

1. COUNTRY

Republic of South Africa

2. DATE OF COMPILATION

14/03/89 - / /04/90

3. REFERENCE NUMBER 1ZA010

4. COMPILER

4.1 Name

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Cape Nature Conservation
PO Box 94
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5. NAME OF WETLAND

Orange River Mouth Wetland (ORMW)

6. DATE OF RAMSAR DESIGNATION

7. GEOGRAPHICAL CO-ORDINATES

16° 30' E, 28° 35' S

8. GENERAL LOCATION
(Nearest large town)

Alexander Bay in Cape Province, RSA, and Oranjemund in Namibia

9. AREA (ha)

Roughly 2 km x 10 km

10. WETLAND TYPE

7 - Intertidal saltmarsh

11 - Freshwater lagoons and marshes in the coastal zone;
includes delta lagoon and marsh systems.

11. ALTITUDE
(Average; or maximum and minimum)

Sea level

12. OVERVIEW OF SITE
(Thumbnail sketch in 2-3 sentences)

In general terms the ORM-system can be described as a delta type river mouth which comprises a distributory channel system between sand banks covered with pioneer vegetation, a tidal basin, the river mouth and the saltmarsh on the south bank of the river mouth.

The Orange River sometimes flows directly into the Atlantic Ocean and sometimes has its access to the sea blocked by sand-bars. It is thus not a true estuary and is best termed as a river mouth. The ORM-system can be defined as the area between the north and south flood margins of the Orange River from the Sir Ernest Oppenheimer Bridge 10 km upstream down to the sea. This represents a section of the Orange River of 9,5 km long.

13. PHYSICAL FEATURES

13.1 Geology and geomorphology

The "sand-bars" at the mouth of the river are of a particular nature. They differ from those to be found higher up in the stream. The geomorphological agent in the case of the latter is the river itself and the material to be found there consists of sedimentary (river) deposits. In the case of the sandbar that stretches from the mouth of the river to the sea, the geomorphological agent is the sea - more specifically the wave action and the long-shore current.

13.2 Origins

The Orange River rises in the Lesotho Highlands some 3 300 m above mean sea level where the average annual precipitation and evaporation are 1 800 mm/yr and 1 700 mm/yr respectively. It stretches 2 300 km from the source to the ORM at Oranjemund and Alexander Bay where it discharges into the Atlantic Ocean.

13.3 Hydrology

The ORM-system is situated approximately 1 335 km downstream of the PK le Roux Dam and 1 155 km downstream of the confluence of the Orange and Vaal Rivers. The closest upstream calibrated flow gauge with a reasonable reliable flow record is situated at Violsdrift approximately 280 km from the ORM-system. No reliable means of flow measurement

or flow record exist for the ORM-system and any derived flow figures for the ORM-system are based on estimates considering flow measurements at Violsdrift and the estimated water losses such as evaporation in the downstream stretch of river.

Total water losses due to net evaporation from the river between the PK le Roux Dam and the ORM-system are estimated at approximately 14 % of the total inflow to the river below the PK le Roux Dam. During a low-flow year such as 1987 this percentage rose as high as 38 %.

Before the construction of the major impoundments, such as the Hendrik Verwoerd and PK le Roux Dams, the flow in the lower section of the Orange River often stopped. These low-flow or no-flow periods coincided with the dry periods in the catchment area and normally occurred during August and September. During rainy seasons the river system and the ORM-system were flushed by small to severe floods.

Since the construction of especially the PK le Roux Dam the river flow became controlled and a more constant flow reaches the lower section of the Orange River. The dams further effectively buffered the medium sized floods and absorbed the smaller floods, and consequently the Lower Orange River and the ORM-system are only partially flushed during medium flood conditions and properly flushed during severe flood conditions.

Future water demand from the Upper Orange River system will drastically reduce the availability of water to the ORM-system and factors such as the flow release pattern and the influence of evaporation in the upstream river section as well as the ORM-system itself may become of extreme importance in maintaining the ecology of the system.

13.4 Soil type and chemistry

The river bed material in the ORM-system consists of various grades of gravel, sand and silt which were transported down the river and deposited in layers of varying depths. The river bed material is underlain by bedrock of which the profile in the ORM-system has not been surveyed. During the construction of the Sir Ernest Oppenheimer Bridge excavations of up to 60 m did not uncover bedrock. Another hole of 110 m, drilled just upstream of the bridge, did not hit bedrock either. It would thus appear that the bedrock level in the system is many metres below sea level.

13.5 Water quality

The influence of seawater intrusion on the surface water quality of the ORM-system is unlikely to extend beyond the deep tidal pool adjacent to the mouth. This intrusion occurs

over a triangular area along the north bank. This phenomenon is typical for a system where river flow is strongly dominant over tidal action and freshwater tends to overflow the heavier salt water which forms a salt wedge at the bottom. This salt wedge may extend up-stream for considerable distances until it is blocked by a natural barrier where it tends to mix with the freshwater.

The salinity of the water in the upper reaches of the system, just above the Oppenheimer Bridge, increases during low-flow conditions to the extent that it exceeds the limit of acceptability for domestic use. The salinity build-up is most likely due to the quality of the fluvial inflow into the system. During low-flow periods evaporation has a concentration effect in the upper river section. Although this interpretation cannot be backed by any water quality data, it should be taken into account when considering a reduction in flow to the ORM-system.

13.6 Depth, fluctuations and permanence

Before the construction of the major impoundments, such as the Hendrik Verwoerd and PK le Roux Dams, the flow in the lower section of the Orange River often stopped. These low-flow or no-flow periods coincided with the dry periods in the catchment area and normally occurred during August and September. During rainy seasons the river system and the ORM-system were flushed by small to severe floods.

Since the construction of especially the PK le Roux Dam the river flow became controlled and a more constant flow reaches the lower section of the Orange River. The dams further effectively buffered the medium sized floods and absorbed the smaller floods, and consequently the Lower Orange River and the ORM-system are only partially flushed during medium flood conditions and properly flushed during severe flood conditions. When there is a surplus of water in the OR-system the releases from the PK le Roux Dam are sufficient to maintain a substantial flow through the ORM-system. No attempt is made to simulate natural conditions by varying the flow seasonally.

13.7 Tidal variations

The mean tidal range at the mouth of the Orange River is approximately 1,57m and can be as much as 2,24m during spring tides. With a restricted open mouth, these tidal variations in the water level within the mouth result in strong tidal currents which is an important factor in the mouth dynamics.

13.8 Catchment area

The Orange River catchment with a total area of approximately 1000 000 square km is the largest in the RSA. A large portion of the catchment (almost 600 000 square km) is located inside the Republic and this area represents approximately 47 % of the country. The precise catchment is difficult to determine since it includes many pan areas and several large tributaries the runoff of which rarely, if ever, reaches the main river channel. The Orange River catchment includes the whole of Lesotho and several large river basins such as the Vaal River basin and the Fish River basin (Namibia).

13.9 Downstream area

Not applicable

The river flows into the Atlantic Ocean

13.10 Climate

Average annual precipitation at the ORM is only 50 mm/yr with an average annual potential evaporation of over 3 000 mm/yr. The sparse rainfall occurs mainly in winter. Single very rare heavy showers can account for as much as the normal annual precipitation. Hail is seldom reported in this region.

The highest average maximum temperature (24,42 C) occurs in January and the lowest average minimum temperature (8,7 C) occurs in July.

14. ECOLOGICAL FEATURES

(Main habitats and vegetation types)

The most important ecological aspects to be considered are vegetation, bird life and fish life:

a) Vegetation

The wetland vegetation includes wetland marshes and saltmarsh, and the island and bank vegetation. Wetland marsh vegetation and island and bank vegetation consist mainly of freshwater species.

The major vegetation types types recognised include the island communities; dominated by *Scirpus littoralis*, *Phragmites australis* and *Sporobolus virginicus*; the peripheral marshland, dominated by *Sarcocornia pillansiae* and *Sporobolus virginicus*; and the *Lycium cf decumbens* floodplain vegetation.

Species which are tolerant of mildly saline conditions, such as *Scirpus littoralis*, only occur close to the mouth where the intrusion of seawater may influence the salinity

level. The predominant presence of freshwater species in the island and bank vegetation is the result of the present regulated flow through the ORM-system. The saltmarsh on the southern bank of the ORM-system adjacent to the mouth, is cut off from the rest of the system by the embankment of an access road to the mouth.

b) Bird life

The river mouth, mudflats, intrafluvial marshlands, islets near the mouth, and adjacent pans provide a sizeable area of sheltered shallow water suitable for concentrations of wetland birds. The bird population can peak at about 20 000 to 26 000 representatives of 50 to 57 species. Several of these species (14) are considered rare or endangered. The ORM-system is used either for breeding purposes or as a stopover on migration routes.

The river mouth area is regarded as the sixth most important coastal wetland in southern Africa in terms of the number of birds supported. At times the area supports more than 1% of the world population of the Cape Cormorant (*Phalacrocorax capensis*), Damara Tern (*Sterna balaenarum*) and Hartlaub's Gull (*Larus hartlaubii*) and more than 1% of the southern African population of an additional six species. These species include the subcontinental population of the Blacknecked Grebe (*Podiceps nigricollis*), Lesser Flamingo (*Phoenicopterus minor*), Chestnutbanded Plover (*Charadrius pallidus*), Curlew Sandpiper (*Calidris ferruginea*), Swift Tern (*Sterna bergii*), and Caspian Tern (*Hydroprogne caspia*).

Additional wetland red data species present in the river mouth but with populations below the regional 1% level are the Great White Pelican (*Pelecanus onocrotalus*), Little Bittern (*Ixobrychus minutus*) whose presence in the river mouth throughout the year suggests that the birds belong to the breeding race *payesii* and not the visiting nominate race, Greater Flamingo (*Phoenicopterus ruber*), African Black Duck (*Anas sparsa*), Yellowbilled Duck (*A. undulata*) and the Greyheaded Gull (*Larus cirrocephalus*).

c) Fish life

Very little data are available on fish life within this system. From the available data it is evident that freshwater species are predominant in the system. As far as fish life is concerned this system cannot be regarded as an ecologically important system.

Believed to be all State land (whether in SA or in Namibia). Diamond mining companies hold a concession to much of this land. The north bank of the Orange River forms the border between SA and Namibia. The border is in the process of being changed, but since Namibia is going to join the Ramsar Convention, this wetland will then be a joint designation.

16. CONSERVATION MEASURES TAKEN

16.1 Legal status

No legal conservation status

16.2 Management category

16.3 Management practices

Diamonds have been transported from inland and deposited by the Orange River in alluvium north and south of the current mouth. The consequent strict control over access to the river mouth and adjacent coastal areas has resulted in the avifauna of the area remaining protected but little known. Its conservation status is currently enhanced by the strict control over access to the river mouth and extensive adjacent coastal areas provided by the security departments of the two mining organisations, Consolidated Diamond Mines in the north and State Alluvial Diggings in the south, and the absence of any current or foreseeable development of the river mouth area as a port or for industry.

17. CONSERVATION MEASURES PROPOSED

The large numbers of birds present, the variety of species involved, and especially the significant numbers of rare or endangered species, support the contention that the Orange River mouth is an internationally important coastal wetland meriting a high conservation priority status. To ensure that the Orange River can continue to support significant populations of wetland birds and other biota, a regional conservation plan is needed. This should be a joint exercise of the two mining operations and the regional nature conservation authorities. The plan should firstly identify the need for continued monitoring of local biota, including wetland bird populations, secondly emphasize the need to safeguard key areas where large numbers of birds gather and especially of breeding conservation priority species; and thirdly recommend the fostering of local environmental awareness, for example by forming natural history societies in Alexander Bay and Oranjemund.

18. LAND USE

(Human population, principle human activities and main forms of land use)

South bank: The area immediately abutting the river is irrigated farmland for supply of produce to the State Alluvial Diggings. Behind this belt of farmland the township is situated on slopes immediately outside the former floodplain area. Downstream of the farmland the natural vegetation occupies the entire floodplain to the edge of the fenced off diamond area.

North bank: immediately west of the bridge meadowland is maintained for a stables complex. Seaward of the meadows the floodplain is under "natural" vegetation on the river side of the dyke which protects developments near Oranjemund, notably the golf course.

19. POSSIBLE CHANGES IN LAND USE AND PROPOSED DEVELOPMENT PROJECTS

Absence of any current or foreseeable development of the river mouth area as a port or for industry. At the Orange River Mouth Workshop held in September 1989 no mention was made of any new local developments or intentions to develop the wetland area.

20. DISTURBANCES AND THREATS

Currently the only disturbance to the ORMW is minor; local recreational use by personnel of the mining organisations and (far) upstream damming of water extraction.

The major threat to this wetland is loss of inflow of water and sediment through human manipulation of water in the Orange River catchment. The two major extant dams on the middle reaches of the Orange River already limit floods in the lower Orange River to events of very large magnitude and also act as traps restricting the quantity of sediment moved downstream of the middle reaches. Development of further dams and diversion of flow in the headwaters as part of the Lesotho Highlands Scheme are likely to further reduce water availability in the ORMW. This scheme will come into effect in the mid-1990's. When fully implemented this scheme will transfer $2\ 000 \times 10^6$ m³/yr from the Orange River to the Vaal River system. One result of these water transfer schemes is that less water will be available for release to the Lower Orange River and particularly to the ORMW.

21. HYDROLOGICAL AND BIOPHYSICAL VALUES

The wetland is important to the Cape Province of South Africa and to Namibia as a source of water for irrigation, stock watering, and its hydrobiological values.

22. SOCIAL AND CULTURAL VALUES

None are known within the proposed wetland area.

23. NOTEWORTHY FAUNA

The wetland is considered as the sixth most important coastal wetland in Southern Africa in terms of the overall numbers of wetland birds which it supports. Wetland bird population can be as high as 20 000 - 26 000 individuals. Of the 57 wetland species recorded 14 can be considered either rare or endangered.

The Orange River Mouth supports more than 1% of the world population of 3 species endemic to southwestern Africa: the Cape Cormorant *Phalacrocorax capensis*, Hartlaub's Gull *Larus hartlaubii* and the Damara Tern *Sterna balaenarum*. On a southern Africa scale the Orange River Mouth supports more than 1% of the subcontinental population of Blacknecked Grebes *Podiceps nigricollis*, Lesser Flamingoes *Phoenicopterus minor*, Chestnutbanded Plovers *Charadrius pallidus*, Curlew Sandpipers *Calidris ferruginea*, Swift Terns *Sterna bergii* and Caspian Terns *Hydroprogne caspia*.

A total of 14 wetland bird species which occur in the Orange River mouth appear in one or both of the South Africa and Namibia red data books for birds. All the species, except the Curlew Sandpiper, of which the Orange River mouth supports more than 1% of the southern African or world population are listed in the red data lists. Additional wetland red data species present in the river mouth but with populations below the regional 1% level are the Great White Pelican (*Pelecanus onocrotalus*), Little Bittern (*Ixobrychus minutus*) whose presence in the river mouth throughout the year suggests that the birds belong to the breeding race *payesii* and not the visiting nominate race, Greater Flamingo (*Phoenicopterus ruber*), African Black Duck (*Anas sparsa*), Yellowbilled Duck (*A. undulata*) and the Greyheaded Gull (*Larus cirrocephalus*).

24. NOTEWORTHY FLORA

The major vegetation types recognised include the island communities, dominated by *Scirpus littoralis*, *Phragmites australis* and *Sporobolus virginicus* and the *Lycium cf decumbens* floodplain vegetation.

In response to the freshwater predominance, the vegetation of the Orange River Mouth is not truly estuarine. Aquatic macrophytes, such as *Zostera capensis*, are absent due mainly to high turbidity levels in the water column, although isolated patches of *Ruppia spiralis* have been observed in the more sheltered environments of the lower reaches, along the south bank. The salt marsh communities, which include species such as *Cotula coronopifolia*, *Triglochin* spp, *Juncellus laevigatus* and *Sarcocornia pillansiae*, are limited in extent and occur close to the mouth where there is a tidal influence and salinity levels become acceptable for marsh establishment. The largest area of elevated salt marsh occurs along the south bank, where *Sarcocornia pillansiae* and *Sporobolus virginicus* are the dominant species.

Scirpus littoralis reedswamp, which is tolerant of mildly saline conditions, occurs close to the mouth but is replaced by the dominant species, *Phragmites australis*, along most of the shallow edge habitats further upstream. The vegetation that occurs on the braided system of islands is largely ephemeral due to periodic flooding, which retains the plant communities in a subclimax state. *Sporobolus virginicus* and *Scirpus maritimus* occur commonly in these environments.

Other communities that are associated with the lower reaches of the Orange River include the *Lycium cf decumbens* dominated floodplain shrubland and, to a lesser extent, the littoral dune vegetation that can develop along the more stable parts of the sand-spit at the mouth.

An extensive area of marshland along the south bank has been significantly affected by the construction of the embankment and road that extends from the farmlands in the upper reaches to the beach. The marsh probably supported a mosaic of communities associated with freshwater and saline conditions but has been drastically affected by the cut-off in the supply of freshwater. An increase in soil salinity during the drying out process may have encouraged the expansion of the *Sporobolus virginicus*-*Sarcocornia pillansiae* community in this area. Desertification has, however, subsequently caused extensive marshland mortality and clear indications of this are evident.

25. SCIENTIFIC RESEARCH FACILITIES

None on the SA side. The restricted access to the diamond areas and the distance from centres of education has deterred research in this wetland area.

26. CONSERVATION EDUCATION

None on the South African side. The diversity of types of wetland within the overall wetland area provides good potential for education programmes. However, the great distance from population centres and the small regional population make it unlikely that this area will have any major short- or medium- term use for environmental education.

27. RECREATION AND TOURISM

The wetland is already used by local residents for fishing, swimming, canoeing, and sailing as well as for walking and birdwatching etc.

28. MANAGEMENT AUTHORITY

Awaiting an answer from the Department of Public Works and Land Affairs.

29. JURISDICTION

Awaiting an answer from the Department of Public Works and Land Affairs

30. REFERENCES

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31. REASONS FOR INCLUSION (Reference to criteria)

1. Criteria for representative or unique wetlands

The ORMW is situated in a trans-border position between Namibia and SA. This wetland is still relatively undisturbed and protected due to strict access control by the operating diamond mining organisations: Consolidated Diamond Mines in the north and State Alluvial diggings in the north.

2. General criteria based on plants or animals

The large numbers of birds present, the variety of species involved, and especially the significant numbers of rare or endangered species waterfowl species, support the contention that the Orange River mouth is an internationally important coastal wetland meriting a high conservation priority status. The ORM-system is used by wetland bird species either for breeding purposes or as a stopover on migration routes.

3. Specific criteria based on waterfowl

The ORM-system provide a sizeable area of sheltered shallow water suitable for concentrations of wetland birds. The bird population can peak at about 20 000 to 26 000 representatives of 50 to 57 species.

At times the area supports more than 1% of the world population of the Cape Cormorant (*Phalacrocorax capensis*), Damara Tern (*Sterna balaenarum*) and Hartlaub's Gull (*Larus hartlaubii*) and more than 1% of the southern African population of an additional six species. These species include the subcontinental population of the Blacknecked Grebe (*Podiceps nigricollis*), Lesser Flamingo (*Phoenicopterus minor*), Chestnutbanded Plover (*Charadrius pallidus*), Curlew Sandpiper (*Calidris ferruginea*), Swift Tern (*Sterna bergii*), and Caspian Tern (*Hydroprogne caspia*).

32. OUTLINE MAP OF SITE (To be appended)

Orange River Mouth Wetland

Location 16° 30' E, 28° 35' S

Nearest towns are Alexander Bay in Cape province, South Africa, and Oranjemund in Namibia.

Area Roughly 2 km x 10 km

Degree of protection No legal conservation status. The area is state land, under responsibility of the Cape Nature Conservation.

Site Description In general terms the ORM-system can be described as a delta type river mouth which comprises: a distributory channel system between sand banks covered with pioneer vegetation; a tidal basin; the river mouth; and the saltmarsh on the south bank of the river mouth.

The Orange River sometimes flows directly into the Atlantic Ocean and sometimes has its access to the sea blocked by a sand-bar. It is thus not a true estuary and is best termed a river mouth. It represents a section of the Orange River of 9,5 km long.

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Very little data are available on fish life within this system. From the available data it is evident that freshwater species are predominant in the system.

International and National Importance The wetland is considered as the sixth most important coastal wetland in Southern Africa in terms of the overall numbers of wetland birds which it supports. Wetland bird population can be as high as 20 000 - 26 000 individuals. Of the 57 wetland species recorded 14 can be considered either rare or endangered and appear in one or both of the South Africa and Namibia red data books for birds. All the species, except the Curlew Sandpiper, of which the Orange River mouth supports more than 1% of the southern African population are listed in the red data lists.

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