

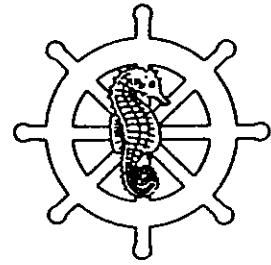
An assessment of the state of the estuaries of the Cape and Natal in 1985/86

A. E. F. Heydorn (Editor)

SOUTH AFRICAN NATIONAL SCIENTIFIC PROGRAMMES REPORT NO

130

AUGUST 1986



An assessment of the state of the estuaries of the Cape and Natal in 1985/86

Edited by: A E F Heydorn
(Chairman, SANCOR Estuaries Programme)

Report of two *ad hoc* working groups established by the
Estuaries Programme of the South African National Committee
for Oceanographic Research (SANCOR)

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Issued by

Foundation for Research Development
Council for Scientific and Industrial Research
P O Box 395
PRETORIA
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from whom copies of reports in this series are available on request.

ISBN 0 7988 3818 3

Printed in 1986 in the Republic of South Africa by

Graphic Arts Division
Council for Scientific and Industrial Research
P O Box 395
PRETORIA
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Prepared by two *ad hoc* working groups established by the Estuaries
Programme Committee of SANCOR.

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Cover: Aerial view of the Bot River estuary south-western Cape, taken
on 15 August 1979, after heavy rains, just prior to artificial
breaching (Photo: A E F Heydorn, ECRU)

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTORY NOTE	(iv)
ABSTRACT/OPSOMMING	(vi)
AN ASSESSMENT OF THE STATE OF THE ESTUARIES OF THE CAPE AND NATAL IN 1985/86	1
CRITERIA	1
AN ASSESSMENT OF THE STATE OF THE ESTUARIES OF THE CAPE IN 1985/86	3
AN ASSESSMENT OF THE STATE OF THE ESTUARIES OF NATAL IN 1985/86	16
CONCLUSION	29
RECENT TITLES IN THIS SERIES	35

INTRODUCTORY NOTE

by DR A E F HEYDORN, CHAIRMAN: SANCOR ESTUARIES PROGRAMME

During a meeting of the South African National Committee for Oceanographic Research (SANCOR) Estuaries Programme Committee held on 12 and 13 October 1983 at San Lameer, Natal, consideration was given to a working paper on the freshwater requirements of South African estuaries. The working paper had been drawn up at the request of the Department of Water Affairs in the light of increasing concern about the effects of water extraction from rivers in catchment areas on the downstream environment, especially estuaries. The Department was seeking an acceptable balance between the water demands inland for agricultural, industrial and domestic purposes and the freshwater requirements of estuaries, if the latter were to be kept in a viable ecological (and hence also economic) condition. In particular, four key questions were to be addressed:

- On what criteria should the environmental importance of an estuary be assessed?
- What is the relative environmental importance of the different estuarine systems?
- What are the effects of variation in freshwater input on the biotic and abiotic characteristics of estuarine systems?
- What freshwater input pattern is required to obtain and/or maintain an agreed state of the estuarine system concerned?

From these four questions jointly, but particularly from the last one, the need for determining an 'agreed state' for each of the estuaries of the Cape and of Natal emerged. This implies an assessment of the present state and of the goal which should be pursued in the future management of each system with regard to both the catchment and the estuary itself. The working group decided that an agreed (or required) state could mean either:

- to conserve in the present state, or
- to conserve but permit controlled development, or
- to develop but according to environmentally acceptable guidelines.

These three categories are described in greater detail under 'Criteria' on page 1 of this document.

The assessment of the 'agreed state' of the estuaries contained in this document is based on the best information available at present and was obtained by harnessing the corporate knowledge and experience of a number of prominent coastal researchers, planners and managers. The estuaries of the Cape and Natal were to be handled separately. The two working groups selected were:

For the Cape

Prof D Baird (Convenor)	University of Port Elizabeth
Prof B R Allanson	Rhodes University
Mr N D Geldenhuys	Department of Environment Affairs
Mr T J E Heinecken	National Research Institute for Oceanology (NRIO), CSIR
Mr O A van der Westhuysen	Foundation for Research Development (FRD), CSIR

For Natal

Prof D Baird (Convenor)	University of Port Elizabeth
Mr M Brokensha	Natal Parks, Game and Fish Preservation Board
Mr F Junor	Natal Parks, Game and Fish Preservation Board
Mr A M Little	Natal Town and Regional Planning Commission
Mr J van der Vegte	Natal Town and Regional Planning Commission
Dr A E L Ramm	National Institute for Water Research (NIWR), CSIR

The secretary in attendance for both was Miss A Schnetler, FRD, CSIR.

The present report represents the outcome of the deliberations of the two working groups. While final answers could not be given for all estuarine systems, the report does provide a concise overview of knowledge of the estuaries of the Cape and Natal available in 1985/86. It records in summary form the current condition of each estuary and categorizes the 'agreed state' of both the catchment and the estuary itself. An interesting but not surprising overall conclusion is that, in many cases, there is a direct relationship between the condition of an estuary and its catchment.

Mr A M Little of the Natal Town and Regional Planning Commission, provides an introductory note for the section dealing with Natal estuaries. In this, he refers to growing problems of human settlement in river catchments and accelerating trends in urbanization and how these trends could jeopardize achievement of the goals set for each Natal

estuary. His warning is timely, also for the Cape, where similar problems exist in many parts and are likely to intensify. These factors underline the need for urgent implementation of co-ordinated catchment/estuarine management policies in South Africa.

It is hoped that this report will also be of assistance in the determination of future research priorities for South African estuaries. The assessment of freshwater input patterns into estuaries required for achieving or maintaining an agreed state, as well as the development of an effective scientific monitoring system, will obviously represent important components of such research. Ecologically speaking it would, of course, be desirable that the estuaries of the Transkei and Ciskei should also be subjected to the determination of an 'agreed state' and to follow-up research, if the necessary finances and manpower can be found. This document may well serve as a basis for discussion with the relevant authorities in the two territories in due course.

I would like to acknowledge the efforts of the two working groups which led to the production of this report - in particular those of the Convenor, Prof D Baird. Sincere thanks are due to Mr P D Morant, Head of NRIO's Estuarine and Coastal Research Unit, who drew up the analyses reflected in the conclusion, and to Prof B R Allanson and Mr A M Little who contributed to the editing of the report. Finally the financial contribution of SANCOR and the Department of Environment Affairs, without which this task could not have been performed, are gratefully acknowledged.

ABSTRACT

The SANCOR Estuaries Programme Committee established two working groups in 1984 to determine an 'agreed state' according to which the individual estuaries of the Cape and of Natal were to be maintained. This was seen as an important aid to management and the setting of future research priorities. The present document, which reflects the deliberations of the two working groups, was compiled in 1985/86. The Department of Water Affairs has particular interest in this work as it is developing a policy for freshwater releases from impoundments in catchments with the aim of reducing detrimental downstream effects to a minimum. Estuaries are very vulnerable in this regard. In general it was found that the condition of estuaries was closely related to the degree of degradation of their catchments. Thus healthy estuaries were generally associated with catchments in good condition and *vice versa*. There is concern that growing problems of human settlement in river catchments and accelerating trends in urbanization may jeopardize the goals set in this report for the management of estuaries. This points to the need for urgent implementation of co-ordinated catchment/estuarine management policies in South Africa.

OPSOMMING

Die Getyriwiere Programkomitee van die Suid-Afrikaanse Nasionale Komitee vir Oseanografiese Navorsing (SANKON) het in 1984 twee werkgroepe saamgestel om 'n 'ooreengekome toestand', waarvolgens die getyriwiere van die Kaap en Natal gehandhaaf behoort te word te bepaal, beide as bestuurshulpmiddel en vir die daarstelling van toekomstige navorsingsprioriteite. Die huidige dokument, wat die resultate van die twee werkgroepe se denke weerspieël, is in 1985/86 saamgestel. Hierdie werk is veral van belang vir die Departement Waterwese, aangesien die Departement tans 'n beleid vir die vrystelling van varswater uit damme formuleer wat poog om die minimum omgewingsversteuring laer af in die riviere tot gevolg te hê. Getyriwiere is baie sensitief in dié opsig. Daar is gevind dat die toestand van getyriwiere oor die algemeen baie nou met die mate van agteruitgang van hul opvanggebiede ooreenstem, met ander woorde, gesonde getyriwiere het gewoonlik redelik onversteurde opvanggebiede en omgekeerd. Daar bestaan kommer dat die toenemende bevolking in opvanggebiede en versnellende verstedelikingstendense die doelwitte, soos in hierdie dokument uiteengesit, mag benadeel. Die implementering van gekoördineerde opvanggebied/ getyriwiersbestuursbeleid in Suid-Afrika word gevolglik as 'n dringende prioriteit beskou.

AN ASSESSMENT OF THE STATE OF THE ESTUARIES OF THE CAPE AND NATAL IN

1985/86

CRITERIA

The following criteria were applied in the designation of the estuaries of the Cape and Natal for the purpose of this document:

- Good, Fair or Poor (present condition) designations were used according to (1) the intensity and characteristics of developments around the estuary and (2) the extent of agricultural and urban development in the catchment. It was found that if the catchment was not too greatly disturbed as regards serious sources of organic and toxic wastes, erosion, and river regulation, or any of these in combination, the ecological condition of the estuary could generally be described as 'Good'. 'Fair' would imply a degree of noticeable ecological degradation in the catchment, as a result of e.g. agricultural or urban development, or river degradation resulting from severe environmental change in areas contiguous to the estuary. A 'Poor' estuary would be one which has been either physically altered e.g. by canalization (for example, the Soutriver Canal at Cape Town), or so heavily eutrophied that the sediments become anoxic e.g. the Sezela in Natal before rehabilitation. The recommended estuarine state to be pursued is defined according to three categories:

Category 1: *conserve in present state* (was assigned to estuaries which were either considered to be pristine and/or representative of a coastal region and well preserved. Land use patterns in their catchment should be carefully considered in view of the possible impacts on the estuarine system).

Category 2: *conserve but permit controlled development* (was assigned to those estuaries where limited development had already taken place but which were considered to be in a good enough state to be conserved with further development strictly controlled at a low intensity).

Category 3: *develop but according to environmentally acceptable guidelines* (was assigned to estuaries where the surrounding areas, including the catchment, were developed, are being developed or are considered suitable for development. These developments must be according to environmentally acceptable guidelines).

AN ASSESSMENT OF THE STATE OF THE ESTUARIES OF THE CAPE IN 1985/86

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Orange CW 1	Fair	3	The largest South African system. Acts mainly as a river mouth, little marine intrusion. Flow patterns controlled by major water management policies in the catchment. Mouth area important for water fowl in semi-desert environment. Diamond mining activities in vicinity of mouth.
Holgat CW2	Poor	3	Dry. Development in riverbed.
Buffels CW 3	Poor	3	Development in riverbed.
Swartlintjies CW 4	Poor	3	Development in riverbed.
Spoeg CW 5	Good	1	Part of proposed west coast national park. Pristine, unique. Representative of west coast. Non-tidal 90% of time.
Bitter CW 6	Good	1	Part of proposed west coast national park. Pristine, unique. Representative of west coast. Non-tidal 90% of time.
Groen CW 7	Fair	2	Part of proposed west coast national park (southern border).
Brak CW 8	Fair	2	Utilized for recreational purposes.
Sout (North) CW 9	Poor	3	Salt-pan development.
Olifants CW 10	Fair	1	Should be considered as possible nature area/park.
Jakkals CW 11	Fair	3	Subsidized nature reserve. (Municipal conservation area).

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Wadrif CW 12	Fair	2	Important bird area.
Verlore CW 13	Fair	1 & 2	1: Vlei area. 2: Mouth and environs. Unique system. Important bird area. Farming area.
Papkuils CW 14	Good	1	Coastal lagoon. Part of provincial nature reserve.
Groot-Berg CW 15	Fair	1 & 2	1: Certain salt marsh reaches could be considered for conservation. 2: Important for waders. Fair: Middle reaches. Poor: Mouth area.
Langebaan (Saldanha) CW 16	Good Fair	1	1: Lagoon. Good: Southern end. Fair: Northern areas. Existing marine reserve proposed to form part of a nature area/national park. Important for waders.
Dwars (North) CW 17	Fair	3	Not functional as an estuary except under conditions of extreme rainfall. Farming in catchment.
Dwars (South) CW 17(a)	Fair	3	Not functional as an estuary except under conditions of extreme rainfall. Farming in catchment.
Modder CW 18	Fair	3	Northern boundary of proposed Atlantis extension (urban development).
Jacobsbaai CW 19	Fair	3	Proposed small boat launching site within Atlantis metropolitan area.
Lerbaai CW 20	Fair	3	Proposed small boat launching site within Atlantis metropolitan area.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Bok CW 21	Good	1	Private nature reserve. Part of proposed nature reserve in Atlantis metropolitan guideline plan. Important area for west coast strandveld flora.
Silwerstroom CW 22	Poor	3	Proposed high intensity recreational facilities.
Sout (South) CW 23	Poor	3	
Rietvlei/Diep CW 24/25	Poor	2	Declared nature area. Important for bird life. The cut-off south-eastern arm (Zöarvlei) could be considered as a green belt. Mouth area disturbed; upper reaches in fair condition.
Soutriver Canal CW 26	Poor	3	Industrial canal.
Houtbaai (Disa) CW 27	Poor	3	Could be considered for rehabilitation.
Wildevöel CW 28	Fair	2	Part of Cape Peninsula nature area.
Bokramspruit CW 29	Poor	3	Township development - storm-water input.
Schuster CW 30	Poor	3	Township development - storm-water input.
Krom CW 31	Good	1	Part of Cape of Good Hope Nature Reserve. Pristine small blackwater system.
Booiskraal CW 32	Good	1	Part of Cape of Good Hope Nature Reserve. Not functional as an estuary except under conditions of extreme rainfall.
Buffels (West) CSW 1	Fair	2	Part of Cape of Good Hope Nature Reserve.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Elsies CSW 2	Poor	3	Salt marshes in lower reaches could be considered for rehabilitation.
Silwermyl CSW 3	Poor	3	Could be considered for rehabilitation.
Sand CSW 4	Poor	2	High intensity residential, recreational and industrial area.
Seekoe CSW 5	Poor	3	Estuary portion sewage and storm-water outlet. Rehabilitation not viable.
Eerste CSW 6	Poor	3	Kuils River wetlands environmentally important and must be retained. Recharging of the Cape Flats aquifer which is being considered for domestic water supply.
Lourens CSW 7	Poor	3	System could be considered for rehabilitation.
Sir Lowry's Pass CSW 8	Poor	3	Water quality at mouth must be improved for recreation.
Steenbras CSW 9	Fair	3	Mountain stream.
Rooiels CSW 10	Fair	2	Within the proposed Rooiels/Bettys Bay nature area.
Buffels (East) CSW 11	Fair	2	Within the proposed Rooiels/Bettys Bay nature area.
Palmiet CSW 12	Good	2	Within the proposed Rooiels/Bettys Bay nature area.
Bot/Kleinmond CSW 13	Fair	2	Within the proposed Rooiels/Bettys Bay nature area. Mouth manipulated.
Onrus CSW 14	Poor	3	Proposed for rehabilitation. Poor, silted and reed encroachment.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Mossel CSW 15	Poor	3	Small blackwater system. Catchment in Fernkloof Nature Reserve.
Klein CSW 16	Fair	3	Farming on flood plain and catchment. Mouth manipulated.
Uilkraals CSW 17	Fair	3	Mouth area has been rehabilitated. Bridge and embankment constrict river and tidal flow.
Ratel CSW 18	Good	2	Within a private coastal nature reserve.
Heuningnes CSW 19	Fair	2	Within a State forestry reserve. Mouth manipulated.
Klipdrifsfontein CSW 20	Good	1	Within ARMSCOR property.
Papkuils CSW 21	-	-	Seasonal stream.
Breë CSW 22	Fair	3	Catchment intensively farmed. Major State impoundments. Direct withdrawal of irrigation water for flood plain farming.
Duiwenhoks CSW 23	Fair	1	The least spoiled estuarine system between Cape Point and Knysna. Counter argument is that the catchment area is heavily farmed.
Kafferkuils CSW 24	Fair	3	Catchment and estuary in fair condition but increasing development in the dynamic mouth region.
Gouritz CSW 25	Fair	3	Seasonal water flow affected by numerous major State impoundments in extended catchment.
Blinde CSW 26	Fair	2	

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Hartenbos CMS 1	Poor	3	Water quality at the mouth important for recreation.
Klein Brak CMS 2	Fair	3	Water quality at the mouth important for recreation.
Groot Brak CMS 3	Fair	3	Water quality at the mouth important for recreation.
Rooi CMS 4	Poor	3	Catchment is a deep valley draining a farmed plateau. Eutrophication by fertilizers possible. Blackwater system. Estuary flow affected by road culvert.
Maalgate CMS 5	Fair	2	
Gwaing CMS 6	Fair	2	
Skaapkop CMS 7	-	-	Blackwater stream.
Meul CMS 8	-	-	Blackwater river/stream.
Kaaimans CMS 9	Fair	2	Not ecologically sensitive but subjected to narrowing through road construction.
Touws CMS 10	Fair	2	Within the declared Wilderness Lake area administered by National Parks Board.
Swartvlei CMS 11	Fair	2	Within the Wilderness Lake area.
Goukamma CMS 12	Fair	2	Within the Goukamma Provincial Nature Reserve.
Knysna CMS 13	Fair	2 & 3	2: Certain parts to be considered as conservation areas.
Noetsie CMS 14	Good	1	Within State forestry area. Western bank of mouth privately owned and used for limited recreation.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Grooteiland CMS 15	-	-	Not an estuary. Blackwater stream. Indigenous forest area.
Kranshoek CMS 16	-	-	Not an estuary. Blackwater stream. Indigenous forest area.
Crooks CMS 17	-	-	Not an estuary. Blackwater stream. Indigenous forest area.
Piesang CMS 18	Fair	3	Water quality important to recreation.
Keurbooms CMS 19	Fair	1 & 2	1: Keurbooms above road bridge. 2: Lower reaches below road bridge.
Matjies CMS 20	Good	1	Small pristine system.
Brak CMS 21	Good	1	Within the Bloukrans Forest Reserve/De Vasselot State Forestry Reserve. River-mouth. Blackwater system.
Sout CMS 22	Good	1	Within the De Vasselot State Forestry Reserve.
Groot CMS 23	Good	2	Within the De Vasselot State Forestry Reserve. Also forms western boundary of the Tsitsikamma National Park.
Helpmekaars CMS 24	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.
Klip CMS 25	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Bloukrans CMS 26	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.
Witels CMS 27	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.
Lottering CMS 28	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.
Elandsbos CMS 29	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.
Geelhoutbos CMS 30	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.
Kleinbos CMS 31	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.
Storms CMS 32	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.
Bruglaagte CMS 33	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Langbos CMS 34	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.
Sanddrif CMS 35	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.
Elands CMS 36	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value.
Groot (East) CMS 37	Good	1	Within Tsitsikamma National Park area. Blackwater stream/river with low productivity and high aesthetic value. Eastern boundary of Tsitsikamma National Park.
Eerste CMS 38	Good	2	Functions as a river mouth rather than as an estuary.
Klipdrif (West) CMS 39	Good	2	Rocky river mouth. River has numerous waterfalls. Agriculture on the plateau. Eutrophication by fertilizers possible.
Boskloof CMS 40	Fair	2	
Kaapsedrif CMS 41	Fair	2	
Tsitsikamma CMS 42	Good	2	
Klipdrif (East) CMS 43	Fair	2	
Slang CMS 44	-	-	Blackwater stream.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Kromme CMS 45	Fair	3	High recreational potential.
Seekoei CMS 46	Poor	3	Could be rehabilitated.
Kabeljous CMS 47	Fair	1 & 2	Eastern arm and eastern banks could be considered as a 1.
Gamtoos CMS 48	Fair	3	Areas near the mouth could be considered for conservation. Large catchment; intensive flood plain farming. Major State impoundments.
Van Stadens CMS 49	Fair	2	Water quality important to recreation. No development on the western bank.
Maitland CMS 50	Fair	3	Recreational area.
Bakens CSE 1	Poor	3	Industrial canal.
Papkuils CSE 2	Poor	3	Industrial canal.
Swartkops CSE 3	Fair	2	Extensive salt marshes to be conserved. System must be kept ecologically viable. Intensive recreational usage. Proclaimed nature reserve areas on some banks.
Koega CSE 4	Poor	3	Salt works.
Sondags CSE 5	Fair	2	Within the proposed Alexandria Wilderness area which should include dune fields on western and eastern banks.
Boknes CSE 6	Fair	3	Conservation value eastward of Boknes.
Boesmans CSE 7	Fair	2 & 3	2: Conservation potential - middle and upper reaches. Proposed Schedule 5 Lake Area.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Kariega CSE 8	Fair	2	Conservation potential - whole estuary. Eastern bank must not be developed. Proposed Schedule 5 Lake Area.
Kasuka CSE 9	Fair	2	
Kowie CSE 10	Fair	2 & 3	2: Eastern banks and upper reaches within the Ebb and Flow Forestry Nature Reserve. Middle and upper reaches are conserved.
Rufane CSE 11	-	-	No longer an estuary except under conditions of extreme rainfall. Utilized for recreation.
Riet CSE 12	Fair	2	Eastern bank forms the western boundary of the Tharfield Private Nature Reserve.
Wes-Kleinemonde CSE 13	Fair	3	No further development on the western bank. Conservation potential in the upper reaches.
Oos-Kleinemonde CSE 14	Fair	3	Conservation potential in the upper reaches.
Groot-Vis CSE 15	Fair	3	Ciskei boundary..
CISKEI : CSE 16 - CSE 29			
Tyolomnqa CSE 30	Fair	2	State forestry reserve on the western side.
Lilyvale CSE 31	Fair	3	
Ncera CSE 32	Fair	2	
Mlele CSE 33	Fair	2	

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Mcantsi CSE 34	Fair	3	
Gxulu CSE 35	Fair	3	
Goda CSE 36	Fair	2	Relatively unspoiled.
Hlozi CSE 37	Fair	2	
Hickmans CSE 38	Fair	3	
Mvubukazi CSE 39	Fair	3	
Ngqenga CSE 40	Fair	2	Small. Road bridge fairly close to the mouth. Agriculture on the plateau. Eutrophication by fertilizers possible. River may carry storm-water.
Buffalo CSE 41	Poor	3	River harbour.
Blind CSE 42	Poor	3	Water quality important to recreation.
Hlaze CSE 43	Poor	3	Water quality important to recreation.
Nahoon CSE 44	Poor	3	Important environmental asset and recreational facility.
Qinira CSE 45	Fair	3	Important environmental asset and recreational facility.
Gqunube CSE 46	Fair	2	Eastern bank forestry reserve.
Kwelera CSE 47	Fair	2	
Bulura CSE 48	Fair	3	

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Cunge CSE 49	Fair	2	Within forestry reserve. Dune forest on both banks.
Cintsa CSE 50	Fair	3	
Cefane CSE 51	Good	1	Within State forestry reserve. May be considered for inclusion in a coastal reserve.
Kwenzura CSE 52	Good	1	Within State forestry reserve. May be considered for inclusion in a coastal reserve.
Nyara CSE 53	Good	1	Within State forestry reserve. May be considered for inclusion in a coastal reserve.
Haga-Haga CSE 54	Good	2	
Mtendwe CSE 55	Good	1	
Quko CSE 56	Good	1	The most pristine of all eastern Cape estuaries.
Morgan CSE 57	Fair	2	
Cwili CSE 58	Fair	3	
Groot-Kei CSE 59	Fair	3	Transkei boundary.

AN ASSESSMENT OF THE STATE OF THE ESTUARIES OF NATAL IN 1985/86

NOTE

by MR A M LITTLE, NATAL TOWN AND REGIONAL PLANNING COMMISSION

The section of this report pertaining to Natal has been prepared in consultation with the Natal Estuarine and Coastal Research Unit of the CSIR, the Natal Parks Board and the Natal Town and Regional Planning Commission.

In Natal, we welcome the production of this document, but have a reservation about the stated goals for the estuaries.

The density of settlement in the river catchments in Natal, and the growing intensity of urbanization along the coast is such that the Natal group could not readily perceive conservation and development as forming alternative goals.

In fact, in future, the emphasis must be directed towards planning and managing the conservation of estuaries within an urban framework - backed by a heterogeneous mix of land uses in the catchments. There is little alternative.

Secondly, although our studies are advancing rapidly, we cannot satisfactorily relate land use practices with water run-off and the responses in the estuary.

The following three categories have once again been used:

Category 1: Conserve in present state.

Category 2: Conserve but permit controlled development.

Category 3: Develop but according to environmentally acceptable guidelines.

The estuarine systems have also been classified as follows:

E: Estuary
EL: Estuary linked lake system
EM: Embayment
L: Lagoon
R: Rivermouth

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Mtamvuna (E) NS 1	Good	1	Deepest system in Natal. International border to Transkei. Very diverse fauna and flora communities. Recreational use by Transkei on southern bank. Development and negotiations should continue with Transkei authorities for classification in category 1. Report to be submitted to NAKOR central committee recommending lagoon be proclaimed a reserve to join up with Natal Parks Board's Mtamvuna Nature Reserve.
Zolwane (L) NS 2	Good	1	Private ownership. Well preserved with definite conservation potential due to undisturbed dune forest stretching southwards.
Sandlundlu (E) NS 3	Fair	1	Private ownership and kept in fairly good condition. Dune conservation potential.
Ku-Boboyi (L) NS 4	Fair	2	Very small system.
Tongazi (L) NS 5	Fair	2	Small system.
Kandandhlovu (L) NS 6	Fair	2	Small system.
Mpenjati (L) NS 7	Fair	2	Southern boundary of Trafalgar marine reserve. Sand works major problem and should be carefully controlled. Northern bank adjacent to Yengele forest. Downstream from new bridge on northern side should be conserved.
Umhlangankulu (South) (L) NS 8	Fair	2	Very small system. Recreational area (San Lameer). Adjacent to Trafalgar marine reserve.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Kaba (L) NS 9	Poor	2	Very small system.
Mbizana (L) NS 10	Fair	2	Very important recreational area. Biotic communities diverse. Well preserved and worthy of protection. Great conservation value.
Mvutshini (L) NS 11	Fair	2	Very small.
Bilanhlole (L) NS 12	Fair	2	High degree of recreational use.
Uvuzana (L) NS 13	Fair	2	Small system. Badly silted.
Kongweni (L) NS 14	Poor	2	Heavily urbanized (Margate). Very important recreational area. Badly degraded from ecological point of view.
Vungu (L) NS 15	Fair	2	High waterfall (25 m) at head discharging into a deep pool makes it unique along Natal coast. Lagoon surrounded by steep cliffs creating scenic setting. Proclaimed municipal nature reserve on either side of river upstream and waterfall. Area of botanical interest. Lagoon and river above have significant resource value. Lagoon well used and popular recreation area.
uMhlanga (L) NS 16	Poor	2	Holiday area and extensively utilized for recreation. Sewage pollution. Rehabilitation potential.
Zotsha (L) NS 17	Good	1	Important lagoon on south coast due to fauna and flora it supports. Extensive wetland area dominated by reeds in lower reaches. Steeper upper reaches forested with many <i>Euphorbia</i> occurring.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Boboyi (L) NS 18	Fair	2	Small system. Polluted. Catchment in poor condition. Lagoon is poor but upper reaches in fair condition.
Mbango (L) NS 19	Fair	2	Very small system. Faunistically poor. Floral communities good. Water quality poor. Catchment in poor condition.
Mzimkulu (E) NS 20	Poor	2	Heavily silted. Recreational activity on banks (Port Shepstone).
Mtentweni (L) NS 21	Fair	2	Good plant communities on banks. Heavily silted. Large sand prawn population. Good birdlife.
Mhlangankulu (North) (L) NS 22	Poor	2	Intensively developed. Undisturbed plant communities in upper reaches.
Damba (L) NS 23	Fair	2	Small system. Important botanical area due to swamp forest on south bank. Should be conserved. Coastal riverine forest and dune forest also occur.
Koshwana (L) NS 24	Poor	2	Small system. Siltation and sewage problems. Urban development.
iNtshambili (L) NS 25	Good	1	Small system. Sugarcane development. Valuable swamp forest communities. Well conserved catchment area and two undisturbed streams feeding lagoon. Suffered least degradation and one of few lagoons left for conservation.
Mzumbe (L) NS 26	Poor	2	Siltation problems.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Mzimayi (South), also known as Mhlabatshane (L) NS 27	Fair	2	Heavy development in mouth. High recreational development (new Hiberdene). Important for recreation.
Mhlungwa (L) NS 28	Poor	2	Small system. Well vegetated banks. Siltation problems.
Mfazazana (L) NS 29	Fair	2	Catchment area in KwaZulu.
KwaMakosi (L) NS 30	Fair	2	Small system. Suffering from agricultural practices.
Mnamfu (L) NS 31	Fair	2	Small system. Suffering from agricultural practices.
Mtwalume (L) NS 32	Poor	2	Heavily silted; rehabilitation urgently needed. Flood plains under sugarcane development. Faunistically rich.
Mvuzi (L) NS 33	Good	2	Very small system. Heavily silted.
Fafa (L) NS 34	Good	2	Severe siltation problems. Bridge and weir restricts water flow. Botanical and recreational value. Attractive system surrounded by steep forested hillsides. Freshwater mangroves and elements of coastal forest also occur.
Mdesingane (L) NS 35	Fair	2	Very small system and catchment area.
Sezela (L) NS 36	Poor	2	Marked improvement taking place due to strict rehabilitation scheme implemented by C G Smith & Co. Previously very heavily polluted and eutrophied.
Mkumbane (L) NS 37	Fair	2	Forest on northern side. Sugarcane in catchment area. Faunistically rich. No industrial pollution.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Mzinto (L) NS 38	Fair	2	Faunistically rich. Sugarcane on flood plain.
Mzimayi (North) (L) NS 39	Poor	2	Small system. Recreational potential.
Mpambanyoni (R) NS 40	Poor	2	Industrial pollution. Severe siltation. Low species diversity. Sugarcane on flood plains. Recreational potential.
Mahlongwa (L) NS 41	Good	2	Sugarcane encroachment on flood plains. Lagoon in relatively good condition with reed beds, small mangrove community and well-conserved example of dune forest.
Mahlongwana (L) NS 42	Good	1	Very small lagoon system. Biotic component should be conserved. Extensive beds of <i>Najas marina</i> (saw weed) considered to be rare in southern Africa and warrants further study.
Mkomazi (E) NS 43	Fair	2	Seawater penetration 3 km. Localized industrial pollution. Severe siltation from catchment. Very large and regarded as one of the most important river systems of Natal.
Ngane (L) NS 44	Fair	2	Heavily silted. <i>Escherichia coli</i> concentration high. Development on banks. Little industrial pollution.
uMgababa (L) NS 45	Good	1	Sedge known as 'ncema grass' occurs on flood plain. Sedge is of regional significance, used by a weaving industry in KwaZulu and reaped annually. Management required by tribal authority to prevent over-exploitation. Lagoon supports substantial estuarine

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
uMgababa (continued)			life and has a valuable asset in dune forest south of lagoon. Most important lagoon for conservation on south coast.
Msimbazi (L) NS 46	Good	2	Faunistically good. Sedge also occurs on flood plain, and same remarks applicable as for NS 45. Further investigation required as lagoon appears to have distinct conservation potential.
Lovu (E) NS 47	Fair	2	Heavy industrial pollution. Road development interferes with water flow. Faunistically good condition. Should be upgraded.
Little Manzimtoti (L) NS 48	Poor	3	Fully developed. Heavily polluted. Vegetation on northern bank should be conserved.
Manzimtoti (L) NS 49	Poor	3	Heavily built-up area. Industrial pollution. Recreational potential. Regularly breached. Should be considered for rehabilitation and active management action.
Mbokodweni (L) NS 50	Poor	3	Industrial and urban development. Polluted. Any changes in peripheral land usage must be resisted.
Sipingo (L) NS 51	Poor	2	State land northern area. Mangrove community in lower reaches worthy of conservation. Industrial pollution. No further development allowed. Rehabilitation recommended.
Mlazi NS 52	Poor	3	Industrial Canal.
Durban Bayhead (EM)	Fair	3	Mangroves worthy of conservation in bayhead.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Mgeni (E) NN 1	Fair	2	Refer to Chris Mulder Associates' report on this system. The Beachwood mangroves are of exceptional educational and aesthetic value and should be protected as such.
Ohlanga (L) NN 2	Good	1	Lagoon, flood plain, dune and coastal forest considered a single ecological unit worthy of protection. Natal Parks Board controls small nature reserve on south bank, east of national road. Restoration in progress. Indian urban development in upper reaches. Should be urgently protected as system and catchment likely to come under increasing residential, recreational and industrial pressure. Report to be submitted to the National Committee for Nature Conservation (NAKOR) central committee recommending conservation of lagoon and surrounds as a nature reserve.
Mdloti (I) NN 3	Fair	2	Breached regularly. Urban development and heavily polluted. Good recreational value and potential. Rehabilitation and protection measures recommended due to freshwater mangrove community, reed swamp and abundant birdlife.
Tongati (L) NN 4	Poor	3	Extremely low species diversity. Heavily polluted. Active measures should be taken for rehabilitation.
Mhlali (E) NN 5	Fair	2	High species diversity. Interference by weir construction. Forest severely depleted. High potential for conservation.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Seteni (L) NN 6	Fair	1	Very small system. Rich sand prawn banks, otherwise low faunal diversity.
Mvoti (R) NN 7	Fair/ Poor	2	System severely degraded due to siltation and organic pollution. Supports wide variety of birdlife and is an important nesting and breeding area for numerous bird species. Proposed proclamation as a bird sanctuary.
Mdlotane (L) NN 8	Good	1	Small system. One of the best preserved systems on north coast south of Tugela. Has definite conservation potential due to undisturbed flora and fauna it appears to maintain.
Nonoti (L) NN 9	Poor	2	Heavily polluted by mills and two factories. Regularly breached. Sugarcane farming in catchment. Should be improved or restored.
Zinkwasi (L) NN 10	Fair	2	Entire catchment under sugarcane. Regularly breached. Caravan park along banks.
Tugela (R) NN 11	Poor	3	Forest south of rivermouth to be given reserve status (Hlongwene forest). Features of historical interest. Seawater penetration maximum 1 km on occasion.
Nyoni and Matigulu (E) NN 12/13	Good	1	Regarded as one system as they share a common mouth and should be conserved as a unit. Surrounding area examples of pioneer dune vegetation, dune forest, swamp forest, coastal riverine forest and coastal grassland with fresh water pans. Disturbed in lower reaches. Faunistically good. Catchment areas in good condition.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Nyoni and Matigulu (continued)			Established nature reserve on KwaZulu side (south).
Siyaya (L) NN 14	Fair	2	Lower reaches in Mlalazi Nature Reserve. Development in upper reaches. Total catchment research project. Restoration possible with the aim of re-instating the estuary to category 1 status.
Mlalazi (E) NN 15	Good	2	Has several outstanding estuarine characteristics, e.g. open mouth, nutritive substrates and mangrove community. Natal Parks Board control Mhlazi Nature Reserve on south bank which comprises large area of dune forest, mangrove community and the estuary surrounds. Popular recreation resort. North bank KwaZulu.
Richard's Bay Game Reserve (sanctuary) (E) NN 16	Fair	1	Sanctuary area. Declared Richard's Bay Game Reserve (sanctuary).
Richard's Bay Harbour (EM) NN 16	Fair	3	Intensive harbour development.
Nhlabane (L) NN 17	Good	2	System comprises large upper fresh water lake and brackish lower lake. Until recently connected to the sea by 4 km long estuary. System disturbed by construction of a barrage across the estuary but is still worth conserving due to quality of water, vegetation and fauna it supports. Below the barrage the system (including adjacent forest) should be protected as a coastal lagoon. When no longer required, it must be insured that the barrage is removed.

Estuarine system and CSIR Estuary Index Number	Present condition	Required (Categories)	Remarks/Recommendations
Mfolozi (R) NN 18	Good/ Fair	1	System degraded. Subjected to considerable change during floods early in 1984. Considered worth protecting because of adjacent dune and swamp forest and papyrus which occurs on floodplain. Should be managed as part of St Lucia/Mapelane conservation areas. Draining of flood plain not recommended. Wetlands not to be disturbed.
St Lucia (EL) NN 19	Good	1	As the largest estuarine system in Natal (and Africa), it has far-reaching effects on coastal ecology. Environmental conditions of estuary fluctuate with climatic changes. Supports a wealth of plant and animal life. Considered the most important estuarine system in Natal due to its size.
Mgobezeleni (E) NN 20	Good	1	System comprises Mgobezeleni estuary and lake and Shazibe lake. Estuary highly disturbed but system warrants conservation because of resource value of flora and fauna some of which are unique, rare and endangered. Adjoins Sodwana Bay National Park. Main water supply for park.
Kosi (EL) NN 21	Good	1	System relatively undisturbed. Comprises five interconnected lakes. Maintains diverse and in many cases, unique flora and fauna. Because of its potential as a natural resource, it should be preserved.

GENERAL REMARKS

The water quality of most of the estuaries of Natal is very important as these systems are heavily utilized for recreational purposes.

Estuarine conditions start to improve nearer to the Transkei, and, with the exception of the Mtamvuna, all are small systems. Furthermore, changes in floral community structure related to declining subtropical influence, can be noted in the southern Natal estuaries.

Agricultural practices and siltation problems are universal to all Natal estuaries and lagoons.

CONCLUSION

It is important to note at the outset that the estuaries of the Cape and those of Natal were assessed by two separate panels. Inevitably there is a strong regional bias, thus the assessments of estuaries in the two provinces may not be strictly comparable. The document must, therefore, be seen as a guide rather than a definitive statement. As more knowledge of the estuaries becomes available, these assessments should be reviewed and revised. This applies equally to the 'condition' and to the 'required state'.

The 'required state' assigned to estuaries should be seen as a goal for the managing authorities who control the destinies of these systems. The given required states should be considered as the minimum level to which management should be directed. The required state should be incorporated within the context of regional planning for the areas in which the estuaries occur. Management of estuaries should be undertaken on a regional and not on a site-specific basis. Whatever is done, it will not be possible to manage any given estuary according to the desires of all sectors of the population. A lack of a clear policy for estuaries on a regional basis leads to *ad hoc* management, often to the detriment of the system concerned, under pressure from vocal (minority) special-interest groups.

ANALYSIS OF THE PRESENT STATE OF ESTUARIES ACCORDING TO COASTAL SECTORS (BASED ON THIS REPORT):

1. CAPE WEST COAST (CW 1 - CW 32)

Size	Present condition				Total
	Good	Fair	Poor	Unscored	
Large	1	4	1	0	6
Small	6	10	10	0	26
Total	7	14	11	0	32

The large estuaries in this region are: Orange, Olifants, Verlore, Groot-Berg, Langebaan, Rietvlei/Diep. Where a system, such as Langebaan and Groot-Berg, has received two scores, the higher value has been used in the summary. For example, the condition of the Groot-Berg which is 'poor' at the mouth and 'fair' in the middle and upper reaches, has been scored as 'fair'.

2. CAPE SOUTH-WEST COAST (CSW 1 - CSW 26)

Size	Present condition				Total
	Good	Fair	Poor	Unscored	
Large	0	7	0	0	7
Small	3	6	9	1	19
Total	3	13	9	1	26

The large systems are: Bot/Kleinmond, Klein, Heuningnes, Breë, Duiwenhoks, Kafferkuils and Gouritz.

3. CAPE MIDDLE SOUTH COAST (CMS 1 - CMS 50)

Size	Present condition				Total
	Good	Fair	Poor	Unscored	
Large	0	8	1	0	9
Small	21	11	2	7	41
Total	21	19	3	7	50

The large systems are: Groot Brak, Touw, Swartvlei, Knysna, Keurbooms, Kromme, Seekoei, Kabeljous and Gamtoos.

4. CAPE SOUTH-EAST COAST (CSE 1 - CSE 59)

Size	Present condition				Total
	Good	Fair	Poor	Unscored	
Large	1	10	2	0	13
Small	5	21	5	1	32
Total	6	31	7	1	45

NOTE

The 14 estuaries in the Ciskei (CSE 16 - CSE 29), as well as those of the Transkei, were excluded from the study - see the Introductory Note.

The large systems are: Swartkops, Sondags, Boesmans, Kariega, Kowie, Groot-Vis, Tyolomnqa, Buffalo, Nahoon, Gqunube, Kwelera, Quko and Groot-Kei.

5. NATAL SOUTH COAST (NS 1 - NS 51)

Size	Present condition				Total
	Good	Fair	Poor	Unscored	
Large	1	0	0	0	1
Small	9	25	16	0	50
Total	10	25	16	0	51

The only large system is the Mtamvuna.

Durban Bay was not included in either the NS or NN categories. The Durban Bayhead mangroves were considered to be in 'fair' condition.

6. NATAL NORTH COAST (NN 1 - NN 21)

Size	Present condition				Total
	Good	Fair	Poor	Unscored	
Large	3	1	1	0	5
Small	7	7	2	0	16
Total	10	8	3	0	21

The large systems are: Tugela, Richard's Bay, Mfolozi, St Lucia and Kosi.

The division into the two size classes was necessarily subjective but it is hoped that it enables the reader to obtain a clearer picture of the status of the estuaries in the various regions.

ANALYSIS OF THE PERCENTAGE DISTRIBUTION OF ESTUARIES WITHIN THE TWO PROVINCES IN THE CONDITION CATEGORIES

1. CAPE PROVINCE

Size	No. of estuaries	Present condition (%)			
		Good	Fair	Poor	Unscored
Large	35	6	83	11	0
Small	118	30	41	22	7
Large and small combined	153	24	50	20	6

2. NATAL

Size	No. of estuaries	Present condition (%)			
		Good	Fair	Poor	Unscored
Large	6	67	16,5	16,5	0
Small	66	24	49	27	0
Large and small combined	72	28	46	26	0

The overall distribution of estuaries in the condition categories is remarkably similar for the two provinces. However, when the large and small estuaries are analyzed separately, it can be seen that Natal is proportionately much better endowed with large estuaries in good condition, mainly in Zululand. The pattern for the smaller estuaries does not differ significantly between the two provinces, indicating either that the small estuaries of Natal are in a better condition or, conversely, that those of the Cape are in a much poorer condition than is generally thought. As pointed out earlier, the condition of catchment areas in South Africa is relevant in this context.

In conclusion, it is emphasized that while the 'required state' of an estuary should not be subject to constant modification, the actual condition can change very rapidly due to factors such as constructing of a major impoundment in a catchment, developments in the immediate environment or at the mouth of an estuary, or due to an infrequent episodic event such as Cyclone Domoina. However, the slow degradation of catchment areas and hence of estuaries is ongoing and almost imperceptible degradation of an estuary can also take place as a result of unco-ordinated minor developments in its vicinity.

It is hoped that the value of the present report will lie in the record of the condition of South African estuaries at the end of 1985 and of the corporate perception of a group of knowledgeable managers/planners/scientists of what conditions should be pursued through effective management. It should have the effect of encouraging careful management and, in some cases, even rehabilitation. Under no circumstances should the report be used to justify environmentally harmful developments, simply because the one or other estuary was recorded as being in poor condition. On the contrary, the poor condition of an estuary should be seen by the managing authority as a challenge to improve the estuary's status. The Sezela provides a fine example of what can be done to improve the condition of a formerly heavily degraded system. The report shows clearly how finite our country's estuarine resources are and the extent to which the natural asset which they represent has already suffered through unco-ordinated human activity. Finally, it is hoped that the report will highlight the need for some estuaries to be retained in an undeveloped and unspoilt condition. If this is not done, reference to the original state of representative estuarine systems will become increasingly difficult, if not impossible.

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