8.11 WETLANDS OF THE SOUTH WEST CAPE

by J.S. MEPHAM

In the past, the coastal plain of the southwestern Cape Province of South Africa (Fig.8.23) has supported a large number of permanent vleis (shallow lakes), temporary vleis and river floodplains. Many of these have now been drained, or used as refuse tips, and of the few remaining most show a great deal of interference by man. No comprehensive account of these water bodies is available, and most of the information in the following section has been gleaned from various theses, government reports and from personal communications. The wetlands dealt with in this section are:

8.11.a Botriviervlei
8.11.b De Hoopvlei
8.11.c Sandvlei

For the climate of the region see Fig.8.2 Danger Point.

8.11.a BOTRIVIERVLEI

Botriviervlei is a coastal lake, showing only a moderate level of disturbance situated in the SW Cape between the towns of Kleinmond and Hermanus, about 110 km SE of Cape Town. It is a closed lake which lies behind beach sand dunes. At times of high water it may overflow the dunes without cutting a channel, and excess water may also be lost, via the Lamloch Swamps, to the Kleinmond Estuary some 5 km to the NW. For further information see Koop, (1982).

1. **Geography and morphology** (Fig. 8.24)

Location: 34°18'30" - 34°22'30"S; 19°04'-19°09'E.

Length: 7 km

Width: 2 km

Area: 14.9 km^2

Shape: The lake is roughly triangular, with a shallow side arm, 'Rooisand', to the northwestern end, which is connected to the vlei by an 80 m wide channel, known as 'Die Keel'.

Landscapes: Botriviervlei is flanked by the mountains of the Kleinmond (c. 450 m high) in the NW, and the Hawston-Onrust-Hermanus (c. 450 m) in the SE. It is separated from the sea by a 100-200 m wide coastal dune belt, consisting of a steep, narrow barrier dune ridge 3-6 m high and a hinterland of low hummock dunes. The rest of the lake is surrounded by farmland.

2. **Geology**

The catchment area of Botriviervlei is dominated by sedimentary rocks

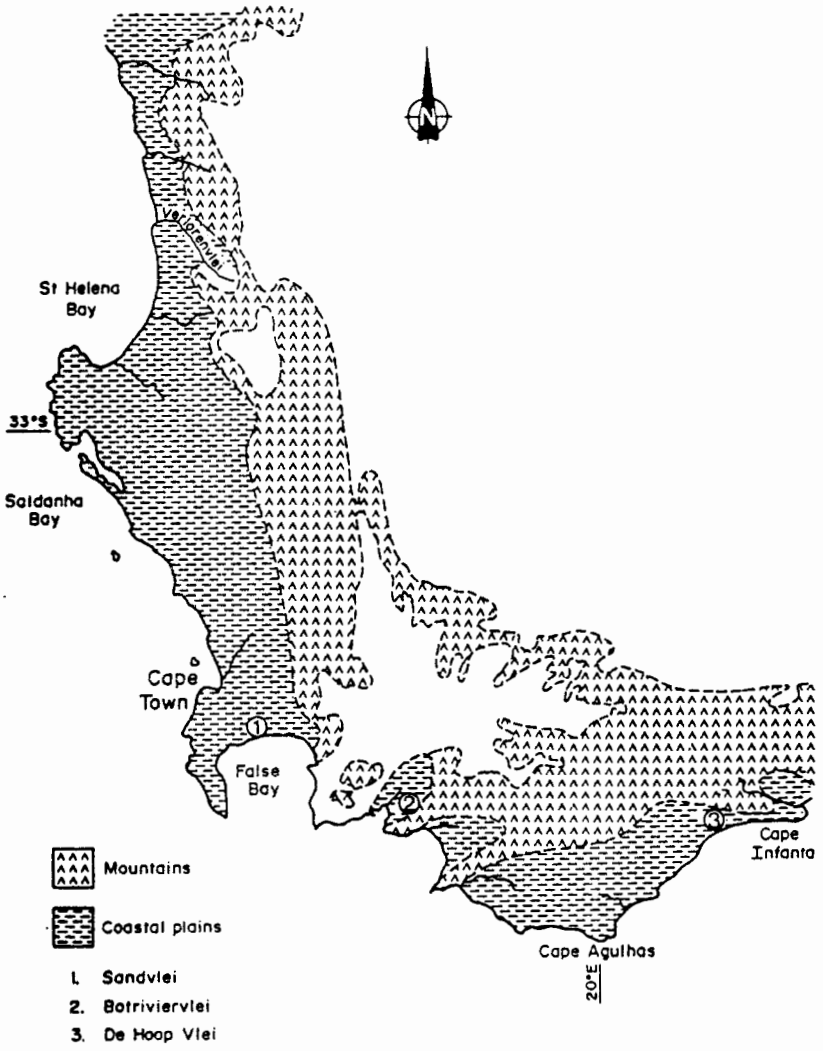


Fig. 8.23 Map of the South West Cape of South Africa showing coastal plains.

of the Bokkveld group, although Table Mountain Sandstone is found on the western and eastern borders.

The bottom materials are derived from two sources. Fine fluviatile sediments which helped fill the river valley, when the sea level began to rise about 18 000 years ago. Subsequently, marine sedimentation has occurred, with marine mud deposited in the upper reaches of the former bay and clean marine sand in the nearshore region. The deeper parts of the lake contain about 95% mud, while the shallower regions are covered by fine to medium sand.

3. Hydrography and hydrology

The Bot River and its tributaries drain the Houhoek, Groenland, Swart, Shaw's and Babilonstoring Mountains. The total length of the Bot River from the source to the dunes on the seaward side of the lake is about 42 km, and its major tributary, the Swart River is of a similar length. The catchment area covers about 813 km^2. There is a fairly marked seasonal pattern associated with the lake. During summer (December, January) water levels fall and the water becomes brackish to saline. In the winter months (June, July) the vlei is filled to about 2.7 m asl, which results in the water becoming less

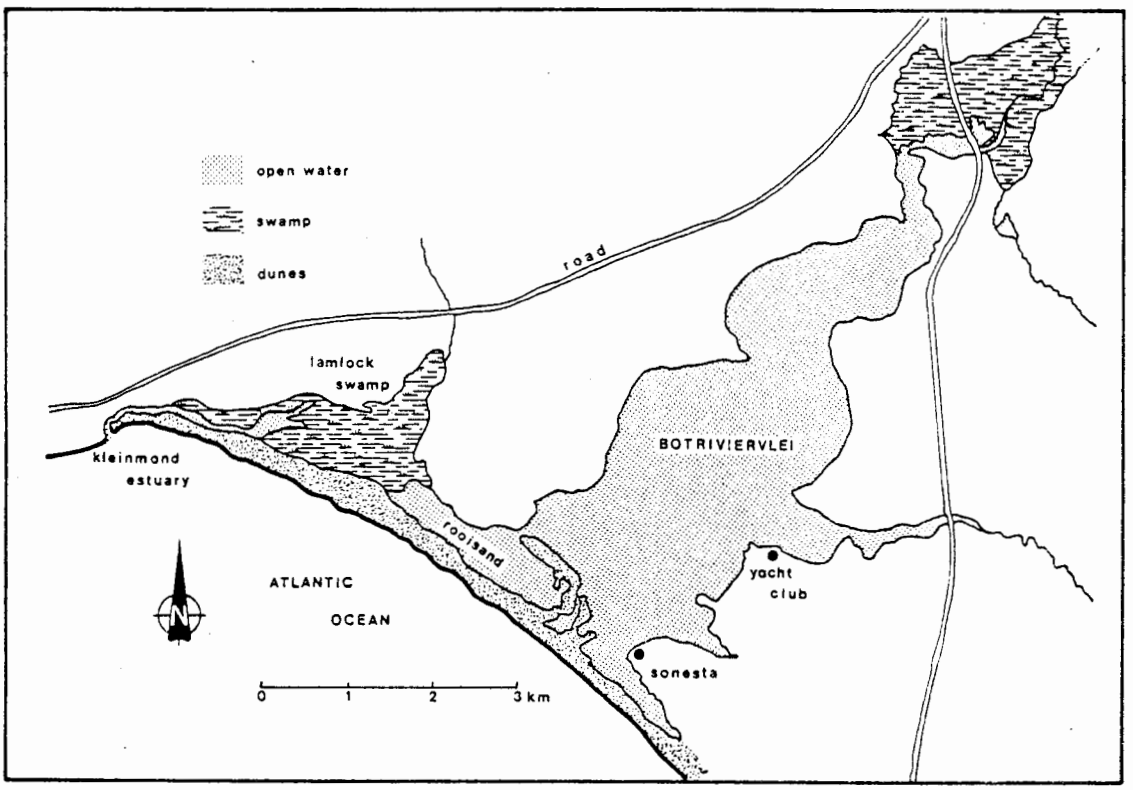


Fig. 8.24 Map of Botriviervlei

saline, and occasionally even becoming fresh. Very high water levels may cause flooding of low lying properties and erosion of the banks. The overflow into the Kleinmond Estuary provides only a very limited contact with the sea, so that the vlei cannot discharge its suspended silt load. Neither does seawater enter through this route, and marine fish are not recruited into the system. Local fishermen periodically breach the dune barrier to allow migration of fish into the lake. This results in the lake draining into the sea, leaving wide expanses of malodorous mud.

The average maximum daily river flow for the whole period 1967-79 is given as 2.52 $m^3.sec^{-1}$. The maximum flow recorded, during July-August 1974, was 65.91 $m^3.sec^{-1}$.

4. Physico-chemical characteristics

pH:	mean for the centre of the lake, 1980-81	7.9
	range for the centre of the lake	7.3-8.3
	range for the whole lake	6.8-8.5

Temperature: For the years 1980-81 the mean temperature for the centre of the lake was 18°C, with a range of 12°C (July) to 23.5°C (January, February), and a range for the whole system of 11.9-23.6°C.

Turbidity: Koop (1980) recorded the following pattern: In the early morning before the onset of winds an underwater visibility of 3 m was recorded with a Secchi disc, but by afternoon, turbulence caused by winds reduced visibility to 10-20 cm, and led to the suspension of fine sediment, particularly in the more exposed lower reaches.

Salinity: The degree of salinity varies in response to climatic conditions and to whether sea water has entered or not. From September to November the salinity ranges from 3-5°/₀₀, and from January to March may reach 40°/₀₀.

Nutrients: The following values are available for the centre of the lake:

NH_4	6.24 $10^{-6}g.l^{-1}$
NO_3	0.37 $10^{-6}g.l^{-1}$
PO_4	0.73 $10^{-6}g.l^{-1}$

Dissolved Oxygen: results from 1980-81 show a mean annual value for the centre of the lake of 8.8 $mg.l^{-1}$, with a maximum in July of 10.5 $mg.l^{-1}$, and a minimum in November of 5.8 $mg.l^{-1}$.

5. Phytoplankton

Standing stocks of phytoplankton, mainly flagellates, are fairly low, probably limited by wind induced turbidity. Diatoms in the sediment are restricted to the top 5 cm of fine sediments.

6. Macrophytes

The alga, Chara sp. occurs throughout the water of the lake, and is particularly dense near the upper swamps and the Lamloch Swamps. The

epiphytic alga, Cladophora sp. grows both on submerged plants and in loose floating mats. It appears to grow spasmodically, with no distinguishable cycle.

The aquatic grass, Ruppia maritima is reported to be the most important plant in terms of biomass (Koop et al. 1982). It is found throughout the system in water shallower than 2.9 m. Potamogeton sp. is found in dense isolated patches in the upper reaches, and Sporobolus virginicus grows predominantly in areas which are periodically inundated, such as the shallow waters along the southern parts of the Lamloch Swamps. Sarcocornia natalensis and Sarcocornia decumbens are also found in the swampy areas.

The emergents Phragmites australis and Scirpus litoralis form dense reedswamps in the very wet and submerged areas, and the marsh grass Chondropetalum tectorum may be found at times completely submerged. Where water levels are lower Juncus kraussii is important and this grades into Scirpus nodosus and Juncus acutis.

7. Invertebrates

Zooplankton: Coetzee (1982) has published an extensive survey of the zooplankton for 1980-81. He obtained values of 8-298 mg dry mass per m^3 of vlei water. More than 99% of this comprised the copepods Pseudodiaptomis hessei, and Halicyclops spp., as well as copepod nauplius larvae and various harpacticoid copepods. After the vlei was opened artificially in 1981, many larvae of the burrowing sand prawn Callianassa kraussi appeared, which have a requirement for a salinity of more than 17°/oo.

Macro-invertebrates: Koop et al. (1982) recorded only 18 species of invertebrates, some of which were present in large numbers (e.g. 4000 individuals per m^2 for Hydrobia sp.). These eighteen species included 2 polychaetes, 2 isopods, 3 amphipods, 1 tanaid, 1 prawn, 1 burrowing prawn, various insect larvae, 1 mussel and 2 snails.

8. Fish

Fresh water species occur in the upper reaches, where the salinity is usually low, e.g. Cyprinus carpio and Oreochromis (= Sarotherodon) mossambicus. When a breach is made through the barrier dune a number of marine species enter the lake. These include Gilchristella aestuarius and Gobius multifasciatus, which breed in the estuary, and some migrants which use it as a nursery for juvenile stages e.g. Mugil cephalus and Liza richardsoni.

9. Other vertebrates

Amphibia: A number of frogs and toads have been recorded in the immediate vicinity, including Bufo rangeri (raucous toad), Bufo pardalis (leopard toad), Rana grayii (clicking stream frog) and Hyperolius horstocki (arum frog).

Reptiles: are not commonly seen, although Crotophopeltis hotamboeia

(herald snake) and Bradypodion pumilum (Cape dwarf chameleon) have been recorded in the Kleinmond swamps nearby. Doubtless there are many other snakes in the swamps yet to be found.

Birds: 118 species of birds, including many waders and coots, have been recorded in this area, a list of which may be found in Koop (1982). A number of rare and endangered species are found here, such as Pelecanus onocrotalus (white pelican), Phoenicopterus ruber (greater flamingo), Phoeniconaias minor (lesser flamingo), Hydroprogne caspia (Caspian tern) and Haliaeetus vocifer (African fish eagle).

Mammals: The following mammals have been sighted in the immediate area; Papio ursinus (chacma baboon), Felis caracal (caracal), Genetta genetta (small spotted genet), Herpestes ichneumon (Egyptian mongoose) and Mirounga leonina (southern elephant seal). (Stuart 1981).

10. **Human activities and management**

Because of limited access to Botriviervlei, it is not widely used for recreational purposes. A small amount of angling and boating takes place, but only power boats with a maximum speed of 11.25 km per hour (7 mph) are permitted on the lake.

A road bridge cuts across the Phragmites swamp at the head of the vlei and the floodplains on the NW side are bisected by a 300 m long causeway leading up to the bridge, where only one, partially blocked culvert allows the passage of water. Another bridge over the Afdaks River appears to have no detrimental impact because it crosses the river above the floodplains. Two small wooden foot bridges also exist, one linking the small holiday resort, 'Sonesta', with the coastal dunes, and the other crossing the Kleinmond estuary near its mouth. They appear to have no impact on the functioning of the system.

A small marina constructed on the SE shore of the lake has proved not to be very popular.

Away from the coast, the lake is bounded by farm land. To the east the land is used mainly for grain production and sheep grazing, while to the west, flower farming of endemic species is practised, together with some grazing by sheep and cattle. Much of the land to the east is still covered by wet coastal fynbos (heathland comprising fine-leaved shrubs), although it is somewhat disturbed. Parallel to the shore the coastal dunes are covered by local dune vegetation, but they are rapidly being invaded by the alien species Acacia cyclops, Acacia saligna and Leptospermum laevigatum.

8.11.b DE HOOP VLEI

De Hoop Vlei is a long narrow closed lake, lying on the coastal plain, about 50 km NE of Cape Agulhas, the most southerly point of Africa.

1. Geography and morphology (Fig. 8.25)

Location: 34°31'S: 20°23'E.

Length: 18 km when full.

Width: up to 1 km.

Area: 6.2 km^2.

Depth: mean 1.1 m, after 1957 flood 7.7 m.

Landscapes: The southern extremity of the vlei is separated from the sea by 2.5 km of bush-clad sand dunes. At its northern end it merges imperceptibly with the Sout River, which feeds it. Here the vlei winds through a limestone range, locally referred to as the 'duine', which runs parallel to the coast from E to W. Precipitous and eroded limestone cliffs of approximately 300 m flank the vlei on both sides along its upper reaches. Although much reduced in height (10-30 m), these cliffs persist along the eastern margin of the lower half, resulting in a complete absence of shore, with the bank being formed of cliff face or rubble. However on the western aspect, the limestone range is replaced by coastal plain and there is a shelving shore of sand with interspersed limestone rocks. Further away to the SW lie the Bredasdorp Mountains, and to the N and NE the Langeberg Mountains.

2. Geology

De Hoop Vlei lies on Tertiary limestone and the hills to the north comprise Bokkveld shales. Many caves and potholes occur in the limestone, which in places is 200 m thick.

There are two main kinds of soil; Mizpah and Glenrosa.

3. Climate

De Hoop lies just inside the winter rainfall area of the southern Cape, and has warm summers and mild winters.

Type: Cf (Köppen)

Temperature:	mean annual	17.5°C
	hottest month, January, mean	22.5°C
	coolest month, July, mean	11.5°C

Rainfall: There is no definite rainy season, although slightly more rain falls between March and August than during the rest of the year. The mean annual precipitation in the catchment is between 330 and 410 mm, with an average of 369 mm. Because of the rain shadow effect of the Hottentots Holland and Langeberg Mountains, this is somewhat lower than that in Cape Town (626 $mm.y^{-1}$) and the Wilderness area (860 $mm.y^{-1}$). Rainfall is predominantly cyclonic, and in the summer cloudbursts lead to soil erosion.

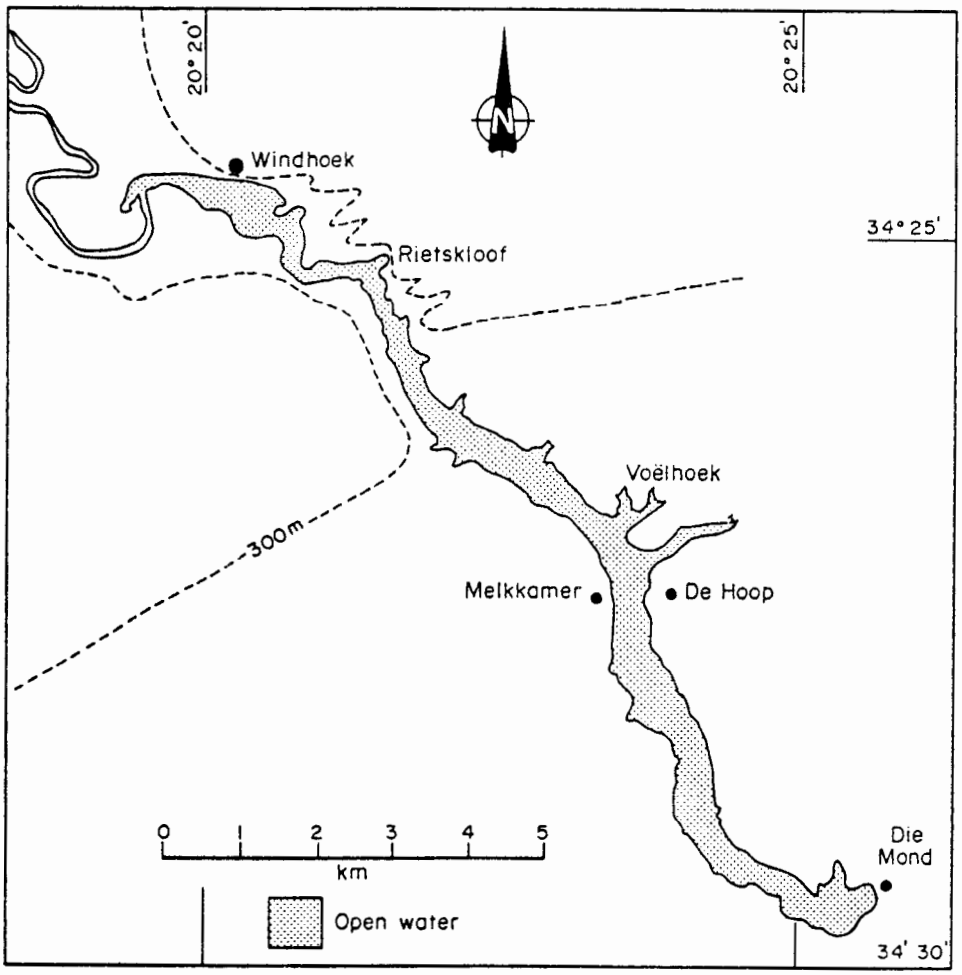


Fig. 8.25 Map of De Hoop Vlei, showing 300 m contour of the limestone escarpment.

wettest month, August, mean	47.7 mm $month^{-1}$
driest months, Dec/Jan, mean	21.1 mm $month^{-1}$

Wind: In winter the annual prevailing wind is from the NW and in the summer from the SW. The area is exceptionally windy and there are few days in summer when a strong 'south-wester' does not blow. Winds are at their strongest at 15.00h when velocities may reach 60 $km.hour^{-1}$.

4. Hydrography and hydrology

Most of the water enters the vlei from the Sout River, 141 km long, which drains the grain farming area of the Bredasdorp district. The perimeters of the region are drained by the Kars, Breede, and Riviersonderend.

The vlei has no direct outlet ot the sea, but local legend has it that a sink hole once provided an outlet to the sea, but that this became permanently blocked after floods in 1906. Since then two channels were constructed to remove excess water. Cloete's Sloot is operated by a sluice gate, and was last used in 1962, but the other channel was soon filled with sand and has never been used.

During the past century the vlei has overflowed its banks from two low points on the west bank, and flooded the surrounding farmland twice (December 1906, August 1957), and it almost completely dried out in 1903, 1945, 1975 and 1980. At these times a few remaining, shallow pools allowed the survival of a number of fish and other aquatic life forms.

5. Physico-chemical characteristics of the water

De Hoop Vlei was classified as alkaline and eutrophic by Harrison in 1948. It has a pH of 8.5-9.5. The total dissolved solids usually range from 5 to 11°/‥, but during the dry period of 1980-81 it rose to 50°/‥.

6. Macrophytes

The lake is almost devoid of emergent macrophytes, and the submerged species Potomageton pectinatus varies in density according to the prevailing salinity, and probably also to the levels of herbicides which have run off from the adjacent farm lands.

7. Fish

There is one indigenous fresh water species of fish present, Sandelia capensis (Cape kurper). Recently, Oreochromis (= Sarotherodon) mossambicus has been successfully introduced by the local Department of Nature Conservation.

8. Other vertebrates

Reptiles: Until the late 1960s Pelomedusa subrufra (water turtles) were common, but there appears to have been a decline since the droughts of 1975 and 1980.

Birds: De Hoop Vlei is registered as a wetland under the Ramsar Convention, and is particularly important as a wader habitat. The beds of Potamogeton pectinatus support large flocks of coot, and varying numbers of ducks, grebes, small waders, herons, little egrets and yellow billed egrets. An annotated check list is available in Uys and Macleod (1966).

9. Human activity and management

The natural state of the catchment area has almost entirely been replaced by agricultural crops and planted pasture. The Cape Department of Nature Connservation purchased the farm, De Hoop, in 1956 for the establishment of a nature reserve. Subsequently more land has been purchased, and the reserve now has an area of 17 846 ha. The reserve includes a number of ecosystems, mobile sand dunes, rocky shore, coastal fynbos (heathland), mountain fynbos, caves, and most of De Hoop Vlei.

8.11.c SANDVLEI

Sandvlei is a small estuarine lake in the vicinity of Cape Town, which over the years, has suffered a great deal of interference and alteration. The original lake had gently graded shores, was subject to wide seasonal fluctuations in water level and was fringed by typical wetland vegetation. It was first drained in 1866, in an ineffectual effort to reclaim the land, and subsequently it has been dredged many times in order to supply water suitable for boating. In 1969 a proposal was made to develop the whole area as a marina and ocean-going yacht harbour, but after the marina was completed in 1973, the rest of the project was cancelled. The 'Marina da Gama' occupies the E and NE shore of Sandvlei, and communicates with the main body of the vlei via excavated channels. Many of the previously graded shores have been replaced by steep banks, often artificially stabilised. The surrounding area has become extensively urbanised and the waters are widely used for recreation. However there are still natural components in the system, which are of vital importance to its viability.

1. Geography and morphology

Sandvlei (Fig.8.26) lies in the southwestern extremity of the Cape Coastal Flats, and drains into False Bay to the south. The western shore lies close to the steep sandstone slopes of the Muizenberg Mountain, while the eastern and northern shores are bounded by the remains of the sand dunes which were formerly present in the area. A 700 m long railway embankment runs N-S across the northwestern part of the vlei, with only a single culvert allowing the passage of water. Behind this barrier there is an extensive Phragmites and Typha swamp, which is very different in character from the rest of

the water body. A road bridge spans the canalised outlet from the entire system, some 200 m from the sea.

Location: 34°05'S; 18°28'E.

Length: 3.4 km Width: maximum 2.1 km

Area: approximately 4 km^2

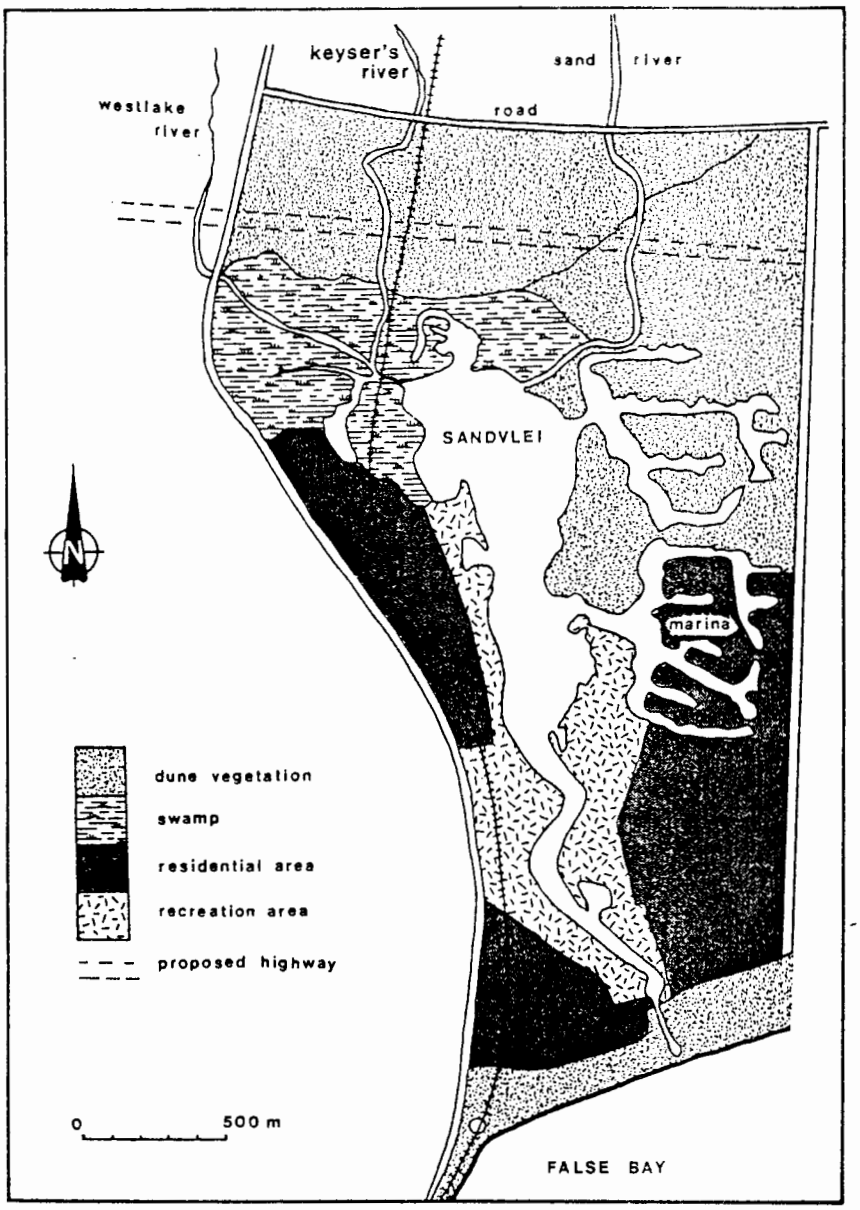


Fig. 8.26 Map of Sandvlei

Depth: The bottom profile is complex, since Sandvlei has been dredged many times since 1947. Currently, little of the vlei exceeds 1 m in depth, and the northern end is particularly shallow. A number of channels, including the Marina da Gama canal system, have been dredged to about 2m.

Local Authorities: The entire water body and shore line of Sandvlei is controlled by the Cape Town City Council, which is also responsible for 42% of the catchment area. The remaining area of the catchment comes under the jurisdiction of the Divisional Council of the Cape, and various state government departments including Defence, Forestry and Prisons.

2. Geology

The catchment area of Sandvlei comprises mountains to the west and a coastal plain to the east. The mountains are derived from the original Malmesbury System of shales and quartzites, which were intruded by Cape granite, and then overlain by Table Mountain Sandstone. Subsequently the Table Mountain Sandstone was eroded to expose the underlying granite and Malmesbury System. At the base of the sandstone there is a thin band of softer shale, richer in iron and manganese than the sandstone above. Iron derived from here was precipitated as a lateritic layer which now extends into the bed of Sandvlei, and in places makes hydraulic dredging difficult. The river water draining into the lake from the mountains is soft, peat-stained and slightly acid. The coastal plain to the NE is of Recent origin, and the soils consist of fine-grained quartzitic sands mixed with marine shell fragments. This calcareous material causes water from this area to be slightly alkaline.

3. Climate

This region has a typical mediterranean climate, with cool wet winters (May to September), and warm to hot, drier summers (October to April).

Rainfall: Figures are available from Plumstead, on the eastern edge of the catchment (34°01'S; 18° 28' E).

mean annual rainfall	887.4 mm
wettest month, June (mean)	193.8 mm
driest month, February (mean)	13.7 mm

In the winter there are between 12 and 15 days of rain per month, and during summer 4–5 days of rain per month.

Wind: From October to May wind is predominantly from the S and SW, with an average velocity of 39.6 km h^{-1}, and from June to September mainly from the N, with an average velocity of 50.4 km h^{-1}.

4. Hydrography and hydrology

It is generally observed that high water levels in Sandvlei correlate closely with high rainfall.

The total catchment area is 8500 ha. A number of small streams and rivers drain into the vlei, including Little Princess Vlei stream (1.05 km), Westlake stream and tributaries (4.7 + 1.1 km), Keysers River + tributaries (7.5 + 2.2 km), Langvlei Canal (3.95 km) and Sand River Canal/ Diep River (12.6 km).

No quantitative data are available for runoff for this area.

A distinct delta is forming where the Sand River enters the vlei, and it has been proposed that a silt/garbage trap should be built to counteract this. The beds of Phragmites and Typha trap much of the sediment delivered by the Keysers and Westlake Rivers.

5. Physico-chemical characteristics

Detailed figures for 10 different locations within Sandvlei are given by Morant and Grindley (1982). Those given here are for the centre of the lake.

	minimum	maximum
surface temperature (°C)	11.0	24.3
bottom temperature (°C)	12.2	23.1
pH	8.0	9.2
salinity (°/₀₀)	2.23	19.34
transparency (m)	0.2	1.8
conductivity ($10^{-6}S.cm^{-1}$)	375	2700
total dissolved solids ($mg.l^{-1}$)	2536	21 838
NH_3-N ($mg.l^{-1}$)	less than 0.01	2.6
NO_2-N ($mg.l^{-1}$)	less than 0.01	0.29
NO_3-N ($mg.l^{-1}$)	0.01	1.18
PO_4-P ($mg.l^{-1}$)	less than 0.01	0.26
alkalinity as $CaCO_3$ ($mg.l^{-1}$)	64	257
SO_4 ($mg.l^{-1}$)	330	1580
surface dissolved oxygen ($mg.l^{-1}$)	6.8	17.0
bottom dissolved oxygen ($mg.l^{-1}$)	0	12.0

Mixing regimes: The water body is well mixed for most of the year because the lake is shallow and conditions are generally windy. The only time that stratification may occur is during late autumn and early winter (May, June). At this time the estuary mouth is usually open, and sea water entering flows under the outflowing fresh water. This heavier saline water tends to accumulate in the deeper channels of the Marina da Gama, where reduction of sulphurous organic debris results in the production of hydrogen sulphide. At the resumption of windy conditions and the mixing of the layers in the water, the hydrogen sulphide is released as a foul-smelling, noxious gas polluting the expensive residential area of the marina.

6. Macrophytes

By far the most common submerged macrophyte species is Potamogeton pectinatus. This grows in dense beds particularly in the middle reaches of Sandvlei, and contributes oxygen, food and shelter for other organisms living in the system. However it interferes considerably with boating activites and the authorities are under permanent pressure to remove it. In 1977 the Cape Town City Council harvested 1 000 tonnes wet weight of Potamogeton together with some of the alga Cladophora, and in 1981 approximately 700 tonnes. Carefully controlled removal is probably beneficial in that it exports excess nutrients which might increase the eutrophication of the lake. Other submerged and floating species include Ruppia marina, Myriophyllum aquaticum, Ceratophyllum demersum, Lemna gibba, Eichhornia crassipes, Nymphaea spp. and Aponogeton distachyos. The latter three occur mainly in the streams entering the vlei.

The emergent species Phragmites australis covers a large area to the NW of the vlei and many small patches of Typha capensis, Scirpus nodosus, Scirpus litoralis, Scirpus maritimus and Juncus kraussii to the N, grow near the bird sanctuary and along undeveloped canals.

Numerous algae have been reported growing in Sandvlei, including Enteromorpha spp., Chara fragilis, Spirogyra sp., Cladophora sp., Lyngbya sp., Nitella sp. and Lamprothamnium sp. Some of these grow on the artificially stabilised canal banks, causing unpleasant conditions when they decay. Kelps (mainly Eklonia maxima) are sometimes washed in from the sea.

7. Phytoplankton:

Approximately 18 species of diatoms have been found in Sandvlei, many of which are epiphytic on submerged plants. At certain times of the year Oscillatoria blooms cause an unsightly surface phenomenon. Begg (1976) reported that the toxic alga Prymnesium parvum was the cause of a high mortality of fish at that time.

8. Invertebrates

Zooplankton: The most common zooplankton species is Pseudodiaptomus hessei, which is important in the feeding of several fish species. At times the rotifer Brachionus plicatilis becomes abundant. A complete list of zooplankton is given by Morant and Grindley (1982).

Macro-invertebrates: The burrowing polychaete Ceratonereis hircinicola, the amphipods Melita zeylanica and Austrochiltonia subtenuis (= Afrochiltonia capensis), the isopod Munna sp. and the mollusc Tomichia ventricosa have been recorded by Shelton (1975). Of particular interest is the polychaete Ficopomatus enigmatica which produces tubes, up to 1.5 m long, on hard substrates such as concrete. The crown crab Hymenosoma orbiculare is common, as is the shrimp Palaemon pacificus.

A number of insects such as the mayfly Cloeon lacunosum, and the dragonflies Crocothemis erythraea and Ischnura senegalensis are common in summer.

9. Fish

Sandvlei is important as a fish nursery, although this rôle has been adversely affected by recent manipulations to maintain water in the vlei. Because there is a salinity gradient from the seaward margin to the head of the lake, a range of fish types are able to make use of the lake. Originally there was one species of fresh water fish, Galaxius zebratus, but in 1896 Cyprinus carpio was successfully introduced. Oreochromis (= Sarotherodon) mossambicus is tolerant to a range of salinities and was introduced into the vlei during the 1970s. Other fish of importance include the herbivorous mullets, Liza richardsoni and Mugil cephalus, which subsist largely on the epiphytic diatoms and detritus in the weed beds. Large numbers of the juvenile mullet support the many piscivorous birds, and they also attract predatory fish such as Lithognathus lithognathus (white steenbras), Rhabdosargus globiceps (white stumpnose), Pomatomus saltatrix (elf) and Lichia amia (leervis).

10. Other vertebrates

Amphibia: 16 species of frogs and toads have been recorded in the area. A species list is available in Morant and Grindley (1982).

Reptiles: 23 species of snakes, 15 species of lizards and 3 species of tortoise have been recorded here. A species list is available in Morant and Grindley (1982).

Birds: 150 bird species have been recorded at Sandvlei, which is an important refuge for waders when local, more temporary water bodies dry out. In former times, before 1960, wading birds such as flamingoes and little struts were very common, but since the draining and dredging of recent years, these have become very infrequent visiors, and the commonest birds now are piscivores such as white pelicans, darters, cormorants and grebes.

Mammals: At present a range of rodents are found in the area plus a few carnivores such as Felis caracal (caracal) and Felis lybica. It is feared that these latter may eventually disappear when the Princess Vlei Highway is completed, which will finally enclose the entire area within busy roads.

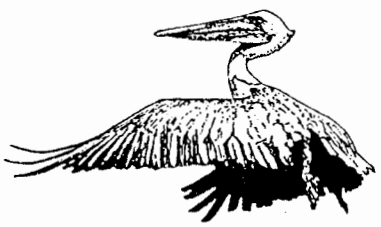
11. Human activity and management

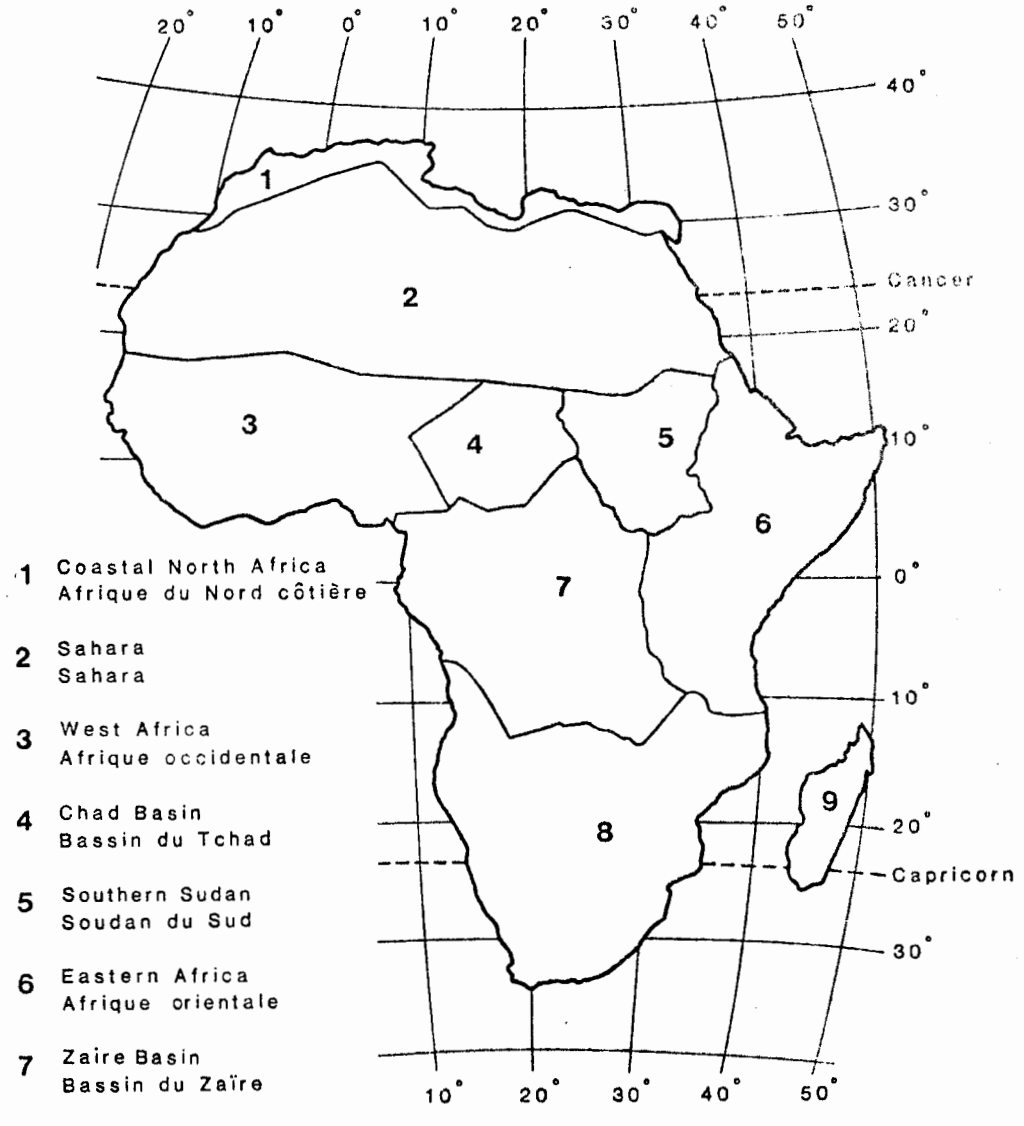
Sandvlei is a small shallow lake lying within the urban region of Cape Town. It is surrounded by roads and residential areas, and is much frequented in the persuit of recreation. Apart from the controversial issue of removing Potamogeton, mentioned in part 6. Macrophytes, there are a number of other problems associated with the system.

There are 9 sewage pumping stations near Sandvlei and its influent rivers. At least five of these overflow at intervals varying between twice per year and once every ten years. On these occasions calcium hypochlorite is added to the relevant canals and water areas.

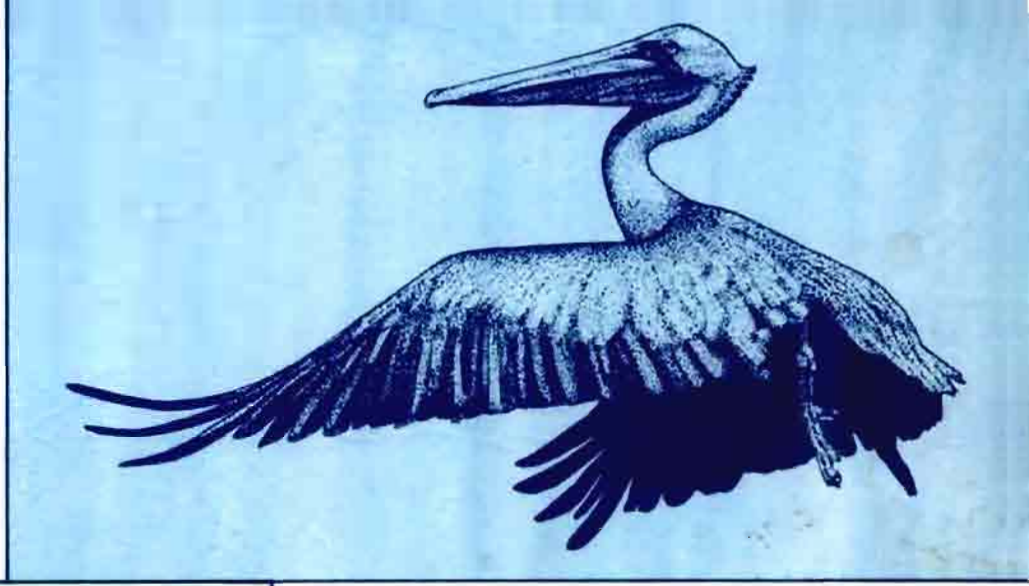
Toxic effluents, from an industrial estate along the Keyser's River, include organic solvents and heavy metals which form part of the discharge from a food factory, a saw mill, a textiles mill, and several electronics and engineering factories.

The Sand River/Langvlei Canal passes through a low income housing area, and a squatter area which has no sanitation. Every conceivable kind of rubbish constantly finds its way into the stream, and ultimately into Sandvlei. Previously an ineffectual rubbish trap was used, but in 1982 proposals were made to build a new trap to the north of the Wildwood Bird Sanctuary.





Regions of Africa treated in this Directory
Régions d'Afrique traitées dans le présent répertoire



DIRECTORY
REPERTOIRE

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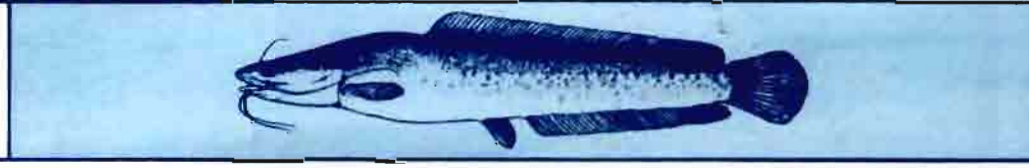

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