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An Overview

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AUSTRALIAN ENVIRONMENTAL ISSUES: AN OVERVIEW

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Abstract

Australia is experiencing significant environmental problems both on land and in its marine areas and several of these problems are interconnected. Clearing of trees and woodland is still substantial and apart from adding to CO_2 emissions, has a number of other unfavourable environmental consequences e.g. on water systems. Australia's river systems, estuary areas, coastal lakes and lagoons are suffering from serious environmental problems of which eutrophication is one of the more serious. Marine environments are also under stress. For example, seagrass beds have declined substantially, toxic phytoplankton blooms are of growing concern, adverse environmental impacts are experienced by some species of marine reptiles and mammals and some fisheries are adversely affected by environmental changes and excessive harvesting. Wastes from human settlements add to these environmental problems; partly because settlement occurs in dense pockets in Australia. Per capita, Australians use a high level of natural resources. Neither markets nor political mechanisms have been able to solve Australia's environmental problems in as effective manner as many would hope for.

1. INTRODUCTION

Australia continues to experience significant environmental changes both on land and in its marine areas, and many of these changes are interconnected. For example, loss of tree-cover, soil erosion, increased chemical fertilizer-use and sewage disposal have led to sedimentation and nutrient-enrichment of water bodies including some marine areas. Consequences have been loss of seagrass, decline in the quality of estuaries and enclosed water bodies due to eutrophication and in some cases threats to corals.

This article provides an overview of some of the most important environmental consequences of human activity in Australia. It discusses the clearing of native vegetation in Australia, the environmental state of river systems, estuarine areas, coastal lakes and lagoons, marine environmental problems and the environmental

impacts of human settlements, especially urbanisation, in Australia. Although Australia has a very low average density of human population by world standards, the geographical distribution of its population has significant environmental impacts and many natural environments in Australia are vulnerable to human disturbances.

2. CLEARING OF NATIVE VEGETATION

Australia has a relatively high rate of clearance of native vegetation by world comparisons. It is estimated, for example, that in 1990 the rate of clearing of native vegetation in Australia exceeded more than half of that in the Brazilian Amazon (Glanzing, 1995, p.3).

Such clearing of vegetation disrupts ecological processes:

- it often adds to soil erosion and to nutrient-enrichment of waters;
- in some areas, it contributes to dryland salinity, a serious threat in some inland area of Australia;
- it fragments populations of native species and can add to biodiversity decline; and
- the current pattern of clearing of native vegetation in Australia has resulted in the release of large amounts of greenhouse gases. The National Greenhouse Gas Inventory Committee estimates that in 1990 forest clearing in Australia contributed some 27.3% of Australia's total net emissions in carbon dioxide equivalent (Glanzing, 1995. p.4).

Much of Australia's land clearing in recent years has been for the purpose of expanding or maintaining beef production. A considerable amount of this beef has been exported to East Asia which provided a buoyant and growing market

prior to the Asian economic crisis. Rising incomes in Asia (Asian economic growth) stimulated the demand for Australia beef. The beef industry however is not the only contributor to land clearing in Australia. While both extension and intensification of agriculture is the main cause of land clearing in Australia, urban expansion, particularly along the east coast of Australia, has increased land clearing.

The extent of clearance of native vegetation in recent times has been on a major scale. While there has been some decline in the rate of clearance, a Department of the Environment, Sport and Territories report states:

"This trend [clearing of native vegetation] increased significantly in the last 50 years. Contrary to the common wisdom that most clearance occurred last century, in the last 50 years as much land was cleared as in the 150 years before 1945 (AUSLIG, 1990, p.6). Extensive clearing for agriculture occurred in the 1960s and 1970s, and significant clearing in still taking place" (Glanzing, 1995, p.1).

In effect, this means that more land clearance has occurred in Australia since 1945 than in the whole of the period before European settlement in Australia. Particularly in the 1950s and 1960s, significant tax concessions existed for land clearing. So the Australian Government provided economic incentives for land clearing.

It is estimated that at European settlement, Australia only had 9% of cover of forest and woodland. About 40% of this has been cleared for agriculture and another 40% has been subject to logging. Only a small portion is virgin. Present protected woodland covering in Australia is around 5%, much lower than that of India.

In terms of rate of forest and woodland clearing, Queensland has the highest rate as

can be seen from Table 1. According to Environment Australia, 308,000 hectares of trees were cleared in Queensland in the period 1991-95 and 150,000 hectares in New South Wales in the same period (Bita, 1997). Areas of land cleared in the various Australian States are indicated in Table 1.

Table 1 - Clearing rates of land in hectares per year for Australia by States.

	1987-88	**1991-95**
NSW	150,000	**150,000**
Vic	10,438	**1,828**
Qld	500,000	**308,000**
WA	31,908	**8,000**
SA	4,471	-
Tas	6,000	**4,000**
NT	16,280	-
Total	719,097	**471,828**

Source: Environment Australia reproduced in Bita (1997)

Not only the rate of clearing of trees and woodland has to be considered but its location. Some ecosystems are more fragile than others or are important for the preservation of particular species --- they contain essential habitat. Although land clearing in Western Australia may seem low in relation to its size, clearing there involves high ecological risk. Western Australia is prone to dryland salting and in some cases this has resulted in 'dead' and silted-up rivers. Also, the rare numbat

(an Australia marsupial animal) has been locally endangered by woodland clearing in Western Australia.

Australia's human population is concentrated along its coastline. This has resulted in considerable loss of wetlands and heathlands, especially in NSW, but also in Queensland. Some of the urban coastal expansion has been stimulated by Australia's burgeoning tourist industry, and by the building of homes for holidays and retirement purposes. In this urban expansion, coastal wetlands have been usually undervalued in Australia and sacrificed to make way for urban development..

3. RIVER SYSTEMS, ESTUARINE AREAS, COASTAL LAKES AND LAGOONS

Inland Rivers

Australia's inland is extremely deficient in water. Australia's major inland water system is the Murray-Darling river system which is shared by four States: Queensland, NSW, Victoria and South Australia. Although the Murray-Darling Commission (an interstate commission) was set up to regulate use of the waters of this system, problems exist. These include:-

(1) The water, especially in the lower reaches of the system, has a very high salt content due to raised water tables as a result of irrigation and tree clearing.

(2) Increasing offtake of water upstream reduces downstream flows and further adds to salting.

(3) Vegetation clearance in the catchment area contributes to silt levels and nutrient-enrichment.

(4) Eutrophication of the water system is present periodically. At times, toxic blue-green algae occurs in the system eg. in the Darling River. To some

extent, this has been blamed on increased cotton production in the catchment of the Darling. Australia is now one of the world's major exporters of cotton. Irrigation of cotton crops reduces waterflows in streams and the fertilization of cotton adds to the nutrient-enrichment of water bodies.

(5) An additional problem is that dams and controls on waterflows prevent periodic flooding of wetlands and floodplains. This adversely affects the reproduction of some wildlife eg. species of ducks and the regeneration of trees such as the Red River Gum.

These problems occur not only in the Murray and Darling Rivers but in many of their tributaries.

Coastal Rivers and Estuaries

Coastal estuaries are in poor shape in Australia. These are considered to be critical habitats for aquatic species.

"Most river catchments in eastern and southern Australia have been extensively cleared. This has resulted in land erosion, sedimentation of rivers and increased sedimentation and levels of nutrients downstream to estuaries, bays and adjacent coastal waters. High sediment levels in the water reduce light penetration which affects rates of photosynthesis. When sediments settle they can also smother seabed organisms. Sedimentation of estuaries and shipping channels causes shoaling and alters currents. Sedimentation is a major problem in ports and shipping channels, necessitating regular dredging. This resuspends sediments, creating further environmental problems." (Zann, 1995, p.10).

"The flows of many of Australia's rivers have also been significantly altered by dams and barriers, reclamation of wetlands, irrigation schemes and flood mitigation schemes, affecting the hydrodynamics or flushing characteristics of

estuaries." Zann (1995, p.10). Reduced waterflow and larger nutrient inputs to waterways have caused nutrient loads to rise in Australian waterways. One result is excessive growth of algae and microphytes which may smother sedentary organisms and deplete oxygen levels. The presence of trash fish in comparison to more edible fish tends to increase in such conditions.

Where rivers drain disturbed acid soils, particularly in northern New South Wales and southern Queensland, acid leaches from these soils. Soil disturbance may arise from urban development or from agriculture such as cultivation of land for tea tree plantations. Low lying clayey soils are a particular risk. Runoff can cause estuaries to become periodically acidic. This process increases levels of dissolved aluminium and iron which form compounds extremely toxic to fish. Diseases such as 'red-spot' therefore occur increasingly in fish and fish kills are increasingly common in estuaries in northern New South Wales and aquacultured oyster production has been affected adversely.

Water quality in at least 64% of estuaries in New South Wales and 22% of those in Victoria is considered to be poor (Zann, 1995, p.10). It is claimed that poor water quality and loss of habitat in coastal estuaries have caused a decline in estuarine fisheries. "For example, fisheries are thought to be threatened in 21% of estuaries in New South Wales and 23% in Victoria. However, eutrophication of some estuaries has enhanced their value for oyster aquaculture" (Zann, 1995, p.11). The impacts often extend offshore. It is believed for example that the considerable decline in seagrass beds in Australia can be attributed to elevated levels of sediments and nutrients in water bodies.

Coastal Lakes and Lagoons Under Threat

"Of great concern in south-eastern and south-western Australia is the declining

water quality and eutrophication of coastal lakes and lagoons, particularly those which are insufficiently flushed by the sea, for example, Tuggerah Lakes and Lake Macquarie (NSW), Gippsland Lakes (Vic.) and the Peel-Harvey system (WA). As coastal lakes are largely restricted to the densely inhabited south-eastern coastal strip, a significant proportion of the nation's coastal lakes has been degraded." (Zann, 1995, p.11). Most of these areas have a high value for recreational and conservation purposes and for fisheries production as pointed out in Tisdell (1998).

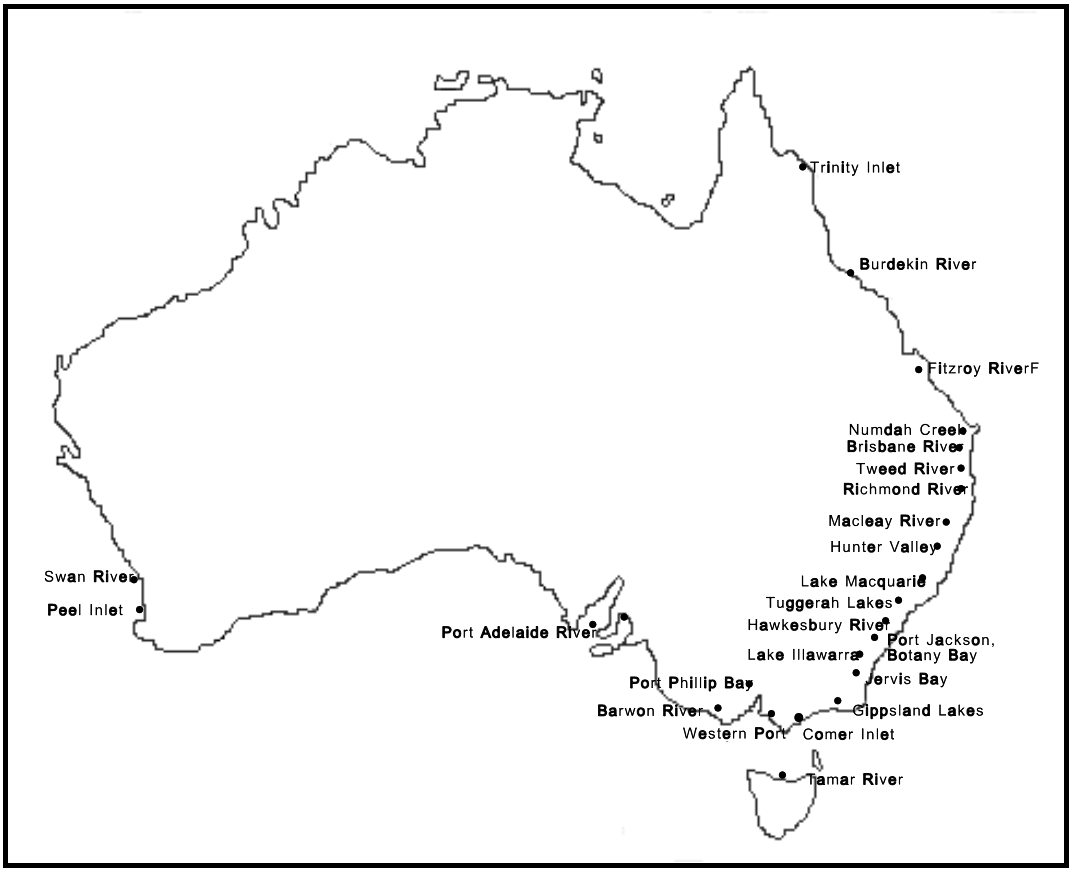


Figure 1: Estuaries and enclosed marine waters named above are environmentally threatened in Australia. (Source: Based on Zann, 1995)

4. MARINE ENVIRONMENTAL/ECOLOGICAL PROBLEMS

Australia has a large marine exclusive zone but the zone around continental Australia is not very productive from a fisheries point of view, mainly because ocean upwellings are absent in these waters. Despite its large marine exclusive

zone, Australia is a net importer of fish. But Australia has many other marine resources e.g. offshore oil and gas deposits and its marine areas are attractive from a conservation and tourist point of view. For example, the Great Barrier Reef is a major tourist attraction and Australia's sandy beaches further south attract many for tourism and recreation. Australia's marine areas are also extensively used for recreational fishing.

In considering Australia's marine environmental issues, one useful approach is to concentrate on ecological and biological aspects as Zann (1995) does. In turn, let us consider inshore environments, nearshore environments such as seagrass beds, coral reefs, phytoplankton, reptiles, marine mammals and fish in Australian marine waters.

Marine Inshore Issues.

Environmental threats to intertidal rocky shores, beaches and so on occur due to recreational use. Shores are often not well protected. Coastal salt marshes and wetlands have been undervalued with many such areas being reclaimed, used for landfill and for real estate development including development of canal estates. Saltmarshes and wetlands can provide breeding areas for some fish species, food sources for marine species, coastal protection and cleanse waste waters.

Mangrove forests can perform similar environmental services. Australia has the third largest area of mangroves in the world. While losses in this area are comparatively small, losses have been significant around coastal cities and towns. For example, clearing of 20% of mangrove stands in Moreton Bay (near Brisbane) has occurred.

Seagrass Beds:

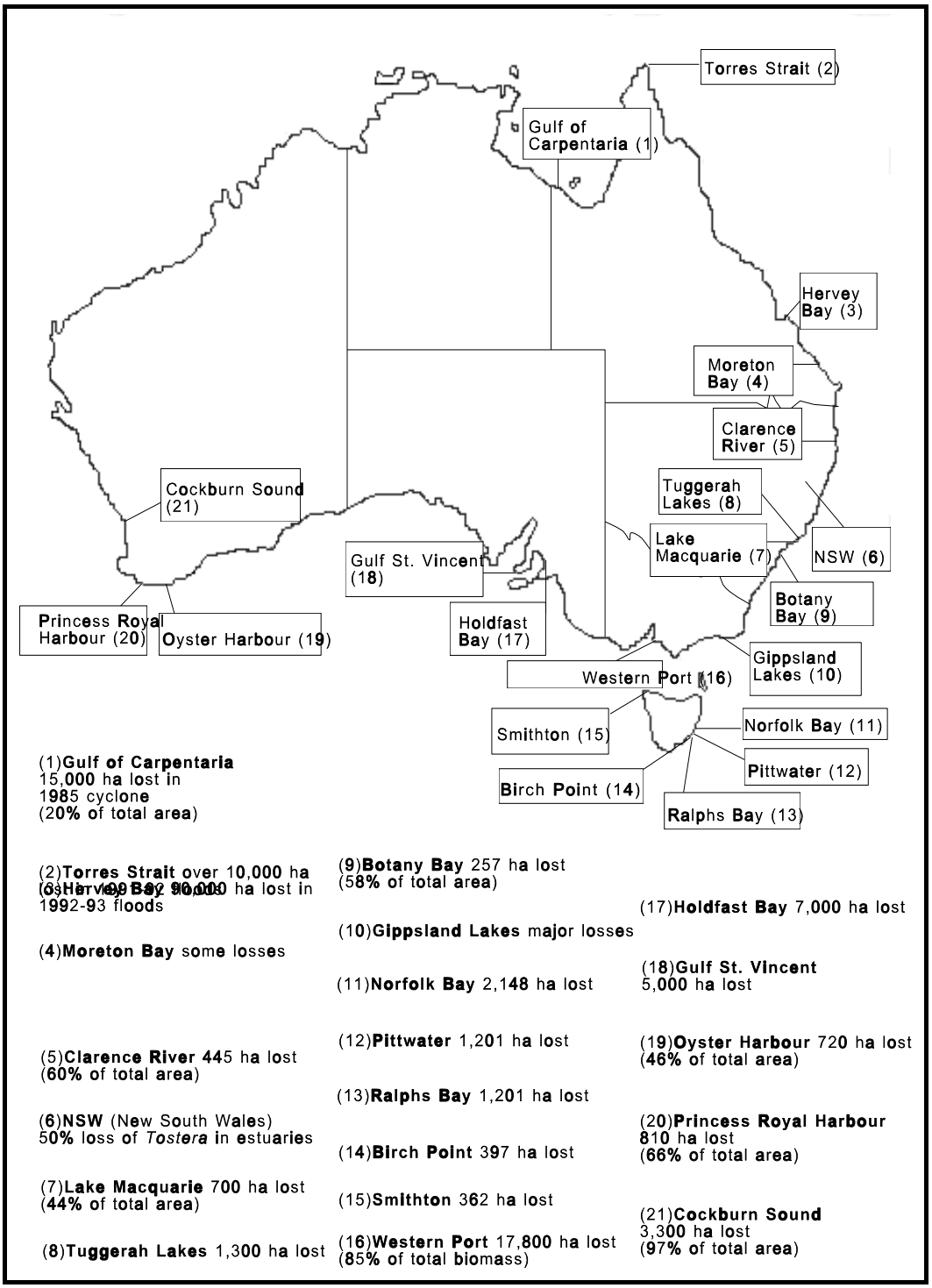
Australia has the greatest biodiversity of seagrass in the world, the most extensive

area of temperate seagrasses and its area of tropical seagrass is one of the largest globally (Zann, 1995, p.14). Seagrass beds are ecologically important and indirectly of considerable importance for fish catches. They trap and stabilise sediments, provide excellent habitats for fish and crustacea and for dugongs and turtles.

However, Australia's temperate seagrass beds are in a state of decline and to a large extent this is linked to increased sedimentation and nutrient releases from water catchments. A major factor in periodic losses in tropical areas is the occurrence of tropical cyclones. The extent of seagrass loss is evident from the following:

"New South Wales has lost half of the *Zostera* seagrass in its estuaries. In Victoria around 85% of the total biomass of seagrass in Western Port has been lost. In Tasmania there have also been declines in the Hobart and D'Entrecasteauz region, Triabunna and St. Helens on the east coast, and Tamar, Port Sorell and Duck Bay on the north-west. In South Australia's Gulf St Vincent around 5,000 hectares of seagrasses has been lost. In Western Australia around 97% of seagrass in Cockburn Sound have been lost. A serious loss of tropical seagrasses has occurred in Hervey Bay in Queensland, causing major mortality of dugongs. Once lost, seagrasses do not readily recover. The decline in temperate seagrass is one of the most serious issues in Australia's marine environment" (Zann, 1995, pp.14-15).

Figure 2: Areas named above are major areas of loss of seagrass in Australia.



(Source: Based on Zann, 1995, p.15)

Coral Reefs

Globally Australia holds a very important position in relation to coral reefs. It has a greater area of coral reef than any other country and the world's major coral reef formation, the Great Barrier Reef, said to be visible from the moon. While most of these reefs are located in the extensive tropical and sub-tropical areas of Australia, some occur in temperate areas at a higher latitude than anywhere else in the world. There has been a global decline in the extent and quality of coral reefs, so the conservation values of Australian coral reefs have been growing (Zann, 1995, p.17).

"General issues affecting Australia's coral reefs include effects of sediments and nutrients, effects of fishing and tourism, and the threats of oil spills. Specific threats include elevated nutrients in the inner Great Barrier Reef; outbreaks of crown-of-thorns starfish in the outer central and northern Greater Barrier Reef and Tasman reefs; damage from the passage of tropical cyclones; and outbreaks of coral-eating *Drupella* snails in Ningaloo Reef, Western Australia" (Zann, 1995, p.17).

Phytoplankton

As is well known, the diversity of living species depends on food chains. Phytoplankton form a primary element in such a food chain for many marine species. They are minute algae which extract nutrients from water bodies but some types of phytoplankton are toxic to animals which eat them. Toxic phytoplankton seem to be favoured by eutrophication. Furthermore, some types appear to have introduced to Australia in the ballasts of ships. They periodically "cause serious problems in parts of Tasmania and Victoria where they kill marine life and cause the closure of shellfish farms" (Zann, 1995, p.18). The main long-term means to control toxic algae blooms is to reduce nutrient enrichment of

the waters involved e.g. by reducing sewerage discharges, artificial fertilizer use and excreta from animals in catchment areas.

Marine Reptiles

Australia has several types of marine reptiles of interest. These include snakes, saltwater crocodiles and turtles. Let us consider the situation of snakes and turtles. "Australia has about 30 of the world's 50 species of sea snakes, around half of which are endemic. The family of aipysurids live in coral reef waters and the family of hydrophiids live in inner-reefal waters of Australia's tropics. Sea snakes bear live young and have a relatively short lifespan; they reach sexual maturity in around three years, and live for some 10 years. The greatest human impact is from prawn trawling. Sea snakes are quite fragile animals and it has been estimated that between 10% and 40% taken in trawls die once released. For the past 20 years trawled sea snakes have been used in a small leather industry. Licences currently limit the take of sea snakes for leather to 20,000 per year" (Zann, 1995, p.20).

Australia provides breeding grounds for most species of turtles. Six of the seven species of turtles occurs in Australia. This is important because turtles are threatened worldwide. Nevertheless, given the highly migratory nature of turtles, conservation of turtles which visit Australian waters is only partially under Australian control. Australian turtles visit Southeast Asia and the islands of the Southwest Pacific where they are hunted for a variety of uses.

"The main human impacts occurring while turtles are in Australian waters are: mortality of adults in prawn trawls, shark nets and gill nets, and in collisions with speedboats; subsistence hunting in indigenous communities; habitat degradation; and predation on eggs by feral animals" (Zann, 1995, p.20).

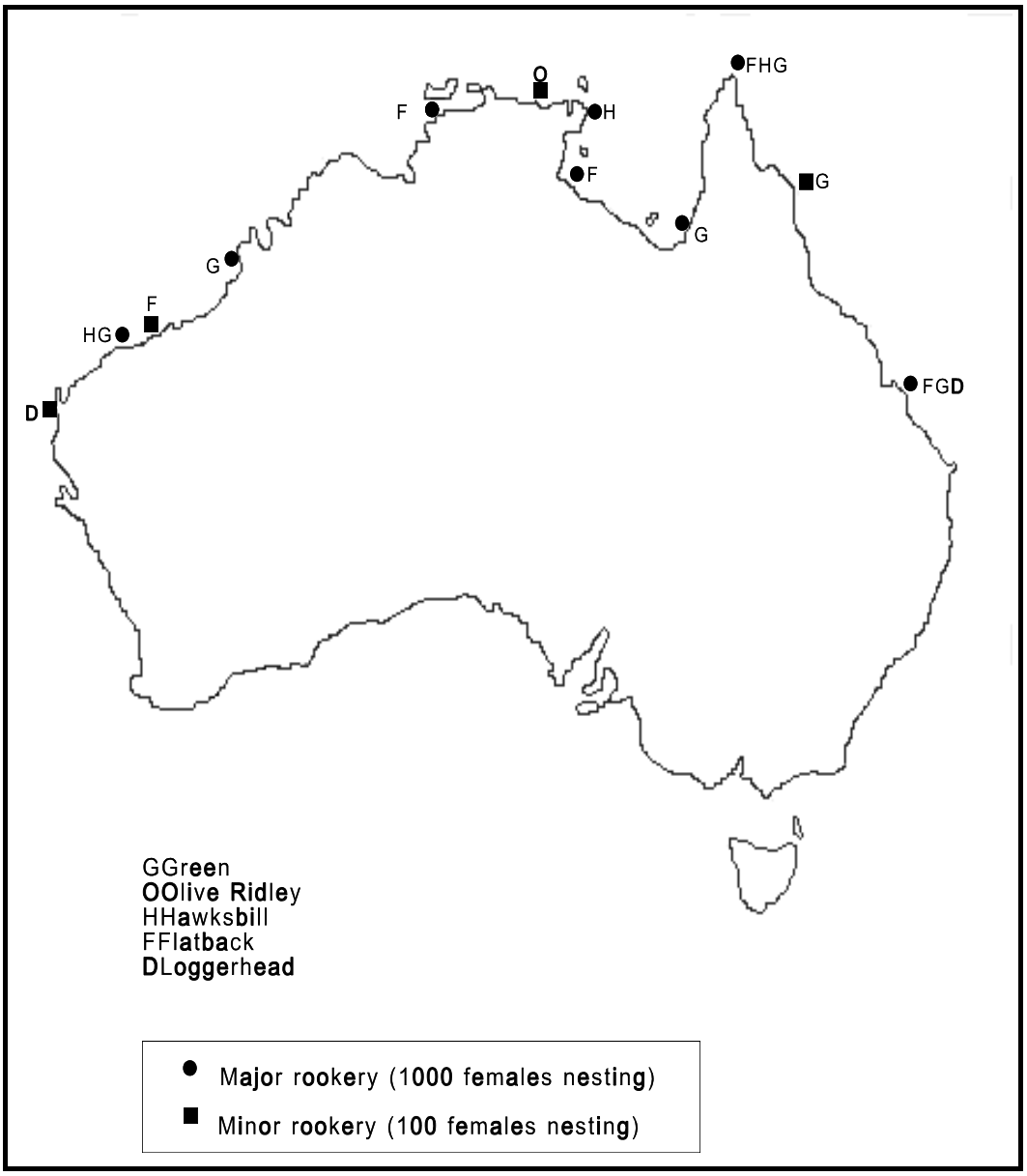


Figure 3: Status of turtle rookeries in northern Australia and adjacent islands as indicated above. Some major declines have occurred in populations of turtles in the north.
(Source: Based on Zann, 1995, p.21)

Marine Mammals

Australian waters contain several important mammal species and threats to their conservation often raises strong emotions. Let us consider three groups of these mammals - dugongs (sea cows), pinnepeds (seal and sea lions) and cetaceans (whales and dolphins).

"The tropical dugong is the only fully herbivorous marine mammal and the only Sirenian (sea cow) to occur in Australia. It is extinct or near extinct in most of its

former range which extended from East Africa to South East Asia and the Western Pacific. Northern Australia has the last significant populations (estimated to be over 80,000) in the world. Large, long-lived mammals, dugongs become sexually mature at around 10 years and calve every three to five years, making them vulnerable to overhunting" (Zann, 1995, p.24).

In Australia dugong populations are being adversely affected by loss of seagrass habitat, mortalities in fish gill nets and shark nets, and injuries from boat propellers. Overhunting is also occurring in the Torres Strait in the territorial waters of Papua New Guinea because populations of dugongs cross national boundaries (Tisdell, 1986). Towards the end of 1997, the Australia Government extended coastal areas in which fishing using gill nets is banned in order to provide greater protection to dugongs and paid compensation to fishers for lost fishing rights. The major problem of declining areas of seagrass has, however, not been effectively tackled by policy-makers because it is likely to require increasing restrictions on agriculturalists, especially growers of sugar cane, on their use of fertilizer.

"Three species of eared seals breed in mainland Australian waters: the endemic Australian sea lion, Australian fur seal and New Zealand fur seal. The Australian sea lion has recently been listed as 'Rare' by the IUCN. Five species of true seals and two other species of fur seals breed in Australia's subantarctic islands and the Antarctic Territories" (Zann, 1995, p.24).

In the last century seals were overharvested in Australia, but are now fully protected. Threats to their populations involves entanglement in fishing nets and plastic litter (including plastic straps for boxes), oil spills and disturbance by visitors. About 2% of seals at haul out or at resting sites in Tasmania are entangled in net fragments and other plastic litter at any time "and it is believed that many seals drown as a result of such entanglement" (Zann, 1995, p.13).

Australia contains more than half the world's cetacean species. This includes eight species of baleen whales, 35 species of toothed whales, porpoises and dolphins. Australian whale population were severely overhunted in the past and Australian only creased whaling in the 1960s. All cetaceans in Australian waters are now afforded protection. The main commercial use of whales in Australia today is for whale-watching tours which have given rise to a minor tourism industry.

Nevertheless, gill nets, shark nets set off bathing beaches to exclude sharks, discarded fishing nets, and ingestion of plastic litter are considered to be a threat to cetaceans, especially dolphins, within Australia. "Contamination of cetaceans by organochlorine pesticides and poly-chlorinated biphenyls (PCBs) is regarded as a significant worldwide threat" (Zann, 1995, p.24).

Fish Stocks

Stocks of several fish species are under threat in Australia due to overharvesting even though restrictions are increasingly being increased limiting the level of catches by fishers. Examples include shark caught for the fish-and-chip trade and sold as 'flake' and coral trout. Serious problems exist in controlling fishing effort in relation to species which migrate outside Australia's exclusive marine zone. This has been most evident in recent years for the southern bluefin tuna. Australia and Japan are in conflict about conservation measures for these species, the stock of which has declined greatly. Australia accuses Japan of overharvesting this species in international waters and has excluded Japan (1997) from harvesting them in Australian waters. Such conflict is of long standing (Tisdell, 1983) and has been compounded by other distant water nations, apart from Japan, increasing their harvesting of southern bluefin tuna in international waters. Southern bluefin

tuna are highly prized in Japan for sashimi.

In addition, fish kills due to the use for agricultural chemical continues as a problem as do the long-term consequences for fish stocks of eutrophication of water bodies due to nutrient enrichment.

5. HUMAN SETTLEMENTS

"Australia is a highly urbanised nation, with about 85% of its population living in towns and cities of 10,000 or more people. Although these settlements occupy less than 1% of the country's total land area, they have a pervasive influence on the natural environment." (State of the Environment Advisory Council, 1996, p.7)

Australian settlements have high livability by international standards and, in general, livability is improving.

Australian settlements are said to have higher metabolic flows - that is, they use more resources and produce more wastes - than those in other industrial nations (State of Environment Advisory Council, 1996). These flow levels have been increasing, both in total and per person, over the past few decades, as illustrated by the following examples:

(1) Domestic water consumption has risen significantly over the past 20 years because of the rising population and increasing use per head. Sydney's total consumption per head (domestic and industrial) rose 25% between 1970 and 1990, from 144 to 180 tonnes.

(2) Australia's primary energy consumption per head increased by 37% between 1970 and 1990.

(3) Food consumption per head (measured by energy content) increased by more than 70% between 1967 and 1992, not because we ate more, but probably because of more energy-intensive production and more wastage in processing.

(4) Australia produces more municipal solid wastes than other industrial nations - 681kg per person per year, compared with an OECD average of 513kg." (State of the Environment Advisory Council, 1996, pp.7-8).

Table 2
Trends in Resource Flows, Sydney, Australia, 1970 and 1990

	1970	**1990**
Population	2,790,000	3,656,500
RESOURCE INPUTS/HEAD		
Energy (MJ)	88,589	115,377
WASTE OUTPUTS/HEAD		
Solid waste (tonnes)	0.59	0.77
Sewage (tonnes)	108.0**	128.0***
Hazardous waste (tonnes)	n/a	0.04
Air waste (tonnes)	7.6	9.3
Carbon dioxide (kg)	7,210.0	9,050.0
Carbon monoxide (kg)	204.9	177.8
Sulfur oxides (kg)	20.5	4.5
Nitrous oxides (kg)	19.8	18.1
Hydrocarbons (kg)	63.1	41.3
Particulates (kg)	30.6	4.7

Notes:
* Derived from food sales data, not consumption data. It reflects an increased use of primary foodstuffs (eg. grains) in the production of meat and processed foods.
** Includes stormwater
*** Waste water within sewerage systems only
Source: Based on State of the Environment Advisory Council, (1996), pp.7-8

6. CONCLUDING COMMENTS

Despite growing concerns in the last two decades about destruction of Australia's natural environments, many Australian environments continue to be undermined by human activity. Loss of trees and woodland cover continue to alter terrestrial landscapes and high levels of economic activity impact adversely on marine environments, which are also threatened by their direct human use and incidental impacts of such use.

The problem is partly a consequence of rising natural resource use per head of population, as *Table 2* highlighted for Sydney. The finding of Adriaanse et al.(1997, p.12) indicate that several developed countries increased their material flow requirements per capita in the 1990s compared to that in last part of the 1970s and the 1980s. Although per capita use of materials by the USA reduced slightly, it remained at higher than for other countries. Thus natural environments remain under stress from high (and in many cases increasing) levels of economic activity. This has occurred despite resource savings on average in relation to the production of individual economic items and reduced levels of pollution in relation to GDP (Gross Domestic Product) in developed countries as predicted by the Kuznets environmental curve (Barbier, 1997). The Kuznets curve shows pollution intensities (pollution levels divided by GDP) as a function of GDP per head. It predicts that as GDP per capita increases it rises at first, reaches a maximum and then declines. However, a declining Kuznets environmental curve does not guarantee a reduced level of aggregate pollution, even though this may occur (Tisdell, 1997) *A fortiori*, it does not guarantee less throughput of natural resources and a reduced rate of their transformation into man-made commodities. This continuing transformation can erode the natural resource-base and brings with it the risk of development that will not last. In addition, the use of environmental and natural resources in Australia, as in many countries, is heavily influenced by market forces. There is a bias in the use of these resources for the production of *marketable* commodities. This may rob the community of natural resources which have high non-market economic values. Although governments in Australia have often intervened to protect such resources, their intervention has often been delayed and imperfect.

Given the nature of market systems, and the objective of creating and maintaining employment in market-type economies, including the Australian one, such

economies must maintain their rate of economic growth and even accelerate it as technological progress or population growth occurs (Tisdell, 1994). Thus, if market economies are to avoid rising total unemployment of labour, they need as a rule foster accelerating economic growth. This is normally accompanied by rising total throughput of materials or natural resources and not infrequently by deteriorating natural environments. Furthermore, when macroeconomic recession or depression strikes resulting in mass unemployment, long-term environmental concerns are likely to be sacrificed. for employment generation if necessary. With economic recession and growing fears of economic depression in many parts of the world, including Australia, the environmental conservation is liable to be sacrificed if the sacrifice means more jobs in the short-to medium-term. The state of the Australian natural environment also reflects the dominance of anthropocentric values over ecocentric ones. Nevertheless, there appears to have been growing community concern about the fate of species other than human beings in the last two decades. This has been reflected to some extent in the policies of Australian governments but many conservationists believe that not enough is being done to protect threatened species, for example, the sea cow or dugong. A contentious issue in this regard has for example been the Hinchinbrook Resort Development near Cardwell in northern Queensland. This is on the edge of a Natural Heritage Area and it is believed that boat traffic to the resort will result in increased mortalities amongst dugong due to greater incidence of boat collisions with dugongs.

Australia still faces significant environmental problems on land and at sea. Clearing of woodland and trees continues to have serious consequences for CO_2 emissions, for wildlife conservation and for the quality of aquatic environments. Possibly the major environmental problems for Australia itself exist in relation to its aquatic environments - salting of inland estuaries, release of acids from soils

and eutrophication of water bodies as well as human damage to aquatic organisms and overharvesting of some species such as the southern bluefin tuna. These problems are partly due to market failures such as the existence of environmental spillovers from land-use and political failures. Both market and political mechanisms work imperfectly in taking into account total economic values of natural resources. In the case of the southern

bluefin tuna, the problem involves international political failure rather than failure by Australia and New Zealand to adopt conservation measures. Both countries have pressed strongly for fishers from other countries, exploiting this stock to adopt similar conservation measures but with less impact than hoped for.

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