Proceedings of the Coastal Planning and Management Seminar

Perth 19–21 November, 1984

Promoted by the Coastal Management Co-ordinating Committee

Organised by: Department of Conservation and Environment, Perth.

Bulletin 204 July 1985

Proceedings from the Coastal Planning and Management Seminar

held between the 19th and 21st of November 1984
at the Riverside Hotel, Perth.

Department of Conservation and Environment
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CONTENTS

Introduction

This Bulletin contains the papers, edited discussion and summaries from the public seminar on Coastal Planning and Management held between the 19th and 21st November, 1984.

The seminar was held at a time when promotion by the State Government of the shoreline and its islands as a major tourist resource is adding further pressure to the existing need for sound planning and management of the coastal zone. The defence of the America's Cup in particular has focussed attention on development of marinas and high rise hotels on the waterfront.

Almost everyone involved in coastal issues recognises that planning, development and management of the coast is complex because many different skills are involved, and that mistakes are costly both in financial and environmental terms.

Many of our current coastal problems can be seen, in the light of hindsight, to be mistakes due largely to a lack of understanding at the time about the character and nature of the coast. Greater knowledge of the coast and coastal processes can enable us to make better decisions based on facts. Unfortunately despite this knowledge, decisions based on short term expediency, that will add new, and perpetuate old, problems are still being made.

'Ad hoc' decision making which only partly recognises environmental limitations and natural processes, has in many cases led to environmental degradation and sometimes to the need for engineering works to achieve short-term relief to offset long-term natural processes.

To avoid perpetuation of this situation the process of coastal planning and development requires continual review.

This seminar was the eighth to be organised by the Department of Conservation and Environment. Earlier seminars in Perth and major coastal centres, concentrated on basic coastal processes and examined local management issues. This seminar built upon and extended this basic knowledge and examined the next logical step in coastal planning and management - the preparation and implementation of Coastal Management Plans.

The seminar was therefore aimed at highlighting the character of the coast; the different approaches to its planning, development and management; and the role and responsibilities of the various parties involved.

Through this seminar, the Department of Conservation and Environment also hoped that local authorities and developers would see the need for, and desirability of 'Coastal Management Planning' as a cost effective tool in guiding utilisation of the coast while minimising potential environmental and financial costs.

The process of preparing a Coastal Management Plan provides an effective means of collecting, assessing and presenting available coastal information on a particular area as a part of the planning process. Preparing a Coastal Management Plan involves study or analysis of the physical environment, natural processes and ecosystems.

It also requires some prediction of the needs of future generations when population growth and increased leisure may stimulate demands which are at present barely apparent. The Plan identifies natural constraints, opportunities and presents options for long-term utilisation of coastal resources. In addition it provides a base against which statutory planning and development proposals may be assessed.

We believe the seminar was a great success. It attracted over 200 participants including members of both State and Federal parliaments. Of the 44 local authorities bordering the Western Australian coastline, no less than 36 sent representatives (Fig. 1). Several other States also sent delegates, although the seminar focussed largely on activities within this State. Many departments sent officers involved in one way or other in coastal matters, and representatives from research institutions, private organisations and consultants also attended. If nothing else these figures indicate the importance with which coastal management is vested. It is also clear in retrospect that we should have chosen a larger venue.

As usual a questionnaire was sent out after the seminar to gauge its impact and to obtain feedback that will be of use in planning future seminars.

Given the interest raised by the seminar, the proceedings and the results of the questionnaire have been collated into this document and I commend it to you as a record of the state of Coastal Planning and Management in Western Australia.

Director, Department of Conservation and Environment
Chairman, Coastal Management Co-ordinating Committee

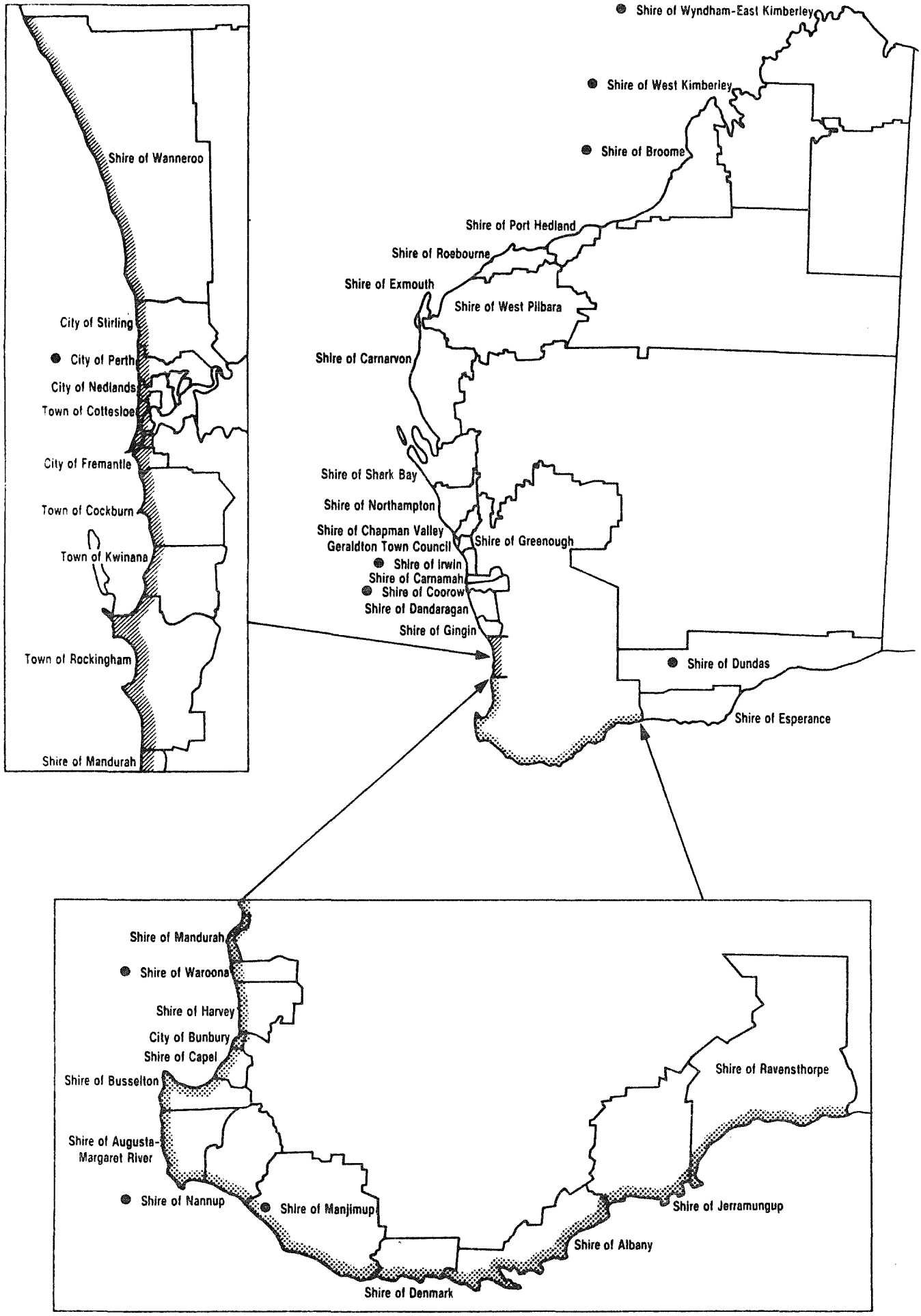

Figure 1 Coastal local authorities represented at the Seminar. (● Local Authorities unable to attend)

Acknowledgements

The Seminar was co-ordinated by the Department of Conservation and Environment (DCE), on behalf of the Coastal Management Co-ordinating Committee.

The Organising Committee comprised:

Secretary: Dennis Grinceri, Environmental Officer, DCE
Assistants: Michael Kerr, Ilona D'Souza, Eve Bunbury.

The Department would like to thank everyone who attended especially the following for their contributions and participation.

The Hon R Davies, MLA	Minister for the Environment
Mr C Porter	Director, DCE
Mr R O'Brien	Coastal Planning and Management Advisor, DCE
Dr P Woods	Consultant, DCE
Dr J Bailey	President, WA Conservation Council
Dr P Hesp	Research Officer, Soil Conservation Service
Dr J Ottaway	Head, Coastal Waters Branch, DCE
Dr K Tinley	Head, Terrestrial Branch, DCE
Mr T Bright	Esperance Regional Administrator
Mr C Chalmers	Environmental Officer, DCE
Dr G Robertson	Commissioner, Soil Conservation Service
Mr M Woolfenden	Director, Halpern Glick Pty Ltd
Mr R Carter	Dandaragan Shire President
Mr M Allen	Planning Officer, Town Planning Dept.
Mr B Evans	Planner, City of Stirling
Mr G Sansom	Deputy City Planner, Wollongong NSW
Mr R Edwards, MHR	Federal Member for Stirling
Mr R Wright	General Manager, Secret Harbour Pty Ltd
Mr B Masters	Chief Geologist, Westralian Sands Pty Ltd
Mr I Le Provost	Natural Resource Consultant
Mr B Allen	Environmental Officer, Mt Newman Mining Company
Mr R Stanton	Planning Consultant
Mr J Glover	Director of Planning, City of Stirling
Mr P Drechsler	Managing Director, Urban and Environmental Planning Group
Dr S Shea	Co-ordinator of Implementation Group, Department of Conservation and Land Management — CALM
Mr L Hitchen	Chairman, Tourism Commission
Dr W Andrew	Principal Engineer, Harbours and Rivers, Public Works Department
Mr P Skitmore	Environmental Officer, DCE
Ms A Van Steveninck	Environmental Officer, DCE
Dr C Whitaker	Chief Environmental Officer, Evaluation Branch, DCE
Mr R Sippe	Environmental Officer, DCE

Special thanks are extended to Mr Warren Jones, Executive Director of the America's Cup Defence, 1987 for his contribution to the Seminar Dinner.

Dr Peter Woods
CONVENER

The Aims of the Seminar

1. To highlight the character of the coast which makes it attractive though difficult to use and develop.

2. To introduce the concept of Coastal Management Planning (CMP).

3. To discuss the roles and responsibilities of individuals, organisations and government departments involved in the coast.

4. To show examples of coastal developments and their consequences on the Beach Tour.

5. To establish contacts between people and organisations involved in Coastal Planning, Management, Research and Development.

Coastal Management Seminar 1984
Programme

Day 1

9.00-9.15	DCE Opening,	C. Porter (Director, Dept. of Conservation and Environment (DCE)
9.15-9.30	Minister's address	The Hon R. Davies (Minister for the Environment)
9.30-10.00	Framing the Problems, Strategy and Players	R. O'Brien, Coastal Planning Management Advisor — DCE
10.00-10.30	Coastal Evolution and Shoreline Movements	P. Woods, Consultant, DCE
10.30-11.00	MORNING TEA	
	Chairman	J. Bailey (Conservation Council)
11.00-11.30	Landform characteristics	P. Hesp Research Officer (Soil Conservation Service)
11.30-12.00	Marine Environment Characteristics	J. Ottaway, Chief, Coastal Waters Branch, DCE
12.00-12.30	Coastal Processes v. Development Expediency	K. Tinley, Chief, Terrestrial Branch, DCE
12.30-1.20	LUNCH	
1.20-1.30	Chairman	T. Bright, Esperance Regional administrator
1.30-1.40	Introduction to CMP	P. Skitmore, Environmental Officer, DCE
1.40-2.10	The Broome — CMP	C. Chalmers, Environmental Officer, DCE
2.10-2.40	Land Capability Assessment as a basis of CMP	G. Robertson, (Commissioner, Soil Conservation Service)
2.40-3.10	An Engineer's Approach to Coastal Management	M. Woolfenden, Director, Halpern Glick Pty Ltd
3.10-3.40	AFTERNOON TEA	
	Chairman	R. Carter, Dandaragan Shire President
3.40-4.05	CMP and its relation to Statutory Planning	M. Allen, Planning Officer, Town Planning Department
4.05-4.30	City of Stirling — Coastal Report	B. Evans, Planner, City of Stirling
4.30-5.00	CMP — The Australian Context	G. Sansom, Planner Consultant Wollongong N.S.W.
5.00-5.15	DCE Close — Pressures	P. Woods
	REFRESHMENTS	

Day 2

9.00	Chairman	R. Edwards, MHR, Federal Member for Stirling
9.10-9.20	DCE Introduction	P. Skitmore
9.20-9.50	Environmental Assessments — A Developer's Viewpoint	R. Wright, General Manager of Secret Harbour
9.50-10.20	Mining in the Coastal Zone	B. Masters, Chief Geologist (Westralian Sands Pty Ltd)
10.20-10.50	Natural Resource Consultant's Role in Environmental Assessment	I. Le Provost (Le Provost, Semeniuk & Chalmers)
10.50-11.20	MORNING TEA	
	Chairman	B. Allen. Env Safety & Occupational Health, Mt. Newman Mining Co.
11.20-11.50	The role of the Planning Consultant.	R. Stanton (Ralph Stanton Planners)
11.50-12.20	The Role of Local Government in the Coastal Strip	J. Glover (Director of Planning, City of Stirling)
12.20-12.50	A Broad Scale Approach to Coastal Management	P. Drechsler, Managing Director, Urban and Env.
12.50-1.50	LUNCH	
	Chairman	S. Shea, co-ordinator, (Implementation Group) Dept. of Conservation & Land Management
2.00-2.30	Role of Tourism in promoting use of coastal resources	L. Hitchen, (Chairman Tourism Commission)
2.30-3.00	The Role of the State in Providing Public or Protective Works along the Coast	W. Andrew (Principal Engineer, Harbours and Rivers, PWD)
3.00-3.30	The Role of the State in CMP	R. O'Brien
3.30-4.00	AFTERNOON TEA	
4.00-5.00	Workshop	
5.00-5.15	Coastal Planning & Management — Summary.	G. Sansom

Workshops

1 - Environmental Assessment Procedure and the role of the Environmental Protection Authority - Sippe, Whitaker

2 - Preparation of CMP - Chalmers, Chape, O'Brien
- Sources of Funds and Responsibilities of Various Departments - CMCC
- Local Government experiences - LGA
- Interaction of Statutory Planning & Coastal Planning - Skitmore, Allen

3 - Land Capability Assessment - Hesp,
- Marine Resources Assessment - Chittleborough, Ottaway
- Coastal Processes - PWD, Eliot, Woods

4 - Role of the New Govt. Dept. - CALM - Shea

5 - Dune and People Management - Van Steveninck, Riches

7.30-10.00	DINNER	

Day 3
Beach Tour

9.00	Introduction to Tour	P. Woods

Tour

The beach tour will involve an inspection of the beaches between Pt. Peron and Ocean Reef. Examples of developments, management technique, erosion control works, and the results of past mistakes will be illustrated. Coastal processes and the evolution of local landforms will be discussed.

1.30-2.30	LUNCH - Wanneroo	
	Tour	
4.00	TEA - Hotel	
5.00	Summary of Tour Close	P. Woods
	REFRESHMENTS	

Seminar Papers

Minister's Address

Hon Ron Davies MLA
Minister for the Environment

Western Australia has the longest coastline of any Australian State and although much of it is uninhabited, certain portions are subject to considerable human impact. The form of the coast changes from place to place and presents those responsible for environmental management with a variety of problems.

Much of the coastal land in Western Australia is held by the Crown. One of the advantages of this is that it is possible to provide access to the coast in the most suitable places. In many countries this is not the case, in certain European countries for example, private homes and hotels own their beaches, and are able to keep the public out or charge them to use the beach.

Despite the vastness of the coastline there is extensive competition for the use of certain coastal resources. Land use conflicts amongst industry, recreation, tourism, residential, resort, port facilities and waste disposal is intense. Those of you who are familiar with Cockburn Sound will appreciate the difficulty of managing resources between large-scale industry,recreation,waste disposal and naval defence facilities. The majority of the State's population lives in the Metropolitan Region and in the 33 local authorities between Kalbarri and Esperance. This indicates the importance of the coast as a human habitat in an otherwise harsh environment.

Along certain parts of the coast people pressure has caused problems. On the Metropolitan coast for example thousands of cars congest parking areas, tens of thousands of feet trample dune vegetation and there is increasing competition between swimmers, surfers, boaters and dog lovers for space.

Many State departments and local authorities are involved with coastal use issues but the need to ensure a balance between development and environmental protection has become more urgent over the past ten years and particularly over the past year.

The Western Australian coast is presently subject to several development proposals related to the America's Cup Yacht Race. The proposal to locate a small boat marina at Sorrento has been much discussed in the press and by various groups that oppose it and support it. At present an Environmental Review and Management Plan is being prepared and the decision, to proceed or not, should be made in the near future.

In addition, proposals for the establishment of the Ningaloo Marine Park are shortly to be put to Cabinet. If the Marine Park is approved one of Western Australia's most important coastal resources will be protected, from use-related damage, for future generations.

The above examples indicate the increasing pressures which are being put on the Western Australian coast by diverse groups of people with conflicting values and differing philosophies.

How then are we to rationalise the use of our coast? It is the intention of this seminar to show that good planning and management of the coastal resources will achieve a balance between environmental protection and good development.

Coastal planning and management involves both local government and the State government and the public in general. The State officers have the benefit of broad experience while local authorities have in-depth knowledge of their areas. One of the aims of this Seminar is to establish useful contacts between the various levels of Government in order that the best planning and management decisions are made along the coast.

The present State Government was the first in Western Australia to acknowledge the need for coastal planning and management. In 1983 the Cabinet adopted a Government Position Paper which set out a goal and ten policies for the ongoing planning and management of the coast. The Position Paper provides details of how the Coastal Management Co-ordinating Committee operates and suggests that after a two-year period the operation should be reviewed.

At its last meeting the Coastal Management Co-ordinating Committee recognised that the present administrative arrangement is inadequate to provide the range of skills, manpower and research capability to do justice to the task and that the position should be reviewed. A **Review** will commence immediately after this seminar.

I therefore declare this Seminar open, and hope that through the presentations and discussions which are to follow, a new awareness of the importance of coastal planning and management will emerge.

Framing the Problems, Strategy and Players of Coastal Planning and Management in Western Australia

Rory J. O'Brien B.A.(Hons), MCRP, MRAPI
Coastal Planning and Management Adviser, Department of Conservation and Environment.

1. Introduction

Western Australia has the largest coastline of any Australian State, some 12,500 kilometres. Although much of the coast is uninhabited certain portions are subject to considerable human impact. The Australian population in general lives in close proximity to the coast. It is estimated that 85 per cent of the population lives in coastal cities and towns and that approximately 4.5 million Australians live within three kilometres of the coast (Hails, 1982).

What is the coast? Although no exact definition exists the coast may generally be defined as encompassing coastal waters and estuaries to 30 metres depth, together with the nearshore lands influenced by coastal processes. The extent of the coast therefore varies from place to place (Figure1).

The delegates at this seminar all have one thing in common. You all have some interest in the coast. You may be from a coastal local authority, a State department, a research organisation, a planning or environmental consultancy or you may be a coastal landowner, developer, or an interested member of the public. Each of you may and probably will see the coast in a slightly different light and it is this multi-objective aspect which makes coastal planning and management such a complex but stimulating area to be involved in.

The purpose of this paper is generally to introduce the subject of coastal planning and management to an extremely diverse audience, to point out some of the complexities, broadly identify what coastal resources are, to illustrate some of the problems encountered on the Western Australian coast and to show how each of us has an important role to play in the future protection of the environment and provision for the social and economic needs of the community.

2. The Complexity of Coastal Planning and Management

Administrators and researchers who plan and manage the coast face a variety of questions and contradictions regarding the use of coastal resources (Ditton *et al.* 1977).

- What uses of coastal resources are most important?
- What aspects of coastal ecology are most easily damaged or are irreplaceable?
- When should the private market economy be allowed to operate unimpeded by government regulations and when should the government intervene?
- What are the relative strengths and weaknesses of each sector?
- What legal and political constraints shape the roles each sector plays in allocating coastal resources?
- What is the best management system that would improve the existing situation?

These questions demonstrate the complexity of managing coastal resources. The following contradictory answers given by various experts illustrate the dilemma:

- Ecologists desire scientifically based solutions.
- Economists tend to promote the free market.
- Government administrators tend to favour regulation in the 'public interest'.
- Conservationists want stringent restrictions on development.

Solutions to the above contradictions and answers to the questions are at the heart of the process of managing coastal resources. This paper can not unravel all the contradictions, nor can it resolve all the conflicts underlying them. It is intended, however, that during the next few days some of the questions explored will lead us in the direction of new answers.

3. The increasing Human Impact on Coastal Resources

The coast exhibits a variety of landforms, vegetation types, biological and geological systems and contains a range of resources for human use. We will now examine some of these resources and identify the changing human impact on them.

Recreation Areas: Water-based activities have been identified as being the most popular, and water based recreation is regarded as one of the largest and fastest growing coastal zone uses. People are swimming, fishing and boating more than ever before, creating crowding and over use of existing resources. In Western Australia our supply of high quality coastal resources is inadequate to keep pace with demand, therefore pressure points need to be properly managed.

Residential Use: Coastal and estuarine property is highly valued as a residential location. The distribution of land value peaks at the waterfront and decreases away from it. The land-use pressures are therefore the most intense in the most environmentally sensitive zones. There is every indication that this trend will continue and intensify.

Fisheries: The dependence of fish (a source of protein and a primary industry) on coastal habitats has only recently been properly understood. Fish depend on the maintenance of coastal marshlands, estuaries, mangroves, reefs, seagrasses and mud flats for nutrients, and as places for breeding. The lack of understanding of such aspects has led to the destruction of the resource in some areas.

Port Sites: Ports are an essential element of our economic system as they provide for the inter-regional transport of materials. Growth in this area is obviously a factor to be contended with in the future.

Industrial Land Use: Coastal land has in the past been seen as the 'least-cost' location for industries on the basis of cheap transportation and cheap waste disposal. Such land allocation is often at the expense of general welfare and the community could end up paying the 'true-cost' for generations, e.g. Albany and Cockburn Sound.

Tourist Attractions and Natural Environments: With increased leisure time and personal mobility, coastal scenery, coral reefs, offshore islands, game fishing, wildlife reserves, wilderness areas and sites for scientific study will come under continuing pressure especially with the higher profile taken by the Tourism Commission in promotion.

Minerals: Mineral extraction and resource development are expected to increase over the next few decades.

4. Coastal Problems: The Balance between Protection and Development

Problems along the coast arise from the inherent fragility and sensitivity of some coastal environments, from land use pressures and conflicts and from simple mistreatment and ill-advised development. Sandy coasts are in a constant state of change as dunes are first built and then attacked by the action of waves and wind, and large quantities of sediment are moved on and off-shore along the coast.

Most of the State's population live adjacent to a fragile sandy coast on the Swan Coastal Plain, and erosion problems such as those experienced at Busselton, Mandurah, Floreat and Quinns Rocks highlight the costs incurred when natural processes are ignored. Pressures for the use of coastal land are intensifying rapidly as demands grow for residential and recreational uses.

Additional attention needs to be given to designating an actual coastal zone to provide adequate safeguards against natural disasters such as cyclones, floods and tidal waves. In such cases massive forces and power come into play and adequate provisions should be made.

Some of the problems with which coastal managers are presently confronted have all too often resulted from 'ad hoc' decision making, and lack of foresight — buildings unwisely located on frontal dunes, poorly designed and located roads, and indiscriminate use of off-road vehicles. Development and a whole range of human activities can be successfully located within the coastal zone but increased awareness of the special characteristics of the coast is urgently required. We need to understand the physical and biological systems before we start to develop any particular area.

5. Coastal Planning and Management

If we are going to achieve the goal of providing a balance between the protection of the quality of the environment and providing for the social and economic needs of people, a close relationship needs to be established between land use planning and resource management.

5.1 **Land use planning** refers to planning with a spatial, or geographical component, in which the general objective is to provide for a spatial structure of activities (or of land uses) which in some ways is better than the pattern existing without planning (Hall, 1974).

Land use planning is an extremely complex profession. The reason for this is that it is multi-objective in its goal. For example, it is far easier to put a man on the moon than to successfully plan a city or region. The reason why it is easier to put a man on the moon is as follows:

1. The objective is simple and singular.
2. The processes involved are nearly all physical.

Land use planning is far more complex:

1. The goals are not well understood, i.e. economic, sociological, environmental objectives tend to be conflicting.
2. The processes which need controlling are human ones. They are less well understood and work with less certainty than the laws in the physical sciences, e.g. personal choice.

In order to resolve the complexities of land-use planning, town planners tend to oversimplify and produce zone plans with little boxes allocated for various uses.

5.2 **Resource management** tends to focus in more detail on individual environmental elements within an area. Management may be defined as the process of controlling an activity or system in order to maintain a desirable state or direction (Hollick, 1981). The following are the characteristics of resource management.

1. Management requires objectives and criteria which define the desired state or direction.
2. Information is required on the present state or direction of the system in order to detect deviations.

3. Control Mechanisms are required to adjust the state or direction of the system.
4. Rules are required for determining the correct control settings for any given state of the system.

Malcolm Hollick summarised the relationship between planning and management as follows.

> "Planning provides the objectives and control rules for management; while management provides the means by which plans can be implemented. Management processes also provide the information needed to form an image of the current situation in order to update the plan. Hence, planning without management is unlikely to be effective because of poor implementation; and management without planning would lack direction in a changing world."

The Department of Conservation and Environment has adopted the joint planning and management approach to coastal management planning.

5.3 **Coastal Management Plans.** It is through the medium of a coastal management plan that land-use planning and resource management are melded into an effective tool to guide, development and safeguard resources.

A coastal management plan contains policies and working plans to guide the development of a particular area. Specifically it provides guidance on subdivision and development control, reservation of Crown land, works programmes, road construction, regulation of off-road vehicles, declaration of Soil Conservation Districts, creation of marine reserves, and so on. To perform this role, a coastal management plan must go further than a conventional regional land use plan or Town Planning Scheme. In addition to establishing a pattern of zones and reservations, coastal management plans make specific management recommendations necessary to achieve objectives for the utilisation, conservation, protection or restoration of coastal resources.

In the preparation of coastal management plans the following broad methodology is followed:

- Analysis of the natural environment and the identification of significant resources.
- Analysis of the human environment and the identification of the social and economic needs of the community, i.e. demands and use pressures.
- Identification of opportunities and constraints.
- Consideration of the ideal situation in achieving a balance between resource management and usage.
- Formulation of proposals.
- Method of implementation.

6. The Players

Coastal planning and management is primarily the responsibility of the 44 local authorities on the Western Australian coast. The local authorities are the custodians of the coast. Local authorities vary in size and population and in their ability to plan and manage their coast. The large local authorities in the metropolitan area have planning, management and engineering staff to provide the expertise to do justice to their coastal areas. Other local authorities in remote areas have no staff and rely on State departments to advise them. Ten years ago local authorities were generally opposed to the State departments giving advice and guidance. Through the coastal planning and management seminars and general coastal extension work, local authorities now desire help and finance to do coastal management planning. Several State departments are involved with coastal planning and management and six of these are co-ordinated through the Coastal Management Co-ordinating Committee, i.e.

- Department of Conservation and Environment
- Department of Agriculture
- Department of Lands and Surveys
- Town Planning Department
- Public Works Department
- Marine and Harbours Department

Other State departments such as Mines Department, Youth Sport and Recreation, and the Tourism Commission are involved in a range of coastal issues. Various bodies such as the W.A. Museum, Fisheries and Wildlife, and National Parks are involved in day to day work activities.

The Perth based tertiary education institutions become involved with various environmental and coastal research and provide new information to assist in the preparation of plans as well as providing independent comment on various problems.

In the private sector, environmental, engineering and planning consultants operate at all levels, landowners and developers use the consultants to provide expert opinion, and valuable research work is fed into the system from this direction. The present approach is to co-ordinate the various inputs to produce the best available utilisation of coastal resources. Represented at this seminar is the whole range of players in the coastal planning and management game.

7. Conclusions

This paper has given a broad overview of the coastal planning and management process. Some more specific conclusions are as follows:

1. Coastal planning and management is complex.
2. Human impact on coastal resources is increasing.
3. Coastal problems arise partly from the fragile nature of the coast and partly from the lack of foresight by decision makers and knowledge of developers and coastal managers.
4. Coastal management plans provide a means of drawing together land-use planning and resource management.
5. A broad range of authorities and bodies are involved in coastal planning and management and several professional disciplines are involved which tends to complicate the overall picture.

8. References

1. Coastal Planning Steering Committee, 1981. *Coastal Planning and Management in Western Australia,* An unpublished report to the Conservation and Environment Council.
2. Ditton, R.B., Seymour, J.L. and Swanson, G.C., 1977 *Coastal Resource Management,* Lexington Books.
3. Hails, J. 1982. The Degradation of Australia's Coastal Environment: A Review of Competition, Conflicts and Compromises, in *Man and the Australian Environment,* Edited by W. Hanley and M. Cooper, McGray-Hill.
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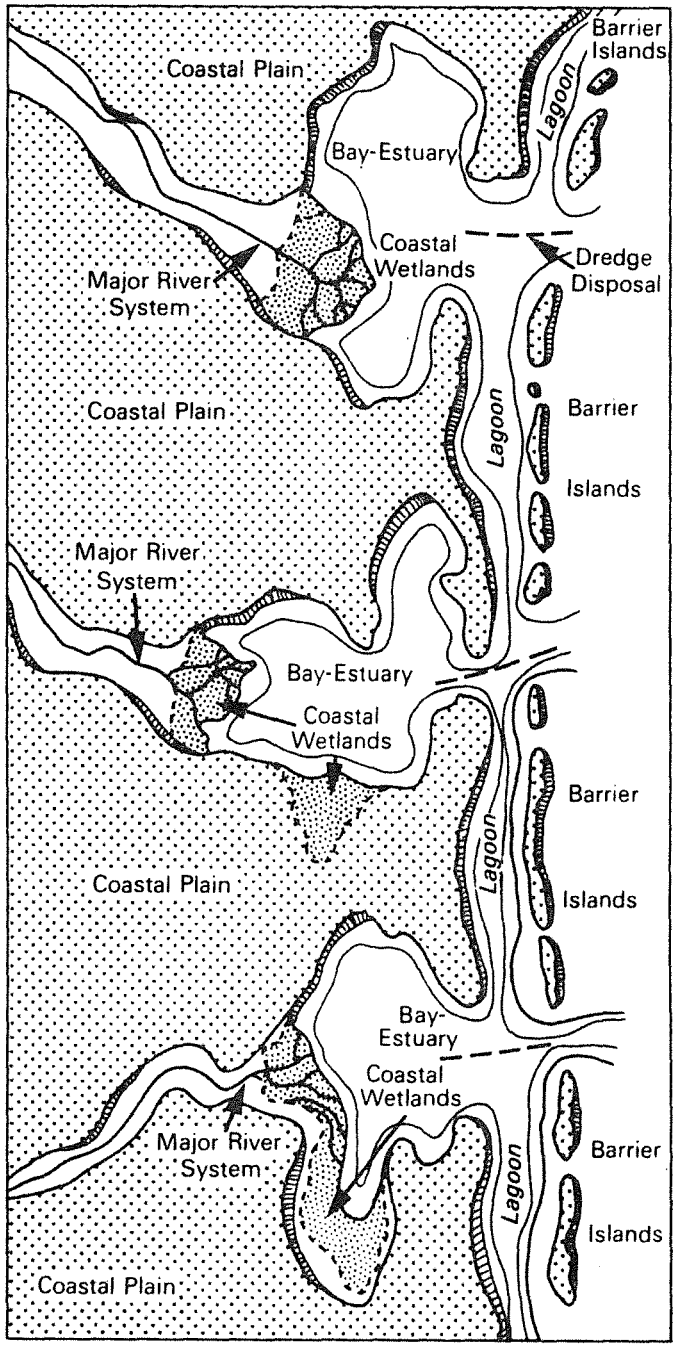

Figure 1. The Coastal Zone
Ditton (et al.) 1977. Coastal Resource Management

Coastal Evolution and Shoreline Movements

Peter J Woods, PhD
Consultant, Department of Conservation and Environment

1. Introduction

This seminar is about Management Planning which basically involves analysis of natural and human environments in order to produce a guide on how to make best use of the available resources.

In respect of the coast I believe that unless we understand the coast and how it works we will not be able to achieve this objective.

My talk covers one aspect of the natural coastal environment - that of coastal evolution and shoreline movements.

There are numerous examples around the Western Australian coast of problems we have created on unstable shorelines. In the majority of cases we can say, with the benefit of hindsight, that many problems are the result of planning in the light of poor knowledge (eg. eroded roads, destabilised land, developments sited on eroding shorelines) and ad hoc decision making (eg. poorly sited developments with a short-term aim, expensive protective work that sometimes cause more problems than they solve),

The issue today is - can we avoid creating similar problems for future generations?

When the last ice age ended 25,000 years ago sea level was at minus 100m. Since then the sea has risen, reaching its present level around 5,000 years ago.

The major effects of this latest rise in sea level have been to:

a) flood old landforms to establish a new shoreline position.
b) sweep onto the coast loose sediment from the drowned lands to form a variety of sandy landforms.
c) erode pre-existing landforms to form cliffs in places where no sand was swept ashore.

As a result our coast today is a combination of exposed older rocks or young sandy landforms superimposed on the older material (Fig 1).

It is very evident now that the offshore supply of sand is virtually depleted so that onshore transport is low. As a result many of the landforms that built up over the last few thousand years are now eroding. Thus the first thing to realise about our coast is that in many cases the trend leading to build-up of coastal landforms has reversed so that stable or eroding conditions are evident (eg. Metropolitan coast, Bunbury, Broome).

As this trend is related to the latest rise in sea level and sand supplies on the continental shelf it is not reversible and therefore largely out of our control.

Along much of the coast sandy landforms are eroding and in some cases they have eroded to the extent that underlying older rocks are exposed. From a management point of view this indicates that our sandy coasts are not permanent and that:-

a) any loss of sand will speed erosion and exposure of the underlying rock, and
b) any developments on sandy landforms may be prone to marine erosion in the long term.

My message therefore is simple:

Without an understanding of how the coastal zone evolved, or what factors are important in maintaining the shoreline, it is difficult to predict what may happen in the future, either with or without human interference. If however, the natural system is understood, allocation of coastal land can be planned so that best use is made of the resources available with disturbance to, conflict with, and maintenance of, the natural system minimised.

The coast as we know it is a young feature that is continually adjusting to different sets of conditions that occur at different time scales. Unless we appreciate this fact we will:

a) perpetuate the problems we already have; and
b) create new problems that will add to these we already have.

With our long coastline and small population I don't believe we can afford in the long term the problems we have, let alone any new ones.

2. Coastal Evolution

The gross shape of our coast was established millions of years ago as a result of the forces of the sea acting on the rocks and sediments that make up the Western Australian landmass.

Over the last million years, sea level has fluctuated depositing shore parallel bands of sedi-

ment around the margins of the landmass or eroding pre-existing landforms into cliffs. During this, the Pleistocene period, the basic shape of the coast as we see it today was established.

As we are dealing with today's coast, this evolution can be treated as a linear, virtually irreversible trend upon which more readily recognisable shorter time scale shoreline movements are superimposed.

3. Shoreline Movements

Superimposed on the evolutionary trend in sandy coastal landforms which results in irreversible movements in shoreline position, there are a number of factors that operate at varying time scales which cause cyclic changes to shoreline position.

At the shortest time scale the beach erodes during storms while in the calm period that follows the beach builds out to its original position. This causes a recycling of sand from the beach to an offshore bar and back again i.e., in the beach sand cycle. Anyone who observes the coast through the year can readily see the difference between a beach before and after a storm.

At an annual time scale there is a seasonal change in shoreline position due mainly to increased frequency of storms during one season. Again anyone can see the difference between typical wide summer beaches and narrow winter beaches along most of the coast.

At a longer time scale the shoreline adjusts to changing conditions that probably reflect local change in climate (or storminess). As a result, sandy beaches often build out for a number of years before being progressively cut back each winter. These changes may result in shoreline movements of a hundred metres or so. There are many instances around our coast where the effect of successive bad winters has led to general retreat of the shoreline and erosion of adjacent developments (eg Mandurah, Busselton, Albany).

It is apparent also that there are much longer cycles which probably reflect changes in world climate over several hundred years. Under the influence of these cycles, long-term changes which may alter the shoreline position by 100's of metres are induced (eg Jurien).

From a planning and management point of view therefore the mobility and temporary nature of the shoreline makes permanent development near the coast difficult. If however, it is recognised that the shoreline does move at varying rates, planning and management can be designed to take these factors into account.

4. Management and Planning Implications

Man has a tendency to want to develop right on the water's edge. Roads, houses, toilets, surf clubs and industrial complexes are all built as close to the beach as possible. As outlined above the shoreline is not a fixed landmark and can be subject to both long- and short-term, linear and cyclic changes in position.

The numerous examples of eroded roads and developments and the presence of protective groynes and seawalls, is evidence that these changes take place in the human time scale and therefore must be accounted for in the planning and management process.

On any piece of coast the landforms give a clue to the history of coastal evolution and the likely nature of shoreline changes. By having a basic understanding of this aspect of the natural coastal environment we do have a better chance of planning use of our coastline without creating new and perpetuating old problems.

The process involved in producing a Coastal Management Plan allows knowledge of this sort to be considered when planning decisions are made (eg. width of coastal reserves, alignment of coastal roads, position of surf clubs, carparks, housing and industry.)

If knowledge of this type is not sought or utilized then Western Australia can look forward to increasing major expenditure on coastal protection works or loss of coastal facilities, along our sandy stretches of coast for the foreseeable future.

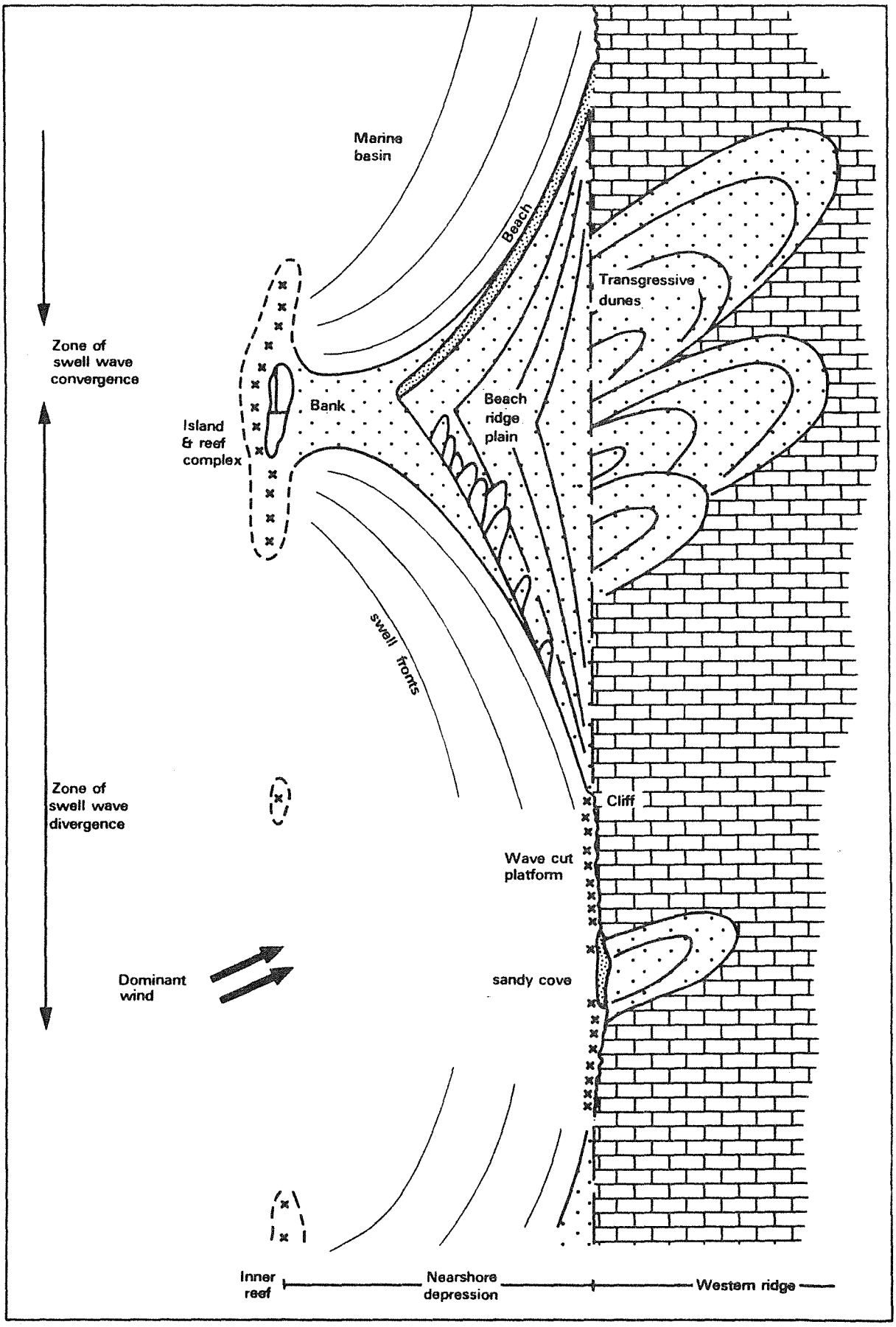

Figure 1. Typical young sandy landforms on older limestones of the west coast of Western Australia.

Marine Environment Characteristics

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Western Australia has about 125,000km^2 of coastal waters coming within the State's jurisdiction. Estimates of the length of the coastline range between 5,000 km and 43,000 km according to whether a simplified map is used as the basis for the calculation, or whether even the smallest inlets and promontories are taken into account. The official 1973 estimate made by government cartographers gives the coastline of Australia, including Tasmania and continental shelf islands, at 36,735 km; hence, on that basis, the Western Australian coastline is about 12,500 km.

In addition to having the largest coastline of Australia's States, Western Australia has the most diverse range of coastal marine environments. In the northwest, for example surrounding Broome, the environment is tropical with sea temperatures in the range 22-32°c. There are two tides each day with rises and falls sometimes exceeding 12 m. Cyclonic disturbances in the December-March period cause catastrophic disturbances to local marine communities. This is quite different to the temperate environments in the southwest and south of the State. In the Perth to Cape Leeuwin area, for example, sea temperatures are about 15-22°c, there is only one tide each day, and the daily tidal range is sometimes negligible. Winter storms disturb inshore marine communities, but more regularly and less catastrophically than (summer) cyclones in the tropical waters.

Even within a local, geographical region there can be many different marine habitats. On the coast are sheltered muddy embayments, sandy beaches, and high energy rocky shores. Most habitats support complex assemblages of plants and animals. Seagrass meadows, seaweed-covered reefs, mangrove swamps, coral reefs, and predominantly surface-living or bottom-burrowing animal communities are all common in parts of the State. Because of this diversity of marine environments, habitats and communities, we do not have one standard, guaranteed formula on which to base decisions of what type of development is, or is not, ecologically acceptable for a particular location.

Nevertheless, sufficient examples exist, of past and continuing mistakes, to plan new developments on a much improved environmental basis than was possible even a few years ago. Consideration of the specific marine environment should start at the earliest stage of planning, requiring the involvement of environmental consultants and environmental scientists. Studies to collect and collate the necessary baseline data, and then examine the proposed development in a marine environmental context, can usually suggest methods to avoid serious environmental problems which inevitably decrease the overall economic, recreational and aesthetic value of the area affected. Remedial measures necessary after the event often are far more expensive than the cost of proper environmental advice before a development proceeded.

Some general points should be considered.

(1) All marine environments are dynamic. What we see now is the result of thousands of years of evolution. Beaches, estuaries, the seafloor and the coast generally, are constantly changing.

(2) Coastal marine environments are a valuable natural resource in direct economic terms (commercial fishing, tourism, attracting recreational users to an area).

(3) Most marine communities (for example, seagrass meadows, kelp forests, mangroves, coral reefs) have many important indirect economic benefits, such as providing nursery grounds or food for edible marine animals, stabilising mudflats, and protecting the coast from erosion.

(4) Effluents poured into coastal waters, and structures built in the sea, can have ecological impacts many kilometres from the perturbation source. These impacts may continue for years after the event. Marked environmental impacts almost invariably decrease the overall economic value of an area.

(5) There are enormous forces associated with marine currents, tides, storm effects and sand movements. Coastal developments attempting to modify or stop existing processes are likely to create major problems requiring expensive remedial action.

Coastal Processes vs. Development Expediency

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Introduction

The previous speakers have outlined the evolution of Western Australia's coastline, its diversity of land and water, and its processes. Process interactions are continuous, inexorable and eternal. Either we match our living and activities to these characteristics, or we continue to play King Canute.

It is difficult enough to win land from the sea even where it allows us to do so. What then are the dimensions of real cost implications in trying to perch permanent developments on the edge of a generally eroding coastline as in Western Australia.

The crucial problem is thus how to balance the increasing conflicts between use demands and protection of resource quality.

Some Key Processes and Properties of Coasts

There are basically two kinds of coast, **hard coasts** that are rock defended, and **soft coasts** which are plant defended. Though solid, hard coasts are susceptible to many kinds of change according to their make-up, mode of weathering and steepness of relief. These changes include gravity slides, rock falls, sinkholes and roof collapse, and undermining by wave action.

Soft coasts comprise beaches, dunes, salt-marshes, deltas, lagoons and estuaries which are held in place by their formative processes and the tenuous stability imparted by plant growth. Soft coasts have the unique property of malleability which is the basis to their durability, by continually adjusting to the changing frequency, intensity and direction of the elements.

Soft coasts are composed of four features closely related by the interchange of sand between each: (1) beaches, (2) frontal dunes, (3) surf zone (sand bars and banks), and (4) river mouths and estuaries. Together these form a single geomorphic system or arena referred to as the **littoral active zone.** Any change in one entrains changes in the others.

Beaches play a prime mover role in the transport and redistribution of sand in the active zone, as they are constantly adjusting their profile of equilibrium to the wave regime of the moment, and require constant replenishment. Sand taken out of storage from sandbanks or the frontal dunes is usually returned to the shore downdrift of its origin.

A constantly rising sea level and/or decreased volume of sand to sustain the active zone results in the landward shift of the beach system and erosion of frontal dunes. The situation in the southwest of Western Australia is one of decreasing sand supply (Peter Woods pers. com.).

The key feature in the erosion of frontal dunes is that the transfer of sand from dune to beach is a self-regulatory form of coastal protection. In this way dunes foster long-term stability of the coast by retarding beach recession (Conservation Foundation 1980, Ritchie 1980).

There are several other properties of coasts that need to be reiterated:

(1) Each coast sector or site is put together in a different way in a large variety of forms, combinations and sequences. Each thus requires a prescription of use tailored to its peculiarities.

(2) Generally all disturbances and influences are transferred alongshore downdrift of their origin affecting other systems, properties and resources.

(3) The land-sea junction is a narrow linear system with a much lower tolerance to misuse than is generally realized (it is not the convenient bottomless pit into which all ills can be poured with impunity). Though soft coasts and coastal waters are highly vulnerable to misuse, they are highly responsive above about 200 mm mean annual rainfall to sustainable protective uses.

It is on soft coasts where people pressures are greatest and increasing fastest, where exploitation is at a maximum and the potential for abuse is greatest (Ritchie 1980).

Preventive Approaches

The golden rule for development on coasts is clear: stay out of reach of the littoral active zone. This zone plus a varying width of terrain immediately landwards, which is susceptible to relatively rapid change, should together form the **coastal buffer strip.** Any development envisaged within this buffer should be submitted to expert environmental authorities for evaluation, and if ratified, should be under special management controls and guidance.

To identify the landward boundary of the buffer, and to prevent unnecessary damage to coast resources and material investments, a set of 7 basic questions need to be answered for each site (Table 1).

TABLE 1

SEVEN BASIC QUESTIONS

1) What are the values of the site at national, regional and local level? re: scenic, cultural, educational, scientific, material resources.

2) What is the erosional status of the coast at the chosen point? ie. is it (a) growing seaward or accreting, (b) "stable", (c) eroding, or retreating landwards.

3) Where are the outer limits or boundaries of the LITTORAL ACTIVE ZONE.

4) Where are the nodes of least change (sites or positions of greatest relative stability).

5) And the converse - what parts are the most vulnerable to the elements and/or to human activities.

6) What HAZARDS is it subject to? (intensity, frequency, direction). e.g. gale seas and winds, flooding or waterlogging, fire, landslides, rockfalls, earthquakes, downdrift position to noxious effluents.

7) What impacts or side-effects will development or site modification have on resources and other people? e.g. water quality and quantity, terrain stability, habitat quality and diversity, viability of adjacent land and waters re: productivity, land value, other peoples enterprises and quality of life. ie. considerate development or uses.

Using common sense based purely on observation of what happens on different parts of a coastline, or a sophisticated scientific analysis, leads to the same conclusion. In practise it is far preferable to prevent or minimize problems, and escape getting trapped into applying endless palliatives, by following easily applied general principles as a fundamental strategy.

Of these a key to successful resource protection is through indirect controls that filter out interest groups to core areas leaving intervening sectors of coast wilderness in reach of only the more hardy or adventurous. Of course it is in these intervening areas out of sight of controls where ORVs can do their greatest damage. This fraternity should be directed to already bare or degraded "sacrifice areas", and be trained to use the coast responsibly.

The most important of the indirect controls include:-

(1) Placement of the main coastal road, railway, or power transmission lines at a minimum of about 5 km inland (depending on coast characteristics), with tangential roads down to each coast site along watersheds (drainage divides). User selection of coast sites is then made at the turn-off from the main road. It also avoids the entrainment of industry and its traffic into recreation areas.

(2) Kinds, quality and quantity of facilities can be used as a means of filtering use.

(3) Confine developments to the nodes of least change along coasts.

(4) Avoid mixing industrial development with resort areas even when they attain township size.

(5) Protect arable land from the spread of material developments.

(6) Avoid sewage and rubbish disposal methods which pollute groundwater or drainage and cause disease (eg Salmonella on Rottnest Island).

(7) Promote resort self-sufficiency in food production, energy (solar, wind), water provision and rubbish disposal.

(8) Resort developments should blend with their surroundings. Obtain guidance from landscape architects.

(9) Devise a means of "freezing" land from dismemberment by speculators until an adequate ecological and land use survey has been completed for responsible land use allocations.

Prevention of damage to coast resource qualities that we are dependent on, and attracted to, requires not only sensitive assessment of ecological, community and economic inter-relationships and values. It should also address the subject of carrying capacity and aesthetics for various kinds of coast habitats, in order to determine a sustained yield use of their qualities over time. In this regard there are two definitions of carrying capacity, one resource based and the other user orientated (Table 2).

TABLE 2

CARRYING CAPACITY: TWO CONCEPTS

RESOURCE ORIENTATED	USER ORIENTATED
ECOLOGICAL CARRYING CAPACITY The amount of use that resources can support over a long period without damage to the resource (measured in terms of use per time unit).	
PERCEPTUAL CARRYING CAPACITY The level of use an area can withstand while providing a constant or sustained quality of life (as "quality" means different things to different people, the effects of crowding and of visitors on the site must also be measured).	

The recognition of a buffer strip along the whole coast would go a long way towards ensuring that uses compatible with site characteristics were promoted. It would also ensure that the coast remained a vital part of a statewide framework of native vegetation bands that should never be cleared, or at least minimally disturbed, for a multiplicity of conservation purposes. These are a means of maintaining a sufficiency of natural ecosystem patterns and processes that can help minimize damage, degradation and erosion, or loss, of all kinds of natural resources such as soils, water, flora, fauna, habitat and genetic diversity, and scenic values.

The landforms or facets common to all landscapes which should not be cleared of their native vegetation include the coast buffer strip, riverbanks, wetland margins, scarps, rock outcrops and breakaways, and the dunes of the interior.

In this way preventive approaches foster resource diversity, viability and productivity and simultaneously give us a higher quality of surroundings in which to live.

Conclusion: Attitudes And Perspectives

The historical injunction of a free enterprise economy is to take all while you can, and more, for profit now. The painful transition stage seems to have been reached in Western Australia where a free for all robber economy has to be replaced by a more forward thinking husbanding of resources. In this the better human qualities of consideration, co-operation, and stewardship have to prevail if all of us are to obtain a sufficiency for living by using resources in a sustainable manner. Such that we are not trapped at the downdrift, receiving end, of some selfish act up-coast from those who reckon it is their right to do what they like, and resort to political machinations to get their way. The latter results in the preconceived model of expedient choice that has to be serviced by Government and payed for by the community (see Table 3).

The invasion of the coast for recreation, space, clean air and water, quiet places must be seen against the predicament of exploding human populations and escalating needs, demands and accelerating wastage. It may seem at first sight quite ridiculous to talk of exploding populations in the vastness of Western Australia, but there are several reasons why we cannot be complacent. Neither the population nor the popular coast sites are evenly distributed around the coast, hence there is disproportionate high concentrated uses where people pressures are greatest in the southwest and to a lesser but significant extent in the northwest.

There is the disproportionate consumption of resources by western societies, up to 40 times as much as Third World people including Aboriginals (Allen 1980). An impasse has developed over responsibility for the countries' resources. The complaint by land owners of increasing government interference in their affairs and rights to do as they please on their own land is symptomatic of a double bind situation.

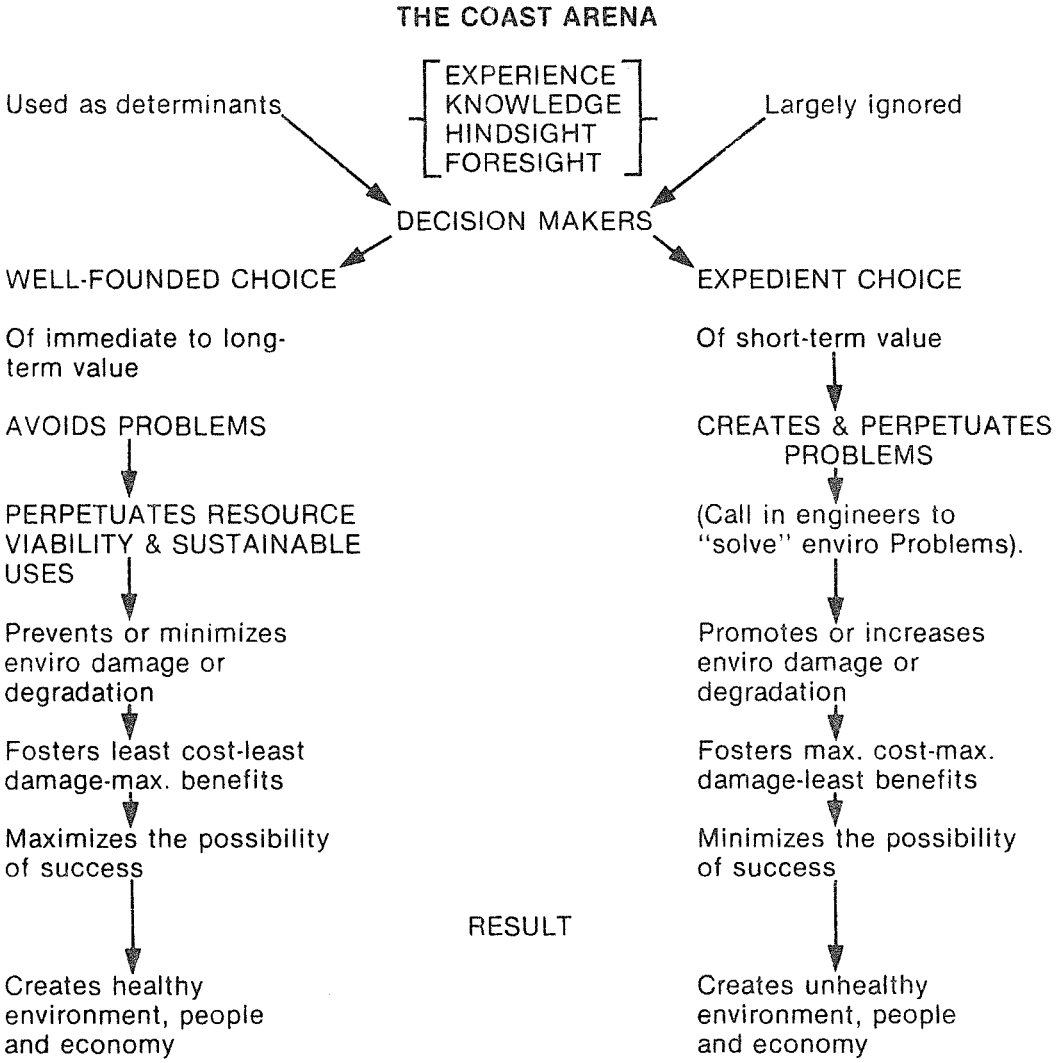
It is typical where a population has grown above a critical number and lost its capacity for self-regulation where individual responsibility for the proper functioning of a community has been eroded away. Hence the increasing failure of individuals to perform conservation methods of sustainable land use on their own initiative due to market and cash imperatives.

This situation is well summarized from more than 40 years ago in the United States by the eminent ecologist Aldo Leopold (1949) and is even more pertinent to the success of resource use under today's pressures particularly on coasts. "The tendency is to relegate to government all conservation activities that land owners fail to perform. The lack of a conservation ethic amongst land users relegates to government many functions eventually too large, too complex, or too widely dispersed for it to efficiently perform."

Democracy like most anything else is a double-edge sword - one of its strengths is enabling free and open debate from all levels, groups or individuals - its major weakness which frustrates successful resource protection is its dependence on the popularity vote. Hence its general failure in applying any change that may require irksome policies to ensure that

TABLE 3

SCENARIO OF THE CHOICE MODEL AND SOME OF ITS IMPLICATIONS



all land users are obliged to apply conservation methods as a matter of individual responsibility for the resources that belong to the whole community and its future generations.

Approaches to resolving this impasse must address the subjects of more successful conservation extension, uses of incentives and disincentives, and research ways of minimizing the artificially inflated market and cash compulsions which induce land users to strip out resources.

Politicians, economists, engineers and developers appear to be generally inadequately informed in respect of what their promises or actions can entrain; which have far-reaching negative effects on resources, the environment and community self-sufficiency. Nor of what is really meant by the term sustainable resource use. In short this can be defined as those actions that bring the economy and the ecosystem into a dynamic, self-sustaining equilibrium (Allen 1980).

In responding to the incessant litany of demands from material developments and all that is involved with them, professionals in all fields of environmental use are in danger of being trapped into merely making time-consuming and money-wasting alterations — palliative and cosmetic adjustments, — to a preconceived model already decided upon by decision makers, and which may be aiming at the wrong target (see Table 3). What is really needed is for the model itself to be changed, by returning to square one and questioning the original decision. Otherwise one is merely putting one's shoulder to the wheel of a heedless development which tries to rearrange whole ecosystems to fit the decision model.

Only by changing public attitudes through extension and education can those who work with natural resources do something much more fundamental. Also by inculcating in government and the people a basic conservation ethic of individual responsibility for the countries welfare.

In learning how to live with our coastal resources and processes the basic conflict between protection and increased access can only be resolved by allocation of uses, where these are matched to site characteristics. This matching requires field survey, planning and management which are the subject of the speakers that follow, who will introduce us to HOW.

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The Broome Coastal Management Plan

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For some time DCE has been preparing and advocating the preparation of coastal management plans. In this paper it is proposed to describe why coastal management plans are prepared, what they contain, and difficulties which arise during their preparation. The Draft Coastal Management Plan for the Shire of Broome will be used to illustrate the process.

At present Coastal Management plans are non-statutory advisory documents except when they are prepared at the direction of the Minister for Lands in accordance with the Land Act. Plans are currently being prepared for the coastal reserves in the Town of Geraldton and the Cape Keraudren area as a result of such requests. They may also be prepared as a result of:—

- a request from a local authority or another department for example Broome, Penguin Island and Jurien Bay;
- a recommendation contained in a town planning scheme for example Kalbarri Townsite;
- as a result of a recommendation from a Conservation Through Reserves Committee decision, for example duke of Orleans Bay, Esperance District, Munglinup Inlet, Starvation Bay Harbour and the Ravensthorpe District.

Although the specific content of coastal management plans varies with location, and scale, in general terms they contain:—

- an analysis of natural resources/systems;
- an analysis of existing use and management, including use pressure/demands;
- formulation of goals and objectives leading to an overall management strategy, which includes examination of resource use opportunities and constraints and (in the case of larger areas) preparation of a structure plan to identify broad patterns of access, landscape protection areas, tourist development sites, urban expansion, etc;
- formulation of detailed recommendations relating to vegetation and wildlife management, erosion control, fire management, marine environment management, landscape and facilities, public awareness and interpretation programs, detailed site planning for priority areas; and
- procedures for implementing management proposals (see Fig 1).

After the study has been established the aims of the study must be determined. A statement of aims is essential before the next step in the planning process, namely the collection of relevant information, can occur. Information must be collected about a wide range of resource attributes and human needs whatever the management planning aims but the type of information will vary. For example if planning for major port developments was the main reason for a study it is necessary to collect detailed information about tides, storm histories, channel depths, shoreline stability, and the type and tonnage of ships likely to use the area, the type and tonnage of cargo. As you would also be concerned about how the development might affect natural values you would also require information about the natural system. However, if the major reason for a study flowed from a demand to establish a national park or nature reserve the information collected for a port development plan would be irrelevant, and information about natural systems would receive more emphasis.

The aims of the Broome study were to:—

- limit use of coastal areas to activities requiring coastal locations;
- protect natural systems and cultural assets;
- protect ground and seawater quality;
- provide for a wide range of recreational uses;
- protect sites of concern to Aboriginal people;
- encourage and cater for tourism;
- provide for appropriate industrial and commercial activities;
- develop a public education programme relating to coastal areas.

Information required in the coastal planning process may come from a number or sources including:-

- existing published and unpublished maps and scientific literature;
- other authorities, for example W A Museum, Departments of Agriculture, Public Works, Marine and Harbours, Fisheries and Wildlife;
- local authorities;
- interested public;
- field studies done by officers from DCE and other departments.

The collection of relevant information involves one of the greatest difficulties in coastal

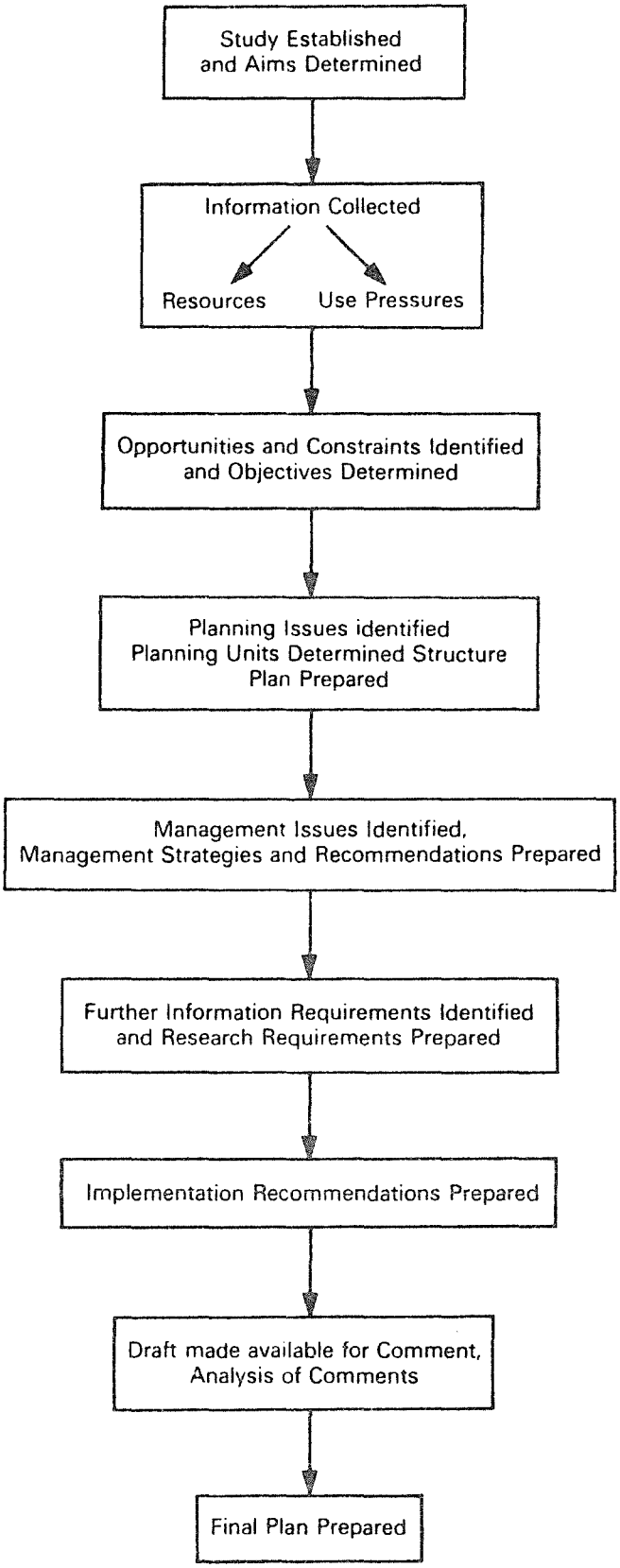
Study Established
and Aims Determined
Information Collected
Resources
Use Pressures
Opportunities and Constraints Identified
and Objectives Determined
Planning Issues identified
Planning Units Determined Structure
Plan Prepared
Management Issues Identified,
Management Strategies and Recommendations Prepared
Further Information Requirements Identified
and Research Requirements Prepared
Implementation Recommendations Prepared
Draft made available for Comment,
Analysis of Comments
Final Plan Prepared

Figure 1.

management planning in WA because often there is a lack of documentation about geology, land capability, biological systems, coastal processes etc, and this may affect the quality of plans or prevent the preparation of a plan. Even so, planning must often proceed despite this lack of basic information because of pressures on coastal areas.

Information collected can be conveniently divided into two major categories: resources (natural and man-made) and use pressures (existing and predicted). At Broome information was collected about the following items:

The Broome Environment

1. **Physical Environment**
   Geology
   Geomorphology/bathymetry
   Landscape
   Soils
2. **Climate and Oceanography**
   Climate
   Winds and weather
   Rainfall and temperature
   Cyclones and storms
   Seas (waves and swell)
   Tides and currents
   Coastal processes
3. **Terrestrial Biota**
   Vegetation
   Mammals and birds
   Marine biota
   Mangroves
   Invertebrate wildlife
   Dugongs
4. **Culture and Heritage**
   The Broome "atmosphere"
   Aboriginal sites
   Historic sites - non-Aboriginal
5. **Existing Planning and Management Controls**
   Existing tenure
   Existing zoning
   Existing management
   Existing facilities

Use Pressures

Population growth
Tourism
Holiday accommodation
Access
Small boat launching
Shell collecting
Aboriginal food gatheirng
Botanical gardens
Commercial fishing
Mining and quarrying
Port development
Rubbish dumping and littering
Shack construction and illegal camping
Horse training

After the information about resources and use pressures in the study area has been compiled, examined and analysed it is relevant to list the opportunities which exist to provide for recognised human needs in the area, and the constraints or limits to the level of use which can occur without a loss of natural values or high management costs. Recognising constraints as well as opportunities is a major philosophical step and an essential part of effective resource management planning.

Factors which may provide opportunities to meet human needs in the Broome coastal environment include:-

- the existence of a small but prosperous town based on tourism, agriculture and commercial fishing;

- a management infrastructure based on the Shire of Broome, and various State and Commonwealth authorities;
- a rich history with associated sites, a cosmopolitan population and a tropical easy-going social atmosphere;
- a developing system of roads and other services that provide access from the rest of the State and the Northern Territory;
- a well developed airport;
- an existing port, jetties and safe moorings for small boats;
- varied coastal scenery including attractive sandy beaches and dunes, clear blue waters, tidal creeks and flats and mangroves;
- a rich natural ecosystem which provides abundant fish and wildlife resources;
- natural food resources which are utilised by the Aboriginal people;
- attractive semi-arid and sub-tropical vegetation which contrasts with the arid hinterland of much of the north-west of the State; and
- good reserves of potable underground water.

Use constraints which influence planning and management in the Broome area include:-

- existing use patterns and planning procedures;
- potential conflict between resident and tourist populations for local resources;
- the great distance from other population centres with management and technical expertise;
- a seasonal climate with occasional very heavy rainfall and hurricane force winds;
- an irregular rainfall which makes stormwater drainage and the establishment of vegetation difficult;
- pindan soils and sand dune systems which depend upon vegetation cover for their stability;
- a large tidal range which create coastal engineering problems, and infrequent cyclonic winds and wave attack which affect coastal structures;
- high building costs which creates coastal engineering problems;
- a naturally eroding coastline on which areas suitable for recreation are limited; and
- limited development and management funding.

After the opportunities and constraints identified in an area have been analysed the issues which must be addressed in preparing the plan can be identified, and planning and management objectives determined. Objectives which are achievable and measurable are vital in the allocation of resources and to guide management staff in the field.

The following planning and management objectives are outlined in the Broome plan:—

- maintain existing terrestrial and marine systems, coastal processes, landscapes;
- protect and maintain groundwater resources and seawater quality;
- provide for a wide range of appropriate recreational use;
- preserve the Broome atmosphere, cultural assets;
- protect Aboriginal sites;
- encourage and cater for tourism;
- provide for appropriate industrial and commercial activities; and
- develop a public education programme.

After consideration of aims, objectives, opportunites, constraints and use pressures, planning consideration must be given to the allocation of particular uses to areas capable of sustaining those uses. If this process does not occur, resources may be misused and environmental damage may occur, resulting in the loss of amenity and increased management costs.

In order to provide a guide for the potential use of coastal resources the Broome area has been classified into three broad planning units after considering natural characteristics and suitability for relevant uses.

Development unit: Areas which can be developed or used with normal levels of caution and with minimal impact.

Management unit: Sensitive areas with particular ecological, cultural or recreational importance, the development and use of which must be strictly controlled or managed. Development is usually expensive (in both capital and maintenance) and special precautions must be taken to avoid flooding, drainage or erosion problems and to manage human use pressure. Any development or use proposals should be preceded by special planning.

Preservation unit: Areas vital to preservation of the ecosystem, which are intolerant of development and must be preserved and protected from most human activities.

Within this broad land-use capability guide, more specific land-use zoning and management strategies can be applied.

After the location of management units and the uses they can accommodate have been determined, the alternative location of future facilities and developments can be considered. The consideration of all uses is a complex process involving discussions between all interested parties and the final decisions are outlined on a structure plan, which often reflects a compromise between conflicting interests. Developments and facilities provided for within the Broome plan include:-

- roads and access ways;
- developments;
- tourism;
- siting and design of tourist facilities;
- urban development;
- industrial and commercial use;
- picnic areas and recreational use; and
- drainage.

When the proposed location of future developments is identified existing and future management issues are determined. Management comprises a variety of human activities which are undertaken to improve and maintain environmental values and provide for human needs. Management issues considered in the Broome plan include:-

- landscape management;
- soil conservation;
- fire management;
- wildlife management and research;
- shellfish collection;
- mangroves;
- nearshore waters and boating control; and
- mining.

After completing the initial investigations outlined so far resource management planners may consider that more information is required to complete their plan and assist in future planning and management. A list of further research priorities is prepared and research work currently being undertaken at Broome includes:-

- a study of the recession rate of Pindan shorelines;
- an investigation of natural vegetation; and
- the preparation of more detailed contour maps.

The final chapter of the coastal management plan contains suggestions for the implementation of plan recommendations. Normally the implementation section is treated superficially at the draft stage and given detailed attention in the final plan. In the Broome draft plan the implementation section addresses:-

- how state government authorities may assist;
- the role of the Shire of Broome;
- possible sources of funds needed for management works; and
- comments about changes to Crown Land vestings.

The draft coastal management plans are usually made available for comment by other authorities, councils and the public for a period of three months, after which the final plan is prepared. The final plan is subject to review after five years but it can be altered before that after consultation between Council, DCE, other interested parties and the public.

Land Capability Assessment as a Basis for Coastal Management Planning

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Without doubt the 1980's is the era of jargon and acronyms designed, in the main, to highlight the user's self-importance and convince the layman that there is something special, mystical about the user's knowledge and skills. I hope the mysticism behind CMPs is dispelled before this seminar is finished. I'm going to try very hard to eliminate any aura of mystique around the concept of Land Capability Assessment.

Land Capability Assessment is the formal review of the land to identify the constraints it has in its current state to use for any defined purpose. Ideally assessment should precede all land use decisions, that is it should precede land use planning. In the programme today we have had it back to front with planning being discussed before assessment. Land assessment should be a precursor to any and all coastal management plans. If it is not, there is a good chance that the resources used in the planning process will be completely wasted.

Land Capability Assessment has two components.

1. **A Land Resource Inventory**

   This step is vital. It surveys the soils, the landforms and identifies geological or geomorphological processes currently occurring. In the coastal sense we are not usually dealing with soils but rather sands in various states of stability and various stages of development towards soils. In the coast we are dealing also with the nature of the shoreline, whether it is receding or being built up.

2. **Interpretation**

   The results of the land resource inventory are interpreted as to the suitability of the area in question to particular uses.
   The assessment of particular uses is important. The characteristics that make land either suited or not suited to a resort development may be quite different from the characteristics most suited to a boat launching ramp.

The assessment of land capability, particularly the resource inventory stage, is time consuming. However, it is naive to think that it is possible to sensibly plan without such assessment. In fact planning either by Government, a council or a developer will be inefficient, if not grossly misleading, unless capability assessment is carried out first. Planning without prior assessment is like trying to land a plane without the undercarriage being in place. You might get through, but it will be pretty rough and it will usually cost a lot to effect repairs.

Of particular importance to councils and developers is that assessing the capability of land before planning commences allows planning to be more efficient. It identifies constraints that should be avoided, and the areas where additional investment will be required to avoid land degradation. It also avoids the costly delays and replanning required when Government agencies or others challenge the plans.

The best way to demonstrate the importance of land capability assessment is to discuss some examples of where the absence of it has caused problems and where its use has improved planning. As an aside, it should be stressed that just as planners are not land capability assessors, land capability assessors are not planners.

It is not the role of a person carrying out land capability assessments to make planning decisions. The capability assessor is an expert on the land, its stability and the land degradation hazards that exist. But it is possible to use any land for any purpose providing that the developer or the community is prepared to meet the cost of doing so (Figure 1). The Dutch grow food on what was the ocean floor but it was very expensive to reclaim and it is expensive to maintain that land. Similarly coastal resorts can be built on unstable sand dunes, or receding shorelines, but generally a vast capital will be required to maintain the stability of the land. This cost will be either the cost of capital investment to protect the landscape or costs in terms of land degradation or even the destruction of the investment in the particular use. Generally, the lower the capability of land for a particular use, the higher will be this cost.

Too often in W.A. developments have been approved where the developer has not had either the capital or perhaps the desire to effect stabilisation and management bodies, because they hadn't required the resource assessment, are now left with a continuing bill, trying to stave off the inevitable.

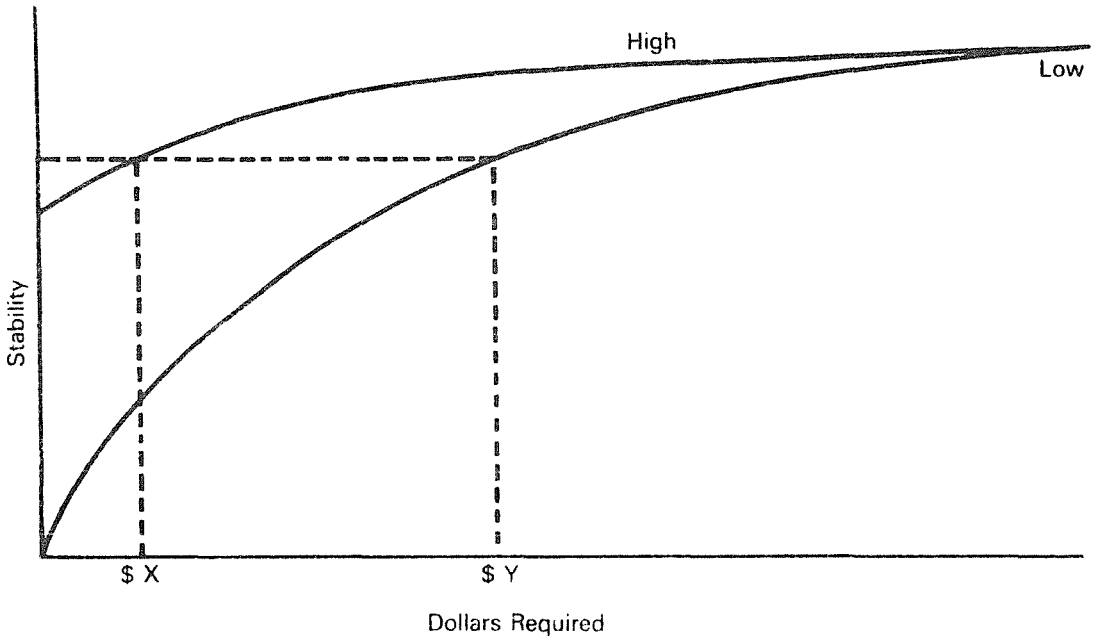


Figure 1: Relationship between Capital required and the Stability that can be Induced in Land of a particular Capability.

It is not the role of the capability assessor to make planning decisions, which must incorporate all the social, aesthetic and economic considerations of the community, but simply to elucidate the likely effects on the land.

To the examples:—

1. **Quobba**

   A chalet subdivision was planned for this area. No capability assessment was carried out by the planners. The proposal proceeded. Land was resumed from the Pastoral Lease and then after two years planning some thought was eventually given to the capability of the land. It was not suitable for the proposed development as it was partly on, and adjacent to, an unstable dune system that would certainly erode and would be very difficult and expensive to stabilise in the arid environment. A more suited site was located nearby after the proposal was delayed for some considerable time.

2. **Tantabiddy Creek**

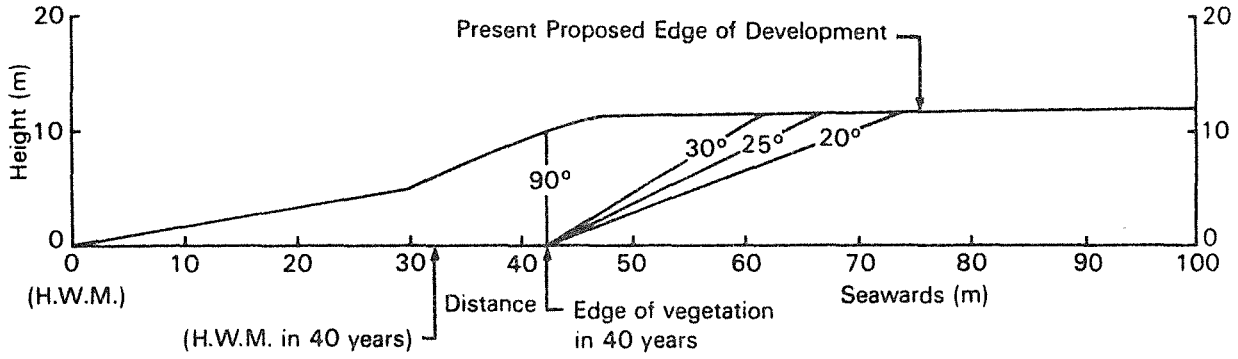
   Again, as usual, the planners started first. The area certainly needed a chalet development and the planners were aware that, in this case, trying to put developments on dunes in this arid region was a very high risk approach. Hence a flat area was found and planning commenced. Again, at the final approval stage the capability of the land to support the development was reviewed. Very quickly the land assessor noted *Paspalum vaginatum* growing on the site, a plant that likes wet, salty conditions. Sure enough, a few holes showed very saline water at depths of less than 1 metre indicating that as soon as the native vegetation was cleared soil salinity would develop. There would be no gardens in the development and no brickwork and no drinking water! Moreover, in this case the salt water table was trapped by very shallow rock, often less than 1m from the surface. This rock, together with the salty waterlogging ruled out any septic system. Capital, in terms of subsoil drainage and sewerage could have solved the problem but in this case the proposal was a low cost development. Oh well, back to the drawing board, this time with a capability assessment first!

3. **Warnbro Sound**

   A housing subdivision was planned by the developer to maximise use of his land resource. Capability assessment reaffirmed casual observation and local experience that the dunes were unstable and very prone to wind erosion. The local shire had been struggling for years to stabilise other areas in the vicinity. However, that was not all!

   Coastline capability assessments must also take account of the deposition and erosion at the shoreline. Perhaps the greatest limitation to development on the coast is the possibility that the land itself might not be there in the future, or that it will cost hundreds of thousands, or even millions of dollars in sand replenishment programmes, or rock walls, to stop the investment in houses and other buildings from falling into the sea.

Back to Warnbro. Aerial photos show that the average rate of shoreline erosion and retreat is 0.8 metres per year. In 40 years the sea will probably retreat another 32 m. Given usual angles of repose of the dunes, it is clearly unsafe in this area to build or develop within 120 m of the coast (Figure 2). The Sorrento Surf Life Saving Club, and perhaps the Main Roads and PWD wish that someone had done the assessment at Sorrento before development occurred there, so do the residents and the Council at Mandurah. In fact, in the Warnbro case, when the wind erosion problem is considered a set-back of 150 m is desirable.



Likely changes to the Coast in the Warnbro Area in the next 40 years.

Figure 2: Cross Profile of Reshaped Dune.

4. Rottnest Island

I've given you some examples and there are hundreds more of where the planners beat the land capability assessors.

Land Capability Assessment would have saved many and improved most coastal developments in W.A. It is not new technology, it has been around for years but it is an expert activity. Are we learning from our mistakes? Very slowly! There are still scores of planners for every resource assessor but **some** planners are learning. For example prior to the planning of proposed developments at Rottnest the consultants commissioned a land capability assessment. All of Rottnest is fragile, but the assessment allowed the planner to identify appropriate development sites, their limitations and the required management. For example, there are reasonably stable sites for development on Rottnest, but often these are adjacent to very fragile areas. If the planner knows this he can locate the development and make the necessary people management plans to ensure that the fragile areas are not degraded. Generally the degradation of the adjacent areas would detract from the development as well as cause irreversible degradation to a unique environment.

In conclusion I would like to reiterate. Before you plan, assess. Then use the assessment as a part of the input to your plan. It should be an important input because if you don't assess, or ignore the assessment, the council or the developer or more likely the taxpayer, will probably have to pay for the oversight!

An Engineer's Approach to Coastal Management

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Introduction

This text tries to describe the standpoint from which the paper may be presented to the Seminar. The presentation will be a verbal and pictorial description of some coastal sites and the effects of interference or neglect.

Consulting Engineers are not just dune blighters with a licence to destroy. A vital part of the Code of Ethics of Consulting Engineers reads:—

"1. The responsibility of Engineers for the welfare, health and safety of the community shall at all times come before their responsibility to the Profession, to sectional or private interests, or to other Engineers.

2. Engineers shall act so as to uphold and enhance the honour, integrity and dignity of the Profession.

3. Engineers shall perform work only in their areas of competence."

This paper presents a Consulting Engineer's approach to coastal management. The approach taken by responsible Engineers working as Contractors or for Government or Local Authority must be very much the same.

The conveners of the Conference prepared an outline for this paper indicating that its purpose was to show that there are more things to do with a fragile dune environment than to leave it alone and put it in the tender hands of the Conservation Service. It must be said, however, that in certain circumstances responsible Engineers would agree entirely with the Conservation approach.

The Engineer will, in any case, be required by the Environmental Protection Authority to consider the conservation and reinforcement of the dune structure by biological means rather than by tearing it all up and protecting the ruins.

The correct approach will incorporate the right combination of both methods.

Beneficial Use

If it is accepted that environment is for people of this generation, as well as the next, people must be allowed to use the environment.

Dune blowouts are not generally caused by people. The 1942 aerial photographs show dune blowouts in places where population pressure was negligible. Later photographs show that increasing population has not necessarily increased the rate of dune degradation although lasting harm to the fauna populations must have been caused by advancing waves of cats, dogs and rats.

The Environment was only invented in the 1970's and with it came the experts who were paid to look after it and to try to understand it. These people were too late to do anything about the existing development along the rest of the dunes from South Fremantle to Sorrento and in Rockingham, Esperance and Mandurah where it was left to the local authorities to do whatever they thought was necessary to keep the sand on the beaches and out of the front verandahs of their rate payers or in certain circumstances to stop the front verandahs falling in to the sea. The local authorities were helped in no small degree by the Public Works Department. The measures adopted were low walls or fences, to keep the sand on the beach; groynes, to move the erosion problem somewhere else and irrigated grass for people to sit on and to provide a better view than the scruffy dune heath which had already been devastated by fire and by the inroads of the neighbour's children.

As soon as the Environment began to be popular, understood and appreciated efforts were made by the Soil Conservation Service and people like Dr. Peter Woods to preserve and restore the dunes by encouraging people to use paths through the dunes and not to wander all over them with their hands in their raincoat pockets.

These conservation methods have worked and are appreciated by beach users and are well worthwhile continuing with and encouraging. And the methods should be employed from the very start whenever any sort of development brings increased population pressure to a section of beach.

This does not mean that the only thing to do with the foredune and its hinterland is to tidy it up, put some footpaths and pine posts on it and spread dead Christmas trees over the rest.

Development from Sorrento to Rockingham has demonstrated that the environment that people want and will pay for is the environment which puts their homes in close association with the ocean and the shore.

There have been some failures and near disasters on the way to attaining this living environment and the more cautious approach now adopted by the Government and its advisors is entirely justified. The population as a whole should not be required to pay the insurance premiums for those people who have ocean views.

The Engineer and the Coastal Management Programme

The Coastal Management Programme should be prepared by the Engineer responsible for the works. There are several reasons for this.

1. **Responsibility**

   The Engineer is responsible for the effects and endurance of the thing he designs or builds. The Engineer, unlike some other professional people, is responsible for the effects of his advice and remains responsible for those effects until he dies and after he dies. If something an Engineer says or does causes loss or hardship he can be, and more and more frequently he is, required to redress the harm. There must be very few cases in which Conservationists or Environmentalist Consultants face the same risk.

2. **Adaption**

   The Design Engineer is the one who can modify the proposals to accommodate any changes to the proposal where the Environmental Impact Study shows that modification would be desirable. The Engineer is the person who can advise the proponent of the likely cost and delay which may arise from the changes and of alternatives to the changes.

3. **Experience**

   Any Engineer who has been engaged in coastal work will, if he is reasonably competent, have carefully observed the effects of doing things to the coast and profited by his own earlier mistakes. He will be able to balance opposing views from Oceanographers and Conservationists and is in a better position to stand back and consider whether what he is doing is really beneficial to the community. He is in fact required to do so.

4. **Rectification**

   The Engineer should not be responsible for the monitoring programme, the monitoring should be carried out by an independent group. The Engineer should carefully evaluate the reports of the monitoring group and move quickly to suggest corrective measures if the long-term or short-term results of his proposals seem likely to cause harm.

The Developer

The Developer is intent on creating something which will give him financial return and satisfaction and this means that whatever is built must be appreciated by the community, locally and at large.

The Development, whatever it is, will attract people who will spread out over the beaches on either side of the Development but with much lesser density than in front of the Development itself.

It can be suggested, therefore, that in the frontage of the marina, or whatever it is, and immediately adjacent to it, dune preservation might have to be abandoned and its place taken by retaining walls, grassed areas, a back beach with the ability to catch blown sand, and housing and gardens and recreational facilities behind.

The dune land would then blend on either side into the sort of protection proposed by the Soil Conservation Service with "no go" areas and paths.

Particular care will be required by the Developer's Engineer to arrange for monitoring and to arrange palliative action for any build up or loss of sand or dispersal of pollutants or rubbish or people spilling over from the Development into the bush areas and dunes to the sides of the Development.

Coastal Management Planning and its Relation to Statutory Planning

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Planning Officer, Town Planning Department

It would seem appropriate in this present election-charged atmosphere, to draw a political analogy in the context of this subject. It can be argued that a Coastal Management Plan is like an election promise — it sounds good on paper, but is not much use if you can't actually bring about its implementation.

What I mean by that statement is that, for better or for worse, CMP's are non-statutory documents and unfortunately without some force of law to back them up, are not on their own in a position to achieve their goals. This is where, in theory, the umbrella of statutory planning through the Planning Acts can play a very significant role.

Coastal Management Planning is a relatively young science — much younger even than town planning which is hardly in itself one of the world's most ancient professions (with due respect to the Greeks and the Romans). Given that, it has not had time to become cocooned in its own laws, rules and regulations but has to rely on associated fields to provide the relevant statutory controls in order to achieve implementation.

The controls with which we are all probably most familiar are those contained in Town Planning or Zoning Schemes, together with certain special plans such as the Metropolitan Region Scheme.

These Schemes provide a convenient framework which specify those land uses which may or may not occur in any particular zone. However, (in simplistic terms) that is all they do provide — they are very much a regulatory mechanism usually without going a step further and suggesting how certain areas may develop and, in the context of this particular seminar, how certain proposed land uses may affect coastal areas.

I realise there are exceptions to that statement, particularly now that policy statements are becoming an increasingly accepted and important part of Town Planning Schemes, but I would argue that what I have said is by and large an accurate assessment.

The main problem with Schemes, apart from their emphasis on control and regulation, is that they are non-compulsory outside the Metropolitan Region.

While there has been a rapid increase over the last few years in the number of Schemes prepared for country areas, large areas not covered by Schemes remain, particularly along the coastline where country local authorities have largely ignored that part of their Shire to concentrate (in planning terms) on their major townsites.

In these circumstances the only control available to a local authority is through the Uniform Building By-Laws, which can be less than satisfactory in the context of a sensitive coastline.

For all their shortcomings, however, it seems to me that the incorporation of CMP's into the statutory planning framework through Schemes is the most appropriate means of giving those plans their legal status. However, there are other mechanisms which may also be considered. The first is through Section 5AA of the Town Planning & Development Act which enables Statements of Planning Policy to be prepared. This would have the effect of co-ordinating statutory land-use planning by local authorities and could enable a uniform approach to coastal planning to be achieved across local authority boundaries. To date, no such policies have been produced although we are all holding our breath waiting for the arrival of the Residential Planning Codes.

However, Section 5AA policies would be useful, but do require the backing of the State Government. I think it would be unreasonable to expect anything other than very broad policy guidelines to be produced given the present extent of the research.

There is also a suggestion that a Ministerial power to "call in" development applications could be used in the event of a major proposal affecting the coast. This power does not exist at present and carries with it the danger of misuse as well as the potential to undermine the authority of local government.

In the same context, the proposals to amend the Town Planning and Development Act to enable Ministers to initiate Scheme amendments has also been shelved, as much as anything because of the potential backlash from local authorities. But this power, too, could be used to assist in implementing coastal planning and should therefore not be dismissed entirely.

I suppose this really highlights the need for close co-operation between State and local government. At present it is the State which is providing the expertise to produce CMP's, while it is the local authorities that are picking up any expense incurred in their implementation.

Therefore, whichever method of 'bestowing' legality onto a CMP is chosen, the end result of'who pays' has to remain a prime consideration. As such, there is no benefit to be gained by

producing a CMP which either prohibits everything and leads to compensation claims, and produces a plan which requires huge financial outlays from a local authority. Similarly, there is no point in having a plan if a local authority then ignores it by approving some development contrary to the plan's recommendations.

In the absence of a system which enables control of zoning, subdivision AND development to be in the hands of a single tier of Government, the need for co-operation and recognition of each other's problems and responsibilities is paramount.

But, assuming Schemes are accepted as being the appropriate vehicle for coastal planning, the problem is, how to assimilate a CMP into a Town Planning Scheme. As I mentioned, policy statements are becoming more evident in Schemes and this is certainly a direction which should be encouraged. It could be argued that a CMP should be incorporated as a policy statement within a Scheme. But, this perhaps does not go far enough simply because a policy statement by its very nature is both flexible and subject to the vagaries of changing Council personnel.

The solution is, perhaps, to return to basics, whenever a planning authority is confronted with potential problems associated with a coastline. By that I mean the coastline has to be seen as a resource to either be used or protected when preparing a Scheme. This in turn means that an examination of the coast and the production of an associated Management plan have to be completed BEFORE a Scheme is prepared. They — the coast and the plan — are then seen as a resource input into the Scheme in much the same way as population projections, commercial floorspace, school requirements and the like are used to determine what is needed to cater for the needs of the people in the future.

By approaching the preparation of a Scheme in this sequence, it would ensure that the ramifications of land use decisions can be seen in the context of the resulting pressures on the coast, and any subsequent effects there may be on the coastal processes. As a simplistic example to illustrate the point, it would not be appropriate for development to be encouraged by zoning areas of the coast which were demonstrably unstable. After all, both CMP's and a Town Planning Scheme are documents supposed to anticipate events, and it would be a self-defeating exercise for something to be proposed when it was known, or could be predicted with certainty, that it would lead to problems in the future.

The example of Broome, which we heard about earlier this afternoon, illustrates the wrong sequence. Having said that, a CMP prepared after a Scheme is better than none but it does mean that amendments to incorporate its recommendations have to be undertaken which is a further time-consuming exercise.

However, it is all very well saying that the preparation of a CMP before a TPS will give that Plan statutory backing, but the reality is not quite as simple. As is well known, landowners tend to consider that they have a right to subdivide and develop their land. Consequently, if a scheme is prepared which suggests that this 'right' is being taken away, it is more than likely that claims for compensation will be lodged against the planning authority which puts forward such a proposal. I realise that injurious affection has to be demonstrated before any such compensation claims become payable, but a planning authority has to face the prospect of battling landowners on this issue, and must therefore have a commitment to any plan it does endorse.

Because of this it should be perhaps that a CMP is only one level of plan which indicates in broad terms the nature of development (or lack of it) or subdivisions which can occur in coastal or foreshore areas.

Beyond that would be local management plans or foreshore management plans, which would indicate in detail what could actually happen on the ground. It is more likely that these later or more detailed stages would be the time when any land required to implement the broader aspirations of the CMP can be obtained.

For example, it is possible in the Metropolitan Region to obtain land when amendments are made to the MRS to change its zoning from, say, Rural to Urban Deferred. It is at that stage that a subdivider or developer is required to give up land required for, in the broadest sense, regional needs and this would include coastal and foreshore areas if relevant.

By way of comment, it is worth recognising that the MRPA has succeeded in reserving the vast majority of the coastal foreshore over the years by a variety of means.

However, it has not pursued the use of a power it has under S.27A of the Metropolitan Region Town Planning Scheme Act enabling it to carry out works 'incidental to the maintenance and management' of Parks and Recreation reserves. This is largely because the Authority has not acted as a 'developer', but rather has assembled the land for a third party — be that local government or another State government department — to physically undertake 'management' works.

Beyond the scale of a local management plan and at a yet more detailed scale, if land has already been zoned for a particular purpose under a Town Planning Scheme and a subdivision application is made affecting the coast or foreshore areas, land can now be required under S.20A of the Town Planning and Development Act for the purposes of foreshore management.

As such a requirement would be imposed by way of a condition from the Town Planning Board, it therefore could be the subject of an appeal. Any such appeal will be fought from a position of strength if a CMP or a local management plan is already prepared and has been adopted as

a policy-forming part of a Town Planning Scheme. Given that background, it should require some quite special circumstances for an appeal decision to be made which did not take account of such a plan.

Now all of us involved in statutory planning do not like becoming involved in appeal situations and it is not just because we are so vain as to think our decisions and recommendations are beyond challenge.

So, with that in mind, how do you make a CMP more acceptable to landowners in order to avoid appeals.

Again, with foresight, the input of a CMP can be embodied in a statutory plan. If such planning indicates that a landowner would be given an 'opportunity' through the production of a plan, he is going to be more receptive to it, than if it shows a blanket ban on any sort of use.

Therefore, where a CMP suggests development could occur in a particular location because of, for example, a stable coastline, a subsequent statutory plan should indicate that potential. It should not just look at a stretch of coastline and put a green strip along it to signify 'hands off'. In fact, by doing that it really signifies this is for public access which may be inappropriate if the area happens to be particularly fragile.

The knowledge with which to make the choice between these alternatives is not usually gathered during the preparation of a scheme, but the preparation of a CMP will provide that knowledge.

I suppose it would be fair to say that much of the Metropolitan coastline is a classic case of missing the chance to identify such opportunities. I am not going to enter into the philosophical debate at this seminar as to whether or not there should be high rise development along the coast, but what I would say by way of an example is that the alignment of the West Coast Highway has effectively limited the opportunity for such buildings to a very few locations — one of which being Scarborough.

This is because the road has been aligned so as to reduce the potential developable area to such an extent that any buildings associated with beach or coastal usage are to the east of the Highway, thereby providing a physical barrier which separates the people and the resource.

This situation may have been avoided if knowledge was available to the 'planners' — I use that word in its very general sense — which demonstrated those areas which were both capable and suitable for intensive use and those areas which should remain isolated. As it is, the road has largely made that choice for us.

Having said that, it then comes down to a question as to whether you want to have a road along the waterfront — be it beach or river — which is very beneficial and pleasant for motorists, or whether the water should be viewed more as a recreation resource where planning can encourage people to get out of their cars and 'recreate'. The point I am making is not to pronounce in favour of one alternative or another, but rather to say that whatever choice is made, it should be made in the knowledge of all the possibilities. A CMP is a very important element in giving us this knowledge.

I am pleased to say that the recognition of these alternatives does not necessarily have to wait for the production of a CMP. A coastal subdivision design can be prepared following a survey of the features of the coast which it abuts and advantage taken of those features. An example of the difference between the traditional thinking and this new approach can be seen at Halls Head in Mandurah. The older subdivision has the road following the coastline, with development on the 'wrong' side of it. The newer areas are being developed with the main distributor road inland, with loops or culs-de-sac leading people to particular points along the coast which are appropriate in terms of either a particular coastal feature (e.g. a safe swimming beach) or have been identified as being stable under pressure.

As I say, this approach has been done in the absence of a formal CMP and it has been implemented through existing statutory planning processes using the zoning and subdivision mechanisms to secure the foreshore reserves which are an essential element in the overall design.

To date the total development has proceeded reasonably smoothly through negotiation between the subdivider and Town Planning Department. I must say that this progress has occurred due to the recognition of the subdivider of the opportunities presented by the coast for ALL people, not just a few who may happen to live adjacent to the water.

But, in the reality of the situation, if the Department was pressing for a particular form of development which the subdivider did not favour, the absence of information such as that contained in a CMP to back up the stance of the Department considerably weakens the argument. The point is that in an ideal world where everyone involved in land development is striving to achieve the same end, then you could argue that no planning is needed. Fortunately for those of us employed as planners, we do not live in an ideal world which is why we need, together with a thick skin, well researched background on which to base decisions. A CMP seems to be the most appropriate research document on which to base decisions affecting coastal locations.

Whatever may be said about coastal management planning, it is a fact that any land and water interface (as jargon would have it) is coming under increasing 'people pressure'. It is therefore essential to plan to cope with that pressure and to ensure that such planning cannot be lightly overturned.

Given that a CMP is designed to, among other things, protect governments from costly repair bills when mistakes are made, it should not be difficult to persuade the powers that be to support those plans. Unfortunately, as I suggested earlier, there may be cases where local authorities are confronted with a choice to support the plan by spending money to acquire a piece of coastal land, or to ignore the consequences. This is a difficult choice given the small budgets of many local authorities. I realise it is a question of priorities and it may be a case in the end of making the decision to spend money in order to save money.

The alternative may be far worse and more costly. As Canute found out, the sea is remarkably hard of hearing when man tries to tell it what to do. Therefore, the solution must be to try and work with nature. Using CMP's, embodied within accepted statutory planning processes, a balance can be achieved between conservation and utilisation.

City of Stirling : Coastal Report

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Introduction

The purpose of this paper is to present the City of Stirling's recently completed Coastal Report as a case study of local authority involvement in coastal management.

The City is, I believe, the first local authority in Western Australia to have completed a comprehensive study of its coastal region. The Report is concerned with the determination of a coastal management/development strategy. It is specifically directed at formulating coastal management/development policies and recommendations to ensure a comprehensive approach to dealing with coastal problems.

It is not the intent of this paper to deal with the Coastal Report in depth, but rather, to consider the City's approach to undertaking the study. The Report structure, major findings and conclusions are briefly outlined to enable a broad understanding of the investigative and analytic processes employed. The Study Group, its problems and the implications for other coastal local authorities and Government are then examined.

The City of Stirling Council at its meeting of the 7th August, 1984 resolved to adopt the Coastal Report as its policy document for coastal management and development.

History : City of Stirling

A brief statement on the historical development of the City of Stirling is necessary to set the Coastal Report in its proper perspective.

The City can identify with the very first settlers of the colony with the establishment in 1830 of a small settlement on the Maylands Peninsula. As early as the 1860's, two families, the Manning family (Scarborough) and the Hamersley family (North Beach) obtained land near the coast for the purpose of agriculture.

In 1871, the Perth Road Board, later to become the City of Stirling, was established when the colony had a population of 25,000 people.

In 1958, the Road Board Offices moved from central Perth to Osborne Park. In 1961, the Perth Road Board became the Shire of Perth and had a population of 84,000. By 1974 (13 years later) the population had doubled to 160,000. The following ten years saw the City's population stabilise and then fall marginally to its current estimated level of 158,000 persons.

The two factors here of particular significance to the Coastal Report are that:

1. coastal development in the City occurred over a time span of 124 years; and
2. the period of highest population growth in the City occurred between 1961 and 1974; ten years ago.

Given these factors, the problems associated with a developed urban coastline have been largely unavoidable and the opportunity for coastal planning, as some might ideally wish, was possibly lost 20 years ago. The earliest settlers were no doubt more concerned with survival than coastal management. The existing level of coastal development severely limits the available management/development options and, as a consequence, the Coastal Management Strategy determined for the City places a heavier emphasis on conservation and restoration than one may otherwise expect.

Origin of the Report

In the early 1970's it was recognised by the City that "piece-meal" development of the coast was an unsatisfactory process and there existed a need for a comprehensive approach to coastal management and development covering the whole of the City's coastline.

The "Scarborough Beach Report" (May, 1973) was prepared for the City by Professor Martyn J. Webb and Dr R. Silvester. The report was presented in two parts. Prof Webb took a broad view in compiling a detailed survey of the whole coastal strip dealing with land use, human activities, development and change. Dr Silvester compiled a technical analysis of the beach processes and critically examined accepted coastal defence measures as applicable to the City's coast. The reports, and particularly that by Dr Silvester, were largely specific to Scarborough Beach.

As a follow up to the above report and the recommendations contained therein, the City's Planning Division undertook a more detailed study of the coastal zone with the object of developing an overall Coastal Plan. The Report was produced in June, 1974 and contained a number of recommendations, many of which have since been implemented. However, problems of vehicular access, parking, landscaping, pedestrian access and coastal preservation/rehabilitation remain, despite previous attempts to find solutions.

In addition to the above studies, various other Division and Section reports have been compiled relating to specific matters associated with coastal development/management. In this regard, the Engineering Section has been involved with road widening and access control on West Coast Highway; the Parks Section with sand dune restoration and pedestrian access control and the Planning Division with residential/commercial development in the Scarborough Beach area through the zoning and development control processes.

Following discussions with Dr Ian Eliot of the Geography Department of the University of Western Australia, an inter-departmental study group, including Dr Eliot, was established in October, 1980 to prepare a Coastal Management/Development Report for the City's coastal area. Dr Eliot is a geomorphologist with a particular interest in coastal processes. Considerable importance was placed on the need for adequate research into local coastal processes. The value of the research input by Dr Eliot and Department staff and students cannot be underestimated both in terms of the end product and the end cost.

The commitment to coastal management/development studies was made by Council some 14 years ago and the need for further detailed investigations recognised. The Coastal Report reflects that commitment and is the culmination of four years work. It serves a dual purpose in that it is both a working document laying the framework for the preparation of detailed coastal plans and is a research document containing a considerable amount of coastal data, some of which was not previously available or known.

The balance of this paper deals with the Coastal Report under the following topics:

Part A: Structure of the Coastal Report.

Part B: The Study Group, its approach and the problems encountered.

Part C: The implications for other coastal local authorities and Government.

Part A : Structure of the Coastal Report

The Report is divided into eight sections. In Section 1, the purpose, goal and objectives of the study are defined. Sections 2 to 5 are concerned with data collection and the analysis and evaluation of information relating to the physical environment, urban environment, beach utilisation and legislation. In Sections 6 and 7, the coastal issues and problems are evaluated, policies formulated and recommendations proposed. The final section, Section 8, is concerned with implementation.

The following extracts and summaries provide a brief outline of the contents of the Report. A summary of all recommendations and policy statements is located at the beginning of the Report.

Section 1 : Introduction

Study Area

The City's coastline extends from Peasholm Street (Scarborough) in the south to Beach Road (Watermans) in the north, being approximately 6.5 kilometres in length. West Coast Highway runs the full lengths of the coastline and for the most part separates the residential area to the east from the coastal/beach areas to the west.

The western boundary of the study area extends 50 metres out to sea from the waterline to include all onshore reefs. The eastern boundary is located approximately 100 metres east of West Coast Highway to include that area of the residential/commercial zones directly affected by the activities that occur on the coast. There was no advantage to be gained in extending the eastern boundary further inland as the bulk of the residential area is well established and the further the distance from the coast, the less relevance there is to coastal issues.

Goal

To determine long-term management/development strategies for the City of Stirling coastal zone in order to enable Council to balance urban, recreational and conservation demands on the coast in a rational manner.

Objectives

Determine whether the present level of utilisation on the coast is appropriate having regard to environmental, recreational, social and economic considerations.

Integrate all facets of development with the natural environment to ensure the protection and preservation of the ecosystem and areas of special interest.

Enhance the environmental quality of the coastal landscape.

Avoid incompatibility of land use activities.

Assess future demands on the coast as a regional recreational resource.

Identify areas that require rehabilitation.

Improve the quality of service for beach users.

Key Issues

"Utilisation" and "Conservation".

"Utilisation" concerns the use of land for urban purposes and the range of activities that occur on it. "Conservation" is concerned with the careful management of land with particular emphasis on preservation, which involves the maintaining of land in its present or natural state, and restoration, which involes the repair of damage inflicted on the coastal landscape.

Coastal Management Strategy

To couple land use planning to known and predictable environmental change in an endeavour to accommodate the natural coastal processes rather than attempt to control them. The approach is essentially conservative in that land use planning is based on options which avoid or minimise maintenance costs encountered through conflict between land use practices and geomorphologic processes, and which are able to accommodate environmental change in high risk areas.

Coastal Issues

1. Marmion Avenue/West Coast Highway realignment.
2. Trigg Regional Open Space.
3. Special Beach Development Zone — Scarborough.
4. Trigg Boat Ramp.
5. Funding.
6. Legislation.
7. Beachfront Development and Utilisation.
8. Beachfront stability.
9. Communication — other coastal authorities.
10. Bay Beaches — residential precincts.

Section 2: Physical Environment

This section largely includes work completed or supervised by Dr Ian Eliot of the University of Western Australia and contains the bulk of the research work. It constitutes approximately 35% of the Report. A detailed assessment of the physical environment was undertaken to better understand the natural coastal processes and the coastal dynamics acting on the coast. A number of specific recommendations for the solution of localised geomorphologic problems have been made in this section of the Report.

Section 3: Urban Environment

This section is concerned with an assessment of land use/zoning and the provision of coastal facilities and services.

The City's coastal suburbs are part of the established urban area of the Perth Metropolitan Region. There are no major commercial or industrial areas, or boating facilities (marinas, jetties, groynes) located near or on this part of the coast. What urban development there is within the study area is largely associated with residential development.

Section 4: Beach Utilisation

Beach utilisation, being one of the key issues concerning coastal management/development, was evaluated in two ways. A survey of beach users was undertaken to collect information on the people who actually use the beach and their associated activites. Secondly, continued observation of the beaches over two years enabled a detailed assessment to be made of how the beaches function in terms of the recreational demands placed upon them.

Section 5: Legislation and Management Responsibilities

This section is primarily concerned with legislation dealing with coastal management responsibilities both at a State and Local Government level. Funding of coastal management/development in the City is also dealt with in this section.

Section 6: Coastal Sector Analysis

The coast was divided into 13 management sectors based on natural boundaries, utilisation patterns and man-made features. A comprehensive analysis of each sector is provided together with recommendations for the development and management of each sector.

The Sector Plans are only schematic and are intended to provide the basis for preparation of detailed Coastal Management Plans necessary for works programmes. The section is, however, sufficiently detailed to permit implementation of low key proposals. This section constitutes the "working document" aspect of the Report.

Section 7: Major Coastal Issues

There are four major coastal (development) issues pertinent to the City that need to be resolved. These issues are complex, of a controversial nature and each will necessitate a separate detailed investigation. These issues have been briefly outlined in the Report to ensure that their

impact on the coast and their implications are clearly understood and, where relevant, to suggest a means of tackling the problems involved. (Refer to first four Coastal Issues listed on Page 5.)

Section 8: Implementation

The process for implementing the proposals and recommendations contained in the Report is outlined in this section. The Beach Sector Plans (Section 6) are primarily intended to provide a uniform basis on which to prepare detailed Coastal Management/Development Plans. These plans, once prepared, should also function as working drawings providing a basis for determininng works programmes and schedules.

This section also contains a Concept Plan based on the coastal strategies outlined in the Report. The Concept Plan shows a development strategy for the City of Stirling coastline.

Summary Of Major Recommendations

The following extracts have been taken directly from the Coastal Report:

Physical Environment

As a general principle, the landforms of the third and fourth depositional phases, land west of West Coast Highway, should be kept free from capital development that is not repairable at low costs.

The old sea cliff line (Plate 2.1 of the Report) should be used to set an absolute limit to building construction and roadworks on this part of the coast.

Groyne construction for beach stabilisation purposes, as implemented at Cottesloe, City Beach, Floreat and Sorrento, cannot be recommended as development of this nature may ultimately have a deleterious effect on shoreline change. The long-term benefits have not been adequately substantiated.

A broad buffer zone free of highly capitalised land use should be maintained, and suitable engineering works to stabilise the beach may need to be considered. Where engineering works are applied they should not simply transfer the hazard problem downdrift along the coast, as has been achieved at City and Floreat beaches.

The beach backshore zone needs to be stabilised by encouraging plant growth and controlling beach access to minimise beach maintenance costs.

Our results indicate that a 100 metre zone of beach and frontal dune, landsward of the late-summer, high-tide shoreline should be kept free from all development except dune stabilisation and beach access work.

Brighton Road to Reserve Street, Scarborough:
An extensive dune development project should be undertaken for the main Scarborough Beach area to control sand drift on the beachfront. The dunes should be located in front of the limestone retaining walls and run the full length of the beachfront linking the existing southern and northern dunal systems.

Reserve Street to Trigg Island, Trigg:
The City should restrict any further encroachment into the coastal reserve by building, roadwork and car park construction.

The City should be prepared to suffer occasional loss of amenities and dune restoration projects in the coastal reserve.

The City would be well advised to make preservation of Trigg Island and the reef complex in its natural state a matter of policy.

Ideally, beach management and planning strategies should encompass a long-term perspective. They should not be based on short-term political expediency.

Beach access paths, other walkways and cycling paths in the coastal reserve should be controlled wherever possible to minimise degradation of existing vegetation and an expansion of dune erosion problems.

Dune restoration and stabilisation projects currently in progress should be maintained and, subject to availability of finance, extended.

Stormwater drain outlets need to be redesigned and in many cases relocated. Appropriate locations include the beach ends, near rock platforms; over limestone beach ramps; and into landscaped, interdune depressions. These are areas of low erosion potential.

Beach Utilisation

Future recreational developments or projects should be directed to Trigg Beach and Scarborough Beach which are the two beaches best able to cope with increased recreational demands.

Development in the Bay Beaches area should be primarily confined to upgrading public facilities and should not encourage or result in an intensification of beach usage.

Coastal Sector Analysis

Preservation Area No. 1 be established as shown on Sector Plan 1 of the Report (Refer Section 6).

Preservation Area No. 2 be established as shown on Section Plan 3 of the Report (Refer Section 6).

A rationalisation of parking (on street/verge) on West Coast Highway for the whole of the Bay Beach area be undertaken as soon as possible. Particular attention to be paid to the likely consequences of the realignment of West Coast Highway with Marmion Avenue through Trigg Regional Open Space.

Major Coastal Issues

The dual function of West Coast Highway in providing a through traffic route for the coastal suburbs as well as access to coastal properties and beaches, should be rationalised in a manner that best serves all the users of the coastal road system.

A Management/Development Plan be prepared for Trigg Regional Open Space (Reserves — C32559, C33680, C33679, C27471 and Lots 5, 6 and 7) to ensure the most proper and orderly development of the area for recreation and community uses, with due regard to the coastal environment in which it is located, with specific areas being set aside for the preservation of the flora and fauna.

A comprehensive set of management/development guidelines should be prepared for the special Beach Development Zone to ensure the most proper and orderly development of the area for commercial, residential and recreational uses, with due regard to the coastal environment in which it is located.

The boat launching facilities at Trigg Island be retained for the purpose of providing a low key operation for local resident usage.

Implementation

Comments referring to implementation are covered in other parts of this paper.

Part B: The Study Group

Structure

The original Study Group comprised five officers from the various divisions of the City and specifically:

Brian Evans — Planning Division;
John Reeve — Finance and Administration Division;
Ross Moody — Technical Services Division (Engineering);
Peter Luff — Technical Services Division (Parks);
Steve Stacey — Community Services Division (Recreation).

In addition to the above, Dr Ian Eliot of the Geography Department of the University of Western Australia was closely involved throughout the preparation of the Report, and officers from the Department of Conservation and Environment were also involved in the early meetings of the Group.

Operations

Each officer was allocated specific tasks relevant to his area of operation with decisions being made on the basis of Group consensus. Meetings were held as investigations progressed. Progress reports were submitted to the Management Executive Committee (Divisional Directors) and Council.

Problems

There were a number of problems encountered by the Group. The major ones are briefly outlined below.

- The investigations undertaken by Study Group members were in addition to their normal work load which was reflected in the amount of time that was available to be devoted to the task.
- In terms of priority, the Coastal Report often had to give way to other more pressing matters particularly with regard to senior staff being involved with the operation of their respective sections and budget preparation.
- Illness, leave (annual and long service), resignations and staff movements also caused considerable delays and breaks in continuity.

Implications of Problems

The Study Group was formed in October, 1980 and the Report published in November, 1984. The four years involved could possibly have been reduced to two years or less if not for the above problems and circumstances. The implications of these problems are as follows:

- A loss of continuity of information collection and analysis and consequently, the production of the Report.
- Delays in gathering information and undertaking analysis of data impaired progress in those other areas reliant upon the availability of this information.

- The diversity of disciplines represented on the Study Group often presented some very real problems in co-ordinating the Report.
- The Report changed direction significantly from conception to conclusion as investigations progressed. In this respect, the period of time involved was beneficial in terms of the end product in that it allowed the inclusion of research results that could otherwise not have been concluded in a shorter time frame.
- The length of time involved also necessitated two updates of information resulting in further delays and rewriting of certain sections of the Report.
- Not surprisingly, at times frustrations and very real concern that the Report would not be completed were experienced resulting in some loss of motivation.

I have spent some time on outlining the major problems and their implications concerning the Study Group simply to emphasize the fact that the process was a long and difficult one and that in the endeavour to achieve results, close attention must be paid to how you approach the matter and who you assign to undertake the work. Coastal local authorities contemplating embarking on a similar exercise should closely consider whether or not they have available the necessary resources.

The above comments are in no way a criticism of the members of the Study Group.

Part C: Implications for Coastal Local Authorities and Government

Local Government

For coastal management to be more effective, there are some important aspects that need to be considered, particularly in regard to adjoining coastal local authorities. These areas of concern are canvassed in the Report but for the purpose of this paper, the major points are summarised as follows:

- There is a need for more direct and effective communication and exchange of information between coastal local authorities at both Council and officer level.
- Greater consideration needs to be given by coastal local authorities to the implications of their management/development policies on adjoining local authorities. Strategies which embrace major engineering solutions as part of their coastal management/development approach can be in direct conflict with strategies which seek to recognise and work within the natural coastal processes. Similarly, greater co-ordination is required of the coastal strategies of adjoining authorities.
- Most metropolitan coastal local authorities share a number of common problems which are best resolved by a co-ordinated approach at the local government level (e.g. control of access to beaches).
- Coastal management/development expenditure is a major budget concern for local authorities. Co-ordination of effort by adjoining local authorities could affect cost-savings and improve the effectiveness of certain coastal management measures (e.g. dune restoration and pedestrian access control).
- In essence, coastal local authorities have two options if they wish or are expected to undertake a similar exercise. They are:
  - to undertake the study "in house"; or
  - to engage outside professional assistance.

  The problems of allocation of resources of Option 1, as opposed to the likely costs of Option 2; may well result in many authorities choosing the historical option — DO NOTHING — unless substantial assistance is forthcoming.

State Government

The Report contains a number of comments on the role and responsibilities of the State Government authorities. These matters will be dealt with in depth in other papers presented at the Seminar, consequently the following statements are brief:

- The City supports the establishment of a committed, multi-disciplinary "coastal committee" with the necessary resources.
- A Coastal Project Fund should be established to provide local authorities with the necessary financial assistance.
- There is also a need for the relevant State authorities to consider providing a higher level of financial assistance to local authorities.
- There is a need for specific coastal legislation to clarify and to define responsibilities and controls.
- The metropolitan coast should be recognised and dealt with as one large single reserve and a framework or guidelines provided to ensure a co-ordinated and uniform approach to coastal management/development.

Conclusions

In closing, I would like to make just a few comments as an overview of this paper.

The City is fortunate to be one amongst only a few local authorities that have the capacity and resources to undertake a study of this nature. The assistance provided by the University of Western Australia in the undertaking and completion of the study was vitally important.

Local Government has traditionally been delegated the responsibility for the development, care and control of land within the coastal zone.

A Government Position Paper on Coastal Planning and Management in Western Australia dated October, 1983, appears to place a fair proportion of the responsibility for the preparation of Coastal Management Plans on the coastal local authorities with the State Government playing the role of adviser.

Given the City's experiences in the production of its Coastal Report, grave concern must be expressed at the practicality of this approach, as the costs and problems associated therewith are likely to be too great for many coastal local authorities.

Coastal Management Planning — The Australian Context

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The 1981 report of the Coastal Planning Steering Committee ('Coastal Planning and Management in Western Australia') proposed a three-pronged attack on perceived inadequacies in existing arrangements —

(i) strengthening of the organisational framework, particularly through the establishment of a Coastal Management Advisory Council and semi-autonomous Office of Coastal Management;

(ii) introduction of a system of coastal management planning and, **as an essential corollary,** a new funding mechanism to assist Local Councils in undertaking multi-purpose coastal management projects;

(iii) specific changes to a number of administrative structures and pieces of legislation, to ensure that implementation of coastal management plans could be effectively pursued.

Since the report has not been published, it would perhaps be inappropriate to go into greater detail concerning its recommendations. By way of background to this paper, however, it is useful to recall some of the report's introductory comments concerning coastal management planning —

> "Effective co-ordination of activities will not come about simply by State and local authorities talking to each other and exchanging information. A mechanism is needed which can impart an overall sense of direction to coastal management programmes, and provide a basis for the determination of agreed priorities.
>
> The concept of a coastal management plan is that of a document which can guide the application of a variety of different management tools — subdivision and development control; reservation of Crown land for various purposes; works programmes; construction of roads; regulation of off-road vehicles; declaration of Soil Conservation Districts; creation of aquatic reserves; and so on. To perform this role, a coastal management plan must go further than a conventional regional land-use plan or town planning scheme: rather than simply establishing a broad pattern of land use and development, the coastal management plan must also make specific recommendations concerning management programmes and priorities necessary to achieve agreed objectives for the utilisation, conservation, protection or restoration of coastal resources. Furthermore, it must cover both lands **and** waters. The co-ordinating role of a coastal management plan is illustrated in Figure 1. (Coastal Management Plans) should promote a positive and active approach towards management, instead of what can often seem the negative stance of relying principally on regulations and limits on coastal use."

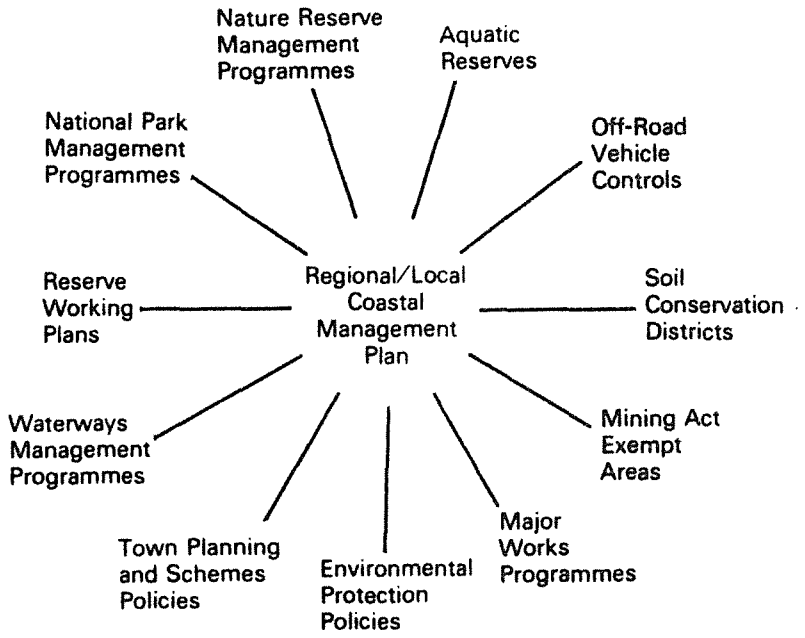

Figure 1. Management Planning

The Committee's findings were based on both a detailed analysis of the situation in Western Australia, and extensive discussions with coastal management agencies in South Australia, Victoria, New South Wales and Queensland. Arrangements in those States will now be briefly reviewed, and then some guidelines suggested for further development of coastal management planning in Western Australia.

It should be made clear at the outset that in all four States responsibility for day-to-day management at the local level, including initial identification of the need for works projects and much of the design of those projects, rests largely with Local Government. The following paragraphs deal with the framework of State administration within which Councils must work, and which governs the effectiveness of the State's own efforts.

South Australia

The S.A. Coast Protection Board, established in 1972, has the most comprehensive charter of the Eastern States management agencies, with functions including coastal engineering, soil conservation, land acquisition, project funding, management planning and development control. It consists of three senior public servants, two outside 'experts', and a representative of Local Government. The Chairman is the State Director of Planning, and the Board is serviced by the Coastal Management Branch of the Department of Environment and Planning. The Branch has a staff of about fourteen, with specialist expertise in all facets of the Board's operations.

The Board has had four principal functions —

(i) protection of Adelaide's metropolitan beach system against erosion damage, and repair of such damage;
(ii) preparation of management plans for each of the State's Coast Protection Districts;
(iii) provision of funds to Local Government for coastal management projects (over $1 million annually);
(iv) review of development proposals likely to affect the coast.

The coastal management plans are statutory documents, with correspondingly onerous procedures for their formulation and adoption. To minimise delays associated with meeting legislative requirements for consultation and review, the Board has opted for fairly generalised policy statements and guidelines, although recent plans have also included concept plans for key locations. The philosophy has been to treat the statutory regional management plans as a necessary legal procedure to facilitate local planning and management, rather than ends in themselves. Regional study reports, which precede the management plans and include detailed assessments of management issues and options, have been regarded as more important documents in terms of actually getting things done.

Victoria

Victoria's coastal management arrangements are currently under review, with Cabinet decisions expected in the very near future. Until recently, there has been a three-fold division of responsibilities —

(i) the Port Phillip Authority has prepared management plans and controlled development on Crown lands around the foreshores of Port Phillip Bay;
(ii) the Department of Conservation, Forests and Lands has had similar functions in respect of other coastal Crown lands, with a modest budget to undertake management projects;
(iii) the Ministry for Planning has administered statutory land-use planning procedures over freehold land adjacent to the coast (including preparation of State policies and regional plans, and supervision of Local Government planning).

The systems of coastal management planning for Crown lands around Port Phillip Bay and along the rest of the Victorian coastline were given statutory effect by Port Phillip Authority Act 1966, and the Crown Land (Reserves) Act, 1978. The latter legislation established a Coastal Management and Co-ordination Committee, composed of four senior public servants, to supervise the preparation of management plans, co-ordinate public works, approve other proposed works and developments, and generally advise the Minister on coastal management issues. It must be re-emphasized, however, that these activities (like those of the Port Phillip Authority) are limited to Crown land. Whilst the legislation includes provisions to promote consistency between management plans for coastal reserves and town planning schemes for adjoining freehold lands, no one has been clearly responsible for exercising an overview of the two systems.

Re-organisation now under consideration is intended, among other things, to bridge the gulf. The Port Phillip Authority has been disbanded and its functions transferred to a Coastal Management Unit within the Ministry of Planning. It is apparently envisaged that the Unit will extend its role to the preparation of coastal planning and management guidelines throughout the State, but with the Department of Conservation, Forests and Lands retaining its responsibility for planning and management of coastal reserves in non-metropolitan areas.

New South Wales

New South Wales has applied very considerable professional and financial resources to coastal planning and management, but lacks an integrated management planning system and appears to suffer from an absence of overall direction.

The NSW Public Works Department has Australia's largest coastal engineering group and has undertaken a series of major investigations into coastal erosion. It administers the Beach Improvement Programme, worth about $2 million per annum, under which major grants are provided to Local Councils to undertake a wide range of projects aimed at maintaining and enhancing the recreational value of beaches — dune restoration, sand nourishment, protective works, drainage, carparks, landscaping, etc. Whilst there is no requirement for preparation of formal management plans, the Department encourages Councils to adopt a planning perspective in putting forward beach improvement projects. In two recent cases Joint Working Parties of the PWD, Department of Environment and Planning and the Local Council have been established to consider the overall need for improvement works in the Local Government Area concerned, and to prepare local management plans.

Under the Coastal Protection Act, 1979, the Minister for Public Works was given powers to call in and determine development proposals likely to affect coastal stability. These powers have been used very sparingly, but the Department nevertheless plays an important role in advising Local Councils on possible erosion problems and on specific development applications.

The other major player at the State level is the Department of Environment and Planning. It has several important roles —

(i) implementation of the statutory land-use planning provisions of the Environmental Planning and Assessment Act, 1979, including preparation of State Environmental Planning Policies and Regional Environmental Plans, and supervision of Local Government planning;

(ii) environmental impact assessment of major development proposals;

(iii) administration of the Coastal Lands Protection Scheme, under which approximately $1 million per annum is available for acquisition of foreshore land for parks and reserves; and

(iv) staff support for the Coastal Council.

The Coastal Council was established under the Coastal Protection Act, 1979, to advise the Minister for Planning and Environment on coastal issues, and to generally foster activity and co-ordination of effort in coastal management. It includes senior public servants, 'experts' and Local Government and community representatives. However, lacking a unifying operational role, such as the preparation of management plans, the Council has thus far failed to achieve its original objectives.

Queensland

Queensland has also lacked a formalised system for preparation of coastal management plans, but like South Australia it does have a clearly dominant coastal management agency, the Beach Protection Authority. Recently, the Authority's role was extended to encompass all tidal foreshores, rather than only the open coast.

The Authority consists of senior public servants and representatives of Local Government. It is chaired by the Director of Harbours and Marine, and serviced by the Beach Protection Branch of that Department. The Branch has a staff of about eighteen, chiefly engineers and soil conservationists. It has an annual budget of some $2 million, excluding works and salaries.

Functions of the BPA include research and investigations into coastal processes, preparation of proposals for works in declared Beach Erosion Districts, and also review of subdivision and development projects in those Districts. The Authority can theoretically refuse permission for any project likely to cause or suffer from erosion, but in many cases compensation for injurious affection would be payable and there are no funds available for this purpose. In practice, then, the Authority's role becomes one of education and persuasion, particularly aimed at encouraging Local Councils to make wise use of their very substantial planning powers, which are exercised with minimal State supervision.

Implementation of works to restore or prevent erosion damage is normally the responsibility of Local Councils, who are eligible for a 25 per cent State subsidy. Whilst the lack of a higher subsidy level has greatly restricted the number of major coastal engineering projects carried out in Queensland, the BPA has very successfully spread the concept of dune management, which seems to have been implemented by a large number of Councils even without financial assistance.

At the same time, the BPA itself continues to receive generous funding for regular coastal monitoring and investigations. It has been accepted in Queensland that a broad understanding of coastal processes provides an invaluable basis for subsequent site specific investigations which may become necessary, and that studies should not be limited to areas in which major projects are already envisaged.

Some Lessons For Western Australia

Clearly, there are no definitive solutions to the problem of achieving effective coastal planning and management. The approaches adopted in the four Eastern States vary markedly, and all have their strengths and weaknesses. Two important variables are apparent —

(i) the extent to which functions are integrated/co-ordinated and subject to overall planning;

(ii) the level of resources applied.

To some extent, application of sufficient amounts of money and expertise can achieve worthwhile results even without a strong planning/policy framework. In Western Australia, however, it seems unlikely that the currently fairly low level of resources applied to coastal management will be dramatically increased. Improved arrangements for planning and co-ordination therefore appear essential —

(i) to achieve the best possible value for money from the expenditures of State agencies; and

(ii) to provide clear guidelines, support and encouragement to Local Government, especially smaller Councils, which will undoubtedly continue to bear the brunt of day-to-day management.

The systems of coastal management planning in South Australia and Victoria appear to have been very useful in a number of ways —

(i) in promoting management efforts, by identifying needs, setting priorities, and generating resources and commitment;

(ii) in providing the management perspective lacking in statutory town planning schemes;

(iii) (in South Australia) in bridging the gap between the different administrative systems for public and freehold lands.

Preparation of coastal management plans could also achieve another key objective, namely co-ordination of land and water management. Again, this is clearly beyond the realm of statutory land-use planning.

Introduction of coastal management planning to Western Australia can thus play a valuable role. It is essential, however, that preparation of management plans does not become an end in itself: the measure of a plan is the extent to which it achieves worthwhile management outcomes. 'Management' in this context can include —

(i) works and maintenance programmes (anything from a major engineering scheme to protection of a rare plant or aquatic community);

(ii) specific development projects;

(iii) controls over use of land and water areas;

(iv) research and information programmes.

Complex hierarchies of plans, expenditure of time and effort on stretches of coast with few immediate management problems, and coverage of minor issues simply for the sake of completeness, are all to be avoided. Plans must be seen to be directly related to specific management needs, and must detail achievable management programmes.

But management plans, however relevant and thorough, are only part of a coastal planning and management system. As noted at the beginning of this paper, the Coastal Planning Steering Committee also recommended a number of moves to provide an administrative, legal and funding framework favourable to the **implementation** of plans. In this regard, key lessons from the Eastern States' experience appear to be as follows —

1. Responsibility for preparing management plans should rest with a clearly recognised and adequately staffed co-ordinating/management agency. Co-ordinating bodies which lack sufficient staff and financial resources, and a clearly defined operational role, are unlikely to prove effective.
2. Close integration of management planning with coastal engineering, soil conservation (including land capability assessment) and development control functions is particularly useful.
3. Similarly, management planning must be linked to a funding mechanism, especially to provide assistance to Local Councils to implement plan proposals.
4. Successful planning and management requires adequate data gathering and research concerning —
   (i) coastal processes; and
   (ii) coastal resources.

The central purpose of the exercise is to derive the greatest possible benefit from the coastal environment. This can only be achieved if key resources are identified and processes understood. Lack of essential data can lead to waste or misuse of resources, or an unnecessarily negative approach.

Peter Woods — Closing Comments — Day 1

Peter J. Woods, Ph.D.
Consultant, Department of Conservation and Environment

First of all, to take you back to the beginning of the day.

What we have tried to do is highlight some of the problems we experience in dealing with the coastal zone and then try to give an idea of how you can cope with those problems. Rory introduced problems, players and strategies involved in coastal management planning which illustrated how complex the subject is. I made the point that the sandy shoreline is not a fixed landmark, and that we must be very careful in siting developments in the light of long-term coastal evolution and shorter-term cyclic shoreline movements. Patrick Hesp illustrated problems with using different sorts of landforms and brought up the dilemma that there is often a choice that one can make, either you defend a road with a rock wall or you let the thing fall in the water. As I see it this illustrates that there are often two sorts of costs involved when coastal works are undertaken. There is, for example, the dollar cost of building a rock wall — and then there is the environmental cost that you may jeopardise the sandy beach. That's the choice we often have to make.

John Ottaway spoke about the marine side of things. He gave us examples of things going wrong, for instance the fishing industry which is causing havoc at a number of places (e.g. Shark Bay). He also showed examples from Cockburn Sound and Albany where in a mere hundred years we have polluted those two huge water bodies to the extent that we now limit eating of fish and shellfish taken from them. Again — we have a choice here. We have to spend money to fix up the problem or we have to cope with an environmental problem. The environmental cost is a lost resource. Ken Tinley brought up the question of a coastal buffer zone where we must take extra care when we utilise resources. In his seven questions, the last one said that we must consider other people. That doesn't seem to be a thing that has a lot going for it these days. He called for more individual responsibilities. The suggestion was that if we don't take more individual responsibility, the Government will have to play a bigger role. To my way of thinking that calls for more education on the part of people with the knowledge to allow individuals to make sensible decisions.

Peter Skitmore introduced the afternoon session and asked us to note the difference between the Broome Coastal Management Plan (CMP) and the City of Stirling CMP. I can't remember how much the Broome plan cost but it would be nowhere near what Brian Evans said the Stirling plan cost. I think one reason for that is that in Broome we had the chance to get in first. Brian came along after almost everything was in place and his was largely a salvage operation.

Colin Chalmers went through the process of preparing the Broome CMP and highlighted that the process takes into account both the natural resources as well as the human needs. The planning processes in the past often appear to have ignored natural processes. Management planning in contrast attempts to take into account what's happening on the ground. Graeme Robertson spoke about land capability assessment and suggested that that was the first thing that should happen when you plan any land. He pointed out the high dollar and environmental cost of not doing it and the loss of time if your plans go wrong. Mike Woolfenden showed us examples of engineering works. I think to be an engineer on the coast must be a very difficult job. As he said, he is one of the few people who actually does something. If I draw up a plan and it doesn't get accepted it wouldn't hurt too many people, but once you've gone and built something — a toilet block, a road or a groyne — it's there for everyone to see. I think that what often makes an engineer's job difficult is that they get sent out to do things in the face of coastal processes as well as in the face of political pressure.

Mike Allen, I think gave one of the most important talks when he discussed how you incorporate Coastal Management Planning into a legally binding Town Planning (TP) Scheme. He suggested either we could incorporate coastal management thinking in the policy of a scheme, or more preferably draw up a CMP before drafting a TP scheme so that the thinking of one is embodied in the other. Brian Evans gave us an account of what the City of Stirling did. As I said, a very different kettle of fish to the Broome plan and I think it is interesting that he said that in 1982, Stirling spent $300,000 on the coast. For your information the Department of Conservation and Environment has a budget of $150,000, i.e. half of that, for the whole W.A. coast. I think one of the major outcomes of this day will be the ability to point out to the Government how little is spent on CMPs in relation to the length of our coastline.

Graham Sansom our last speaker made a good point that we are here to implement things and gave us an account of the two different systems in Queensland and South Australia where CMP is recognised and agencies have been set up to deal with problems of coastal management.

Now I'd like you all to share a drink with us, and take part in one of the most important aspects of the seminar, making a few contacts. Thank you.

Environmental Assessments — A Developer's Viewpoint

Robin Wright
General Manager, Secret Harbour Pty Ltd

I think it is appropriate when considering Environmental Review and Management Proposals, as a developer, to first ask several questions of oneself.

First Question — Why do we have ERMP's?

Most of the reasons are basically historical. We had —

- developers who **did not care** what effect their development had on the environment,
- developers who were **ignorant** of what effects their development may have,
- Governments who were also ignorant in these matters — both State and Local, and as a result:
- a perceived need, from bitter experiences, of the necessity to address the on-going impact of a change in environmental structure, and
- the need to determine the total financial cost to a community as a result of a development, and the allowances to meet that cost in the future.

Second Question — What does an environmental assessment really mean to a developer? In short it means:

- the preparation of a sometimes large, complex and costly document called an "Environmental Review and Management Proposal",
- the lodging of that document with the Environmental Protection Authority,
- the receipt of a report from the Authority, which will make a series of recommendations, and finally,
- the consequences of those recommendations — which usually mean additional costs.

A subsidiary question to this one however, is: "does it mean a step towards the developers goal — approval to start work?"

The third question I ask is "what is it about environmental assessments that make developers angry?" The answers to this question can probably be put in two categories:

a) the uncertainties, and

b) the question of real need.

Some of the uncertainties existing in the current process are:

- uncertainty of cost — what is the **real cost of the process** going to be in terms of out-of-pocket expenses, delays, loss of potential market and holding costs on the land.
- uncertainty of the parameters — this aspect has certainly improved since the Secret Harbour reports were first prepared — but from a developer's viewpoint, it is still not 'finite' enough.
- uncertainty of effect — what effect will this report and, more particularly the EPA's recommendations, have on the project as conceived. Will it still be viable to proceed, or will the developer be obliged to take unnecessarily strict precautions if he wishes to proceed. Also, under 'effect' one asks "does it achieve real goals?" In other words, if you pass the environmental test, have you really taken a step forward, and
- one other uncertainty — **the credentials of the assessors.** This does not question their credentials as Environmental Assessors but more as Environmental Assessors who also understand the 'Rules of Development'.

What may be seen by one person as a perfectly reasonable recommendation, with very little cost penalty may, in the developer's eyes, completely ruin his project.

In the areas of real need, we could question:

- Scope — the need to cover as broad a scope as seems to be the case at the moment.
- Repetition — the need to cover issues which have essentially already been addressed by others, and
- Benefit — the question as to whether a report — to the extent requested — will be beneficial to the community.

Sometimes we wonder whether some of the issues we are asked to address are simply there to satisfy a "boffin's palate". We must be careful however to recognise our own ignorance in some of these areas.

I believe these questions are all valid from a developer's viewpoint, and I am sure they have been asked many times before. Certainly there have been attempts to address some of them, but some have also gone into the 'too hard basket'. This all leads to the burning question, and perhaps really the topic of this paper, when one asks "what developers should do about environmental assessment"?

I BELIEVE THE FIRST THING WE SHOULD DO IS ACCEPT THEM. They are part of life in the development world in which we operate, and as I indicated when I asked "why we have them in the first place?", to a large degree we brought them upon ourselves. There could be no doubt in anybody's mind that right throughout the world, and right throughout history, developers have been guilty of having prime regard for only one thing — the end dollar or the **bottom line.** The problem, is that the **bottom line** is also a reality, and if it is **red,** instead of **black,** then the game is usually over.

In third world countries where communities cannot bear the financial burden of environmentally sensitive developments, there is still no care taken. I believe Australia is well capable, of bearing the financial burden of taking **reasonable** care of its future, and probably **it cannot afford not to.**

My experience of development in South Australia gives me the opportunity to reflect on some issues, that had they been as carefully checked as similar issues in the Secret Harbour project, then current problems could have been avoided. The classic case is a Breakwater and Harbour Entrance built over an accreting beach. About 12 years ago I recall asking one of the Senior Engineers on the project, "why he wouldn't eventually have a problem with sand build up at his harbour entrance". He said something like "it's easy. You simply build the breakwater into deep enough water — so that you are beyond the sand settlement zone".

Of course, that Harbour Entrance now has a problem which will become critical in the next 5 to 10 year period. A proper analysis of the littoral drift of that coastline — and the need to justify the conclusions reached before commencing construction — would have allowed people to foresee the problem correctly.

But of course, on that particular project, it was not just the developer and his consultants who were at fault. A model study of the internal wave patterns of the harbour was carried out, and three different configurations of breakwaters were tested. The construction costs were unacceptable for the most desirable configuration, and so, because of financial expediency by both the Government of the day and the developer, a fourth configuration was built without testing. Unfortunately that didn't work effectively and eventually additional breakwaters had to be constructed to remedy the problems created.

In both of these situations the end cost of the remedial works is being met by the Government. The developer has long gone. One really must ask the question whether this is **fair** on the community and I am sure you would all agree, that it is not.

There are many examples such as this throughout Australia. The processes we now all go through should eliminate many potential problems and place the cost burden in its rightful place. Authorities must be careful however, not to stifle the entrepreneurial drive of willing developers, by making life too difficult. A sensible balance must be achieved.

At Secret Harbour the preparation of the environmental review and management proposals cost in excess of **$350,000.** That only includes direct costs. God knows what the other costs added up to. It was perhaps unfortunate for the Company, that at that time, the new reporting system was still being developed. It meant that we were the guinea pigs and that the process was much longer.

However, after suffering that pain we can now feel confident that we know where we are heading. We know what our problems are likely to be, and we have a plan of action to cope with them. A sensible developer should have all of these items in his kit-bag in any case, but he probably would put them there at far less cost. But, the process could have been even more painful. I am told some of the factors the Company was originally asked to investigate were in their view quite unreasonable. Suggestions that full studies, and management programmes, for the fish populations of the Murray Reefs, be addressed in the report, were **clearly outside** of the Company's **reasonable responsibilities.**

On the other hand, one of the side benefits to being an 'early cab off the rank' with this type of report, was the necessity for a good level of co-operation between departmental officers and Company personnel, as to how each problem should be addressed. Co-operation at this point is a cost saver and I believe it is something that should be encouraged by all. Presumably, in time, most serious questions will have been addressed by somebody, and short cuts can then be taken by those following.

Let's face it, two of the main objections developers can justifiably have of these types of assessment processes are:

- the direct costs of preparation, and
- the indirect costs while delays occur.

The reduction of those costs should be pursued with great tenacity by developers and Government, and **Government** officers must **continually analyse** both the questions they ask, and the recommendations they make, with regard to their **cost implications** and **necessity.** This approach will make developers much more willing to co-operate and make the task more meaningful.

The final thing which should, in my view, be addressed in this Environmental Assessment system is the legal aspect. I referred earlier to a matter which makes developers angry, in that

the environmental assessment procedure does not lead to a positive approval. This is because the EPA, when it all boils down, has no 'legal teeth'. Now it seems a little odd to me, that a procedure which apparently has no legal base, can be imposed on anybody. I also doubt very much whether those who originally proposed the system really thought about or understood the cost implications. Certainly the environmentally sensitive in the community, or the 'greenies' if you like, rarely have regard for that aspect.

I acknowledge however that, in the majority of cases, they are looking at the future cost to the community, where developments are allowed to proceed, with little regard for the environment. I suppose that is justification enough for their cause, but it does not necessarily justify it for the developer.

While I am one of the first to agree that our community is in general over-regulated, I also hold the view that where large sums of money are expended by developers, on the demand of public authorities, **there has to be a positive and binding result at the end of the day.**

Once a developer embarks on an ERMP, receives the EPA report and recommendations, and agrees to abide by them, he should be able to put that question behind him. This probably also means that before he embarks on that course, he should be able to gain from both Local and State Government Authorities, binding approval, in principal, to his scheme subject to:

- a positive EPA report,
- the developer's agreement to abide by that report and recommendations and, of course,
- subject to all other statutory requirements, such as planning approval and the like.

This legal stature would have one other significant implication. It would mean that there would be **no exceptions** to the requirement for these assessments unless so legislated by Parliament. Under our Governmental system, parliamentary debate is deemed as representation by the people, and therefore should be acceptable.

I am sure there are lots of other implications which stem from such a move, but I believe in recent history, there have been a number of cases where large sums of money have been spent, and at the end of the day the question as to whether it was worthwhile or not, has rightfully been asked. Certainly the issues were complex and there were some unusual aspects. However, the system should be able to cope adequately with these situations.

In summary therefore, from this developer's point of view:

1. Environmental assessments are **basically a good thing,** and even a necessity!
2. If we are going to have them however, **a rule for one is a rule for all.** If the Government is a developer, the rules still apply.
3. The **ground rules** for assessments must be **clearly established** before the event. Economies should always be aimed at, repetition from previous assessments avoided, and assistance with procedures provided by the assessing officers whenever possible.
   Seminars such as this one may assist in this area.
4. Once an environmental assessment has been done there should be a **reward** at the end of it, i.e. a positive report and **agreement** to the recommendations **means approval** of that aspect and,
5. If we are going to live with these rules, let's make them **formal,** let's make them **legal.**

Finally, Ladies and Gentlemen, let's not forget that man too is part of nature, and for man to progress he must develop. But, development of any type will always have the effect of changing the environment — we will lose some things and gain others, but I don't find that at all surprising as nature has been changing the environment since long before man appeared on the scene.

Mining in the Coastal Zone

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Summary

The ability to mine is initially dependent upon the presence of an economically recoverable mineral deposit. Within the coastal zone, mining is often favoured by nature because the zone represents the penultimate deposition site for sediment derived from the processes of erosion, prior to its final deposition offshore. In the coastal zone, sediments are often better sorted, cleaner and selectively concentrated into their heavier or lighter fractions; exposure of bedrock is often high; and biological and topographical features encourage the accumulation and development of certain mineral resources.

In common with all other coastal zone users, mining companies (ranging from small sand-pit operators to large mining concerns) have various responsibilities:—

to shareholders : the operation should return a reasonable profit
to employees : secure, safe employment must be provided
to the community : the operation must be a worthwhile undertaking, with benefits outweighing costs
to mineral purchasers : the demand for mineral resources must be met by products of acceptable quality at acceptable prices.

In the final analysis, a mining development must gain general community approval as being a desirable undertaking, in which costs are outweighed by benefits. The role of planners in gaining community approval is critical for mining or any other development. Unwise planning can affect any or all of the 3 parts of the developmental/financial/competing land use inter-relationship so that one or more of the costs or benefits are advantaged or disadvantaged to the point where land use options open to future decision makers are reduced.

W.A.'s extensive mineral resources within the coastal zone are evaluated and two case histories involving mineral sands deposits, one to be mined before land use planning can have an effect and the other certain to be alienated because of future land use planning schemes, are given.

Although mining is a temporary user of land, the full costs and benefits must be fully assessed, including social, environmental, economic and others. Planning is of critical importance in allowing a particular section of coastal land to meet its full land use capabilities and must be carried out with the greatest diligence. Where knowledge is incomplete, allowance must be made in coastal management plans to keep all options open.

Introduction

Mining and agriculture are the two primary industries upon which Western Australia's economy is largely dependent. The State does not support a major, export-based manufacturing industry (1) and, while tourism offers much potential, the service sector generally does not generate high levels of financial independence and security. The loss of the America's Cup in 1987 would have many serious consequences, for example.

Biological conservation is the management of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations (2). Although mining is usually not sustainable, minerals being finite commodities, there is a responsibility placed upon the shoulders of mining companies to conserve the finite mineral resources of this world, along lines similar to this biological conservation philosophy. The provision of mineral products to a world which has material as well as recreation and conservation needs often generates land use conflicts in which all parties have legitimate points of view.

Planning is a tool by which proper use of most or all of the values of a portion of land can be achieved. Mining is a legitimate land user in the coastal zone but its costs and benefits must be fully assessed before the decision-making process can begin.

Definitions

In this paper, a mineral is defined as any naturally occurring substance found below the ground surface which can be mined or otherwise recovered if present in sufficiently high concentrations. A mineral resource is a concentration of a mineral such that recovery of that mineral by some form of mining is potentially viable.

The term "mining companies" is used in its broadest sense to include the larger mineral resource developers, the small operators of a sand or limestone pit, as well as individuals who may extract domestic water from a backyard bore or take a trailer load of sand for their garden.

"Cost" means financial, environmental, social or other penalty or sacrifice.

Mineralization within the Coastal Zone

The coastal zone is highly mineralized when compared with non-coastal areas but a full understanding of the reasons for this are beyond the scope of this paper. However, a number of factors can provide a general explanation.

First, the natural processes of erosion transport rock-derived material from higher inland areas to the lower coastal zone, ultimately to see them deposited far offshore. While these sediments temporarily rest in the coastal zone, they are subjected to cleaning, concentration and sorting into uniform grain sizes, so that mineral resources slowly develop from the original products of erosion. Deposits of sand, mineral sands and heavy minerals such as gold owe their origins to these mechanisms.

Second, the coastal zone provides a temperate environment in which biological activity is often higher than normal, thus forming diatomite, coal and limestone deposits.

Third, the presence of sea-water will, under suitable climatic conditions, give rise to salt, evaporite or tidal energy resources.

Fourth, the coastal zone is a high-energy environment in which topographic expression will often become subdued over geological time. The resulting low-lying areas, in combination with other factors, can accumulate mineral resources such as clay, salt, coal and gypsum.

Fifth, all rocks have some potential to host economically viable mineral deposits and, in a state with an extensive coastline, the law of averages dictates that some rocks carrying recoverable minerals will be found, for example, base metals, petroleum, gas and uranium.

Finally, the presence of 70% of the State's population living within 50km of the south west coast causes lower grade mineral resources to be developed because higher processing costs can be offset against lower transport distances to market. As well, cities and towns require mineral commodities which elsewhere could not have a viable use, a good example being yellow sand which finds wide application in urban environments for construction and fill.

The Roles and Responsibilities of Mining Companies

Mining companies are the initiators of coastal zone developments and are little different from other developers who wish to exploit only the surface of coastal land. The miner's role is to locate and extract mineral resources using the most appropriate and efficient techniques and to attend to the social, environmental and industrial requirements which the deposit's characteristics and location demand.

It is important to recognize that " mine" can embrace a wide range of alterations to the land and its surface. **Quarrying** removes a mineral commodity, the bulk of which is usable and hence valuable, and leaves behind a hole or open pit. **Back-fill mining** uses similar techniques as quarrying but only a small proportion of the excavated material forms the final mineral product, so that the hole or pit is back-filled to recreate a near-original land surface. **Underground mining** requires only a small area of land surface and the valuable minerals are recovered via tunnels and shafts in the case of solid minerals, and bores and wells for liquids or gases.

In W.A., examples of these 3 types of mining include:—

quarrying	: limestone, sand, construction stone and coal;
back-fill mining	: mineral sands, gemstones and uranium; and
underground mining	: base metals, petroleum, natural gas and water.

The responsibilities of mining companies can vary within certain limits, based upon the mining method and the mineral being mined. However, every operation (including non-mining) should be conducted with the following responsibilities clearly entrenched:-

To shareholders	: the operation must return a reasonable profit.
To employees	: safe, secure employment must be provided.
To the local community To the state community To the national community	: the operation must be a worthwhile undertaking in that costs should be outweighed by the benefits.
To customers	: a product of acceptable quality at a reasonable price must be provided at an assured rate of supply.

The word "environment" has not been specifically mentioned in this list because the mining industry believes that its responsibilities to the community are extensive and the environment is just one of several areas in which the costs and benefits must be assessed before the worth and social acceptability of an operation can be determined. Within the coastal zone, mining will affect land uses in exactly the same way as it does at inland sites but, because of the high population density and the larger number of alternative land uses to which the coastal zone is subjected, the likelihood of conflict is higher. Full assessment of all costs and benefits is essential prior to mining proceeding.

Community Acceptance of Mining

For every development in the coastal zone, be it recreational, urban, conservation or mining, there are costs to be paid. The creation of a national park alienates the affected land and normally precludes urban and mining development and restricts the range of recreational uses available. Similarly, although mining is a temporary user of the land surface, it can affect all other land uses in the short term and alter some land uses in the long term, e.g. conservation.

In general terms, for every development, there are costs to be borne by the competing land uses. While the use of larger amounts of money can sometimes be the only way that those costs can be overcome, the alternatives are to alter the development so that it has smaller impacts on the competing land uses or to accept the altered competing land uses in preference to the development, as figure 1 shows:-

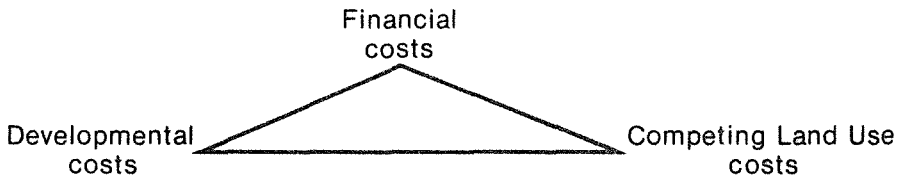


Figure 1: The cost triangle

As the triangle suggests, if a competing land use such as conservation or recreation is seriously affected by a proposed development, then the outlay of greater finances to overcome the effect on the other land uses is one way of dealing with the problem, if those charged with making decisions view the development as desirable. Alternatively, if the competing land uses are too important to compromise, or if the financial cost of avoiding serious impact to those land uses is too high, then the development can be reduced in scale to better suit the affected area or abandoned.

Overall, the community must judge the desirability of a development (mining or otherwise) and only by full assessment of the different costs can a proper decision be arrived at. For land use planners and decision makers, paying strict attention to each of the 3 points of the costs triangle is a major responsibility.

Mineral Resources in W.A.'s Coastal Zone

Western Australia is well endowed with mineral resources and the coastal zone is especially rich, for reasons as outlined earlier. Figure 2 (A, B, C) outlines the known or potential mineral resource areas of the coast and the following table lists the potential for discovery of new resources, if not already discovered, and their likelihood for development.

Table 1

Mineral Commodity	Potential for Discovery	Likelihood for Development
Limestone, limesand and sand	Large deposits known	High existing exploitation with large future demand.
Mineral sands	Large deposits known	One deposit to be mined soon, several to have mining approval sought in 10 to 15 years' time.
High value heavy minerals e.g. gold	Moderate	Moderate to high
Gemstones	Low	Low to moderate
Opal	Low	Low to moderate
Tidal energy	High in Kimberley region	Moderate to high in the long term.
Construction stone	High	Moderate: many inland deposits available.
Dimension stone	Deposits known with high future potential	Moderate but many developments already existing.
Primary igneous and base metals	Low to moderate	Moderate
Petroleum and gas	High	High
Uranium	Moderate	?
Underground water	Extensive deposits known	High existing exploitation with large future demands.
Diatomite	Low to moderate	Low
Evaporites and gypsum	One deposit known with moderate to high potential	One deposit being mined
Coal and peat	Large deposits known	High in the medium to long term
Clays	Low to moderate	Low
Salt — solar evaporators	high	Developments existing but high future potential

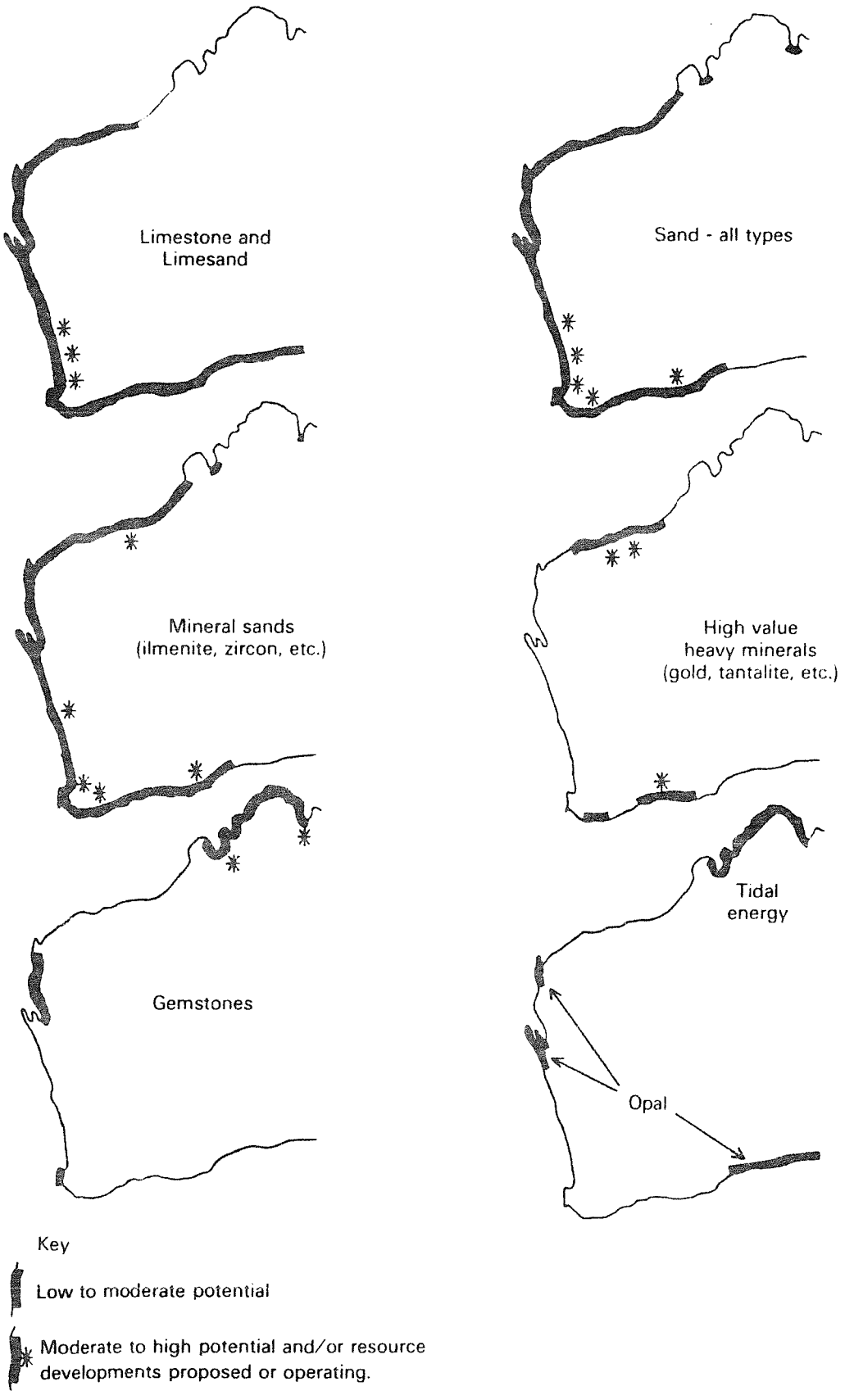


Figure 2A: Coastal Mineral Resources

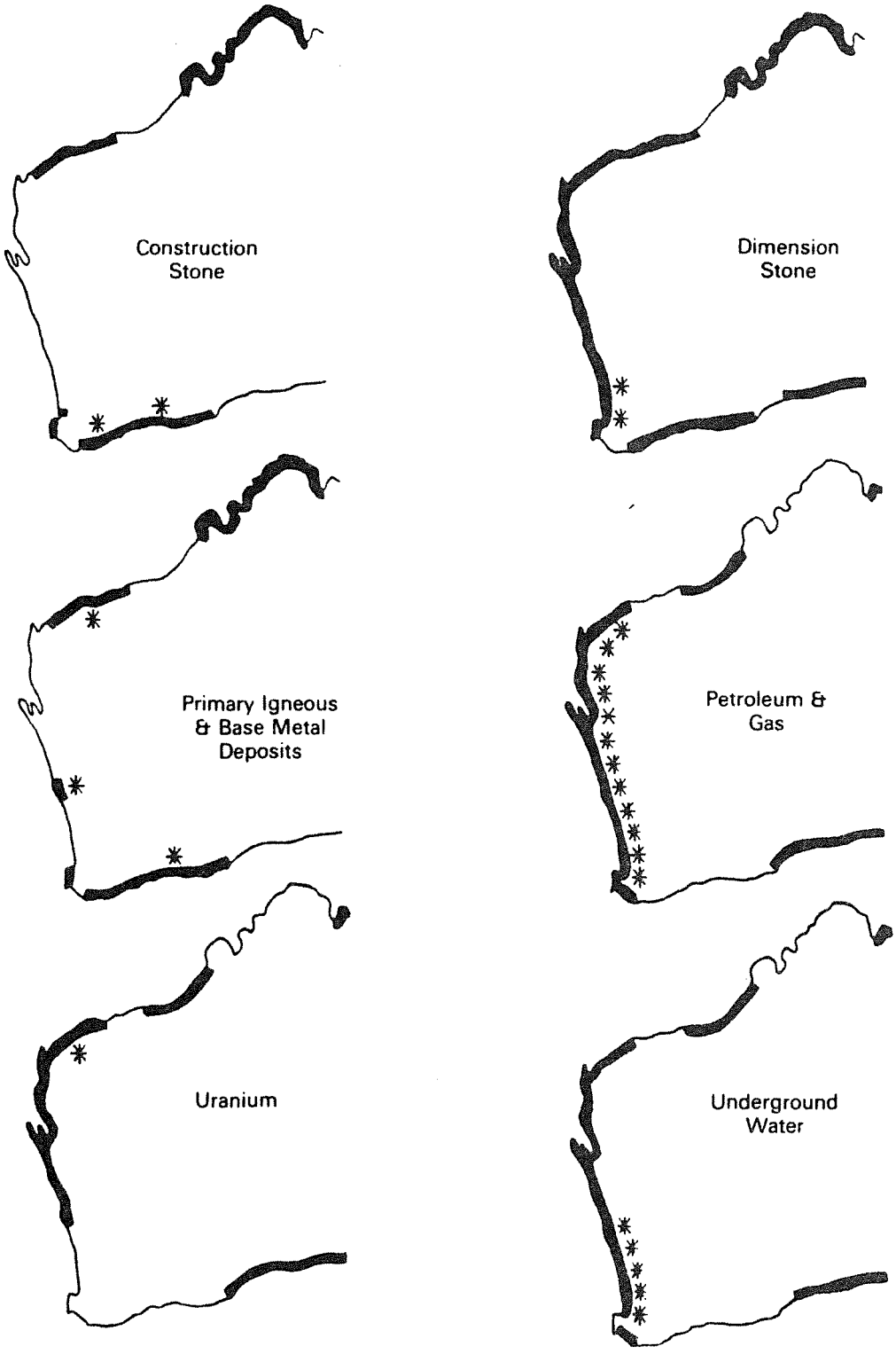
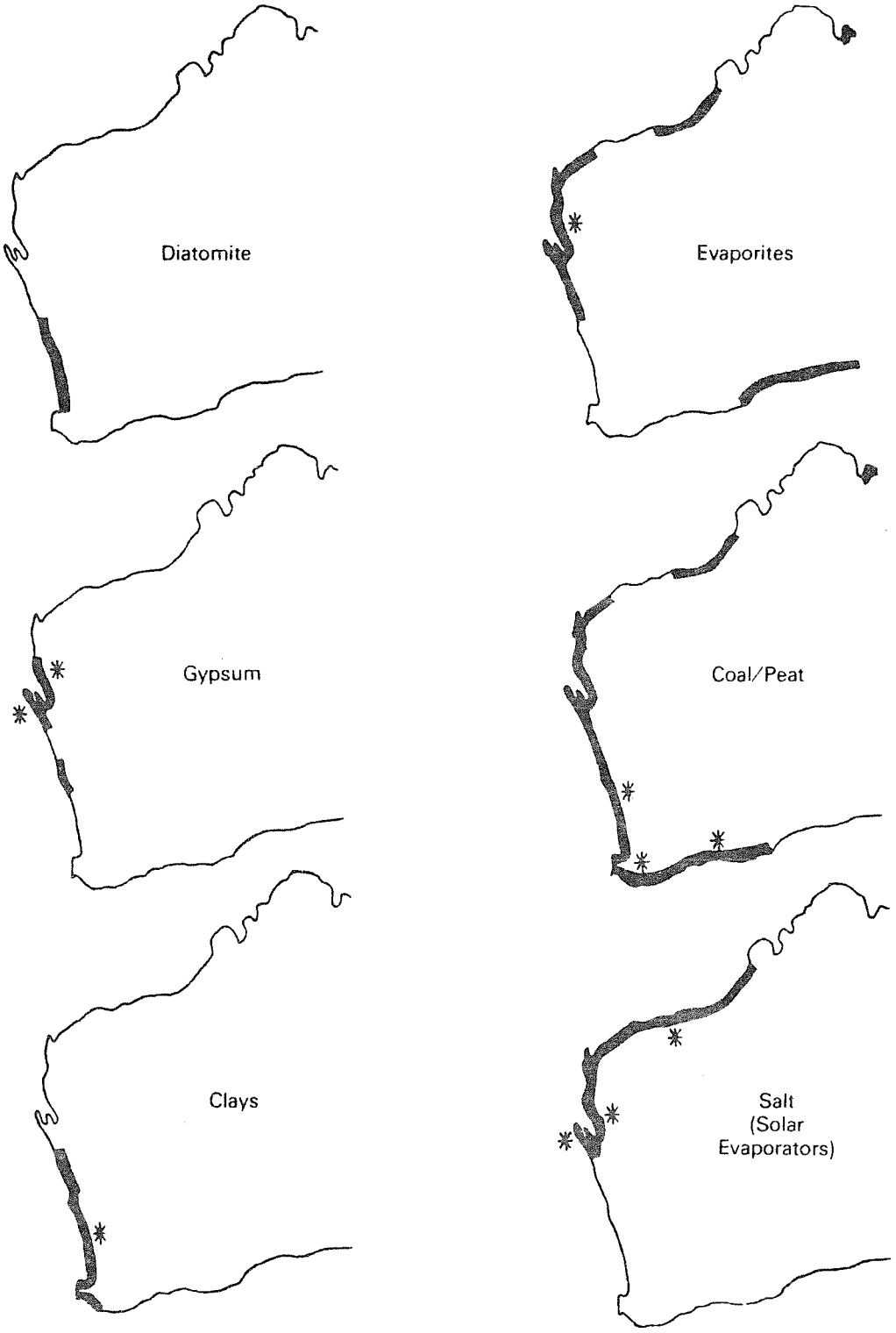


Figure 2B: Coastal Mineral Resources



Key

Low to moderate potential

Moderate to high potential and/or resource developments proposed or operating.

Figure 2C: Coastal Mineral Resources

While table 1 may not be complete, and even though the comments on the likelihood of future developments are subjective, the table does show that, within the coastal zone, there are:—

7 mineral resources being actively mined;
1 mineral resource awaiting short-term development;
2 mineral resources with major long-term potential;
4 mineral resources with moderate to high discovery and development potential; and
5 mineral resources with low to moderate discovery and development potential.

Case History 1: Minninup Mineral Sand Deposit

Located on the coast between Bunbury and Capel, this ilmenite, zircon and monazite deposit contains some 900,000 tonnes of potentially saleable mineral. Ore processing will be carried out on 9,000,000 tonnes of free-flowing calcareous sands and the value of the final separated products will be approximately $27,000,000. Mining will be conducted over a 6 to 7 year period and will provide direct employment for about 85 persons. Rehabilitation wil be back to native vegetation and there will be complete rebuilding of the dunal system.

The ability to mine this deposit has come about mainly by fortunate timing and good luck. The subject land had a low agricultural potential, was located in a comparatively remote section of coast and was owned by the same farming families for many years. However, the urban expansion of Bunbury is steadily progressing southwards towards the deposit. Because of opportune economic circumstances, the mining company proposing to develop this resource now finds itself in the position where land use conflicts are minimal. A 10 year delay, however, would have seen greatly increased urban/hobby farm developments nearby and a resident population nervous about mining as well as wishing to use the subject land for recreation.

For this deposit, there had not been any deliberate land use planning. If circumstances had been different and a coastal management plan had been formulated some years ago, it is not inconceivable that the failure to recognize mining within that plan as a potential land use could have forever prevented the development of the deposit.

Case History 2: Smiths Beach Mineral Sand Deposit

Located on one of the most scenic sections of the Leeuwin—Naturaliste Ridge coastline, this deposit is a major mineral sand resource, larger than the Minninup deposit, but not held under mining title nor, on available information, is the subject of mining plans. It is partly located within National Park and partly within private properties which, although of small size, are highly valued because of their scenic views and desirable local environment.

Pressures to allow mining of this deposit are not likely to arise within the next 10 years, so it is probable that a coastal management plan will be compiled for the area beforehand. It is important that the existence of the deposit be recognized in the plan, not necessarily so that mining can be approved, but so that competing land users are made aware of the alternative land use which would affect all of them. It is not impossible that, in times of national need or to preserve part or all of the 400 jobs presently generated by the mineral sands industry located in the south-west corner of the state, the decision to mine may be enforced. If the adjoining private land in the meantime had been subdivided for small farmlets or if the National Park contained expensive recreation facilities, the failure to include mining as a potential land use would have been a costly error since the competing land users would have been needlessly disadvantaged to an extent greater than otherwise necessary.

Mining in Perspective

The location of mineral deposits is beyond the scope of human control and nature must be blamed for placing mineable resources in the coastal zone. As much as the developers of mineral deposits would prefer to operate away from conflicting land use areas, the inescapable fact is that minerals can only be removed from areas where they are found: if a deposit doesn't exist, it cannot be mined.

Once the constraints of location have been recognized, it is then that society is given the ability to choose whether a particular deposit is mined or not. In this regard, and of particular relevance to planners and decision makers, the following points should be noted:—

- Mining is a temporary user of the land surface and, with proper rehabilitation, many developments can have little, if any, post-mining impact.
- There are costs and benefits associated with a mineral development proceeding.
- There are costs and benefits associated with a mineral development not proceeding.
- Mining is a legitimate land use and must be considered within the framework of a complex array of other competing land uses.
- The definition of mining must be sufficiently broad to include the coastal zone urbanite (with his backyard water bore) and the larger mining company (possibly wishing to develop an export-based coal mining industry.)

- The planning process is not easy and the acceptance of mining as being a potentially important component will complicate the process even further. However, ignorance of mining, whether deliberate or accidental, is the start of a buck-passing exercise which will require far more complex situations to be resolved in the future.
- As well as economic benefits, mining can accomplish benefits which would otherwise not be available (mineral sand mining can reduce background radioactivity levels), or which would be excessively costly (placing a car park in a disused quarry rather than on the side of a steep hill).
- If properly planned, mining can form the first stage of a sequential land-use process which can later involve recreation, farmlets and finally urban housing, to give one possibility.

Conclusions

As planners and managers of the coastal zone, shire councils must accept responsibility for proper planning and management. To do otherwise is to repudiate the principles of the democratic processes which elected the councillors to their positions of community trust. In turn, the people who provide advice to councils must be honest and exhaustive, otherwise the consultative process becomes meaningless. Finally, the community (local and national) must abandon the widely-held Australian version of the Cargo Cult, which states that, while the benefits of a development will be most welcome here, if there are any costs to be paid, then locate the development in the next shire! For almost every development, there will be some costs to pay and it is of critical importance that the leaders and decision makers within the community accept reasonable costs as being an essential part of desirable development.

A further responsibility which rests on council's shoulders is to resist the temptation to make a final land use decision before adequate knowledge about an area's competing land uses is available. Whilst planning is made more difficult by incomplete knowledge, a premature decision today reduces the number of future land use options, and the needs of future generations must be allowed for if a coastal plan is to fulfill its designed purpose (see reference 4).

To conclude, the significant role of mining in this State's prosperity is easy to overlook, especially when many mining activities are located far from the populous south west corner. It is also possible to ignore the less recognized mineral developments, based upon common commodities such as limestone and sand, which are just as essential for maintaining our existing standards of living. To properly plan for mining so that it can be a potential land use within the coastal zone, it will require commitments from the mining industry to fully advise planners of the presence or potential of resources and to outline the costs and benefits of developments so that sound judgements can be made.

Anything less than complete honesty on the part of the mining proponents will damage their standing and public acceptability. Anything less than full and competent planning on the part of those charged to produce coastal management plans will have medium and long-term consequences which should be avoided wherever possible.

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The Natural Resource Consultant's Role in Environmental Assessment

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1. Introduction

The objective of this paper is to outline the natural resource consultant's role in the decision-making process associated with development of coastal resources. As such the paper firstly defines what is a natural resource consultant, then outlines the services provided, how they are provided and what the consultant's responsibilities are in the provision of those services. The paper then examines the roles that the consultant performs and outlines one consultant's approach to resolving the basic dilemma of how to produce a credible, defensible and acceptable ERMP within a restricted budget and time frame.

2. What is a Natural Resource Consultant?

According to Telecom Yellow Pages, natural resource consultants are:

- * System analysts
- * Environmental consultants
- * Ecologists
- * Geomorphologists
- * Geologists
- * Foresters
- * Zoologists
- * Botanists
- * Analytical chemists
- * Oceanographers
- * Meteorologists
- Engineers
- Planners
- Computer mapping services
- Air conditioning and pollution control consultants
- Managers and share registrars for mining and exploration companies

* = natural scientists

The above list contains a very wide range of professions. However, not all the above professions are suitably trained for decision making in the natural environment. Those professions which in our opinion are most suitable are those based in the study of natural science, i.e. the sciences collectively that are involved in the study of the physical world and its phenomena including biology, physics, chemistry, and geology but excluding social sciences, abstract or theoretical sciences such as mathematics and applied sciences. Those professions listed above that belong to this category of natural science are identified with an asterisk.

3. What Services are Provided?

Natural resource consultants are a relatively new profession in comparison to older, more established professions such as engineers, lawyers and doctors. In the last 10 to 15 years there has occurred a steady growth in demand for the natural resource consultants largely as a result of the associated increase in environmental awareness and legislation throughout the world. The major stimulus for this growth has been the legislative requirement for Environmental Impact Assessment (EIA) of major and controversial development proposals.

Input to an EIA or ERMP (as called in W.A.) requires (among other things) the description of the natural environment and the assessment of effect on the natural environment of a proposed development. Hence the demand for natural scientists to perform that service.

However, while most natural scientists are qualified to describe some aspects of the natural environment, not all natural scientists are suitably qualified or experienced to both **design** ERMPs and **assess** impacts. Only a few natural sciences actively research the relationships between various aspects of nature to provide the understanding of ecosystems and earth-forming processes required for impact prediction and assessment. Two sciences which are most useful in this regard are those of:-

- **geomorphology** — a branch of earth science that is concerned with the structure, origin and development of the topographic features of the earth's crust,
- **ecology** — a branch of life sciences that is concerned with the relationship between a particular organism or population of organisms and their physical surroundings. Specifically, ecology is the science of understanding the distribution and abundance of biota in relation to the physical structures and processes which provide the habitat for those biota.

4. How does a Consultant Fit into the ERMP Process?

Preparation of ERMPs can rarely be accomplished by natural scientists alone. The requirement that the environment be considered in its broadest sense necessitates the use of a multidisciplinary approach. The disciplines that are represented in any ERMP study team will vary according to each particular development and its environmental setting, but a minimum requirement is to have input from engineering and social sciences, as well as from natural sciences.

Preparation of an EIS also requires an ordering of input. The disciplines required in a study team can be ordered into a three-tiered framework of describers, primary synthesizers, and co-ordinators (refer Figure 1). The describers form the bottom layer of the framework and comprise those disciplines which are mainly descriptive, i.e. botanical and zoological taxonomy, geology, meteorology, oceanography, and archaeology. These descriptions provide the basic data or information required for describing the environmental setting of a project.

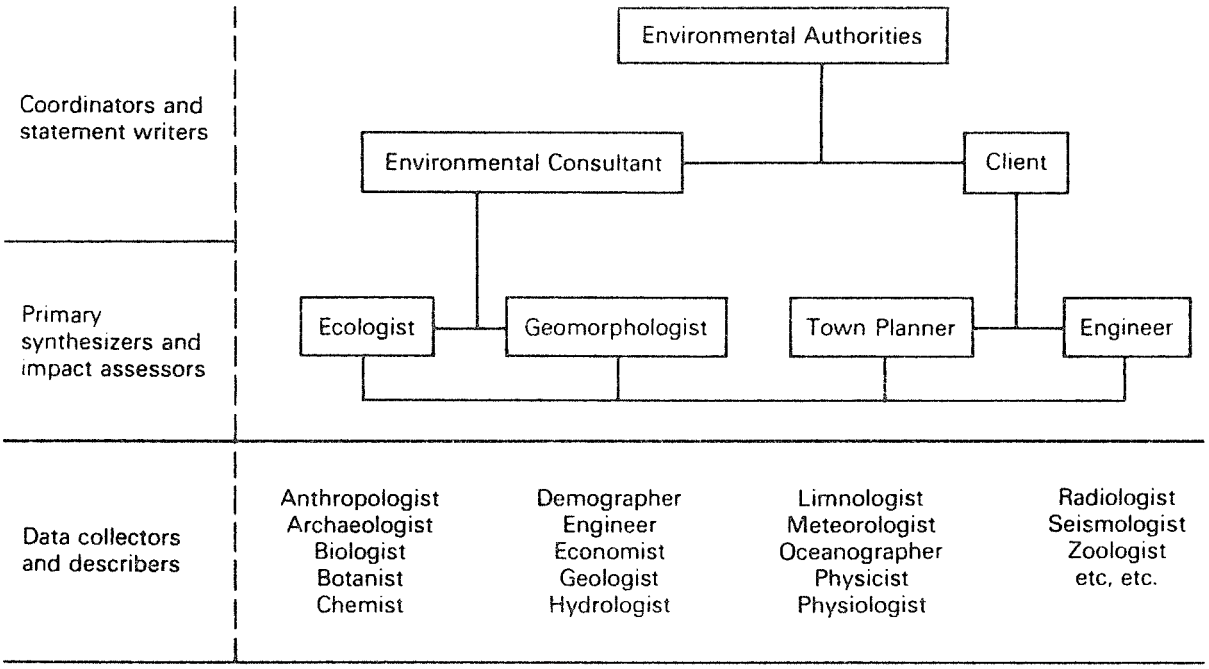

Figure 1. Components of an ERMP study team.

The middle layer is comprised of those disciplines which draw from a number of descriptive sciences to produce an understanding of relationship between those sciences, e.g. ecologists and geomorphologists.

The top tier is generally comprised of one person (or a small committee) whose role is to co-ordinate the activities of the others below in the framework, understand and synthesize their inputs and prepare the statement of Environmental Impact. Such a person or group can be of any discipline but usefully should have:-

(i) a 'Jack-of-all-trades' understanding of a wide range of sciences;

(ii) management and communication ability; and

(iii) substantial experience in the preparation of ERMPs and knowledge of the associated administrative and legal processes.

The ease with which an ERMP passes through the government evaluation process and the public review process often depends very much on the ability and experience of the co-ordinators and primary synthesizers.

Having identified the various type of natural resource consultants available and their relative contributions to the ERMP process, let us now examine the roles and responsibilities of the persons whose job it is to design and prepare acceptable ERMPs, i.e. the co-ordinators and primary synthesizers. Such persons are here loosely termed environmental consultants.

5. What are the Consultant's Responsibilities?

Because Environmental Consulting is a relatively new profession, consultants have not as yet formed a professional association such as that formed by engineers or mining industry personnel (e.g. ACEA or AIMM). As such, there is no nationally-recognised code of ethics — hence at present consultants have had to develop their own code of ethics to assist them define their responsibilities. As far as our firm is concerned, we believe that consultants have three major responsibilities:

(i) Firstly, we have a responsibility to ourselves and our colleagues in similar disciplines to do a job of work that is professionally competent and acceptable to our peer group. By doing this we not only protect our professional reputations but also markedly contribute to our client with the provision of the best available information on which to base decisions.

(ii) Secondly, we have a responsibility to our client to obtain environmental approval for his project to proceed in as short a time as is practicable and with the expenditure of minimum cost. To do this we have to firstly ensure that the client's design is as environmentally acceptable as practical, and secondly we have to prepare a sufficiently objective and thorough statement of environmental information such that reviewers and decision makers within the government can determine the adequacy and accuracy of our assessment.

(iii) Finally, we have a responsibility to the public to identify and consider their interests and concerns because it is the public, through their parliamentary representatives, who have requested environmental legislation. It is also the public who, through their payment of taxes, are funding the government departments whose responsibility it is to ensure that the public's interests are considered. There is another good reason for considering the public's interests and that is because, in today's politically-motivated system, it is the public's perception of the acceptability of a project which tends to influence the time span and additional cost required for final approval of that project. It would be an unwise consultant indeed who ignored the public's interest since such an act could cost his client dearly.

Most ERMP's that do not successfully negotiate the approval process quickly are those which have either:-

- failed to idenfity the social issues associated with the project;
- provided inadequate information on which to base reliable assessment; or
- been environmentally unacceptable.

The fact that very few ERMPs are ever completely rejected shows that most projects can be designed to fit into their local environment with an acceptable level of impact.

6. What Role does a Consultant Perform?

When working on a project the consultant performs a number of roles, each aimed at facilitating acceptance of his client's proposed development. These roles can be categorised as follows:

Procedural Adviser — the consultant needs to guide his client through the administrative processes and legislative pathways which are part of the ERMP approval process. There are many State and Federal Acts of Parliament and Procedures to the Acts which need consideration in some assessments.

Problem Solver — an experienced consultant can generally gauge the acceptability of a project during its early stages. If potential problems occur these can be identified and often solved by merely altering the design or specific location of a project or associated facility — as long as the problem is identified early enough in the planning process.

Educator — most proponents are either unaware or not well informed about the legislative and administrative requirements of environmental approval, the complex and dynamic nature of the natural environment, and the range and scope of work required for adequate ERMP production. Thus the consultant finds it necessary to educate him up to a level of understanding sufficient to justify the expenditure of time and money considered necessary.

Sometimes, particularly with unusual projects such as say uranium mining or toxic effluent disposal, the consultant also has to educate the government's officers who will assess his report because of their inexperience with a new type of development. Thus time needs to be frequently spent in liaison with the officers to keep them up to date with the project as it proceeds.

Public Relations Adviser — in today's politically-motivated system the media are playing an increasingly frequent role in environmental issues. Unfortunately most coverage tends to be imbalanced and emotive, and as such it is not a good medium on which to base assessment of a project's acceptability. However, media reporting does provide a useful guide to the range of social issues which should be considered, and can be a strong force in shaping the public's perception of a project. Hence it should not be ignored. As a result, consultants are increasingly being asked to provide reliable information for public relations purposes.

Researcher — many large projects which are proposed in W.A. are the first of their type in the State and as such information about their potential impacts is not available. In such cases the consultant often designs and implements a scientific research project aimed at providing data upon which the adequacy of his impact prediction can be based.

Reporter — the success of an ERMP often depends on how well data and information are presented, and how understandable it is to reviewing officers and laymen. Hence the consultant needs to have communication skills to be able to present his client's project in a readily assimilable format.

Compromiser — the consultant's major role however is that of translator of assessment guidelines provided by the DCE into a short-term, applied investigation programme designed to provide acceptable data upon which to base assessments. In so doing he is normally directed by his client to limit his efforts to a level which is necessary to get the project approved. However, he must also consider the possibility of project delay or even refusal if the studies are found unacceptable to the reviewers.

He therefore regularly becomes the "meat in the sandwich" between the DCE and their perspectives and expectations of the assessment process on the one hand, and the proponent and his differing perspective of the process on the other hand. As such he has to develop a compromise between the approval required by the client, and the scientific and technical standards which he would like to adopt to ensure acceptance within a process that is essentially a peer review.

Thus the core of the consultant's dilemma is to devise a defensible, credible method for undertaking impact assessments within a restricted time and budget framework.

7. How does the Consultant do it?

Our firm has found that the best strategy to achieve a reliable assessment at minimum cost is to adopt a phased approach to the production of ERMPs. Three phases of work are involved. These are:-

Phase One — Preliminary Appraisal;
Phase Two — Investigation; and
Phase Three — Reporting.

Phase One — Preliminary Appraisal

The major objective of this phase is to determine the scope of research work required for reliable impact assessment. As such it should be conducted very early in the development's planning stage. Achievement of this objective usually involves:-

(i) a review of available local knowledge on the particular environment under threat;
(ii) a review of published scientific literature on effects of similar proposals in other biogeographical similar parts of the world; and
(iii) a short field inspection of the project area.

From the above work we then:-

a) identify the present level of knowledge about:-
   - the resources potentially at risk from the proposed development; and
   - the human and ecological significance of these resources;

b) we also identify the range of potential impacts that may occur to the environment, as a result of the proposed project.

Having identified the issues involved we are then, and only then, in a position to **design** the research programme necessary for reliable impact assessment because only after this stage can the information necessary for assessment be judged to be either available or lacking. This appraisal should be conducted by the consultant when preparing his proposal.

The advantages of this preliminary phase of work are that:-

(i) it enables formulation of clear objectives at the start of the study;
(ii) it provides the client with an early appreciation of potential problems and the scope and cost of work required to solve these problems; and

(iii) it enables informed input to the study by government authorities at an early stage of the development planning, thereby providing the proponent with an early and relatively cheap indication of the risk factor associated with his development.

Phase Two — Investigation

The major objective of this phase of work is to collect the environmental data required for impact assessment. In general, two types of study are usually necessary.

Descriptive Studies: The main objective of these studies is to describe the environment to only sufficient detail to allow identification of:-

(i) the geographical boundaries of the natural system to which the project locality belongs;
(ii) the important resources of the study area;
(iii) the human significance of those resources;
(iv) the major processes which control distribution and persistence of those resources; and
(v) those processes which may interact adversely with the project.

To determine the above it is necessary to place the locality of the proposed development into both regional perspective and an historical perspective to provide a space and time framework for assessment of the study area's human significance. Most environmental issues involve the conservation of resources believed to be of value to the community. Hence an assessment of its significance needs to be based on criteria such as:-

- Is the natural system in which the project is located, regionally widespread and common, or is it restricted to local areas?
- If it is restricted, then does it contain unique landforms, biota or other natural features that provide it with statewide, national or international value?
- Does it offer recreational, educational, scientific or other conservation potential not offered by other areas?

In our experience, it is rarely necessary to develop more than a background conceptual understanding of the local ecosystem to achieve the above objectives. There is no need to develop a baseline description of the environment at this stage. Such a detailed description is only required if it is determined that monitoring will be necessary to confirm the predictions made in the ERMP.

Assessment Studies: These studies are specific to each ERMP and usually involve the collection of local impact experience by describing the distribution and abundance of biota in the vicinity of existing facilities which are similar in potential impact to the proposed development.

Phase Three — Assessment and Reporting

The objectives of this phase of the ERMP process are generally to:-

(i) predict the impact of the proposed development;
(ii) assess the significance of that impact;
(iii) determine the need for a management programme, and if a programme is considered necessary, outline the scope of monitoring and management work considered suitable; and
(iv) present the results of the study in an acceptable format.

This phase of work is generally the most difficult to accomplish, and the most difficult part within it is the actual prediction of impact. Unfortunately, there is no completely objective technique available for either predicting the environmental or social impact of a proposal, or assessing the significance of that impact. Therefore some subjective assessment is necessary. However, it is possible to minimise the level of subjectivity in assesment by referring to a combination of all or some of the following techniques:-

- review of scientific and engineering literature for effects of similar projects in similar parts of the world;
- field experiments or surveys designed to determine the effect of specific impact (i.e. assessment studies);
- analyses of the evolutionary history of the natural system by stratigraphy to identify the processes which have operated in the past and present to maintain it;
- numerical simulation models of worst-case situations of dispersion and dilution of waste materials into the environment.

Possibly the most time-consuming part of this assessment phase is the production of the report because it needs to be understandable to laymen and the general public, but yet needs to be sufficiently rigorous for professional scrutiny by government officers and peer review. This requirement is usually accommodated by producing a layman's report and presenting technical detail of results and interpretation in appendices to the report for the professionals.

8. Synthesis of Consultant's Perspective of an ERMP

That concludes our opinion of how consultants view and produce ERMPs. There are a number of points that we feel need to be stressed:-

(i) Not all natural resource consultants are the same. They vary widely in terms of both professional training and experience, and hence in level of input to the decision-making process. Therefore they need to be selected carefully.

(ii) Those who are trained to design ERMPs and assess impacts have a responsibility to their client to obtain ready acceptance of his project from environmental authorities.

(iii) In obtaining that approval the consultant needs to continually compromise between the expectations of the environmental authorities and peer group reviewers on the one hand, and the proponent's requirement to limit the amount of work done to the bare minimum on the other hand.

(iv) Our firm has found that the best way to resolve this dilemma is to adopt a phased approach to the production of ERMPs such that the client can obtain an indication of the likely costs and difficulties he faces in obtaining environmental approval at an early stage in the planning phase of the project. That way the proponent can assess the entrepreneurial risk that he is running with his project.

(v) An ERMP is not just a document which justifies the proponent's development, but it is a lengthy study process by which a proposed development undergoes environmental scrutiny and, as a result, is designed to ensure that impacts associated with the development are acceptable to the community. Thus preparation of ERMPs takes time (up to 12—15 months for large developments) and is not something that can be easily rushed. Therefore, it is important that the consultant be engaged at an early stage of the development planning so that he can both ensure that the design is environmentally acceptable and have the time required to collect the data necessary for reliable impact assessment.

Development in the Coastal Environment — The Role(s) of the Planning Consultant

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Introduction

Adequate protection of our coastal and estuarine environment is becoming a major issue facing planning, at both regional and local scales. In this paper I will briefly review the several roles a planning consultant may occupy as an advisor to different groups (Government, Local Government and private), illustrating these roles by reference to examples from my work.

I will then examine the lessons to be drawn from these examples — good and bad — and the issues arising which in my view should lead to a better understanding. And, I hope, to a better means of integrating environmental considerations and environmental management into the planning and development of the coastal and estuarine resources of the State.

1. The Pressures on the Coast

All the major cities of Australia are located on the coast or close to it, as are most of our major towns. In W.A., with the exception of Kalgoorlie, almost every town of consequence is so located. Expansion of these towns and cities — because of the attractiveness of the beach — concentrates itself, as in the Corridor Plan for Perth, along coastal suburbs. What is more, a high proportion of our leisure activity at all levels is water-orientated — swimming, surfing, windsurfing, scuba-diving, yachting, motor-boating, fishing and other similar pursuits. Already the boating pressure on the Swan estuary has reached a practical limit and the advent of the Americas Cup is only accelerating the development of new coastal facilities to the north and south of Perth.

Added to all this is the propensity to spend our holidays by the seaside. This, together with increased international tourism, increasing local spending-power, a growing tendency towards investment in second homes, longer retirement and other factors has attracted vast resources and huge investments into coastal and estuarine development projects. And even where no large projects are planned, pressure from local inhabitants (eg. trail bikes, dune buggies) is a growing source of concern for local and State authorities alike.

What we must be aware of is the need to ensure that in the search to enjoy and exploit this coastal environment we do not bring about its destruction. We must find ways of managing and planning for rational human use of the coast without destroying the very factors which make it attractive in the first place. In this process, the planning consultant has several roles to play.

2. The Consultant's Role

The consultant may find himself advising one of several groups, each having a different interest in the environment and in the outcome of the consultant's work.

For example, a government authority may be concerned with regional planning issues affecting the environment or with assistance at a policy level on environmental planning matters.

On the other hand, local government may be concerned with interpreting the requirements of State Authorities, with applying their own statutory controls, and, on occasion, with the development of their own vested lands in riverfront and coastal environments.

The third main group seeking advice is the development community, meaning in this context land development organizations (including government agencies) and other professionals advising them, such as surveyors, engineers, architects, landscape architects and property consultants.

Of the three groups, government and local government tend to require advice on development **control,** whilst the latter group is concerned simply with **development.** The planning consultant, if he has made himself aware of both the development constraints imposed by the environment and the opportunities for overcoming or managing those constraints, can play a vital role in bringing these two views together in a creative way.

For a planning consultant to be effective in this area he must firstly have an understanding of the environment, not just as another factor to be taken into account (like roads or shopping centres) but as the essential background underpinning whatever development is being planned for. He must also proceed on the basis that good environmental management, especially in a coastal situation, will mean more efficient use of land, a more attractive development, a development less prone to environmental damage and thus a more succesful long-term investment.

By way of illustration: a holiday or resort development may be proposed on a stretch of coastline somewhere in W.A. It is desirable from the developer's point of view, that development be permitted as close to the waterside as possible. This may raise issues such as degradation of the

dune system through excessive human access or destruction of the dune by wave and tidal action over the short or long term. The result may be the destruction not only of the dune but of major portions of the development — at great cost to the developers and to the public. The planning consultant must be aware of these and similar issues (eg. the impact of a harbour proposal on underground water supplies; or the possible gouging effects of a harbour mole on adjacent beaches), not as an expert environmentalist, but in sufficient general terms to know when specialist advice is required. Additionally he should be able to co-ordinate and orchestrate the advice of specialist consultants in an imaginative and creative way.

The planning consultant must also be able to deal with environmental constraints from an understanding of the potential inherent in good environmental-management practices (for example the proper siting of pedestrian accessways to avoid dune degradation, the possibilities of dune re-vegetation programmes etc.) again, not as an expert in soil-erosion control nor as an expert landscape architect, but with sufficient insight and understanding of the issues to propose such measures, to design them into the development, and to be able to brief the specialist sub-consultants as required to achieve a workable and practical overall planning concept that is at the same time an imaginative and exciting one.

I will illustrate my approach to these issues by reference to some examples:

3. Some Practical Examples

The planner's work is concerned with the allocation of human uses to particular areas of land — i.e. "land-use planning". To do this effectively he must have an understanding of what is possible and what is practicable. In the context of this seminar this means answering the question: "What land uses are appropriate on a given parcel of land that has a high environmental sensitivity due to its coastal or riverine location?"

Not all the projects I will describe required a full Environmental Review and Management Programme and not all are in prime coastal locations. Nevertheless they clearly illustrate my approach to environmental management and planning design in coastal or riverine situations, and the role the planning consultant can perform.

A. Coogee Coastal Area Study

Undertaken in conjunction with Kinhill Stearns P/L for the MRPA.

Task:	To identify the most suitable land uses in a coastal area currently given over to noxious industries — abattoir, processing works, powerstation etc.
Major Concerns:	Effluent disposal methods; location of site for a future container port; sites for new waterfront industries; beachfront recreation/conservation values.
Issues:	If a) current disposal methods and b) current land uses (sheltered coast used for noxious waste purposes) were unacceptable, what alternatives were available, and at what cost to the community and to individuals?
Findings:	Noxious industries could be removed over the long term from the Coogee area, to be replaced by a mixture of housing and other industries.

B. Burswood Island Study

Undertaken for the W.A. Government by Interlake P/L.

Task:	To identify possible land uses of a public and recreational nature which could be located on the "Island".
Major Concerns:	Location of the site within a meander of the Swan River; Subject to long- and short-term inundation; poor foundation conditions generally; history of the site as a sewerage and waste disposal area; major road plans.
Findings:	Certain parts of the site are available and suitable for certain public recreation functions; certain parts are capable of being built upon without environmental degradation; certain public uses with careful planning, design and landscaping, can enormously enhance the public value of this presently degraded spot.

C. Swan River Foreshore, Nedlands

Undertaken for the City of Nedlands.

Task:	To advise the local authority how best to upgrade and improve a foreshore reserve.
Concerns:	Windswept playing fields, access, parking, visual amenity.
Findings:	A low-key solution was proposed, gentle realignment of access roads, subtle introduction of parking areas, bicycle paths, groynes, beaches and a new planting programme for Council to implement.

(This plan subsequently embellished by a landscape architect, which to an extent has destroyed its simple character.)

D. Pelican Point, Bunbury

Undertaken for a development company.

Task:	To advise on development of a holiday village resort at the mouth of the Collie River.
Issues:	Flood plain characteristics; potential for small boat harbour; re-vegetation of site; edge-control of foreshores.
Solution:	Design of the development reflects environmental constraints; eg. buildings elevated above flood-level; periodic floodway; management techniques for water quality control & foreshore development.

E. Mindarie Development Study
Burns Beach Development Study

Separate, but adjacent coastal development parcels in Perth's NW Corridor.

Task:	To advise on development potential and an overall land-use pattern.
Approach:	Using integrated matrix-value techniques based on McHarg ("Design with Nature") we were able to assess large land areas, to allocate values for development, recreation and conservation and to integrate these into an overall plan.

F. Secret Harbour ERMP

A resort/residential development to the South of Perth.

Task:	To advise on development possibilities and constraints associated with the proposed harbour and groyne construction on the coast.
Approach:	The developer was proposing substantial residential construction to the west of the proposed inland harbour — i.e. in close proximity to the water-front on an inherently unstable dune system. If engineering considerations indicate a stability arising from the harbour construction itself, it can be assumed the dune will be protected from wave trauma. Windblown sand, vehicular and pedestrian access; re-vegetation programmes etc. must all be assessed in this context.

G. Two Rocks Centre, Yanchep

Expansion of a harbour and resort theme already established at Two Rocks. Westerly exposure and restricted opportunities for large-scale developments have been maximised.

4. Conclusions

With all these examples — as with other proposals for harbours, marinas, canal developments etc. on the west coast — we are faced with similar conditions and constraints. Firstly the westerly exposure (the strong summer south-west breezes, the north-west winter storms) can dramatically and drastically affect coastal development. Hand-in-hand with this natural exposure is the lack of natural shelter. Apart from the Swan River and Cockburn Sound, very little shelter can be found in this part of the coast for small boats. Further, the west coast itself is notoriously reef-strewn and treacherous for the unwary.

No wonder then, that the search to establish recreational boat havens has been so prolonged here, nor that the types of coastal residential developments so prolific in parts of the east coast have taken so long to eventuate. Our difficulties are much greater and the risks higher. Nevertheless, all these examples demonstrate the value of understanding the environmental determinants at an early stage and of close interaction between the planning consultants and the other consultants on the development team. Bring the planner in early. If he is sympathetic to the environmental constraints of a particular project or a particular coastal site this can only be for the benefit of the project. He has an essential role in establishing zoning and re-zoning requirements and in dealing with the authorities to be encountered in the development process, but he may also have an extremely helpful and imaginative role to play in the "urban design" or "environmental attractiveness' of the ultimate project.

Local Government — It's Role and Responsibility in Balancing Conflicting Objectives along the Coastal Strip

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1. Introduction

The management and development of the West Australian coastline is receiving increasing attention and various suggestions have been made for more effective control. Notwithstanding these suggestions, one undeniable fact remains constant. It is, that although coastal waters come under the jurisdiction of the Commonwealth or State Government, the major part of the coastal strip, with some notable exceptions like the Fremantle Port Authority and the Swanbourne Army land, comes within the jurisdiction of a local government authority.

That is not to say that other authorities do not have some jurisdiction in respect of Crown land, environmental protection, public works and town planning matters, but in the absence of any overriding Commonwealth or State Government funding for the development and management of the coastal region, the responsibility has fallen squarely on the shoulders of municipal ratepayers.

The Tourist Authority, the Department for Youth, Sport and Recreation, the Lotteries Commission and some others have provided financial assistance in particular circumstances.

Meanwhile the talk goes on about how fragile and unstable the coastal strip is especially when confronted by the worst of all environmental hazards — man himself — and the implication is that the local authorities who actually have the responsibility to do something about it are insensitive or inept, or both.

2. Attempts at Co-operation among Coastal Local Authorities

Notwithstanding this, attempts have been made by some local authorities to confront some of the coastal problems.

For example, prompted by the North-West Group District Planning Committee (formerly the Group B District Planning Committee of the Metropolitan Region Planning Authority), a Northern Metropolitan Coastal Committee was set up on the 18th November, 1974. It lasted five years, having its last meeting on the 19th June, 1979.

It was formed from all the Local Authorities controlling ocean beaches between Fremantle and Wanneroo and the Fremantle Port Authority and its objectives were to share information and ideas of common interest, to make joint representation to the State Government, if applicable, and to encourage one another in involvement in beach matters. The Committee met regularly and comprised one elected and one Technical Officer from each of the member Local Authorities and an official from the Port Authority.

The following list of items was drawn up at the inaugural meeting as worthy of consideration:

Wind and wave erosion;
Vandalism;
Beach cleaning;
Provision of Reserve lands;
Improvement of beaches — new developments;
Dune management;
Parking areas;
Beach access;
Roads near beaches;
Aesthetics at beaches;
Parking control;
Broad planning of beach/foreshore resources;
Management and use of beach resources;
Beach stabilisation;
Surveys of winds and tide movements;
Clothing and decency at beaches;
Surf life saving clubs;
Film — "The Beach a River of Sand";
Recreation vehicles on beaches.

Each Local Authority was requested to submit a broad outline statement of its beach foreshore resources with a view to establishing a Master Plan. I believe a Master Plan was produced although very few have ever seen it.

In its five years, the Committee exchanged a good deal of information and was not intimidated when it discovered the existence of potential competitors like a "W.A. Coastal Development Committee", a "Coastal Advisory Committee" and a "Coastal Protection Association".

The Committee learnt about some of the worst excesses of environmental and aesthetic vandalism such as the foreshore tip run by the Mosman Park Town Council, the dumping of an entire demolished house on the Cottesloe foreshore, the Trigg Island car parks with their dreadful light poles and the architectural gizmo called Brigette Beach at South Scarborough in the City of Stirling.

The Committee also learnt about the problems at Floreat and Quinns and more positively about the experimental areas at City Beach and Trigg where research was undertaken into coastal erosion and dune rehabilitation.

Other things were canvassed like small boat ramps and charges for parking at beaches. At one stage, the Committee toyed with the idea of inviting Kwinana, Cockburn and Rockingham to attend its meetings but those authorities were already members of the Cockburn Conservation Committee, so the idea was not taken up. It is interesting to note that the Committee did resolve to support the setting up of a Statutory body for control of the beach area as a specific region.

Although the suggestion of one elected official at the very first meeting for an inspection of the Swanbourne Free Beach was not taken up, an inspection of the entire northern metropolitan coastline was subsequently undertaken by the members of the Committee with, it is understood, some mutual benefit.

As an example of Local Authority co-operation, the Northern Metropolitan Coastal Committee did not have a very high profile. It could be said, however, that much of the environmental protective work by Local Authorities that has occurred along the north metropolitan coastline in the last ten years had its genesis in the meetings of that Committee. I was not a member of the Committee, but as a citizen of Perth I will be eternally grateful for the effort and commitment displayed by many who without funds or fanfares served on it. Even though they may not have realised it, they had some considerable influence on the restorative work and on the rationalisation of haphazard and indiscriminate use of the beach region by unthinking humans.

3. The Role of Planning Legislation

I must confess to having been somewhat reluctant when asked to give this address because my experience is limited to the Metropolitan Region and the City of Stirling in particular and the problem is far more wide-ranging than that.

However, let us commence with some fundamentals. What control mechanisms are there to protect the coastal strip in the Metropolitan Region?

The 1963 Metropolitan Region Scheme reserves the entire coastal strip for Parks and Recreation. This means, for example, that between Fremantle and Quinns all the land on the ocean side of the main north-south access road is reserved except for the Whitford Nodes, three single house lots at Trigg, Scarborough, and the area of South City Beach.

At South City Beach, the main coastal route was diverted inland via Challenger Drive after the land between the coast road and Challenger Drive had been fully developed with single housing.

Scarborough is unique in that it has some 13.75 ha. of land in private ownership between the ocean and the main West Coast Highway. Of this, 7.6 ha. has been shown in the City's district Planning Scheme since 1969 as Special Beach Development Zone, of which more will be said later.

All privately-owned land on the eastern side of the main coast road is zoned for urban purposes. This is, for the most part, low density housing. Local Authority District Planning Schemes reflect these reserves and zonings.

Now this is all right as far as it goes but coastal management requires more than the town planning mechanisms of reserving or zoning land. As Jeremy Randell pointed out in his paper on Coastal Management to the Royal Australian Planning Institute Congress in Perth in October, 1983, zoning is only one aspect of Planning. He said that "Little attention is given to specific goals or needs of particular users or sectors of society. There is little long-term perspective, or vision of the future. You rarely see a conception of how a coastal area should look in 10, 20 or 50 years." He goes on to say that "coastal management is at the mercy of developers for it is the developers who have a vision of the future (often one with which many people disagree) and all coastal management can do is slightly modify the vision that the developer imposes."

It is undoubtedly true that the coastal region has some fairly intense land use conflicts. For example, controversy arises when private developers wish to exercise their rights to develop and find themselves not only subject to a maze of land use and environmental conditions but also to community outrage. Unfortunately, until such time as government at all levels develops an alternative vision and more importantly the wherewithal to implement such a vision, it will be forever difficult to resolve the land use conflicts which plague the coastal region.

When a private developer has a proposal which impinges on the coastal region now, each authority that gets the chance adopts a fall-back position and attempts to cover its backside by applying all manner of conditions to the proposal.

In its Report No. 12 entitled "A Conservation Strategy for Western Australia", the Department of Conservation refers to 25 State Government organisations plus the Local Authority concerned as having a direct or indirect involvement with matters coastal. Conditions on development applied by all these Authorities are capable of having considerable economic and social effect.

Geoff Standen, a Sydney lawyer, recently referred to the developer's dilemma in getting approval to develop which is accompanied by a litany of conditions that amount to a "Yes — but" or even worse.

He recalls a telex sent by an Israeli intelligence officer to his superior in John le Carre's book "The Little Drummer Girl". The telex read "Yes, repeat No". This may often be precisely how a developer sees it when receiving his conditional planning approval.

4. The City of Stirling's Special Beach Development Zone

In the last few years, a good deal of publicity has been given to the Scarborough Beach front, and it may be of interest if I put some of the wilder claims into perspective.

The 7.6 ha. known as the Special Beach Development zone is privately-owned land situated 11.2 km. from the Perth C.B.D. and is bounded by The Esplanade, Reserve Street, West Coast highway and Brighton Road. Comparisons have been made with the Gold Coast.

The coast line of the Gold Coast municipality is 41.8 km. That is equivalent to the distance between Fremantle and Quinns Rock. The City of Stirling's coast line is 6.5 km.
The main development at Surfers Paradise occupies approximately 6 km. of coast line and varies in width from 0.5 km. to 2 km. Six kilometres is equivalent to the distance between South Scarborough and Marmion. The Special Beach Development Zone by comparison occupies 0.9 km. of coast line and is approximately 120 metres wide.

There are enormous differences between the two areas in respect of climate, wind patterns, coastal processes and shadow effects.

The distance at Scarborough between the ocean and the nearest building is considerably more than at Surfers Paradise. Moreover, the width of the actual beach at Scarborough has been increasing by some three metres per annum and is presently in the order of 135 metres wide.

I would say that any comparison betwen the Gold Coast and Scarborough Beach is simply irrelevant.

The important point however that needs to be made has to do with the notion of choice, a notion that all Town Planners strive for. Nowhere in the Perth Metropolitan Region is there a coastal resort where the community at large can enjoy the benefits of the seaside where recreational, commercial and residential uses are mixed in a concentrated and vital environment.

Instead of a well-designed three dimensional dynamic environment at the one single place in Perth where it could have happened, we have had at Scarborough a dilapidated low grade built environment fronted with a sea of bitumen parking. Every proposal whatever its merits, including the latest comprehensively designed Observation City, which meets all the criteria of the City's Planning Scheme and development guidelines has been the butt of ill-informed, parochial, small minded and intensely biased comment from people who have produced not one single shred of evidence to back their claims of impending disaster. The same people have dismissed out-of-hand all surveys, investigations, research and studies produced to support the development.

The City of Stirling's Special Beach Development Zone is an example of one Local Authority that is prepared to think regionally and it is to the credit of the Council and the State Government that they are prepared to support comprehensive proposals like Observation City for the benefit of current and future beach-goers in Perth.

5. The Wherewithal

The amounts of money actually spent on the coastal region by Local Government vary considerably. If the City of Stirling allocates $500,000 for beach-related maintenance and capital works out of a budget of $35m., what would be expected of Broome, with a budget of less than $100,000. Is it fair to expect Cottesloe to maintain and promote its popular beaches with no assistance of a permanent nature.

When one considers the annual amounts of money that are required to provide and maintain changerooms and toilets, surf-life saving facilities, beach cleaning, car parking construction, maintenance and lighting, dune stabilisation, sand drift control, pedestrian paths and bicycle paths, it is little wonder that local authorities are continually looking for alternative funding sources. In a number of instances in Stirling, developers of privately-owned land on the coastal strip have contributed to the provision of facilities for the general beach user.

6. A Common Goal for Coastal Management

Notwithstanding the debate that goes on about intergovernmental relations and the statements made about the importance of the third tier or the third sphere as the current jargon has it, it is at the local government level where effective control is exercised for better or worse along the Metropolitan coast line. Rather than bemoan this fact, it may be preferable to organise a

way of setting down what objectives should be pursued. The Metropolitan Region Planning Authority did this with the Herdsman Lake Concept Plan. The Authority certainly didn't expect everyone to agree but all interested parties were given an opportunity to work up a plan which was then adopted for future planning purposes.

By sharing in a common goal where differing objectives are rationalised into some kind of plan, it may be that you will get all coastal Local Authorities to think regionally and act locally. To most Local Authorities, all land-use problems are local problems. The question is which of the local problems are also regional ones.

Given a commitment to a common goal, it may not matter how many authorities are involved. Sometimes it is not structures that are the problem, but the behaviour of the people charged with the responsibility for making them work.

A Broad Scale Approach to Coastal Management — A Local Scale Approach to Implementation

Paul Drechsler, B.A., MMRS
Director, Urban and Environmental Planning Group — a Division of Hames Sharley Australia

Introduction

This paper represents a synthesis of our approach to the formulation of a coastal management plan under the auspices of the South Australian Coast Protection Act.

South Australia was the first to introduce legislation that specifically relates to coastal zone planning and management. The legislation provides for the establishment of Coast Protection Districts which are subjected to a comprehensive investigation of their biophysical, economic and social characteristics prior to the preparation of coastal management plans. There are seven Coast Protection Districts in South Australia correlating roughly with the State's Planning Regions. These are shown on Figure 1.

Four Coast Protection Districts have been studied to date on a priority basis. The Adelaide metropolitan coast was investigated first because of its vulnerability to storm events and human impact. This was followed by the Fleurieu, Yorke and South East coasts.

There is an obvious logic in prioritizing areas to be investigated — from those with the highest degree of vulnerability to those that are the least vulnerable. This is particularly relevant in the Western Australian situation where the coastline extend over 12,000 kilometres and, in the main, is sparsely settled.

Investigation of a Coast Protection District

General Description of the Coast Protection District

The most recent large-scale investigation of the South Australian coast was carried out by U.E.P.G. as Principal Consultants. The Coast Protection District comprised the South East coast depicted on Figure 2.

For the statistically-minded, the coastline length is 390 km; the District area is 870 square kilometres; the maximum distance inland of the District boundary is 5.5 km; the minimum distance is 2.2 km; there are six local government instrumentalities that have jurisdiction in the area; and there are fifteen or so settlements of varying size.

The South East Coast exhibits considerable landform diversity including high energy beach dune systems, beach ridge plains, dunerock headlands and reefs, limestone cliffs and reefs, shingle beaches and sink holes — to name just a few. More importantly, the coastal zone includes the Coorong estuary and chains of ephemeral and permanent lakes.

A number of aspects of the South East coast are of considerable scientific and educational interest. The beach-ridge plains of the South East and abundant archaeological evidence of the Aboriginal occupation of the coastal region are of particular significance. The South East coast is also significant from an ecological point of view in that almost every type of coastal ecosystem in South Australia is to be found along there.

European settlement of the South East began shortly after the establishment of the colony of South Australia. Since then, European man has had a significant impact on the coastal zone through the clearance of native vegetation; the introduction of livestock and pests, such as the rabbit; and the construction of townships, shack settlements, roads, ports and other facilities. Many of these activities have led to the destabilization and degradation of the coastal zone, especially in those areas which are environmentally sensitive.

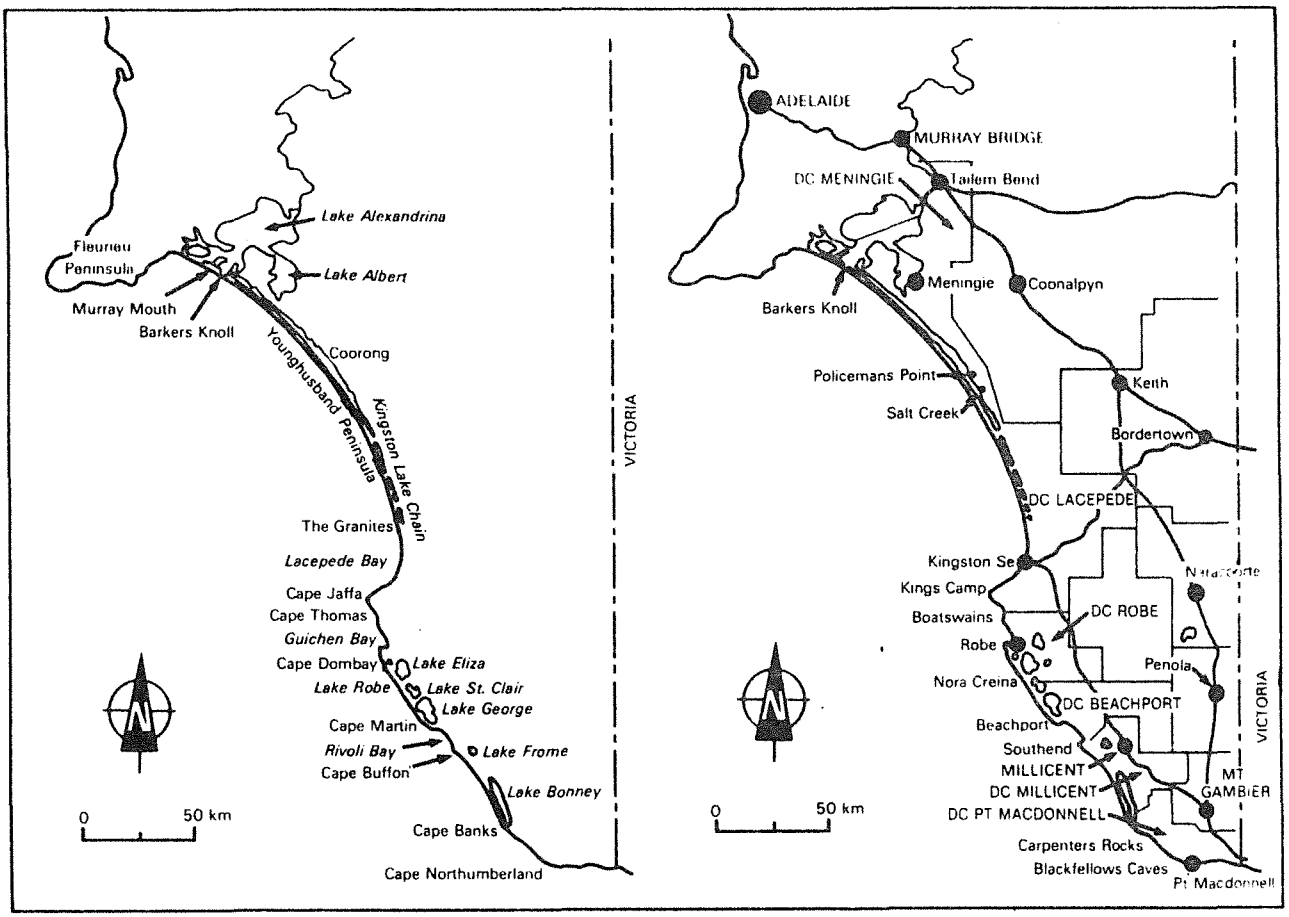
Grazing, commercial fishing, recreation and tourism are the major economic activities carried out in the coastal region of the South East today. Major settlements are located at Kingston S.E., Robe, Beachport and Port MacDonnell. These towns service the fishing, grazing and tourism industries. Many smaller settlements, including Carpenter Rocks, Southend and Nora Creina, are centres for fishing and/or holiday shacks.

The Study Process

The study was commissioned by the S.A. Coast Protection Board for a fee, in 1984 dollar terms, of about $65,000.00. In total, some thirteen people worked on the project including:

... three Planners experienced in coastal matters;
... a Coastal Engineer;
... an Ecologist;
... two Marine Biologists; and
... two geomorphologists.

Figure 1. Coast Protection Districts in South Australia compared with the length of the Western Australian coastline.



(a) South east coast natural features. UEPG

(b) South east settlements and Local Government boundaries. UEPG

Figure 2.

In essence, the study was a multi-disciplinary effort with the Planners accepting the coordination role.

Our task was to examine, in a comprehensive manner, all of the aspects and issues that would have a bearing on the formulation of a future Coastal Management Plan. Our task was made easier by the fact that the Board had previously commissioned two specialised reports — one by Short and Hesp on the morphodynamic aspects of the coast, and the other by E.R.P.G. on the terrestrial biota. These reports were made available to us at the commencement of the study.

The methodological framework of the study was based upon a period of data collection followed by elucidation of the issues and then the framing of recommendations.

Figure 3 illustrates the main headings under which we worked.

It should be noted that Figure 3 represents an analysis that was carried out at the macro, or regional level as well as the local, town-specific level. Whilst one may conclude that Figure 3 represents a logical series of headings, I believe that there are a number of aspects included in our study which I had not seen in any large degree in other coastal planning studies.

Firstly, it appears that there has been some neglect of the water side of the coastal management equation. Attention seems to be focused on the land side, probably because it is easier to perceive the forces at work. In our study, Marine Biologists carried out a broad brush evaluation of the marine biota, particularly where we thought there were threats from pollution or where important marine communities needed to be protected. As a consequence, new marine reserves have been proclaimed along the South East coast and a multi-million dollar sewage treatment works is to be built in the future near Mount Gambier to accommodate that city's effluent, which is presently being discharged in a raw form into the marine environment.

In non-metropolitan situations, of all man's activities, the tourism industry potentially has the largest impact on both townships and the coastal zone as a whole. Consequently, close examination of the tourism industry provided an important input into the formulation of coastal zone management strategies. That is my second point.

Physical Environment
- climate and oceanographic parameters
- geology and geomorphology
- soils
- hydrology

Terrestrial Biota
- biota of inland waters
- vegetation
- fauna

Marine Biota
- intertidal and subtidal biota
- importance of marine habitats
- the Coorong

Cultural Heritage
- Aboriginal cultural heritage
- European cultural heritage

Land Utilization
- land use
- land tenure

Socio-Economic Characteristics
- socio-demographic characteristics
- economic development

Tourism
- tourist attractions
- visitor origins
- length of stay
- seasonality
- occupancy rates
- visitor expenditure

Movement and Accessibility
- road network
- coastal access
- off-road recreational vehicle activity

Development Analysis
- in the foreshore zone of each town examined settlement pattern, land use and tenure, built environment and access

Coastal Engineering Assessment
- integrated specialist consultant study

Development Options and Guidelines
- prepared coastal scheme plans for all towns along the coast

Land Capability Analysis
- translation of an evaluative framework for land systems into a pragmatic framework for planning policy formulation

Coastal Management Scenario
- implementation of recommendations

Figure 3 : Study Methodology

Thirdly, coastal management should not be viewed as an exercise in crisis management. We should not just be "fighting fires on beaches" or trying to hold the last remnants of the sea wall together. We should view coastal management also in a positive strategic context. For this reason, we prepared conceptual physical plans to enhance the amenity of all foreshores of all settlements. Known as Coastal Scheme Plans, these form the basis of the positive side of the Management Plan for the South East Coast. I will show you some scheme plans in a minute.

The fourth aspect I would like to address is the land capability analysis that we performed along the coast. You may get a feeling of deja vu after yesterday's excellent paper on the subject.

Our objective in carrying out the land capability analysis was to establish a framework of management of the coast, in its broadest terms, that was based on the important biophysical characteristics of the coast, yet interfaced with the planning and development control system. This was achieved by the preparation of environmental assessment information matrices — an example of which is given in Figure 4.

Overall, the approach was reasonably successful and a number of Councils have utilised the matrices in formulating planning policy and delineating zone boundaries in planning schemes.

Preparation of the Coastal Management Plan

The Coast Protection District Study provides the baseline input to the statutory instrument — the Coastal Management Plan.

South Australian Coastal Management Plans have two parts. The first is a statement of general coastal management policy applicable to the whole South Australian coast. The second is specific to a Coast Protection District and is far more definitive than the first part.

Another important characteristic of the Management Plan is that, under the provisions of the South Australian Planning Act, the Minister can declare a Management Plan to become part of the State's statutory planning instrument. This has considerable ramifications for the control of private development which I won't deal with here, other than to say that the Minister has not exercised his power in this respect.

As I flagged to you earlier I don't see Coastal Management Planning, and Plans, as responses to crises. I can use the town of Robe as an example.

Figures 5, 6, 7 and 8 illustrate what we visualise for Robe in the future. These coastal scheme plans are to be incorporated in the statutory instrument — the Coastal Management Plan. The measures for upgrading the coastal environment in Robe represents a joint commitment by the State Government and the local Council to fund and carry out certain works over a five year or longer period. Most of the measures identified will be funded jointly, with State Government contributing between 50% and 80% of the cost of projects. The Council will undertake, or arrange for the undertaking of the works and commissioning consultants etc.

Summary

In summary, State Governments who administer long lengths of coastline need to divide up the coast into manageable units, suitable for comprehensive investigation. They then need to prioritize their efforts, that is, tackle each coastal section in a logical sequence based on the coast's vulnerability to degradation and the environmental, social and economic consequences should degradation occur. These areas are generally those that are subject to the greatest population pressure.

Once the districts or regions are identified in accordance with the priorities, each coast should be investigated from a physical, economic and social stance. Land capability analytical techniques should be utilised to obtain the best fit between land use, development and conservation. Proposals for enhancement of the coast should be formulated.

This baseline investigation should be sponsored by the State Government and form the basis of a Management Plan describing the "rules for the game", in the broadest sense. The Management Plan should be a statutory instrument.

Local Government should have input into the preparation of the Management Plan via an advisory or steering committee role, as they will be the prime implementers of the Plan.

Management strategies identified in the Plan will form the basis of negotiations between State and Local Government instrumentalities for capital works measures which can either be rehabilitative or relate to environmental improvement and enhancement.

The bottom line of the whole exercise however, is financial. Some governments have made a commitment to funding these large-scale investigations as well as a large proportion of the costs associated with implementing works programmes formulated by Councils in response to those investigations.

The approach adopted in South Australia is highly successful, with State and Local Government working in concert most of the time. I suspect that this is because we are not just fighting fires on beaches — we are responding to a plan of action that has clearly established priorities; involves Local Government right the way through; and of course, has considerable financial backing by the State.

What you need now, in this State, is commitment.

Thank you.

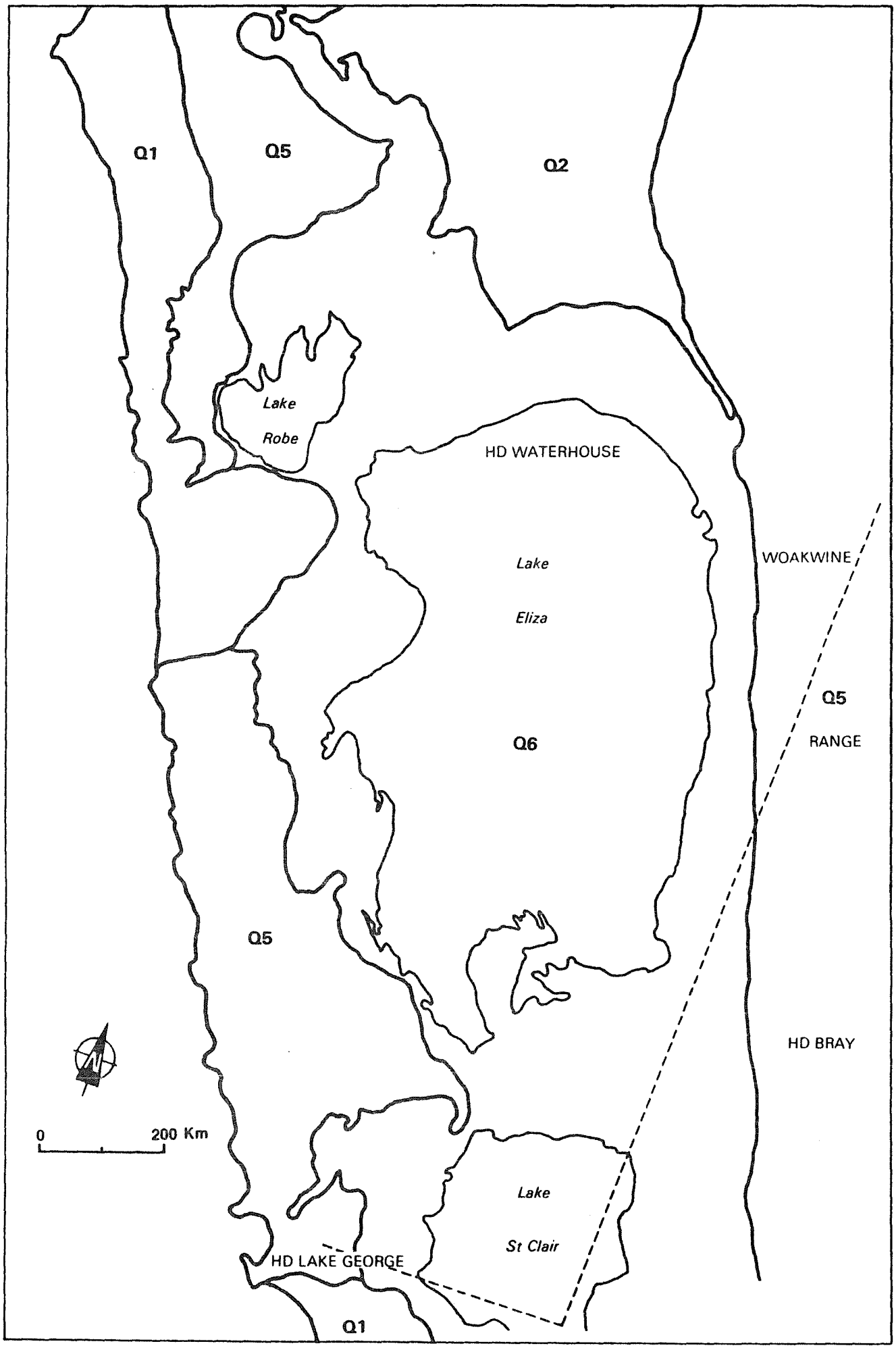
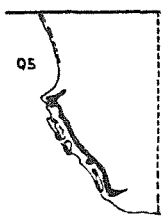


Figure 4. South east Coast Protection Study - 15. Land Systems.

Figure 4. Examples of environmental assessment information matrice.

Land System	Land Unit	Morphology	Materials	Vegetation	Grazing	Cereals	Mining	Mature Conservation	Heritage Conservation	Camping	ORRV	Physical	Waste Disposal	Infra-structure	Urban/Ind. Development	Transport Corridors
	BIOPHYSICAL DESCRIPTORS				**LAND USE SUITABILITY (ROBE RANGE)**											
Q5.	Geology:— Pleistocene calcarenite stranded coastal dune and beach deposits overlain by extensive Holocene dune system.															
	Q5.1 Coastal cliffs and wave platform	Rocky near vertical up to 30m high sea cliffs fronted by intertidal shore platforms and rocky scree slopes.	Calcarenite rock (dunerock)	N/A	—	—	—	A	—	—	—	A	C	—	—	—
	Q5.2 Clifftop dunes	Discontinuous elevated dune fields often scarped and eroded along the cliff top boundary.	Reddish brown & yellow fine to medium grained sand often overlying brown to dark brown silty & clayey sands (paeleosols) over calcarenite rock.	*Bayeria lechenaultii* — *Eutaxia microphylla*; also *Alyxia buxifolia, Hakea vittata, Scaevola spp.*	C	C	C	A	A	C	C	C	C	C	C	C
	Q5.3 Ocean beaches	Discountinuous generally steeply sloping reflective beaches between headlands or calcarenite rock	Variable depth of medium to coarse grained calcareous poorly graded sand.	N/A	—	—	C	A	—	B	B	A	C	—	—	—
	Q5.4 Foredune	Generally discontinuous frontal vary in height from 3 to 10 metres. Often scarped and eroding due to wind and water action.	Deep calcareous fine and medium grained sands.	Similar to Q1.2	C	C	C	A	B	C	C	C	C	C	C	C
	A5.5 Swale	Generally discontinuous concave depression between the foredune and hind dune areas. Base level commonly about 5 metres above sea level but reduced at blowouts.	As above	Similar to Q1.3	C	C	C	A	A	B	C	B	C	C	C	B
	Q5.6 Mid dune beach ridge	Discontinuous linear dune ridge parallel to the foredune. Height varies from about 5 to 30 metres. Slopes variable ranging from 10 to about 80% but often flatter than on foredune.	As above	Similar to Q1.4	C	C	C	A	A	C	C	C	C	C	C	C
	Q5.7 Stable dune fields	Generally well vegetated old parabolic dunes and transgressive dune sheets. Slopes variable between 10 & 10% but often in the range 10 to 50%.	Deep calcareous fine & medium grained sands with isolated shell beds (aboriginal middens).	Similar to Q4.2, but also *Eucalyptus diversifolia, E. leucoxylon var.macrocarra, Acacia pycnantha, Casuarina stricta.*	B	B	B	A	A	A	B	A	B	B	B	B
	Q5.8 Transgressive and transverse dune sheets	Bare sand sheets resulting from wind erosion of older stable areas or the frontal beach. Large areas often show a transverse dune development. Slopes range from 10 to about 40% on the sindward side up to about 80% along the advancing edge.	Deep calcareous mainly fine to medium grained sands.	Similar to Ql.7	C	C	C	A	B	C	C	C	C	C	C	C
	Q5.9 Ephemeral lakes and swamps	Small local concave depressions often formed at the landward boundary of the Molocene dune system of the Pleistocene calcarenite rock. Possibly replenished from soakage from dunes as well as overland flow from Dunerock Range.	Dark mainly shallow to moderately deep silty & organic soils overlying calcrete on calcarenite rock.	Similar to Q1.6	—	—	—	A	A	—	C	—	C	—	—	—



A MOST DESIRABLE LAND USES B: LAND USES WHICH MAY BE DESIRABLE DEPENDING UPON AREA SPECIFIC ANALYSIS C: LEAST DESIRABLE LAND USES —: NOT APPLICABLE.

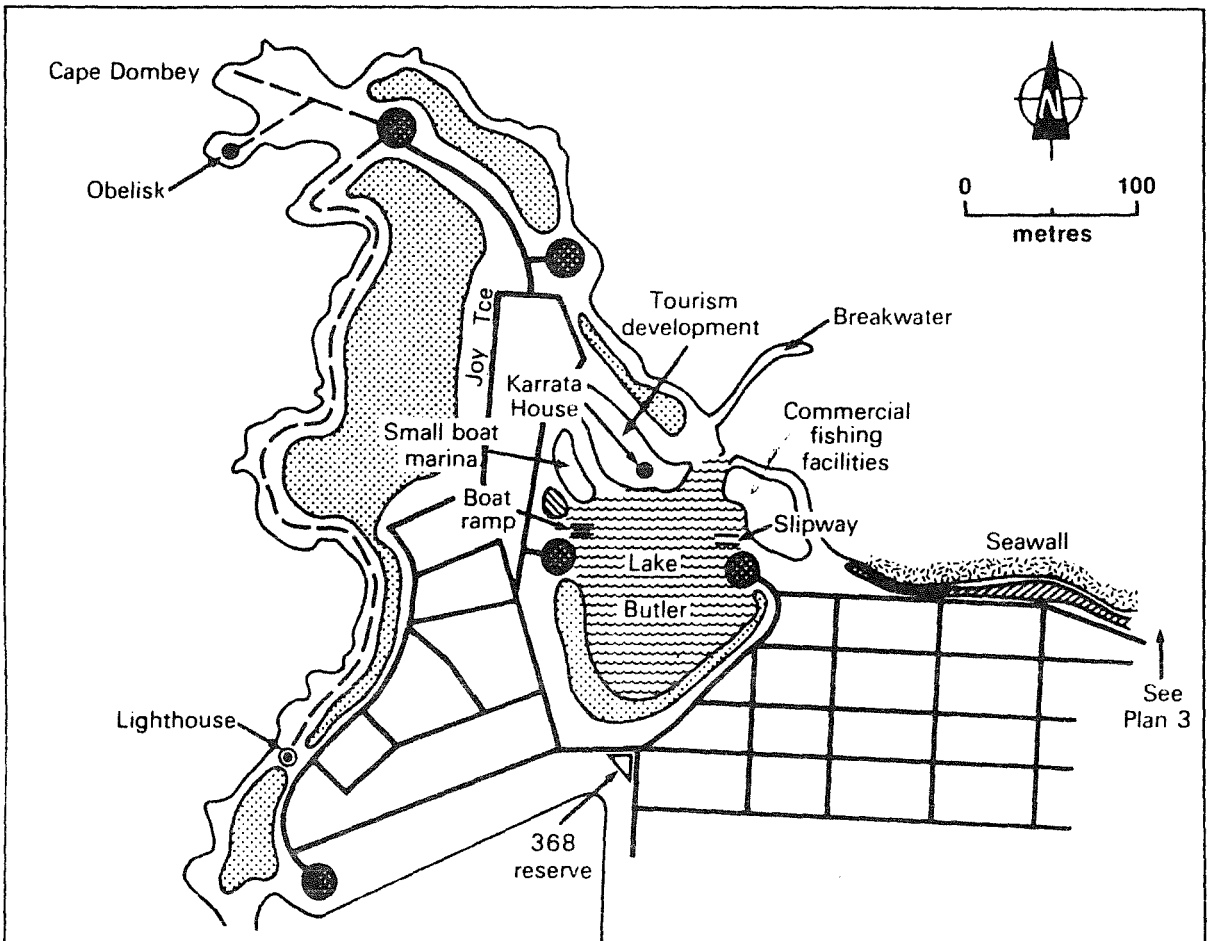


Figure 5. Robe 4.

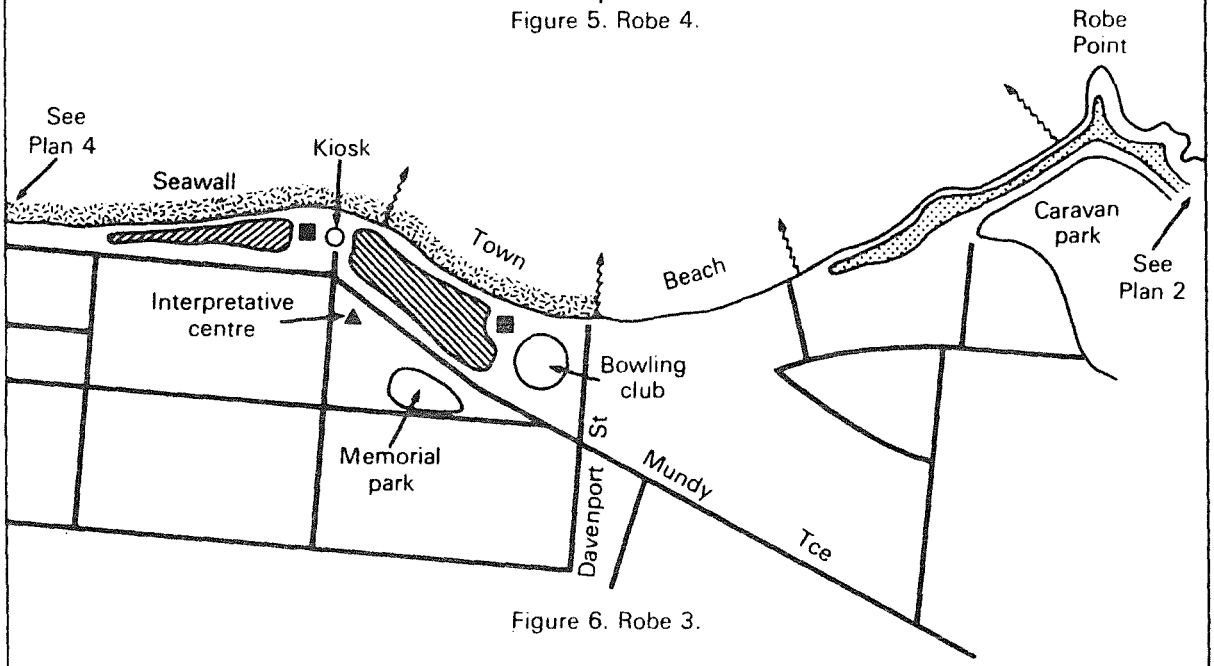


Figure 6. Robe 3.

Figure 5 and 6: Coastal Scheme Plan (draft) S.E. Coast Protection District. District Council of Robe.

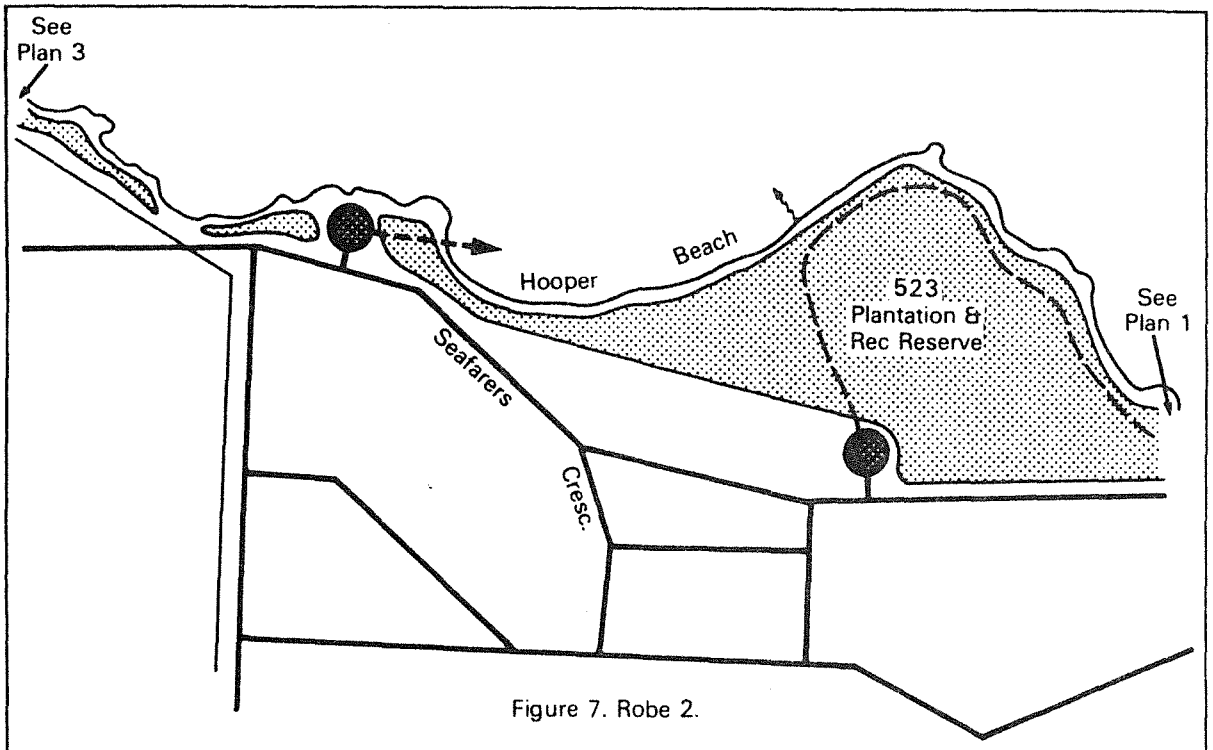


Figure 7. Robe 2.

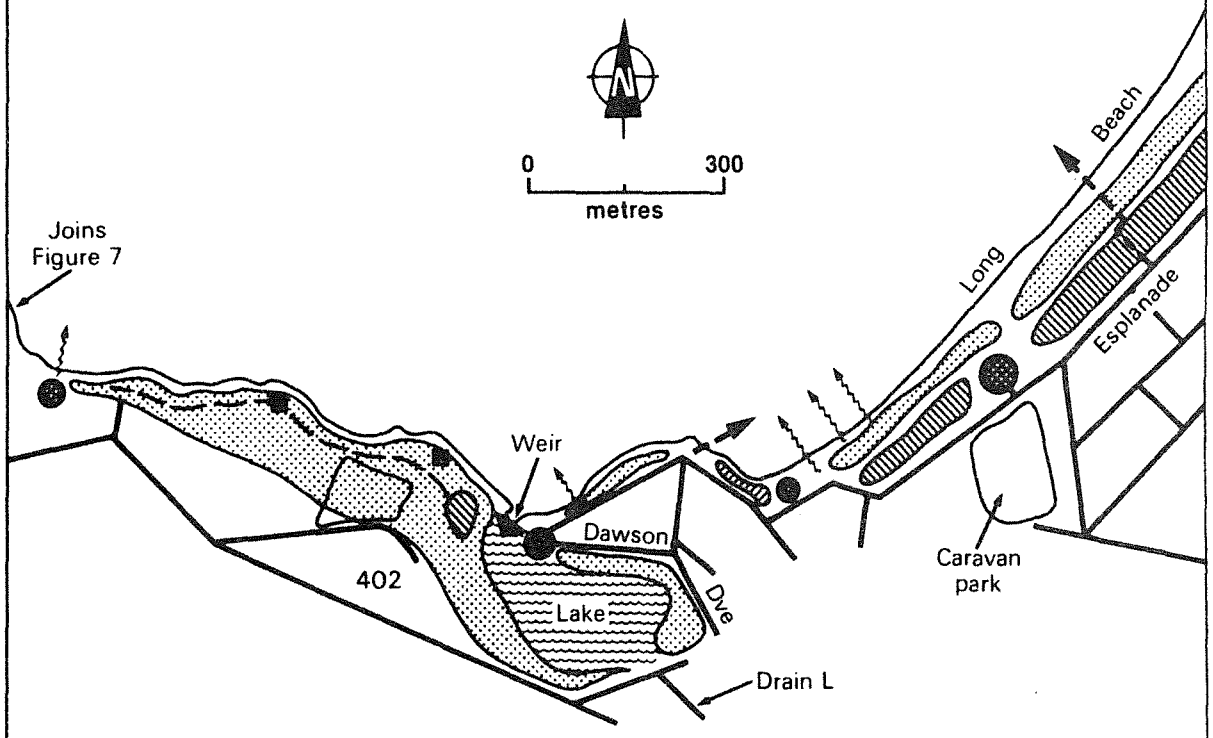


Figure 8. Robe 1.

Key

- Native vegetation
- Walking trail
- Car park
- Vehicle access
- Pedestrian access
- Landscaped open space
- Recreation area
- Shelter

Figure 7 and 8: Coastal Scheme Plan (draft) S.E. Coast Protection District. District Council of Robe.

The Role Of Tourism in Promoting the Use of Coastal Resources

Len Hitchen,
Chairman and Chief Executive, W.A. Tourism Commission

I am well aware of the concern expressed over the years by the Department of Conservation and Environment about Western Australia's shoreline and its islands, and the need to develop coastal management plans to guide and co-ordinate use and development of this very important natural resource.

I see no conflict at all between the Department and the Commission in this aim. Sound planning and management is as essential to the tourism industry as it is to any other industry.

I was a little concerned when I read in the pamphlet containing the registration form for this seminar the assertion that despite greater knowledge of the coast and coastal processes, decisions based on short-term expediency are still being made — and that these decisions would add new, and perpetuate, old problems. I am not aware of any such decisions with the tourism industry. Perhaps someone could raise this point during questions at the end of my talk, I think it needs to be discussed.

I'm here to tell you about the role of tourism in promoting the use of coastal resources, and how the Commission sees its responsibilities. Clearly our superb coastline is one of our chief attractions and as such we promote it as part of our overall promotion of Western Australia.

But of course the greatest users of the beaches, the coast and islands are the people who live close to them, Western Australians themselves.

Our population is concentrated along the coast, and our gentle climate allows us a lifestyle geared towards enjoying our coastal resources to the full. We all gravitate towards the water whether we choose to swim in it, sail, ski or surf on it, fish from it or just sit and look at it.

The America's cup win and the defence series to be sailed off our coast in 1986-87 has been the catalyst in much of the recent development proposed on or near the coast. But for recreational and tourism reasons more development was inevitable even without the cup victory.

Fears have been raised in the Press — and with all due respect, by the Press - that developments proposed for the America's cup defence will turn the near metropolitan coastline into a gold coast, with strings of marinas in front of clusters of high-rise hotels. I can assure you that's not going to happen. It's the last thing the Tourism Commission would want to happen. Why would we encourage development helter-skelter with no thought for the consequences, ruining the very environment on which our lucrative tourism industry depends? It would be self-defeating, to say the least.

In our role of promoting tourism to Western Australia, we clearly are vitally concerned with preserving the environment. We want it to remain attractive and stable, to continue to delight generations of visitors.

I feel that the word "development" is being misused a bit these days and has taken on connotations in some quarters that are completely unjustified and unreasonable. Certainly the monstrous hotels that blight the beaches of Spain's Costa Del Sol are developments, but so are the brick cottages on Rottnest and the Monkey Mia Welfare Centre concerned with protecting the dolphins there.

The view that all the developments proposed for the America's cup defence will be to the benefit of only a few rich tourists is also nonsense. Take a look at the developments in Perth in the past few years — the hotels with their bars and restaurants, the new-look Hay Street Mall with its attractive lamps and street furniture, the plans for Forrest Place, the Art Gallery and all the new buildings and renovations of old buildings in the Northbridge area.

These developments make our city more attractive for visitors, but also for us, and give us more opportunities for enjoyment and enrichment than we had before.

What we develop with tourists in mind can be and is enjoyed by our own people — it seems a very obvious point to make, but we in the tourism industry often come across the negative point of view that what's good for tourists can't be good for locals. At the risk of repeating myself, this is so much plain nonsense.

I hope you are all aware by now of the Government's recognition of the importance of tourism to the economy and employment, and its commitment to the industry's expansion and development in Western Australia.

Tourism will certainly initiate considerable changes to local areas.

Much of the change will be good, but some could have negative aspects. Larry Helber, an international tourism consultant, put it in a nutshell when he was here some months ago. He said that the challenge for the government and the private sector was to shape the industry so as to maximise the socio-economic benefits, yet also use tourism as a means for the preservation and conservation of Western Australia's heritage, culture and natural scenic environment.

It's a challenge that I believe can be met, with co-operation, knowledge, initiative and clear and unbiased thinking on the part of all those involved in the industry.

And the main beneficiaries of a healthy tourism industry whose growth is carefully planned and nurtured are all of us and the generations of Western Australians to come.

I will again quote Larry Helber, who is one of the world's foremost tourist development planners.

The Tourism Commission brought Larry to Western Australia to make use of his wide experience and enlist his help in planning the direction of our tourism industry, which compared with most other western countries is still in its infancy. Even so, tourism is now Australia's biggest industry and Western Australia's second biggest. Because it is so young here, we can avoid many of the mistakes that have been made in other parts of the world.

Larry Helber's philosophy on a tourism product is that it should enhance and perpetrate the natural and inherent attributes of the area. Tourist facilities should complement, not distract from, a site's natural environment. An area's heritage should be preserved and enhanced and not be commercially exploited in a negative way for the benefit of visitors.

Tourist facilities and activities should be concentrated and contained in specific areas to both facilitate service to visitors and to minimise potential adverse tourism impacts on local communities and natural resources.

This is what we must strive for here in Western Australia. If developed properly, the tourism industry can be a very effective means of heritage and environmental conservation.

Unfortunately, in too many instances in other parts of the world, the industry has actually done the opposite. Its rapid expansion and development has badly disfigured scenic environments, destroyed the charm and special character of local areas, overwhelmed small communities with hoards of "outsiders" and has contributed to the expansion of crime and other social problems.

And as a result, the overall tourism product soon loses its appeal and ability to draw visitors to the area, and the industry can no longer sustain itself.

This must not — and will not — happen in Western Australia.

In explaining to you the roles and responsibilities of the Tourism Commission, let me stress that a general partnership between the public and private sectors is required to avoid the ills of tourism development and to achieve the maximum benefits from the industry.

Each sector has specific interests and objectives. For the private sector — the developers of hotels, tourist attractions, support services or multi-use resort complexes — the principal interest lies in the construction and/or operation of projects which will earn a reasonable rate of return for their owners.

The private sector is profit-oriented; the key objective in the simplest terms is to make money. And although higher rates of return are often available in other industries and investment ventures, the excitement, visual identity, and flair that tourism offers tends to attract significant private interest in the financing and development of tourist facilities.

On the other hand, the principal interests of the public sector — specifically the government decision-makers and town planners — focus on protecting the rights of the community and on ensuring its individuals their safety, health and welfare.

Government planners also strive to preserve and improve upon the community's living environment and its quality of life. The planner's focus is on the broad aspects of socio-economic growth of the community.

Tourism is normally only one of a number of economic development opportunities. So it is significant to realise that government planners are community or multi-project oriented in contrast to private developers who tend to be oriented and think in terms of single, specific projects.

But each group has traditionally an important role in fostering the growth of tourism, and the success of the tourism industry is directly related to a working partnership between the public and private sectors.

There are many things the public sector can do to facilitate the development of a strong tourism base. But it cannot initiate laws to ensure that all developments are top quality or all visitor services are of a high standard. It cannot legislate for the tourism product's excellence.

The tourism commission has embarked on the preparation of a state-wide tourism strategy plan to provide the overall framework and guidelines for more detailed strategic planning at the shire and municipal levels. This, I am sure, will contribute significantly to furthering the public-private sector partnership in tourism development. A coastal management plan would of course be an integral part of the overall strategy.

I hope that these remarks will have given you a picture of the Commission's role and how it sees its responsibilities. Let me stress again that we are not blindly committed to development, regardless of consequences.

When developers come to us with their ideas and plans, we ensure that they are aware of the environmental criteria that must be fulfilled before their plans can be approved. We study these proposals carefully, offer advice and suggestions, encourage some and discourage others that clearly do not fulfil the basic requirements for a proper Western Australian tourist development.

Land management and in particular the resources to carry out the plans for effective management remains of great concern to the Commission. We have supported for some time moves

for more funds for national park management, stressing that national parks are some of our strongest visitor drawcards.

Increased visitor traffic to the parks is stretching the available resources to the limit.

The formation of the government's new Department of Conservation and Land Management will, I am assured, result in substantially more resources being available for land management throughout the State. The national parks will have access to capital funds that it did not previously have.

The government has recognised that agencies responsible for management of public land in Western Australia have received insufficient resources for their task for years. The Tourism Commission will continue to press for more funds for land management as part of its responsibility to conservation.

Our natural environment is more than 90 per cent of the product we offer visitors; we are aware of the importance of the environment — we are not about to facilitate its destruction or deterioration — and we support to the full sensible measures designed to preserve it.

The Role of the State in providing Public and Protective Works along the Coast

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Introduction

1. Public works can be viewed in several ways. In the early years of the colonisation of our land by our community they were quite definitely those projects of modification of the land and waters which were essential for our communal survival. Once survival was reasonably assured, public works expanded to also include projects of modification which were jointly needed for our comfort and convenience, and thus which improved our lifestyle.

2. Public works still have the same set of fundamental elements — they serve a communal benefit, while ensuring our continued survival and improving our quality of life. The involvement of these elements is basic to all engineering works, and thus there is much in common between public and any other works.

Coastal Engineering Works

3. The works which are of special relevance to the coast include ports, harbours, navigation channels, pipelines, ocean structure and sea defences. They provide humanity, as land dwellers, with access to, or control over, the ocean waters.

4. The task of the coastal engineer in designing and building these works requires an understanding of the forces of the ocean, and of the natural behaviour of the land under the influence of those forces. There is also a need to understand the behaviour of rivers and estuaries, since the waters and sediments they deliver to the ocean also impact on the coast and coastal works. Estuaries are commonly included as part of the coast, since they are dominated by ocean influences. Another essential need is to understand people, since they are the ultimate beneficiaries, or dependants, of the works under discussion.

Coastal Natural Forces

5. In Western Australia, the dominant coastal force comes from the ocean-wave action for the southern half, and waves and tides in the northern half. While the impact of wind forces is noticeable, their work and energy input is of a lesser order.

6. Wave forces come from the weather, and are as difficult to predict and as variable as the weather. It has been necessary for coastal engineers to use statistical methods to quantify these forces, so that they can have a basis for structural loadings which might be experienced in a structure's lifetime. For structural work the skills have been quite well developed. provided that an adequate data record has been available.

7. The seasons of the year have different weather patterns, and therefore also different wave patterns. An adequate statistical record thus needs at least one full cycle of seasons. Even then, we have mild winters and severe winters in this State, so the quality of statistical prediction improves if the record on which it is based includes more than one winter.

8. While the record of waves over one or two years can give sufficient statistical data to permit the design of a fixed solid structure in the ocean, because it identifies extreme values of forces, it is less helpful about the problem of predicting the changes to the coastal land which are controlled by waves. This is because the land is worked upon by all waves, large and small, from their many different directions and at different tide levels. Different land responses also occur with different land types, and shore movements must thus be viewed over a longer time period than applies to the simple structural problem. There are extremes of behaviour, as the people at Albany and Bremer Bay and Hopetoun found in the 1984 winter. The north-westers know the occasional impact of local cyclones, while the south-westers experienced the rare and different behaviour of Cyclone Alby a few years back.

9. The coastline of this State is in fact continually changing under the impact of the ocean and its waves, and will continue to change in the future. The rocky sections change slowly in the context of the human life span, but the sandy sections are very mobile over our time spans of years and decades. Change is normal on our coastline and we must acknowledge this when we manage it.

State Government Coastal Works Involvement

10. The Government of this State has played a dominant role in the past in the provision and operation of coastal works, partly because the works serve a public function but also because the immensity of ocean forces and the long-time scale of their impact on the coastline call for the resources of the wider community. The Harbours and Rivers engineering group has been in existence for about a century, and its records and its staff can view the coast and oceans in the timeframe of the ocean forces. We see this to be important, and to be the main factor which sets us apart from the many other professional and administrative groups associated with the coast and the shorter-term aspirations of the coastal population. We know that most States and countries throughout the world have a similar group performing a similar role, so we are not unique. We do feel, however, that we do have a special task which we must continue to perform in this State.

11. The basic "survival" coastal works of the State are the commercial ports and harbours. The ports are mainly developed in the early phase of colonisation, when the sea provided one of the better means of internal transport and the only means of external trade. Those ports with the best natural shelter have endured and have had urban communities grow around them as they have themselves grown. We must not however forget the port's basic survival role, and their absolute right within our communities to occupy their prime coastal locations. The harbours generally have a more recent origin as the primary industries of the ocean have developed more widely. They have however no lesser right to those few available coastal sites which are capable of supporting the ocean production and commerce. Indirectly but importantly too are the pipelines and outfalls which use the ocean waters to support those coastal communities, by cooling their industries or purifying their wastes. The ability of ocean waters to perform these tasks is one of the limited number of natural resources available to our communities in the support of our chosen lifestyles.

12. Another "survival" activity involves sea defense works, which are constructed to prevent the sea from damaging important coastal land assets. The State Government, in common with most other central authorities, has adopted a role only of support to the local community for these works, in acknowledgement of the rights and responsibilities of the local authorities in planning and managing the coastal shore lands.

13. A valuable benefit which the State Government can offer to defence works, because of its continuity and its long view, is the ability to stage the development of the works over several years or several seasons. It has been previously said that the accurate prediction of coastal behaviour is very difficult, and staging permits the actual behaviour to be identified and measured, allowing those measurements to more accurately guide the final form of the sea defenses.

14. It is a relevant point that the shores of Western Australia are with very few exceptions owned and controlled by public authorities and are available to the general public. While this means that they are of most use to local residents and are normally controlled by the local government authority, they also are a statewide asset used by the wider community. It is also for this reason that State Governments of the past decade or so have assisted local government authorities to build sea defenses where valuable property is threatened by sea erosion.

15. While works to defend valuable developments have a community survival purpose, it is clearly not in the community interest to carry the cost of halting all the previously-mentioned natural movements of all of our sandy shores. A further associated task of the State is thus to try to prevent the developments of the future from being put at risk from sea erosion. To this end, efforts are being made to measure the wave forces and to monitor shore movements, so that development can be kept away from the mobile area of the coastline. The same monitoring, interpreted by coastal engineers, is needed and is used to prevent essential coastal developments from changing the natural system and thus creating an erosive threat to existing assets.

Coastal Recreation Projects

16. There is at present in this State a strong desire within the community to use the coast and shores for recreation. Different groups promote different uses, but nearly all involve bringing people and their equipment to the shore in such ways and such numbers that works in some form are needed to permit safe recreation without coast or property damage. The State role in such works is not yet clearly established, since these works are not directly in the "survival" category.

17. Recreational activities have been traditionally seen to be the responsibility of local government authorities, but in recent times it has also been accepted that those authorities do not have the resources or skills for works which have to combat the forces of the ocean. Technical and financial support has thus been given for boating facilities which can serve a wide population. There has been no absolute support policy, with projects tending to be taken on their merits. Funding assistance has also been given for jetties which serve swimmers or recreational fishermen, and again the projects are taken on their merits, with a tendency for 50:50 funding proposals to be given support.

18. In promoting specific forms of coastal recreational use, people often fail to accept the claims of other users for coastal access — for their right to a piece of the coast. One of the needs of the future for the State Government is to rationalise these different use demands, and to endeavour to place the different users and their facilities in those locations best suited for them. Since the sea forces are the dominant factor controlling our coast, these locations are those which the ocean favours. Land features are often also relevant, but we can control and reform the land more cheaply and more predictably than the ocean. Our land planners generally do their task well but they must not forget that in the coastal zone, **THE OCEAN RULES.**

The Role of the State in Coastal Planning and Management in Western Australia

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1. Introduction

The State Government has been involved in coastal development since its earliest days. Coastal erosion at Mandurah and Busselton in the early 1970s, however, saw State departments considering a broader approach than had previously been the case. The urgency of such problems led in 1974 to the establishment of a Cabinet Sub-Committee on Beach Erosion, together with an Advisory Committee of senior departmental representatives, who authorised the establishment of a research organisation within the Public Works Department. Major erosion repair works and control activities were handled in succeeding years, until it became apparent that Environmental Protection Authority (EPA) initiatives from 1975 onwards could lead to a broader concept of coastal management.

A Sand Drift and Sea Erosion Committee specifically looking at the interaction of development and coastal processes was reformed into the existing Coastal Development Committee at this time. In 1977, the EPA published its Guidelines for an Environmental Protection Policy on the Coastal Zone of Western Australia. The potentially far-reaching consequences of the proposals contained in the guidelines aroused considerable interest and concern. In 1978, following a period of submissions and debate, the situation was referred by the EPA to the Conservation and Environment Council for review. The Council recommended the formation of an interim Steering Committee. The Coastal Planning Steering Committee, together with a newly appointed Coastal Planning and Management Adviser, carried out a comprehensive review of coastal planning and management in Western Australia. The Coastal Planning Steering Committee presented its report, **Coastal Planning and Management in Western Australia,** to the Conservation and Environment Council in August 1981.

The purpose of this paper is to examine the activities of the various State departments in coastal planning and management and to discuss the findings of the 1981 report on **Coastal Planning and Management in Western Australia.**

Finally, the operation of the Coastal Management Co-ordinating Committee will be commented on, and some preliminary thoughts on the future of Coastal Planning and Management in Western Australia will be discussed.

2. State Departmental Activities

Several State departments, authorities, commissions and boards have coastal responsibilities of one form or another (Appendix 1). From the point of view of coastal planning and management the following are the important areas:

2.1 Coastal Planning

There is little co-ordinated planning for the conservation and use of coastal resources. Outside Perth, Western Australia lacks an integrated regional planning system. Coastal development projects are considered in isolation without an ordered set of priorities. Planning is usually a response to developer pressure.

2.2 Subdivision and Development Control

The Coastal Development Committee, comprising officers from the Departments of Agriculture, Conservation and Environment, Lands and Surveys, Public Works, and Town Planning, and representatives of Local Government, was established in 1975 to advise the Town Planning Board on subdivision in coastal areas. The Coastal Development Committee considers subdivisions on a case by case basis although some overall guidelines have been developed.

2.3 Management of Coastal Reserves, Waters and Estuaries

The Waterways Commission manages certain estuaries such as the Peel-Harvey Inlet and the Leschenault Inlet. The Department of Fisheries and Wildlife administers the Fisheries Act. National Parks hold large areas of coastal land. At present there is no comprehensive approach and there is no mechanism to bring the various agencies together.

2.4 Reservation and Management of Crown Land

Western Australia has a high proportion of land in Crown ownership that is virtually unmanaged owing to lack of resources. The land is, however, unevenly distributed across

the State and financial resources are insufficient to acquire additional areas. The recent creation of a Land Planning Development and Management Branch in the Department of Lands and Surveys may result in welcome changes.

2.5 **Coastal Engineering and Ports:**

The Harbours and Rivers Branch of the Public Works Department is the State's principal source of advice and expertise in the field of coastal engineering. The Marine and Harbours Act of 1981 has helped to rectify shortcomings in the co-ordination and planning of ports and boating activities and the provision of protection works.

2.6 **Soil Conservation:**

The Departments of Agriculture (Division of Resource Management), and Conservation and Environment have developed expertise in dune management. Both advise local authorities on dune management.

2.7 **Access Provision:**

The provision of access is a coastal management issue which is administered by local authorities in conjunction with the Main Roads Department and various other authorities.

2.8 **Mining and Resources Development:**

Mining and resources development are separate from other planning and management arrangements. Certain resource development projects do not always receive the environmental attention they deserve. This may be particularly damaging in sensitive coastal areas.

2.9 **Tourism and Recreation:**

Tourism and recreation pressures on the coast are increasing rapidly. There appears to have been little forward planning for the provision of additional facilities. Recent changes in the administration, however, may result in a new approach.

2.10 **Information and Research:**

No State Government agency has sufficient resources to provide the necessary research and information base required to do justice to coastal planning and management, although the Department of Conservation and Environment has attempted it.

The Coastal Planning Steering Committee Report on Coastal Planning and Management in Western Australia considered the State's involvement in coastal planning and Management, in depth, and came to the following conclusions.

1. That there is excessive fragmentation of responsibility coupled with a lack of overall direction in the system.
2. That there is a lack of machinery to establish commonly agreed strategies, priorities and funding of projects.
3. That there is a shortage of funds and manpower.

3. Coastal Planning and Management in Western Australia:

The Coastal Planning Steering Committee Report prepared by Graham Sansom provided an in-depth analysis of the situation as it existed in 1981. Briefly, the main recommendations of the report are as follows:

Stage 1:

(a) That a senior-level Coastal Management Advisory Council (COMAC) be formed to co-ordinate departmental activities.

(b) That an Office of Coastal Management (OCM) be formed and attached to an existing department or agency.

Stage 2:

(a) That a 'lead agency' be recognised within which a Division of Coastal Management be established (presumably a State Department).

The Conservation and Environment Council submitted the report to the then Minister for the Environment. The Cabinet of the day, under the Premier, Mr R O'Connor, was briefed on the report and considered additional submissions from the EPA and the Conservation and Environment Council. The latter two bodies reached accord in all areas except one. The EPA believed that the Coastal Management Advisory Council (COMAC) should report to it, and the Conservation and Environment Council believed that COMAC should report directly to the Minister.

Cabinet referred the matter back to the various departments and the entire initiative seemed to be petering out. The Coastal Planning and Management Adviser resigned and left the State service for personal reasons.

4. The Coastal Management Co-ordinating Committee:

In September 1982 the Director of the Department of Conservation and Environment put a compromise proposal to Cabinet. The proposal was briefly as follows:

1. That the position of Coastal Planning and Management Advisor be refilled.
2. That a Coastal Management Co-ordinating Committee be established comprising senior public service officers from relevant departments.

The proposal was adopted and the Committee set the following terms of reference:

1. To over-view the preparation and implementation of coastal management plans at both regional and local levels.
2. To co-ordinate departmental activities on the coast through exchange of information and views, and to review expenditure programmes and priorities.
3. To advise Government on coastal management policies, legislation and administrative arrangements.

It was acknowledged at the time that Western Australia is the only mainland State in Australia with no coastal legislation of any form. There are several Acts, however, which are used to manage the coast, such as the Land Act, Town Planning and Development Act, and the Soil and Land Conservation Act. At the time of forming the Coastal Management Co-ordinating Committee there was no intention of introducing specific coastal legislation. The Committee saw its role as developing management plans and promoting co-ordination for a minimum period of two years when a further review of the administrative situation would be undertaken.

The Coastal Management Co-ordinating Committee met for the first time in December 1982 and to date has met on eight occasions. The Committee has produced **"A Government Position Paper on Coastal Planning and Management in Western Australia"** which sets out a goal and ten policies. The Position Paper was adopted by the Cabinet under the Premier, Mr B. Burke, in November 1983. To date 13 coastal management plans are at various stages of completion. Of the 13 plans, nine would have been done by DCE officers irrespective of whether the Coastal Management Co-ordinating Committee had been formed. The two-year trial period is nearing an end and a review of the operation of the Committee and the ongoing administrative arrangement is imminent, and in view of the experience over the last two years the Coastal Management Co-ordinating Committee, at its last meeting, accepted the following points:

1. That the level of inter-departmental co-ordination is better than it was previously but that it is still superficial.
2. The present staff arrangements of a Coastal Planning and Management Adviser and a Coastal Planning and Management Officer, attached to DCE, with back-up from two Environmental Officers in the Planning and Research Branch of DCE, is inadequate to provide the range of skills, manpower and research capability to do justice to the task.
3. Attempts to establish a planning team approach through inter-departmental co-ordination have not been successful.

The Committee resolved:

1. that Cabinet be briefed on the progress of the coastal management co-ordinating initiative;
2. that an up-dated review of coastal planning and management be prepared to consider broader issues; and
3. that additional staff resources be sought.

5. Some Preliminary Thoughts on the Future of Coastal Planning and Management in Western Australia:

5.1 At its meeting on 16 February 1981, the now defunct Coastal Planning Steering Committee considered a recommendation by Mr G. Sansom that Western Australia introduce a management planning system similar to that operating in South Australia and Victoria. Obviously it would be impractical to adopt the entire structure as the State departmental systems are totally different. Certain comparisons, however, are useful to consider.

Western Australia has a higher population and a coastline approximately three times the length of South Australia. Western Australia, however, has a small group of people, with a small budget of $150,000 to manage and advise 44 local authorities, whereas South Australia has a 14 person Division, and a budget of $1.5 million. It would seem obvious, therefore, that more staff and budgetary resources be allocated to Coastal Planning and

Management. It is interesting to note that the present Government spent $6 million on 2 kilometres of coast at Whitfords. this represents approximately 40 years coastal management budget for DCE for the entire coast. This is hardly the best allocation of finance.

5.2 With hindsight it would appear that one of the reasons why the 1981 report on Coastal Planning and Management in Western Australia did not succeed in being adopted by Cabinet was because of the 'lead agency' aspect. If coastal planning and management is attached to any existing agency it is tainted by the image or the professional approach of that department. It is my contention that coastal planning and management in Western Australia needs to be independent of any existing agency.

5.3 Coastal planning and management in Western Australia is presently being operated on an informal co-ordinating basis, and there is no statutory control except for the Land Act, Town Planning and Development Act, and the Soil and Land Conservation Act. These Acts are administered by separate agencies which do not have an overall approach. An attempt has been made to co-ordinate coastal planning and management through policies but these have largely been misunderstood and misinterpreted. It would seem that a Coastal Protection Act may be the only way to achieving overall planning and management.

5.4 Coastal Planning and Management is not only fragmented departmentally but is fragmented professionally. The differences in approach of engineers, geomorphologists, ecologists and planners result in different action being taken. It would seem necessary to internalise these professional differences within one agency.

6. Conclusions:

The State has always played an important role in coastal planning and management although its efforts are largely one of advising local authorities who are the responsible planning agencies. It is unfortunate that the 1981 report on Coastal Planning and Management in Western Australia was not adopted by Cabinet. The compromise Coastal Management Co-ordinating Committee has proceeded with management planning and has achieved a certain level of co-ordination but has fallen short in terms of providing the range of skills, manpower, funding and research capability to do justice to the task. It may be necessary to have a Coastal Protection Act and an independent Coastal Protection Authority to achieve adequate coastal planning and management. The State needs to seriously consider its approach to coastal planning and management in order that long-term problems be avoided.

7. References:

1. Coastal Planning Steering Committee, 1981.
Coastal Planning and Management in Western Australia, A report to the Conservation and Environment Council.

2. Western Australian Government, 1983.
Coastal Planning and Management in Western Australia : A Government Position Paper.

Appendix 1

Coastal Planning and Management Responsibilities

Function	Authority	Comments
Regional Planning Development	TPD/P & CA	Regional studies (mainly related to urban growth)
	MRPA	Regional planning/policy in metropolitan area
	DRD/P & CA	Planning for regional resource development, especially North-West
	Regional Administrators/Regional Development Committees	Preparation of plans for increased population and production
Environmental Protection	EPA	Review of major development projects. Environmental Protection Policies
Town Planning Schemes	MRPA	Metropolitan Region Scheme Statements of Planning Policy to guide LGAs
	LGAs	Preparation/implementation of Town Planning Schemes (Ministerial approval required)
	TPB	Advice to Minister Statements of Planning Policy to guide LGAs
Development/ Building Control	LGAs	Development control under Town Planning Schemes Building by-laws/regulations
Subdivision Control	TPB	Approves/rejects all subdivisions. Advised by Coastal Development Committee
Control/ Management of Crown Land	Lands and Surveys/ Minister	Administers Land Act and Parks and Reserves Act. Controls vesting and leasing of reserves, pastoral leases. Responsible for Vacant Crown Land, but very limited management resources. Crown townsites, leasehold recreation settlements.
Land Acquisition for Conservation Reserves	Parks and Reserves Committee (EPA)/Lands and Surveys	Very limited funds
Management of Reserves	WAWA	Nature Reserves. Prepares management plans under Wildlife Conservation Act
	NPA	National Parks. Prepares management plans under National Parks Act.
	LGAs	Vested Crown Land and reserves created in new subdivision
	MRPA	Acquires and administers regional open space in metropolitan area
	DYSR	Recreation camps on some coastal reserves

	SEC/MWB/PWD/M & H	Coastal reserves for public utilities, water supply, port facilities, etc.
Aquatic Reserves	Fisheries and Wildlife	Declared under Fisheries Act. May be vested in a body corporate, e.g. NPA, WAWA, LGA
Fisheries Management	Fisheries and Wildlife	Fisheries Act: regulations to control all aspects of professional and amateur fishing
Estuarine Management	Waterways Commission and Management Authorities	Waterways Conservation Act currently applies only to Swan, Peel-Harvey and Leschenault estuaries
	M & H/PWD/Fisheries and Wildlife	Statutory responsibilities for aspects of management in all estuaries
	LGAs	Foreshore management, land-use planning in catchment areas
	EPA	Estuarine and Marine Advisory Committee - Policy advice, conducts studies. EPA can advise/instruct Waterways Commission
Roads	MRD	Highways, Main Roads. Allocates funds to LGAs
	LGAs	Secondary, Local and Tourist Roads
	NPA/WAWA	Roads within National Parks/Nature Reserves
Off-road Vehicles	Local Government Department	Administers Control of Vehicles (Off-road Areas) Act. Advisory Committee includes representatives of LGAs and user groups
Mining and Resource Development	Geological Survey	Assesses mineral resources. Supervises exploration activity
	Mining Department	Administers Mining Act, Petroleum Act, etc. Supervises rehabilitation (except under Agreement Acts)
	DRD/P & CA	Co-ordinates major mining/industrial projects through Agreement Acts
Recreation	DYSR	Research and policy. Funds Recreation Officers for LGAs. Operates camps. Subsidises projects through Community Sporting and Recreation Facilities Fund
	LGAs	Local recreation reserves and facilities
	M & H	Navigation/safety aspects of aquatic recreation
Tourism	Tourism Department	Policy, planning and promotion. Subsidises regional committees and development projects
Dune Management	Soil Conservation Service	Commissioner has powers under Soil Conservation Act. Works, advice to LGAs. etc

	LGAs	Reserve management
	PWD	Dune stabilisation associated with coastal engineering works
	DCE	Funding/advice to LGAs for management of beach usage
Coastal Engineering and Ports	PWD	Harbours and Rivers Branch - development, coastal investigations, erosion control
	M & H/Port Authorities	Works in ports/for navigation purposes. M & H administers Jetties Act
	LGAs	Local protection works/boating facilities
	DRD	Planning of ports associated with major resource projects
Navigation	M & H/Port Authorities	All aspects of navigation control except lighthouses (Commonwealth)
Water Pollution Control	Waterways Commission	Estuaries administered under Waterways Conservation Act
	Public Health Department	Controls/monitors possible pollution from sewers and septic tanks
	DRD	Pollution control provisions within Agreement Acts for major industrial/resource development projects
	Port Authorities	Some control of outfalls within port areas
	EPA	Reserve powers. Environmental Protection Policies

Abbreviations

DCE	Department of Conservation and Environment
DRD	Department of Resources Development
DYSR	Department for Youth, Sport and Recreation
EPA	Environmental Protection Authority
LGAs	Local Government Authorities
M & H	Department of Marine and Harbours (currently Harbour and Light)
MRD	Main Roads Department
MRPA	Metropolitan Region Planning Authority
MWB	Metropolitan Water Supply, Sewerage and Drainage Board
NPA	National Parks Authority
P & CA	Planning and Co-ordinating Authority
PWD	Public Works Department
SEC	State Energy Commission
TPB	Town Planning Board
TPD	Town Planning Department
WAWA	Western Australian Wildlife Authority

Source: Coastal Planning and Management in Western Australia, 1981, pages 35-38.

Coastal Planning and Management Seminar — Summary

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Participants in the seminar were presented with an awesome array of information and opinions which would have left no one in doubt as to the diversity and complexity of issues associated with coastal management. Several key points emerged:

1. In the absence of concerted public pressure for a more systematic approach to coastal planning and management, issues will tend to be addressed individually. For example, considerable attention has been given to management problems along the Perth metropolitan coastline (pockets of erosion, major development projects, marinas for the America's Cup) but the need to plan that coastline as a whole has yet to be recognised by Government.
2. Developers need a clearer definition of the ground rules for projects in coastal areas.
3. Local Government needs a clearer understanding of the State's intentions — policies, planning programmes, land management systems, possible developments and infrastructure works etc. Councils also require more financial and technical assistance to meet the very substantial coastal management obligations which the State has left to them.
4. Everyone concerned with coastal management needs more basic information about coastal processes and the natural and human resources to be managed. Drawing together such information is in itself a major undertaking requiring a concerted effort and substantial resources.
5. Management of coastal lands and waters must go hand in hand.

Over the past 5-10 years the Department of Conservation and Environment has played a very valuable role in drawing attention to the importance of sound coastal planning and management, and in providing low-key practical assistance to Local Government. This effort has complemented the coastal engineering functions of the Public Works Department, the important contribution of the Coastal Development Committee in promoting sound planning controls, and the work of specialist management agencies such as the National Parks Authority (a somewhat surprising omission from the seminar line-up).

Despite very limited resources, much has been achieved through an intensely practical approach and a particular emphasis by DCE on grass-roots communication with Councils and local communities. This has dramatically increased awareness of the issues (as measured by the high attendance at the seminar) and promoted a widespread concern for better planning and management practices.

It is clearly essential that these efforts at the local level should continue. The City of Stirling's experience as documented in Brian Evans' paper, and the related issues canvassed by John Glover, both pointed to the potential benefits of an enhanced role for Local Government and the need for further State initiatives to support that role. A follow-up seminar on those particular themes could be most valuable.

At the same time, however, there seems to be a clear need for the State Government's own efforts to shift into higher gear. In opening the seminar, the Minister announced a review of the progress made to date by the Coastal Management Co-ordinating Committee, and suggested that present arrangements are inadequate to provide the range of skills, manpower and research capability to do justice to the task. Clearly, it is the State Government's responsibility to provide a framework of information, policies, plans, guidelines and funding mechanisms within which its own agencies, Councils and developers can operate as effectively as possible. As discussed in my own paper and that by Paul Drechsler from South Australia, several other States are further advanced in that regard.

In one sense, the climate appears right for further moves in Western Australia. Awareness has been increased; recent experience with both major development projects and management of public lands along the coast has highlighted deficiencies in the present system; and the renewed emphasis on coastal tourism generated by the America's Cup points strongly to the potential benefits of planning and management programmes. On the other hand, however, the very success of the "muddling-through" efforts of the last decade or so, coupled with a lack of major erosion or pollution crises, has perhaps kept the lid on pressures for substantial changes to existing administrative arrangements, and for new funding programmes.

The establishment in 1982 of the Coastal Management Co-ordinating Committee, and the associated work of DCE in preparing coastal management plans, represents the latest step in strengthening coastal management in Western Australia, but again without any substantial injection of additional resources.

As shown in Paul Drechsler's paper, systematic preparation of coastal management plans can be the centrepiece of a concerted State Government effort to establish the framework of infor-

mation, policies, guidelines etc. required by Councils and developers. It remains to be seen whether the plans being prepared in Western Australia will fulfil that role: at present, much of the work seems to be addressing specific local issues rather than providing a regional context and broad co-ordinating mechanism for management and funding programmes. This is not to say, however, that the whole of the Western Australian coast should be covered by management plans. Whilst there needs to be an overall assessment of coastal resources and likely management needs, it would clearly be wasteful of scarce resources to prepare fairly detailed proposals for areas requiring only limited or spasmodic management efforts. In those areas, planning can wait until substantial pressures for works or other management programmes are imminent. Western Australia simply cannot afford the luxury of the more comprehensive approach adopted in South Australia, and management plans will lose credibility if they are of no immediate practical value.

The question of whether or not coastal management plans should be given statutory effect emerged as a major issue during the seminar. Suggestions were advanced that management plans could be integrated with the statutory land-use planning system and recognised through the provisions of the Town Planning Act. A number of points need to be considered here:

1. The concept of coastal management plans put forward in the report of the Coastal Planning Steering Committee involved building on a whole range of statutory mechanisms — the Town Planning Act, Soil Conservation Act, Wildlife Conservation Act, Environmental Protection Act etc. Statutory land-use planning (zoning, development and subdivision control) is just one of several mechanisms for coastal zone management.
2. Statutory approval of coastal management plans is likely to require more complex, formalised procedures for their preparation. This will consume both time and scarce staff resources.
3. Experience elsewhere with statutory regional planning (especially New South Wales) shows that statutory instruments likely to impinge on the functions of a range of Government agencies are reduced to broad generalities so as not to circumscribe those agencies.

A compromise approach might be to legislate for Ministerial approval of management plans, and to require those individuals and bodies subsequently proposing works or other management activities (including Town Planning Schemes) along the stretch of coast concerned to demonstrate consistency with the management plan, or to justify any departure from it. Such an approach would enhance the status of coastal management plans without introducing complex new procedures.

This leads back to the review announced by the Minister. The issues at stake were clearly (and bravely) spelled out in Rory O'Brien's second paper — a paper which might perhaps have been more useful as an opener.

There seem to be two ways to go —

1. Further evolutionary development of the Coastal Management Co-Ordinating Committee and coastal management plans. This could include enhanced status for management plans along the lines suggested above; preparation of an inventory of strategic coastal resources (settlement and port sites, major tourist attractions, prime conservation areas etc.) to help define those stretches of coastline and management issues requiring priority attention; formal links to the Coastal Development Committee to strengthen ties with statutory land-use planning (detailed proposals in this regard were spelled out in the report of the Coastal Planning Steering Committee); legislation to amend relevant Acts to plug some gaps in existing arrangements (again recommended by the Steering Committee); two or three extra members for the Committee (the new CALM department, Department of Youth Sport and Recreation, Local Government); additional support staff to create a more clearly identifiable coastal management secretariat; new funding mechanisms to assist Councils with management projects (especially larger dune conservation works), plan preparation and appointment of Reserve Management Officers (similar to National Parks rangers).
2. Establishment of a central agency for coastal management, either by setting up a new authority or much stronger co-ordinating body, or by identifying an existing department as having prime responsibility and grouping a number of key functions in that department.

Whichever approach is adopted, discussion at the seminar pointed clearly to the need for a more dominant and clearly identifiable focus for coastal management. Whether this requires an independent authority, and whether the Government would wish to create such an organisation, is debatable. But ultimately a single agency (either a department or a co-ordinating body) has to be responsible for ensuring that a suitable framework of plans, policies and programmes for coastal management is in place, and that the various organisations involved are operating effectively. Whilst in the final analysis that is a Ministerial and Cabinet responsibility, it cannot be properly exercised unless the appropriate bureaucratic machinery has been established.

In 1981, the Coastal Planning Steering Committee suggested that this need might best be met by attaching a multi-disciplinary coastal management group to the Public Works Department.

This approach recognised the fact that the PWD had the largest budget for coastal projects, and also the prime importance of ocean forces in coastal processes and management requirements. Bill Andrew's paper again stressed that latter point. "The Ocean Rules". The Committee was also influenced by the apparent benefits of the arrangements in Queensland, where the Department of Harbours and Marine draws together coastal research, engineering, dune conservation and aspects of development control. The South Australian Coast Protection Board, serviced by the Coastal Management Branch of the Department of Environment and Planning, has a similar grouping of functions.

Another option mentioned at the seminar would be to add coastal management functions to the new CALM department. This would build on the established role of the National Parks Authority and Western Australian Wildlife Authority in managing long stretches of coastal reserve. However, experience with a similar system in Victoria points to the risk of dividing management of Crown lands from planning control over freehold lands on the one hand, and implementation of major coastal works on the other.

No matter how events now move in Western Australia, it is vital that the lines of communication and exchange of views fostered by the seminar be maintained. Coastal management decisions are essentially political because they concern the distribution of scarce resources. Seemingly endless debate is therefore inevitable: the trick is to ensure that debate leads to effective action.

Notes On Question & Answer Segments

Transcribed from tape by C. McDavitt
Day 1 — am

R. O'Brien — "Framing the Problems, Strategy & Players"

Q. — Clarke — PWD Dept. NSW

Perhaps my question stems more from an ignorance of the machinery of government here in Western Australia — when you put up the "players" in your Coastal Management Co-ordinating Committee there was no mention of say Soil Conservation Service and an organisation which at home I would call National Parks and Wildlife Services. Could you comment on that?

A — R. O'Brien

Yes the Soil Conservation Service is part of the Dept of Agriculture so they were represented on the Committee, and NP's is fairly closely tied to the DCE so there is a fair amount of liaison between them.

P. Woods — "Coastal Evolution"

Q — Charlton — Shire of N. Hedland

Is the coast of Western Australia rising? And will that get rid of the sand erosion?

A — P. Woods

The question is, is Western Australia rising, and if it is rising is that going to solve our problem for us? I think you're right, it is rising. In that slide of Becher Point I showed you, the second last one, I found that the same sediments we find on the beach today, where the waves break is about 2 m higher, up against the Mandurah Road, so that means that sea level has fallen or the land has risen. At Busselton and at Jurien we also found that the land had risen relatively about 1 m. At Northampton, over the last million years or so there is evidence that the land has risen quite substantially, but I don't know whether that is going to help us because I think the sand that came ashore during the last rise of the sea resulted in the Continental Shelf being swept bare. If the land rose therefore there wouldn't be too much sand offshore to sweep on-shore. I'm not too sure of the relationship between rising land and the formation of sandy land-forms, but I guess it would save us our erosion problems. But it might expose a lot of bare rock underneath.

Q — C. Russell — Shire of Albany

You used a slide there to show the erosion of the Albany coastline at Middleton Beach. A lot of people in the area use that as an example to demonstrate that if other beaches weathered that storm .....then that is a reasonably good situation. What do you think of that sort of argument?

A — P. Woods

Albany - Middleton Beach. I showed there was a large cut into the dunes, the question is, as I understand it, that as the beach survived, it will survive anything. Is that what you were saying?

— C. Russell — Other beaches have survived.

A — P. Woods

Well all I can say is I think it is very lucky that there was enough sand at Middleton Beach for the beach to erode back into the dunes. If there hadn't been a store of sand there, the bedrock would have been exposed and you wouldn't have had a nice sandy beach there at all. I've heard that there were some sandy beaches around the place that have been scoured so much that all that was left behind were pebbles about a foot across. So I'd say that's the difference between Middleton Beach and many beaches around there. That slide I showed at Denmark, the very first one, that was taken at the same time and there is a lot of sand gone from there so I think all the beaches lost a lot of sand. Whether it will come back is the big question. Possibly it will come back, but whether there will be the same number of grains will be very interesting to find out.

Q — ? Shire of Shark Bay Shire President

All those slides were referring to the open ocean, but is the same problem evident with land locked waters?

A — P. Woods

In Shark Bay we don't have an open ocean situation but I think the Shire President asked the question and he will know that his road at Denham is buttressed by rock wall, evidence that even at Shark Bay there is a change in sandy shoreline positions and the fact that we build things that don't move on shorelines shows that they are moving in the time frame that we are talking about. We have to take into account the fact that shorelines do move. People say to me that "You're only talking about a 100 years or whatever". I think that is irrelevant because in Busselton, 130 years ago or whenever they started Busselton, roads were built not presuming, I guess, that they would fall into the water. And now we have a problem. So I think we must consider things in terms of 100's of years. We aren't talking about a long time and even in Shark Bay where the processes are not so intense the changes are still taking place and causing us problems.

Q —Houston, — Shire of Gingin

The interesting thing I have learned here so far is that sand is limited. Many of us, and I'm one of them, did think that sand was manufactured over time, which leads us to think that what we take away was replaced over time by this manufactory in the sea. But you are pointing out today that this is not so or if it is so, it is over the millenium. Could you clarify that please?

A — P. Woods

The question is, in a nutshell, is the amount of sand on the coast limited and is it being produced? Well, a problem we have today is that we have large estuaries at the mouths of most of our rivers, and the sand generated inland is carried down the rivers, but it doesn't reach the coast because it is dumped out in estuaries. Now 20,000 years ago when the sea was right down at minus 100 m all those estuaries would have had rivers flowing through them so the sand would have been transported out past the present position of the coast. Now that sand that was transported out past the present position of the coast has been swept back onshore, to form the sandy dunes and beaches along the present coast. So I guess the sand is still being generated but today it isn't reaching the coast, and therefore for our purposes the amount of sand is limited.

Q — Pike PWD — NSW

What investigations are you doing offshore to determine the supplies of sand that might be there and what evidence do you have that these are diminishing?

A — P. Woods

The evidence we have that supplies of sand are diminishing are several fold. If you remind me afterwards I will introduce you to Lindsay Collins who did a PhD on the Rottnest Shelf and he had great trouble in trying to get sediment samples out there. So that is one piece of evidence that there isn't a lot of sand out on the Shelf. The second piece of evidence, in my eyes, that stands out which anyone can see, is that most of the sandy lands on the coast are eroding. Now I can't see how you can have a sandy landform built and then eroded unless something happens, and I would suggest that the reason they are eroding is because there is not a supply of sand coming in to keep them stable or to keep forming them.

When I talk about sediment it is mainly quartz sediment which is stuff that is derived from inland. There is of course a proportion of material generated by organisms that have shelly hard parts that break down. These shelly pieces get incorporated into the sediment body. Now that's still happening. We do have sediment generated but it is mainly carbonate sediment, and the main areas where they are generated are around seagrass meadows, mainly in areas that are fairly protected, they are not out on the shelf. So we do have a small amount generated, but generally I'd say the amount coming ashore has diminished substantially.

Comment — L. Collins — WAIT

Point of information — the rate of generation of sediment on the Shelf by organisms is about 50 mm / thousand years so you don't have much of a supply and that's excluding seagrass banks.

The blanket of sediment extends out for 30 or so kms and is ½ to 1 m. thick over rock. It would be nice to regard the Continental Shelf as a sediment factory to supply the coastal zone. The kind of sediment we have out here is carbonate sediment generated by organisms rather than river sand brought down and reworked back into the coastal zone but the rate of deposition is very slow, and the depositional rate has been calculated at 50 mm per thousand years so you can't really look to the Shelf to source the coastal zone, the sediment is just not available.

Q — D. March — Esperance

Where has all the eroded sand from our beachlines gone?

A — P. Woods

When sand was swept ashore it either formed dunes or those triangular beach ridge plains in general. The dominant force at that stage was onshore — pushing sand up the coast. Now sand supply is diminished, the main forces operating are now alongshore and so what we are tending to get is sediment spreading out along the coast which means often that sediment falls into deep holes where it is no longer in the system. An example of that is at Jurien Bay where the sand has been swept from the southern coast around to the northern coast but at the same time it is falling into a 12 m deep hole and once it is in that hole it can't get out. Generally instead of the sand building up and over, is now being spread along. If we let any sand move inland through dunes or blowouts that is another loss. So we have two modes of transport now on land: inland as a blowout which means the sand is taken out of the system; or alongshore with the chance that sand going alongshore will fall in deep holes and again go out of the system. The sand is still there, but it will not be on the wide sandy beaches we have at the present.

Q — Russell — Esperance

Could you expand on where you say Jurien Bay is losing the coast on one side and increasing it on the other? What about the Leeuwin, the south and the west coast and the north coast of W.A? It must have an overall effect on the whole coast. Aren't we having some parts of the coast building up or is it all going?

A — P. Woods

SLIDE — See this deep hole — 12 ft deep, sand sweeping around like this and falling in the hole. The sand that's in the hole is now out of the system and it won't be back on the beach.

The second question referred to the State as a whole. I am not aware of very many places where the coast is building up. If you can tell me, I'd be very interested to know. The north side of Jurien is one, but it is very limited and as the coast gradually erodes that too will disappear and almost everywhere I have looked in the State, beaches are in a state which I call stable erosion. I don't know which it is but it is certainly not growing. If you can show me some I would be interested.

P. Hesp — Landform Characteristics

Q — Russell — Esperance

In Esperance we have the problem of the coast eroding in town where it is necessary to save it to save a road. Surely we can have rock on a slope so that the energy of the wave can be dissipated and the wave can just go back to sea and we need not keep putting sand in like we do down there.

A — P. Hesp

It is said that you can stabilise anything if you put enough concrete on it. It really depends on what environment in the end you want to look at. And if it is expedient for you to save your road then that is more important to you than having your ecosystem intact or the look of your ecosystem. That's really your choice. You are correct in saying that you can dump rock on anything. I can't say you can't. All I would argue is that you must balance the expediency of having the road against the ecosystem. There is no guarantee that rocks will stay there in the long term, and in addition, dumping rocks on the foreshore will result in accentuated wave reflection and removal of beach sand.

Q — Shire of Shark Bay

At the Shire of Shark Bay we live on the inner peninsula, but on the outer peninsula there are some massive blowouts. At Steep Point, the most westerly point of Australia, we now have the early stages of an erosion problem where people who go there fishing carve a new track over scrub all the time in order to cross the sandhills. What do you suggest on our particular basis we should be doing to control that or is there nothing we can do to control it. What advice would you give us?

A — P. Hesp

I think you have a situation which most shires along the coast are dealing with or have dealt with since the 1950's in that you are getting to a point where you are having enough people going into that point where you actually have to formalise their access. That may mean in low-scale terms merely putting some gravel down on a road so it doesn't blow away, or it may mean that you are putting in thousands of dollars of fencing, signs, proper roadways, pathways access ways etc. and then having an ongoing revegatation programme as well. It does depend somewhat on the scale of the problem.

J. Ottaway — Marine Environment Characteristics

Q — A. Mensaros, MLA

Could you comment more on the detrimental effect of sewage discharge and also the extent, distance of this type of ... (result)?

A — J. Ottaway

The impact on the marine environment will depend to a large extent on what quantity and quality sewage is put out, and to a lesser extent how far out to sea. Clearly, if the sewage was tertiary treated the effect is about the same as fresh water input, which may be very minor. Untreated sewage has obvious, major impacts on local ecosystems, primarily through decreasing light levels reaching the seafloor, though in effect smothering seafloor organisms, and through creating a situation where the oxygen levels in the water near outfalls can be markedly diminished. Around the Australian coastline, mostly as a result of economic considerations only, sewage is not treated at all, or at best given secondary treatment. As far as I am aware there is nowhere on the Australian coast that uses tertiary treatment, which is very expensive. From memory, the cost of a tertiary treatment plant for 100,000 people is about $20m. With the productive coastal waters being close to shore the further one takes the sewage out to sea the better, in order to alleviate immediate local impacts. However, in that instance, one is alleviating the disturbance to the marine community immediately around the disposal site, but there may still be serious long-term problems on a larger scale.

Around the world there are millions of tons of sewage dumped into the sea every year, in effect slowly building up the organic content of the sea. This enrichment must have a major impact eventually. When the impacts do become apparent, they will not be as easy to rectify as putting a few more kilometers onto the ends of existing outfall pipes.

Q — A. Thomas — Bremer Bay/Jerramungup Shire

Three or four years ago I saw some red bloom on the sea on an isolated beach west of ..... ? Those beaches are not inhabited and have seasonal professional fishermen using them and I understand that bloom is from pollution. Could you explain how this red bloom could come on an isolated beach?

A — J. Ottaway

First, I make the point that red tides events are a natural occurrence. Circumstantial evidence at this stage suggests that sewage inputs to the sea, and other waste materials, are exaggerating this natural phenomenon of red tide events. When red tides do occur they can spread thousands of kilometres. One major red tide event in November-December 1982 spread from Coffs Harbour on the northern NSW coastline to north of Cairns, which is about 1800 km. Depending on wind, current and tide patterns in a locality, it could either sink or wash up somewhere though what does wash up is usually only a tiny fraction of the amount present in the sea at that time. It is very easy if one has an eddy of water or some large-scale circulation effect to have a "parcel" of water moving off somewhere, taking with it the red tide organisms. Hence, it is not surprising you have red tide washing up on isolated beaches.

Q — M. McGrath — Conservation Council of WA

All your comments to date have been on the environmental consequences of land-based developments. Could you comment on the significance for WA of the impact of the fishing industry on the marine environment of the State.

A — J. Ottaway

It is quite likely that bottom trawling in particular is having absolutely devastating impacts on the marine environment, mainly through habitat modification. CSIRO research suggests that the activities of prawn trawlers and sea-floor fish trawlers can modify the sea-floor to the extent that the composition of the catches change too. The main problem here is that when trawling stops, for whatever reason, the ecosystem almost certainly will not revert back to what was there before trawling began. I doubt that anyone understands what will be the long-term impacts of these activities on marine environment, but I think this is a very strong reason for having a set of extensive marine reserves, at locations right around our State's coastline. At least then, in the instance we're discussing, if a local natural ecosystem is disrupted there is a chance that communities contained in nearby marine reserves might 'seed out' and help the disrupted areas regenerate.

K. Tinley — Processes vs Expediency

Q — J. Yates — Augusta/Margaret River

I would question your comment re siting of main roads away from coastal areas. We find by experience in our particular shire, where the Caves Road runs parallel to and on the landward side of the Leeuwin Ridge and yet we find an enormous number of your hardy people tearing across the ridge, mainly by 4-wheel drive and transgressing right along the coast and making their own roads. This is an almost inevitable thing and we have yet to come under what the pundits call our full tourist pressure, so God help the coastline that we have formal roads in that area.

A — K. Tinley

That is fully understood and comes around to adequate planning and adequate extensions so people will know what it is all about, so everybody sees where responsibilities really lie. It is inevitable that when you separate things out there is a whole group who do just as they please anyway. But this selfish approach is going to have to diminish if we are going to ..... for long-term survival.

Q — ?

Ken, you are talking about various principles that can be applied to coastal planning, and one of the ones that I've heard referred to is that within a coastal zone however defined the only development which be permitted in that zone are coastal dependent uses, uses which couldn't be sited anywhere inland or don't have effectiveness. What do you think of that .... if sited elsewhere?

A — K. Tinley

If I understand the question correctly, is that there are certain developments that have to be on the coast and if you move these developments landward, it becomes a non viable situation.

Questioner's comment — *Yes, such things as port facilities and coastal recreation things.*

A — K. Tinley

Well this comes around full swing to land allocation according to its characteristics then, matching activities with property. Only in that way are you going to be able to work out which goes where.

C. Chalmers — The Broome CMP
Q — Pat Vinnicome — Museum Aboriginal Sites Dept.

Broome coastline is very rich in Aboriginal resources. To what extent have Aboriginal interests been taken into consideration in preparing CMP's? The Broome coastline is among the richest in Aboriginal resources.

A — C. Chalmers

We find that Aborigines tend to favour very similar places to people of European origin but as I outlined earlier, one of the great difficulties we have in preparing good resource management plans in the coastal areas is that we can't obtain information. This is particularly so with respect to Aboriginal sites. The Museum has a good deal of information and we can refer to that. And we can refer to Aboriginal people, but they are often not anxious to identify their most sacred/precious sites and that creates difficulties. Despite this we attempt to gain as much information as possible early in our investigations. One that is considered early .....

Q — Mike Clarke PWD, NSW

How do you go about getting information from the local authority, particularly when I get the impression that a lot of these management plans could be asked for by bodies external to the local authorities? And the second string to that question, how do you proceed to be sure that your efforts are going to be implemented, particularly when these plans have been asked for by other than the local authority?

A — C. Chalmers

Usually if a plan is requested by another authority and its in an area with the National Parks or an area which isn't directly under the control of the local authority or it we are doing an exercise in any local authority, we automatically communicate with the officers of that authority and establish dialogue. We speak to the council and determine what their thoughts and requirements are for the area.

Implementation requires following up — DCE's major role is to liaise with, and co-ordinate, other authorities. There are a number of barriers to implementation. The greatest one is normally one of funding. Sometimes there may be animosities which we attempt to overcome during our negotiations.

Q — P. Driscoll — Shire of Augusta/Margaret River

The Broome plan was dominated by the existence of the racecourse. What sort of decisions and restraints did you work under in leaving a facility which was I presume used not all that often in such a prominent position.

A — C. Chalmers

Good question. First I point out that the little example I just demonstrated to you at the end of my talk was only a very small portion of the study area. Many decisions were made about all sorts of areas in the study and that was only a very small portion. The course occupies one of the best sites in the Broome study area. It is used relatively frequently. Certainly most frequently by the country racecourse standards. Peter Woods my fellow author thought we should move racecourse and put it somewhere else. It was one of our original suggestions and it met with "cool" reception. After negotiation we compromised and now it would appear that the facilities will be relocated as described in my talk. Structure plans always represent a compromise and that was one of the ones we made. Yes it does occupy a prime site and it is a facilty that doesn't necessarily have to have a coastal location but we thought because it represents a big capital investment, compromise was appropriate.

G. Robertson — Land Capability Assessment as a Basis of CMP

Q — T. Bright DID — Esperance

What other resources have you at your disposal for your land capability assessment?

A —

They are growing at the moment. Two people are fully involved in coastal resource assessment and there are some people in the DCE that work in various areas of that. I see our role as not so much being able to carry out a resource assessment of the coastal lands of the State, but to develop the methodology, and for that methodology to be available to private consultants, local government or whoever, so that they can adopt that methodology for their own use.

Q — ? Horrocks Beach

What about the costs? We need a contour survey done and the cost would be $22,000. Where will the money come from?

A — G. Robertson

I don't know anything about that request for a contour survey. A lot of work can be done on photo interpretation particularly with people who are able to develop an appreciation of that particular coastal system. There might be critical angles on which you can develop one type of proposal and not another but we've had it quite clearly said today that on the dunes close to the coast the ones that are going to be unstable, the best thing to do is steer clear of those. And its probably only if you're entering into a high cost/high risk and probably a higher profit development right on the coastal land that you need to spend that amount of money.

Q — :

Re: P. Hesp said in about a half an hour he could digitise the data on Rottnest. Perhaps you could tell us how the information is collected and collated.

A — P. Hesp

I don't know where you got the half hour from. It took two of us in a cross-checking type exercise about 3 or 4 days to do the land form mapping of the Rottnest Island area indicated on Graeme's slides earlier. And it took us about 7 full days field work to field check that landform mapping. And probably the whole exercise in terms of coming up with a capability map took about two months overall from beginning to end. It really depends on the system. Some systems are relatively easy and some are very complex. Rottness being in the latter category and then depending on the constraints and the landform types, developing the capability ratings can again vary from relatively quick to taking quite a time.

M. Woolfenden — An Engineer's Approach to Utilisation of Coastal Resources

Q — Brian Evans, Stirling — Sorrento Resident

I have been involved with CM Planning with the City of Stirling. I stood on that third Groyne over a period of three months (much mirth). I saw a 20 ft high frontal dune system disappear and it had vegetation on it which also fell in the ocean and I would assume that the vegatation probably took the best part of 20 years to establish. Your comment was that the groyne didn't cause it. My comment is that that is the very reason it happened. I could be wrong but logic suggests that to me.

A — M. Woolfenden

Logic also suggests that since the West Coast Highway had been there for 20 years it would not have disappeared either. But there was definitely an erosive cycle going on that section of the coast. I don't know the answer. I suspect only very faintly (because I try to work with the PWD) that you may be right.

Q — B. Russell, Esperance

We are blaming the groyne that built the harbour at Esperance for the erosion we have on the road near the Fresh Air League. We have been instructed by the relevant department to keep tipping sand in. We are getting a lot of criticism from the ratepayers and the shire councillors are wondering are we like King Canute. Some of us are quite convinced that we could put in sloping rock surface there. I don't think the look of it is important. It is the fact that we must save that piece of road. In future the roads won't be put in those positions, but that piece must be saved. Now the question is are we sensible to keep tipping sand in or would we be more sensible to put a sloping rock surface in to absorb the energy.?

A — M. Woolfenden

If you put in a sloping rock surface you will have very little beach if any because you get more energy reflected off the rock surface than you have now. I think you have to keep shifting sand — put sand in and keep it there or maybe finding some other solution, but certainly putting a rock slope in there will not give you a beachfront. Sloping rock will not help at all, it would cause more erosion than if you had something soft in place.

Q — P. Hesp

This is really a housekeeping question. Why don't we bury groynes in the sand. Why do we have a sub-aerial portion to the groynes. In the States and in South Africa they are making them sub-aqueous now and if they come onto the beach at all they are under the normal beach surface. They seem to work just as well. Why don't we indulge in that since we seem always to be going to have groynes?

A — M. Woolfenden

I think as well as being sub-aqueous they have to be sub-beach as a line of last resort. Groynes parallel to the coast have been very successful, they don't have to be made of rock, they can be made of sand and can deter coastal erosion. Buried groynes will not save the beach above the level of the top of the groyne.

Q — T. Bright — DID, Esperance

Ten years ago and before, how often was the engineering solution, in fact, the aesthetic solution?

A — M. Woolfenden

At Halpern, Glick always. According to the foreword to the Annual Report of DCE, immediately after the Two Rocks Harbour was built, the question was asked why didn't they make the breakwater match the rock. I don't see how we could have done it except by painting birds on the breakwater to match the rock. That was the sort of aesthetic appreciation that DCE had, compared with our own.

Q — B. Russell, Esperance

Isn't there some system of having concrete under the surface of the water, just out to sea off a shore to assist.

A — M. Woolfenden

In your case it is the swell that does a lot of the damage, and this sort of underwater device would assist.

Q — ?

At Busselton about ten years ago they put plastic sausages in as groynes, what was the result of that?

A — M. Woolfenden

You can make a sausage and fill it up with concrete, but it is a fairly inflexible groyne. One of the real purposes of breakwaters and groynes is to absorb energy, and the more hollows you have the better. If you make it solid then all you are doing is collecting the energy and passing it straight over the top. If you could make breakwaters and groynes that were nearly all hole and very little rock, then you would have more success, but they would wash away unless carefully anchored.

M. Allen — CMP and its Relation to Statutory Planning

No Questions

B. Evans — The Stirling CMP

Q — M. Clarke — NSW PWD

I commend the City of Stirling very much for the report it has produced. I would say it has quite obviously been due to the initiatives and extreme dedication of a group of very senior officers. At $100,000 cost I believe they got good value for their report.

A —

The cost estimates for the report of $100,000 are not actual costs. These estimates were provided to indicate the level of costs involved and were based on time spent by the Study Group members in terms of wages, plus other miscellaneous production costs.

Q — R. Carter — Dandaragan

I think Brian that you could probably frighten a few of the smaller country shires into getting involved with coastal management plans. You mention that your Council allocated $300,000 for 6½ kms of coastline and you express surprise what Broome is going to do with $100,000. The Shire of Dandaragan has about 80 miles of coastline, and we've got a plan for the Town of Jurien and for an expenditure of less than $10,000 I believe that we can implement some very effective controls on our foreshore areas in Jurien and I'm a bit frightened that you are going to frighten off other councils from getting involved in this planning and perhaps could we ask how your Council intends to spend the 40% of that $300,000 on construction works I assume, because you did mention 60% was on maintenance?

A — B. Evans

The figure is now around $450,000 for the 1985 budget. The interesting thing about coastal management is that its like a recreational facility. You have an initial capital outlay and that is fine, you know what you are up for. What a lot of people don't appreciate is that the maintaining of it over five years is quite often more than the initial capital outlay. I think that is our situation. We are now committed to a whole stack of proposals such as access ways, fencing, parking, landscaping, rehabilitation of dunes — now once we set those up our maintenance budget is probably going to go from 60% to 80%. In fact it may ultimately reach the situation where 90% of our budget is merely maintenance, assuming that we don't reach a situation where we need more facilities. Certainly I think that is where the money will be spent. There are always pressures for new facilities and that money will be provided from the budget. As far as scaring off other local authorities, I certainly don't want to do that. We had a budget of $32 m back in 1983 and a budget of $35 m, I believe, this financial year so maybe it is something we can afford, but bear in mind I am talking about an LGA in the metro area. We are the largest population-wise, 160,000 odd people. We have tremendous pressure on our coastline and in fact our survey indicated people as far away as Mundaring coming to use the beach. Now with due respect to what you think about local government, the coast is a regional resource as well and the council has committed that sort of expenditure to maintain the coast in a good situation and improving it. That's not to say this is applicable to all other coastal local authorities. I don't think other LA's would have to produce management plans or reports identical to that which was appropriate for us in our circumstances. Other local authorities' situations would be different — certainly Wanneroo's is different from the City's. I think you have just got to sit down and think out your particular approach and it may well be necessary to use consultancies, the University or WAIT or the various government departments.

G. Sansom CMP — The Australian Context

No questions

Open Period — P. Woods

Q — Peter Skitmore DCE to G. Sansom

How do you see the existing planning system coping with a proposal wherein there is no CMP? Is the planning system able or willing to insist on a CMP before making a decision? Can the TP system defend proper CM approach for coastal lands?

A — G. Sansom

The simple answer to that question is that up until the very recent past all planning ..... being made in this State in the absence of CMPs so the answer to your question is yes you can

make those decisions but as mentioned in the paper it is a lot easier to defend any controversial decisions which may be made and which may lead to appeals being generated if you are making your planning decisions in the context of CM planning.

A.M. Session — Day 2

R. Wright — Developer's Role in Environmental Assessment

Q — R. Edwards, MHR — Federal Member for Stirling

The local community have a long-term vested interest in their community. The developers sometimes have a much shorter-term interest because they very often sell out to another corporation or change ownership or management. The community is often left five years later with a different management and financial structure and a feeling that somehow the decisions of the private sector are often shorter-term decisions than the responsibilities of the community and produces that general unease about developments that you addressed yourself too. Would you like to comment on that please?

A — R. Wright

That's a very valid question. You've got to put it in two categories. One is the developer who is in there very quickly. It is unlikely that the developer who is in and out quickly is going to spend a lot of money and have a lot of effect and I think the rules as they stand at the moment are quite able to cope with that guy, and if he is going to continue to be the developer the word gets around and he soon gets known by all authorities and he won't get away with it more than once or twice. Projects that I have been involved in have been long-term ones basically and I think that in that issue both the councils and the local constituents tend to forget that if a developer is in to a site for more than a year he needs the goodwill of both the council and the community to succeed. If he hasn't got that he won't make his sale and he won't make his dollars. And it is as important to him that the relationship is maintained as it is to the community. At Secret Harbour we think we'll be there for 15 to 18 years and we are very conscious that we must have a good relationship.

Q — B. Humphreys — Rottnest Planning Group

Two related questions — one is that in my experience in environmental science a lot of things you complained about in your paper are related to timing and when a developer chooses to schedule environmental work. My suggestion is that if an early low-cost environmental review phase is done right at the early concept/design stage of the development that might solve quite a few of the problems that you allude to, and do you see any difficulties with doing that before major loan raising took place.

Secondly, what proportion of the cost of the job is reasonably spent on it in environmental design studies — do you have a rule of thumb about this? And it is probably worth comparing the cost of good and beneficial environmental work with the possible costs of restoration if that work wasn't done, afterwards. Rottnest is a classic case of this.

A — R. Wright

Yes I think there is a good case for staging it. To some degree Secret Harbour is staging it. There were certain procedures ..... have to satisfy the EPA before ..... approval commence. That could be taken a little further in that were broad overview of environmental assessment done, that would probably also assist in setting precise parameters for the whole report. Really the only time you can set those parameters now is with the Notice of Intent. Perhaps some preliminary stage may help, I'm not sure. It's worth looking at.

As far as percentage cost — I haven't looked at it but what I can tell you is that the percentage is going up all the time. It is only getting dearer, it is not getting cheaper. The comment yesterday in one of the talks about different sites and what it cost to bring them up to certain levels — that varies very much from site to site — while one site might cost more to make it environmentally acceptable, it may cost you less for other aspects. So there is no rule of thumb on it.

Q — B. Russell — Esperance

How do we get an answer in a fixed time — or quickly?

We recently wanted to do some chalets and when all the questions had been asked they then decided they wanted to go along the beach and look for Aboriginal sites. Now how do you try to have a fixed time when these questions stop coming and you can get on with the action?

A — R. Wright

You do it in a legal manner. If the questions are important enough they will be easily recognis-

ed and therefore there is procedure set down which says, just for sake of argument, there are NOIs and then there are a series of questions asked with details to the developer what the concerns are and why he should answer them, etc. Provided that the developer's answers don't raise additional matters which were not initially defined in his NOI, then that's the end of the ball game. Developers only get one shot at it, why shouldn't authorities. If you can't identify the real issues up front, knowing what the development is going to do, then I suggest they are not important enough, and there should be time limits put on it. Give them so long, ask the questions, give the developer so long to answer. The only way that you will make that stick is to make it legal.

Q — F. Stokes — Shire of Wanneroo

I was impressed by your comment that the private development you referred to (Westlake — 075) lowered the rate in the $ for a municipality. In the Shire of Wanneroo at the moment the Council is split and the community is too, as regards the location of the Sorrento Marina. We've had two or three environment reports on the location of a marina several years ago and they've come out in favour of a particular spot where we have an Ocean Reef. Now the Government proposes to put a marina in at Sorrento subject to a favourable environment report. It seems to me we have had two already and the EPA may come out with one that is favourable and I can't understand why they should come out with a favourable one when on two other occasions it was recommended that that particular spot remain as public recreation for passive pursuits. We see a marina as bringing an increase in rates for all people who live in that vicinity.

A — R. Wright

Well, the development I was talking about was 1800 acres in a community of some 20,000 people who now live there. It has a major regional shopping centre and that created a large rate increase for council. That gave them an opportunity to break down their finances, reduce their borrowing in the long term, and that's how they effectively reduced the rate in the dollar. I mean the rate in the dollar didn't go up the way other councils did. In your case the difference is that you are talking about a marina — you have a coastline and you are going to building some rockwalls and you are going to put some boats in it. The only way the marina can be commercially viable — something governments when they do this sort of thing don't have to worry about, commercial viability 10 years down the track doesn't worry that government — you can't make a commercially viable marina if you are taking into account interest on the money, build the rockwalls, etc. etc. and all the added cost to the community, unless you have an infrastructure around it to support the marina. Any world expert will tell you this — unless the demand is so high you can charge exhorbitant rates to dock. Now that won't happen here — the demand is not that high. And the sort of clientele you are talking about for that marina are not the same. You need a marina full of 35 ft upwards motor cruisers, all costing more than $150,000 where the guy probably charges the company account, and doesn't care (about costs). Your marina is not going to reduce your rate. What I'm talking about is a project which sets out to improve the basic community and generate more funds for the Shire gives you more opportunity to offset costs.

B. Masters — Role of Mining Industry in Utilising Coastal Resources

Q — B. Claughton — Carnarvon Shire Council

Your comment regarding the role of the local authorities in these areas is probably more in the coastal zone ..... right on the coastline. ..... action of the ocean. And remembering too that much of the mining operations can be offshore or dredging operations cause effect that local authorities can have very little control over. I agree too that in the areas of control where you've got a high population density, LAs have obviously got a very great concern, and the property would in very many cases be under their control. In other areas, particularly those on the coastline, of course, are all Crown land there is some question of who should be controlling them, particularly where you have small population area with very large coastline. And certainly haven't got the expertise to look after the area. I'd like to ask you how you'd see the responsibility for control of those sorts of areas and whether or not LAs should be equipped to look after those or whether you see some government departments being in control so that mining operations such as yours have got some steady contact point.

A — B. Masters

Well I'm a firm believer in local authorities having a lot more control over what happens within their Shire boundaries than I think they have at the moment. I think it is crazy for developments to take place without the Shire being fully supportive of it. Ultimately it gets down to a question of legislative responsibility. All I can do is support you in your stand that there must be more local shire involvement. As for how the information is gathered, I am not convinced that shires should be totally responsible for that problem. The proponents of developments must put up

some additional costs. I think the State Government ie taxpayers, should also accept some cost commitments certainly as much as the costs that may be borne by Local Authority. I think you've got to take each particular case on its merits as to who should pay what, when.

Q — R. Edwards MHR

Re your cost triangle — do you include "social costs"?

A — B. Masters

Yes, it does include environment, social matters, effects on other developments, you name it.

Q — P. Vinnicome — Aboriginal Sites Dept. — Museum of W.A.

My comment is in response to a comment from the floor regarding the situation at Esperance, an example of the way development plans can go ahead without taking account of Aboriginal needs. Aboriginal sites are quite often regarded as an impediment to development. Some consultation should take place with the Aboriginal community at a very early stage which would obviate a lot of difficulties later on. They're becoming increasingly antagonistic towards other government departments making statements on their behalf. It is not that they wish to be obstructive or difficult, but they do want to be consulted. At that very basic level there could just be agreeable awareness of consultative processes at an early stage — it might obviate difficulties.

A — B. Masters

I can't disagree with anything that you have said. Mining companies like any other developers have to pay due attention to the various assets of the coastal zone, be they Aboriginal sites or otherwise. However, it is important for Aborigines to come forward when they believe their sites or interests are threatened. These days a major development does not go ahead without a lot of fanfare and publicity and I believe the onus is on Aborigines who believe their sacred sites etc. are affected to come forward, rather than for us to always to go them. It has got to be a two-way thing, whereby information flows freely from one to the other and back again. I believe that at this stage the onus is on the developers to go to all the relevant authorities and other interested or affected people and there isn't that much onus for those people to come to us. I think we have to develop a far better communication both ways.

R. Edwards — Comment

The bargaining and contractual arrangement is a two-sided process, not one in which all the responsibility must lie with either the developer or the miner.

I would like to make a comment about Aboriginal sites. I had a look recently at Bungle Bungle as part of my committee's work and also went to the Keep River National Park in the NT. It became clearly evident that if we are astute enough Aboriginal sites can very often be regarded as an asset. They can be a focus for people to go and visit a NP — rather than being a barrier to development, they can be an asset in development seen not necessarily in terms of changing or over riding, but development seen in terms of getting a community to recognise that there are assets there for people to experience and enjoy. I think that is an important issue.

I. LeProvost — Natural Resource Consultant's Role & Responsibilities

Q — B. Blaikie — Member for Vasse

The question I pose to you follows on from what a series of speakers have already indicated this morning, those of the Government developers and those of the private developers. The question I raise is with the studies you are undertaking at Pt. Piquet and Pt. Port Geographe — have they received T.P. preliminary approvals and how do you relate and react to the proposals that on the one hand are submitted by Government and a proposal on the other hand that is submitted by a private developer. And does the Government give any special favour to its proposals rather than those of the private developer? In both cases one is a private development and the other is a Government development.

A — I. LeProvost

Oh dear, I wish you hadn't asked that. I work for both sides and it is difficult to be impartial. As far as the T.P. question, that is not my area. I am a natural scientist and I deal with the natural environment.

Regarding the business of how do government authorities review their own proposals. It has been my experience that the DCE is keen to apply just as much scrutiny to government developments as they would to those submitted by private enterprise. I think it is fair comment that they are scrupulous in trying to maintain a fair approach, but there is one area where I do believe there is a different approach and that is where there have been large-scale government projects

proposed, such as the Cape Peron pipeline. The Government instituted a technical management group of their own — experts who were available to guide and liaise with the proponent and with the Government and with the consultant to make sure that the project ran smoothly and was as acceptable and as accurate as possible. And that type of technical management group, as far as consultants were concerned is a very worthwhile facility. That type of technical management group does not often occur with private enterprise developments, and that's perhaps an area where there could be more cooperation.

Q — R. Edwards, MHR

You speak of the dichotomy between natural science and social science between objectives and subjective activities. One of the reasons why there has been a great deal of community concern about so much of what goes on with development proposals is that in fact so called natural sciences are in fact making subjective assumptions anyway and at some stage ..... must be committing themselves and wanting to say we feel about these issues in a protective way and in fact (natural scientists are making subjective assumptions)?

A — I. LeProvost

We would like to think we're not making subjective assumptions. We do have to make subjective assessments at times, but because we are professionals based in a science, there is the scientific method available to us of setting up a hypothesis and then collecting data to disprove that hypothesis or prove that hypothesis, and that's what we see as the need for collecting adequate information on which to base a ..... . We see our role as endeavouring to provide an objective and rational and scientifically acceptable basis for making these decisions so that the subjective assessments can be handled elsewhere.

R. Stanton — Planning Consultants' Role and Responsibilities

Q — Allen (Mike A — TPD, or J A BHP, or Bob A Mt. Newman)

Do you find there is enough expertise in WA to cover all facets of Planning?

A — R. Stanton

If you know who to ask there is a lot of expertise available in State Government departments. Generally it is only on the odd occasion when an Eastern States expert has to be called in.

Q — B. Masters

What mechanisms are available to local councillors to allow final decisions to be made?

A — R. Stanton

If a council needs to take urgent action, under the Town Planning Act, an Interim Development Order (IDO) can be brought in quickly as a holding mechanism to allow the right decisions to be made in due course.

Q — G. Sansom

Could you comment on the points Mike Allen was making yesterday, on the ways in which coastal management proposals as against ..... only proposals can fit into the planning system we have?

A — R. Stanton

The TP system we have grown up with is basically a land development control system based on identifying areas of land, making a decision between what area may be reserved and what area may be developed — lines on a map. Nothing wrong with that in itself but it may not take account of change. In other words the whole question of coastal processes is an ongoing one and the impact of a particular project development proposal may depend on its scope, scale, range — what you have — which may not be able to be foreseen by a development control plan under the TP scheme. I don't see it as impossible but I see it would have to be carefully thought out as to how the two could be married together. One is a dynamic management requirement and the other is essentially static. The way I think it might work would be this — a CMP might be prepared for an area which would overlap with the extent of the TP scheme somewhere along an area adjacent to the coast, and within that area we find perhaps not rigid statutory requirements but rather a policy of the council relating to development in the coastal zone. Thus any proposal by a public authority, developer or by Council itself, would have to be assessed in terms of the CMP before being granted Town Planning approval. Then having been given approval, it could be included in a particular zone within the TP scheme at a later stage. I think the CMP might only be an interim step towards final zoning, before inclusion of coastal areas within the statutory planning system.

J. Glover — Role of Local Government in Planning & Management

Q — from Member of LGA

Has the speaker ever heard of the NP Authority?

A — J. Glover

The answer to that question is yes.

Retort form LGA Member — *It didn't sound like it earlier.*

A — J. Glover

I don't intend to mention everybody. If you feel that hurt about it I'll certainly change my paper. Because you're not in it you are not out of mind.

Q — LGA Member

We are one of the unfortunate LGAs in the situation where we've got 6 towns on the ocean-front and they are all interspersed with large stretches of land controlled by the NPA. It makes any attempt that we make at coastal management absolutely ridiculous.

A — J. Glover

I take your point. There seems to have been at this conference an enormous amount of expertise available and untapped in our own backyards. The true fact is that most of the expenditure on the coast does come from ratepayers in local authorities. As a matter of interest, Nedlands last year spent $30,000 on the coast, Cottesloe $115,000, plus a $270,000 payment, part payment of their new pavillion, with a total cost of $350,000 which they got ..... a grant, but that figure represents 10% of their total rates income. Perth City spent about $183,000 which I find surprising, Fremantle Port Authority $200,000, Stirling $286,000 and about $500,000 allocated to next year and Wanneroo $400,000.

P. Drechsler — A Broad Scale Approach with Local Scale Implementation

Q — No questions

Lunch Break

L. Hitchen — Role of Tourism in Promoting Use of Coastal Resources

Q —

Re Reports — Sorrento Marina? — decisions made in undue haste .....(inaudible)
Background Question — by?
Perhaps the report that you referred to concerns the Sorrento Marina which some councillors at Wanneroo decided that particular spot was decided in haste, at a 1-hour meeting before a full council meeting where all councillors were notified. I always felt that the decision was made in undue haste when we anticipated that the marina would go to Ocean Reef further north.

A — L. Hitchen

Presently there are developments going ahead with perpetuated problems that have cropped up in the past. My understanding of the Sorrento one is that there has been a tremendous amount of study undertaken by the appropriate authorities.

Q — B. Masters

Has there been any studies done to determine whether tourists who are given coastal roads with mile after mile of uncluttered view of the coast can get bored. Wouldn't it be more appropriate to have a road which only occasionally comes in and presents them with a coastal view?

A — L. Hitchen

To the first part of your question — to my knowledge "No". On the other hand we are spending money on research for studies at the present time, looking at what the tourist looks for when they go to a place. It seems to me to be pretty much up to the individual what he wants to see and where he is travelling as far as coastal views are concerned. I think there is a definite need for coastal views to be seen. Any of the proposals which I am aware of, I think there is one up in Kalbarri that is being debated at the present time, are not long stretches of road, they can be covered in about 20 minutes — the one at Yallingup is a bit longer. I don't see that as a boring exercise looking at coastal scenery for that length of time.

Q — P. Woods

How do you see the tourist industry assisting local authorities cope with the coming pressures?

A — L. Hitchen

The problem is one that cannot be solved in the instant. The Tourist Commission will be able to encourage tourist development in various ways. I believe we have a greater influence than we did some years ago. For instance under the Act we can own a block of land, we can build a hotel on it and build whatever we desire and we can run it. It has got to bring additional revenue to an area, it's got to bring opportunities to the people in the area for employment. That is very important, as are the additional rates that come in. Problems that may crop up with roads for instance, I think that we can put in a word and hopefully get some resolution a lot quicker than it was possible 5 years ago. On Friday the Premier and Minister for Tourism is holding a very significant capital investment type seminar in respect of the tourism industry and he will be making comment on the type of assistance that we will be able to provide in future to encourage developers and investors to get their operations under way, and that well could include an access road from point A to point B — development or improvement of an access road which in the past has been the cause of headaches between that developer and the Shire.

Q — ? from S.W.

We should be able to protect developments from the whims of developers and imposition of their personal flair on developments.

A — L. Hitchen

It has got to be up to the individual and the individual proposal. We see some "unusual" proposals now and again, dozens a year go over our table. I would hate to see a potential developer stymied to the extent that he has to comply exactly with what has been the situation in the past. Give it a bit of flair and a bit of variety and that will keep the ..... interested and keep him around.

Q — I.D. Johnston — DID — Geraldton

Going back to the Kalbarri situation — a coastal road was generated by the Northampton Shire Council and through the Chamber of Commerce people in Kalbarri to get it graded and taken right through to Port Gregory. Since then, over a four year period, there have been NPs involved, DCE, Dept. of Tourism and also the Tourist Commission involved. It appears to have got nowhere, I know the Premier even got involved at one stage. It seems everybody is having a bite of the cherry but nobody is making decisions. The local people obviously want the development for tourism, and it is a very scenic drive. I am wondering if it will be another 4 or 5 years before Government is prepared to stand up and make a decision?

A — L. Hitchen

I really cannot tell you the current situation other than that it has not been resolved. In itself this is an interesting one in that there are 3 or 4 different points of view. Could someone here tell us if those groups have ever sat down together.

A — Colin Sanders

I'll answer the question if you like.
The Shire of Northampton wished for a coastal road from Pt. Gregory northward to Kalbarri giving a variety of experience whereby tourists can come from the south via Geraldton, Northampton, Port Gregory, to Kalbarri and exit from the eastern road that's the Adjana - Kalbarri road, northward up the Highway 1 or southward. With regard to the Shire's proposal, they wish to take a road right along the coast which was an old firebreak which has been transformed into a track which normal vehicles can proceed along but with difficulty. The NPA's view is that you do not set major roads along a coastal scenic area. For a national park the standards are there of tranquility and beauty. If you set your highway back from the road then the major attractions which in this regard is the coast, the coastal canyons ..... steep cliffs can be places of beauty and tranquility, without being interrupted by the sounds of vehicles. So what we have endeavoured to do in association with the EPA is, and there have been quite a number of meetings between ourselves, DCE and at one stage even with the Shire, is to have an assessment made of the coastal road. A decision was taken that an inland route would be appropriate. An alignment has now been surveyed and there will be access ways to the coast. Now the inland route is at a higher level, you see panoramic views over the coast, over the cliffs, as well as back on to the eastern side to allow views over heathland. It is also the best solution engineering-wise and economically.

Applause

W. Andrew — The Role of the State in providing Public or Protective Works along the Coast

Q — B. Humphreys

You explained the high costs of coastal structure engineering, I just wonder whether the State or the Tourist Commission has considered more of a "user pays" approach to coastal protection and coastal facility provisions?

A — W. Andrew

In regard to payment I haven't identified that the State has been able to find out how to get directly back at specific users. It certainly is Government policy as we understand it that where possible identifiable users pay for recreational facilities on the shore, boat launching, boat mooring and so on. Coastal protection of course is still practised a bit like bolting the stable door after the horse has gone. It is seen, regrettably as a community task to help the people who normally don't have the resources to pay for themselves. I think the State would like to have the beneficiaries pay. The State would also like not to pay at all and I have raised that point in my paper — one of the actions which is essential in Coastal Management is to try to minimise the extent to which the community will have to pay in the future. Different State Governments' policies vary. I haven't yet struck one that is absolutely consistent, except that in general where there are identifiable beneficiaries they contribute some money towards it.

Q — J. Ottaway

In your paper abstract you mentioned the ability of the oceans to purify the wastes put out in the ocean outfall. Clearly the implication of that is incorrect; for example, look at what happened in Cockburn Sound, and Princess Royal Harbour. The ocean has a very limited capacity to absorb all of those pollutants, sewage wastes and industrial pollutants. It seems that what has happened in Cockburn Sound and Princess Royal Harbour is just a forerunner of what we will be seeing on a much grander scale in the open ocean if sewage outfall continues. Would you like to comment on that?

A — W. Andrew

I do see it as an asset the ocean has in capability for purifying waste — it has a particular ability to purify sewage, by sterilising harmful bacteria. One of the most effective forms of sewage treatment in fact comes from discharge to the middle of the open ocean. You mentioned embayments and its quite true, that embayments have a limited capacity for this. By contrast I believe that our open ocean does have a very substantial capacity. I'm encouraged in this view by reading what's happening in other parts of the world where, for example, the Mediterranean sea currently seems to be under some pressure from approximately 300 m people dumping everything they can into it. It is coping but not well. I'm making my statement in the West Australian context. We have the outpourings of perhaps only a million people pouring into something much larger, the Indian Ocean and the Southern Ocean and yes, I believe it has this capability and I further believe that capability is one of the natural resources available to us. I wouldn't like to go to extremes, of course, and I wouldn't like to discharge sewage in Cockburn Sound or into Princess Royal Harbour, but it is an asset and I think is one that we have to use — because we don't have all that many natural assets going for us here.

Q — J. Ottaway

Bill, I have another comment. The Mediterranean isn't 'coping'. It is greatly stressed, and even over the last 20 to 30 years there has been marked deterioration. The Mediterranean sea is vast, but it is not 'coping'. I would also question the 'substantial capacity' of the sea to take this sort of punishment. It seems to me that pouring sewage and industrial waste out to sea is not really 'treatment' at all. What you are doing is simply dispersing the wastes, and getting rid of the problem for the time being, but when it does show up again it will be an immense problem, and will take a huge amount of money and considerably more engineering and scientific expertise than we have at this time to rectify the problem. I suggest that now is the time that we should be looking in terms of going to tertiary treatment plants, as expensive as they may be, as one solution to stop the problem before it develops out of hand.

Q — W. Andrew

The argument between secondary and tertiary treatment of human effluent going into the ocean is probably getting to be a fairly technical one. I think it is a point where you and I will have differences for a few years. I think we have the time to have that difference — to discuss it at length because we have on the one hand the desire to conserve something, and I am conscious of your desires in this regard. Equally, I am conscious that we don't particularly have a lot of resources to put into treating things unnecessarily. Somewhere in between I believe is the line

to travel for the people of WA, particularly in some of the smaller communities. We don't have a need for very elaborate nutrient extraction facilities when one of the things the sea is screaming out for and the land is screaming out for is nutrient, so let's get it all properly in perspective.

Editor's note added in proof: the following information was supplied after the conference by Dr. Ottaway.

The international journal *New Scientist* gave a clear account that Dr. Andrew's opinion is incorrect. The Mediterranean Sea is **not** 'coping' with pollution from sewage and industrial wastes, but is showing marked environmental degradation. In a survey of 700 beaches in 14 countries, nearly one quarter were found to be unsafe for swimming, due to sewage and industrial pollution (New Scientist, April 1984, No. 1406, page 5).

Furthermore, in 48 of 50 areas sampled for shellfish, the shellfish were unsuitable for human consumption. These are only the most obvious symptoms of an ecosystem which is not coping with the polution load on it. Consequently, I find it baffling that Dr. Andrew sees this as an example to encourage him in his view that we should continue to regard the sea as an appropriate place to dispose of effluents. Rather, we should regard the sewage as a resource, and be making major efforts to find economically viable methods to recover the water and nutrients for other uses.

Rory O'Brien — DCE/State Role

Q — P. Hesp

Graham Sansom must be overcome with waves of deja vu by this stage. You've said there's no fun, there's no people and the co-ordination is hopeless. The message I understood from this seminar was to tell people that CMPs was where it was at. Perhaps you'd like to comment on the statement that we don't seem to be able to provide anyone with any resources to help them do it.

A — R. O'Brien

— Who said we don't seem to be able to provide resources?

Q — P. Hesp

Well you said in your talk that we have little funds, little resources, little people and there's a lack of co-ordination — it's supposed to be a CM planning push seminar here. You seem to be saying that we don't seem to have the ability to do CMPs in W.A. Would you comment on that?

A — R. O'Brien

What I'm trying to say is that we have a lot more work than we can do. In fact on my desk I've got probably ten years' work waiting to be sorted out. We are half way through a CMP for Roebourne coast which is standing there because there is no one to pick it up. We employed someone on a part-time basis and we ran out of funds and we tried to get hold of that person to come back again and complete some of the work on it and we have hopefully secured her for three months to tackle the volume of work accruing for someone who is on long service leave. In terms of the budgeting, I know that Bruce Claughton from Carnarvon will probably back me up when I say that we really need to put in a lot of money — in a place like Coral Bay. The Shire of Carnarvon can't afford to set up Coral Bay themselves, they don't get any rates return from the area, they've a lot of work to be done. We really need to put in a boat launching ramp and that's 300,000 worth. We have continual requests from people and local authorities around the State for assistance with coastal management and we have to write back to them to say we don't have the funds ..... try this particular tack with other state departments. Another aspect is some of the shires have extensive lengths of coast and they don't have rangers. They can't afford to pay rangers to get out and just keep an eye on what's going on. From the point of view of finance, and manpower what I'm saying about CMP planning is we are able to turn out working plans, we are able to prove the situation but we need a lot of extra help to be able to get on with some of the plans. For instance, Busselton — a plan was announced several months ago that a plan would be prepared. One of the people who was allocated that task is involved with other work. He is not able to get on to it. He is now on LS leave and will be back in February. Another aspect is that coastal planning which is the top of the list — is unco-ordinated the way it is done in W.A. — it is like firefighting, picking on little areas which have been overtaxed and sorting them out.

Q — B. Evans — City of Stirling

I completely concur with your views on this matter. I would like to add a sixth point to the

last few points you have outlined — I would point out who works in local government — town planners, engineers, administration staff, recreation officers, health inspectors and of course, treasury people ..... Now I would point out who don't work in local authorities — marine biologists, geomorphologists, hydrologists, zoologists, oceanographers, geologists, geographers, solicitors, psychologists and it goes on and on. Now to me there seems to be a high expectation of local government but they don't have the expertise. Now that expertise is about and its obvious at this seminar. It is in statutory departments and it is also in private consultancies. Now we need access to that information and get a co-ordinated approach. And quite frankly if it is going to happen the State Government needs to get serious and start bringing that expertise together and the financial assistance. You might like to comment on that.

A — R. O'Brien

Yes, I agree with you (mirth)

Q — P. Beeson — S.W. Development Authority

I query your insistence on the South Australia thing. What we had presented this morning was a very good organisational thing, but I've been in S.A. a fair bit in recent times. I'm not sure how long that organisation has been running. I recently did a trip from Vic. through to Adelaide, up through the Coorong. They've got problems with sandbars on their rivers, they've got coastal erosion. The Coorong stank. What is the practicality of another organisation. If that's been going for a long time what has it achieved. In the end it is what people want — what you can achieve.

A — R. O'Brien

I am not implying that we should take over that model exactly. Obviously W.A. is different, the whole State's fabric is different. To transplant something like that would be a waste of time. I think there are a couple of points in the S.A. model which we could use and modify for our own purposes. The S.A. Act was brought in in early 1970 because they had erosion on the metropolitan beaches and it came right under the noses of all the politicians and there was a general public outcry. The result of that was that they came up with the Coastal Protection Act almost immediately to solve some of the problems. The S.A. coastal scene is very different to W.A. A lot of their attention is actually in the metropolitan area, because they have continual erosion on their metropolitan coastline, and in speaking with the people in S.A. they have said to us for example that their main progress is on the metropolitan coastline — they have done very little work outside it so you are probably quite correct with your observations about the S.A. coast. But in some ways their planning framework of dividing the coast up as Paul Drechsler showed us this morning — getting planning consultants to designate coastal protection districts and try and identify some of the problems, and come up with priorities on their coast, has been a good overall approach, and that's really what I'm trying to put across. Does that answer your question?

P. Beeson — It does — I just raised the query.

Syd Shea speaks — to 480

Peter Woods speaks - to 510

adjourn to tea then workshops

Seminar Dinner

On Tuesday evening, the 20th of November, a seminar dinner was held at the Riverside Hotel. 95 people attended including wives and friends of delegates. The guest speaker was Warren Jones, Executive Director of the America's Cup defence 1987.

Beach Tour

The final day of the seminar, Wednesday the 21st of November, consisted of a Beach Tour, covering the coast from Point Peron to Ocean Reef. 120 people attended the Tour and we were transported by 3 MTT buses.

Beach Tour Notes

Pre-amble

The aim of the Beach Tour is to illustrate aspects of coastal landforms, ocean processes, coastal planning and beach management techniques. Although the tour covers only a small part of the WA coast, a lot of the discussion matter can apply to other areas of the coast, especially with future planning and management in mind (see Beach Tour Map).

Discussion:

The route from the hotel meets the coast near Naval Base. From Naval Base to the bridge over the train tracks, the Rockingham Road runs on the Mainland Ridge of coastal limestone. The old Mandurah Road which turns south at the first set of traffic lights after the bridge marks the position of the old shoreline about 5000–6000 years ago. The Mainland Pleistocene Ridge lies on the eastern side of the road while the Holocene (Modern) beach ridge plain and two lakes lie on the western side. The two lakes were isolated from the sea around 5000 years ago by Holocene spits and beach ridges, which mark the beginning of the modern beach ridge plain. Surf zone sediments beneath the lake are about 2 m above sea level indicating either sea level has fallen or the land has risen since their deposition.

Pt. Peron — Stop 1

The route to Pt. Peron crosses the width of the beach ridge plain which has built out across the Warnbro-Cockburn Depression to reach the Inner Ridge which forms the contemporary Garden Island/Murray Reef chain. Pt. Peron was therefore an island in the Garden Island chain between 3000 and 6000 years ago. It was linked to the mainland 2500 years ago when the beach ridge plain spanned the depression between the Mainland and Inner Ridges. South of the Point the inner ridge is clearly marked by islands and wave-cut platforms. Inland from the lookout the flat beach ridge plain extends eastwards to the base of the Mainland Ridge. Cockburn Sound to the north is part of the unfilled Warnbro-Cockburn Depression between the Mainland Ridge and the Garden Island Ridge. Note swell waves refracting between the islands and reefs forming small sand banks that extend to the shore, i.e. the Tombolo effect.

The Route from Point Peron to Kwinana Beach

While travelling back from Pt. Peron three different types of foreshore treatments can be seen. These are:

(i) Narrow reserve — dune vegetation, note eroding road,

(ii) Wide reserve — shade trees, note that a wide range of recreation activities can be accommodated, or

(iii) Wide reserve — no development. Note however that as space has been left between the road and the coast there is room here to develop a wide range of facilities if required. Contrast this with much of the metropolitan coast.

Note also that C.B.H. has been set back from the beach with a conveyor belt that passes underneath the road towards the loading facility. This allows maximum public use of the foreshore. Contrast this to the rest of the Industrial Area where the foreshore reserve is virtually non-existent. With better planning, the factories could also have been set back further inland to allow greater public access.

Kwinana Beach — Stop 2

Note pleasant surrounds, shade trees, irrigated grassed area and a wide foreshore public recreation area. Note the eroding foreshore and the efforts to stop it, illustrating the $ cost of placing rock and the socio/environmental cost to the public of replacing a sandy beach with a rocky one. Note to the north, access to beaches is restricted by industry, so that apart from a few spots, public access is very limited.

Mt. Brown — Stop 3

Panoramic view of Kwinana Industrial Area, Cockburn Sound, Garden Island and flat Rockingham beach ridge plain to the south.

Fremantle — Stop 4

A look at the marinas being developed for the America's Cup.

Crossing Swan River and now travelling to Port Beach

From now on, few stops will be made but as we drive along, contrast the different ways the various beaches have been developed. Note the opportunities taken of natural resources but also of opportunities lost in places by having a narrow coastal reserve backed by a road and residential development or railyards etc. In the main, the coast consists of a veneer of sand overlying the limestone of the Mainland Ridge. In many places the limestone outcrops on the beach, testifying that the veneer of modern sands is very thin.

Port Beach 1st Carpark: Problem of sand blowing onto carpark because of no dune vegetation in front of carpark.

Leighton — Stop 5

A narrow coastal reserve managed by concentrating cars and pedestrian access with low log railings, i.e. a psychological approach. The dunes in the area have successfully revegetated despite this being a popular beach with heavy pedestrian pressure.

Cottesloe: A narrow coastal reserve and a wide road. Development right up to the road results in a limited opportunity to develop anything between the road and the beach. Note the difference between the Cottesloe Surf Club (built on top of limestone and therefore safe) and the North Cottesloe Surf Club, built on top of a sand dune.

West Coast Highway continues inland creating room for a pocket of residential development and parkland areas and golf course between the main road and beach, with a bypass road to the north servicing residents and beach users.

City Beach — Stop 6

Note dune fencing, high wall backing the beach, groynes, log railing, shade trees and plenty of grassed areas. A totally managed beach environment with potential for further development if required. Dune vegetation is absent and inland sand movement is controlled by walls. Note also how sand builds up on one side of the groyne with erosion on the other.

Continue along West Coast Highway to Scarborough

A wide coastal reserve and a big road. Scope for more access to the beach, if required.

The limestone ridge which is covered by modern dune sands lies to the immediate right of the road with a narrow beach ridge plain to the west of the road.

Scarborough Beach

The main road is several hundred metres inland but the space between the road and beach is totally developed with carparks, shops, etc., and a planning high-rise hotel development. This contrasts with Cottesloe where development has been restricted to the eastern side of the main road.

Trigg beach

Large carpark developments on left. On the right there are examples of Holocene dunes successfully developed and stabilised for housing. Further north, the limestone ridge is totally exposed along the coast with only small pocket beaches. The road is narrow and close to the beach, e.g. Watermans, where there are no options left on the beach side of the road.

Sorrento Beach — Stop 7

Behind Sorrento and Mullaloo the coast has built out over the last 5000 years to produce a triangular beach ridge plain — with its apex at Pinaroo Pt. This is a similar formation to that at Rockingham with sandy sediments building out towards the Inner Ridge which forms the modern Whitfords reefs and islands.

In common with other similar landforms, the area is eroding on its southern flank in response to a lack of sand coming ashore. This has necessitated construction of groynes to protect the Sorrento Surf Club. The groynes have transferred the erosion problem north so that West Coast Highway is under threat from erosion during summer.

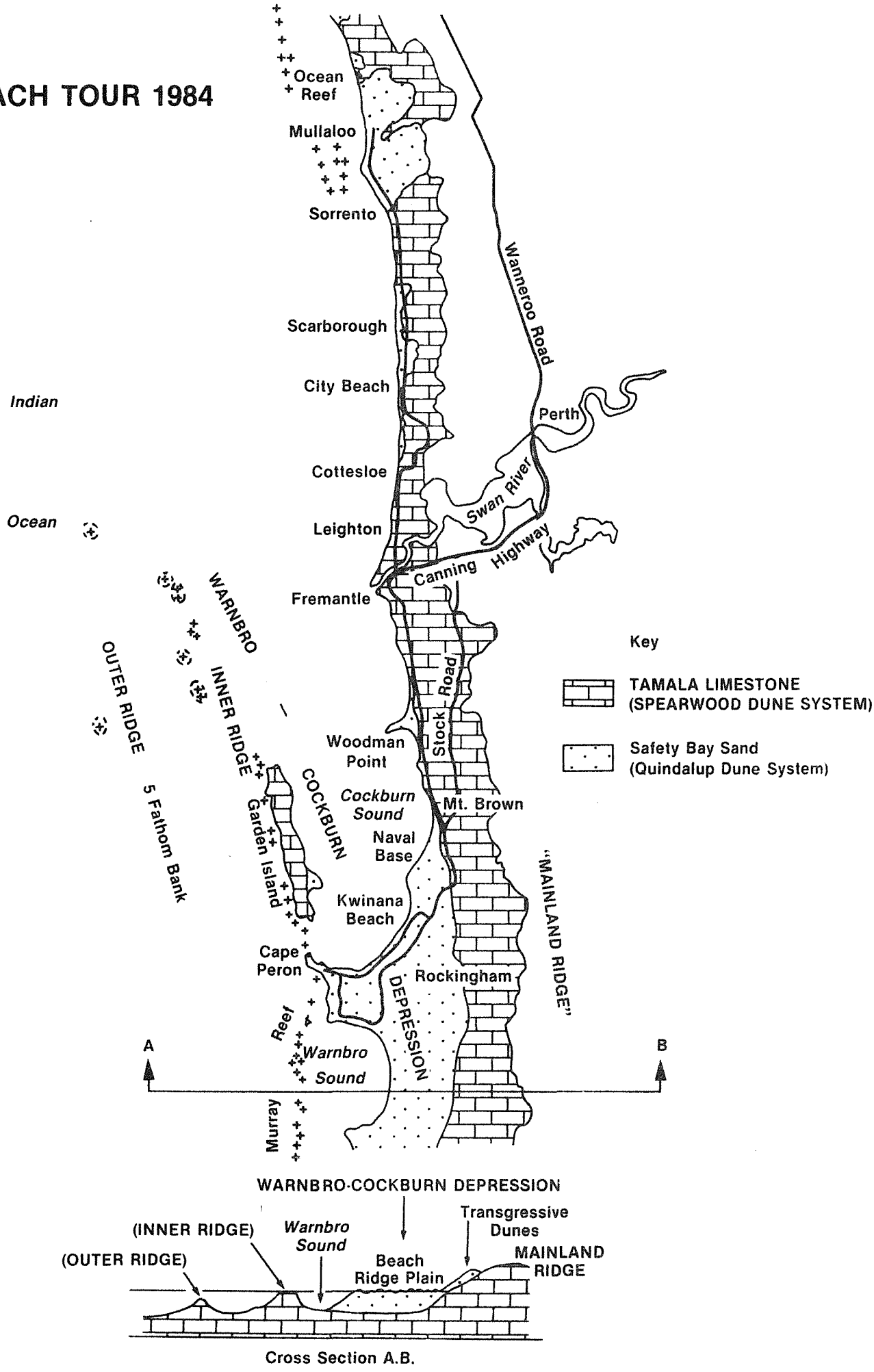
North of the groynes is the site of the proposed government marina development. Mullaloo has narrow road with a wide foreshore reserve for recreation. It has been carefully developed and provides a pleasant place for the public. Further north, the reserve is narrow and maintained in its natural state with limited opportunity for development.

North of Mullaloo the mainland ridge becomes exposed with limestone pinnacles protruding through the thin veneer of sand. The area inland was a mobile sand dune, "the little desert" that has been zoned urban. The area provides a good example of how to stabilise mobile sand ready for housing through recontouring and sowing of rye grass.

Ocean Reef — Stop 8

The Clubhouse is built on the edge of the Mainland Ridge. In contrast to many other areas, e.g. Sorrento, this is a safe place to build close to the beach without the threat of erosion.

BEACH TOUR 1984



Cross Section A.B.

The Survey Questionnaire

One hundred and fifty questionnaires were sent out to individuals that attended the seminar. Sixty three responses were returned of which sixty were received in time to be processed and included as part of the survey results.

This represented an adequate sample coverage as many individuals were represented as a singular group response (eg Shire Organisation). In fact, one third of the total responses received were a singular group response, thus representing a larger sample than an individual response.

The organisers were pleased to note the positive responses from state, local and private organisations and others, in regard to whether they benefited with new or useful information by attending the seminar (Q1). Also the response to Q18 is important as it indicates the overall willingness for the ongoing educational process to continue.

Coastal Planning and Management Seminar 1984
Questionnaire for Participants

Name or Group:
Address:

1. Did the seminar provide you with new or useful information?

   ☐ Yes Comments _____
   ☐ No _____

2. Did you find the level of information:

   ☐ Too technical ☐ Too philosophical
   ☐ Not technical enough
   ☐ A good mix

3. With the aims of the seminar in mind, were there any areas that you feel were left out or not covered adequately?

   _____
   _____
   _____

4. Was the seminar venue satisfactory?

   ☐ Yes
   ☐ No If Not, why? _____

5. Were the presentations by the speakers satisfactory? e.g. Could you hear them, see and read their slides?

   _____
   _____
   _____

6. (i) Was a 20 minute talk plus 10 minutes for question time for each speaker adequate?

☐ Yes
☐ No

(ii) If not, can you suggest a better mix?

_____

_____

7. Would you have preferred concurrent sessions i.e. the same number of talks but over a shorter time?

☐ Yes
☐ No

8. Did you have adequate opportunity to talk to and question the speakers?

☐ Yes
☐ No

9. Do you think that a seminar is a good forum for learning and exchanging information?

☐ Yes

☐ No If not, why? _____

10. Was the seminar audience too large?

☐ Yes
☐ No

If yes, what is the maximum size group you would prefer?

_____

11. Would you have liked a forum in which you could present and discuss your own specific problems?

☐ Yes
☐ No

12. What were the impressions of the workshop you attended (tick 4 boxes).

☐	enjoyable	☐	not enjoyable	No. ☐	
☐	informative	☐	uninformative	Subject	☐
☐	well organised	☐	badly organised		
☐	adequate time	☐	too long/too short		

Other comments _____

_____

13. (i) Would you prefer more specific seminars/workshops in your own area?

☐ Yes

☐ No

(ii) if **yes** would you also attend a larger seminar every 3 or 4 years to bring State, Local Government and the community together?

☐ Yes

☐ No

14. What form of information exchange do you feel can be **most** beneficial in learning about Coastal Planning and Management (tick one)?

☐ a) Beach Tour

☐ b) Lunches/teas

☐ c) Seminar

☐ d) Workshops

☐ e) a combination of both c) and d)

☐ f) Other

Specify: _____

_____

15. Did the Beach Tour assist you in understanding the talks?

☐ Yes

☐ No

16. Could the Beach Tour organisation be improved? eg. its duration, the time at each stop.

_____

_____

17. Was the amount and quality of lunch, tea and refreshments (drinks) satisfactory?

Lunches	Teas	Refreshments
☐ Yes	☐ Yes	☐ Yes
☐ No	☐ No	☐ No

Did you enjoy the dinner and the speaker?

Dinner	Speaker
☐ Yes	☐ Yes
☐ No	☐ No
If not, why? _____	If not, why? _____

Overall, I found that the seminar was:
(tick whichever boxes apply)

- ☐ interesting
- ☐ boring
- ☐ the right length
- ☐ too long
- ☐ too short
- ☐ too much content to absorb
- ☐ too little content
- ☐ the right amount to absorb
- ☐ achieved a lot
- ☐ achieved something
- ☐ achieved little

Any other comments you may care to make?

_____

_____

_____

18. If another seminar was organised would you recommend that another representative from your organisation attend?

- ☐ Yes
- ☐ No

Coastal Management Seminar Perth

Questionnaire Answers

1. Yes 59, No 1
   - Coastal Processes
   - Coastal Management responsibilities
   - Scientific and Social

2. Too technical 3, not technical enough 10, a good mix 46, too philosophical 7.

3.
   - Planning for the retention and management of conservation/natural areas on the coast.
   - How to prioritize management tasks.
   - An effective system of integration of CMP's with the statutory planning process, with emphasis on implementation.
   - What level of cost-sharing should be carried out by State and Local Government.
   - Examples of successful developments on the coast, i.e. those without adverse effects.
   - Measures for coastal protection and reinstatement along industrial coastal strips could be exploited.
   - Specific problems associated with coastal management at a local level.

4. Yes 49, No 12
   - Venue too small for the number of people in attendance
   - Low ceiling, flat floor (poor acousting)

5.
   - Need to rehearse slide show prior to seminar for each speaker.
   - Slides and overheads, difficult to see at times.
   - Some poor quality slides and overheads.

6. Yes 54, No 4
   - 30 minutes to be used as speaker requires rather than a rigid 20/10 format.

7. Yes 13, No 47.

8. Yes 48, No 10.

9. Yes 60, No 0.

10. Yes 16, No 45. 100 max.

11. Yes 29, No 25.

12.

enjoyable	23,	not enjoyable	5
informative	23,	uninformative	11
well organized	19,	badly organized	12
adequate time	15,	too long/too short	13

13. (i) yes 51, No 9
    (ii) yes 41, No 3

14. a) Beach Tour 13
    b) Lunch/teas 1
    c) Seminar 15
    d) Workshops 6
    e) A combination of both c) and d). 25
    f) Other 3

15. Yes 37, No 4

16. The provision of a tour guide on **each** bus.

17.

Lunches	Yes 56, No 0
Teas	Yes 53, No 2
Refreshments	Yes 50, No 3
Dinner	Yes 22, No 1
Speaker	Yes 19, No 3

interesting	51
boring	0
the right length	28
too long	11
too short	1
too much content to absorb	12
too little content	3
the right amount to absorb	18
achieved a lot	14
achieved something	36
achieved little	3

3.
- more practical, less philosophical.
- more workshops desirable.
- more public education required.
- valuable contact making achieved.
- too much information for the time available.
- a healthy exchange of views between State/Local Govt and private enterprise.

18. Yes 53, No 3.

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