

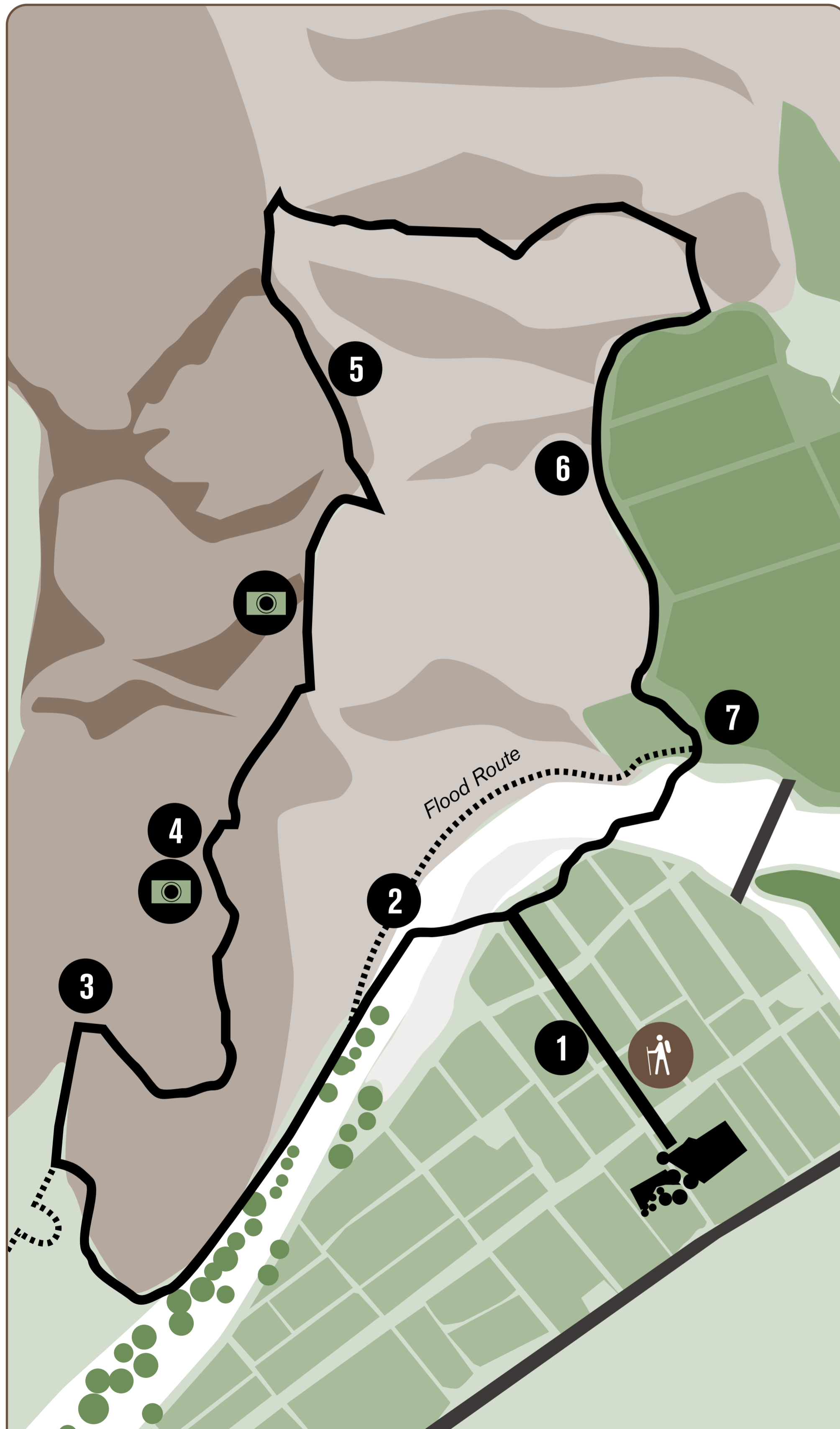


7.5km



138m
ABOVE SEA LEVEL

BIODIVERSITY TRAIL



THE CAPE FLORAL REGION

Identified by the **United Nations Educational, Scientific and Cultural Organisation (Unesco)** as a **World Heritage Site**, the **Cape Floral Region** has been recognized as one of the most special places for plants in the world.

The Heritage Site consists of **eight protected areas** covering **553 000 ha** in the southwestern and southern Cape. It represents less than **0.5% of the area of Africa** but is home to nearly **20% of the continent's flora**. The protected areas also conserve the outstanding ecological, biological and evolutionary processes associated with **Fynbos vegetation**.

The plant reproductive strategies including the **adaptive responses to fire** of the **flora** and the patterns of **seed dispersal by insects** are of particular scientific interest.

The Cape Floral Region forms a **centre of active speciation** where interesting patterns of endemism are found in the flora. The region has been identified as one of the world's 18 biodiversity hotspots. Some 69% of the estimated 9 000 plant species in the region are endemic, with some 1435 species identified as threatened.

Source: whc.unesco.org

BASIC ROUTE INFO

LENGTH 7.5 km

TIME TO COMPLETE ± 3.5 hours

GRADING A1-B2

SIGNAGE & DISTANCE INDICATORS? Yes

TERRAIN Loose gravel & stones

SEASONS Suitable all year

Biodiversity & Wine Initiative

The WWF-SA's **Biodiversity and Wine Initiative (BWI)** is a **partnership** between the **South African wine industry** and the **conservation sector**.

Nearly 95% of the country's wine-growing takes place in the Cape Floral Kingdom (CFK), the **richest** and also the **smallest plant kingdom on the planet**.

Barely 4% of the CFK's **unique renosterveld** remained and much of its **lowland fynbos ecosystems** was threatened when the BWI was created in 2004.

The parties are the **Wines of South Africa, Rand Merchant Bank** and the **Mazda Wildlife Fund**. The BWI also encourages wine producers to **farm sustainably** and express the advantages of the **Cape's abundant diversity** in their wines.

Source: WWF-SA



COMFORT & SAFETY TIPS

- Report to the tasting room for a permit before departure
- Depart early on hot days
- Take enough drinking water
- Wear comfortable walking/hiking shoes
- A trekking pole can be rented at the tasting room and can be useful – there are some gravelly slopes
- Wear a brimmed hat or cap
- Keep an eye out for snakes
- Carry all rubbish with you and deposit in a bin back at the winery or take it home
- Apply sunscreen as necessary
- Carry a mobile phone in case of an emergency

Emergency tel: 086 880 1111



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Disclaimer: Please note that any activities undertaken are done so at own risk. Van Loveren and/or its owners will not be held responsible for any injuries/losses that may occur. All visitors are to sign an indemnity form prior to embarking on this route.

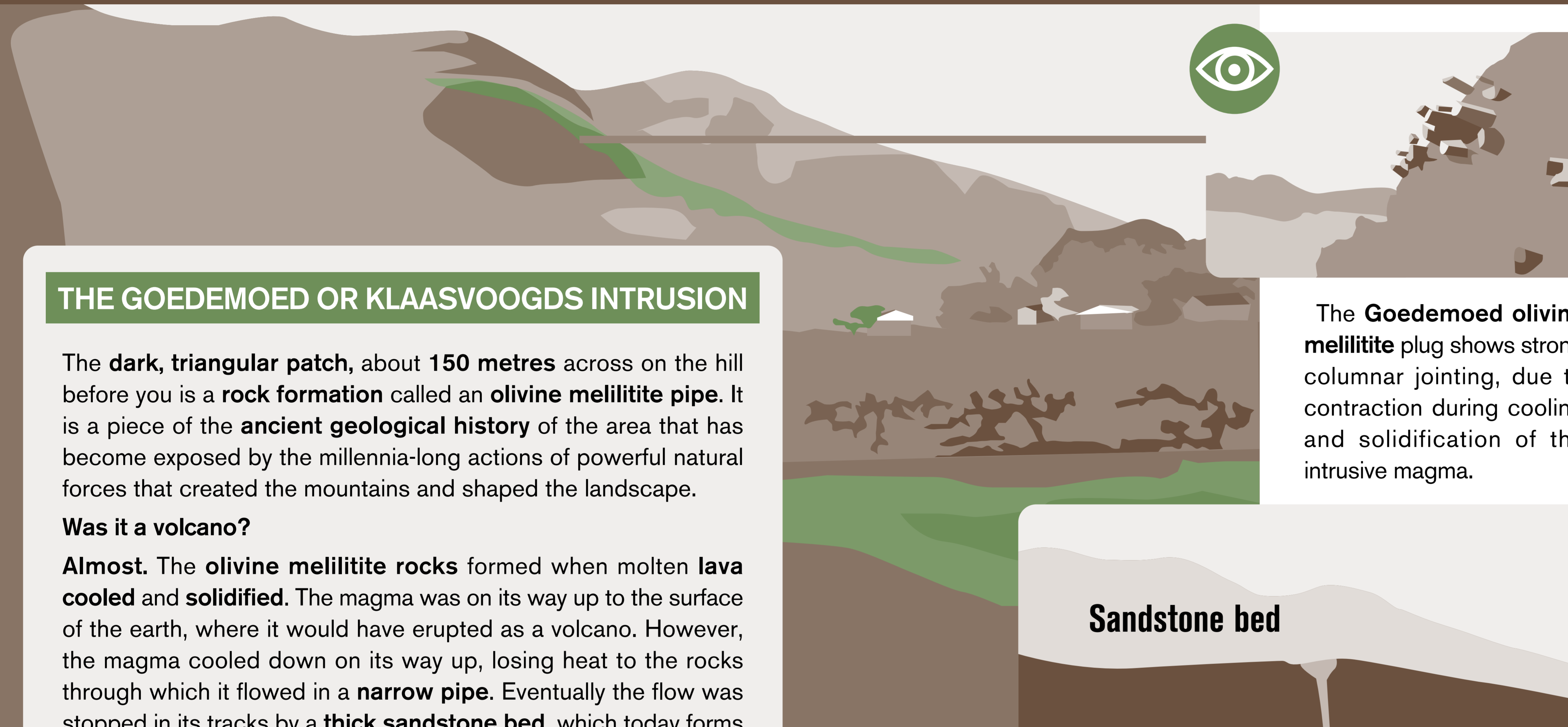


200M



134M
ABOVE SEA LEVEL

GEOLOGY



THE GOEDEMOED OR KLAASVOOGDS INTRUSION

The **dark, triangular patch**, about **150 metres** across on the hill before you is a **rock formation** called an **olivine melilitite pipe**. It is a piece of the **ancient geological history** of the area that has become exposed by the millennia-long actions of powerful natural forces that created the mountains and shaped the landscape.

Was it a volcano?

Almost. The **olivine melilitite rocks** formed when molten **lava cooled** and **solidified**. The magma was on its way up to the surface of the earth, where it would have erupted as a volcano. However, the magma cooled down on its way up, losing heat to the rocks through which it flowed in a **narrow pipe**. Eventually the flow was stopped in its tracks by a **thick sandstone bed**, which today forms the cap of the hill.

Scientists still don't know the source of the magma and what forced it up in such a narrow and long intrusion – probably more than 100 km upwards through the planet's crust.

When did this happen?

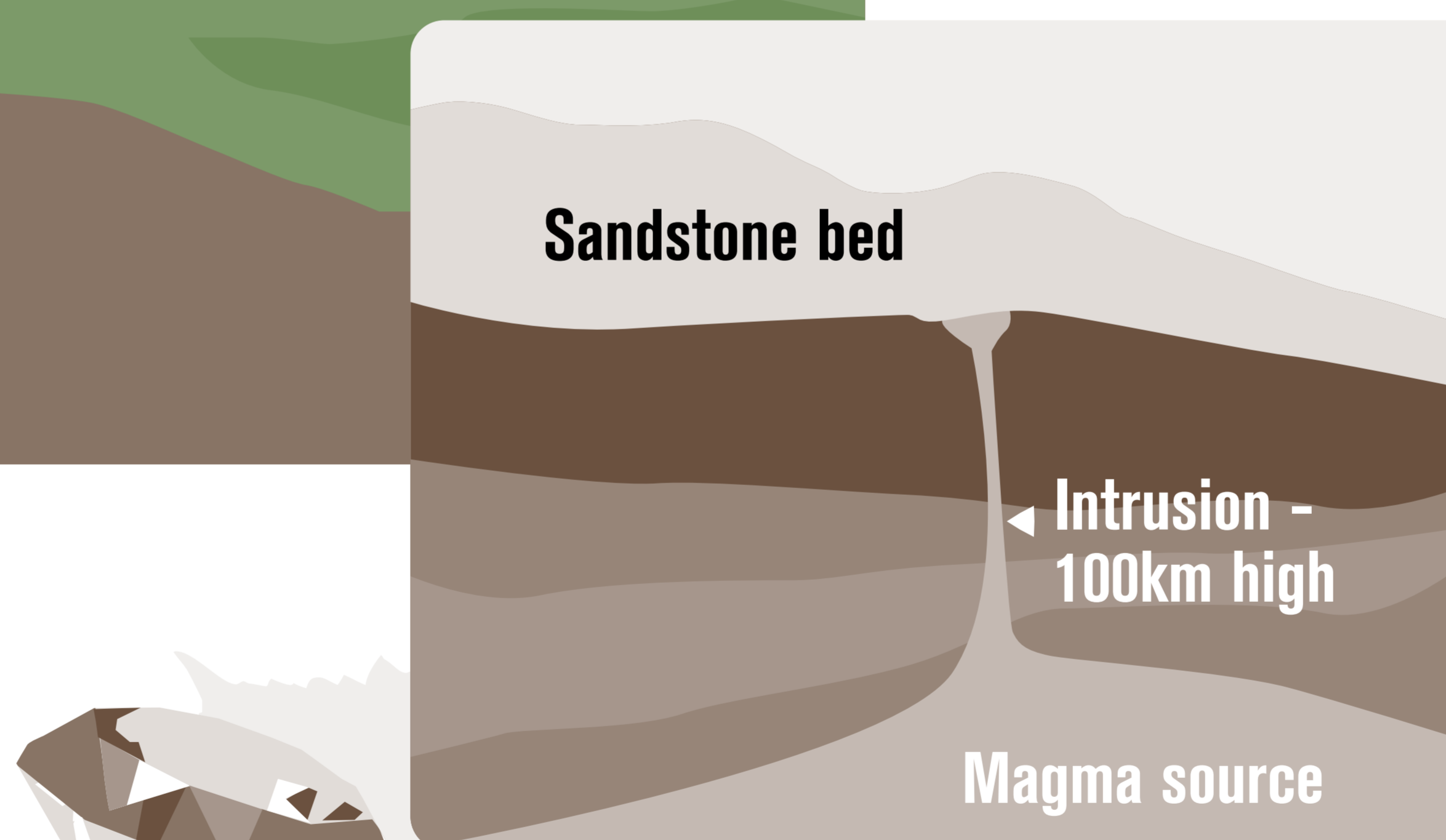
This intrusion was dated to about 63,7 million years ago, give or take 1,3 million either way!

Is this the only one?

No, the **Goedemoed intrusion** is part of an arc of similar formations across South Africa, with examples at **Heidelberg**, **Sutherland**, **Lambert's Bay** and in the **Bushmanland** and **Namaqualand**. Geologists think these magma intrusions happened around the edge of a very ancient, stable piece of the earth's crust, called the Kalahari Craton.



The **Goedemoed olivine melilitite** plug shows strong columnar jointing, due to contraction during cooling and solidification of the intrusive magma.



Source: Duncan Miller in SA Lapidary Magazine, Dec. 2005.

The **olivine melilitite** in these intrusions is very similar to the **kimberlite** in which diamonds are found. Many prospectors have looked for **diamonds** in them, but found nothing.

The intrusions happened **tens of millions of years** later than the **kimberlite** intrusions that brought the **diamonds**.

CAPE FOLDS MOUNTAINS

The **Langeberg** mountain range – the mountains behind you on the opposite side of the Robertson Wine Valley – is made of **Table Mountain Group sandstone** formations.

This rock with its **distinctive yellowish colour** is what many of the spectacular sandstone cliffs of many of the Western Cape's mountains are made of. It has a **geological history** that stretches back into pre-historic times of **long-gone continents** and **oceans**.

Hundreds of millions of years ago the area was still part of the **super-continent Gondwana** and joined to what today is **South America**. The area that now is the **southwestern Cape** began to **sag** under geological pressures in the earth's crust, and a new sea was formed. At the bottom of this shallow sea, called the Agulhas Sea, sandy sediments were laid down that would in time be compacted into **sandstone**.

Three layers of rock were formed in this way on the ocean floor, including the **yellow Table Mountain sandstone** and the **whitish Witteberg Group sandstone**.

The white cap of the hill in front of you (visible just above the Goedemoed olivine melilitite intrusion) is made up of **quartzite** which was originally Witteberg Group sandstone.

Source: Duncan Miller in Village Life, Aug/Sept 2006.



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700M



142M
ABOVE SEA LEVEL

BIRDS



AFRICAN FISH EAGLE *Haliaeetus vocifer*

The **African fish eagle** is one of the more brightly coloured raptors. The pure white head, neck, upper belly, mantle and tail contrast sharply with the rich chestnut flanks, lower belly, thighs and under-wing coverts, and with the black back, upper tail coverts and flight feathers.

The lower legs are dull yellow and bare. In flight, the **conspicuous white head**, short white tail and broad wings with dark flight feathers of the adult are unmistakable.

Juveniles have mottled dark-brown and white plumage, and only attain full adult plumage at 4-5 years and after several moults.

Food

About **90% of the diet is fish**, of many species, mostly caught within 15cm of the water surface. The preferred size range is 200-500g, and a single catch is enough food for the day. Bigger fish are sometimes caught; anything up to 1.5kg can be carried away, but bigger fish – up to 3kg – are “planed” over the water surface to shore and eaten there. On average about **eight strikes** are needed for one capture, so the **African Fish Eagle** has a pretty leisurely life. Fish are caught by a short swift swoop from low above the water surface, with feet outstretched forwards. Fishing is a very profitable business; hunting occupies only about **two hours per day**, with most activity in the morning.

Breeding

Winter is the **breeding season** in southern Africa. The eagles become **especially vocal** in early winter and the pair often duets and undertakes display flights, ascending in ever-decreasing circles. A breeding pair mates almost **daily**.

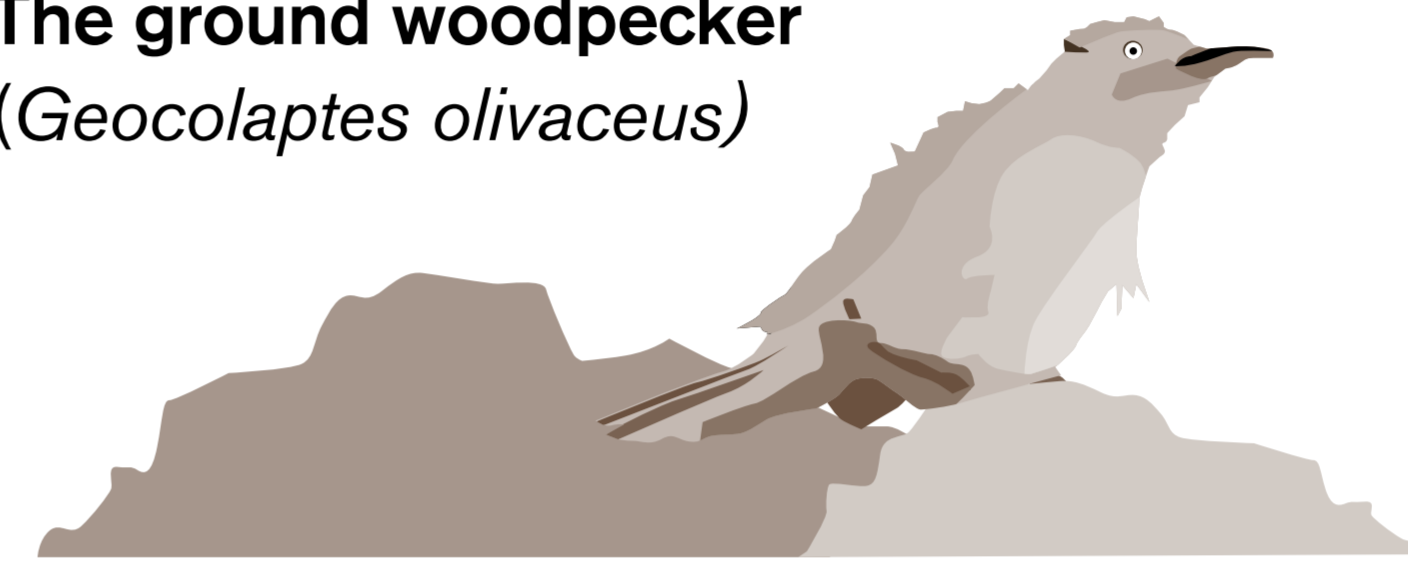
The nest is a platform of sticks with a shallow central cavity built by both partners in a high fork of a tall tree. It is **used for many years**, with frequent repairs.

The clutch consists of **1-3 white eggs**, laid at intervals of 2-3 days. Both parents take turns to incubate. The biggest chick(s) grab(s) all food until sated, and the smaller chick(s) may **starve**.

Source: BirdLife South Africa



The ground woodpecker
(*Geocolaptes olivaceus*)



The African black duck
(*Anas sparsa*)



The lanner falcon
(*Falco biarmicus*)



A pair of **African fish eagles** has been **nesting** in a massive blue gum tree along the Breede River **since 1995**. The patch of alien trees is kept especially for the birds.

Their **distinctive call** is often heard along the walk. **Keep an eye out** for their nest, high in the trees to your left in about 100 metres.

Birds are excellent **flagship species** and **valuable indicators** of the environment. According to BirdLife South Africa, places that are **rich in bird species** are often **abundant** in other forms of **biodiversity**. The presence of birds indicates a **healthy environment** and thriving ecosystem.

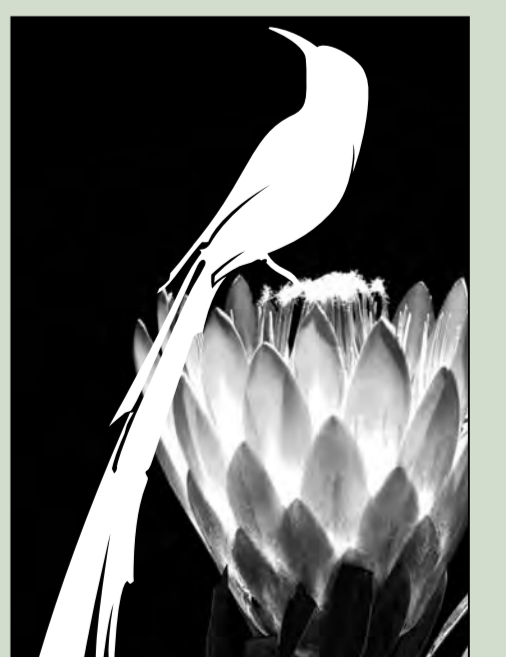
The **Fish Eagle Biodiversity Route** is such a place, especially the part of the route you are now entering. The stretch along the **Breede River** is considered one of the **best birding spots** in the Robertson area.

The **summer months** are best for bird-watching and up to **100 species** can be recorded in a **day**.

Look for the **tambourine dove** which may appear unexpectedly. If you listen carefully, you will hear the **greater and lesser honeyguides** and the **olive, cardinal and ground woodpeckers** before you see them.

Along the cliff face, where shrubs and aloes grow, you will see the **cape rock-thrush** and also the **cinnamon-breasted bunting**, if you are lucky. The cliff face is a favourite hunting ground for the **lanner falcon**.

Be sure to return with your **binoculars** and **bird guide!**



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2.1km



211m
ABOVE SEA LEVEL

PLANT LIFE



FYNBOS (definition)

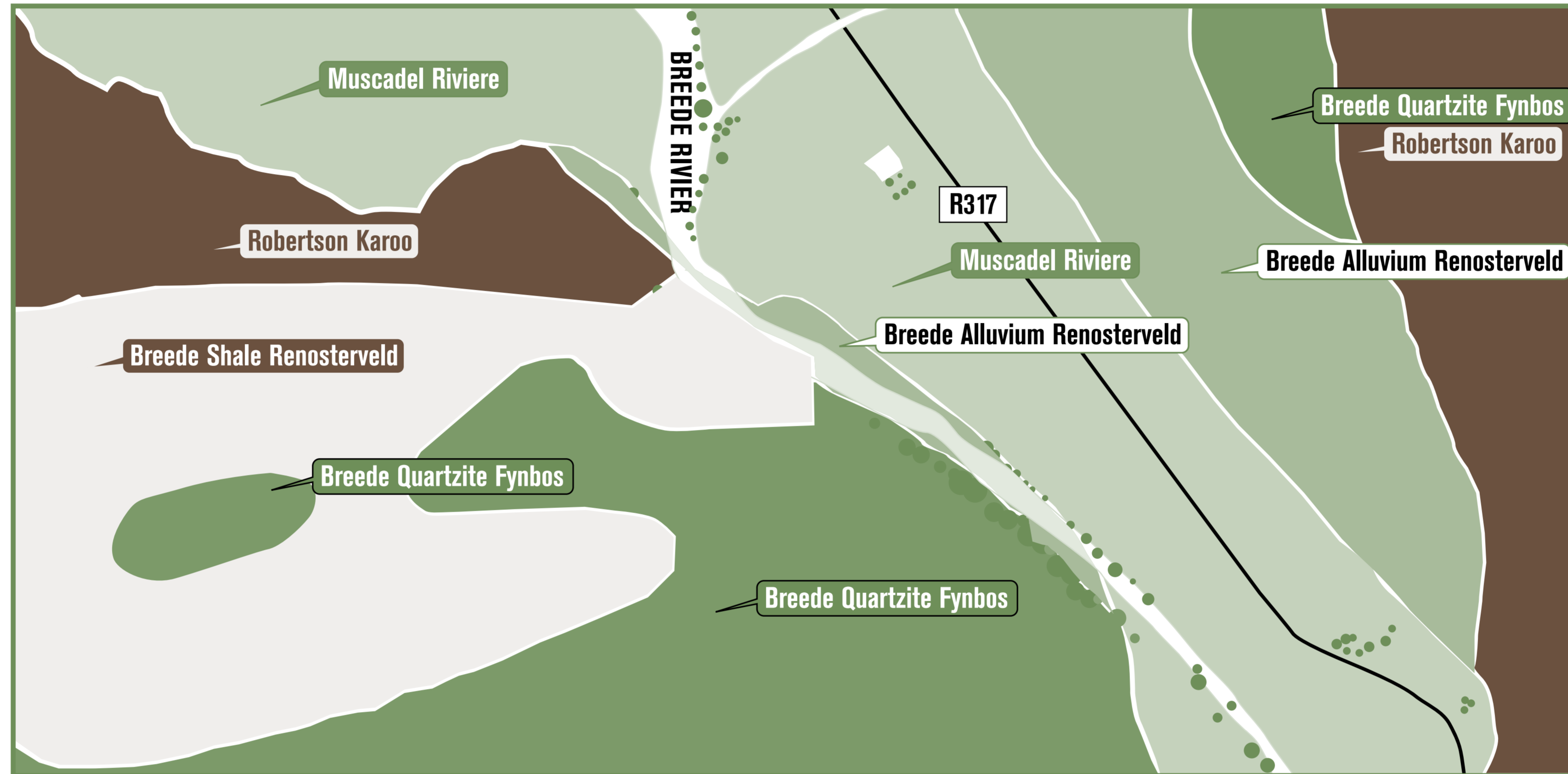
An **evergreen, hard-leaved** shrubland occurring on **nutrient-poor soils**, especially those derived from heavily leached sandstones or limestone; dominated by small- and leathery-leaved shrubs associated with **evergreen, grass-like perennials**; and comprising essentially members of plant groups that are characteristic of the Cape Floristic Region.

FIRE AND FYNBOS

Fynbos is a **fire-dependent vegetation** type, like grasslands and savannas. It is adapted to nutrient-poor soils, and nutrient recycling is essential. **Fire drives this nutrient cycle**, and is more common in fynbos than in any other heathlike vegetation type on earth. It is rare to find stands of fynbos vegetation older than 20 years old. The optimal fire frequency for fynbos is between **10 and 14 years**, although there are species that flourish with more frequent fires.

DID YOU KNOW?

The first recorded use of the term 'Fynbos' ('fynbosch') was in **1868**. The word was widely used by the locals to describe the southwestern Cape's distinctive vegetation. However, the term was only accepted internationally in the latter half of the 20th century.



A Floral Paradise

“All that I had pictured to myself of the riches of the Cape botany, was far surpassed by what I saw in this day's walk. At every step a different plant appeared; and it is not an exaggerated description, if it should be compared to a botanic garden ... so great was the variety everywhere to be met with.”

From the diary of William Burchell, English explorer, November 1810.



Source: *Field Guide to Fynbos*, John Manning

Renosterveld

Definition: An **evergreen, fine-leaved vegetation** type, dominated by the shrubby, granular-leaved renosterbos (*Elytropappus rhinocerotis*) that once covered large tracts of the more fertile clay soils of the coastal forelands and intermontane valleys of the southwestern Cape, but has now largely disappeared under the plough. It is especially rich in bulbs, but otherwise poor in typical fynbos plant groups – especially proteas, ericas and restios.



The **lemon-scented pelargonium** (*Pelargonium citronellum*) is endemic to the **Muscadel Riviere vegetation** type. Thanks to its popularity as a garden plant and the fact that it is easy to propagate, the species is not endangered, although the vegetation type is critically endangered.



Wynand Retief planted seven species of Protea in this area. Can you spot them? (Look to the left behind this sign)



VEGETATION TYPES

The **Fish Eagle route** traverses remnants of **five distinctive vegetation types**, one of which is critically endangered.

This **critically endangered vegetation** type is called **Muscadel Riviere**, a complex of riverine thickets dominated by **Acacia karoo thorn trees** accompanied by **succulent gannabos** and **low vygie shrublands**. It used to occupy about 42 000 ha on the banks of the Breede River between Worcester and Bonnievale, as well as along rivers in the Montagu and Oudsthoorn areas. Today **less than 15%** of this vegetation remains, as it competes with agriculture for some of the most productive farming land along the river banks.

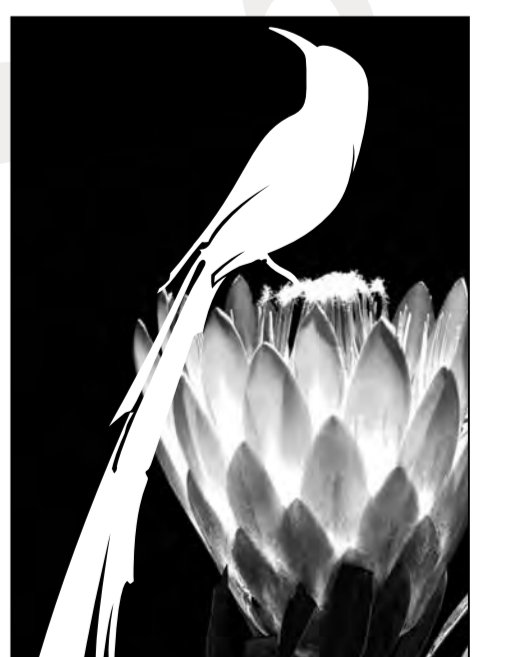
Less than 1% of the original area is currently protected. One of the protected areas is in CapeNature's Vrolijkheid Nature Reserve, just across the hill from Van Loveren.

Much of the Fish Eagle route winds through **Robertson Karoo vegetation**, which is classified as least threatened.

The Robertson Karoo ecosystem is a succulent shrubland found around the Breede River's middle reaches in Worcester, Robertson and Ashton. The plants in this ecosystem thrive

in hot summers (often reaching 40°C) and cool and moist winters, with temperatures often as low as -1°C.

Sources: *The Vegetation of South Africa, Lesotho and Swaziland*, by L Mucina and M Rutherford; www.sanbi.org



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3.1km



332M
ABOVE SEA LEVEL

RIVER



THE BREEDE RIVER

The **Breede River** is **322 km long**, rising in the Skurweberg near Ceres and draining to the estuary mouth between **Infanta** and **Witsand**.

The river and its tributaries drain a catchment of **12 600m²** that reaches as far as the towns of Ceres and Wolseley to the north, the Du Toits Kloof to the northwest and the Hex River Valley and the area beyond Montagu on the other side of the Langeberg mountain range to the east.

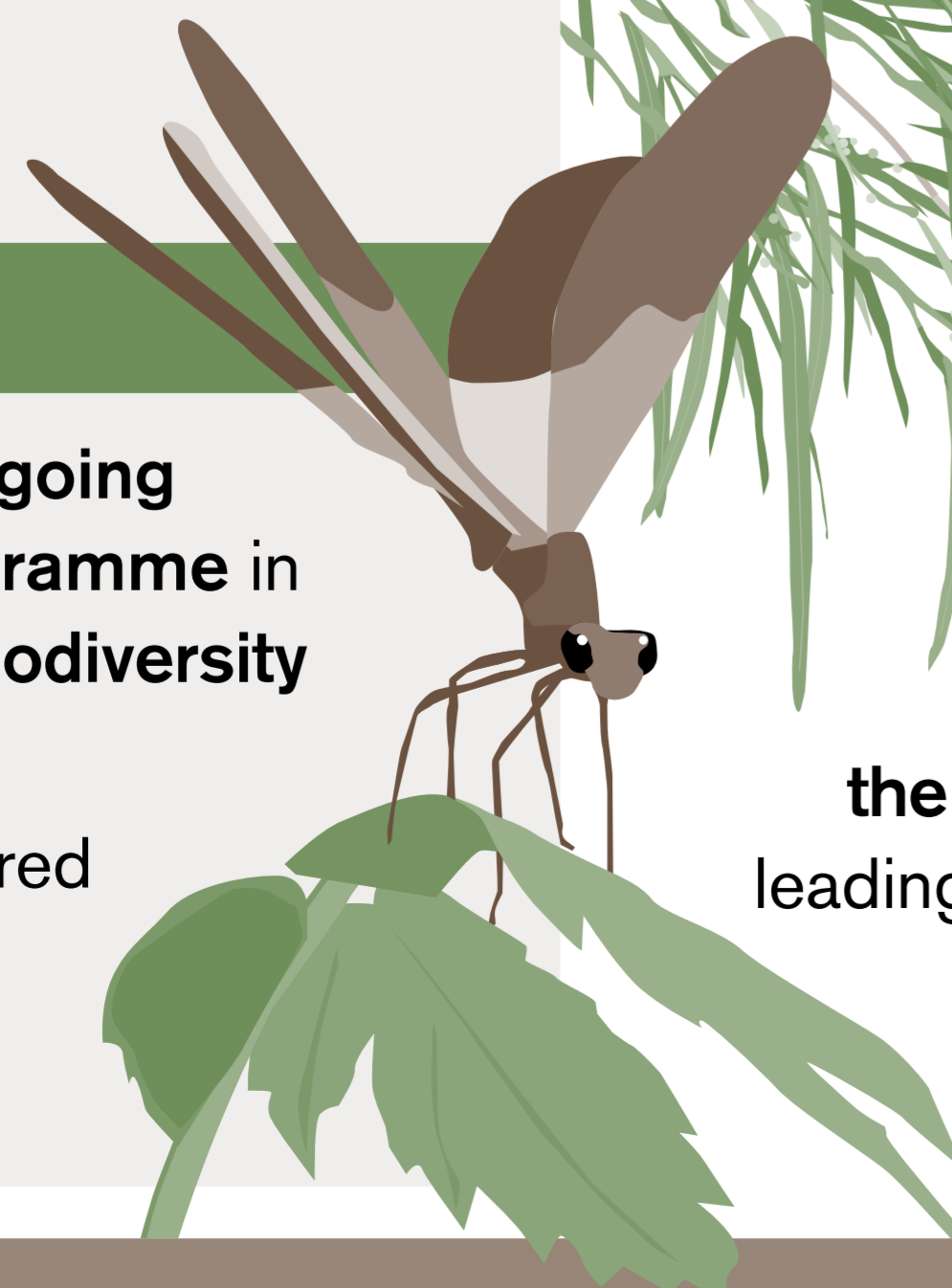
Its main **tributary**, the **Riviersonderend** ('endless river') joins with it near Swellendam and carries water from the Groot Drakenstein and Franschhoek mountains beyond Grabouw and Villiersdorp.

The **Brandvlei dam** was built in a tributary, the **Brandvlei River**, in **1949**. Controlled release of water from the dam has made the Breede downstream from it perennial, changing land use and making widespread **irrigated agriculture possible**.

DID YOU KNOW

Van Loveren has an **ongoing alien eradication programme** in consultation with the **Biodiversity and Wine Initiative**.

Alien vegetation is cleared and replaced with indigenous species.



Invasive alien plants

Invasive alien plants such as the **black wattle**, **Port Jackson willow** and **river gum** were introduced to the area approximately **150 years ago**.

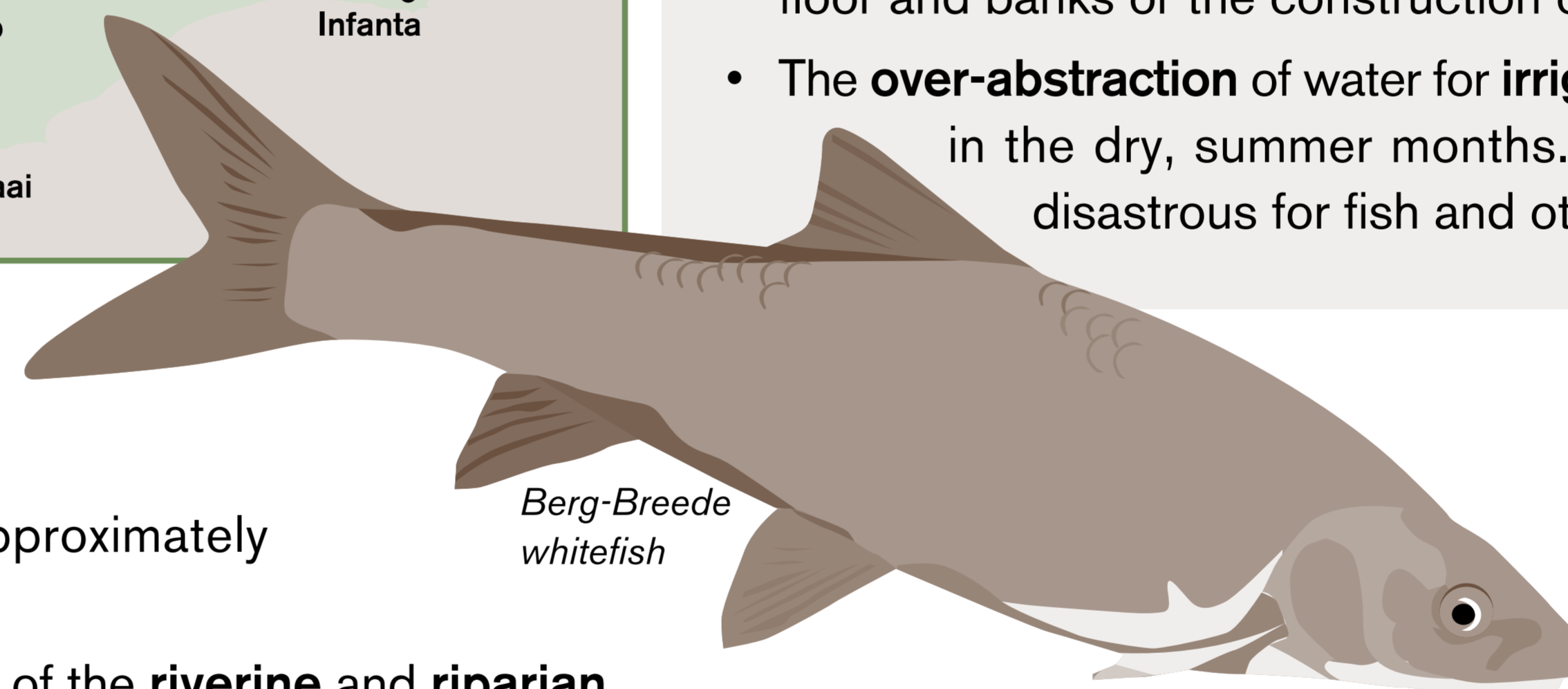
The invasive plants **damage** the health of the **riverine** and **riparian ecosystems** in a number of ways, including:

- Thirsty aliens can **drink** up enough water to **lessen the flow of a river** or to dry up smaller streams before they can flow into rivers;
- Invasive aliens **supplant natural vegetation** types and **disrupt ecosystems** dependent on the indigenous species. For instance, the loss of overhanging riparian vegetation means less space for the variety of species that thrive in or on the shady river shallows;
- Infestation with alien vegetation can **alter the flow of rivers**, causing it to straighten and pick up speed, leading to **soil erosion**.

Source: Department of Water Affairs, State of Rivers Report

What is the impact of human activities?

- Farming alters the vegetation of the **riparian zone** (the plants **close to the river bank** that form **part of the river ecosystem**). This can be through planting crops too close to the river or allowing animals to overgraze the river banks.
- **Fertilizer runoff** or leaching into the groundwater raises the **nutrient levels** of river water and can lead to deadly **algal blooms**.
- The **modification** of the **river's flow** disrupts the **ecosystem**. The flow can be modified through **erosion** caused by overgrazing, the **bulldozing** of the river floor and banks or the construction of **low-water bridges** and **dams**.
- The **over-abstraction** of water for **irrigation** can reduce the **flow level**, especially in the dry, summer months. This **temporary loss of habitat** can be disastrous for fish and other animal and plant species.



Berg-Breede whitefish

FISH OF THE BREEDE RIVER

The Breede River is home to a **unique indigenous fish fauna** and the system has four recognised primary freshwater fish species. These are the **Berg-Breede whitefish**, **Burchell's redfin**, **Cape galaxias** and the **Cape kurper**.

Ongoing research into the genetics and morphology of these species indicates that they are more diverse than originally believed. Some of these species are actually species complexes with a number of unique lineages found in different parts of the river and its tributaries.

Several of these species are listed by the Union for the Conservation of Nature (IUCN) as **critically endangered**, **endangered** or **near threatened**.

One of the major sources of pressure on these species is the threat of **alien fish species**. These species were introduced into the rivers and dams of the catchment area from **1880 onwards** for angling purposes and to **provide food**.

Many of these species found the inland waters of this region much to their liking and **12 species** have become **invasive**.

They have had a severe impact on indigenous fish species by either competing with them or feeding on them. They have **altered food webs** and thus had a knock-on effect that extends even to terrestrial species.



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4.0km



368M
ABOVE SEA LEVEL

ANIMALS



FYNBOS ANIMALS

A few hundred years ago, before agriculture transformed the natural landscape of the southwestern Cape, you would in all likelihood have been able to see herds of **large game grazing** in the valley before you.

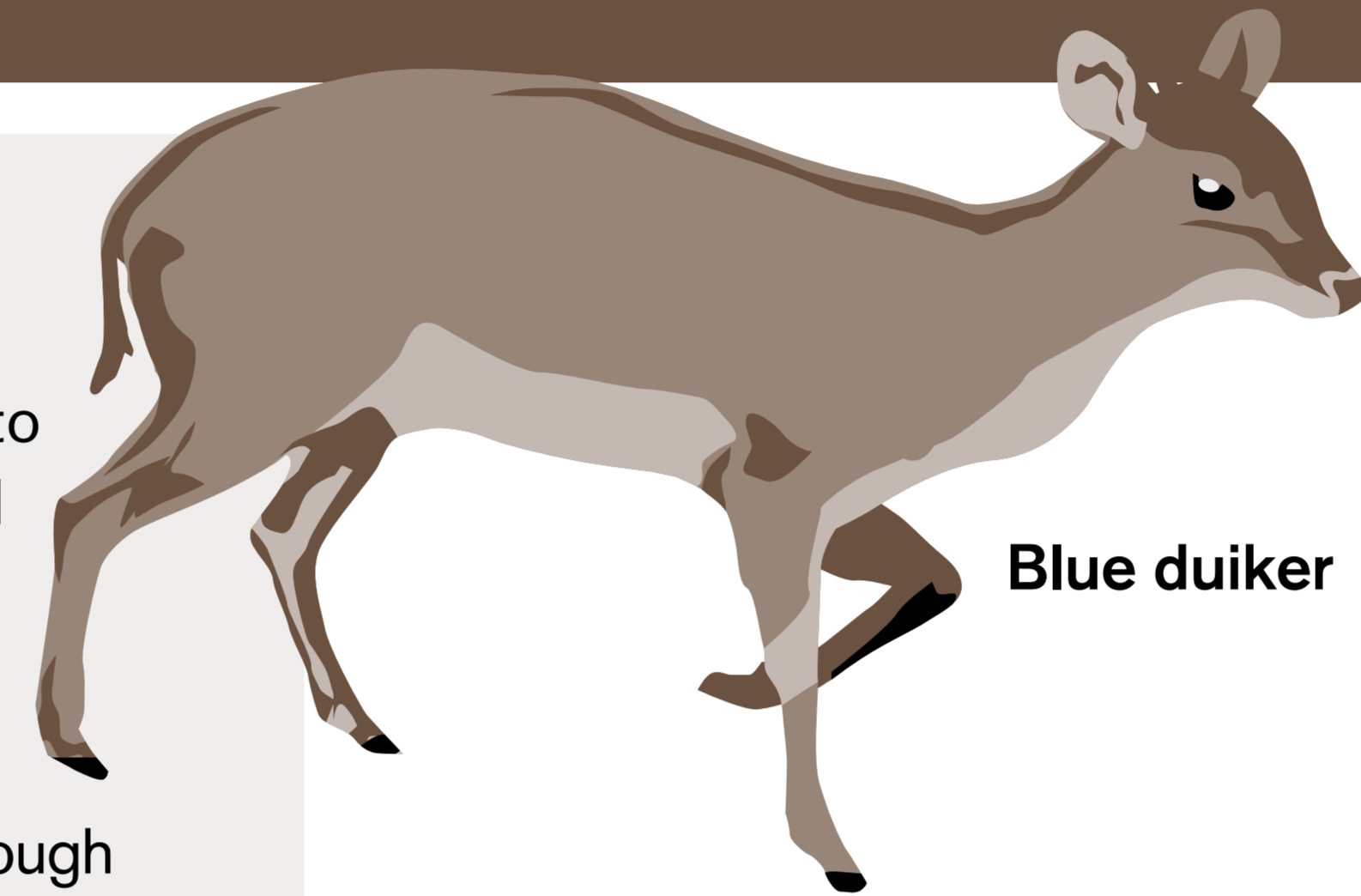
Most of the larger game species that used to occur in the Fynbos Biome were most likely found in **Renosterveld**, because of its **high soil fertility**.

Apart from the **black rhino** that some say the vegetation type took its name from, the valley was probably grazed by **quagga, mountain zebra, roan antelope, red hartebeest, bontebok, bluebuck, eland, cape buffalo** and **elephant**. Bontebok and

the now extinct **bluebuck** were endemic to the fynbos biome. The predators who hunted these herbivores included **lion, cheetah, leopard** and **African wild dog**.

Only The **bontebok, leopard** and **mountain zebra** are today still found in the **biome**, although some of the other species have been reintroduced in conservation areas.

Today small antelope like **blue duiker, steenbok, Cape grysbok** and **grey rhebuck** are still found in the **Riviersonderend** and **Langeberg mountains**.



Blue duiker



Did you know that this area has been identified as a key genetic connectivity corridor between the leopard populations of the Langeberg (to the north) and the Riviersonderend mountains (to the south). The leopard habitat remaining in the Robertson, Rooiberg and McGregor areas allow the otherwise isolated populations in the two mountain ranges to intermingle and exchange genes, which is essential for the genetic health of the species. The Landmark Foundation, an NGO, collaborates with landowners in the Robertson and McGregor areas to study and protect this valuable corridor.

Did you know?

Scientists have theorized a link between baboons' **social interactions** and the origins of **human language**.

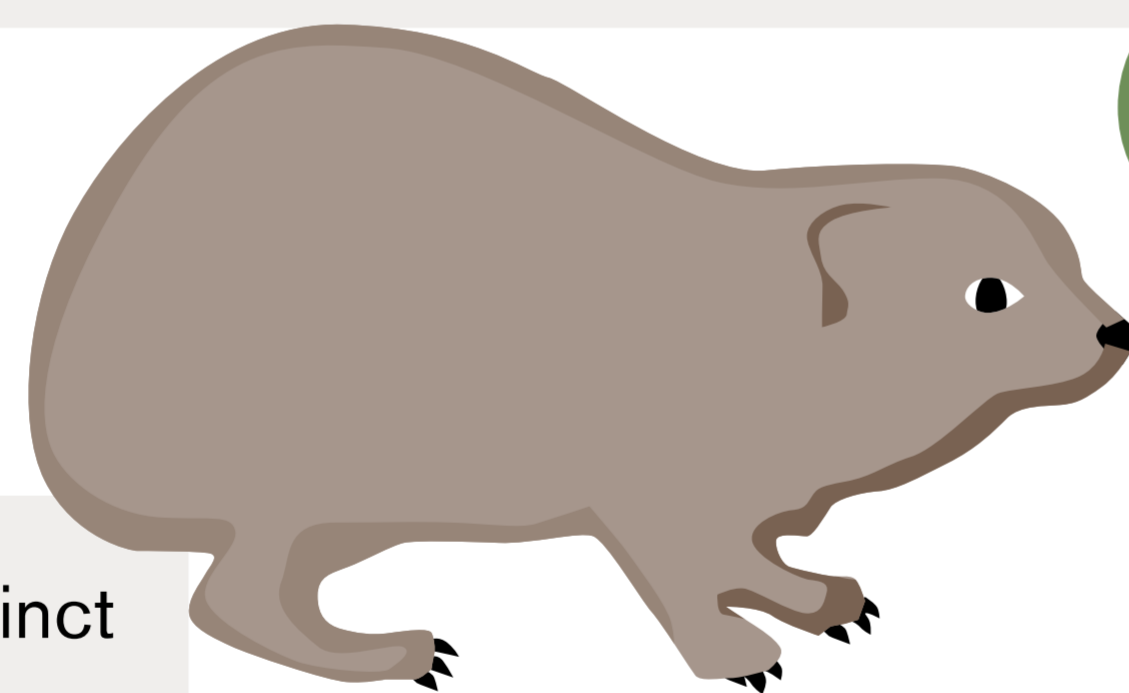
These intensely social animals use grooming to **cultivate relationships** with allies within their group. Baboons **need friends** in their group to help **keep watch for predators** and also to be on their side in the intense internal competition for available food.

The theory goes that as our proto-human ancestors started leaving the trees and moving out onto the savannah, their survival depended on making their groups larger than that of their primate ancestors.

Eventually the groups would grow to a point where there were too many individuals to get to know through grooming alone. Verbal communication might have been the answer.

Source: The Complete Book of Southern African Mammals (Mills, Hes)

ROCK DASSIE (PROCAVIA CAPENSIS)

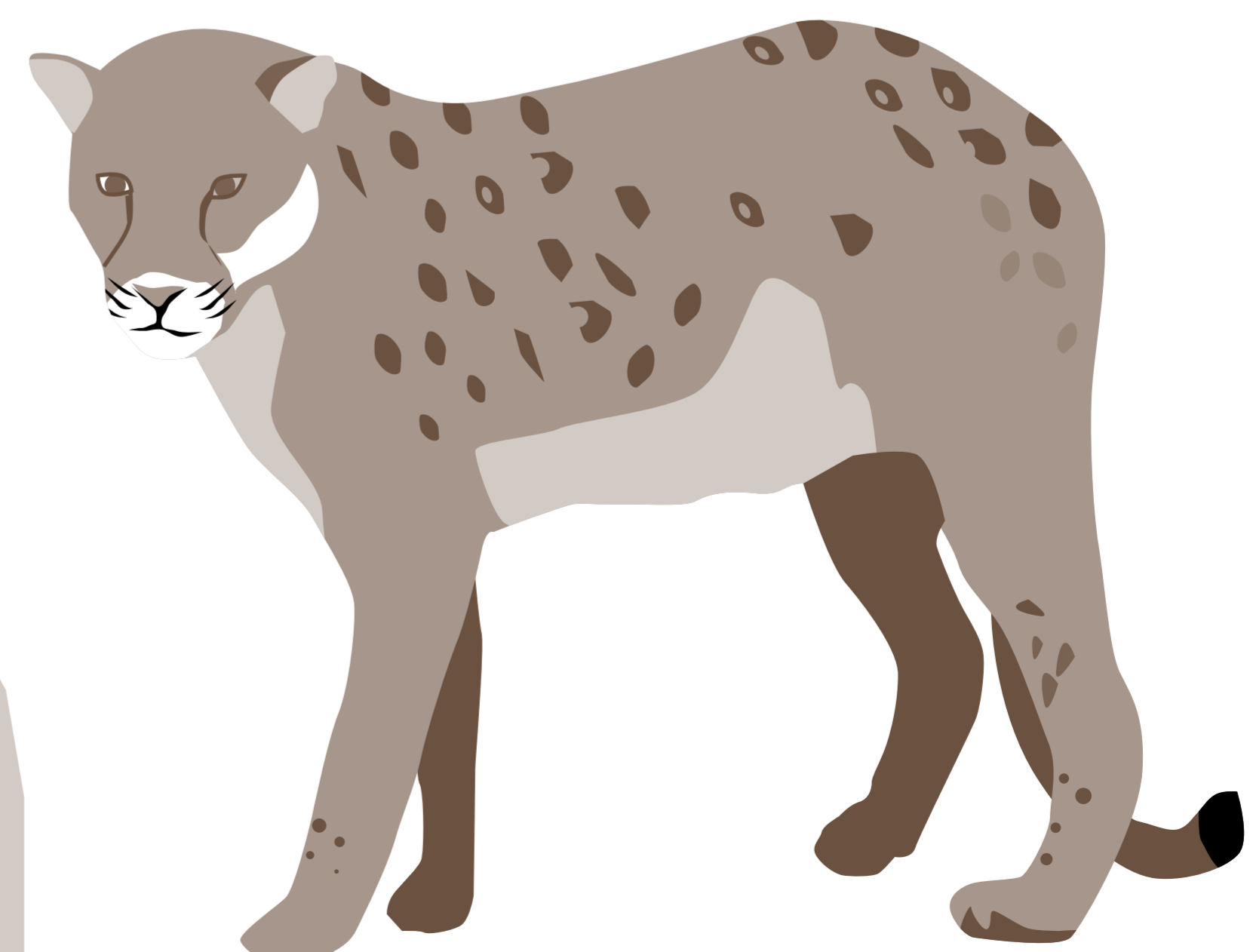
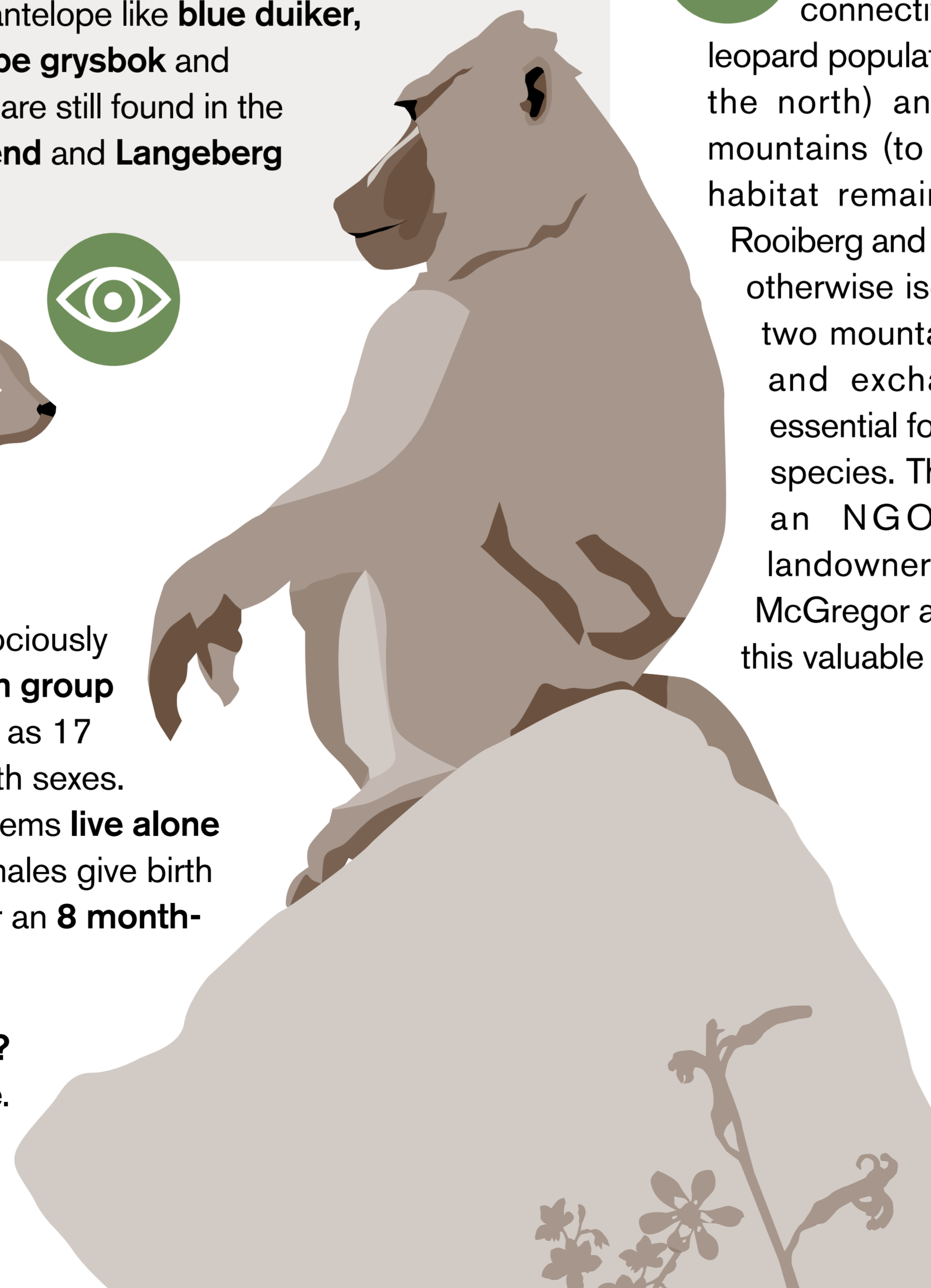


► Although there is evidence of extinct species as large as lions, zoologists say Hyraxes (of which the **rock dassie** is one) has changed very little in the past **45 million years**. The closest relative of the dassie is the **elephant**, with which it shares several traits, including **open rooted incisors** that have developed into defensive tusks.

► **Male dassies** fight ferociously for dominance of a **harem group** that can contain as many as 17 females and young of both sexes. Mature males without harems **live alone** on the periphery. The females give birth to one or two young after an **8 month-long** gestation period.

► DID YOU KNOW that dassies don't have a constant body temperature?

This is why the pattern of their daily activities correlates with the temperature. They **sun themselves** at dawn and dusk and also huddle together to keep warm. This adaptation allows them to survive in a wide range of climates.



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5.5km



204m
ABOVE SEA LEVEL

FARMING



PESTICIDES AND POISONS

One advantage of the relatively **low rainfall** in the **Robertson** area is a higher resistance to the plant diseases. This enables Van Loveren to use significantly **less pesticides** than on wine farms in higher rainfall areas. By taking some proactive steps and using **environmentally friendly** alternatives as prescribed in terms of the Integrated Production of Wine Scheme (**IPW**), the use of pesticides is further reduced.

BABOONS

(Papio cynocephalus ursinus)

Baboons can be a pest – just ask the inhabitants of the southern part of the Cape Peninsula. When they live in **proximity to humans**, they learn to supplement their diet with **'human' food** quite quickly. Human crops or leftovers tend to be much more **energy-rich** than their natural diet, enabling the baboons to spend less time looking for food. Troops can also grow larger, supported by the human food, leading to even more **conflict** between man and his primate cousin.

At Van Loveren the philosophy is: There is enough for everyone. Baboons are allowed to pick their share of grapes. There is even a **vineyard block regarded as the baboons' share**. This serves as a nice decoy, as the block is the one closest to where the baboons sleep.



Neutron Moisture Detector

You might have noticed **little white boxes** mounted on poles in the vineyards. These are part of a state-of-the-art neutron moisture measuring system that monitors the **moisture levels** in the **soil**. This is a powerful tool that enables the **water wise management** of Van Loveren's vineyards.

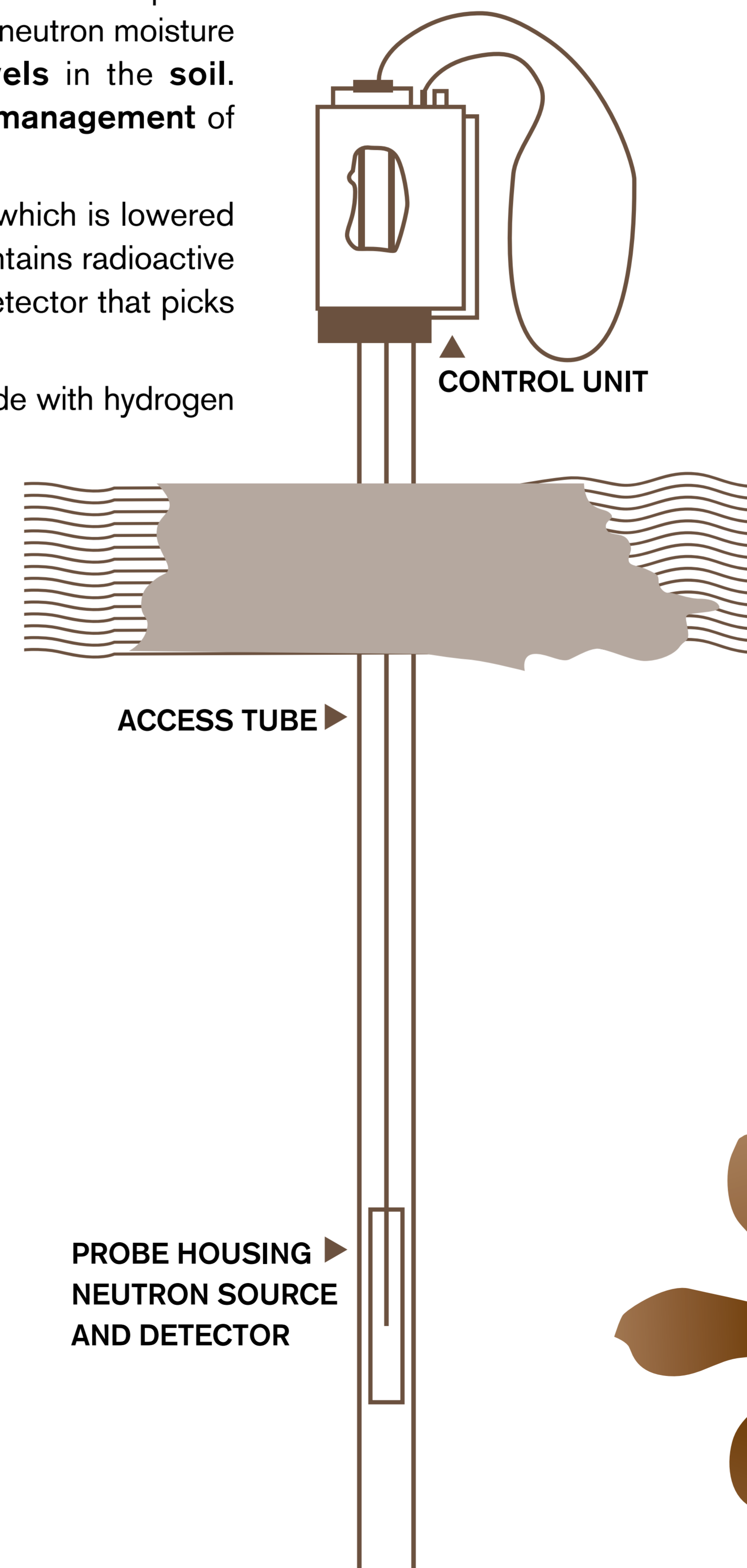
The white box is a **logger** that is attached to a probe which is lowered into the ground through an access tube. The probe contains radioactive material that emits high energy 'fast' neutrons and a detector that picks up lower energy 'slow' neutrons.

Since neutrons lose much more energy when they collide with hydrogen atoms than with elements like oxygen, nitrogen or carbon, the **rate of energy loss** of the neutrons is a good **indicator** of the moisture level of the soil surrounding the probe.

Benefits:

The moisture measuring system **prevents** the **over-watering** of the vineyards. The positive impacts of this water efficiency include:

- Water **conservation** in a relatively water-stressed area.
- Reducing the need for spraying vineyards with pesticides and other chemicals. Overwatering causes fungal and root diseases to thrive. Maintaining optimal moisture levels keeps vineyards healthier.
- **Protecting** the **ecosystems** of the Breede River. One of the biggest threats to the river is agricultural runoff degrading the water **quality**. The moisture monitoring stops overwatering that would wash nutrients from the soil and cause runoff from the vineyards into the river and ground water.



IPW

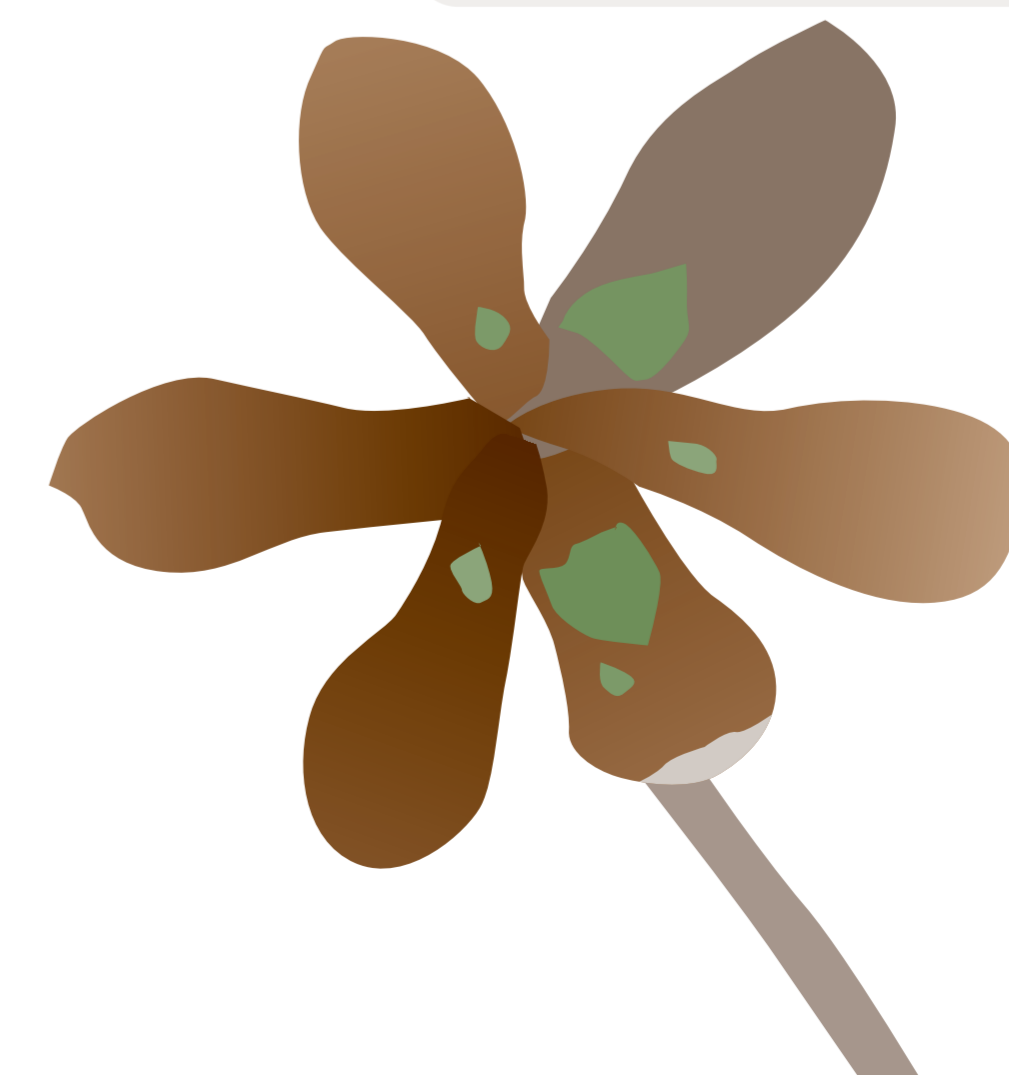
Integrated Product of Wine (IPW) complies with international wine industry environmental sustainability criteria, including the **'Global Wine Sector Environmental Sustainability Principles'** as published by the **International Federation of Wine and Spirits (FIVS)** and the **'Guidelines for sustainable Viti-viniculture: Production, processing and packaging of products'** as published by the International Organisation of Vine and Wine (OIV).

The production practices on farms and/or cellars of persons joining the scheme are evaluated and audited by the board.

In **2010 South Africa** became the **first** wine producing country in the **world** to establish a seal not only to **certify** the **origin of a wine**, but also for **sustainable production** and **traceability** up to product level.

Did you know?

More than **50% of the Van Loveren farms** are **not cultivated**, and a significant portion is under active conservation management.



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6.3KM



138M
ABOVE SEA LEVEL

WATER



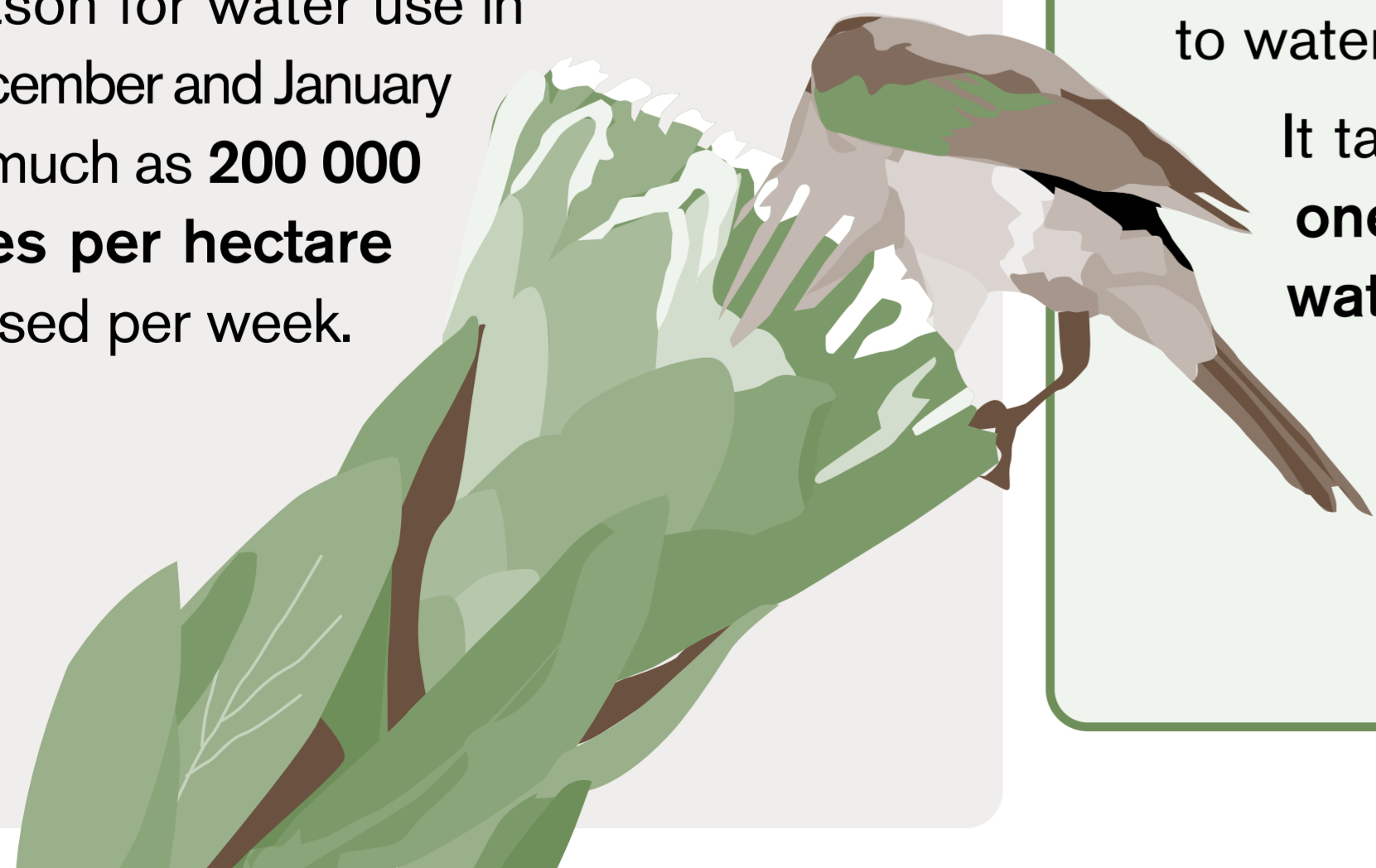
HOW IRRIGATION CHANGED THE VALLEY

Before the building in **1949** of the **Brandvlei Dam** near Worcester, farming in the Robertson area had more in common with that in **Klein Karoo** towns like Oudtshoorn than the Boland.

Irrigation canals built around the turn of the **20th century** gave more farmers access to runoff water from the mountains. They were still in the minority and were the only ones who could produce **grapes** and **fruit**. In the absence of electricity to run pumps the farmers used **flood irrigation**.

The majority of the farmers in the valley were still **dry land farmers**, mostly farming with ostriches until the dam was built. Thanks to the dam the **Breede River downstream** became **perennial**, whereas before it would have been dry during critical times of the year.

Today **25 000 hectares** of agricultural land in the Robertson/Worcester area is irrigated from the dam. During the peak season for water use in December and January as much as **200 000 litres per hectare** is used per week.



PRODUCING FOOD IS A THIRSTY BUSINESS

Water is an **essential** input in agriculture and the processing of agricultural products to make the **food** and **drinks** we consume.

The good news for wine lovers is that their favourite drink is **relatively frugal** when it comes to water-use!

It takes about **375 litres** of water to make **one litre** of wine. That's **about 47 litres of water per glass**.

Compare this to the **30 litres** of water it takes to produce a **cup of tea** or the **140 litres** that go into a **cup of coffee**!

How much water does it REALLY take?

Cup of tea:	30 litres
Glass of wine:	47 litres
Glass of beer:	75 litres
Cup of coffee:	140 litres
1 litre of milk:	1000 litres
1 kg of maize:	1000 litres
1 kg of rice:	3000 litres
1 kg of beef:	15500 litres

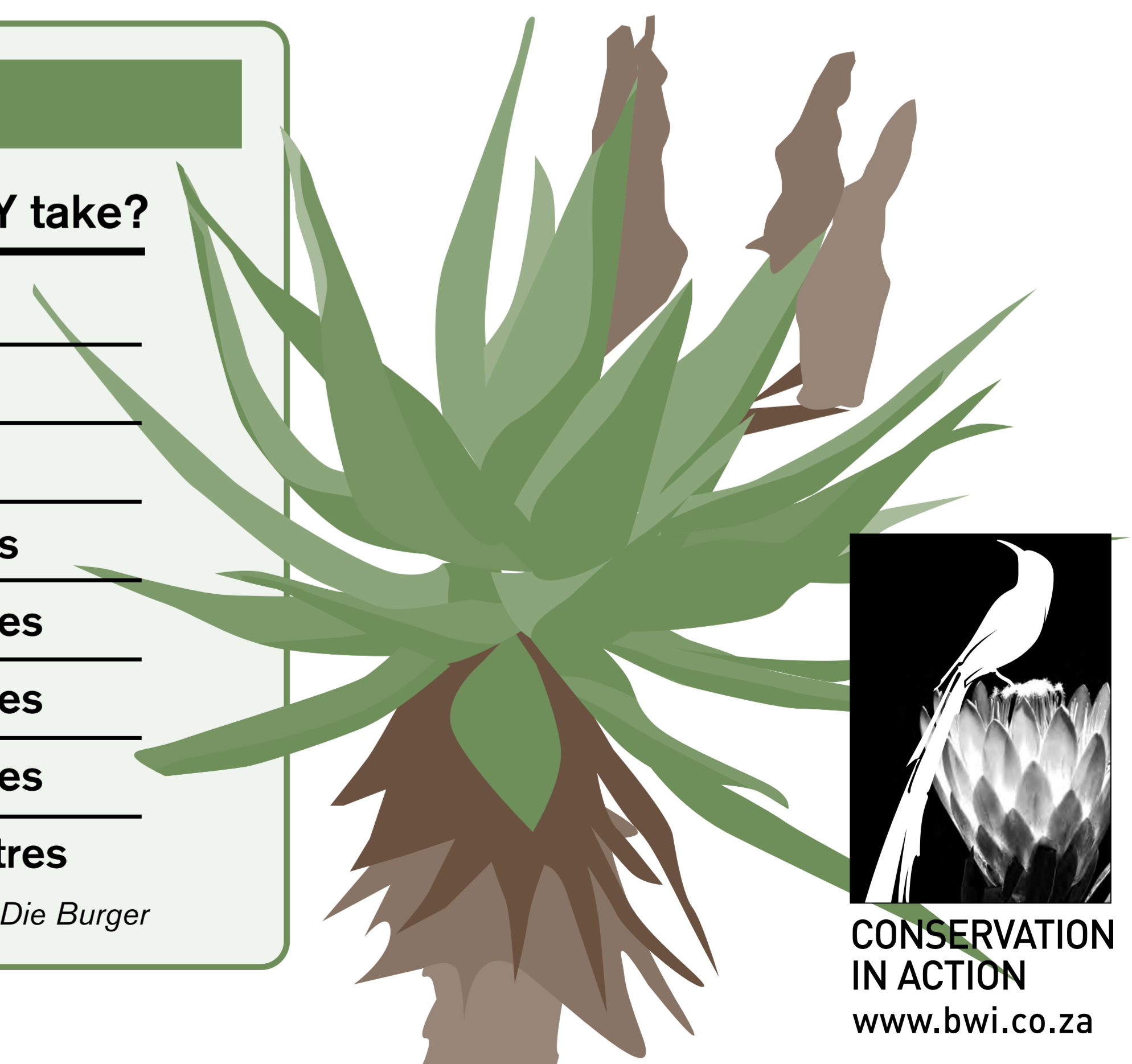
Source: Die Burger

THE IMPACT OF CAREFUL WATER MANAGEMENT

Modern technology, like the computerized neutron moisture metering system Van Loveren uses, allows farmers to **better manage** their water use.

While irrigating one hectare requires about **7.5 million litres per year**, through careful water use management Van Loveren limits this to about **5 million litres** per year.

This benefits the environment by conserving **water** and **electricity**. This also has a huge financial implication for the business.



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