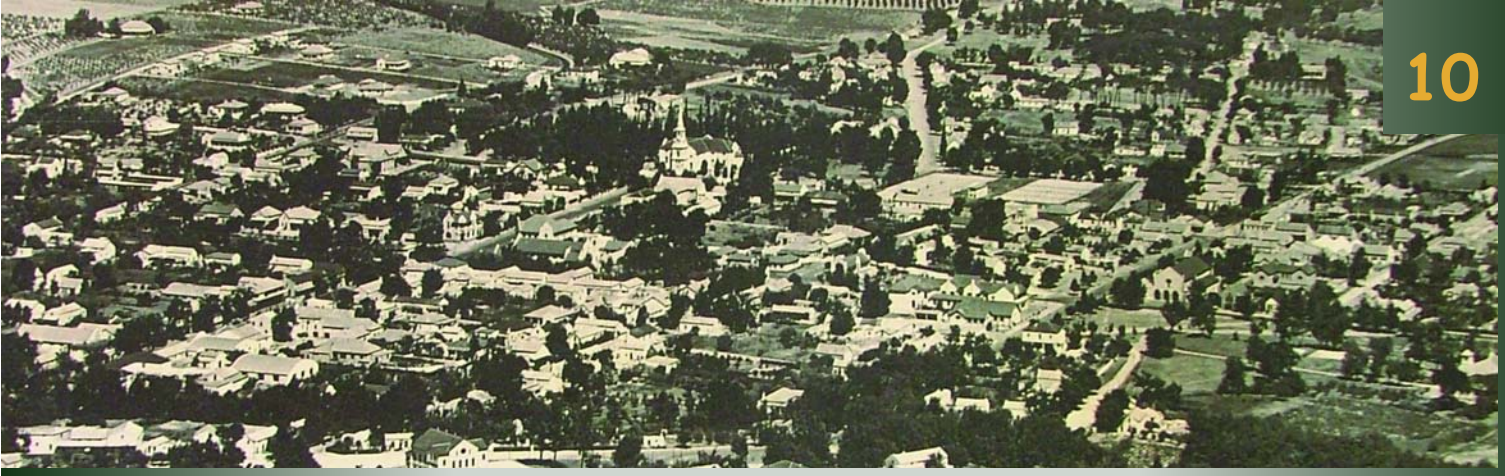
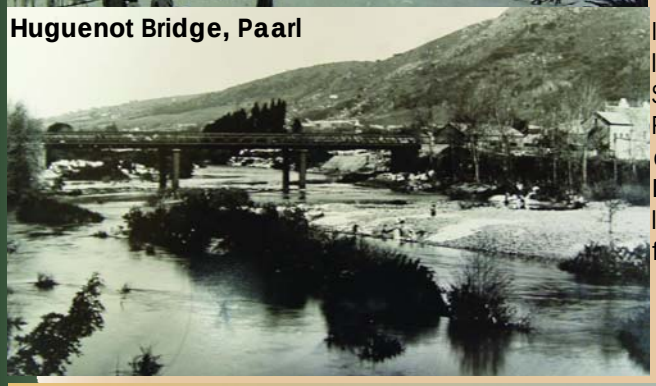


The first known European record of the Berg River was made by bailiff Abraham Gabbema in 1657 when Dutch Governor Jan van Riebeeck sent him to trade with the Khoekhoe for meat for the settlement at the Cape. Gabbema named the river the 'Groot Berg Rivier'. In years to follow many of van Riebeeck's men relied on the river waters and followed its winding course as they ventured northwards. Despite Gabbema's visit, the Berg Catchment was not developed until Governor Simon van der Stel's time (1679 – 1699), prior to which settlement was limited to the Peninsula. Governor van der Stel visited the area with the first free burghers, and prompted by the Berg River's fertility and beauty, he established the first European settlements at Paarl and the Drakenstein valley in 1687.

The first pontoon across the Berg River was established in 1732 at Kalkoentjies Drift

Wellington, Franschhoek and Tulbagh were established shortly after this as the farmlands expanded. These towns became home to the Huguenots who brought with them an intellectual property that was to transform the Cape: wine-making skills. Although fruit grew in abundance, it was considered of little value and much of it was left to rot. In 1886 several boxes of grapes were transported to London and sold for 15 shillings per pound compared to a penny per pound in Cape Town. This was the birth of the fruit export industry.

Huguenot Bridge, Paarl



In 1699, Governor Willem van der Stel granted licences to stock farmers to graze stock in the Swartland to the north of Cape Town, as far as Riebeek-Kasteel. Later, during the nineteenth century, the towns of Hopefield, Moorreesburg, Darling, Porterville and Piketberg were established and grain farmers joined the stock farmers.

EARLY SCIENTIFIC ENDEAVOURS

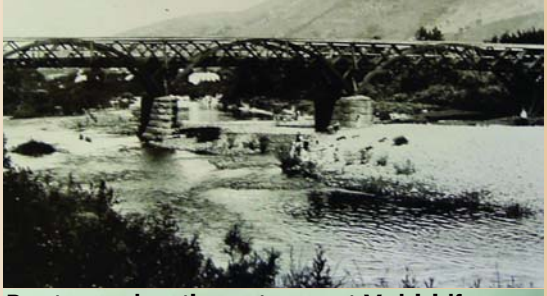
The Berg River was the first river in South Africa on which a detailed limnological and chemical study was conducted. A.D. Harrison and J.F. Elsworth undertook the study and sampling spanned a period of 3 years, beginning in May 1950. Although initially intending to determine the biological effects and indicators of pollution, the objectives of the study shifted to assessing the biota and conditions of life in an unpolluted South African river. The data obtained from the study provides a firm basis for the historical faunal communities and zonation patterns occurring along the river course. This study was not only the first of its kind in South Africa, but aided in the development of methods and provided fundamental concepts for South African river biology.

PAST DEVELOPMENT (CONTINUED)

Various manipulations of the Berg River over the past three hundred years have provided water for surrounding agriculture. In 1852, Sir Thomas Bain, a prominent engineer at the time, and Gawie Retief, constructed one of the first major water diversion schemes in South Africa at a cost of R2 800. Water from the Witte River (a tributary of the Breede River) was diverted via a furrow to the Krom River, a tributary of the upper Berg River. This became known as 'Gawie se Water'.

In 1886, Bain suggested that the Klein Berg River be dammed and that surplus water be stored in 'a small periodical lake named Vogel Vley'. Bain's advice was taken and expanded upon. Today the Voëlvlei Dam can be found a few kilometres south of Gouda. This led to the loss of a rare and valuable wetland.

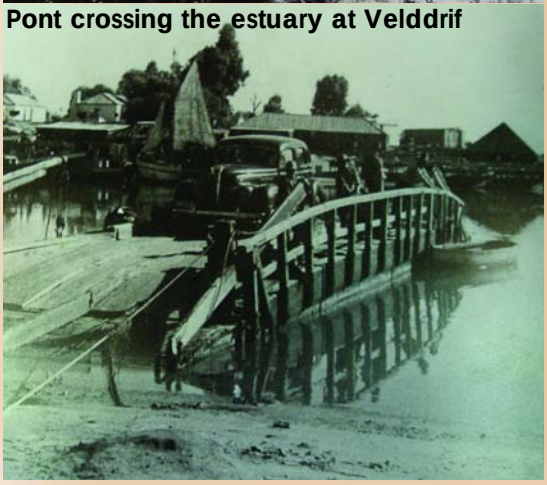
Lady Grey Bridge, Paarl, 1853



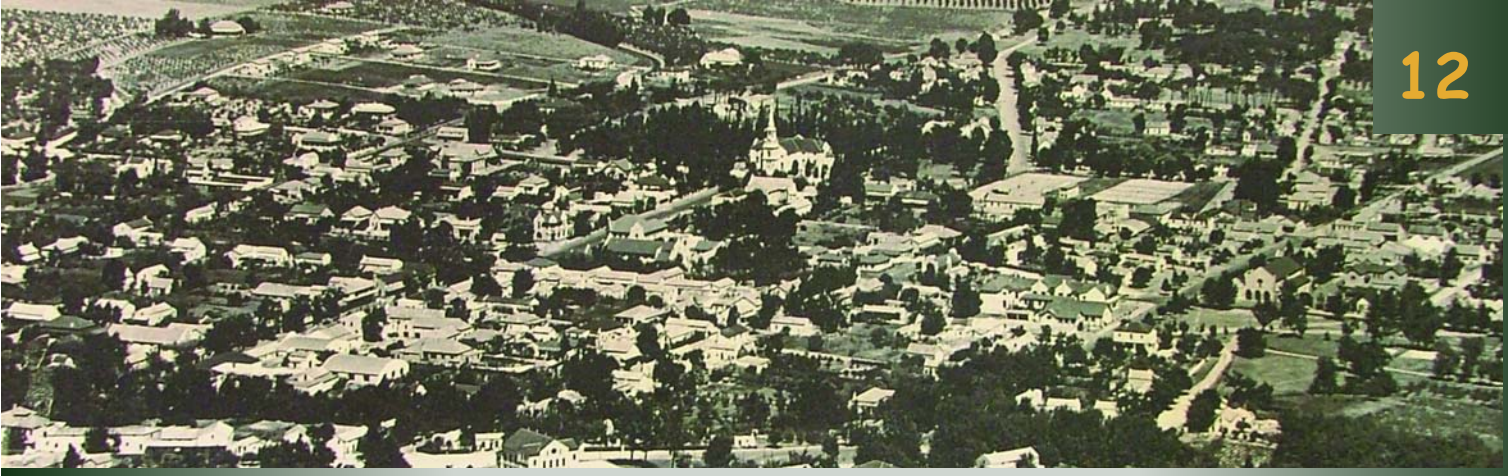
One of the first bridges across the Berg River was the Lady Grey Bridge, opened in 1853 and formed the first uninterrupted connection between Paarl and Wellington.

In 1850, a bridge was constructed at "de Brug" on the middle Berg River, just upstream of the present day N7 bridge. The bridge, constructed in England, was originally bound for Australia, but the ship transporting it needed to stop in Cape Town for repairs. In order to do the repairs, the bridge was offloaded, but could not be reloaded. Subsequently, a section of the Berg River, narrow enough to accommodate the bridge was selected, and the bridge found a new home over the Berg River.

Pont crossing the estuary at Velddrif



The coastal route from the Sandveld, originally forded the river at Velddrif, but was also later moved to a concrete bridge about 5 km upstream of the river mouth.



Although not a navigable river in its upper reaches, the lower reaches of the Berg River were used for many years as a means of transport. The sand bar at the mouth of the Berg River proved a major problem for navigation as it could not be crossed by large boats except at high tide, and could never be crossed during bad weather. Laaiplek (the loading place) served as a shipping point for wheat and other goods transported down the Berg River.

The idea of cutting a path through the sandbar was first mooted in 1786. Almost 200 years later, in 1966, a deeper, artificial channel was finally blasted, linking the river and St. Helena Bay, and bypassing the silting estuary. Breakwaters were built and the fishing harbour was finally completed. The remains of the former mouth channel which lay approximately one kilometer south of the present mouth now form a 'blind arm'.

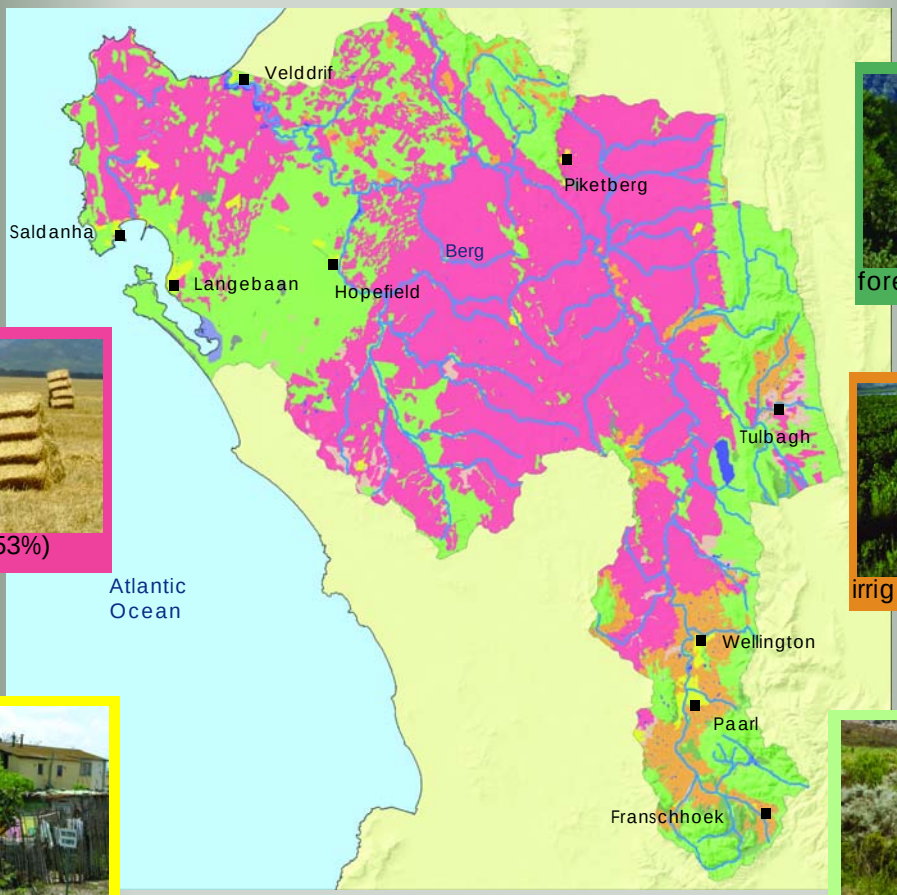
Legend has it that the little sailing cutter 'Alabama' carried cargoes up and down the Berg River, and would often come into Table Bay loaded with dekriet (thatch), which was harvested along the Berg River. The dekriet was used for wedding beds of Cape Malay brides. From this originated the Malay folk song "Daar kom die Alabama".

HIPPOPOTAMI IN THE BERG RIVER

Historically, the Berg River was one of many habitats in the Cape inhabited by hippos but, in the late 1600s, hunters began overexploiting the hippos for their meat and hides, resulting in a decline in their numbers. By the mid-1700s, they had declined to such an extent that governor Tulbagh introduced a fine of 1000 guilders for anyone caught killing a hippo. Despite this protection, their numbers continued to dwindle as human settlement altered and destroyed their habitat. By the early 1800s, perhaps only a dozen remained, sheltering in the region of Kersefontein and the estuary. In 1829, only six hippos remained. The last known hippo was shot in 1869 by Martin Melck when it attacked and killed one of his employees.

LAND-USE

LAND-USE WITHIN THE CATCHMENT comprises mainly dryland wheat farming, livestock farming, forestry, industry, fruit farming, urban areas and nature conservation.




forest plantations (<1%)


dryland crops (53%)

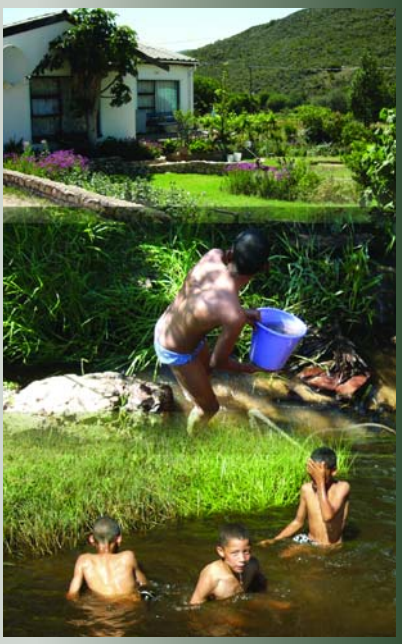

irrigated crops (7%)


urban areas (2.5%)


natural vegetation(36%)

	Upper Berg River & Tributaries	Upper Middle Berg River & Tributaries	Lower, Middle Berg River & Tributaries	Lower Berg River & Tributaries	Floodplain & Estuary
Main land-use per catchment	Natural vegetation	Irrigated crops	Dryland agriculture	Dryland agriculture	Dryland agriculture Natural vegetation
Dams	Wemmershoek	Nantes, Bethel	Voëlvlei	Misverstand	-
Total dam capacity (Mm^3)	64 (23% MAR)	32 (12% MAR)	189 (66% MAR)	13 (14% MAR)	-
Main dam water usage	Domestic	Domestic	Domestic Irrigation	Domestic Irrigation	-
Population (Urban)	24 345	174 665	21 193	33 805	75311
Population (Rural)	4 317	37 141	19 236	15 729	8813
Population with water services (%)	99	99	91	87	92

Population



The total population in the Berg River catchment for 2004 is estimated at about 420 000. About 79% lived in urban areas and 21% lived in rural areas. The majority of the population is concentrated in urban areas (e.g. Paarl) where they are attracted by economic activity and employment opportunities. Population density in the winelands is moderate, becoming sparse to the north and west, reflecting the combined influence of climate and economic activity.

The average population growth is about 3.2% per annum. The urban population increased at 3.4% per annum and the rural population at 1.4% per annum. Future population growth is expected to increase in the urban areas, as economic opportunities and potential increase. As the potential for agriculture is not expanding, little change in the rural component of the population is expected.

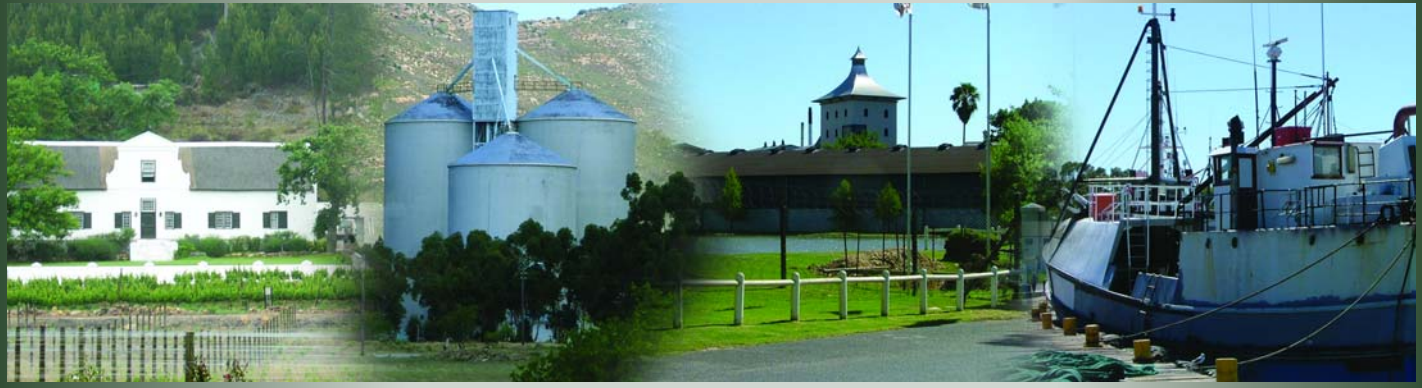
Economic Profile

The major industries in the Berg River catchment are agricultural-based (wheat, grapes and deciduous fruit) and include wineries, canneries and other food processing factories. Wineland tourism provides another major source of income.

Dryland grain farming and stock farming (sheep and cattle) dominates much of the area between Wellington and Velddrif. Forestry (pine) is found near Franschhoek. The upper catchment of the Vier-en-Twintig River remains essentially in a natural state and is an important catchment for water supply to Cape Town.

Major sources of income to the Berg River Estuary are tourism and recreation. Port Owen Marina, hotels and guesthouses along the estuary are popular recreational destinations. The estuary is being promoted as a premier bird-watching locality on the Cape coastline. Fishing industries are located on the estuary at Laaiplek and Velddrif. Cerebos salt works also provides further income to the area.

The total Gross Geographic Product for the catchment was twelve billion rand for 1997. This amounted to 2.5% of the Gross Domestic Product of South Africa.



Future Development

Berg Water Project

In May 2002, the South African Government directed TCTA to fund and implement the BWP, a R1,8 billion project to augment the Berg-Riviersonderend Scheme (see p. 18)

The Berg River Dam, previously Skuifraam Dam, is to be built on the Berg River in the La Motte State Forest, about 5 km west of Franschhoek. It is the largest water project currently being implemented in Southern Africa.

To overcome the frequent water restrictions during summer and a growing water demand from the City of Cape Town, the Department of Water Affairs and Forestry decided to implement a new water project linked directly to water conservation and water demand management. This project, known as the Berg Water Project (BWP), will supply water for agricultural use in the lower Berg River and augment the Berg-Riviersonderend Scheme (see p. 18).

The decision followed a comprehensive 14 year study of the current and future water needs of the Western Cape, the available water resources, and an extensive review of all the alternative options. There was an intensive public consultation process, to ensure that all interests, objections and ideas were considered.

The Proposed Development

The BWP will be integrated with the Western Cape Water System and will consist of:

- A 60 m high dam wall with a gross storage capacity of 130.1 million cubic metres and
- An abstraction works on the Berg River below the confluence of the Dwars River that will increase the yield of the system by 25 million cubic metres.

The BWP will augment the yield of the Berg-Riviersonderend Scheme by 81 million cubic metres (18%) to 523 million cubic metres per annum by 2007. The total demand on the supply system is expected to reach 500 million cubic metres per year by 2009 despite highly effective water demand management measures (saving 20% or more of projected consumption) .

TCTA

TCTA is a public entity created in 1986 by a Government Notice to implement the South African part of the Lesotho Highlands Water Project (LHWP). Subsequently, TCTA was made responsible for the financing and debt and risk management of the entire LHWP, except the hydropower station. Currently, TCTA manages R18,3 billion debt on the LHWP. In 2000, the organisation's mandate was expanded to include additional projects in the water sector. Now TCTA also manages the treasury function of Umgeni Water and is responsible to implement and fund the BWP. A Board of Directors, appointed by the Minister of Water Affairs and Forestry, oversees and directs the organisation.

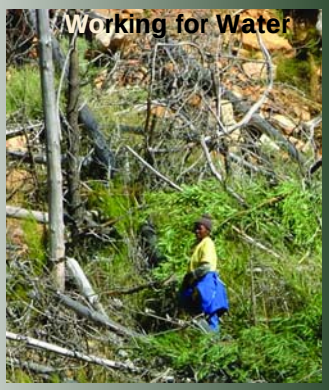
Sound Environmental Practice

By 1997, both the environmental impact assessment for the Berg River Dam and the Berg River Supplement Scheme had been completed. The BWP is the first project in South Africa that is being implemented according to the development guidelines of the World Commission on Dams. The Department of Environmental Affairs and Tourism, in consultation with the provincial Department of Environmental Affairs and Development Planning, issued a single Record of Decision in 1999, granting authorisation for the project.

The authorisation stipulated that an Environmental Management Plan be compiled prior to construction and that a community-based and representative Environmental Monitoring Committee be appointed to ensure effective environmental management of the project. A condition of the authorisation was that Baseline Monitoring should commence as soon as possible and that implementation of the Reserve requirements be undertaken.

Social Considerations

One of the key lasting benefits of the project is the construction of 80 houses in the village of La Motte, preferably by local contractors. These houses will be transferred to the Stellenbosch municipality to the benefit of the local community on completion of the BWP.



Job creation as a result of the BWP is a major consideration. TCTA developed a skills database which underpins an employment framework known as 'Franschhoek First'. It specifies minimum employment and procurement targets for the employment of local labour and small businesses on the project. Other opportunities created by the project include a R20 million Working for Water project in the previous La Motte State Forest, more than 600 direct jobs on the main construction contract, as well as skills development and training programmes that will increase the marketability of the trainees.

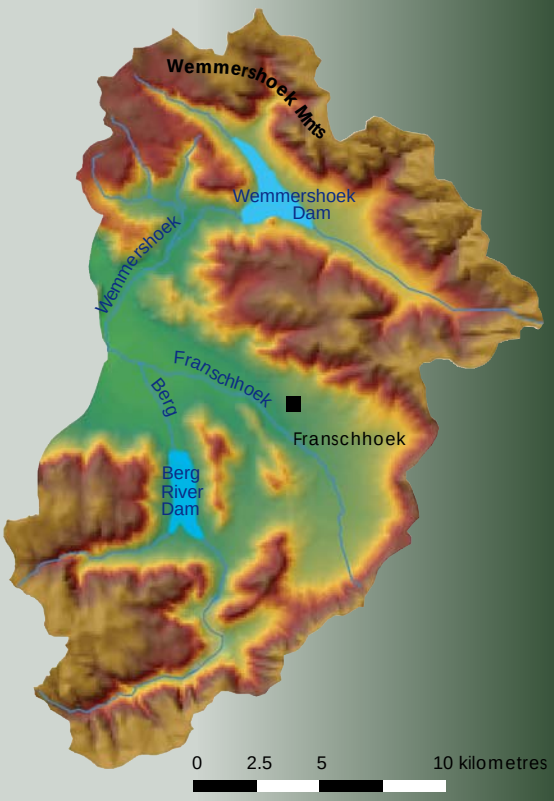
An all encompassing Sustainable Utilisation Plan will be developed by TCTA to ensure the effective utilisation and integration of infrastructure, skills, training, business development and recreational opportunities to benefit all members of the Franschhoek and Dwars River valley communities.

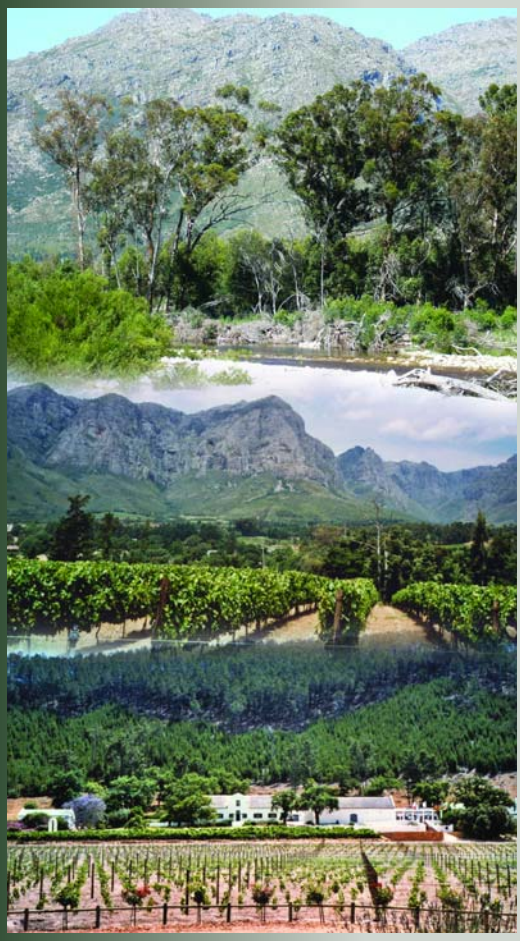
Upper Berg River & Tributaries

The Berg River has its source in the Drakenstein Mountains at a height of 1 500 m. The river drops steeply to its confluence with the Franschhoek and Wemmershoek rivers. This section of the catchment receives high rainfall and accounts for nearly one third of the runoff (267 million cubic metres per annum) of the Berg River.

The mountainous upper Berg River catchment comprises Sandstone Fynbos, plantations and areas invaded by alien trees. The lower lying areas have intensive agricultural development (vineyards and fruit farming).

Alien vegetation infestation (black wattle) is also prolific in the lower reaches of these rivers. Working for Water has a programme to remove alien plants in the upper Berg and Wemmershoek rivers (see p. 18). Much of the pine plantations are currently being cleared to make way for the Berg River Dam, which is under construction on the section of the Berg River that flows through La Motte State Forest (see p. 45).





Franschhoek, the only town in this part of the catchment, obtains its water from bore holes and the Du Toit's River in the Breede System. Wastewater treatment works in Franschhoek (200 cubic metres per day) and Wemmershoek (100 cubic metres per day) discharge treated wastewater into minor tributaries of the Franschhoek and Wemmershoek rivers, respectively.

Wemmershoek Dam on the Wemmershoek River is currently the only large in-stream dam (see p. 18). Many smaller dams provide water to wine and fruit farms in the area.

WATER SUPPLY SCHEMES

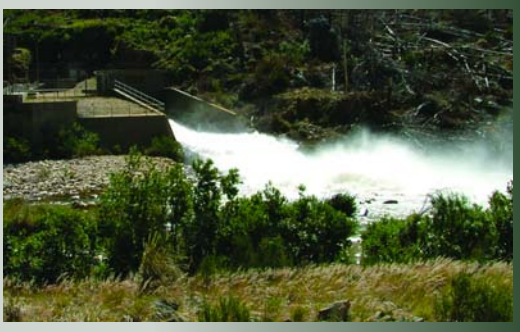
Wemmershoek Dam (59 million cubic metres) was completed in 1958 to augment water supply to Cape Town, Franschhoek, Paarl and Wellington. Prior to the completion of the Berg-Riviersonderend Scheme (see below), Wemmershoek also released water to supply irrigation demands upstream of Zonkwasdrif, near Gouda.

The Berg-Riviersonderend Scheme (proposed in 1968 and constructed in 1980) transfers water between Theewaterskloof Dam (Breede System) and the Berg River. It consists of four tunnels:

- through the Franschhoek Mountains to the upper Berg River (see Interbasin Transfer below),
- under the Berg River and the Klein Drakenstein Mountains to the Kleinplaas Dam at Jonkershoek,
- from Kleinplaas Dam to an outlet near Stellenbosch, and
- diversion works on the Banhoek and Wolwe rivers which allows surplus winter water to be stored in Theewaterskloof Dam.

Water from the scheme is for domestic use in Cape Town and for irrigation along the Berg River during summer.

Impending water shortages in Cape Town prompted the design of the Berg River Dam. The dam, approved for completion in 2007, will be located in the upper Berg River near Franschhoek (see p. 15).



INTERBASIN TRANSFER

Water transfers from Theewaterskloof Dam to the upper Berg River in the dry season increase the turbidity and salinity of the water, altering the structure of aquatic macroinvertebrate communities. Large numbers of zooplankton, insect larvae and fish are also transferred through the tunnel, further complicating the species profile. Transfers mainly occur in summer in response to irrigation demand, and increase the flow in the Berg River when it would have been naturally low. There is growing concern regarding the increasingly poor water quality of the water transferred from Theewaterskloof Dam.

Upper Berg River & Tributaries – Present State

JIM FOUCHE

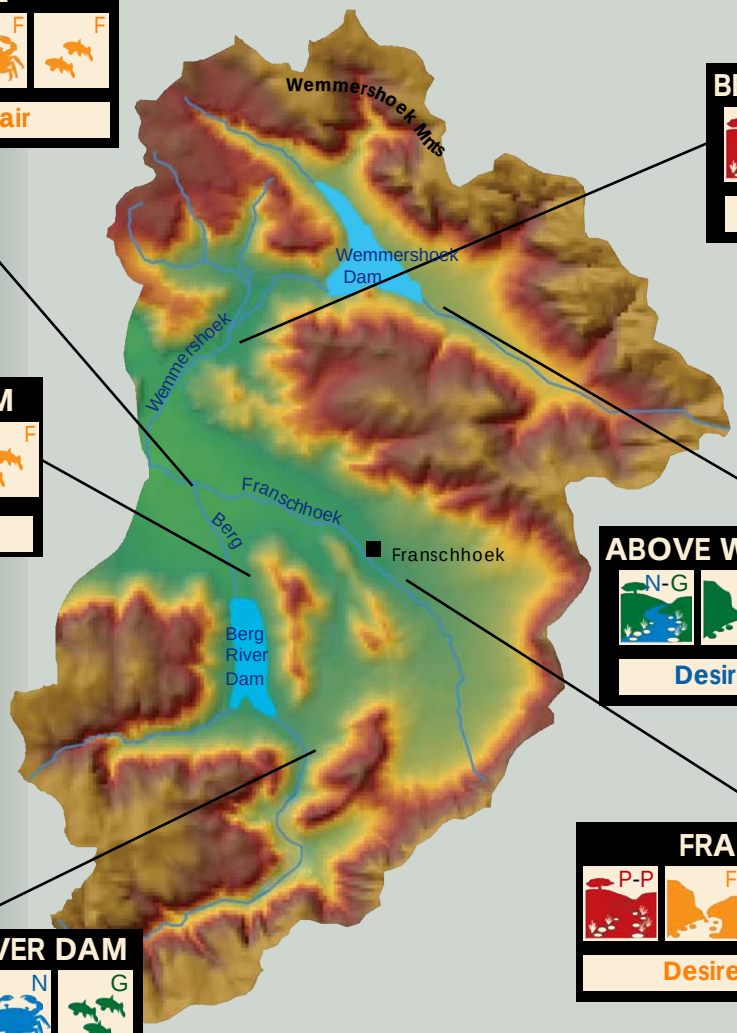
F-F | F | P | F | F

Desired health: Fair

BELOW WEMMERSHOEK DAM

P-P | F | P | F | P

Desired health: Fair



BELOW BERG RIVER DAM

G-P | G | P | G | F

Desired health: Good

ABOVE WEMMERSHOEK DAM

N-G | G | N | N | G

Desired health: Natural

FRANSCHHOEK

P-P | F | P | P | F

Desired health: Fair

ABOVE BERG RIVER DAM

N-F | N | P | N | G

Desired health: Natural

Major Impacts and Management Actions

ALIEN FLORA AND FORESTRY

The upper reaches of the Berg River are moderately to severely invaded by alien vegetation. Alien vegetation and forestry reduce runoff and hence reduce river flows, especially during summer.

ALIEN FISH

The presence of rainbow trout, smallmouth bass and bluegill sunfish has resulted in the loss of indigenous fish (e.g. witvis) and greatly reduced numbers of the endangered Berg River redfin.

RIVER AND FLOW MODIFICATION

Bulldozing and stone mining have modified the river bed and banks, and reduced habitat diversity. Alien trees along the river banks confine the river beds, causing incised channels throughout most of the catchment.

The lack of environmental flow releases from the Wemmershoek Dam results in a dry river bed directly below the dam. A tributary below the dam restores flow in the river, but not the biodiversity.

The interbasin water transfer further reduces water quality in the river and disrupts the flow regime (see p. 18).

URBAN AND AGRICULTURAL DEVELOPMENT

Centuries of cultivation have led to removal of much of the riparian vegetation, resulting in sedimentation in the river. Runoff and wastewater discharge also affect water quality near Franschhoek.

Management Actions

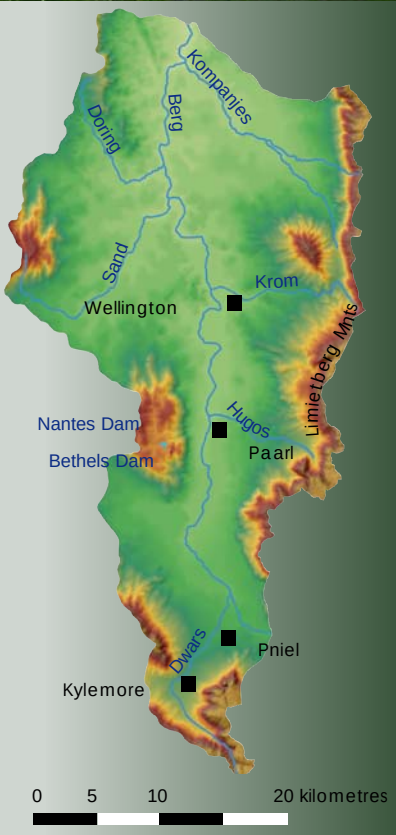
- **Clear alien vegetation in the upper catchments and next to rivers and maintain cleared areas**
- **Re-introduce indigenous riparian vegetation to act as a buffer between the river and surrounding areas**
- **Construct a weir above the proposed Berg River Dam to prevent migration of alien fish upstream and to assist with making water releases required for the ecological Reserve**
- **Improve monitoring and management of runoff and wastewater discharges from agricultural and urban areas**
- **Improve farming practices to reduce sedimentation and water quality problems**
- **Ensure environmental flow releases are made from the Wemmershoek and Berg River dams**

Upper Middle Berg River & Tributaries

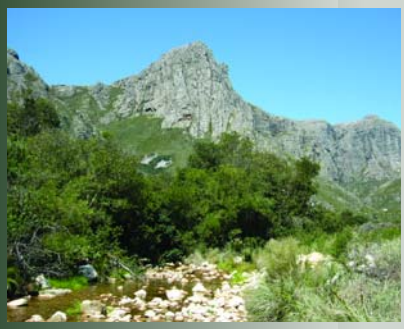
Tributaries in this section of the catchment are the Dwars, Krom, Hugos, Sand and Kompagnes rivers. These tributaries drain the Groot Drakenstein and Limietberg mountain ranges, generating about 28% of the runoff for the Berg River. The Hugos and Dwars rivers are the only tributaries that are naturally perennial.

Renosterveld, a fynbos type, which was previously the dominant vegetation, has made way for vineyards, orchards and vegetable farms. Today, natural vegetation consists largely of Sandstone Fynbos remnants in the mountainous areas.

The pH and total dissolved salts of the river increases as a result of the underlying geology (Malmesbury Group). The naturally mineralised water is further impacted by agricultural runoff and water received via the interbasin transfer (see p. 18).



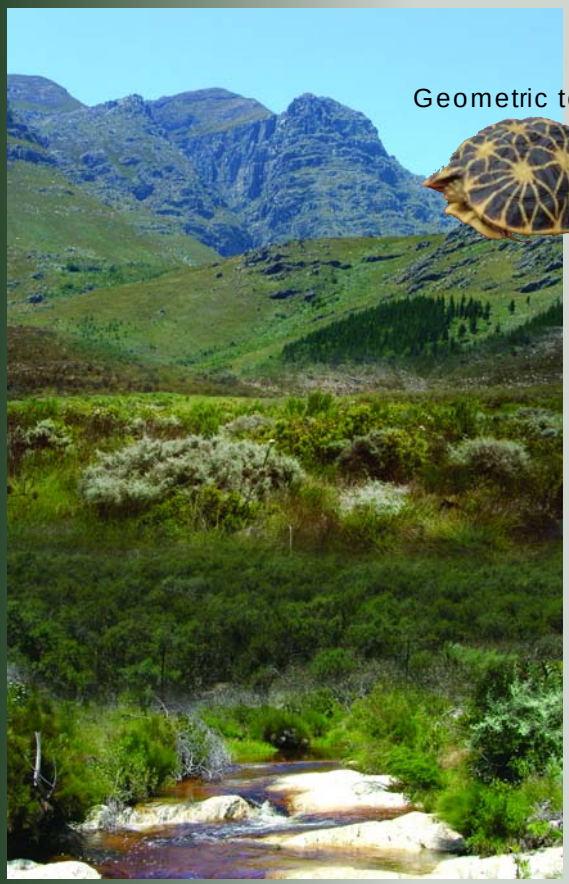
Urban areas are Pniel, Kylemore, Paarl and Wellington. Pniel and Kylemore rely on local mountain streams for their water, while the Wemmershoek Dam supplies Paarl and Wellington. Paarl's water supply is augmented from the Nantes and Bethels dams and from the Berg River (2.8 million cubic metres per annum). Wellington supplements its water from Antoniesvlei in Bain's Kloof (0.5 million cubic metres per annum).



The wastewater treatment works at Paarl discharges treated wastewater (16 million cubic metres per annum) into the Berg River, while the treatment works at Wellington discharges (0.6 million cubic metres per annum) into ponds.

Irrigation Schemes

Irrigation districts in this catchment that administer water allocations are Berg River, Banhoek, Daljosaphat, Palmiet, Simonsberg, Noord- and Suid-Agter-Paarl, La Motte, Kromme River and Perdeberg. Most of these districts obtain water from the Berg-Riviersonderend Scheme (see p. 18) via the Berg River. Daljosaphat and Palmiet districts divert water from the Dal and Hugos (1.0 million cubic metres per annum) rivers. Banhoek district abstracts water from the Dwars River (1.8 million cubic metres per annum), with additional water from Theewaterskloof Dam supplied on request. Similarly, the Kromme district abstracts water from the Krom River with an additional 5 million cubic metres per annum being transferred from Gawie's se Water (Wit River, Breede System).



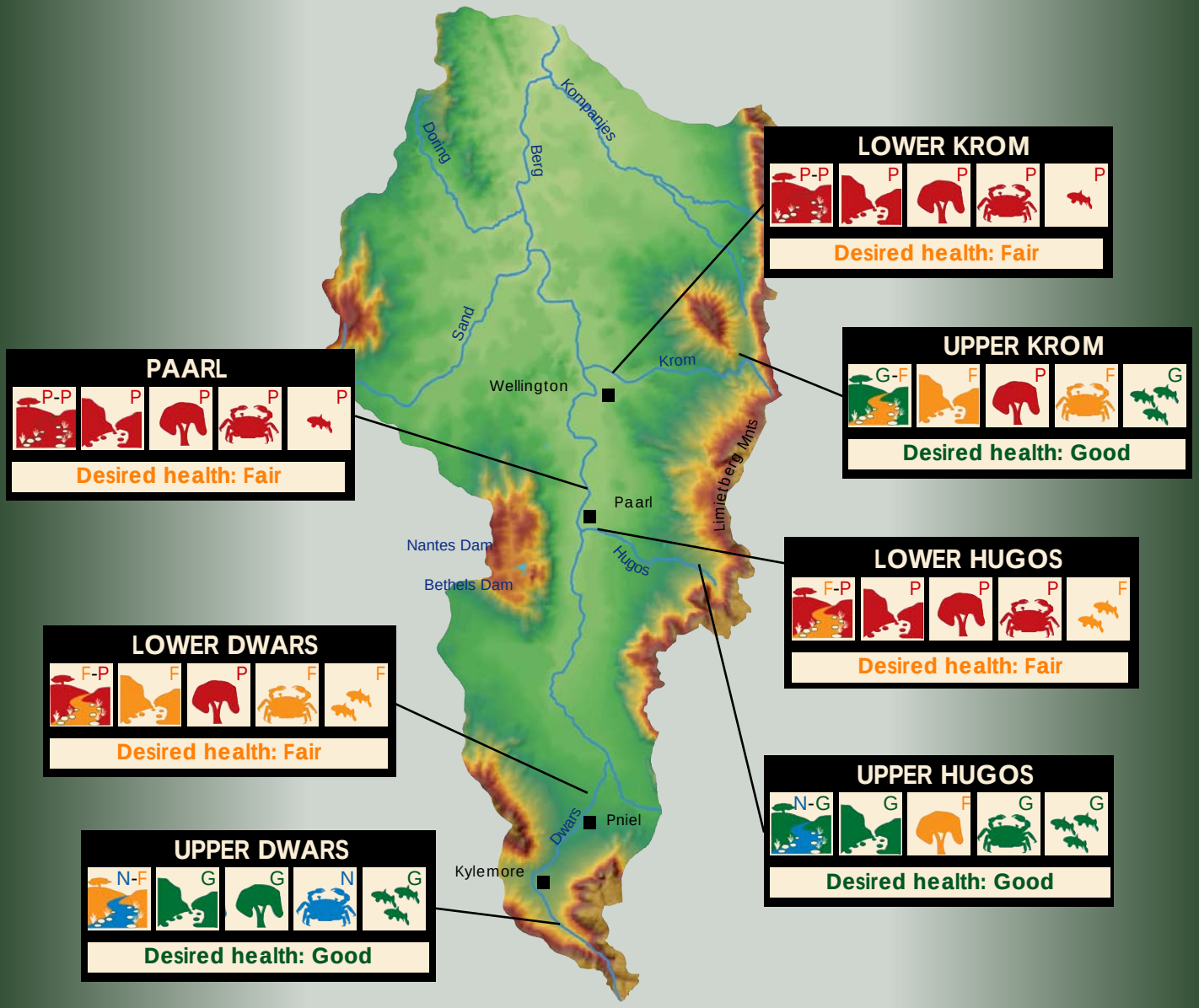
Geometric tortoise

Limietberg Nature Reserve

Limietberg Nature Reserve (117 000 ha) lies in the Du Toitskloof Mountains, stretching from Franschhoek in the south and Groot Drakenstein in the east, to Voëlvlei Dam (see p. 26) in the north. The reserve is an important water catchment area feeding the Berg River and Wemmershoek and Voëlvlei dams. The reserve serves to maintain reaches of the Berg River system in a relatively unimpacted condition. Rainbow trout were introduced prior to the reserve's establishment and occur in most of the rivers. Some invasion by alien trees (e.g. black wattle, hakea and pine) occurs, but is being controlled by Cape Nature.

Sandstone Fynbos predominates, with remnants of indigenous forest in the river valleys. A large area of renosterveld near Voëlvlei Dam is habitat to the endangered geometric tortoise (*Psammobates geometricus*). This tortoise only occurs in lowland renosterveld, of which more than 90% has been lost due to farming (wheat, vineyards and grazing), alien vegetation and too frequent veld fires.

Upper Middle Berg River & Tributaries - Present State



Major Impacts and Management Actions

ALIEN VEGETATION

The Dwars, Krom and Hugo rivers are severely infested with black wattle, poplars, spanish reed, river gum and longleaf wattle. This has reduced river flow, caused incised channels and destabilised river banks.

RIVER MODIFICATION

Straightening and stabilising of the river channels by gabions have reduced habitat diversity. This has resulted in a loss of sensitive aquatic species (e.g. caddisflies).

AGRICULTURAL AND URBAN DEVELOPMENT

Water quality and habitat diversity in the lower reaches have been reduced by agricultural and urban activities at Paarl, Wellington and Pniel. Runoff has resulted in poor water quality and hence a loss of sensitive aquatic invertebrates (e.g. stoneflies and mayflies).

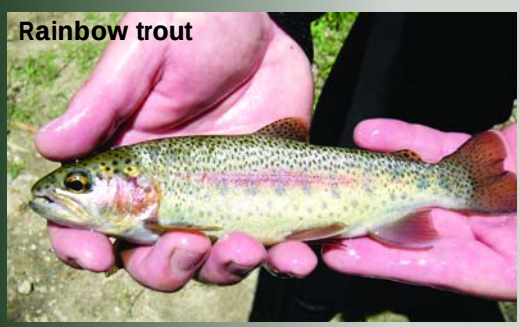
Habitat loss due to removal of natural riparian vegetation causes a loss of refuge areas for biota.

Management Actions

- **Clear alien vegetation and re-establish indigenous vegetation in the upper catchment and riparian zone of rivers**
- **Maintain a buffer area of at least 10 m next to the river**
- **Use environmentally acceptable farming practices**
- **Improve management and monitoring of stormwater quality in urban areas**
- **Stock dams with indigenous fish rather than alien fish**
- **Ensure that tributaries receive environmental flow releases**

WATER ABSTRACTION

High levels of water abstraction in the Dwars River have reduced its flow, particularly during summer. The decrease in flow concentrates pollutants and impacts on river health.



Rainbow trout

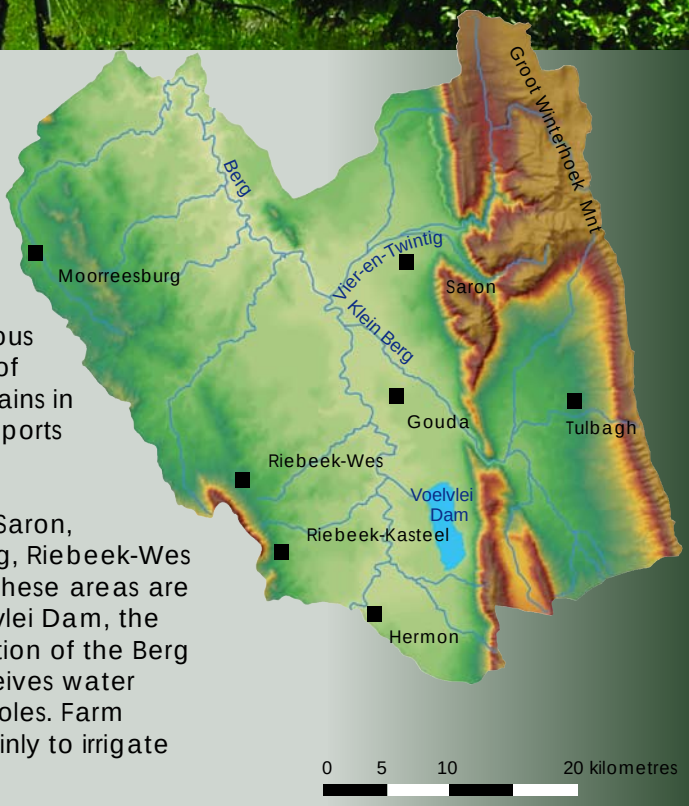
ALIEN FISH

Rainbow trout and smallmouth bass have contributed to localised extinctions of indigenous fish (e.g. Berg River redfin, Cape kurper and witvis).

Lower Middle Berg River & Tributaries

The Vier-en-Twintig and Klein Berg rivers rise in the Groot Winterhoek and Witzenberg mountains and join the Berg River near the towns of Saron. Both tributaries were historically perennial. These rivers no longer flow in their lower reaches during summer as a result of over abstraction for agriculture and the diversion of water to Voëlvlei Dam (see p. 26).

Under natural conditions, West Coast Renosterveld would have dominated this region, but most has been cleared for agriculture (grain and vineyards). The mountainous eastern portion of this section of the Berg River catchment remains in a natural state and mainly supports Sandstone Fynbos.



Urban areas include Tulbagh, Saron, Hermon, Gouda, Moorreesburg, Riebeek-Wes and Riebeek-Kasteel. Most of these areas are supplied with water from Voëlvlei Dam, the only major dam within this section of the Berg River catchment. Tulbagh receives water from local streams and bore-holes. Farm dams in the area are used mainly to irrigate vineyards.

Wastewater treatment works at Tulbagh discharge treated wastewater (0.2 million cubic metres per annum) into a tributary of the Klein Berg during winter but use it for irrigation during summer. Moorreesburg (0.5 million cubic metres per annum), Riebeek-Wes (~ 0.1 million cubic metres per annum) and Riebeek-Kasteel (~ 0.1 million cubic metres per annum) use oxidation ponds to treat wastewater.

The Working for Water Programme has removed much of the alien vegetation, mainly black wattle, in the upper reaches of the Klein Berg River. Plantations in this area are also being cleared by Working for Water.