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INVENTORIES OF THE ESTUARIES AND COASTAL LAGOONS OF SOUTH WESTERN AUSTRALIA

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Information relevant to conservation of the estuarine environments of the south west has been collected over the last decade with the intention of publishing a series of inventories about individual estuaries. The first such Inventory: Wellstead Estuary the estuary of the Bremer River (Hodgkin and Clark, 1987), was published in June as Number 1 in an Estuarine Studies Series from the Environmental Protection Authority.

The objective is to record available information about the estuaries and to make this accessible to anyone involved in any way in their conservation and management and in further study of them. The information is patently incomplete in many respects and although it has been possible to fill some outstanding gaps as funds have permitted, there is still much to be done before the inventories can be regarded as adequate documentations. Indeed it is emphasised that the aim is to provide a resource on which to base further investigation when specific questions need to be answered; for example with respect to the nutrient status of most estuaries. The limited data on nutrients comes principally from samples taken by Fisheries Research staff at infrequent intervals and more frequent sampling, both from the estuarine waters and from tributary rivers when they are flowing, is essential for a proper assessment of nutrient status.

The various sections of the Wellstead Inventory deal successively with aspects of the catchment - it's geomorphology, rainfall, river flow and land use etc; the estuary - it's geomorphology, sediments, form and behaviour of the bar, and recent geological history; water characteristics - salinity, temperature etc, vegetation - both aquatic and fringing; and the fauna - invertebrates, fish and waterbirds. Management Problems is the title of the last section of the Inventory; the problems are presented and discussed, but possible solutions are only considered in very general terms. The same format is being used for other inventories.

In addition to the individual inventories a comparative account of all the estuaries of the south coast is in preparation. This will discuss their nature and problems associated with them in terms of their origin and geological history, coastal features, climate, river flow and sedimentation, and their fauna and flora. Some generalisations can usefully be made about them, but no two are alike and such an account will serve primarily to stress resemblances and differences and to relate these to implications for management.

There are recognisably different kinds of estuaries in the south west and attempts have been made to classify them: Hodgkin and Lenanton (1981), Colman (1983), Hesp (1984) and Hodgkin and Kendrick (1984). The emphases are different, attempting to interpret their hydrology, geomorphology, and Pleistocene-Holocene history. These are not simply academic exercises, they aim to understand the character of the estuaries and the processes by which they came to be what they are today. The same physical and biological forces still operate, accelerated or retarded by various human activities, and an understanding of them is an essential basis for rational management policies. These interpretations have been based on limited data and cannot be greatly improved without more information, especially on the sediments. It would be nice to be able to extrapolate from the extensive studies of Roy (1984) on the sedimentary history of estuaries of the NSW coast, but the WA environment is different in important respects and there is not yet the data on which to base a reliable account of the evolution of our estuaries.

Coring in the estuary of the Blackwood River gives a good picture of sedimentation, though the Pleistocene basement was not reached in 10m cores near the mouth. In 1987 shallow (5m) cores have been taken in Wellstead Estuary and Stokes Inlet by Dr. K H Wyrwoll of the Geography Department, University of WA and study of these will be very helpful. But, if we are to have a proper understanding of the sedimentary history many more cores must be taken and to depths beyond that achievable with the equipment used.

It is not possible to compile inventories which cover such a wide range of topics without the help and advice of a great variety of persons, from Government departments, tertiary institutions and of many private individuals. This has willingly been given in the preparation of this first inventory and of others now being drafted and is greatly appreciated by the authors. Valuable help has been given in the current year by Dr Ian Eliot of the Geography Department University of WA and his students in surveying and interpreting the geomorphology; by Jane Chambers of the Botany Department UWA in identifying and mapping the flora; and Jenny Shaw of the Department of Fisheries and her team through their studies of the inveriebrate and fish fauna of a number of estuaries.

Hopefully the inventories will stimulate futher study; the texts are on computer and can be updated as further relevant information becomes available. Suggestions as to how future inventories can be made more useful will be welcomed.

References

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Notes for talk, 2 Sept 1987

INVENTORIES OF THE ESTUARIES AND COASTAL LAGOONS OF SOUTH WESTERN AUSTRALIA

I have been accumulating information about the estuaries of the south west in a desultory way for the last 15 years and EPA has encouraged me to put this together in the form of a series of Studies. The **Wellstead Estuary Study** is the first of a series covering all the estauries of the south coast.

The aim is to catalogue what is known about the estuaries as a source on which judgments can be based with respect to management. In some cases it may be possible to make decisions on present knowledge, but more often the Studies will serve primarily to indicate what further investigation is necessary.

Most estauries are coming under increasing public pressure, they are more accessible and the recreational and developmental demands are greater. Also clearing for agriculture in the catchments has changed the volume and pattern of river flow to them, increased the input of sediment and in some cases the nutrient load.

The studies are addressed to two audiences: lay - Shire Councils and local residents; professional - Fisheries, EPA, CALM, Waterways, other scientists. It is not easy to write for both!

The Wellstead Estuary Study is a trial run on which we hope to improve and suggestions and advice from anyone interested will be greatly appreciated.

We have drafts for studies of all the 20+ estuaries of the south coast, but it will take time to finish them and money to get them published. The scope of the studies covers:

Catchment characteristics -- size, rainfall runoff and river flow, cleared vs. forested areas, soils.
Estuary -- physical features, geomorphology, dimensions, the bar, the Holocene history.
-- Hydrology
-- Aquatic and fringing vegetation
-- Aquatic fauna - invertebrates, fish, waterbirds
Management problems -- known and foreseen, but not how to solve them.
References

Much of the material in the studies is outside my expertise; we have to seek the help and advice of experts in a variety of fields and are most grateful for their assistance, especially to Rod Lenanton and his team over the years with whom it has been a pleasure to work.

One of the enjoyable spinoffs has been the contacts with local officials, residents and fishermen to find out what they know about the estuaries, their histories and problems.

Our estuaries differ greatly from the classical idea of an estuary -- the tidal mouth of a large river. Few are permanently open the the sea, most are either seasonally closed or normally closed (Lenanton's terms). They vary greatly in size and geomorphological features. Hydrologically they may be fresh, brackish, approaching marine, from almost fresh to hypersaline, sometimes completely dry.

They vary enormously in fishery potential, in their recreational and conservation value and their potential for survival.

In the 6000 years of their existence most if not all have changed from being deep, open estuaries or embayments, with a diverse marine fauna, to now having only restricted exchange with the sea most of the time and only a small specialist estuarine fauna; though that is often abundant.

The geomorphological processes which have caused this progress towards extinction are still active today and to some extent these processes have been accelerted by human activities. Culham Inlet was already extinct, as an estuary, in 1829, Hamersley Inlet is on the way out -- though with an abundant fauna when it has water in it, and Wilson Inlet is in danger of going the same way.

Wellstead Estuary is small, and shallow; it has a massive flood tide delta, a small catchment in an arid area, and neither tidal exchange nor the intermittent river flow are great enough to keep a channel open through the bar. Salinity has varied from 4, after recent heavy rain, to 80 at the end of summer, and then it stinks.

If such estauries are to survive as viable ecosystems decisions must soon be made about their future and action taken to manage them. This may involve costly engineering measures; though probably not on the scale of the Dawesville Channel. As yet there has been no investigation of the problems involved in management of the bars and there may be relatively simple solutions.

The estuaries are an important part of our national heritage. Their management should not be left to local Shire Councils alone. These have limited resources of finance and technical expertise, and they have to accommodate a variety of conflicts of interest which may be contrary to the long term interests of the commumity.