

Annexure 12: Bergrivier Spatial Development Framework

Environmental overview

3.4 Environmental

The delineation of an urban edge can provide security for the protection of sensitive biodiversity elements and natural resources. The essence of planning for sustainable development is to create equilibrium between the different components that constitute present-day society. It is imperative that the built, social, economic, political and natural environment correspond. The indispensability of each component in the urban context should determine its planning significance.

3.4.1 Biophysical environment

The biophysical resources of the region provide the foundation for the basic life-supporting systems, as well as for tourism, recreation and agriculture. It gives form to the urban / settlement components and demands consideration in urban planning.

3.4.1.1 Climate

Bergrivier Municipality is situated in an area with a typical “moderate” climate with warm summers and cool winters that is on average generally suitable for habitation as well as ideal for a variety of agricultural activities *e.g.* wheat, deciduous fruit and vine cultivation. At the coast the average summer temperature is less than 30° C and the air is dry. In winter the night temperatures seldom drop to lower than 5° C and day temperatures are usually in the twenties. Inland it usually becomes much warmer in summer and the average day temperature in summer is 18°C. The moderate to high summer temperature in particular encourages outdoor life and creates ideal conditions in which natural resources can be utilized. Even in winter the cool to moderate temperatures do not hamper outdoor activities.

The area is situated in the winter rainfall region. In the south-eastern part of the study area the rainfall varies from as low as 300 mm to more than 450mm in the mountains. The same applies for the area to the north of Piketberg and at Aurora. In the northern part of the study area the annual rainfall varies between 200mm and 350mm. The coastal zone receives the least rainfall through the year with an average of between 150mm - 200mm.

The most common wind directions in the area can be classified according to the seasons in two main categories, *e.g.* in summer from a south-easterly direction and in winter from a north-westerly direction. The position of the Olifants River Mountains gives occasion to a high prevalence of ‘berg winds’. Berg winds and north-westerly winds can be detrimental to farming.

3.4.1.2 Topography and drainage patterns

The region is intersected by two mountain chains, *i.e.* the Olifants River Mountains and the Piketberg Mountain. Other prominent mountain ranges are the Koue Bokkeveld Mountains, the Witzenberg Mountains and the Cederberg Mountains which occur just outside the study area.

The topography of the Lower Berg River is typical of that of a lower stage river and displays the characteristics of a flood plain. The coastal section has a relatively low relief with long sand beaches, succeeded by low-lying knobby dunes.

On the western side of the Olifants River Mountains as well as the Witzenberg Mountains and the south-westerly side of the Piketberg Mountain the Great Berg River system, as well as tributaries, have cut deep into the landscape. The Great Berg River is also the most important element of the drainage system of the region.

3.4.1.3 Catchment areas and water sources

3.4.1.3.1 Catchment areas

Within the context of bioregional planning the catchment areas play an important structuring role and are utilized in the demarcation of bioregions. Within the Western Cape several catchment regions can be identified, usually associated with mountainous, high rainfall regions.

3.4.1.3.2 Water sources

The study area is well endowed with water sources, both above ground and subterranean.

A thorough exposition of the hydrological functioning of the Berg River, being the most important surface water source, as well as flow patterns and most important water schemes are expounded in the Lower Berg River Sub-regional Structure Plan (2001).

The availability of water for consumption in urban activities is however, limited.

3.4.1.4 Geology and soil types

The analyses of the geology of the region are particularly important when alternative land-uses and development proposals are considered. The following table provides a summary of the geological formations with lithology.

Table 1 Geological formations with lithology

Group	Sub-group	Formation	Lithological description
Klipheuwel			Ck: Sandstone, conglomerate, shale

			Nbl: Greenstone
Malmesbury	Moorreesburg		Nmo: Greywacke, shale, limestone
Malmesbury	Franschhoek	Piketberg	Np: Phyllitic shale, greywacke, limestone
	Franschhoek	Porterville	Npo: Phyllitic shale, greywacke, limestone, arenite
Tafelberg		Piekenierskloof	Op: Quartzitic sandstone, shale
Tafelberg		Skiereland	Ope: Quartzitic sandstone, shale
Bredasdorp			Q: Alluvium, sand, calcrete
Tafelberg	Nardouw		Sn: Quartzitic sandstone, shale, tillite

Source: Information provided by the Council for Geoscience (1984, 1991 and 1994).

The geological formations should not pose serious problems for the installation of services (*e.g.* digging of trenches for the laying of water and sewerage pipes and electrical cables) and the construction of building foundations. With modern construction machinery excavating problems should be minimal. Areas where alluvial deposits occur are often situated beneath the 1:50 year flood line and are thus not suitable for development. Furthermore these alluvial deposits are normally weakly consolidated, have a poor retention ability and high water tables often occur. Large differences in substrata characteristics can be expected over short distances.

Although the aforementioned geological perspective gives an indication of the geological nature of the region, it is based on generalized characteristics and local differences may occur. Terrain-specific engineering or geo-technical investigations are thus imperative. The siting of new stone quarries or cemeteries will for instance be subject to detailed geo-technical investigations.

3.4.1.4.1 Mineral deposits

The region has relatively few exploitable mineral deposits. The location of the mines of which some are in and others out of production are shown on the geological plan. It is mainly Salt (NaCl), Limestone (Ls), Gypsum (Gy) and Phosphate (P) that are worked. Salt and Limestone are exploited extensively.

3.4.1.4.2 Soil types

The soil types that occur in the region, more than anything else, determine the type of farming operations that can be practiced. The carrying capacity of agricultural practices (arable lands) is principally determined by the type of soil that underlies the area. The western side of the study

area has mainly sandy, well-drained soils. The soils that are found in the central part of the region, north-west of Piketberg, as well as in the eastern section have minimal agricultural development potential. These soils are shallow on hard or eroded rock, with or without alternating diverse soils. Limestone also occurs in most of these soils. In the general area between Piketberg and Porterville a mixture of strongly structured clay soils occurs, as well as weak-structured soils with a high base status. Clay sections underlie especially the foothills of the Olifants River Mountains, while the mountainous sections are rocky.

3.4.2 Biological environment

The biological environment encompasses the plant and animal communities of the region.

3.4.2.1 Natural vegetation

The municipal area covers a region where Coastal Renosterveld and Coastal Fynbos, as well as Strandveld occur.

3.4.2.1.1 Cape Fynbos biome

The vegetation of the sandstone fold mountains and sandy coastal plains of the Western Cape is known as Fynbos. Fynbos plant species constitute 80% of all the plants in the Cape Floristic Kingdom, which is the smallest of the world's floristic kingdoms and covers only 0,04% of earth's surface. Even though the soils of the mountains and coastal plains of the Western Cape contain few nutrients, about 8600 fynbos species are projected to occur there. About 5800 of these fynbos plant species are endemic and some have such a restricted range that they may in some cases only occur on a single mountain peak.

The vegetation is hardy and well adapted to the warm summer seasons and strong coastal winds of the Western Cape Province. These adaptations may be large, leathery leaves (*e.g.* in the protea family); or fine, small leaves, often with rolled edges (*e.g.* in the erica family); or long, thin stems with no leaves (*e.g.* in the restio family); or underground storage organs (*e.g.* in the lillies and orchids). Fynbos grow typically in nutrient-poor, well-drained and often shallow soils.

The primary veld types of the study site are summarized here:

(a) Strandveld

Strandveld is usually located on the lower lying sections of the sandy western coastal plains, with rainfall varying between 50mm-300mm per year, and mainly in the winter. There are two variants: a thick, dwarf, semi-succulent shrub and an open, semi-succulent shrub. Bushy groups are found on geological formations known as 'heuweltjies'.

The Strandveld north of Velddrif is in a relative good condition and may sometimes reach a

height of up to 1,5m. Formal conservation measures are necessary in isolated areas to protect the natural veld against uncontrolled motor and recreation activities. However, serious disturbance of strandveld plant types has occurred in the Velddrif environment as well as south of the Berg River Estuary, mainly due to agricultural, industrial and residential development as well as alien plant infestation¹.

(b) Coastal Renosterveld

This vegetation type is found in two areas of the study site: on the western coastal plains and on the southern coastal plain. In both areas the soil is clay-like and it is already ploughed to such an extent for the cultivation of wheat that remnants of the natural vegetation are scarce and in a poor condition. Height above sea-level is from 0m - 300m and rainfall from 300mm - 500mm annually, mainly during winter.

(c) Coastal Fynbos

This type of Fynbos occurs on sand and limestone in the western coastal strips of the study site. It is not as disturbed by ploughing as is the case with Coastal Renosterveld. In the dryer west coast strip with its winter rainfall the plant communities are shrubby veld in grassy Fynbos. The thick thorny and semi-succulent character of shrubs found on heavier soil types is apparently absent here. Height above sea-level is from 0m - 300m and rainfall from 300mm - 500mm annually, during winter.

(d) Estuary and flood plain

A total of 145 plant species have been identified in and around the Berg River Mouth, of which 111 are from the estuary and flood plain. Of these 111, 11 species are alien species. Although the diversity of the flora at the Berg River Mouth is relatively poorly developed, taking into account the diversity of the Fynbos Biome, it is the vegetation's high structural diversity that is important. The presence of a great diversity of habitats, and the vegetation's particularly high level of productivity, is responsible for the high fauna biomass per unit area, and also the rich fauna diversity. This is also reflected in the area's bird life².

Wetlands, pans and flood plains are of great value as they support a variety of plant species. The wetlands and pans have their own characteristic plants such as water hyacinth, sea-grass, restios, 'waterblommetjies' (Cape pondweed) and water-grasses. Over and above the above-mentioned vegetation types, the Berg River mouth is rich with nutrients that support plant life. Plants provide the basis for all estuary life.

3.4.2.1.2 Threats

¹ Lower Berg River Subregional Structure Plan (2001)

² Lower Berg River Subregional Structure Plan

In spite of the uniqueness of the Cape Floristic Kingdom, large sections of its habitat have already been destroyed by the invasion of alien vegetation such as rooikrans, pines, wattle and hakea. These plants compete with Fynbos and diminish the natural diversity, increase the danger of untimely fires, extract great volumes of water and are viewed as aesthetically unattractive. Other meaningful threats are ill-considered farming activities, non-sensitive urbanization, uncontrolled cutting of veld flowers, disturbance via 4x4 vehicles and the mining of gravel. Of the 8600 fynbos plant species, at least 1600 are rare or endangered, while 35 have already become extinct. These 1600 species represent 65% of the threatened plant species in Southern Africa. The abovementioned results in some sections of the study site being sensitive to development actions, and the placing of recreational activities such as hiking trails, picnic and camping sites must therefore take cognisance of the sensitivity of the Fynbos biome.

3.4.2.2 Fauna and marine life

The animals that occur in the Berg River Municipality study area are to a great extent related to the structure of the vegetation. The area supports a variety of animal and bird species especially due to the landscape's diversity, and subsequent plant bio-diversity of the ecosystem. Many of the animal, bird and marine life can be seen in statutory conservation areas, for example the black oystercatcher in the Rocher Pan Nature Reserve - one of Africa's most endangered coastal bird species.

Generally speaking it is difficult to take the animal population into account in the planning and management of development projects. A number of proposals are given in this regard. It is important to:

- # Take the requirements for the normal functioning of the animals into account in development projects. For each project the developers have to acquire the necessary information from knowledgeable persons.
- # Take cognisance of the presence of and habitat requirements of threatened and protected animals that occur in a specific planning area.
- # Take cognisance of the role of key animal species in the functioning of the different plant communities.

Although the fynbos biome is not rich in animal and bird life, a few endemic species occur in the study site, *e.g.* steenbok, springbok, klipspringer, cape rock-thrush and cape tilapia.

Some of the fauna are threatened by extinction, including the yellow-billed duck, white pelicans, and greater and lesser flamingoes.

The richest bird habitat is possibly the river mouth and floodplain of the Berg River that accommodates hundreds of bird species at times. The Berg River mouth is one of only two localities in South Africa to which approximately 30 000 wading birds migrate to annually. This area has been considered as a Ramsar site due to its international importance for waterfowl.

Another important bird habitat is the Rocher Pan Nature Reserve. Many bird species (seaweed-eating types as well as fish-eaters) utilize the combination of land, vlei, and marine environments for feeding and nesting sites. Some examples are the following; on land: ostriches, black-shouldered kite, blue crane, brown snake-eagle and white stork; in the vlei areas: white pelicans, great white egret, yellow-billed duck, spur-winged geese, and giant kingfisher; along the coast: jackass penguin, black oystercatcher, cape gannet and white-breasted cormorant.

In the study area the Berg River estuary is an important breeding area for many fish, prawn and crab species. Some of the fish species are dependent on the estuary for their total life cycle. Most of the fish species, though, breed in the sea and return to the estuary until they are mature enough to breed. The most common fish species in the estuary is probably the mullet (*harders*) that feeds on both detritus and plankton. The area is also known for its catches of steenbras and kabeljou.

3.4.2.3 Conservation areas

The BSDF area is characterized by a range of unique natural and cultural elements that are protected via a series of conservation actions (formal and informal) involving different conservation areas. These areas are mainly situated along the Berg River, or along the coast, or in the mountain areas.

The following Table provides a summary of the formal as well as informal conservation areas:

Table 2: Conservation areas

Conservation area	Size	Under management of
Rocher Pan Nature Reserve	929 ha	WCNCB*
Rocher Pan Marine Reserve	896 ha	(National) Department of Environmental Affairs and Tourism (DEAT)
Groot Winterhoek Nature Reserve	27 501 ha	WCNCB
Stalkrans Private Nature Reserve	77 ha	Dr. B. Dommissie
Gys se Kraal Nature Heritage Area	650 ha	Varingvliet (Edms) Bpk
Lower Berg River Conservancy	31 354 ha	Lower Berg River Conservation Trust

Olifants River Mountain proposed conservancies		info pending from the Porterville office of CapeNature
Groot Winterhoek proposed conservancy		info pending from the Porterville office of CapeNature

*WCNCB : Western Cape Nature Conservation Board (CapeNature)

3.4.2.3.1 CAPE project

In November 1997 conservation in South Africa was afforded a huge opportunity when the Global Environmental Facility (GEF) authorized a R59 million grant for the conservation of fynbos to the World Wildlife Fund-South Africa (WWF-SA) and the South African National Parks Board.

This grant was utilized to support the Table Mountain Fund, and to found the Cape National Park, and to initialize a long-term conservation strategy known as the Cape Action Plan for the People and the Environment (CAPE).

The CAPE project is managed by the World Wildlife Fund-South Africa (WWF-SA) and its goals are the following:

- § Priorities for conservation on the basis of bio-diversity and to identify threats
- § The development of a long-term strategic vision
- § Scenarios for the development of new nature reserves
- § To develop guidelines for effective conservation strategies outside nature reserves
- § To establish a 5-year action plan with priority projects
- § To identify potential financial sources for projects

A wide range of specialists and organizations came together to manage the CAPE project, including state departments on national and provincial level (Western and Eastern Cape Provinces), South African National Parks, the National Botanical Society, Western Cape Nature Conservation, Eastern Cape Provincial Environmental Advice Committee, the Botanical Society of Southern Africa, Wildlife and Environment Society of Southern Africa, and the Fynbos Forum.

Thus several studies have been undertaken since 1998 and plans evolved regarding conservation worthy-elements. These plans and inputs are also of importance for strategic conservation in the area of jurisdiction.