Shark Bay: The Preservation of its World Heritage Values

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PREFACE

The purpose of this report is to provide a preliminary appraisal of the World Heritage values of the Shark Bay region and the means by which they may be conserved. It is designed to be read in conjunction with the proposed Shark Bay Region Plan produced (March, 1987) by the West Australian State Planning Commission and the Department of Conservation and Land Management. However, the report also stands by itself as an account of the World Heritage properties of the region and the means by which they should be preserved.

The report has been directed to the Australian Heritage Commission because of their paramount position in the conservation of Australia's cultural and natural heritage property. A similar version of the present paper has been written as a submission on the proposed region plan. The majority of the report has been taken from my forthcoming Ph.D. thesis entitled The Geography of Hope: The Relationship Between International Heritage Agreements and Wilderness Preservation in Australia (Department of Geography, University of Western Australia). As such, the report is intended as a geographical contribution to the protection of Australia's rapidly dwindling cultural and natural property of World Heritage quality. It is to be hoped that the Shark Bay region will be one such area to be preserved.

C. M. Hall, July 1987.

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INTRODUCTION

> The philosophy behind the Convention is straightforward: there are some parts of the world's natural and cultural heritage which are so unique and scientifically important to the world as a whole that their conservation and protection for present and future generations is not only a matter of concern for individual nations but for the international community as a whole.
>
> RALPH SLATYER, 1983 (138)

The purpose of this report is to review the World Heritage Convention and its relationship to Shark Bay in the context of the recently formulated Shark Bay Region Plan (State Planning Commission, Department of Conservation and Land Management, 1987). As Davis (1984, 196) has commented, the lay public has 'a rather confused view' of what the World Heritage Convention entails and how the nomination procedure operates. The following pages are therefore designed to clarify the implications of any listing of Shark Bay as a World Heritage site. In particular, attention is paid to the operations of the World Heritage Convention, the suitability of Shark Bay for the World Heritage List, the relationship between World Heritage Listing and various human impacts on the region including mining, fisheries, pastoralism, and tourism, and the implications of World Heritage listing for the management of the region.

THE WORLD HERITAGE CONVENTION

The Convention for the Protection of the World's Cultural and Natural Heritage, commonly known as the 'World Heritage Convention' was adopted by a United Nations Scientific, Education and Cultural Organisation (UNESCO) Conference on 16 November, 1972. The Convention was designed to enable nations to cooperate in the protection of cultural and natural sites of outstanding value to mankind.

The Convention came into force in 1975 when twenty nations had ratified it. As of 3 August, 1983, eighty-one countries had ratified or accepted the Convention. Signatories to the Convention commit themselves to assist in the identification, protection, conservation and preservation of World Heritage properties. According to Slatyer (1983, 138):

> They recognise that the identification and safeguarding of those parts of the heritage which are located on their own territories is primarily their responsibility, and agree that they will do all they can, with their own resources and with

> what international assistance they can obtain, to ensure adequate protection.
>
> RALPH SLATYER, 1983 (138)

Under the Convention (Articles 6 and 5) signatories undertake to refrain from 'any deliberate measure which might damage directly or indirectly' the cultural or natural heritage and to 'take appropriate legal, scientific, technical, administrative and financial measure' necessary for its protection.

The Convention is administered by the World Heritage Committee, an intergovernmental committee for the protection of the world cultural and natural heritage, composed of twenty-one states, elected at a general assembly of States that are party to the Convention, every two years. The Committee is responsible for all decisions pertaining to nominations to the World Heritage List and the World Heritage in Danger List, and to requests for assistance under the World Heritage Fund.

The Committee elects a Bureau which is responsible for detailed examination of new nominations to the World Heritage and World Heritage in Danger Lists and requests for funding. The Committee and the Bureau receive technical advice for 'cultural' sites from the International Council for Monuments and Sites (ICOMOS) and the International Center for Conservation in Rome (ICCROM), while for 'natural' properties the advisory body is the International Union for Conservation of Nature and Natural Resources (IUCN). UNESCO provides a Secretariat to help implement the decisions of the Committee. A World Heritage Fund has also been established to provide financial and technical assistance to those State Parties which otherwise would not be in a position to fulfill their obligations under the Convention.

All signatories to the Convention are invited to identify and submit nominations of outstanding universal value to the World Cultural and Natural Heritage List. Cultural property nominated to the World Heritage List should:

> 21. a) (i) represent a unique artistic achievement, a masterpiece of the creative genius; or
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> (ii) have exerted great influence, over a span of time or within a cultural area of the world, on developments in architecture, monumental arts or town-planning and landscaping; or
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> (iii) bear a unique or at least exceptional testimony to a civilization which has disappeared; or
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> (iv) be an outstanding example of a type of building or architectural ensemble which illustrates a significant stage in history; or
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> (v) be an outstanding example of a traditional human settlement which is representative of a culture and which has become vulnerable under the impact of irreversible

change; or

(vi) be directly or tangibly associated with events or with ideas or beliefs of outstanding universal significance (the Committee considers that this criterion should justify inclusion in the List only in exceptional circumstances or in conjunction with other criteria); and

b) meet the test of authenticity in design, materials, workmanship or setting (the Committee stressed that reconstruction is only acceptable if it is carried out on the basis of complete and detailed documentation on the original and to no extent on conjecture).

LIST OF CRITERION FROM INTERGOVERNMENTAL COMMITTEE FOR THE PROTECTION OF THE WORLD CULTURAL AND NATURAL HERITAGE, 1984, 7-8.

Natural property nominated to the World Heritage List should:

24.(i) be outstanding examples representing the major stages of the earth's evolutionary history; or

(ii) be outstanding examples representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment; as distinct from the periods of the earth's development, this focuses upon ongoing processes in the development of communities of plants and animals, landforms and marine areas and fresh water bodies; or

(iii) contain superlative natural phenomena, formations or features, for instance, outstanding examples of the most important ecosystems, areas of exceptional natural beauty or exceptional combinations of natural and cultural elements; or

(iv) contain the most important and significant natural habitats where threatened species of animals or plants of outstanding universal value from the point of view of science or conservation still survive.

INTERGOVERNMENTAL COMMITTEE FOR THE PROTECTION OF THE WORLD CULTURAL AND NATURAL HERITAGE, 1984, 8-9.

Within Australia, at least in theory, 'anyone can approach UNESCO suggesting listing of cultural and natural property, but in practice all sites thus far nominated have been selected by State or Commonwealth Government agencies, often with the support and encouragement of the voluntary conservation movement' (Davis, 1984, 197), most notably the Australian Conservation Foundation (Mosley, 1983). The Australian Heritage Commission is actively involved in the documentation of suggestions for World Heritage listing and engages in a detailed consultation process with the relevant Commonwealth, State and local authorities, as well as a wide range of experts.

Nominations need to provide a detailed account of the characteristics of each site. Each nomination must be endorsed at the government level, and be signed by the government authority which is responsible for the implementation of the Convention. Following endorsement, the nomination is sent to the UNESCO Secretariat via the UNESCO National Commission of the nominating signatory. In Australia, this task is undertaken by the

World Heritage committee of the Australian National Commission for UNESCO.

The Secretariat passes nominations onto ICOMOS or ICCROM for cultural properties and IUCN for natural properties where the nomination is rigorously analysed to determine whether or not the property concerned meets the World Heritage criteria and is of outstanding universal value. The World Heritage Bureau, acting upon the advice of ICOMOS, ICCROM or the IUCN , can make three types of recommendations to the World Heritage Committee. Nominations may be accepted, rejected, or deferred until further information on a property is available.

As of late 1983, 136 sites had been inscribed as World Heritage Property. However, a large majority of the sites are 'cultural' rather than 'natural' properties. Through the international and national attention which is focussed on the nomination process, 'the inclusion of a property on the World Heritage List should give added protection to the site' (Slatyer, 1983, 142) In addition to the prestige attached to a World Heritage site, a degree of protection under international law, and a possible increase in the attraction of the site as a tourism destination may be expected. Yet, the World Heritage List is not necessarily unchanging. Properties which have been degraded through either manmade or natural causes may be deleted from the World Heritage List and placed on the World Heritage in Danger List. It is hoped that the prospect of a country's site being placed on the World Heritage in Danger List will focus enough attention on such sites to save them.

On August 22, 1974, Australia became the twenty-second country to ratify the Convention. Since then six Australian nominations for World Heritage listing - the Great Barrier Reef, Kakadu, Lord Howe Island, Willandra Lakes, Western Tasmanian National Parks, and the Australian East Coast Temperate and Subtropical Rainforest Parks - have been accepted by the World Heritage Committee. A seventh nomination - Uluru Park (Ayers Rock) - is presently under consideration by the Commitee. A cultural property, the Sydney Opera House and surrounding waterways, will probably be nominated when suitable criteria are established for such modern architectural sites (Hall, 1987), while the Commonwealth Government has foreshadowed the nomination of the North Queensland rainforests to the Convention. However, the implementation of the World Heritage Convention in Australia has often been surrounded by controversy (Mosley, 1983) in the cases of hydro-electric development in south-west Tasmania and mining in Kakadu, which has in turn led to a misunderstanding of the aims and objectives inherrent in World Heritage Listing.

SHARK BAY AND WORLD HERITAGE LISTING

The Shark Bay region 'is an environmentally sensitive area' (Department of Conservation and Land Management, 1985, 1) which has a number of faunal and floral (Chalmers, 1986; Prince, 1986; Woods, 1986), geological (Chalmers, 1986; Woods, 1986) aesthetic (Fisher, 1983) and cultural (Western Australian Museum, 1986) attributes that make it suitable for World Heritage Listing (Nevill and Lawrence, 1985). However, the environmental characteristics which make it worthy of consideration for the World Heritage List are threatened by a variety of human activities which, if uncontrolled, have the potential to severely degrade and even destroy the heritage values of the Shark Bay region (Nevill and Lawrence, 1985). These activities include mining (Chamber of Mines of Western Australia, 1986; Department of Mines, 1986), grazing (Department of Agriculture, 1986), sandalwood extraction (Department of Conservation and Land Management, 1985), fishing (Fisheries Department, 1986), and tourism (Clough Engineering, 1986).

International Significance of Shark Bay

The international significance of the Shark Bay region is recognised in the IUCN's (1982) indicative inventory of natural sites of World Heritage quality. The four criterion for including a natural property on the World Heritage List are all met by the Shark Bay area (IUCN, 1982, 56). Under the heading of universal significance, the IUCN recorded the following description of the Shark Bay area:

> Covering an area of over 500,000 ha., Shark Bay has numerous bays, inlets, and islands scattered throughout the shallow seas of the area. Interspersed sand banks and seagrass meadows support a profusion of aquatic life, including undisturbed populations of dugongs, green turtles, rays, sharks, and shell fish. In the highly saline waters of the Hamelin Pool, high rates of evaporation and low rates of circulation have caused the formation of algal stromatilites, structures of blue green algal mats bound together by sediment; these formations are exactly like those known from 300 million years ago. Of particular interest are two islands contained within the site, Bernier and Dorre, which form the northwestern boundary of Shark Bay. On these islands are found several species of mammals which have become extinct on the mainland, including the banded hare wallaby, the barred bandicoot, the western hare wallaby (also found in one part of the Northern Territory) and the boodie, a rat kangaroo.
>
> IUCN, 1982, 56

The Shark Bay Region Plan (hereafter known as SBRP) produced by the West

Australian State Planning Commission and the Department of Conservation and Land Management (1987, 106) also observed that, 'with respect to Shark Bay, the area as a whole is seen to fit a number of natural values indicated in the criteria suitable for it to be included in the World Heritage List'. Similarly, Nevill and Lawrence (1987) and several reports (Gare, 1985; Country Planning Council, 1986; Woods, 1986) prepared for the Shark Bay Study, which was conducted as a preliminary to the SBRP (1987), have recognised the region's World Heritage values. As Woods (1986, 2) wrote:

> From a conservation point of view... Shark Bay is unusual and therefore the region as a whole has conservation value. Within the region there are also large areas containing sensitively balanced or evolving systems which contain unique, rare or unusual natural features. These large areas have high conservation value.
>
> PETER WOODS, 1986, 2

The World Heritage significance of the natural property of the Shark Bay region are also strengthened by the areas cultural values. Shark Bay contains sites of the first known European landings on the west coast of Australia. In addition, there is a long history of scientific exploration in the region which is of 'international interest' (State Planning Commission, Department of Conservation and Land Management, 1987, 107). The cultural values of Shark Bay appear to fit the World Heritage Committee's (1984, 8) criterion (a)(vi) for the assessment of cultural property, whereby the cultural property must be 'directly and tangibly associated with events or with ideas or beliefs of outstanding universal significance'. However, except in only the most exceptional circumstances, *such a criterion does not by itself justify nomination to the World Heritage list.* It is a criterion that should be used in conjunction with other criteria (World Heritage Committee, 1984, 8), which in the case of Shark Bay represents the natural values of the region. A situation which the SBRP (1987) failed to recognise. The region's land use history, such as that related to grazing, the guano trade, mining, pearling, the sandalwood trade or whaling, may hold some heritage values, but they do not fit the criteria of universal significance necessary for the World Heritage list and neither do they necessarily justify the continuation of such land use practices, especially in the case of grazing and mining.

The Aboriginal sites of the region have not been fully documented, as the West Australian Museum (1986, 1) have noted, 'no comprehensive examination of the whole area for Aboriginal sites has been undertaken'. However, the Museum (1986) did observe that a number of Aboriginal and

European sites of some significance do exist in the Shark Bay region.

Shark Bay: World Heritage Values.

The following provides a preliminary account of the values of the Shark Bay region for World Heritage listing. It should be noted that this list is by no means complete and, given appropriate research, would undoubtedly receive addtions.

CRITERION	SHARK BAY PROPERTY FULFILLING CRITERION
Natural	
(i)	The algal stromatilites of Hamelin Pool, exposures of calcrete soils (especially at Baba Head), marine Pleistocene sequences (Edel Land peninsula).
(ii)	Hypersaline embayment of Hamelin Pool and its associated communities, the Faure Sill, Wooramel Seagrass Bank, evaporite pans in the interdune depressions in the Peron-Nanga area.
(iii)	The Zuytdorp cliffs, cliffs on the ocean side of Dirk Hartog Island (notably Herald heights), Heirisson and Bellefin prongs, and Edel land; Hamelin Pool and the Faure Sill, the Wooramel Seagrass Bank, bays and inlets at the eastern margin of the Edel Land Peninsula, island ecosystems (notably Dirk Hartog, Bernier and Dorre Islands), the southern parts of tamala station have been recorded as fulfilling the requirements of a wilderness area although with appropriate management the majority of the Shark Bay area could be conserved as wilderness, especially the islands, the western coastline and the north of Point Peron.
(iv)	Fauna: Rare and endangered species of mammals include the Banded Hare-wallaby (Lagostrophus fasciatus), Rufous Hare Wallaby (Lagorchestes hirsutus), Marl or Barred Bandicoot (Peramales bougainville), the Rabbit-eared bandicoot (Macrotis lagotis) Shark Bay Mouse (Pseudomys praeconis), Western Hare-wallaby (Lagorchestes hirsutus), Burrowing Bettong (Bettongia leseur), Ashy gray mouse (Pseudomys albocenereus), Sandy Inland Mouse (Pseudomys hermannsburgensis). Shark bay is the northernmost limit of the Western grey Kangaroo (Macropus fuliginosus). A peculiar form of the widely distributed Little bat (Eptesicus sp. nov.) is found at Shark Bay. Rare and endangered endemic reptiles include the skinks Menetia amuara, Ctenotus youngsoni, Ctenotus zastictus, the Baudin Island skink or Spiny-tailed skink Egernia stokesii aethiops, Lerista humphriesi, Lerista petersoni, Lerista connivens and an undescribed Lerista on Hamelin - Coburn stations; the legless lizards Aprasia haroldi, Aprasia smithi and Pletholax gracilis edelensis; and a dragon lizard Tympanocryptis buteri. The isolate

population of the agamid lizard Ctenophorus rubens may represent a distinct subspecies. The rare python Aspidites ramsayi is located on the north of Peron peninsula. At least six species of sea snake have been recorded at Shark Bay, including an endemic form of the seasnake Aipysurus laevis pooleorum. Another species endemic to Shark bay is the Round (Sandhill) Frog (Arenophryne rotunda). The area represents the southernmost west coast nesting grounds for the Green (Chelonia mydas) and Loggerhead turtles (Caretta caretta).

The Shark Bay Dugong (Dugong dugon) population is of international conservation significance, while the Bay is an important wintering area for the Humpback Whale (Megaptera novaeangliae). Other whales considered to be returning to the area folowing past exploitation include the Southern Right Whale (Eubalaena australis) and the Killer Whale (Orcinus orca). The Shark Bay dolphin (Tursiops truncatus) population, although not threatened, is of major scientific interest because of their close contact with humans.

Over 100 bird species have been recorded and the area is the site of several breeding colonies, including the only Australian breeding site for the white-breasted morph of the wedge-tailed shearwater (Puffinus pacificus). Of special scientific and conservation interest is the endemic form of the Black-and-white Wren (Malurus leucopterus), the White Winged Fairy Wren, the Southern Emu-Wren and the Thick-billed Grasswren (Amytornis textilis). The area is the southern limit of the Yelow Silvereye (Zosterops lutea) and the northern limit of the Mallee-Fowl (Leipea ocellata) and the Southern-Scrub Robin (Drymodes brunneopygiea).

Flora: The region contains a wide diversity of genera, including species which are little-known or undescribed and are endemic to the area. Families which have a rare or restricted distribution include Aizoaceae, Amaranthaceae, Apiaceae, Asteraceae, Chloanthaceae, Dasypogonaceae, Haemodoraceae, Liliaceae, Orchidaceae, Mimosaceae, Myrtaceae, Papilionaceae, Poaceae, and the Proteaceae. Peron Peninsula contains the southernmost stand of the mangrove Avicennia with an associated mangal fauna community. The coast between Denham and Point Peron contains scientifically important coral reefs. The significance of the flora of the region will certainly be enhanced by further scientific studies, as the erea has not been fully investigated.

Cultural

(iii) Aboriginal sites may possibly fit this criterion but the area has not been properly examined.

(iv) Historical importance in terms of European discovery and exploration of Australia; long history of scientific exploration of region. However, continued conservation of the region's marine and terrestial ecology would contribute to the values of the area as a cultural property.

As the above has demonstrated, the Shark Bay region fulfills several criterion for listing as a World Heritage site. However, it is important to recognise that the World Heritage values identified above should neither be seen to exist nor managed in isolation from each other. As the World Heritage Committee (1984, 9) has stressed the criteria for natural property must fulfill the condition of *integrity*.

Conditions of Integrity

The World Heritage Committee (1984) has reported that World Heritage sites should fulfill the following conditions of integrity for natural property:

> (i) the site contained in 24(i) should contain all or most of the key interrelated and interdependant elements in their natural relationships; for example, an "ice age" [i.e. glaciated] area would be expected to include the snow field, the glacier itself and samples of cutting patterns, deposition and colonization (striations, moraines, pioneer stages of plant succession, etc.).
> (ii) The sites described in 24(ii) should have sufficient size and contain the necessary elements to demonstrate the key aspects of the process and to be self-perpetuating; For example, an area of tropical rainforest may be expected to include some variation in elevation above sea level, changes in topography and soil types, river banks or oxbow lakes, to demonstrate the diversity and complexity of the system.
> (iii) The sites described in 24(iii) should contain those ecosystem components required for the continuity of the species or of the other natural elements or processes to be conserved. This will vary according to individual cases; for example, the protected area of a waterfall would include all, or as much as possible, of the supporting upstream watershed; or a coral reef area would include the zone necessary to control siltation or polution through the stream flow or ocean currents which provide its nutrients.
> (iv) The area containing threatened species as described in 24(iv) should be of sufficient size and contain necessary habitat requirements for the survival of the species.
> (v) In the case of migratory species, seasonal sites necessary for their survival, wherever they are located, should be adequately protected. The Committee must receive assurances that the necessary measures be taken to ensure that the species are adequately protected throughout their full life cycle. Agreements made in this connection, either through adherence to international conventions or in the form of other multilateral or bilateral arrangements would provide this assurance.
>
> WORLD HERITAGE COMMITTEE, 1984, 9.

Any nomination of the Shark Bay area to the World Heritage List would therefore have to fulfill the above conditions of integrity for natural property. The Shark Bay Region Plan (SBRP) (State Planning Commission

and Department of Conservation and Land Management, 1987) in its current form does not adequately provide for the protection of natural property nor does it meet the conditions of integrity for the natural property of World Heritage value in the Shark Bay area.

THE NEED TO PROTECT THE INTEGRITY OF THE SHARK BAY REGION

One of the most important questions to be asked in examining the integrity of an area is how big must an ecosystem reserve be to maintain its general community and species content integrity. The answer to this question 'probably rests at the intersection of two bodies of knowledge - community ecology and the recently formalized theories of island biogeography' (MacMahon, 1979, 128). The species diversity-stability model of community ecology broadly states that the inherent stability of a community increases as the count of included species increases. Stability may be defined as 'the maintenance of the ecosystem's equilibrium integrity in the face of pertubation' (MacMahon, 1979, 128). However, it should also be recognised that stability can also be a function of the diversity of species and/or the internal organization of the component species.

Studies of island biogeography (MacArthur and Wilson, 1967; Diamond, 1975) suggested that the number of species/unit area may be approximated by the formula:

$S = CA^Z$ where S = number of species on an island;
C = a parameter characteristic of the particular taxon and archipelago of interest;
z = a power assuming values in the range 0.18 - 0.35 and approximated *a priori* by assuming that species abundance are distributed in a lognormal manner (MacMahon, 1979,129).

This relationship may be used to infer the optimum size of nature reserves. Given a certain number of species, it is possible to calculate the area necessary to maintain them. A point of difficulty does arise in that the calculation requires estimates for the values of z and C. However, appropriate studies of habitat and species characteristics should be able to provide reasonably accurate estimates of these values. One of the conclusions to be drawn from island biogeographical research is that:

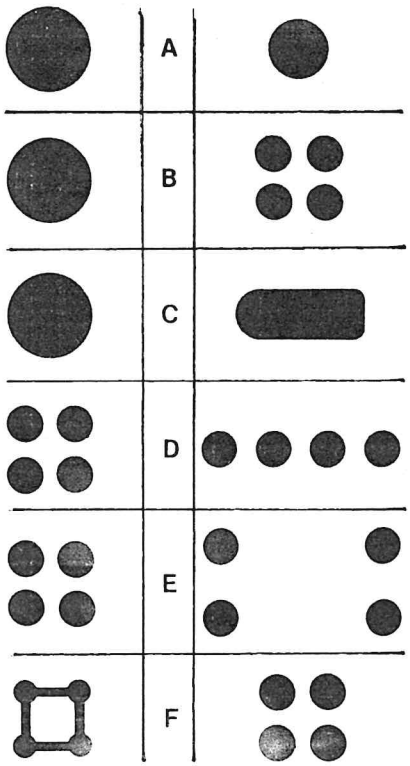
> communities composed of vagile, specialized, rare, sensitive, large-sized species and lots of them in a complex (heterogeneous) environment may require large areas to

> maintain their integrity... The obviou solution in a practical sense is to study and meet the needs of the species in the community of interest which has the greatest areal requirements. For communities as a whole, the island biogeography rule of thumb is that it takes a 10-fold increase in area to house twice as many species.
>
> James MacMahon, 1979, 129,130

Furthermore, island biogeographic theory suggests that in order to help prevent the tendency for species to become extinct replicate reserves of equal size should be used. 'A nature reserve surrounded by a totally different community may be constantly bombarded with potential competitors and thus may have a high species replacement rate, while an isolated area with few infiltrating competitors loses species at a lower rate' (MacMahon, 1979, 130). The consequences of the relationships observed in island biogeographical studies has led to the positing of the appropriate shape and size of nature reserves (Diamond, 1975; Wilson and Wills, 1975).

The figure below depicts several postulates derived from island biogeographical research:

GEOMETRIC RELATIONSHIPS OF RESERVES BASED ON BIOGEOGRAPHICAL PRINCIPALS



Relationship in the left hand column is always more desirable than that in the right hand column. A. Larger reserve better than small; B. large reserve better than four small ones of equal area; C. circular reserve better than any other shape; D. mutually adjacent areas better than linearly arranged; E. close replicate reserves better than any other; and F. smaller but connected reserves better than separate but equal area reserves (after Diamond, 1975; Wilson and Wills, 1975; MacMahon, 1979).

A biogeographical approach to preserving the integrity and stability of the Shark Bay region would appear clear. First, determine the minimum area necessary to maintain community type. Second, assess rate of extinction for the most sensitive species. Third, establish replicate natural areas making the practical trade-offs among size, number and proximity, with the ideal being 'a large number of large areas adjacent to and mutually interconnected' (MacMahon,1979, 131).

The SBRP (1987) makes no mention of the problems of size and shape of the conservation areas it proposes. Furthermore, the SBRP (1987) tends to see zones of land use as isolated units rather than as an integrated structure. This major shortcoming of the plan casts serious doubts on its ability to provide for sound ecological management and for the West Australian Government to establish a regime of implementation which would fulfill the conditions and requirements of the World Heritage Convention.

The Environmental Protection Authority's (EPA) (1975) System 9 recommendation's provide a far more appropriate management strategy for the Shark Bay region, and with relatively minor modifications to allow for some of the values identified in the SBRP, should be used as the basis for World Heritage nomination. The System 9 recommendations paid explicit attention to the need to preserve habitat and to treat the biological resources of the region as an interdependent unit. Such an approach, which is expressly related to notions of the ecological integrity of the Shark Bay area with its particular marine and terrestial environments, would be essential if the region was to be nominated to the World Heritage List.

One of the most important considerations in the development of a management plan for the Shark Bay region would be the size and shape of reserves designed to protect both marine and terrestial environments and their interface, particularly tidal flats and mangals. The SBRP does not deal with this problem. Biogeographical theory points to *the need to preserve large areas of habitat*, or if this is not possible, to *provide for as many large habitat fragments as near to each other as possible* (Kent, 1987, 100). The larger the area, the greater the number of species it can hold at equilibrium because extinction rates can be reduced. Each species has a minimum viable area for it to survive. However, no attention is paid in the SBRP (1987) to the notion of minimal viable area. This stands in stark contrast to the EPA's (1975) recommendations which provided for the protection and maintenance of larger areas of habitat. Similarly, the proposed management plan needs to pay attention to the migratory habits of a wider variety of birds and animals than well known marine fauna

such as the dugong. A facet of management which was addressed to a greater degree in the EPA System 9 report. Furthermore, consideration needs to be paid to the interrelationships between animal ranges, and predator-prey relationships in the selection of management boundaries for any World Heritage area. Habitats are interconnected and should not be dealt with in isolation.

The shape of reserves is also an important consideration. The greater the ratio of the boundary of a reserve to the area of a reserve, the greater is the opportunity for exotic species to invade the reserve. The SBRP (1987) does not deal with this major aspect of biogeographic theory. Compounding problems of the delimitation of the shape and size of nature reserves is the nature of the activities that occur outside a reserve. If an activity that occurs immediately outside of a reserve has repercussions for the ecological integrity of the reserve, then consideration should be given to placing some form of control on the area immediate to the reserve through the use of buffer zones. Such zones are established in order to achieve the goal of maximising both the natural values of a reserve and the cultural and natural values attached to the surrounding area (Eidsvik, 1980,188). The utility of buffer zones to help protect World Heritage property has been recognised by the World Heritage Committee:

> Whenever for the proper conservation of a cultural or natural property nominated, an adequate "buffer zone" around a property should be foreseen and should be afforded the necessary protection. A buffer zone can be defined as an area surrounding the property which has an essential influence on the physical state of the property and/or on the way in which the property is perceived; the area constituting the buffer zone should be determenied in each case through technical studies. Details on the size and characteristics of a buffer zone, as well as a map indicating its precise boundaries, should be provided in the nomination file relating to the property in question.
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> WORLD HERITAGE COMMITTEE, 1984, 6.

In the case of Shark Bay, the SBRP (1987) pays inadequate attention to the buffer zone concept in the protection of the natural property of the region. For the conservation of the heritage values of Shark Bay provision needs to made for the use of buffer zones in lands or waters contiguous to areas of high heritage value. Therefore, controlled usage through buffer zones should be considered in relation to the drainage basins of the area, shorelines, and areas which are highly sensitive to human impacts.

Human Impacts

One of the most important aspects of the conservation of the Shark Bay

region is the impact of humans on the integrity of the marine and terrestial ecosystems. Specific attention needs to be paid to the impact of mining, fishing, grazing and uncontrolled tourist and visitor access. For instance, mining is incompatible with the purposes of national parks. However, any management plan needs to pay attention to existing land uses which can continue without major adverse environmental effects over a wide area of the region.

Mining

The existing salt mining operations at Useless Loop should be allowed to continue provided they do not interfere with fish nursery areas vital for the local fishing industry and the habitat of trans-equatorial. migratory waders. Upon completion of the salt mining operations the land should become a national park. Proposed development of a gypsum mine on Peron Peninsula should not go ahead because both the mining site and the loading facilities would adversely reduce the conservation and recreation values of the area. The siting of the mine in an area of high environmental value is also of concern in relation to the introduction of exotic species into the area and the potential for uncontrolled access.

Fisheries

There has been a long history of fisheries activity in the waters of Shark Bay and, given an appropriate management programme, there is no reason why fishing should not continue. The experience of the Great Barrier Reef Marine Park Authority should prove invaluable in the management of the Shark Bay region's marine environment. The case of the Great Barrier Reef has demonstrated that, through the application of zoning plans which prescribe usage for a given zone, it is possible to balance demands for commercial fishing and marine conservation within an Australian World Heritage area (Kelleher and Kenchington, 1984). Similarly, and although at a smaller scale than the Great Barrier Reef example, a balanced approach to commercial fishing and marine protection has been achieved at the Lord Howe Island World Heritage Area.

The conservation of the marine environment of Shark Bay is a vital issue for conservation, fishing and tourist interests alike. Shark Bay's incredibly diverse and complex marine ecosystems, which include coral reefs, hypersaline waters, seagrass beds, mangals, tidal flats and deeper waters with sandy and rocky bottoms, provide habitat for a wide number of species. Any management plan must provide the fullest possible protection

for this range of habitats. Furthermore, fishing practices may need to curtailed or modified in certain instances in order to prevent either the depletion of certain populations of marine fauna, including nursery stock, and/or the degradation of certain marine habitats.

The System 9 study recommended the creation of an aquatic reserve on the eastern shoreline of Shark Bay. This recommendation should be implemented with the western boundary being extended to include prawn nursery and seagrass protection as recommended in the SBRP (1987). Further aquatic reserves should be declared on the western shorelines of Bernier, Dorre and Dirk Hartog Islands; and in the Freycinet Estaury, as recommended by the SBRP (1987). In addition, the waters on the northern tip of Peron Peninsula presently recommended for recreation and commercial fishing by the SBRP (1987) should be declared an aquatic reserve, for reasons of providing for the protection of mangal habitat, tidal flats and seagrass beds which function as nursery beds for marine fauna and as important marine habitat. The remaining area recommended as recreation and commercial fishing by the SBRP (1987) should be declared a marine national park (as per the System 9 recommendations) with recreational use as its prime function, and with commercial fishing activities being carefully managed. In all the protected marine zones, close attention must be given to the prevention of overfishing of the fisheries resource by amateurs. A catch limit should be introduced to help achieve this goal.

Grazing and Pastoralism

There is a long history of pastoralism in the Shark Bay region. The SBRP (1987, 34) reported that 'Local pastoralists have expressed the view that pastoralism does not interfere with the major conservation interests of the area'. However, this viewpoint would appear to be at odds with several research reports on the effects of animal grazing and trampling of the environment (Weaver and Dale, 1978). The following table lists some effects of grazing by domestic stock on five ecological processes:

SOME EFFECTS OF GRAZING BY DOMESTIC STOCK ON FIVE ECOLOGICAL PROCESSES

Ecological process	Effects
Natural succession	a. Modification of natural succession by treading and selective grazing leading to dominance of unpalatable species. b. Invasion of weeds and exotic species. c. Reduction of palatable tree, shrub and perennial

	species and expansion of grassland particularly of annual species. d. Increased competition with native herbivores. e. Excretion of dung and urine making vegetation unacceptable with native species. f. Disturbance of native animal species by domestic grazing.
Organic production and decomposition	a. Primary production diverted to ground level with loss of trees and shrubs. b. Reduction in total biomass and possible energy capture. c. Decrease in biomass of native animals. d. Natural decomposition process circumvented by grazing animal cycle. e. More of primary production diverted to large herbivores. f. Increased herbage intake leading to less litter and lower rates of decomposition.
Nutrient circulation	a. Reduction in nutrient pool with fewer nutrients in vegetation. b. Local and uneven re-allocation of nutrients according to distribution of faeces and urine. c. Increased rate of nutrient circulation. d. Replacement of slow cycling through soil organisms by more rapid, plant animal cycling pools. e. Initial stages of decomposition in rumen and gut of grazing animals. f. Loss of nutrient capital with removal in animal products.
Water circulation	a. Increased surface run off. b. Reduction in interception and transpiration. c. Soil surface layers drier. d. Increase in evaporation from soil surface with loss of vegetation cover.
Soil development	a. Localised overgrazing resulting in soil erosion. b. Increased exposure of soil especially where animals congregate. c. Increased salinity with loss of trees and shrubs. d. Increased soil compaction due to treading.

SOURCE: Ovington, 1984, 63.

As the above table demonstrates, the pastoral industry is likely to have had a major impact on the ecological integrity of the Shark Bay area. Unfortunately, the necessary research has not been conducted in the region with which to measure the full ecological impact of pastoralism. However, land degradation of the lands included in the Shark Bay study is recognised as a major problem (Department of Agriculture, 1986). The West Australian Department of Agriculture (1986, 5-7) have reported five main types of land degradation being encountered in the Shark Bay region:

(1) General loss of shrub cover, with or without soil erosion (occurs with major erosion over parts of the Wooramel delta and on the Tamala

land system).

(2) Loss of understorey shrubs and perennial herbs (occurs throughout the Shark Bay area).

(3) Invasion of undesirable (inedible) shrubs (occurs as a local problem on alluvial plains systems, Carbla plateau systems and on the Edel land system).

(4) Hummock grassland degradation (present on the southern part of the Peron Peninsula).

(5) Near-coastal degradation and dune blow-outs (occurs as active, mobile sand drifts on Tamala, Carrajang and Dirk Hartog).

Methods to counteract these problems for the pastoral industry include introduction of exotic annual species, paddock spelling, prescribed burning, and mechanical removal (Department of Agriculture, 1986, 5-7). In addition to the stress already placed on the environment by the pastoral industry, many of these management practices will have severe consequences for the indigenous faunal and floral populations through alterations to habitat. The pastoral industry, as it presently exists in the Shark Bay region, does not provide a basis for the management of the area along the lines required for World Heritage listing. Pastoralism's impacts are such that they threaten the integrity of the region as an ecological unit and, hence, reduce the possibilities for fulfilling the criteria for World Heritage listing.

Tourism

Tourism is regarded as the major potential growth industry for Shark Bay (SBRP, 1987). However, it is vital that tourism does not degrade the resource base upon which it is founded i.e. the scenic attractions and diverse marine and terrestial environments of Shark Bay.

The acceptance of a site to the World Heritage List does not mean that the area will be closed off to tourists and visitors. In fact, evidence suggests that World Heritage Listing enhances the appeal of an area or site as a tourist destination (UNESCO, 1980). As the Australian Department for Arts, Heritage and Environment (1986, 11) have noted, 'Any site that is added to the World Heritage List in the future might therefore be expected to benefit from an increased level of tourism as a result of the international recognition of the area. This in turn will benefit the local economy'. In the twelve months to April, 1986, 790,000 Australians (excluding children under fifteen) visited World Heritage areas. The Great Barrier Reef being the most popular with 486,000 visitors. In the same period, 4.1 million Australians (about 35%) visited at least one national

park (excluding World Heritage Areas) (Department of Arts, Heritage and Environment, 1987, 1). However, these figures do not indicate the importance of repeat visits to parks and visits of overseas travellers.

Since their nomination to the World Heritage list all of Australia's World Heritage areas have experienced a significant increase in the number of tourists and visitors. In the Northern Territory, construction of one of Australia's premier tourist destinations, the Yulara Resort in Uluru (Ayers Rock - Olgas) National Park, was directly related to the scenic attractions of the National Park (see Conservation Commission Northern Territory, 1983,10) a recent World Heritage nomination. The folowing table provides a brief outline of the growth of visitor numbers for Kakadu National Park in the Northern Territory:

KAKADU NATIONAL PARK: VISITOR DAYS.

YEAR	VISITOR DAYS
1972[1]	19,000
1982	164,257
1983	209,625

1. Before the National Park was established

SOURCE: Gare, 1984.

There was a 28% growth in visitor days to Kakadu National Park between 1982 and 1983. An increase which occurred before the rise of the international awareness of the natural features of 'Crocidile Dundee' country. Tasmania's appeal as a tourist destination is also largely dependent on its natural environment and in particular its national parks such as those which comprise the Western Tasmanian Wilderness Parks World Heritage area (Murrell, 1984). As the proceedings of the 57th National Conference of the Royal Australian Institute of Parks and Recreation (Wells, 1984) indicated, national parks form a vital component of Australia's domestic and international tourist industry. A contribution which is perhaps sometimes ignored when alternative proposals for national park and reserve land, such as mining or grazing, are proposed.

However, the attraction of tourists to a World Heritage quality area, such as Shark Bay, may not be without its environmental and social costs. Tourism has been shown to have had major effects on the environment (Pigram, 1980). Trampling of vegetation by humans can have an enormous impact on the environment, causing soil compaction, exposure of soil, the destruction of certain species of flora, and the replacement of sensitive plant species by more hardy species (Dale and Weaver, 1974; Goldsmith,

1974a, b; Walter, 1975; Wall and Wright, 1977). In addition, the presence of humans may have an impact upon wildlife through habitat disturbance. This is especially the case with some of the more sensitive marine mammals of Shark Bay such as the dolphin and the dugong. However, a greater concern is the uncontrolled use of off-road vehicles (Weaver and Dale, 1978; Mathieson and Wall, 1982) which are able to cause far more damage than that caused by walking, especially in arid landscapes such as Shark Bay. Off-road vehicular use in the Shark Bay region should be strictly managed, unless this is done the environment which at present proves attractive to the visitor will be degraded. Vehicles should be encouraged to use specific routes by means of upgrading of roads, signposting and legal enforcement.

Recreational activities in the Shark Bay region should be confined to passive activities, such as bushwalking and boating, which when properly managed cause minimal damage to the environment. Emphasis needs to be placed on the reduction of habitat disturbance and in the prevention of the decline of aesthetic landscape qualities through the creation of off-road tracks. Wilderness recreation, controlled under a permit system for purposes of management as in the United States, should be developed. Employment can be created by the need for visitor guides and interpretive services. Similarly, encouragement should be given to the use of the waterways of Shark Bay as a means of access to various points of scenic and scientific interest. This should not only open up employment opportunities but also lessen the impacts on the terrestial environment. One avenue for tourism is the conducting of guided boat tours on the waters of Shark Bay to examine the marine fauna and flora. This form of tourism would have little impact on the marine environment and would serve useful educational purposes. The return of various species of whales to the Bay would also appear to open up opportunities for whale-watching cruises which are presently very popular overseas.

Denham should continue as the regional centre for Shark Bay. By concentrating tourist infrastructure, such as resorts, to the Denham area, environmental impacts will be minimised and the financial benefits of increased tourism will flow more directly to the present inhabitants. Denham should act as the point from which boat and charter cruises operate and also as the administrative focus for environmental management. The major limit to the growth of tourism in Denham, as throughout the Shark Bay region, is the lack of an adequate water supply. This environmental constraint may well provide an index of the capacity of the area to adsorb tourists.

Despite the likelihood of economic benefits accruing to the residents of the Shark Bay region from an increase in tourist activity in the area, no

mention is made in the SBRP (1987) of the possible social impacts of tourism. Research has clearly demonstrated that tourism affects resident populations in a variety of ways, including resident opposition to tourist activity which is perceived to affect local lifestyles, the seasonality of tourism, and the perception that tourism will bring with it a range of socially disruptive activities such as an increase in crime (Mathieson and Wall, 1982). In order to minimise undesirable impacts, a social impact assessment of the prospective increase in tourists to Shark Bay should be conducted.

Tourism is a human impact on the environment which, provided it is properly managed, is compatible with the need to preserve the integrity of any prospective World Heritage area. In the case of Shark Bay, tourism can provide a means of educating visitors in the values of conserving the natural environment and can also provide a sound economic justification for the nomination of the sight to the World Heritage List.

The above section has discussed the implications of World Heritage listing in terms of the major human impacts on the region. The next section of this report will concentrate on the institutional arrangements of any prospective World Heritage site at Shark Bay.

THE MANAGEMENT OF THE REGION UNDER WORLD HERITAGE LISTING

Before any property can be accepted to the World Heritage list the nominating country must ensure that the legislative and administrative arrangements essential for the continued conservation of the property has been established. If the necessary institutional arrangements which secure the integrity of the property have not been established then a nomination may fail, or otherwise be placed on the World Heritage in danger list. As Justice Mason (46 ALR 625 at 702) noted in delivering his judgement in the Tasmanian Dam Case, 'Implementation of the Convention, and of the obligation which it imposes on Australia in relation to the property, calls for the establishment of a regime of control which will ensure protection and conservation of the property'.

As pointed out above, six Australian sites are at present on the World Heritage List. A seventh nomination, Uluru park, is presently under consideration by the World Heritage Committee. The following tables indicate the legislation and management authorities which surround Australia's World Heritage sites:

AUSTRALIAN WORLD HERITAGE SITES (Legislation)

SITE	LEGISLATION
Great Barrier Reef	Great Barrier Reef Marine Act 1975 (Commonwealth), Continental Shelf (Living Natural Resources) Act 1968 (Comonwealth), Whale Protection Act 1980 (Commonwealth), State Forests and National Parks Act 1903-1948 (Queensland), Forestry Act 1976 (Queensland), National Parks and Wildlife Act 1976 (Queensland), Fish and Oyster Act 1914 (Queensland), Fisheries Act 1976 (Queensland), Fauna Conservation Act 1974-1979 (Queensland).
Kakadu	National Parks and Wildlife Conservation Act 1975 (Commonwealth).
Lord Howe Island	Lord Howe Island Act 1953 (New South Wales), Lord Howe Island (Amendment Act) 1981(New South Wales), Environmental Planning and Assessment Act 1979 (New South Wales).
Willandra Lakes	Western Lands Commission Act, New South Wales National Parks and Wildlife Service Act.
Western Tasmanian Wilderness Parks	National Parks and Wildlife Act 1970 (Tasmania), World Heritage Properties Conservation Act 1983 (Commonwealth), The World Heritage (Western Tasmanian Wilderness) Regulations issued under the National Parks and Wildlife Conservation Act 1975 (Commonwealth).
Temperate Rainforest Parks	New South Wales National Parks and Wildlife Service Act.
Uluru	National Parks and Wildlife Conservation Act 1975 (Commonwealth).

AUSTRALIAN WORLD HERITAGE SITES (Management Authority)

SITE	MANAGEMENT AUTHORITY
Great Barrier Reef	Great Barrier Reef Marine Park Authority, Queensland National Parks and Wildlife Service, Queenland Fisheries Service.
Kakadu	Australian National Parks and Wildlife Service.
Lord Howe Island	Lord Howe Island Board (with the assistance of the New South Wales National Parks and Wildlife Service).
Willandra Lakes	Western Lands Commission, New South Wales National Parks and Wildlife Service.
Western Tasmanian Wilderness Parks	Tasmanian National Parks and Wildlife Service, Joint Commonwealth - Tasmanian Management Committee.
Eastern Australian Temperate Rainforest Parks	New South Wales National Parks and Wildlife Service.
Uluru	Australian National Parks and Wildlife Service.

The above tables indicate a diverse set of institutional arrangements which vary from state to state. However, two main points emerge. First, the arrangements are such as to prevent the degradation of any World Heritage area. Second, the Commonwealth Government has a high degree of involvement in ensuring that World Heritage sites are managed in accordance with the Convention and the World Heritage Committee's (1984) operational guidelines for the implementation of the Convention.

The principal legislative tool for the implementation of the World Heritage Convention in Australia is the Commonwealth's World Heritage Properties Conservation Act 1983 and any regulations that may be issued under that Act. The Commonwealth are also involved through the activities of the Australian National Parks and Wildlife Service and the Australian Heritage Commission, which are able to give both advice and financial assistance to responsible state authorities in the management of World Heritage areas. The Australian Heritage Commission, in particular, is important in ensuring that sites are adequately managed and that nominations may meet the requirements of the Convention.

The SBRP (1987, 107) observed that World Heritage listing is important in terms of prestige, tourism, funding, research, management and presentation, and conservation and protection. However, the SBRP (1987, 107-108) also noted that listing, 'may be seen to have some disadvantages':

> Perceived unwarranted scrutiny from an external party eg. UNESCO. However, this is unlikely to happen to a properly managed area.
>
> Concern that the Commonwealth's role under the World Heritage Properties Conservation Act can be used in a way to sway unreasonably, or to dominate the State and the people of Shark Bay, in the management of the area. This problem can be overcome by ensuring at the outset that the management plan and any relevant State legislation is consistent with the objectives of a World Heritage Property, primarily one which is to be managed for a range of purposes including the promotion of free enterprise in a conserved landscape. The basic thrust, therefore, in both the State's and the Commonwealth's aims should be toward complimentary goals.

Concern over outside interference probably arose because of the conflict which surrounded the Franklin Dam case. However, it is important to note that this conflict only emerged because of the failure of the Tasmanian Government to conserve the Western Tasmanian World Heritage nomination in the manner prescribed by the Convention and the World Heritage Committee. As the SBRP (1987) implied, given a properly managed area it would be unlikely for such a controversy to develop over Shark Bay.

It should be recognised that as the government of the nominating state the Commonwealth must, of necessity, ensure that it plays an active role in reviewing the management of any Australia World Heritage area. A 'regime of control' does not imply that the Commonwealth would unduly interfere in the region, rather the Commonwealth would be fulfiling the obligations of the Convention. To ensure the minimum desired level of direct Commonwealth involvement in the region the management plan for a Shark Bay nomination should meet the requirements of integrity laid out by the World Heritage Committee (1984). Unfortunately, the SBRP (1987) does not fulfill these requirements, and any nomination of Shark Bay under the SBRP (1987) may well result in either the rejection of the nomination, placement of the nomination on the World Heritage in Danger list, or acceptance of the site subject to modification of the management plans. These options will undoubtedly be influenced by the opinions of scientific experts on the adequacy of the management plan for the conservation of the region.

The SBRP (1987, 108) noted the desire for a Shark Bay nomination to be 'managed for a range of purposes including the promotion of free enterprise in a conserved landscape'. The establishment of a World Heritage site does not prohibit commercial activites. However, free enterprise does not mean freedom to conduct any business activity. Commercial activities need to be compatible with the conservation of the site. Hence, mining and pastoralism should not be allowed within the boundaries of any World Heritage nomination proposed for the Shark Bay region. As the case of the Great Barrier Reef has demonstrated, fisheries and tourism can be compatible provided they are properly managed. Given this situation, there exists a clear need for a reformulation of the SBRP (1987) to ensure that it meets the stringent requirements of the World Heritage property nomination process.

In order for a World Heritage nomination to succeed the institutional arrangements surrounding the conservation of Shark Bay need to be organised so as to ensure that legislative and management objectives are met. This should be done by:

1) The creation of State legislation to cover the area of the nomination. This legislation should be matched by the enactment of regulations at the Commonwealth level under the World Heritage Properties Conservation Act 1983. A body similar in structure to the Great Barrier Reef Marine Park Authority would be ideally suited to the particular needs of the Shark bay area. Such a body would also provide an avenue for the channelling of Commonwealth funds to assist in the management of the World Heritage site.

2) The establishment under legislation of a board of scientific advisers to provide a sound basis for the management of the natural and cultural property of the World Heritage site.

3) The establishment under legislation of a board of management for the site which would include Commonwealth, State and Local Government representatives and individuals who are suitably qualified to contribute to the mangement of the nomination.

The SBRP (1987, 108) contained three recommendations regarding World Heritage listing:

> It is considered that the State Government should appoint a special committee composed of Ministers of the relevant portfolios and representatives of Local Government, to investigate the benefits and implications of World Heritage Listing for Shark Bay.
>
> The Committee would have discussions and negotiations with the Commonwealth, the Australian Heritage Commission, and State and Local Government bodies affected by areas currently listed.
>
> The committee should be empowered to travel to World Heritage areas and receive evidence from other persons and bodies before reporting to Government.

The above recommendations are not entirely suitable for the task of discussing the full range of subject matter required for World Heritage listing. To ensure full consideration of the implications of World Heritage nomination an independent committee of inquiry should be established to investigate the benefits and costs of listing. During the period that the committee meets no new projects should be undertaken in the Shark Bay region which would substantially damage the resources that listing would be designed to conserve.

CONCLUSIONS

This report has reviewed some of the considerations that arise in examining the prospects of World Heritage listing for the Shark Bay region. However, far more research needs to be conducted and the management plan presented in the SBRP (1987) needs to be dramatically improved to ensure the conservation of the natural and cultural resources of the region. Nevertheless, it is apparent that Shark Bay is clearly of World Heritage quality and that steps should be taken as soon as possible to nominate the region to the World Heritage List.

RECOMMENDATIONS AND CONCLUSIONS: SUMMARY

(1) The Shark Bay region 'is an environmentally sensitive area' which has a number of faunal and floral, geological, aesthetic and cultural attributes that make it suitable for World Heritage Listing. However, the environmental characteristics which make it worthy of consideration for the World Heritage List are threatened by a variety of human activities which, if uncontrolled, have the potential to degrade and even destroy the heritage values of the Shark Bay region. These activities include mining, grazing, sandalwood extraction, fishing, and tourism.

(2) The international significance of the Shark Bay region is recognised in the IUCN's (1982) indicative inventory of natural sites of World Heritage quality. The four criterion for including a natural property on the World Heritage List are all met by the Shark Bay area. International significance of the natural values of the region are further enhanced by the presence of fauna (including migratory birds and whale species) that are subject to international conventions and treaties concerning their conservation and the protection of their habitat.

(3) The World Heritage significance of the natural property of the Shark Bay region are also strengthened by the area's cultural values.

(4) The 'cultural property' aspects of Shark Bay do not by themselves justify nomination to the World Heritage list.

(5) The World Heritage values of Shark Bay should neither be seen to exist nor managed in isolation from each other.

(6) The Shark Bay Region Plan (SBRP) (State Planning Commission and Department of Conservation and Land Management, 1987) in its current form does not adequately provide for the protection of natural property neither does it meet the conditions of integrity for the natural property of World Heritage value in the Shark Bay area.

(7) One of the most important factors in examining the integrity of an area is related to its size and shape. The SBRP (1987) makes no mention of the problems of size and shape of the conservation areas it proposes. Furthermore, the SBRP (1987) tends to see zones of land use as isolated units rather than as an integrated structure. This is a major shortcoming of the plan and casts serious doubts as to its ability to provide for sound ecological management and for it to establish a regime of implementation which would fulfill the conditions and requirements of the World Heritage Convention.

(8) The Environmental Protection Authority's (EPA) (1975) System 9 recommendation's provide a far more appropriate management strategy for

the Shark Bay region, and with relatively minor modifications to allow for some of the values identified in the SBRP, should be used as the basis for World Heritage nomination.

(9) No attention is paid in the SBRP to the notion of minimal viable area. Similarly, consideration needs to be given to the provision of buffer zones.

(10) The existing salt mining operations at Useless Loop should be allowed to continue provided they do not interfere with fish nursery areas vital for the local fishing industry and the habitat of trans-equatorial. migratory waders. Upon completion of the salt mining operations the land should become a national park.

(11) Proposed development of a gypsum mine on Peron Peninsula should not go ahead because both the mining site and the loading facilities would adversely reduce the conservation and recreation values of the area.

(12) Fishing practices may need to curtailed or modified in certain instances in order to prevent either the depletion of certain populations of marine fauna, including nursery stock, and/or the degradation of certain marine habitats.

(13) The System 9 study recommended the creation of an aquatic reserve on the eastern shoreline of Shark Bay. This recommendation should be implemented with the western boundary being extended to include prawn nursery and seagrass protection as recommended in the SBRP (1987).

(14) Aquatic reserves should be declared on the western shorelines of Bernier, Dorre and Dirk Hartog Islands; and in the Freycinet Estaury, as recommended by the SBRP (1987).

(15) The waters on the northern tip of Peron Peninsula presently recommended for recreation and commercial fishing by the SBRP (1987) should be declared an aquatic reserve.

(16) The remaining area recommended as recreation and commercial fishing by the SBRP (1987) should be declared a marine national park (as per the System 9 recommendations) with recreational use as its prime function, and with commercial fishing activities being carefully managed.

(17) In all the protected marine zones close attention must be given to overfishing of the fisheries resource by amateurs. A catch limit should be introduced to help achieve this goal.

(18) The pastoral industry, as it at present exists in the Shark Bay region, does not provide a basis for the management of the area along the lines required for World Heritage listing. Pastoralism's impacts are such that they threaten the integrity of the region as an ecological unit and, hence, reduce the possibilities for fulfilling the criteria for World Heritage listing.

(19) Tourism, provided it is suitably managed, is compatible with World

Heritage nomination at Shark Bay. It should also produce significant economic and educational benefits.

(20) To ensure the minimum desired level of direct Commonwealth involvement in the region the management plan for a Shark Bay nomination should meet the requirements of integrity laid out by the World Heritage Committee. The SBRP does not fulfill these requirements, and any nomination of Shark Bay under the SBRP may well result in either the rejection of the nomination, placement of the nomination on the World Heritage in Danger list, or acceptance of the site subject to modification of the management plans.

(21) The following should be undertaken to ensure that legislative and management objectives of World Heritage listing are met:

(21A) The creation of State legislation to cover the area of the nomination. This legislation should be matched by the enactment of regulations at the Commonwealth level under the World Heritage Properties Conservation Act 1983. A body similar in structure to the Great Barrier Reef Marine Park Authority would be ideally suited to the particular needs of the Shark Bay area. Such a body would also provide an avenue for the channelling of Commonwealth funds to assist in the management of the region.

(21B) The establishment under legislation of a board of scientific advisers to provide a sound basis for the management of the natural and cultural property of the World Heritage site.

(21C) The establishment under legislation of a board of management for the site which would include Commonwealth, State and Local Government representatives and individuals who are suitably qualified to contribute to the mangement of the nomination.

(22) To ensure full consideration of the implications of World Heritage nomination an independent committee of inquiry should be established to investigate the benefits and costs of listing. During the period that the committee meets no new projects should be undertaken in the Shark Bay region which would substantially damage the resources that listing would be designed to conserve.

(23) Shark Bay is clearly of World Heritage quality and steps should be taken as soon as possible to nominate the region to the World Heritage List.

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