

**Eastern Cape Biodiversity Conservation Plan
Handbook**

Eastern Cape Biodiversity Conservation Plan Handbook

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The Eastern Cape Biodiversity Conservation Plan (ECBCP) is available in two versions: on posters (wall maps) and electronically. Posters showing the ECBCP are available for each District Municipality and for the whole Province. An electronic version of the ECBCP and the associated decision support system is contained on the CD (a copy of which is included in this handbook). A web-enabled version of the ECBCP is available from the website <http://www.ecoplanner.co.za>¹.

This Handbook contains a short description of how the ECBCP biodiversity priorities were identified, an explanation of the land use guidelines in the ECBCP, and user-friendly guidelines for using the electronic decision support system of the ECBCP. More information is available from the ECBCP Technical Report (Berliner, D. & Desmet, P. 2007).

Please note that the boundaries of the Province and of the Alfred Nzo District Municipality shown on the ECBCP maps may have changed since this document went to press.

Readers of this book are encouraged to consult the STEP Handbook (Pierce, S.M. and Mader, A.D. 2006), which contains complementary information, especially for municipalities, on understanding and managing for environmental sustainability, tools and legislation for environmentally sustainable planning and management, and land reform and the natural environment.

Disclaimer:

While every endeavour has been made to ensure the accuracy of the ECBCP, the authors and designers hold no responsibility for any inaccuracies, injuries or financial loss that may result therefrom.

¹ Please note that the website address of the ECBCP may change. If this occurs, please consult DEDEA or DWAF (contact details at the back of this Handbook) for further information.

Preface

The Eastern Cape is globally recognised for its high biodiversity value and scenic beauty. It has the highest biome diversity of any province, with no less than seven biomes: Forest, Fynbos, Nama Karoo, Savanna, Succulent Karoo and Thicket. The Province is also unique among provinces in that it overlaps with three centers of biological endemism: the Albany Centre, the Drakensberg Centre and the Pondoland Centre (Fig. 1).

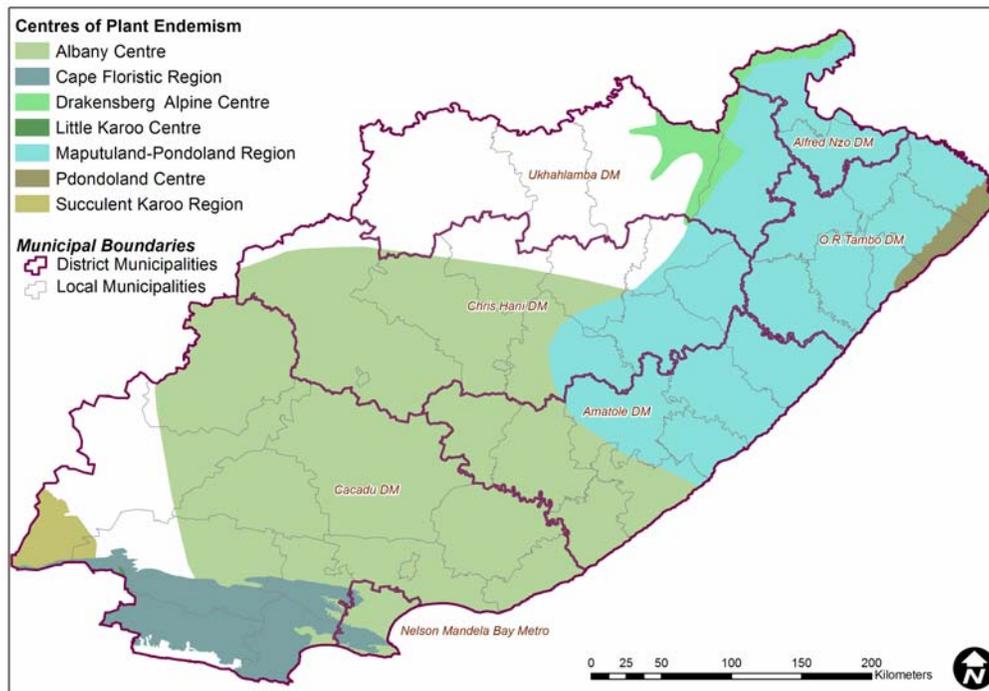
At the same time, it has some of the highest levels of rural poverty in the country, with low employment rates, rural poverty and underdevelopment. The Province is currently facing unprecedented pressure from unplanned development, urban and agricultural expansion, mining, illegal holiday cottages, and over-harvesting of natural resources. All of these pressures have the potential to rapidly erode the natural resource base.

There is thus an obligation for government on the one hand to promote rural development poverty alleviation and service delivery, and on the other hand to ensure that the rich natural capital of the Province is sustainably used and conserved such that both current and future generations may benefit.

Recognising the need to ensure that these important natural resources are conserved, the Department of Economic Development and Environment Affairs (DEDEA) together with the Department of Water Affairs and Forestry (DWAF) have collaborated to draw up the Eastern Cape Biodiversity Conservation Plan (ECBCP). Funding for this project was generously provided by the Development Bank of Southern Africa (DBSA), DWAF and the Eastern Cape Parks Board.

The ECBCP addresses the urgent need to identify and map critical biodiversity areas and priorities for conservation in the Province. It also provides land use planning guidelines, recommending biodiversity-friendly activities in priority areas. The ECBCP is intended for use by technical users and decision-makers in the spheres of planning, development and environment. Mapped information can be used both reactively and strategically to guide future development away from sensitive and priority biodiversity areas.

Figure 1: Centres and region of plant endemism occurring within the Eastern Cape (after Van Wyk & Smith, 2001)



Box 1: Why conserve biodiversity?

Biodiversity provides us with clean water, air and soil, as well as medicinal plants, fuelwood, food products (from fishing, hunting and veldkos), building materials and grazing. Plant roots stabilise the soil and prevent erosion. All of these are vitally important for human wellbeing. Biodiversity also contributes significantly to rural livelihoods. The scenic beauty of the Province provides valuable products for the tourism and wildlife industry, with potential to generate considerable economic revenue from nature reserves, game farms and hunting lodges. At the global scale, we depend on nature, particularly forests, to absorb the carbon dioxide that we generate, and to regulate the climate. All of these resources depend directly on biodiversity.

For more on conserving biodiversity, see the STEP handbook (second edition).

Important note

All technical terms used are explained in the Glossary at the end of this Handbook. Please note that in this report, the word “*transformation*” refers to the process where natural vegetation is replaced with cultivation, urban development, plantations etc, and biodiversity and ecological processes are thus irreversibly destroyed.

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Introduction

This Handbook provides information on the ECBCP and contains guidelines on how to use it.

Although a number of landscape-scale conservation planning projects had been undertaken in the Eastern Cape prior to the ECBCP², there were large areas of the Province that were excluded. In addition, much of the information in these plans was not readily available to land use planners and decision-makers.

To address these needs, as well as to provide a basis for future bioregional plans, the ECBCP has been developed. Its aim is to integrate information from existing biodiversity plans and to fill in the gaps, thereby providing a single, user friendly, biodiversity land use decision support tool for the whole Province.

Chapter 1 provides a brief explanation of Critical Biodiversity Areas and how they were identified. It also explains the relationship between the ECBCP and Bioregional Plans.

Chapter 2 sets out the ECBCP land use guidelines and explains how to apply them.

Chapters 3 and 4 contain instructions and guidelines for using the electronic decision support system of the ECBCP.

Box 2: What is a Biodiversity Conservation Plan?

Some areas have higher levels of biodiversity than others. These 'higher levels' may include larger numbers of species or ecosystems, large numbers of threatened species, or ecological processes that are crucial for the long-term persistence of biodiversity. A spatial biodiversity conservation plan takes this variability into account by collating and mapping information about:

- Biodiversity features (species, ecosystems, ecological processes);
- Existing protected areas;
- Current patterns of land use;
- 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.

Spatial planning can occur at a variety of scales. The National Spatial Biodiversity Assessment (NSBA) (Driver, et al, 2005) was done at a broad scale and does not yield information suitable for site-scale land use decisions for a municipality or for a specific river or catchment. The finer scale ECBCP is suitable for use at municipal level, because the underlying data on biodiversity features in the Province were recorded and mapped at a finer scale than the national data used in the NSBA. However, the ECBCP data is still fairly coarse, and when assessing a development application it is essential to verify the information on the ECBCP map(s) with a site visit.

Source: Ferrar, and Lötter, 2007.

² These include the STEP, the NSBA, DWAF Forest Conservation Planning, Wild Coast Conservation Plan, Pondoland Systematic Conservation Plan, the planning phases of C.A.P.E, SKEP and the Grasslands Programmes and the Maloti Drakensberg Transfrontier project.

Chapter 1: Identifying Critical Biodiversity Areas in the Eastern Cape

Philip Desmet, Derek Berliner and Amanda Younge Hayes

1.1 What are Critical Biodiversity Areas?

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning.

1.2 Why identify Critical Biodiversity Areas?

In terms of the Biodiversity Act (Act 10 of 2004), the Minister or the MEC for environmental affairs in a province may determine a geographic region as a bioregion for the purposes of the Act and publish a plan for the management of biodiversity in that region. This plan is termed a 'bioregional plan', and must contain "measures for the effective management of biodiversity" in the region.

A bioregional plan must contain a map of CBAs, including terrestrial and aquatic features and ecological corridors. The map must show four main categories:

- Existing protected areas
- Critical biodiversity areas (for example, threatened ecosystems, ecological corridors; special habitats, wetlands and priority sub-catchments)
- Other natural habitat
- Areas where no natural habitat remains.

A bioregional plan must contain, amongst other things, guidelines for land-use planning and decision-making, linked to the features and categories on the map.

1.3 How were CBAs identified in the ECBCP?

The ECBCP developed two maps, one showing terrestrial (land-based) CBAs (see Fig. 2), and the other showing aquatic (freshwater) CBAs (Fig. 3).

The map of terrestrial CBAs was compiled by undertaking a systematic biodiversity planning analysis (see Box 3) and adding all biodiversity priority areas identified by other systematic biodiversity planning projects (such as STEP) in the Province.

Aquatic CBAs were identified on the basis of sub-quatarnary catchments, addressing the linkages between catchments, important rivers and sensitive estuaries. Priorities were identified through a systematic conservation planning analysis.

Table 1 shows how the various biodiversity features were used to define terrestrial and aquatic CBAs. For a more detailed explanation, please consult the ECBCP Technical Report.

Figure 2: Map of Terrestrial Critical Biodiversity Areas

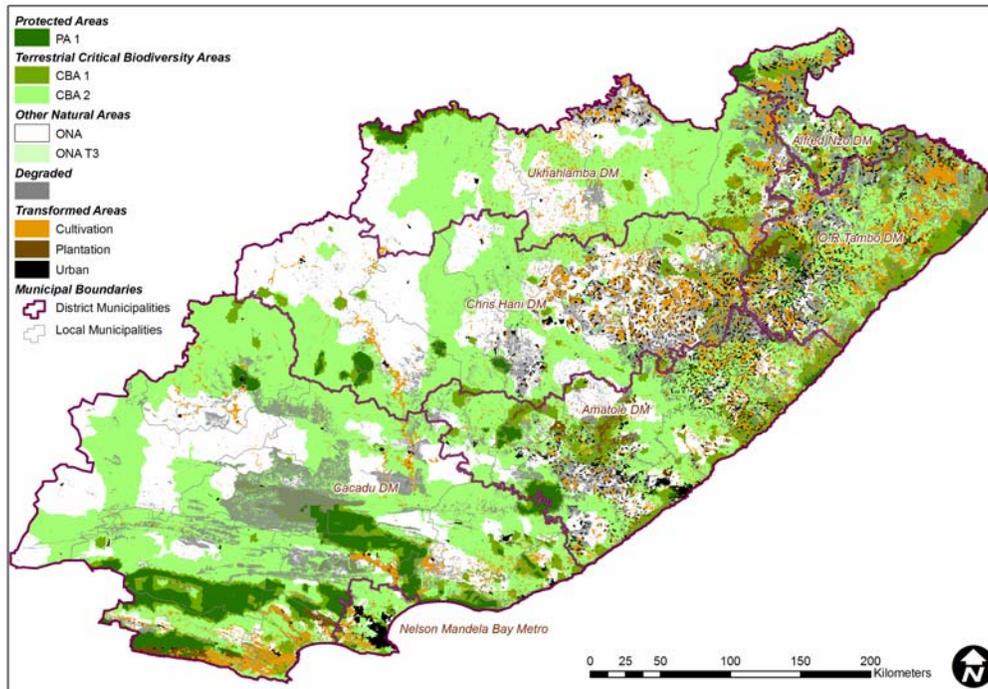
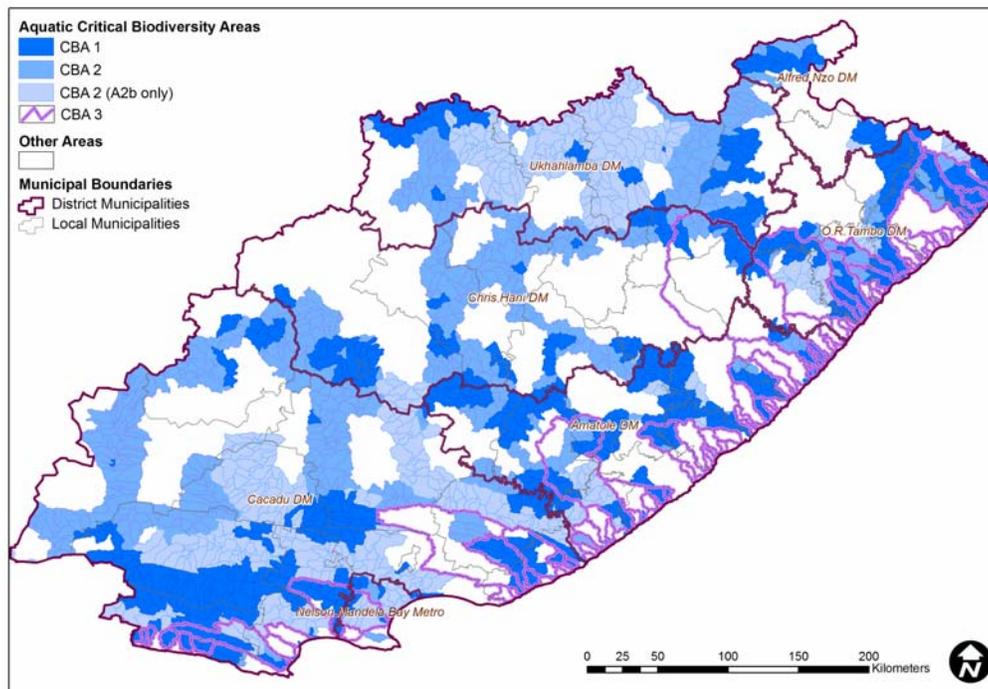


Figure 3: Map of Aquatic Critical Biodiversity Areas



Box 3: What is Systematic Biodiversity Planning?

The process of identifying spatial biodiversity priorities in the ECBCP is based on the systematic biodiversity planning approach of Margules and Pressey (2000), also referred to as systematic conservation planning. The underlying principle is to identify representative samples of biodiversity that are located where they can persist over the long term. A target must be set for each biodiversity feature, so that it is clear how much biodiversity needs to be protected. This target tells us how much of the feature needs to be maintained or conserved in order for it to persist and contribute to ecosystem functioning.

Steps in Systematic Biodiversity Planning

(Margules & Pressey 2000)

Systematic biodiversity planning involves a sequence of procedures:

1. Select and collate the biodiversity features and surrogates to be used in the planning area.
2. Formulate explicit conservation goals that can be expressed as quantifiable biodiversity targets.
3. Review the extent to which goals have been met in existing protected areas.
4. Use systematic methods to identify additional areas that should be protected or conserved in order to meet the remainder of the biodiversity targets (that are not currently protected).
5. Identify, prioritise and implement conservation actions on the ground.
6. Manage and monitor (adaptive management) to maintain biodiversity features.

Systematic biodiversity planning is currently at a more advanced stage for terrestrial than for aquatic ecosystems. As a result, such plans are usually done separately.

Main source: Ferrar, and Lötter, 2007.

Table 1: Criteria used to map CBAs and other categories in the ECBCP

Category	Code	Features used to define categories
Protected Areas:		
Protected area 1	PA1	Statutory protected areas. They include all national parks and provincial nature reserves.
Protected area 2	PA2	Non-statutory protected areas: municipal and private conservation areas.
Terrestrial Critical Biodiversity Areas:		
Terrestrial CBA 1	T1	Critically endangered vegetation types (ecosystems) identified through ECBCP the systematic conservation assessment
		Critically endangered vegetations types from STEP
		Critically endangered forest patches in terms of the National Forest Assessment
		Areas essential for meeting biodiversity targets for biodiversity features (SA vegetation types, expert mapped priority areas)
		KZN systematic conservation planning priorities
		Forest clusters identified as critical in the forestry planning process (Berliner et al 2006)
Terrestrial CBA 2	T2	Endangered vegetation types identified through the ECBCP systematic conservation assessment
		Endangered vegetations types from STEP
		Endangered forest patches in terms of the National Forest Assessment
		All expert-mapped areas less than 25 000ha in size (includes expert data from this project, STEP birds, SKEP, Wild Coast, Pondoland and marine studies)
		All other forest clusters (includes 500m buffers)
		1km coastal buffer strip
	C1	Ecological corridors identified in other studies (e.g. from STEP, Wild Coast, Pondoland, WMA 12 SEA, etc.) and corridors mapped by experts
	C2	Ecological corridors identified by the ECBCP using an integrated corridor design for the whole Province
Aquatic Critical Biodiversity Areas:		
Aquatic CBA 1	A1	Critically important river sub-catchments, and all wetlands
	E1	Critically important estuaries
Aquatic CBA 2	A2a	Important sub-catchments
	A2b	Free-flowing rivers important for fish migration
	E2	Important estuaries
Aquatic CBA 3	A3a	Hydrological primary catchment management areas for E1 estuaries
	A3b	Hydrological primary catchment management areas for E2 estuaries

Category	Code	Features used to define categories
Other Map Categories:		
Other Natural Areas	ONA T3	Vulnerable vegetation types identified through the ECBCP systematic conservation assessment
		Vulnerable vegetation types from STEP
	ONA	All remaining natural areas not included in the above CBA categories
Transformed land	TF	Urban and rural settlements, cultivated lands and plantations

Note: Degradation appears as an overlay in the terrestrial CBA maps.

Box 4: How was the ECBCP developed?

The approach used to develop the ECBCP is known as systematic conservation planning or systematic biodiversity planning. This approach relies both on data and the wisdom of experts. (See Box 3: What Is Systematic Biodiversity Planning?)

The approach used to develop the ECBCP can be summarised as follows:

- a) Aquatic and terrestrial data available for the Province were assembled and integrated;
- b) A land cover map for the Province was produced;
- c) Planning units were identified for terrestrial, freshwater and estuarine areas;
- d) Experts assisted with mapping special biodiversity features such as known locations of rare and endangered species and ecological corridors;
- e) An assessment of land use pressures was undertaken, combining a number of factors such as agricultural potential, development pressure, ecological integrity etc;
- f) Priority areas that were identified by other sub provincial conservation planning projects in the Province were included;
- g) Systematic conservation planning software was used to identify terrestrial and aquatic areas that are critical for conserving biodiversity and maintaining ecosystem functioning. These areas are termed Critical Biodiversity Areas (CBAs). The process included identifying landscape corridors linking biodiversity priority areas through a Province-wide network;
- h) CBAs were grouped into Biodiversity Land Management Classes and objectives formulated for each class.

The products included in the ECBCP are:

- A map of CBAs (terrestrial and aquatic) for the Province, including explicit provincial ecological corridors (as well as associated GIS layers)
- A land cover map for the Province
- A map of existing protected areas
- A degradation and land transformation map
- A human population density map
- An ecosystem status map

- A map of subsistence resource use pressure
- A map of land use pressures
- Special biodiversity features as mapped by experts
- Rare and threatened species maps
- A description of regionally important ecological processes
- Priority water catchments and ecosystem service areas
- Maps of terrestrial and aquatic Biodiversity Land Management Classes (BLMC)
- Land use planning and decision-making guidelines linked to BLMCs.

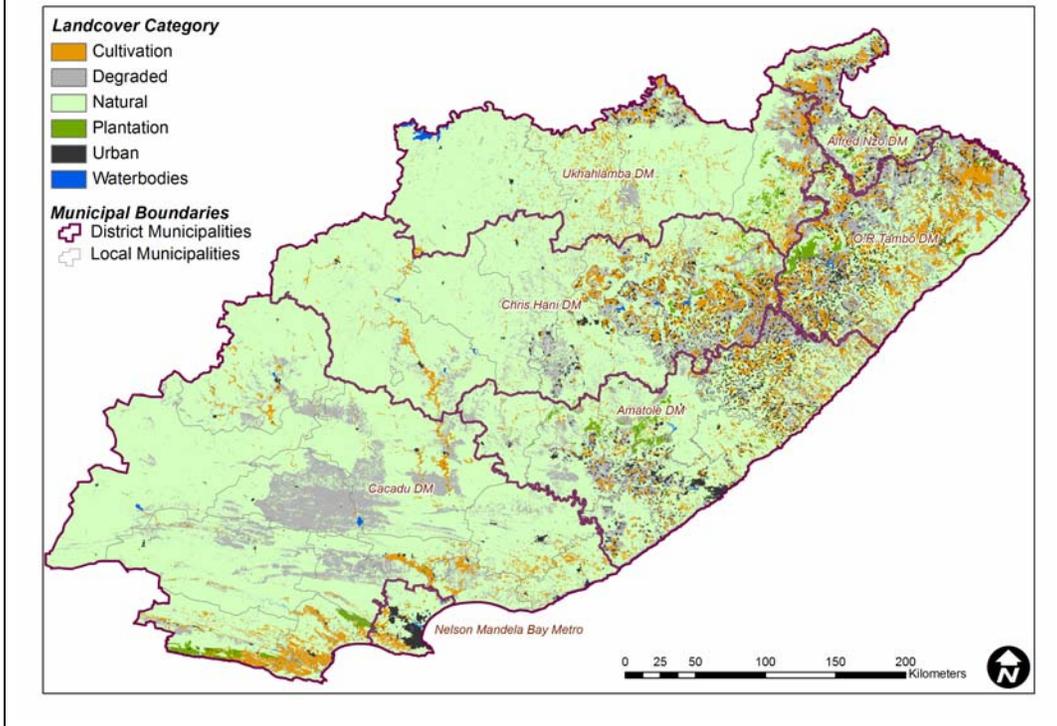
This information and analysis is integrated into the ECBCP decision support system, (see Chapters 3 and 4). For more information, see the ECBCP Technical Report (Berliner, D. & Desmet, P. 2007).

Box 5: Eastern Cape Land Cover

A land cover map describes the land surface, showing urban areas, cultivated areas, plantations, natural areas etc.

The Provincial land cover map drawn up for the ECBCP integrates all available land cover products for the Province into a single product (Fig. 4)

Figure 4: Eastern Cape Land Cover



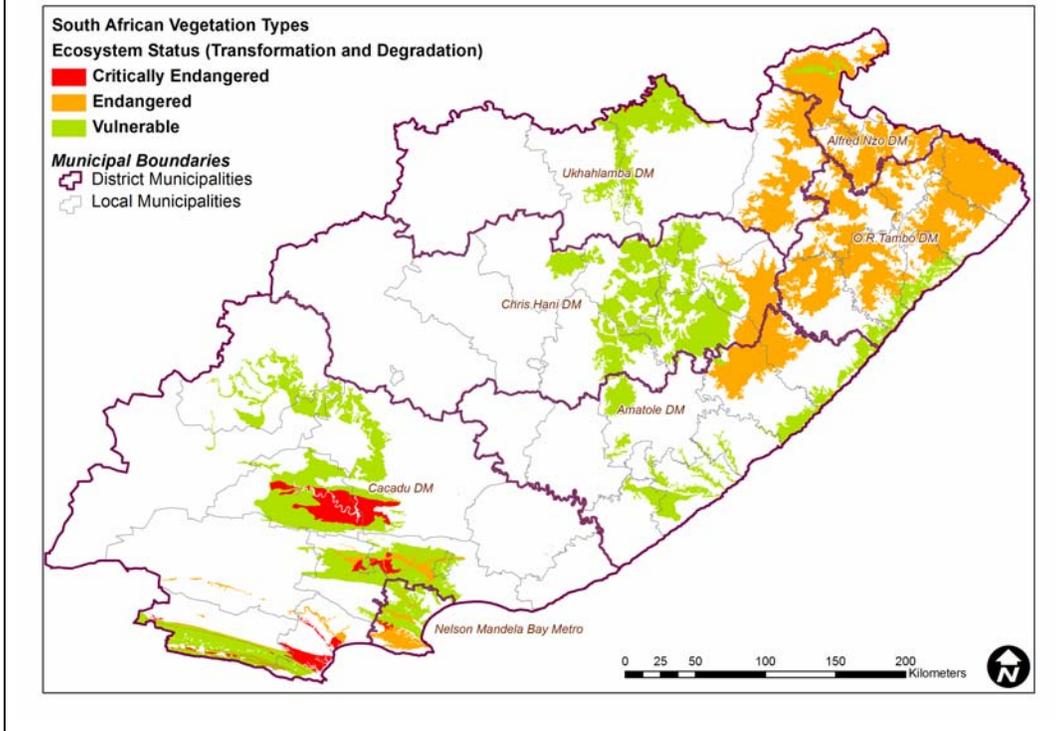
Box 6: Ecosystem Status

The ECBCP identified ecosystems in the Province that are critically endangered, endangered and vulnerable, based on the extent to which ecosystems have been transformed or degraded. These are shown in Fig. 5.

Section 52 of the Biodiversity Act provides for the listing of threatened ecosystems at both national and provincial level. Ecosystem status refers to the likelihood of an ecosystem persisting. Ecosystems that are Critically Endangered, Endangered or Vulnerable can be listed in terms of the Biodiversity Act. For example, Critically Endangered ecosystems are defined in the act as being “ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation”.

Importantly, any land-use change application occurring within an ecosystem listed as Critically Endangered or Endangered in terms of the Biodiversity Act will automatically require environmental authorisation in terms of the NEMA EIA regulations.

Figure 5: Ecosystem Status



1.4 How should the ECBCP be used in land use planning?

The ECBCP is a broad-scale biodiversity plan. It integrates other existing broad-scale biodiversity plans in the Province, and fills in the gaps using mainly national data. (The ECBCP did not generate additional fine-scale data.)

The ECBCP has no legal status. However, it has been designed to serve as the basic biodiversity layer in Strategic Environmental Assessments, State of Environment Reports, SDFs, EMFs and Bioregional Plans. It conforms to the requirements of the *Draft Guideline regarding the Determination of Bioregions and the Preparation and Publication of Bioregional Plans* (DEAT and SANBI 2007), as it contains maps of terrestrial and aquatic CBAs, as well as suggested land use guidelines.

The ECBCP maps of CBAs will also be useful in determining which areas of the province most urgently require fine-scale biodiversity planning.

According to the *Draft Guideline*, local and district municipalities should integrate critical biodiversity areas in the relevant bioregional plan into their Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs), and should also integrate critical biodiversity areas and other relevant guidelines and recommendations from the bioregional plan into Environmental Management Frameworks (EMFs) and zoning schemes.

In addition:

- The integrated map of planning zones or categories in the SDF should reflect the critical biodiversity areas in an appropriately restrictive planning zone or category.
- The map and guidelines should be meaningfully incorporated in any EMFs developed for the area, as well as in any provincial maps developed to supplement the NEMA EIA regulations.
- The map and guidelines should be referred in all EIAs and should be consulted in the decision-making process for all land-use authorisations.

1.5 Is the ECBCP a bioregional plan?

The ECBCP itself is not a Bioregional Plan. However, because it identifies CBAs and provides land use guidelines, it will be a key input to future bioregional plans in the Province.

For more information on bioregional plans, consult the *Draft Guideline* (DEAT and SANBI, 2007).

Chapter 2: Land Use Guidelines

Derek Berliner, Philip Desmet and Amanda Younge Hayes

This chapter sets out guidelines on how to use and apply the ECBCP in land use decision-making so as to avoid or minimize negative impacts in CBAs and important water catchments in the Province.³ Because the vast majority of CBAs fall outside the protected area network in the Province, the ECBCP provides guidelines for land use planning and decision-making across the whole Province. These guidelines recommend appropriate land uses and suggest limits on the extent of development in CBAs. These guidelines can be used both in assessing applications and developing forward plans (e.g. Spatial Development Frameworks).

2.1 Land use planning principles

The ECBCP land use guidelines are based on ten principles, described in Box 7.

Box 7: Ten principles of land use planning for biodiversity persistence

1. Avoid land use that results in vegetation loss in critical biodiversity areas.
2. Maintain large intact natural patches – try to minimize habitat fragmentation in critical biodiversity areas
3. Maintain landscape connections (ecological corridors) that connect critical biodiversity areas.
4. Maintain ecological processes at all scales, and avoid or compensate for any effects of land uses on ecological processes.
5. Plan for long-term change and unexpected events, in particular those predicted for global climate change.
6. Plan for cumulative impacts and knock-on effects.
7. Minimize the introduction and spread of non-native species.
8. Minimize land use types that reduce ecological resilience (ability to adapt to change), particularly at the level of water catchments.
9. Implement land use and land management practices that are compatible with the natural potential of the area
10. Balance opportunity for human and economic development with the requirements for biodiversity persistence.

³ Note that the guidelines provided here only apply to biodiversity and ecosystem concerns, and do not address infrastructural, social, economic and other factors that may need to be taken into account in making a land use decision. These guidelines do not replace the need for EIAs, which would still be triggered in terms of the law.

2.2 Biodiversity Land Management Classes

For successful implementation of the ECBCP, the CBAs need to be incorporated at all levels of spatial development planning (e.g. Spatial Development Frameworks, Integrated Development Plans and Environmental Management Frameworks), as well as in any provincial maps developed to supplement the NEMA EIA regulations. Bioregional Plans are based on identifying CBAs and associated land use guidelines.

To facilitate the use of the ECBCP information, a land management objectives-based approach has been adopted. This approach rests on the concept of Biodiversity Land Management Classes (BLMCs). Each BLMC sets out the desired ecological state that an area should be kept in to ensure biodiversity persistence⁴. For example, BLMC 1 refers to areas which are critical for biodiversity persistence and ecosystem functioning, and which should be kept in as natural a condition as possible.

The ECBCP has developed four terrestrial Biodiversity Land Management Classes (BLMCs), which result from grouping the various terrestrial CBAs, and two aquatic BLMCs (ABLMCs), which result from grouping the various aquatic CBAs. This grouping is set out in Table 2.

Terrestrial BLMCs set out the desired ecological state of a parcel of land. Only land use types that are compatible with maintaining this desired state should be allowed. Aquatic BLMCs set out suggested catchment transformation thresholds. These are a set of recommended permissible upper limits to the loss of natural vegetation cover in each sub-quaternary catchment.

⁴ BLMCs can be applied at the scale of habitat patch, landscape or catchment.

⁶ Variations in local environmental conditions and the kinds of activities associated with the land use in question will influence how severely biodiversity is affected by each land use.

Table 2. How do BLMCs relate to CBAs?

CBA map category	Code	BLMC	
<i>Terrestrial CBAs and BLMCs:</i>			
Protected Areas	PA1	BLMC 1	Natural landscapes
	PA2		
Terrestrial CBA 1 (not degraded)	T1		
Terrestrial CBA 1 (degraded)	T1	BLMC 2	Near-natural landscapes
Terrestrial CBA 2	T2		
	C1		
	C2		
Other Natural Areas	ONA T3	BLMC 3	Functional landscapes
	ONA		
Transformed Areas	TF	BLMC 4	Transformed landscapes
<i>Aquatic CBAs and BLMCs:</i>			
Aquatic CBA 1	A1	ABLMC 1	Natural state
	E1		
	A3a		
Aquatic CBA 2	A2a	ABLMC 2a	Near natural state
	E2		
Aquatic CBA 3	A3b		
Aquatic CBA 2	A2b	ABLMC 2b	Near natural state

The process of identifying CBAs avoided degraded areas wherever possible. However, this was not always possible, as some biodiversity features had little or no intact biodiversity left. In these cases, important remaining (degraded) areas that would have the potential to regain a CBA1 status through rehabilitation were identified as CBA 1. However, in classifying them as BLMCs, these degraded CBA1 areas were assigned a BLMC 2 classification.

The ECBCP allocates the whole landscape of the Eastern Cape into BLMCs, based on how biodiversity should be managed there – i.e. in accordance with its CBA status. Fig. 6 shows the terrestrial BLMCs, while Fig 7 shows aquatic BLMCs for the Province.

Figure 6: Eastern Cape Terrestrial BLMCs

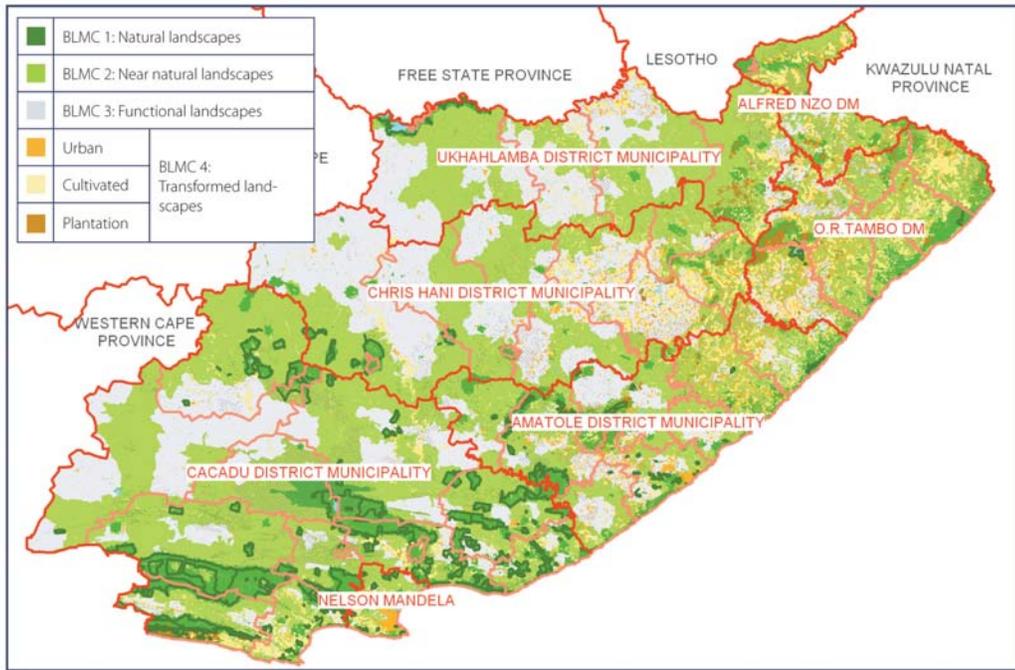
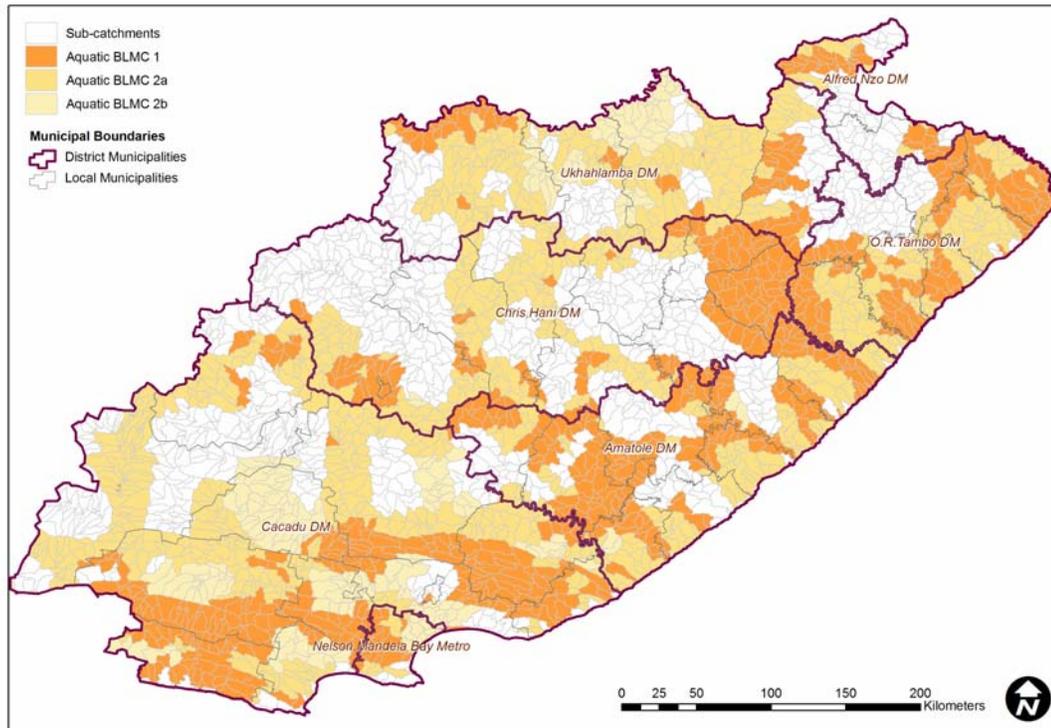


Figure 7: Eastern Cape Aquatic BLMCs



The ECBCP sets management objectives and broad land use guidelines for each terrestrial BLMC, and catchment transformation thresholds for each ABLMC.

2.3 Land use objectives for Terrestrial BLMCs

A decision to approve a land use change should be guided by the objective of the BLMC for that land. In the same way, forward planning in an area should also be guided by the objectives of the BLMCs for that area.

Table 3 sets out the Terrestrial BLMCs and the recommended land use objective for each class.

Table 3: Terrestrial BLMCs and Land Use Objectives

BLMC	Recommended land use objective
BLMC 1: Natural landscapes	Maintain biodiversity in as natural state as possible. Manage for no biodiversity loss.
BLMC 2: Near natural landscapes	Maintain biodiversity in near natural state with minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted.
BLMC 3: Functional landscapes	Manage for sustainable development, keeping natural habitat intact in wetlands (including wetland buffers) and riparian zones. Environmental authorisations should support ecosystem integrity.
BLMC 4: Transformed landscapes	Manage for sustainable development.

Box 8: Why preserve natural ecological corridors?

Natural ecological corridors such as rivers and mountains sustain the natural landscape by providing pathways for species to travel between different areas, and by protecting water catchments. Ecological corridors are a crucial part of the ecological infrastructure of the Province, and are as important as the built infrastructure of roads, highways, ports and so on. These natural corridors are often best suited for grazing, and only small portions should be ploughed or developed for settlement.

For more information on corridors, see the STEP handbook (second edition)

2.3.1 Which land uses should be allowed in each BLMC?

Some land use types have a much greater negative impact on biodiversity than others. For instance, timber plantations and urban settlement are much more damaging to biodiversity than livestock and low-impact tourism activities⁶.

To further guide land use decision-making, the ECBCP recommends permissible land use types for each terrestrial BLMC (see Table 4), based on the impact of these land uses on biodiversity. It should be noted that this list does not include every possible form of land use. Even within a land use type, there are variations in the intensity and impact on biodiversity, and these too cannot be included here. These guidelines are not able to provide this level of detail, but instead provide a broad framework to assess proposals for land use change.

Table 4 also calls attention to land use changes that require environmental authorization (e.g. an EIA). These are listed as “conditional”.

Table 4: Recommended Permissible Land Uses for Terrestrial BLMCs

Abbreviations: No = not recommended; Yes = recommended; Conditional = Approval conditional on environmental authorisation.

Land use	Biodiversity Land Management Class			
	BLMC 1	BLMC 2	BLMC 3	BLMC 4
Conservation	Yes	Yes	Yes	Yes
Game farming	No	Yes	Yes	Yes
Communal livestock	No	Yes	Yes	Yes
Commercial livestock ranching	No	No	Yes	Yes
Dry land cropping	No	No	Conditional	Yes
Irrigated cropping	No	No	Conditional	Yes
Dairy farming	No	No	Conditional	Yes
Timber	No	No	Conditional	Yes
Settlement	No	No	Conditional	Yes

Box 9: Restoration and rehabilitation of biodiversity

Ecological restoration and rehabilitation is difficult to achieve and can be expensive, depending on the ecosystem and vegetation type involved. However, if funding is available, it would make sense to focus restoration and rehabilitation efforts especially on CBA 1 areas that have been identified as degraded. (Degraded areas are shown as a hatched overlay in the MapInfo version of the EBCP.)

To provide a finer level of detail, the ECBCP suggests acceptable, unacceptable and conditional forms of land use for each BLMC, and hence for each of the CBAs linked to that BLMC. These are shown in Table 5.

Table 5: Recommended Permissible Land Uses for Terrestrial CBAs and BLMCs

Abbreviations Yes = permitted, No = not permitted, Conditional = Approval conditional on environmental authorization.

CBA Map Category	Protected Areas		Critical Biodiversity Area 1	Critical Biodiversity Area 2	Other Natural Areas	Areas with No Natural Habitat
	PA1	PA2	T1	T2, C1, C2	ONA & ONA T3	TF
BLMC	1	1	1	2	3	4
Conservation	Yes	Yes	Yes	Yes	Yes	Yes
Game farming	No	Conditional	Conditional	Yes	Yes	Yes
Communal livestock	No	No	No	Yes	Yes	Yes
Commercial livestock	No	No	No	No	Yes	Yes
Dry land cropping	No	No	No	No	Conditional	Yes
Irrigated cropping	No	No	No	No	Conditional	Yes
Dairy farming	No	No	No	No	Conditional	Yes
Timber	No	No	No	No	Conditional	Yes
Settlement	No	No	No	No	Conditional	Yes

Box 10: A cautionary note!

Always verify the information with a site visit: The ECBCP is based on the best available data and methods, but it is not a fine-scale plan. In addition, the data is not always 100% accurate. This means that when a development application is assessed, or when a forward plan is developed, it is crucially important to conduct site visits to check the information on the ground.

The ECBCP is not a substitute for a full evaluation: These guidelines will help with identifying appropriate land uses for each BLMC. However, land use decision-making for biodiversity conservation is complex and involves many variables that cannot be fully represented within a simple matrix. There is still a need to assess each application and proposed land use type fully against appropriate objectives and criteria.

By way of example, consider the case of game farming within a critical biodiversity area designated as an ecological corridor. Although game farms are generally considered to be a relatively biodiversity friendly form of land use, they must by law be fenced. These fences restrict animal movement, and can compromise the functionality of the ecological corridor, resulting in a conflict with biodiversity persistence objectives. Any application for game farming in a terrestrial BLMC 2 area should still be reviewed thoroughly to assess any likely negative impacts.

The ECBCP should not be used for urban and fine-scale planning: The ECBCP provides a broad framework to assess proposals for land use change and to develop forward plans and fine scale plans. The information it contains is not at a scale suitable for fine scale planning and urban planning.

2.4 Guidelines for aquatic ecosystems

2.4.1 Limiting transformation in CBA catchments

Land-use planning needs to take into account the linkages between catchments, important rivers and sensitive estuaries. Ad hoc land transformation can result in fragmented landscapes and loss of ecosystem connectivity. When landscapes are transformed beyond certain critical thresholds, ecological processes such as fire and the water cycle show dramatic changes. Transformation of catchments also results in loss in stream flow and a decline in water quality (through increased sedimentation and agricultural chemicals run off). This can damage estuaries, many of which are important CBAs.

As with terrestrial CBAs, aquatic CBAs are grouped into BLMCs (see Table 2). Fig. 7 shows the Aquatic BLMCs (ABLMCs) as identified in the ECBCP.

The ECBCP recommends limits (thresholds) to the total amount of land transformation that should be allowed in an ABLMC 1 and 2, if biodiversity is to be conserved. The goal is to maintain sufficiently large intact and well-connected habitat patches in each sub-quaternary catchment, to prevent the consequences outlined above.

For example, when an estuary is identified as a CBA 1 (E1), the sub-quaternary catchments that supply this estuary with fresh water should not be transformed too heavily. Recommended catchment transformation thresholds for each ABLMC are set out in Table 6.

Table 6: Suggested transformation thresholds

ABLMC	CBA Code	Description of CBAs	ABLMC Transformation Threshold
ABLMC 1	A1; A3a	Critically important river sub-catchments; Priority primary catchments for E1 estuaries	Less than 10 % of total area of sub-quaternary catchment
ABLMC 2a	A2a, A3b	Important sub-catchments, Primary catchment management areas for E2 estuaries.	Less than 15 % of total area of sub-quaternary catchment
ABLMC 2b	A2b	Catchments of free flowing rivers important for fish migration	Less than 20 % of total area of sub-quaternary catchment

This means, for instance, that in a sub-quaternary catchment that has been identified as ABLMC 1, the extent of land transformation that should be allowed is less than 10% of the total area of that sub-quaternary catchment ⁷.

⁷ Note that development in all catchments remains subject to standard DWAF requirements regarding limits to reduction in mean annual runoff (MAR).

2.4.2 Assessing the impact of a development on an ABLMC

If a land use change is planned in an ABLMC 1 or 2, its impact on the extent of transformation in that sub-quaternary catchment should be assessed. This should be done as follows:

- Firstly, find the extent of existing transformation in the catchment from the tables in the ECBCP (see Chapter 3, paragraph 3.6.7 for how to do this in MapInfo);
- Secondly, check the area to see if any further transformation has taken place since these estimates were done. If this is the case, calculate the current percentage transformation of the sub-quaternary catchment;
- Finally, calculate whether the proposed development will exceed the recommended transformation threshold for that sub-quaternary catchment.

Please note that development in all catchments is also subject to DWAF stream flow reduction authorisation.

Box 11: Wetlands

Wetlands include rivers, vleis and marshes, and help to purify water and to reduce flooding. South Africa has already lost over 50% of its wetlands due to development. As more wetlands are lost in an area, flooding increases and water can become polluted. Any proposed development near to wetlands should be carefully assessed to prevent further damage to wetlands. Seasonal wetlands are particularly vulnerable as they are easily overlooked at dry times of the year.

2.4.3 Guidelines for riverine, wetland and estuarine buffers

Until national guidelines for riverine, wetland and estuarine buffers are established, the guidelines set out in this section should be applied. Table 7 recommends buffers for rivers.

Table 7: Recommended buffers for rivers⁸

River criterion used	Buffer width (m)	Rationale
Mountain streams and upper foothills of all 1:500 000 rivers	50	These longitudinal zones generally have more confined riparian zones than lower foothills and lowland rivers and are generally less threatened by agricultural practices.
Lower foothills and lowland rivers of all 1:500 000 rivers	100	These longitudinal zones generally have less confined riparian zones than mountain streams and upper foothills and are generally more threatened by agricultural practices. These larger buffers are particularly important to lower the amount of crop-spray reaching the river.
All remaining 1:50 000 streams	32	Generally smaller upland streams corresponding to mountain streams and upper foothills, smaller than those designated in the 1:500 000 rivers layer. They are assigned the riparian buffer required under South African legislation.

Currently there is no accepted priority ranking system for wetlands. Until such a system is developed, it is recommended that a 50 m buffer be set for all wetlands.

It is recommended that no new development be permitted below the 5m contour around an estuary. This would allow for the protection of most important estuarine ecosystem processes and drivers, other than upstream development pressures on estuaries, which are addressed through the catchment transformation thresholds.

⁸ This table and the estuarine buffer proposals are drawn from Snaddon et al. In prep. 2007.

Chapter 3: How to Use the ECBCP Decision Support System: MapInfo User Guide

Richard Hayes

3.1 Introduction

The ECBCP is presented in three forms:

- Electronically (on CD ROM), viewed by means of MapInfo software;
- Electronically, on the internet at www.ecoplanner.co.za;⁹ and
- On posters (wall maps).

The information on the CD is identical to that on the website, although presented in a slightly different format.

This Chapter shows you how to install MapInfo® on your machine, and then use it to view the ECBCP. Please note that MapInfo has its own manual and extensive help files. Please refer to them for tips on using MapInfo, by clicking *Help/ProViewer Help Topic*.

A Geographic Information System (GIS) contains computer-generated maps (map layers) that can give you information about an object you can find on the map. The different map layers contain different sets of information, e.g. population, towns and rural communities, roads and rivers. Each layer is a database that is represented on a map. The advantage of a GIS over a paper map is that if this GIS were printed at 1:50,000, it would be fifteen metres wide and ten metres high and then the information would be difficult to read!

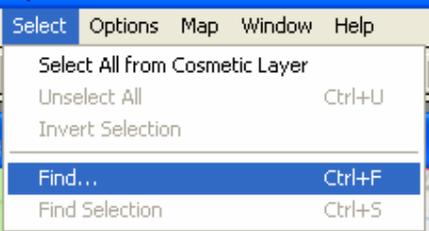
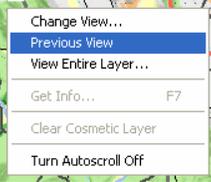
3.2 A note on terminology

In this Chapter, we have kept to the standard Microsoft® approved words for actions where ever possible, but just to ensure clarity here are a couple of definitions for you:

- | | |
|-------------|--|
| Click | Tap the left button of the mouse gently once. |
| Double | Click – Tap the left button of the mouse gently twice. |
| Right Click | Tap the right button of the mouse gently once. |
| Point | Move the cursor till it rests on the place you want on the screen by moving the mouse. |
| Drag | Press your finger gently on the left mouse button and pull it in the direction required. |
| Press <F1> | Press a keyboard key, in this case the <F1> key. |

It is always difficult to convert what you see on an application into words and understandable symbols. This paragraph tells you how we have done it in this manual.

⁹ Please note that the website address of the ECBCP may change. If this occurs, please consult DEDEA or DWAF (contact details at the back of this Handbook) for further information.

Buttons are shown in text with angle brackets. E.g. <OK>	
Drop down boxes are identified by the adjacent label. E.g. <i>View Entire Layer</i>	
Button bar buttons are shown in text with a label and a graphic. E.g. <i>Open File</i> ().	
Drop down menus are shown as the master menu option and then the sub-option. E.g. <i>Select / Find</i>	
Pop-up menu. The option selected is in italics. E.g. Popup menu <i>Previous View</i> .	
Fields are identified by italicised labels. E.g. <i>Zoom (Window Width)</i> .	
Forms are identified by the name in the title. E.g. <i>View Entire Layer</i> form.	

3.3 Before you start

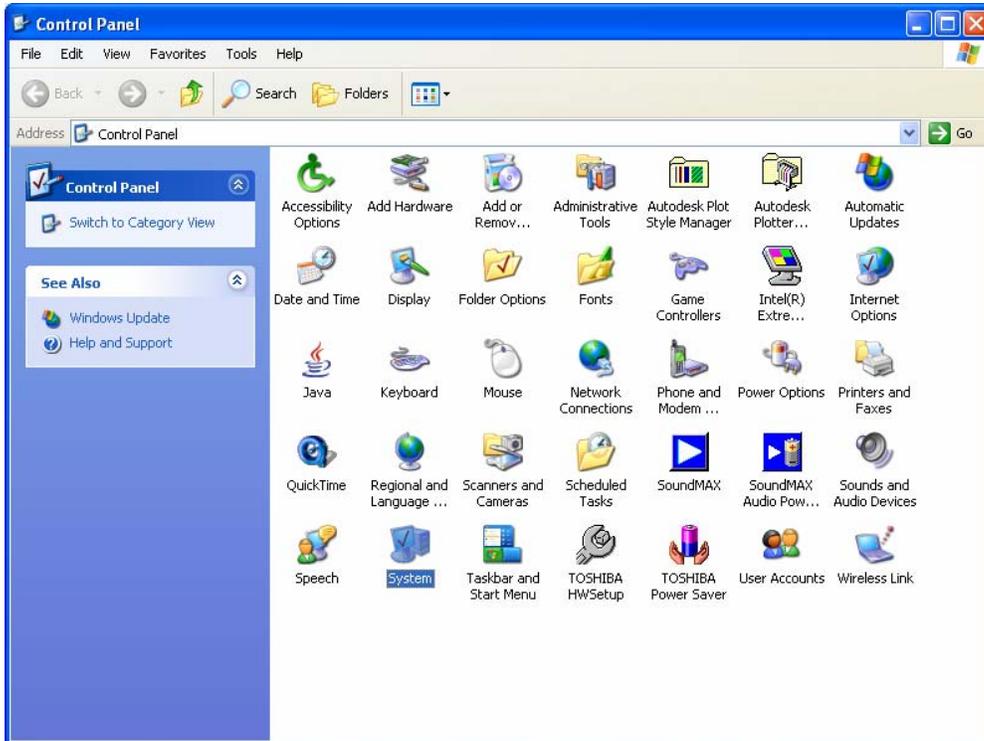
The first thing that you need to check is that your computer can handle the MapInfo® application. It is quite easy to do this, but if you have an IT department they will be able to help you:

1. Click on the Start button on your task bar.

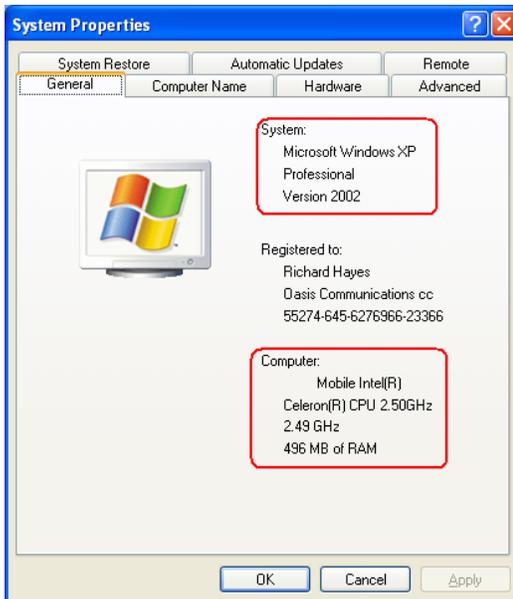


Please note that the following pictures were generated on an XP machine, so there might be small differences in the look and feel of the forms on your PC, but the basic procedure is fairly standard.

2. Click on the Control Panel option. A Control Panel Form should open.



3. Double click on the System icon. The icon is highlighted in the picture above. The System form should open and the computer information should be displayed as shown below. The information you need to know is shown inside the red boxes in the picture below.



4. Now you must check that your computer has more than the basic requirements.
System: Your computer must have Microsoft® Windows 2000, Windows XP or Vista.

Computer: Your computer must have more than 128 MB of RAM, and your hard drive must have 1.5 GB of free space.

5. Check that your computer has CD disk drive.
6. If it has these requirements, then you can begin to load MapInfo.

3.4 Installing MapInfo® on your Machine

There are two methods of installing MapInfo® on your personal computer (PC) or laptop.

1. You can use the install shield on the CDs provided,
OR
2. You can download the file off the internet.

3.4.1 Installing from a CD

This description assumes that you have been given a CD.

Insert the CD into the CD drive. The PC will scan the disk, and a help file will open. This help file will guide you through the rest of the installation procedures. (This installation will also transfer the ECBCP files to your computer). Note: Please read the MapInfo End User Licence Agreement document that is included on the CD.

3.4.2 Downloading your MapInfo® from the Internet

If you want to download MapInfo from the internet, go to the MapInfo website (www.mapinfo.com) and follow the directions for installing MapInfo® as given on the site. Don't forget to register. MapInfo® is completely free software, there is no payment involved. (You will need to transfer the ECBCP files from the CD to your computer yourself).

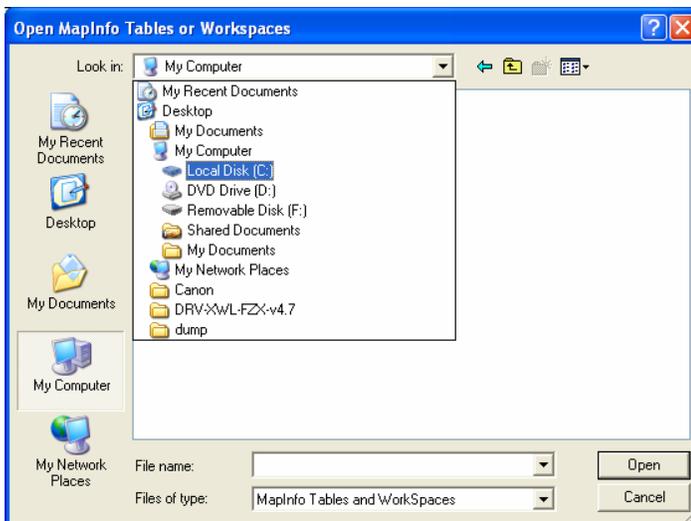
3.5 Navigating Around MapInfo®

Now that MapInfo® and the ECBCP files are on your machine, you can start to use the system to:

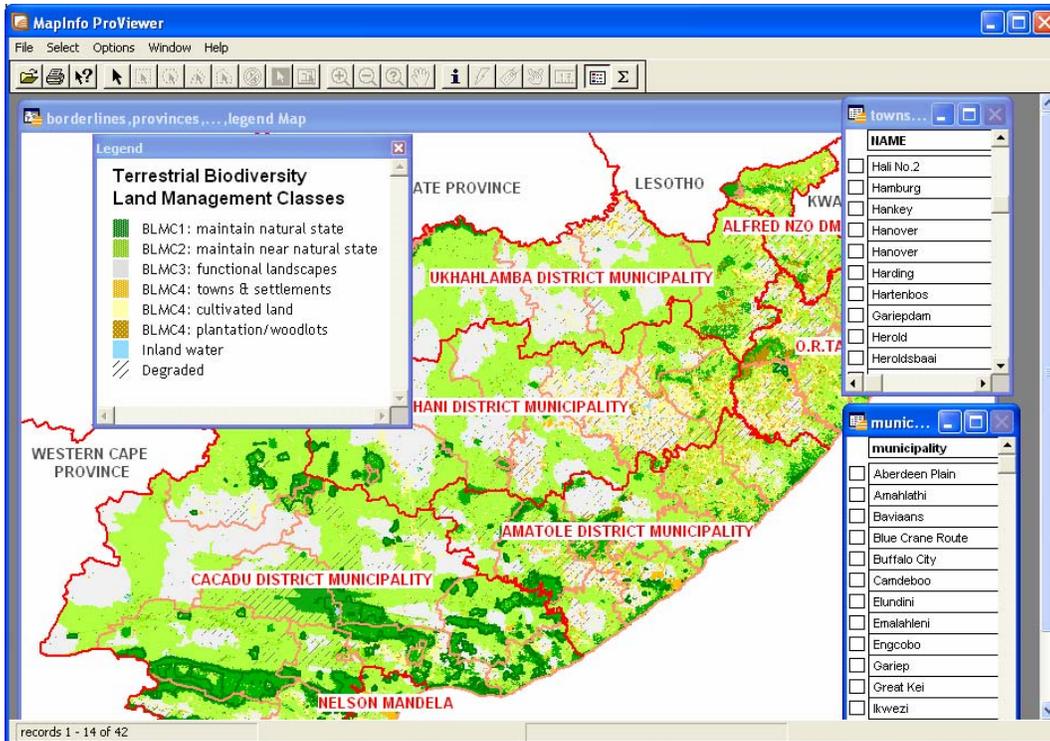
- identify sites and areas in the Province at a range of scales
 - see what land uses are suitable for the area, if biodiversity is to be conserved
 - find areas where development will not have a negative impact on biodiversity
 - find areas which are priorities for conservation of biodiversity, and
 - see the reasons for the classification of each area.
1. To open the ECBCP, Click on the new MapInfo® option in the Start menu.



The MapInfo application will open. The first form you should see is an *Open MapInfo Tables or Workspaces* form as shown below. If you don't see this form, then click the *File Open* button (📁) on the button bar. Click the down arrow of the *Look in:* drop down box and select *Local Disk (C:)* as shown below.



2. Click on the ECBCP folder and then click on the LAND_USE_Light.WOR file that is in the ECBCP folder, to open it. If you have a fast computer, you could open LAND_USE.WOR instead. It contains the same information, but also shows relief (land form). However, please note that it will work more slowly and that it is very difficult to print from LAND_USE.WOR.
3. Click on it and then click <Open>. The relevant forms should open. See the next picture.



You are now ready to start using the ECBCP with MapInfo®.

3.5.1 Button Bar

The button bar runs across the top of the MapInfo® form.

Note: MapInfo® has an extensive and informative Help file and users manual. The ECBCP manual only covers the topics covered in those publications very briefly. Please refer to those publications for a more detailed description of application usage. For all ECBCP usage, please follow this manual.



The buttons most commonly used are described below.

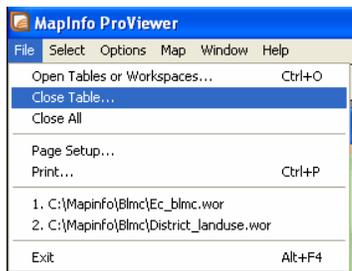
	Open file. This button opens the Open File form and allows you to retrieve the files that you want to view. Note that the required files have a .WOR extension.
	Print button. Prints the selected window.
	Help file. Allows you to access the MapInfo® help files.
	Pointer button. This is a Select Tool and can be used to select an object in the map window or a row in a table (browser list) window. Please see the MapInfo help files for a more detailed description.
	Zoom in button. Clicking on a map zooms the user into the map. Clicking and dragging zooms into the selected area. As you zoom in, more information becomes visible (e.g. relief, property boundaries, farm numbers, local roads, rural communities etc.) You may also just

	click in the centre of an area you want to view. This zooms in by a factor of two. Please see the MapInfo help files for a more detailed description.
	Zoom out button. This zooms the user out of the map. Left click anywhere on the map and you will zoom out by a factor of two. Please see the MapInfo help files for a more detailed description.
	Grabber button. This button changes the mouse button to a hand. When you click on the left mouse button the hand grabs the map and moves it in the direction the mouse is moved. Please see the MapInfo help files for a more detailed description.
	Info Tool button. This button opens a box that provides important information on the location, land use class, etc in a form when you click on a site or area. More detail on the contents of the Info Tool box is given in the section below.
	Labels button. This button switches on the name of the object on which you click. Please see the MapInfo help files for a more detailed description.
	Ruler button. This button measures linear distances in kilometres. To make a measurement, click and release on the point where you want to start the measurement. Please see the MapInfo® Help files for more specific details. For context sensitive help, point at the form you wish to query and press the <F1> button
	Legend button. This button switches the Legend form on and off. The map legend is a key to the different colours used on the map. Clicking on this button toggles the legend on and off. Please see the MapInfo help files for a more detailed description.

3.5.2 Menus

This paragraph describes the drop down menu options. As with the Button Bar, the drop down menus are only described if they are used in the ECBCP.

Note: Options are indicated by the menu they are part of then a / and then the actual menu. Thus *Files / Close Table* is the *Close Table* option in the *Files* drop down menu as shown below:



The most commonly used menu options are discussed below.

<i>Select / Find</i>	This option opens a <i>Find</i> form and allows you to search for the criteria you have specified. In 3.6 below, you will find a description of how to use the <i>Select / Find</i> button.
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<i>Map / Previous View</i>	This option allows you to go back to the view you were on previous to the present one.
<i>Map / Get Info</i>	This option provides geographical coordinates and size of selected objects.
<i>Map / Select Layer</i>	This option allows you to show only a single layer rather than all the layers as normal. We do not recommend that you do this as most of the other useful information is removed in the process.
<i>Map / Get Info</i>	Please consult the MapInfo® help file on the use of this menu option.

3.5.3 Right Click Pop Up Menu

Pop up menus are available when the mouse cursor is pointing to an open window and act only on that window.

The options available are:



The most commonly used options are:

Change View	This option allows you to change the size of the window you are viewing.
Previous View	This option allows you to go back to the view you were on before the present one (this is the nearest to a “back button” that MapInfo has).
Get Info	This option allows you to see basic information about the area selected.

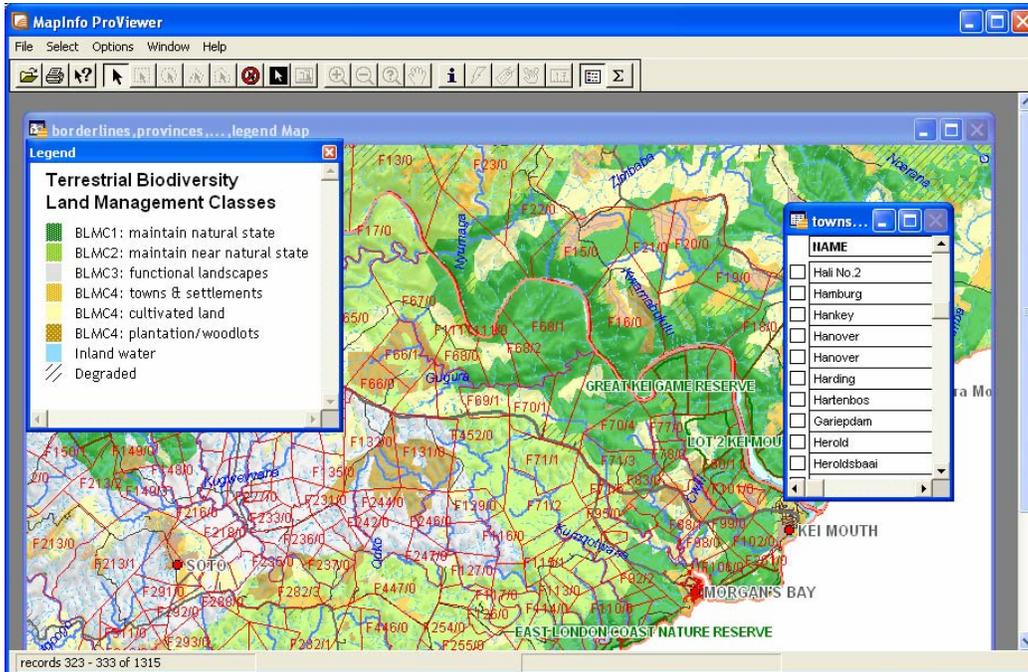
3.6 Using MapInfo®

This paragraph takes you through a step by step procedure of finding things on the maps provided, using the different tools provided by MapInfo®.

3.6.1 How do I find a town?

Open the MapInfo application and zoom into the map at more or less the scale you want to use.

1. Click the *Window / towns Browser* option. The *towns browser* should open.

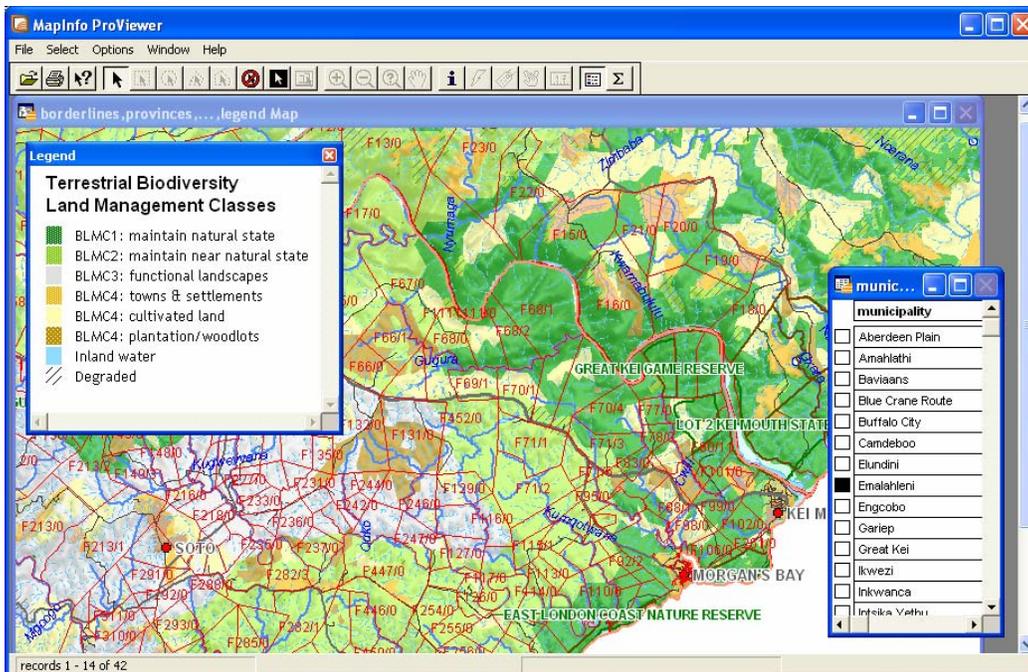


2. Select the town you wish to view and click the black box next to the name of the town.
3. Click the drop down menu *Select / Find Selection*. The map should move to the town and the town should be highlighted.

3.6.2 How do I find a municipality?

Open the MapInfo application.

1. Click the *Window / municipality Browser* option. The *municipality browser* should open.



2. Select the municipality you wish to view and click the square box next to the name of the municipality.
3. Click the drop down menu *Select / Find Selection*. The map should move to the municipality and the municipality should be highlighted.

Note: If necessary MapInfo will zoom outwards or inwards to encompass the entire municipality.

3.6.2.1 Municipality Browser Information

The *municipality browser* contains additional information in a series of columns which you can access by using the slider bar. The following graphic shows some of the additional columns.

	municipality	population	total_hectares	urban_HAs	cultivated_HAs	plantati	CBA1_HAs	CBA2_HAs	w
<input type="checkbox"/>	Inkwanca	21,718	358,659	1,156	4,546	374	3,771	193,818	
<input type="checkbox"/>	Lukanji	197,997	426,249	14,884	13,713	926	14,473	178,927	
<input type="checkbox"/>	Intsika Yethu	208,381	361,655	36,837	62,889	5,672	5,541	31,757	
<input type="checkbox"/>	Emalaheni	124,392	324,130	16,683	52,050	890	2,020	95,455	
<input checked="" type="checkbox"/>	Engcobo	159,217	226,053	20,872	61,418	8,720	25,169	45,786	
<input type="checkbox"/>	Sakhisizwe	57,971	225,843	5,867	20,287	10,837	11,979	127,226	
<input type="checkbox"/>	Etundini	147,606	536,379	12,931	65,516	30,168	44,820	257,508	

The following table gives a brief summary of the columns and the data they provide.

Municipality	This column provides the official name of the Municipality.
Population	This column provides an indication of the population of the Municipality.
Total Hectares	This column provides the total area of the Municipality in hectares.
Urban HAs	This column provides the total area of land covered by the towns and cities of the Municipality in hectares.
Cultivated HAs	This column provides the total area of cultivated land in the Municipality in hectares.
Plantation HAs	This column provides the total area under plantations in the Municipality in hectares.
CBA1 HAs	This column provides the total area of CBA1 land in the Municipality in hectares. Please note that this figure includes protected areas, even though they are shown as a separate category on the map of CBAs.
CBA2 HAs	This column provides the total area of CBA2 land in the Municipality in hectares.
Water HAs	This column provides the total area of water in the Municipality in hectares.
Natural HAs	This column provides the total area of natural vegetation in the Municipality in hectares.
Degraded HAs	This column provides the total area of degraded land in the Municipality in hectares.

3.6.3 Using the Info Tool

The *Info Tool* provides information about an area, town or municipality. You can use the *Info Tool* in two ways.

- Directly, or
- Using the browsers.

3.6.3.1 Using the Info Tool Directly

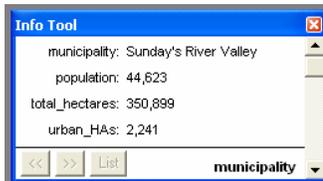
Click the *Info* button () and then click the place of interest on the map. The *Info Tool* box will open and display the relevant information.

If you click on the Municipality browser, the information on that specific municipality is shown.



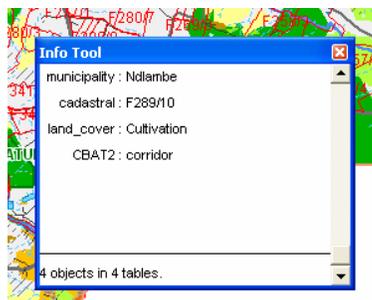
3.6.3.2 Using the Info Tool box with the Browsers

Open the browser of your choice and then select a town or municipality by double clicking on the selection box on the left hand side. The *Info Tool* box will open and display the relevant information.



3.6.3.3 Interpreting the Information in the Info Tool Box

The *Info Tool* box does a search of the database that supports the ECBCP and produces all the data it can find on the area you have selected. A typical response will be as shown below.



The bottom bar will tell you how many results were retrieved from the database. In the case of our example only four results were obtained from the database. If more than one result was retrieved from a specific table in the database, this bar will indicate it. An example might be 6 objects in 4 tables.

The first line on the form will tell you which municipality your mouse cursor is pointed at. If you click on this line of the form, it will give you more information about that municipality (population, hectares, etc.). The same applies to the other lines on the form.

The land cover line on the form will tell you what the existing land cover (land use) is at that spot (cultivated land, towns and settlements, water, plantation, etc). Please note that if no land cover line is shown, this means that the area is a natural area, i.e. is covered mostly by natural vegetation.

In LAND_USE_light.WOR, if the area on the map that your mouse cursor is pointing at is coloured dark green or light green (i.e. if it is a BLMC 1 or 2), the form will tell you whether the area was identified as a CBA 1 or CBA 2, and will set out briefly the reasons for this classification. For an explanation of these reasons, refer to Table 1 in Chapter 1 of this Handbook. Some areas are identified as CBAs for several reasons. Each of these is set out in a separate line on the Info Tool form.

The Info Tool box also provides the BLMC classification of the site. Sometimes it will show two different BLMCs for the same site. In such situations, the map colour will indicate the correct BLMC.

Some areas coloured light green on the map (BLMC 2) may have a CBA 1 classification in the table. The reason why they are not classified as BLMC 1 is due to their being in a degraded state.

3.6.4 How do I find a specific property?

Open MapInfo® as previously described.

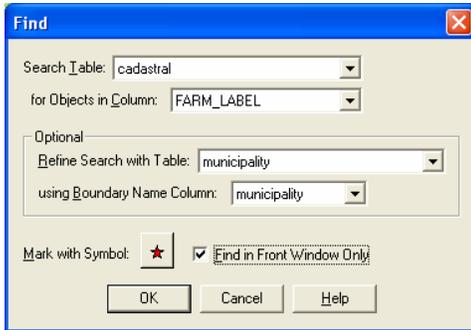
Note: The following description is for finding a farm. The procedure for searching for other things is much the same. Only searches for specific properties (farms), searches using longitude and latitude, and searches for rural communities are described here.

Farms are identified in GIS in two ways:

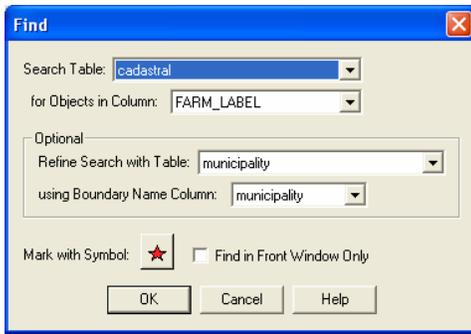
1. **Farm Number:** A farm name is the official 20-digit cadastral number. If you get it right it should take you directly to the farm, as it is a unique number.
2. **Farm Label:** A farm label is a label provided by municipal or other authorities. It is not unique, so there could be many farms identified by a single farm label.

3.6.4.1 To find a farm using Farm Label:

1. Click the *Select /Find* option. The *Find* form will open. Click the <Respecify> button if the *Respecify* form is not yet open.



2. Select *cadastral* from the *Search Table* drop down box.
3. Select *FARM_LABEL* from the *for Objects in Column* drop down box.
4. Select *municipality* in the *Refine Search with Table:* drop down box.
5. Select *municipality* in the *Using Boundary Name Column* drop down box.



6. Click the <OK> button. The *Find* form should open.



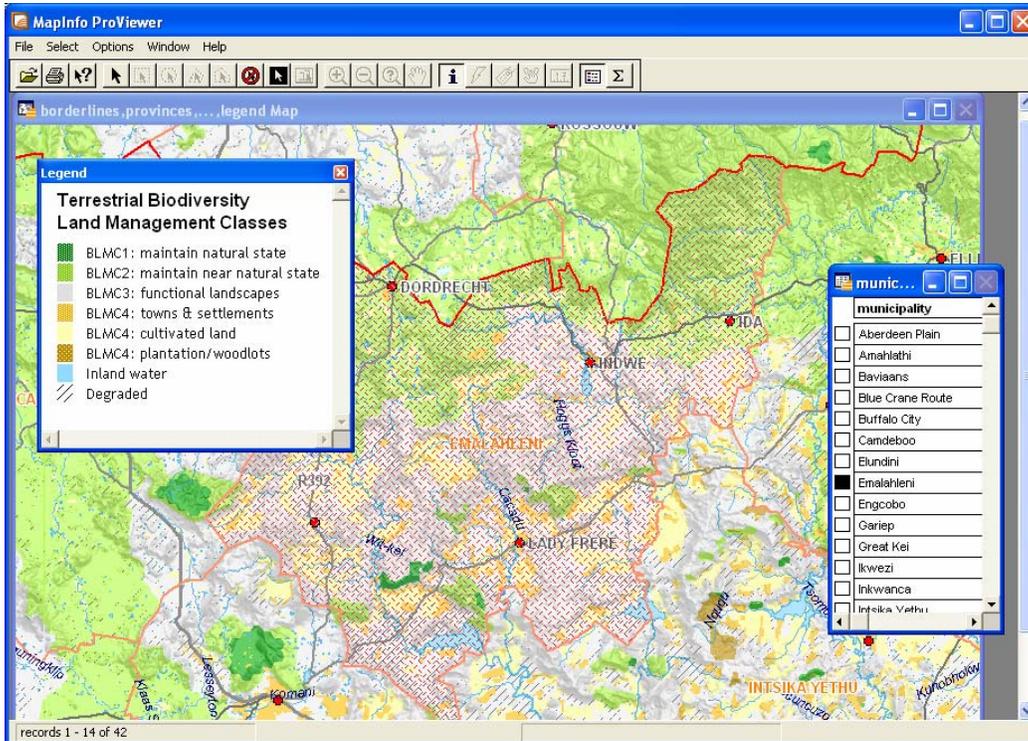
7. Enter the farm label into the *FARM_LABEL* field.
8. Enter the municipality in the *municipality* field. We need to use the municipality because the farm label is not unique.



9. Click the <OK> button. The *Find* form should clear and the farm should be shown with an icon such as a red star.
10. If you get something wrong, the *Find* form will present you with all the possible variations. In the following example, the municipality Gariep is incorrectly spelt. MapInfo finds all the possible F108/0 farms and displays the possible municipalities.



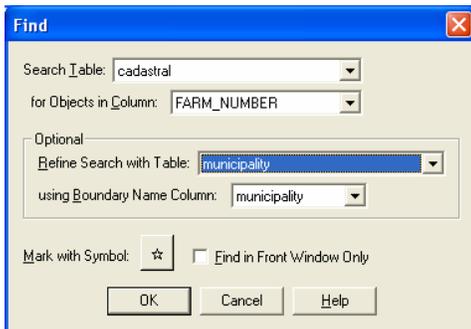
11. Knowing that the farm is in the Gariep municipality allows us to click on the option and then click the <OK> button which will then mark the relevant farm.



12. Zoom in on the farm marked by in this case by a red star.

3.6.4.2 To find a farm using Farm Number

1. Click the Select /Find option. The Find form will open. Click the <Respecify> button if the Respecify form is not open.



- 2 Select cadastral from the Search Table drop down box.
- 3 Select *FARM_NUMBER* from the *for Objects in Column* drop down box.
- 4 Click OK. This will bring up a form where you can enter the farm number. Note – Farm numbers all start with “C”.

You can enter only a partial farm number. If you do a search like this, the bottom field will be populated with all possible iterations of the farm number you have entered.



If however the search you have made returns no results, MapInfo® will return ALL the results possible. You can tell that this has happened by the first name in the list being aaaaaaaHMBURG as shown below. You can either scroll down till you find the number or farm you are looking for or you can re-enter the search criteria and try again.



Move up and down using the <Up> and <Down> buttons, then click on the required farm number and then click the OK button. The required farm will be centred on the map.

3.6.5 How do I find a site using longitude and latitude?

In communal areas you may need to find a site using longitude and latitude. To do this:

1. Open MapInfo® as previously described.
2. Once the map is open, zoom in so that you can see a town or village close to the area you wish to view. (You can also use the search function as described above to find the relevant city, town or village.)
3. Click on the value shown in the bottom left hand corner of the MapInfo® window.



4. Select the *Cursor location* option. The window will close and the latitude and longitude will be shown in decimal format. Moving the mouse cursor shows the longitude and latitude of the tip of the mouse pointer. If you need degrees, minutes and seconds then multiply the decimal value by 60 to get the minutes and then the resulting decimal value to produce seconds.

The following is an example of a decimal to degrees, minutes and seconds.

For a value of 25.5669 degrees proceed as follows:

25 degrees

$0.5669 \times 60 = 34,014$ i.e. 25 degrees, 34 minutes,

$0.014 \times 60 = 0,84$. Rounding up gives 1 second.

The result is $25^{\circ}25''1'$.

This description is to convert degrees, minutes and seconds to degrees and decimals.

For a value of $25^{\circ}45''31'$

25 degrees

$45 \div 60 = 0.75$

$31 \div 60 \div 60 = 0.0086$

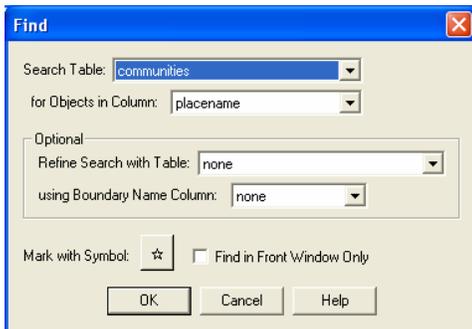
$0.75 + 0.0086 = 0.7586$

25.7586 degrees.

3.6.6 How do I find a specific rural community?

Just as with towns, municipalities and farms, small rural communities can be found using *Select /Find*. To do this:

1. Open MapInfo® as previously described.
2. Once the map is open, zoom in so that you can see a town or village close to the area you are looking for.
3. Click the *Select /Find* option. The *Find* form will open. Click the <Respecify> button if the *Respecify* form is not yet open.



4. Select *communities* from the *Search Table* drop down box.
5. Click the <OK> button. The *Find* form should open.



6. Enter the name of the community into the into the *placename* field. Note that only the first 9 letters of the community name will be shown.
7. Click the <OK> button. The *Find* form should clear and the community should be shown with an icon such as a red star.

3.6.7 Finding the extent of transformation in a catchment

To do this you will need to open the file CATCHMENT_light.WOR (as described for LAND_USE_light.WOR, see paragraph 3.5). Please note that if you are assessing a forestry application, you should instead open the file AFFORESTATION_POTENTIAL_light.WOR.

1. Having opened the Catchment workspace, locate the area you wish to view and if necessary, zoom in.
2. Click on the *Info Tool* button () and the cursor will turn into a cross.
3. Click on the area of interest. An *Info Tool* box will open as shown below.



4. Click on the municipality line and the list will expand to show the municipality data as shown below.

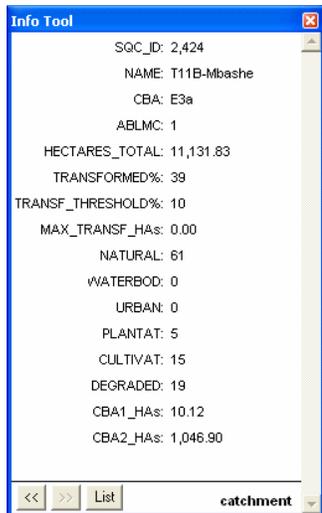


Note: The bar at the bottom will have the name of the list you are viewing on the right hand side (*municipality*).

5. Clicking the *List* button () will take you back to the original list of municipality and catchment area.

OR

Click on the right double arrows button () to view the Catchment data. You can also access the Catchment data by clicking on Catchment in the list that opens when you first click area of interest, or when you click the *List* button ().



Note that the ABLMC classification of the sub-catchment is displayed in the Catchment data (in the example above, it is an ABLMC 1, because it is a CBA E3a).

The extent and percentage of transformed land in the sub-catchment is also displayed (TRANSFORMED%) followed by the recommended transformation threshold for that sub-catchment (TRANSF_THRESHOLD%). This is followed by the amount of hectares that are still available for transformation (MAX_TRANSF_Has). In the example above, the percentage of the area already transformed (39%) is higher than the recommended transformation threshold (10%) and thus the number of hectares still available for transformation is zero (0.0).

(It should be noted that the extent of existing transformation may be underestimated, as things may have changed since this data was collected.)

If you are viewing AFFORESTATION_POTENTIAL_light.WOR, please note that:

- Areas shown in colour were those that were assessed in the ECBCP as having forestry potential.
- The Info Tool box contains an estimate of the extent of land in that sub-quaternary catchment that has forestry potential. This is shown in the line AFFOR_POT_HAs. (This figure excludes land classified as CBA 1 and 2.)
- The Info Tool box also lists the amount of land in that sub-quaternary catchment that was still available for afforestation at the time when this information was compiled (in the line AFFOR_MAX_HAs).

3.7 Creating a Report

This paragraph is of necessity fairly general as the type and format of the report generated depends on your organisation's requirements.

3.7.1 Printing a map directly

This is the standard Windows® procedure.

Click on the <Print> button of *File / Print* and the standard Windows® window.

Maps are better printed in landscape to fill the entire page rather than only part of the page.

Note: **Do not try to print** from LAND_USE.WOR, CATCHMENT.WOR, or AFFORESTATION_POTENTIAL.WOR files, as the print file is too large to print both colours and relief.

3.7.2 Cutting and pasting into Word or Powerpoint

We recommend that you use the FreeWare application *Mr Snappy 95*© (a copy is included on the CD).

1. Start the application by double clicking on the *Mr Snappy 95*© icon in the ECBCP directory. This will open the application and let it run in the background.
2. When you have located the information you need, press Ctrl-Shift-S and a Mr Snappy window will open.
3. Point with your mouse pointer to the top left corner of the image you want to capture, press down on the left mouse button and pull the mouse pointer down to enclose the area you want to capture.
4. Release the button when you have what you want.
5. Open the application you want to paste it into (e.g. Word), and click the <Paste> button or command. The image will be pasted into the application.

3.7.3 Enclosing a MapInfo® object in a Word document

You can drag and drop sections of MapInfo® into MS Word. This method gives you a very clear image but unfortunately has a number of shortcomings. One is that the person reading the document has to have MapInfo® installed on his or her machine. The other is that the file is enormous and many Internet Service Providers will not allow you to send the file. Anyone with a dial up connection will take a long time to download the file.

We recommend that you do not use this method. It is documented in detail in the MapInfo® manual should you wish to do your report this way.

Chapter 4: How to Use the ECBCP Decision Support System: Website User Guide

Derek Berliner

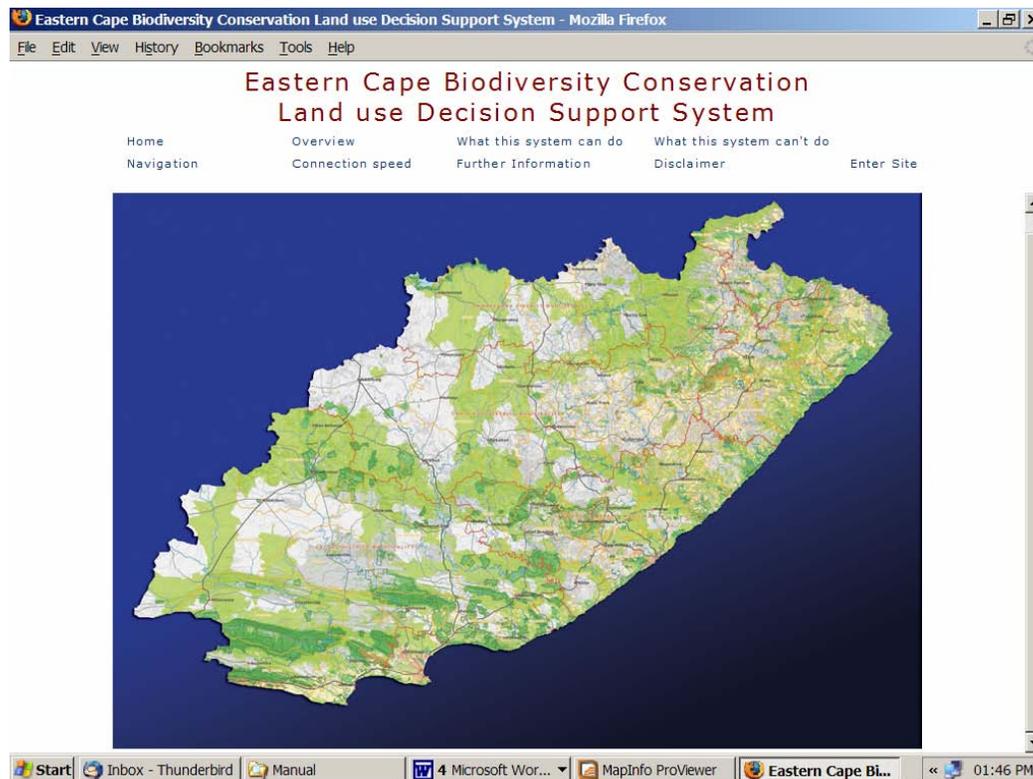
4.1 Introduction

This chapter provides instructions on how to use the website version of the ECBCP decision support system.

The web-based version of the ECBCP is available at www.ecoplanner.co.za.

Please note that the information on the website is identical to that on the CD, although presented in a slightly different format.

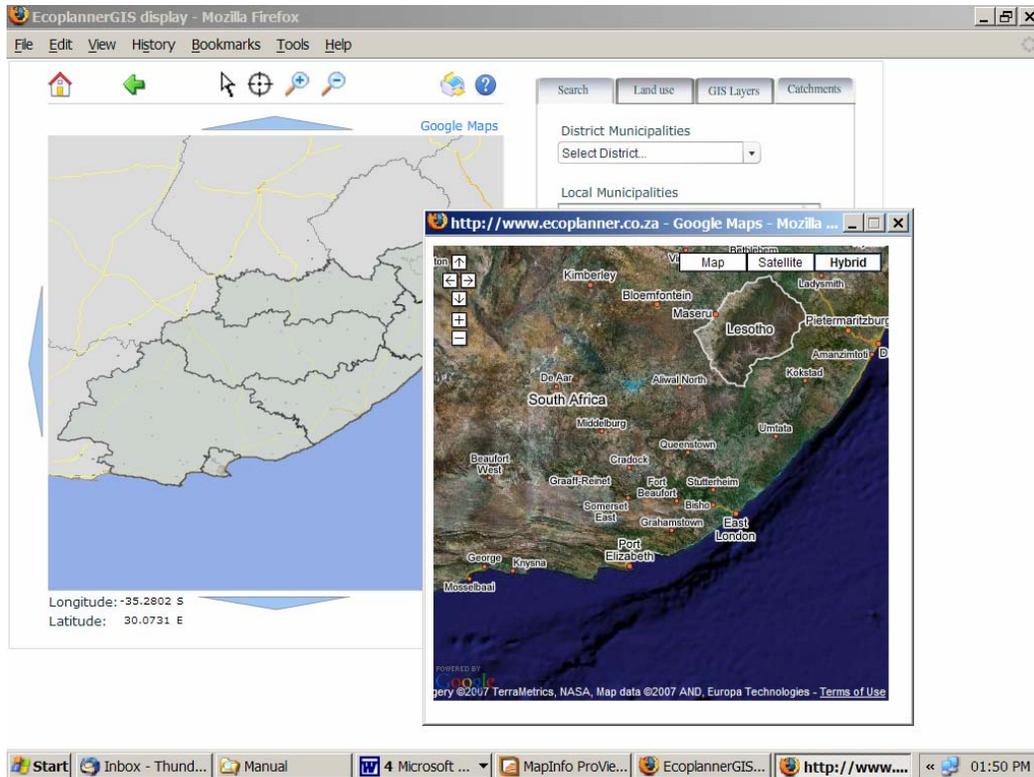
4.2 Opening page



The opening page of the website offers a number of options. Click on “Enter Site” to view the map.

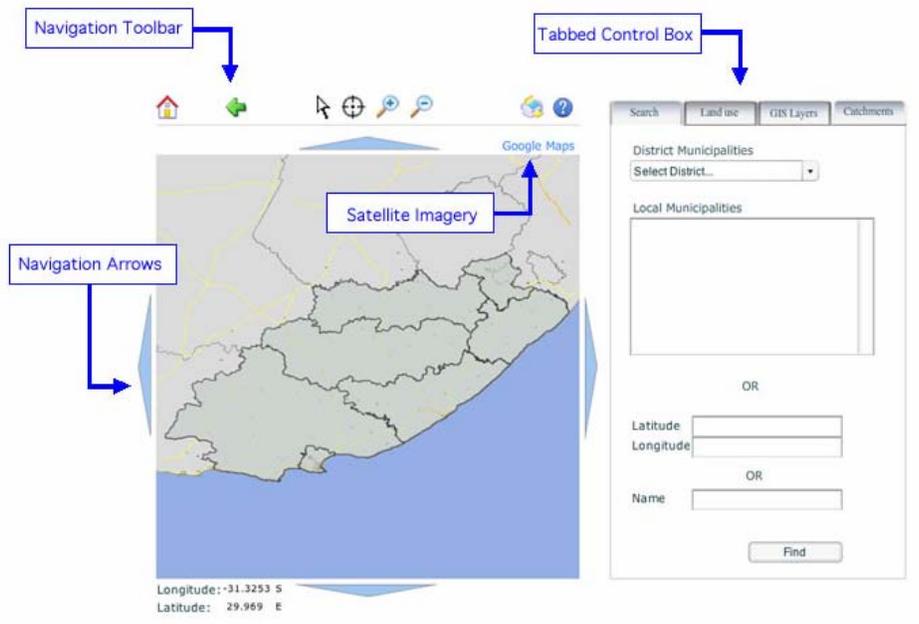
The initial map that is displayed is one of the Eastern Cape as a whole, as well as the edges of the surrounding provinces.

At any time during operation of the map the "Google Maps" button at the top right of the map can be selected to view satellite imagery of roughly the same map area that is visible on the screen.



4.3 Screen Components

The Eastern Cape map is subdivided into its District Municipalities. When you move your mouse over these districts they will be highlighted and a tooltip with the name of the district is displayed. This interactive image is made up of layers that are turned on from within the "GIS Layers" tab of the Tabbed Control Box.



4.3.1 Toolbars and Controls

The *Navigation Tool Bar* above the map has the following buttons:



Home - Takes the user back to the home page (<http://www.ecoplanner.co.za>)



Back - Takes the user back to the previous map they were viewing

Mouse Tools:



Selection tool - Used to interact with the active (switched on) layers of the map. Refer to Navigation and Map use



Center tool - Allows the user to centre the map on a selected point



Zoom in tool - Allows the user to zoom in by dragging a box over the desired area



Zoom out - Zooms the map out



Print - Allows the user to print the map that is currently on the screen



Help - Brings up the user manual.

The *Tabbed Control Box* has the following tabs:

- Search - Allows the user to navigate to a desired location (Local Municipality, Coordinates, Town, Cadastre)
- Land Use - Displays the class name, permissible land use and conditional land use of a critical biodiversity area selected on map as well as allows you to view the cost data of the selected polygon

- GIS Layers - Tab which allows user to turn layers on and off once checkbox is selected and refresh button pressed.
- Catchments - Allows user to turn on catchment and afforestation layers once the checkbox is selected and refresh button pressed.

Tools in the Map Area:

- Blue navigation arrows - Shifts the map in the direction of the arrow
- Google Maps button (top right) - Displays satellite imagery of current map on screen
- Latitude/Longitude (bottom left) - Displays the coordinates of the mouse over the map
- Map - Made up of a background image and interactive layers

4.4 Navigation and Map Use

4.4.1 Methods of navigation

- District selection - From the initial map the user will be able to select the district municipality that contains the location of the place being searched for by clicking on the map. The map will then zoom into that district and turn on the local municipalities within that district. The "DistrictMunicipalities" layer will be automatically turned off. If the user then selects the local municipality the map will zoom into that local municipality and automatically turn on the critical biodiversity layers. This method of navigation is the easiest.
- Municipality search - At any time the user can select a district municipality from the dropdown list on the "Search" tab of the tabbed control box. This will then populate the list below it with the names of the local municipalities within in. If you click on one of the local municipalities in the list the map will automatically zoom into that local municipality.
- Latitude/Longitude search - At any time the user can enter in coordinates of the desired location into the text areas located on the "Search" tab of the tabbed control box. Once the "Find" button has been pressed the map will then zoom into those coordinates.
- Name search - At any time the user can enter in the name of a town or the cadaster number of the place they are looking for in the text area on the "Search" tab of the tabbed control box. Once the "Find" button has been pressed, if the place is found the map will zoom in to that location.

4.4.2 Map use

When wanting to turn on/off layers there may be certain checkboxes that are not selectable, this means that you are too far zoomed out to enable it. There are two groups of layers that will generate an output response, the "Critical Biodiversity Areas" and the "Catchment and Afforestation" layers located in the GIS Layers and Catchments tabs. If you move your mouse around on the map the tool tip of the mouse will display the name of the layer that it is on provided that the selection tool is active.

If you click on one of these critical biodiversity layers an output response will be generated in the Land use tab and if a catchment is clicked an output response will be generated in the Catchments tab. Further movement around the map can be made by using the other tools available on the navigation toolbar as well as the navigation arrows aside the map.

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Acronyms

ABLMC Aquatic Biodiversity Land Management Class

BLMC Biodiversity Land Management Class

CD ROM Compact disc

CBA Critical Biodiversity Area

DBSA Development Bank of Southern Africa

DEAT National Department of Environment Affairs and Tourism

DEDEA Department of Economic Development and Environment Affairs (Eastern Cape Province)

ECBCP Eastern Cape Biodiversity Conservation Plan

DWAF National Department of Water Affairs and Forestry

GIS Geographical Information System

IDP Integrated Development Plan/Planning

IEM Integrated Environmental Management

MAR Mean Annual Runoff

NEMA National Environmental Management Act 107 of 1998

NEMBA National Environmental Management: Biodiversity Act 10 of 2004

NSBA National Spatial Biodiversity Assessment

SANBI South African National Biodiversity Institute

SANParks South African National Parks

SBP Systematic Biodiversity Planning

SDF Spatial Development Framework

SEA Strategic Environmental Assessment

SKEP Succulent Karoo Ecosystem Programme

STEP Subtropical Thicket Ecosystem Programme

WMA 12 SEA Strategic Environmental Assessment for Water Management Area 12

Glossary

Main source: STEP Handbook, Second Edition

Other sources as specified in the text

Alien Invasive Species Any plant or animal species that has been introduced into an area and that thrive in local conditions, suppressing and replacing indigenous biodiversity. Invasive plants and animals are the second greatest threat to biodiversity worldwide. Invasive species may cause economic or environmental harm, or even harm to human health.

Biodiversity All the different kinds of indigenous plants and animals and micro-organisms in the natural environment, and the natural processes that allow them to survive. Biodiversity is the living component of the natural environment. The word is short for “biological diversity”.

Biodiversity planning maps 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.

Biodiversity target A quantitative target that tells us how much of each biodiversity feature needs to be conserved in order to conserve a representative sample of biodiversity pattern and key ecological and evolutionary processes. Targets are expressed as, for example, numbers of hectares of a vegetation type.

Biome A biome is a broad classification of vegetation according to the kind of plants that occur there, which is influenced by factors such as soil and climate. A biome is not usually found only in one part of the country. Depending on the climate and features of the landscape, a particular biome can be distributed in patches, like forest in the kloofs of mountains all over the country.

Bioregion An area defined by its natural ecosystems and human communities. A bioregion is identified by local people, governments and scientists. It must be large enough to maintain the integrity of the plant and animal communities, but small enough for local people to think of it as home. A more technical definition is “a specified geographic area of any scale that contains whole or several nested ecosystems and which can be characterised by its landforms, vegetation cover, human culture and history”.

Bioregional programme A plan for a region which brings human communities together to identify their problems and goals, and agree on an approach and projects. It focuses on methods for the effective management of the region’s biodiversity, and the long-term survival of that biodiversity.

Catchment An area in which rain falls, and from where it flows into a river. The catchment of a particular major river can include entire mountain ranges.

Conservation The sustainable management of the natural environment.

Conservation planning See “systematic conservation planning”.

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning.

Data Information or facts, often expressed in numbers

Desert A biome that has very little vegetation compared to other biomes - the landscape is often covered mainly by sand or gravel. Deserts receive less rain than any other biome in the world and are therefore very dry, but several different species of animals and plants are specially adapted to survive in even this harsh environment.

Development The act of altering or modifying the natural environment e.g. agriculture, housing, industry, holiday resorts etc. Development is necessary, but it disturbs and impacts on the natural environment and its resources. Therefore it is vitally important to be as environmentally sustainable as possible when placing and designing any kind of development.

Ecosystem An ecosystem is a system that is formed by components (plants, animals, water, soil, etc.) of the natural environment as well as the relationships and interactions between them. Ecosystems

operate at different scales (sizes). For example a small pond is an ecosystem; a forest is an ecosystem; even the whole planet can be seen as an ecosystem. Ecosystems are maintained through internal processes that take place between their components as well as external factors like climate. The word “ecosystem” is short for “ecological system”.

Ecosystem processes All the processes that result from the *relationships and interactions* in and between ecosystems are called ecosystem processes. For example nutrients are cycled from the soil to plants to animals and back to the soil again; insects fertilize (pollinate) flowers as they feed on nectar. Many of these ecosystem processes provide direct services for humankind.

Ecosystem services Ecosystem services are ecosystem products and processes that benefit human beings. For example soil and water is purified as plants extract nutrients; plants stabilise soil with their roots, preventing soil erosion and so keeping our rivers clean so that towns and cities can drink clean water; nectar-eating insects pollinate crops as they move from flower to flower; and there are many more examples. Ecosystem services are often impossible or too expensive for humans to create artificially. Therefore we are totally dependent on the Earth’s ecosystems and their biodiversity.

Ecosystem Status Ecosystem Status categories indicate how threatened an ecosystem is, based on how little of the ecosystem remains intact.

Endemic A plant or animal species that is confined to, or exclusive to, a particular specified geographic area and nowhere else.

Environment Describes our surroundings, and includes all living plants, animals, bacteria etc. and non-living components (air, water) and systems (e.g. biological, physical, cultural, political, economic and social aspects). The term “natural environment” describes the same surroundings, but excludes humans, their activities and their impacts.

Environmental Impact Assessment (EIA) Part of a process required by law when certain “listed activities” are proposed by an applicant (landowner or developer) for a piece of land. These activities can pose harm to the environment, and therefore require initial authorisation from the provincial environmental/conservation agency before permission may be granted by a municipality. This authorisation must be obtained by the applicant from the provincial agency, and requires an initial investigation, followed by a basic or entire EIA.

Forest A biome dominated by tall trees that form a roof above the forest floor, making it dark on the ground below. Found in areas of high rainfall and in kloofs in the mountains, where it is wetter than surrounding areas. Forest is the biome that covers by far the smallest area in South Africa.

Fynbos A biome dominated by medium-height (about 1 to 2m) bushes, mostly with very small leaves, sometimes with reed-like plants called restios and taller protea bushes. Most types of fynbos are found on sandy soils, mainly on mountains and along the coast. Fynbos is restricted mostly to the south-western Cape, where most rain falls in the winter, and to the in western coastal and mountain areas of the Eastern Cape.

Global warming Carbon dioxide and other so-called “greenhouse gasses” prevent heat from escaping from the Earth into space. Due to the increasing amounts of these gasses that are being produced by humankind, the concentrations of greenhouse gasses in the atmosphere have become so high that the average temperatures on Earth are beginning to rise. This has serious implications for humans and biodiversity, such as the melting of the polar ice caps which will cause a rise in global sea level. It is important that we all decrease our production of these gasses.

Grassland A biome dominated by different species of grasses, with very few bushes or trees. For most of the year only grass can be seen, but in spring a variety of flowers sprout from underground bulbs. As in fynbos and savanna, fire is a natural and important part of these systems..

Habitat The natural home of a plant or an animal. The habitat of a frog might be a wetland, whereas the habitat of a kudu is veld with tall shrubs and trees that it eats.

Hydrologic cycling The Earth’s water always in movement, and the **water cycle**, also known as the hydrologic cycle, describes the continuous movement of water on, above, and below the surface of the Earth. Since the water cycle is truly a “cycle,” there is no beginning or end. Water can change states among liquid, vapour and ice at various places in the water cycle, with these processes happening in the blink of an eye and over millions of years. (Source: Wikipedia).

Indicator species can include species of special concern such as rare, threatened, keystone species, or

umbrella species. (Source: Berliner, D. & Desmet, P. 2007).

Land cover is the physical material at the surface of the earth. Land covers include grass, tarmac, trees, bare ground, water, etc. There are two primary methods for capturing information on land cover: field survey and through analysis of remotely sensed imagery. (Source: Wikipedia).

Land use management The use of procedures to restrict or regulate the use of land, e.g. in reactive decision-making in response to applications by landowners for changes in land use.

Mean annual runoff This is defined as the average annual flow of a river under natural conditions (Source: Stats SA)

Listed activities A list of specific activities which may pose harm or a threat to the well being of the environment, and which therefore require prior investigation to ensure against unnecessary damage to the environment. The investigation forms part of the environmental impact assessment (EIA) which is regulated by the provincial environmental/conservation department. Municipalities must, by law, ensure that applicants have acquired this authorization before allowing such activities in their area..

Nama Karoo A biome characterised by a mixture of grasses and small, dry-looking bushes with open ground in-between. As with succulent Karoo, Nama Karoo occurs in areas with very low rainfall and soils are often very rich, but plant growth is limited by the dry climate. Quite extensive areas of this biome are found in a few inland areas within the STEP region, such as Graaff-Reinet and Cradock.

Natural environment The living (plants, animals and micro-organisms) and non-living (soil, water, etc.) components of our surroundings, *excluding* the changes that humans have made (cities, agriculture etc.). In cities there is almost nothing left of the natural environment, but elsewhere, in places like Addo Elephant National Park and farms where livestock feed on natural vegetation, the landscape still consists mostly of the natural environment.

Pristine Unspoiled. Used to describe the natural environment where it is undisturbed and undamaged.

Red Data Book species Plant or animal species that are named in a list (the Red Data Book) because their survival is under threat. They are protected by law under provincial ordinances, and the NEMA, and are protected under the Biodiversity Act.

Rehabilitation Meaning (roughly) restoration of natural vegetation, especially after mining activities or quarrying.

Reptile Reptiles are animals that have skin covered in dry scales. They include snakes, lizards, tortoises and crocodiles.

Restoration The repair of the natural environment to a state close to its original state. This can be achieved by e.g. the removal of alien invasive plants, or the repair of eroded sites and the replanting of indigenous plants.

Safeguard Look after or protect, by preventing unnecessary and unwise development or activity.

Savanna The savanna biome is the most typical of Africa's biomes, consisting of trees scattered in grassy veld. Many of the trees have thorns. As in fynbos and grassland, fire is a natural and important part of these systems. In savanna regular fire is needed to keep the balance between trees and grass.

Spatial planning Any planning related to space, which can be shown on a map.

Species All plants and animals are classified and identified by scientists according to a scientific name (species name). Each species has at least one local name, plus a scientific name which is the same everywhere in the world. Different species are organisms that are distinctly different to each other. For example, the black rhino (scientific name *Diceros bicornis*) and the white rhino (scientific name *Ceratotherium simum*) are both rhinos, but they are different species. As another example, an indigenous forest consists of many different indigenous species of plants and animals, while a plantation of pine trees consists of just one plant species.

Strategic Environment Assessment (SEA) An assessment which is aimed at ensuring that environmental issues are addressed from an early stage in, and throughout, the formulation of plans.

Subtropical Thicket See "thicket".

Sub-quaternary catchment Quaternary is an adjective meaning 'fourth' ... It is next in the sequence primary, secondary, tertiary... (source Wikipedia). A sub-quaternary catchment is a fifth-level subdivision of a river catchment.

Succulent Karoo A biome consisting mostly of small bushes with open ground in-between. Many of the bushes have succulent (fat) leaves or stems. Very few grasses. As with Nama Karoo, succulent Karoo occurs in areas with very low rainfall and soils are often very rich, but plant growth is limited by the dry climate.

Sustainable development Development that meets the needs of people now without endangering the capacity of meeting needs in the future. National Environmental Management Act 107 of 1998 (NEMA) states, “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”.

Systematic conservation planning, also known as Systematic Biodiversity Planning Planning for the sustainable management of biodiversity. This approach considers the entire landscape rather than only protected areas, which is necessary for the long-term survival (persistence) of biodiversity.

Transformation refers to the process where natural vegetation is replaced with cultivation, urban development, plantations etc, and biodiversity and ecological processes are thus irreversibly destroyed

Thicket A biome consisting of dense bushes and small trees, many of them succulent (fat leaves or stems) or thorny. In some areas thicket is so dense that it is impossible to walk through (solid thicket). Elsewhere it occurs as “mosaic thicket”, where clumps of thicket vegetation are scattered within other kinds of vegetation. This is the biome that is most common in the STEP region.

Vegetation The collective term for plants in an area. Often referred to as “bush” or “veld”.

Vegetation Type Vegetation types are a more detailed classification of vegetation than biomes. Each biome consists of several different vegetation types that are similar to each other.

Virgin land Natural veld that has not been damaged. This usually refers to land that has not been ploughed for the cultivation of crops.

For further information, contact:

Eastern Cape Provincial Department of Economic Development and Environment Affairs (DEDEA)

Website: <http://dept.ecprov.gov.za/>
Private Bag X0054
Bhisho 5605
Tel: 040 609 3094

Department of Water Affairs and Forestry (DWAF)

Website: <http://www.dwaf.gov.za/>
Eastern Cape Regional Office: Private Bag X7485
King Williams Town 5600
Tel: 043 604 5400

SA National Biodiversity Institute (SANBI)

Website: <http://bgis.sanbi.org/>
SANBI Bioregional Programmes Coordinator
Private Bag X5001, Greenacres, 6057, Port Elizabeth.
Tel: 041 508 5817

The Director, SANBI Directorate for Biodiversity Programmes
Policy & Planning Services
South African National Biodiversity Institute
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