating biodiversity into these procedures. Available from the BGIS Unit on (021) 799-8738, or downloadable from [www.bgis.sanbi.org](http://www.bgis.sanbi.org).

**GIS, GIS layers and GIS shapefiles:** A GIS is a computer technology that combines geographic data (the location of man-made and natural features on the earth's surface) and other types of information (names, classifications, addresses and much more) to generate visual maps and reports. A GIS can play a major role in integrating information from a variety of databases to identify problems and explore solutions (Adapted from Looney 2000 *Beyond Maps – GIS and Decision-making in Local Government*). A GIS shapefile (or GIS layer) is an electronic picture of geographically mapped features (e.g. dams, roads, etc) which are used in a GIS.

**Groundwater** is the term for any water found subsurface in the saturated zone below the water table. (The water table marks the upper surface of the groundwater systems.)

**Habitat:** The natural home of a plant or animal species. Generally those features of an area inhabited by animal or plant which are essential to its survival. An example is the habitat of a frog in a specific wetland.

**Hotspot** (biodiversity hotspot): An area with high concentrations of different plant and animal species and whose survival is threatened by unwise human activities.

**Indigenous** (vs. Endemic): Naturally occurring or "native" to a broad area, such as South Africa. See 'endemic' above for distinction between the two terms.

**Intact/ecological integrity:** Used here to describe natural environment that is not badly damaged, and is still operating healthily.

**Invasive alien species:** Invasive alien species means any *non-indigenous* plant or animal species whose establishment and spread outside of its natural range threatens natural ecosystems, habitats or other species (or has the potential to threaten ecosystems, habitats or other species); and may result in economic or environmental harm, or harm to human health.

**Land cover:** Refers to the substance which covers the land, e.g. natural vegetation, roads, factory, or bare ground. In the context of this document, land cover gives an indication of the level of transformation of natural ecosystems and can range from natural through to irreversibly transformed. Land cover cannot always be equated to land-use, e.g. bare land can either be borrow pits (where the land-use is mining) or natural bare soil (where the land-use may be conservation).

**Land-use planning and decision-making** (LUPDM): Land-use planning and decision-making takes the form of both reactive decision-making and proactive planning. The former refers to decisions and recommendations made by authorities and professionals dealing with development applications (EIA and LUPO); while the latter refers to the compilation of forward planning documents and maps, such as SDFs, Strategic Environmental

Assessments etc. that guide land-use development. LUPDM is a multi-sectoral planning process.

**Mainstreaming biodiversity** means integrating biodiversity considerations into the policies, strategies and day-to-day operations of a range of sectors whose core business is not biodiversity conservation. Mainstreaming biodiversity is essential for overcoming the "conservation versus development" mindset, and for ensuring sustainable development.

**Multi-sectoral planning procedures** consider all available sector plans (biodiversity, agricultural, mining, economic, social etc.) in order to make informed decisions and promote sustainable development. IDPs and SDFs are examples of multi-sectoral planning tools.

**National List of Threatened Terrestrial Ecosystems:** A national list of threatened terrestrial ecosystems developed in terms of Section 52 of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004).

**Offsets:** See Biodiversity Offsets.

**Offset receiving areas:** See Biodiversity Offset Receiving Areas.

**Other Ecological Support Areas:** See Ecological Support Areas.

**Precautionary principle** as referred to in NEMA: In the face of uncertainty about the workings of ecosystems and the effects of human activities, we should always err on the side of caution. Incomplete or inadequate data are generally the norm in conservation and resource management activities; however, the lack of data should not be used to justify a delay in taking conservation actions.

**Pristine:** Unspoiled- used here to describe the natural environment in its undisturbed state.

**Protected Areas:** These are formally Protected Areas declared in terms of the National Environmental Management: Protected Areas Act.

**Ramsar Convention and List:** Known as the 'Convention on Wetlands of International Importance', where certain wetlands have been listed and have acquired a new status at the national level and are recognised by the international community as being of significant value not only for the country, but for humanity as a whole (See [www.ramsar.org](http://www.ramsar.org)).

**Red Data species:** All known plant or animal species have been assessed and classified according to their potential for extinction in the near future. This categorization is listed in the Red Data Book as Extinct, Critically Endangered, Endangered, Vulnerable or Least Concern. The terms Red Data species or Red data listed species are however colloquially used to refer to species which are either Extinct, Critically Endangered, Endangered or Vulnerable. These species are protected by law under provincial ordinances, the NEMA, and the Biodiversity Act.

**Rehabilitate/rehabilitation** (also see restore): Meaning (roughly) restoration, especially after mining activities or quarrying, but where the natural environment is not repaired to its original pristine state. Rehabilitation emphasises the need for the reparation of ecosystem processes, productivity and services.

**Restore/restoration** (also see rehabilitate): The process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed, and which involves the repair of the natural environment to a state close to its original state. For example, this can be achieved through the removal of alien invasive plants, or the repair of eroded sites and the replanting of indigenous plants. Restoration involves, not only the reparation of ecosystem processes, productivity and



services, but also the re-establishment of species composition and community structure.

**River Reach:** A stretch of a river or tributary to a river. Need not be the entire length of a river.

**Spatial Planning Categories** are delineated in the landscape into Core 1, Core 2, Buffer 1 and Buffer 2, as per the Western Cape Provincial SDF (2005). They represent the level of importance of biodiversity attached thereto and include land-use recommendations based on the principles of bioregional planning (see above). They are intended to manage activities in the four main physiographic components of the Western Cape.

**Species:** Any living organism e.g. plant, animal, insect, bird etc., of a particular kind and name.

**Species of Special Concern** in this handbook refer to threatened species (see above), endemic, scarce and nationally protected species. Species of Special Concern are also referred to as Species of Conservation Concern.

**Sustainable Development:** Development that meets the needs of both present and future development, equitably. In terms of the NEMA, "(sustainable) development is the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations."

**Sustainable Human Settlements:** Integrated and sustainable human settlements redress the legacy of racial and social divisions, combat urban sprawl, ensure centrality for the poor and create empowered communities through social capital formation (PSDF, 2005). They promote sustainable development through encouraging nodal development and the protection of nature's ecosystem services.

**Systematic biodiversity plan** (also known as a systematic conservation plan): A map which indicates priority areas for conservation and sustainable management to ensure the continued existence of biodiversity. Systematic biodiversity planning is an approach to conservation that prioritises actions by setting quantitative thresholds for biodiversity features (e.g. vegetation types). It is premised on conserving a representative sample of biodiversity pattern, including species and habitats (the principle of representation), as well as the ecological and evolutionary processes that maintain biodiversity over time (the principle of persistence). The configuration of priority areas identified in the plan is designed to be spatially efficient (i.e. to meet biodiversity thresholds as efficiently as possible in terms of the amount of land required) and

where possible to avoid conflict with other land-uses where these are known to exist (principles of efficiency and conflict avoidance). It recognises that the whole landscape must be planned and managed strategically to ensure sustainable development.

**Thresholds** See 'biodiversity threshold' above.

**Transformation** (i.e. habitat loss): Clearing an area of its indigenous vegetation. These transformed parts of the landscape no longer contain indigenous habitat. In many areas, this has led to the breakdown of natural ecological processes.

**Urban Edge:** An urban edge is 'a defined line drawn around an urban node as a growth boundary, i.e. the outer limit of urban areas'. It is intended to protect the rural environment from urban sprawl and to encourage efficient settlement patterns. Refer to the DEADP Guideline Document 'Urban Edge Guidelines in the Western Cape'.

**Vegetation:** The collective term for plants in an area. Often referred to as "bush" or "veld".

**Water Management Area:** South Africa is divided into a number of Water Management Areas (WMAs), according to the National Water Act (Act No. 36 of 1998). A WMA is an area established as a management unit under the national water resource strategy within which a catchment management agency will conduct the protection, use, development, conservation, management and control of water resources.

**Zoning and Zoning Schemes:** The general purpose of zoning is to determine use rights, manage urban growth, develop and utilise land, as well as to conserve the natural and cultural environment.

**Box 16: Hopefield:** The acid sands of marine origins and the Malmesbury shales of the Swartland meet at Hopefield. Here, the interplay of soil types and water permeability of these substrates as well as the climatic influence of the nearby Atlantic Ocean leads to unique habitats and many seasonal wetlands. Thus the area has many interesting endemic and threatened plant taxa and it is no surprise that Hopefield is now renowned for its annual flower show which is run by a passionate and knowledgeable group of local volunteers.

Hopefield area with *Leucadendron bruniodes* var *flumenlupinum* in the foreground



Rupert Koopman

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