

1266
(A)

VF



South Pacific Bureau
for Economic Co-operation



South Pacific Commission



Economic & Social
Commission for Asia and the Pacific



United Nations
Environment Programme

South Pacific Regional Environment Programme

SPREP/Country Report 2
Original: English

COUNTRY REPORT No.2

AUSTRALIA

SPREP Information Centre
Received

30 AOUT 1998

South Pacific Commission
Noumea, New Caledonia
February 1981

SOUTH PACIFIC REGIONAL ENVIRONMENT PROGRAMME

Noumea, New Caledonia

A U S T R A L I A

COUNTRY REPORT

(Department of Home Affairs and
Environment - February 1981)

(i)

CONTENTS

	<u>Page</u>
1. Introduction	1
1.1 Constitutional Background	1
2. Policy and Implementation	2
2.1 Policy	2
2.2 Legislation	3
2.3 Planning	5
2.4 Administration	7
3. Assessment	11
3.1 Major Environmental Problems	11
3.2 Research and Monitoring	19
4. Management	20
4.1 Status of Resources	20
4.2 Major Development Trends	27
4.3 Management Approaches	31
5. Requirements for National Action	33
5.1 New Actions	33
5.2 Requirements	33
6. Priorities and Requirements to be Included in the Regional Programme	36

SOUTH PACIFIC REGIONAL ENVIRONMENT PROGRAMME

AUSTRALIA - COUNTRY REPORT

1. INTRODUCTION

This report follows a checklist and suggested format set out in South Pacific Commission (SPC) Savingram No. 52. Australia has a Federal Constitution and in responding to the SPC checklist a distinction needs to be made between the Commonwealth Government, the six States and the two internal Territories. It has not been possible to consult with the States and hence this Report has been prepared on the basis of existing published and unpublished information available to the Commonwealth Department of Home Affairs and Environment. The report should not be considered as a comprehensive 'national' Report encompassing all the views of the Commonwealth, State and Territory Governments.

1.1 CONSTITUTIONAL BACKGROUND

Australia is governed according to a federal system in which the respective powers of the Commonwealth Government and the six States are defined under the Commonwealth of Australia Constitution Act of 1900. The Head of Government is the Queen of Australia and Australia is a member of the British Commonwealth. The Governor-General, appointed by the Queen, is formally the Chief Australian Executive. The powers of the Governor General are limited. The effective executive powers of the Commonwealth are vested in the Prime Minister and Ministers of State. The Commonwealth Parliament consists of the House of Representatives, whose members are democratically elected from electoral districts defined within the States and the two internal Territories on a population basis, and a Senate with equal representation from each State and with representation of the internal Territories. Federal judicial power is vested in the High Court of Australia, in Federal courts, and in State courts invested with jurisdiction in Commonwealth matters by the Federal Parliament.

Under the Constitution, certain powers are specifically assigned to the Commonwealth Government, while others are held concurrently by both the Commonwealth and the State Governments, with Commonwealth legislation prevailing in those instances where conflicts between Commonwealth and State powers occur. Powers not specifically assigned in the Constitution remain with the States. The latter is the case with most aspects of environmental protection, especially with respect to regular control functions involving the operation of State instrumentalities, municipal matters, industrial enterprises and the environmental conduct of individuals. The Commonwealth Government has powers in those environmental matters involving international relations, overseas trade, federal finance, territories and the environmental impact of Commonwealth Government activities.

State political, administrative and legislative systems parallel, for the most part, those of the Commonwealth. Each State has a democratically elected lower house (the Legislative Assembly or the House of Assembly) and, with the exception of Queensland, each State has an upper house (the Legislative Council). Each State has a government administrative and judicial system.

2. POLICY AND IMPLEMENTATION

2.1 POLICY

2.1.1 Has the government adopted any statements of environmental policy?

Both the Commonwealth and State Governments issue policy statements on a range of environmental issues. At the Commonwealth level an overall statement on environmental policy has not been made. Matters which the Commonwealth Government has issued environmental policy statements include:

- a. uranium mining;
- b. Great Barrier Reef;
- c. Kakadu National Park; and
- d. whaling.

2.1.2 Desirability of adopting a statement of environmental policy

Recently the Prime Minister announced that the States and the Northern Territory had agreed to collaborate with the Commonwealth in utilising the World Conservation Strategy to develop a National Conservation Strategy for Australia. A copy of the Prime Minister's press statement is at Appendix 1.

The National Conservation Strategy is to represent a consensus statement of priorities and actions for meeting national conservation objectives which all levels of government and non-government bodies can adopt. The strategy document will be a first attempt to provide comprehensive statement of national environmental policy.

2.1.3 Government Policies

a. Economic and Social Planning

Australia, like most other industrialised countries, has a market economy in which both public and private institutions exercise economic and social control.

b. Physical or regional planning

Physical and regional planning in Australia is largely the responsibility of State and Local Governments. State physical planning policy is implemented through statutory planning and development control mechanisms. Planning policies have been developed for specific regions in most States.

c. Design of development projects

Major development projects often require government policy decisions. Government policies can include such matters as location, finance, social and environmental impact and economic benefits. Recent major development projects which have been the subject of Commonwealth Government decision include:

- (i) the development of uranium resources in the Alligator Rivers Region of the Northern Territory;
- (ii) construction of a gas pipeline between Moomba (South Australia) and Sydney (New South Wales);
- (iii) construction of Dartmouth Dam at the headwaters of the Murray River in Victoria; and
- (iv) large scale expansion of aluminium refining and smelting industries in several States.

d. Major resource areas

Both Commonwealth and State Governments have specific policies on agriculture, fisheries, forestry, mining, energy and water. For example, in respect of agriculture the Commonwealth Government enforces a strict quarantine policy on the entry of animals and plants from overseas. Water resource development and management is an area in which the Commonwealth and State Governments have agreed to a comprehensive resource policy (see S.4.1.2 for details).

e. Area Development

The Commonwealth and State Governments also have policies relating to specific areas of rural and urban development. Examples of federal policy on rural development include:

- (i) taxation concessions for primary producers;
- (ii) agricultural loans;
- (iii) rural adjustment; and
- (iv) Commonwealth grants for agricultural extension services.

While urban development is primarily the responsibility of State and local government, the national government has several programs relating to urban development including:

- (i) financial assistance for the Albury/Wodonga Growth Centre;
- (ii) decentralisation incentives; and
- (iii) pilot urban rehabilitation program.

f. What are the Government's priorities in these areas

Government priorities between these areas are not explicitly stated. Some assessment of Government priorities could, however, be made from an assessment of annual budget allocations.

2.2 LEGISLATION

Legislative powers in areas affecting the environment are primarily the responsibility of the States. In all States there is separate legislation covering air, water and noise pollution, various

aspects of natural and living resource conservation and other matters of environmental concern. The States have also enacted general administrative laws to provide mechanisms for coordinating environmental programs. Common law provisions also apply to various matters affecting individuals, with environmental relevance.

The most comprehensive federal legislation is the Environment Protection (Impact of Proposals) Act 1974, the purpose of which is to ensure that matters affecting the environment to a significant extent are taken into account in Commonwealth actions and decisions. Other legislation at the national level includes:

- a. the Australian Heritage Commission Act 1975 established the Australian Heritage Commission and provides a mechanism for the identification and environmental assessment of Commonwealth actions relating to the natural and man-made environment of national importance.
- b. the National Parks and Wildlife Conservation Act 1975 established the Australian National Parks and Wildlife Service and provides for the establishment and management of parks and reserves in Commonwealth territories and for aspects of wildlife conservation;
- c. the Great Barrier Reef Marine Park Act 1975 established the Great Barrier Reef Marine Park Authority and provides for the establishment and management of a marine park in the region of the Great Barrier Reef;
- d. legislation to allow uranium mining in areas of the Northern Territory subject to specific environmental controls including the Environment Protection (Alligator Rivers Region) Act 1978, establishing the Office of the Supervising Scientist to supervise environmental aspects of uranium mining activities in those areas, and the Environment Protection (Northern Territory Supreme Court) Act 1978 which allows certain interested parties to seek relief from the Courts in relation to actual or possible damage to the environment;
- e. the Environment Protection (Nuclear Codes) Act 1978 which provides for the development and promulgation of Nuclear Codes of Practice in collaboration with the States and the Northern Territory for the regulation of the uranium industry. These codes will be implemented under appropriate legislation within each State and Territory;
- f. the Environment (Financial Assistance) Act 1977 which allows Commonwealth financial assistance to be granted to States for environmental programmes; and
- g. the Commonwealth has recently legislated for the total protection of whales and Antarctic flora and fauna. Commonwealth legislation in areas such as health, science, fisheries, transport and water resources also has some environmental relevance.

2.3 PLANNING2.3.1 Are environmental factors considered in economic planning?

Commonwealth Government policy is to maintain a responsible balance between economic planning and development and environmental protection.

2.3.2 Have resource or land use surveys been made?

Extensive resource and land use surveys have been conducted in Australia for many years. A recent listing of surveys is contained in the 'Catalogue of Australian Land Resource Surveys', prepared by the Commonwealth and State Government Collaborative Soil Conservation Study 1975-77.* Surveys have been made of many resources and over large areas of the continent. Most surveys are undertaken by, or on behalf of, the State Governments. Authorities conducting national surveys include:

- a. Australian Heritage Commission - maintains a register of the National Estate;
- b. Bureau of Mineral Resources, Geology and Geophysics - information on the geological framework and mineral resources of Australia including the Territories and offshore areas;
- c. Division of National Mapping - conducts geodetic and bathymetric surveys, topographic mapping and air photography. Coordinates Commonwealth and State survey and mapping activities; and

Australian Biological Resources Study - established to promote studies of the taxonomy, distribution and ecology of Australia's flora and fauna. The Study will produce major taxonomic works on the flora and fauna of Australia.

2.3.3 Are environmental maps or other environmental data used in physical planning?

Use of environmental maps and data in physical planning is now generally accepted. Environmental factors are required to be taken into account in state physical planning activities by statutory regulation. Various manuals and guide books have been produced to assist planners. A similar situation applies at the Commonwealth level. An extensive review of physical planning and environmental assessment procedures has been undertaken by Fowler** for the Commonwealth Department of Science and the Environment.

* Australian Department of Environment, Housing and Community Development. Catalogue of Australian Land Resource Surveys. Commonwealth and State Government Collaborative Soil Conservation Study 1975-77. Report 4. Australian Government Publishing Service, Canberra, 1978.

** Fowler, R.J. The Integration of EIA Procedures with Development Controls (Planning and Pollution): A Report.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) Division of Land Use Research recently conducted a major four year study of land use planning in a rural area on the South Coast of New South Wales.* The purpose of this study was to determine the type of information (including environmental information) that would be needed for comprehensive land use planning within a coastal region, and to determine how this accumulated information might be used.

2.3.4 Are environmental assessments made of major activities?

All States and the Commonwealth have arrangements to conduct environmental assessments of major activities involving government decisions. The Commonwealth, New South Wales and Victorian governments have established environmental impact assessment legislation. The other States have formal procedures.

The Commonwealth Environment Protection (Impact of Proposals) Act and associated Administrative Procedures have been under review. A major aspect of the review has been the elimination of duplication and overlap between the Commonwealth and the States in environmental impact assessment and the streamlining in the administration of the Act.

2.3.5 Improvements in environmental planning

A Standing Committee on Environment and Conservation of the Commonwealth Parliament, is inquiring into the "Adequacy of Legislative and Administrative Arrangements Relating to Environment Protection and Resource Management." In a submission to that Inquiry in 1978, the then Department of Environment, Housing and Community Development concluded by suggesting that in the future increased attention could be given to:

- "a. the availability of environmental data - Data on the state of the nation's environment and information which would assist in weighing the costs and benefits of environmental protection and resource management in Australia are not centrally coordinated, collected, analysed or published in any coherent fashion. As a result:
 - (i) government, industry, and the community in general have only a restricted perspective on which to base current decisions and attitudes and to anticipate future ones.
 - (ii) many day-to-day decisions are hampered by the fact that much useful information is dispersed and not readily available;
- b. the development and application of national environmental policies - Because measures have already been initiated to resolve the more obvious and simple problems, the important issues of the future could involve both greater environmental damage and higher control costs than in the past, while others, although not involving great expense may call for a combination

* Coming to Grips with Regional Planning. Ecos. No. 10. Nov. 1976.

of legislative, technical and social innovations. The most important requirements for future national policies are that they should be:

- (i) coordinated effectively between different levels of government, industry and the community at large.
 - (ii) flexible, in that all available policy instruments, whether they be administered at Commonwealth, State or local level, should be considered for dealing with particular environmental problems.
 - (iii) anticipatory, in that action taken sufficiently early reduces the risk of major environmental damage, offers greater security to employment and investment decisions and eliminates the need for heavy corrective expenditure;
- c. the cost of environmental protection - While overseas studies suggest that the costs associated with environmental protection and resource management have been justified by the benefits gained, there is not sufficient information to make a definitive judgment about specific measures which have been undertaken in Australia, or which might be undertaken here in future; and
- d. the adequacy of existing legislative and administrative arrangements - The Commonwealth should undertake an overview of the state of the environment in Australia, the success of legislation, administrative practices and financial measures, and the appropriateness of methods of achieving environmental objectives which are so far untried."

Work is in progress to meet these requirements. As discussed elsewhere in the report the Australian Environment Statistics project is aimed at producing a report on the state of the Australian environment (see S.3.2.1 (d)). A Commonwealth/State Collaborative Study of Industry Pollution Abatement Costs is being conducted under the auspices of the Australian Environment Council. The study is aimed at estimating the costs of pollution abatement in some Australian industries. As part of the development of the National Conservation Strategy (see S.2.1.2) a review is to be undertaken on the achievement of conservation objectives and of government and non-government conservation activities.

2.4 ADMINISTRATION

Environmental administration is shared between Commonwealth, State and Local Governments.

Commonwealth

Commonwealth environmental responsibilities are administered by the Department of Home Affairs and Environment through the responsible minister. The portfolio includes four statutory authorities concerned with environment and conservation:

- a. the Australian Heritage Commission;
- b. the Australian National Parks and Wildlife Service;

- c. The Great Barrier Reef Marine Park Authority; and
- d. The Office of the Supervising Scientist.

Two committees of the Commonwealth Parliament undertake inquiries into environmental matters. The House of Representatives Standing Committee on Environment and Conservation has undertaken inquiries into matters such as the urban environment, grants to voluntary conservation bodies, hazardous chemicals, management of the Australian coastal zone and the effectiveness of a range of Commonwealth environmental legislation. The Senate Standing Committee on Science and the Environment has conducted inquiries into woodchips and the environment, trafficking of fauna and Uluru National Park.

Commonwealth/State Cooperation

Two Ministerial councils have been established specifically to promote cooperation between the Commonwealth and States on environmental issues.

The Australian Environment Council (AEC) was established in 1972 by agreement between the Prime Minister and State Premiers. Membership consists of the Ministers responsible for environmental matters in each State, internal Territory and the Commonwealth. New Zealand and Papua New Guinea send observers. The Council meets annually to discuss environmental issues and consider recommendations. The AEC is supported by a Standing Committee consisting of the heads of the relevant State, Territory and Commonwealth Departments and agencies. It meets at more frequent intervals to formulate policies and recommendations for consideration by Council. The AEC supports research and study in those areas of environmental management having national application. Matters currently before the AEC include the development of a national approach to the control of emissions from motor vehicles, management and control of environmentally hazardous chemicals and a uniform approach to noise control legislation.

The Council of Nature Conservation Ministers (CONCOM) was formed in January 1974 and consists of Commonwealth, State and Territory Ministers with nature conservation responsibilities, together with observers from New Zealand and Papua New Guinea. There is a supporting Standing Committee of senior officials. There are also specialist technical working groups covering subjects such as ecological surveys for nature conservation, waterbirds, endangered species, kangaroos, education and training, non indigenous species and the classification and nomenclature of land for nature conservation purposes.

Another Commonwealth-State body with important environmental functions is the National Health and Medical Research Council. This Council is served by a variety of advisory committees, many of which are concerned with aspects of environmental health. Among its activities, the Council has endorsed draft model asbestos regulations, recommended a national design for control of asbestos emissions into the atmosphere from industrial sources and has made recommendations regarding standards for air quality.

A Commonwealth-State Consultative Committee on Nuclear Codes of Practice provides for collaboration in the development of codes of practice. The codes currently being developed relate to protection from radiation in the mining and milling of radioactive ores, the transport of radioactive materials and the management of wastes from the mining and milling of radioactive ores.

Other Commonwealth-State Ministerial Councils with environment related responsibilities include the Australian Water Resources Council (provides a continuous comprehensive assessment of the quantity and quality of Australia's water resources), the Australian Transport Advisory Council (activities relating to the development of national standards for vehicle exhaust control), and the Australian Agricultural, Fisheries and Forestry Councils.

State and Local Government Environmental Administration

All Australian States have established environmental ministries or agencies for environmental control and management activities. The arrangements in New South Wales, and Victoria, the most populous States, are representative.

In New South Wales, principal responsibility for environmental control rests with the State Pollution Control Commission (SPCC) and the Department of Planning and Environment. Both are responsible to the Minister for Planning and Environment.

The SPCC has "responsibilities, powers, authorities, duties and functions of a supervisory, advisory and coordinating nature for the prevention, control, abatement and mitigation of pollution, the control and disposal of waste and the protection of the environment from defacement, defilement or deterioration". In this capacity, the SPCC, which was established by statute in 1970, is charged with:

- a. coordinating, monitoring and inspecting the activities of all public authorities in New South Wales to the extent that they may effect the environment;
- b. setting environmental standards and supervising their implementation;
- c. advising the Minister of Planning and the Environment on the efficacy of present environmental measures and on the necessity for new or modified legislation;
- d. carrying out, commissioning and coordinating surveys, investigations and research; and
- e. providing and encouraging the development of specialist guidance and technical advisory service.

The SPCC is empowered to make regulations under the State Pollution Control Act 1970. It administers the Clean Air Act, the Clean Waters Act and the Noise Control Act.

The Department of Planning and Environment administers land use planning, development control and legislation relating to environmental impact assessment.

In Victoria, the Ministry for Conservation is responsible for conservation and protection of the environment. The Ministry was formed in 1973 and brought together a number of government organisations, working separately in the field of conservation, some since before the turn of the century.

The Ministry now includes the Environment Protection Authority, the Fisheries and Wildlife Division, the Land Conservation Council, the National Parks Service and the Soil Conservation Authority.

The work of these agencies is assisted by a central coordinating group the special responsibilities of which include environment impact assessment (through the Environment Effects Act), information services, conservation planning, and broad-scale multi-disciplinary studies of regions in Victoria where major development is anticipated.

The State Minister for Conservation, advised by the Director of Conservation, is responsible for promoting the objectives of the Ministry for Conservation Act 1972, which are:

- a. protection and preservation of the environment; and
- b. proper management and utilisation of the land and living aquatic resources of Victoria.

Pollution control is the specific responsibility of the Environment Protection Authority (EPA) which administers the Environment Protection Act 1970. The EPA exercises overall management and control of all waste discharged in the environment, the prevention of pollution, and the control of environmental noise. Some of the licensing and enforcement functions provided for in the Act are undertaken by other government agencies under direction from the EPA. The EPA is advised by an Environment Protection Council which includes representatives of other government agencies, municipalities, industry, the universities and the general public.

The EPA has Branches responsible for Water Quality (the quality of streams and water-ways), Air Quality (licensing provisions of the Environment Protection Act applying to air emissions and the monitoring of ambient quality), Noise Control (formulates policies, drafts regulations and conducts research on particular environmental noise problems), Land Waste Management (the prevention of pollution in the terrestrial environment caused by the deposit of waste material either solid or liquid) and Investigations (licences discharges, detects unlicensed discharges and detects pollution generally).

In each State, local government authorities responsible for districts, municipalities, shires, towns or cities, are comprised of elected councils and supporting staff. Local government is created under State Government legislation. Local governments are primarily concerned with matters such as local road construction and maintenance, building regulations, garbage collection and disposal, sanitation, noxious weeds and the provision of community health and library services.

Implementation of Environmental Laws and Policies

The means for achieving compliance with environmental laws and regulations include licensing, the right of pollution victims to sue for damages at common law or seek injunctions, and penalties for non-compliance with environmental legislation.

A variety of courts may deal with the enforcement of environmental laws. Judgements have been made on environmental matters even in the High Court of Australia.

Interaction between Government, Industry and the Community

Co-operation between government and industry has been important in environment protection in Australia. Industry is represented on advisory bodies associated with a wide range of Commonwealth and State environmental authorities. Direct interaction between industry groups and government policy makers and officials is common. Industry is consulted in regard to environmental standards and there is considerable interaction in the preparation of the environmental impact assessment of major development activities.

There are many voluntary community organisations concerned with conservation and environment matters, and these communicate with government at the local, state and national levels. Non-government organisations are interested in matters ranging from site specific and short term local concerns to wide ranging issues with long term implications. There are small, ad hoc, local organisations, and others which have large memberships and a broad charter eg the Australian Conservation Foundation. The Commonwealth provides financial assistance for voluntary environmental associations.

3. ASSESSMENT

3.1 MAJOR ENVIRONMENTAL PROBLEMS

3.1.1 Major development projects

Mining - Over the past decade the rate of discovery and development of new mineral deposits has been high in Australia. There has been strong public pressure for control of the environmental effects of mining development and for the protection of the interests of Aborigines. Consequently mineral development projects are increasingly being given careful, protracted and wide ranging public consideration in Australia.

Mineral sands mining along the relatively heavily populated eastern coast of Australia has been a major focus of attention by environment and conservation interests. Environmental impact statements have been prepared and released for public review under Commonwealth and State environmental assessment procedures. Major environmental issues involved have been disturbance of natural areas, rehabilitation, temporary and permanent loss of recreational, scientific or educational amenity, the opening up of relatively inaccessible areas and pollution of the marine environment.

Several major uranium deposits have been discovered in the Alligator Rivers Region of the Northern Territory. In order to determine whether the development of these deposits should proceed in the face of much adverse criticism, an Inquiry was directed on 16 July 1975 under Section 11 of the Environment Protection (Impact of Proposals) Act. The major finding of the inquiry was that development proceed subject to wide ranging recommendations designed to protect the physical and social environment of the Alligator Rivers Region. These recommendations which were subsequently accepted by the Commonwealth Government, are now being used for uranium developments elsewhere in Australia.

Forestry - Australia's forested land has been cleared for agricultural and community settlement and the forests utilised for fuel, timber and wood products since the earliest days of European settlement. With the establishment of forest services in the States, some 50 or 60 years ago, reservation of forest lands and forest protection measures began and depletion of forest resources was slowed. However, the main role of the forests was still seen as provision of firewood and timber. It is only relatively recently that the community has started to recognise other values of forests, such as protection of soil and water resources, provision of wildlife habitats and recreation areas, and as a genetic resource.

Several parliamentary committee and government inquiries have been undertaken into the environmental consequences of forestry operations and particularly the effects of the woodchip industry. These inquiries have led to substantial modifications in forest management practices and close attention is now given to assessment of environmental issues in planning forest development projects.

Energy and the Environment - There is a developing perception in Australia that the environmental effects resulting from the production, transport and use of energy are among the more important determinants of environmental quality in industrialised countries.

In June 1978 the Government established a National Energy Research Development and Demonstration Council (NERDDC) to advise the Minister for National Development and Energy on the coordination of the national energy research and development effort. The Council is required to consider the environmental effects of expanded coal, oil, gas and uranium use, and new technological developments in existing and alternative energy forms. High priority is being given to determining the environmental effects of the increased mining and utilisation of coal and the mining, processing, enrichment and waste management of uranium.

Increased attention is being given to alternative sources of liquid fuels. Oil from shale deposits at Rundle on the Queensland coast and elsewhere offers a possible alternative in this decade as does methanol from natural gas. In the 1990s ethanol from crops, coal liquefaction and the increased use of electric cars could be important alternatives to petroleum based transport. Use of any of these alternatives will have significant environmental effects and national energy policy recognises that cost-effective mitigation of adverse effects will be an issue in their choice. Accordingly the National Energy Research and Development Program includes efforts to improve environmental knowledge of coal mining and combustion, and ethanol production and use.

A further aspect of the environmental effects of energy relates to the cumulative regional impact of major projects. The Hunter and Latrobe River Valleys, in NSW and Victoria respectively, are significant coal mining regions and the location of major electricity generating plants. Large additional power stations are planned or are under construction. In the Hunter Valley, new mining projects are being developed for coal export and aluminium smelter capacity is to be greatly increased. In the 1990s coal liquefaction plants could be located in the Hunter and Latrobe regions. The cumulative environmental effects of these developments could be highly significant and regional environmental planning for these valleys has commenced. Water resource availability is known to be an important constraint to energy conversion in both regions.

Aluminium Industry - The aluminium industry is attributed to Australia because of the availability of large and accessible bauxite deposits and the relatively cheap and reliable sources of energy. Environmental impact assessments of a range of aluminium/bauxite projects have been conducted under Commonwealth and State procedures including the following:

- a. an aluminium smelter at Gladstone, Queensland;
- b. a bauxite mine at Wagerup, W.A.;
- c. a bauxite mine and refinery at Worsley, W.A.; and
- d. an aluminium smelter at Portland, Victoria.

Other projects which are currently being assessed under Commonwealth legislation include two aluminium smelter developments in the Hunter River Valley, NSW, for which draft environmental impact statements have been prepared.

Matters of concern in the environmental assessment of these proposals include resource utilization, land use planning, air and water emissions, solid waste disposal, community health and social impacts.

Impact of Major Industrial Proposals on Isolated (Indigenous) Communities - Development of industrial proposals such as the uranium projects in isolated areas in the Northern Territory has resulted in rapid changes in the social environment of traditional Aboriginal social patterns. The spiritual relationship that Aboriginal people have for their land has been challenged by the Western European idea of land ownership and the view that land is an economic resource to be disposed of through sale or transfer. Four specific areas of impact associated with this conflict are identified as follows:

- a. impacts on spiritual values and beliefs;
- b. consequent disruption of traditional Aboriginal law;

- c. effects on traditional community coherence within the Aboriginal group; and
- d. disruption of existing patterns of social relations in general.

Thus the question of land rights has become increasingly important to Aboriginals and led to the introduction of the Commonwealth Aboriginal Land Rights (Northern Territory) Act 1976.

3.1.2 Urban Areas

Air quality - Ambient air concentrations of lead and ozone exceed national air quality goals in a number of the larger Australian cities. Motor vehicles are the main contributors to airborne lead and a major contributor of pollutants which are the precursors of photochemical smog. Australian Design Rules are recommended by the Australian Transport Advisory Council for new motor vehicles. These Rules specify maximum pollutant emission limits and are normally incorporated into State transport legislation. In three States, control of emissions from new and in-service motor vehicles is provided for in environmental legislation.

A long term national motor vehicle emission strategy is being considered for further emission controls in the eighties and a report has been prepared on the energy and economic implications of further, more stringent, emission controls. Projections of total pollutant emissions and their effect on air quality have been made from the present to the end of the century for a number of possible control strategies. The report concluded that if more stringent emission controls were necessary, introduction of unleaded petrol of 91.5 octane and exhaust catalyst technology would be cost and energy effective.

Hazardous Chemicals - In recent years the Commonwealth and the States have attached high priority to management of environmentally hazardous chemicals. A National Advisory Committee has been established by the Australian Environment Council to advise governments on appropriate procedures for assessment of chemicals and control measures. The UNEP International Register of Potentially Toxic chemicals is seen as providing an important basis for developing a national register on hazardous chemicals. Investigation of the environmental effects of specific chemicals such as polychlorinated biphenyls, chlorofluorocarbons, asbestos, and heavy metals are also being undertaken.

Noise - Legislation and regulatory agencies have been established in most States to prevent and control excessive noise in the working and domestic environment. Very little in the way of comprehensive data is available on noise levels in Australian cities. However one recent estimate was that 26% of the industrial work force was continuously exposed to a noise level greater than 90 dBA (the maximum continuous noise level to which a worker can be exposed under Australian Standard 1269).* The Australian Environment Council has established a specialist working group on noise to make appropriate recommendations.

* Noise Pollution and the Cost of Hearing Loss. Ecos. No. 25 August 1980.

Waste management - On average one kilogram of domestic garbage is generated per Australian per day, and more than \$100 million is expended annually to manage these wastes. As is the case in other countries, waste management costs have escalated rapidly in the past decade due to demands for higher environmental standards and rising costs for labour, transportation, acquisition of landfill sites and purchase of advanced equipment for waste treatment and disposal.

In response to these changes, traditional approaches to waste management are under review, particularly in some metropolitan areas where lack of adequate disposal sites and shortages of capital for urban services are becoming evident. Aside from the need to minimise resource depletion, it is apparent that under appropriate circumstances recovery and re-use of materials will assist in reducing waste collection and disposal costs.

There are several problems of special importance across the broad waste management spectrum including managing litter and packaging wastes, disposal of used automobiles, tyres and hazardous industrial wastes, and control of marine dumping.

The problem of litter has been, and continues to be, the subject of substantial public campaigns, and in many cases the local authorities who have immediate responsibility are turning to other levels of government for assistance with abatement. Packaging materials together with other paper items such as newspapers form the largest component of litter. The packaging component of the waste stream is often regarded as a special problem, not only because of the associated nuisance but also because used packaging materials are perceived as valuable resources which are potentially recoverable. There is a heightened awareness both in industry and government of the importance of public education in litter abatement. At the same time it is generally recognised that there is a need to evaluate the potential costs and likely benefits associated with particular litter abatement and waste management programs.

Used vehicles and rubber tyres present difficult disposal problems for many local authorities. In addition to the problem involved in collecting abandoned vehicles, neither tyres nor vehicle wastes are suited for disposal by conventional sanitary landfill methods. The loss of valuable resources contained in discarded tyres and vehicles is of course another example of the hidden costs associated with present waste disposal arrangements. As is the case with all such waste reclamation schemes, the viability of tyre recycling is dependent on assured long term markets for the recovered materials.

Satisfactory disposal of hazardous wastes is becoming increasingly difficult and costly as the potential for environmental damage becomes more obvious. A general inability on the part of waste disposal authorities to accept intractable wastes or provide alternative disposal facilities has led to an increasing tendency for those who generate them to stockpile. There is now general recognition among governments in Australia of the need to quantify the types of wastes being stockpiled and to assess the availability of disposal arrangements. The present challenge is to develop an overall strategy which is geared not only to satisfactory disposal of hazardous wastes, but is also conducive to minimisation of hazardous waste production and to re-use in industrial cycles wherever possible.

3.1.3 Rural Areas

National Parks - National Parks are managed largely by the States and Territories. Many new Parks have been proclaimed in recent years as the need to preserve large natural areas for environmental and recreational purposes becomes more pressing. The Commonwealth was directly involved in the establishment of two parks in the Northern Territory of particular national and international significance.

Kakadu National Park was established following the recommendations of the Ranger Uranium Environmental Inquiry, which considered that the Park was essential to minimise possible adverse social and environmental impacts associated with the development of uranium mining. The first stage of the Park, covering 6450 sq. km. was proclaimed in April 1979.

The Uluru (Ayers Rock-Mount Olga) National Park was proclaimed in May 1977. The Conservation Commission of the Northern Territory has responsibility for the day to day management of the Park and a plan of management is being prepared jointly by the Commission and the Australian National Parks and Wildlife Service. An important factor in the development of the plan of management will be the views of Aboriginal people with interests in the area.

Desertification - Desertification is a problem of the arid region, (defined as the area with insufficient rainfall to grow crops of any type), which covers 5.7×10^6 km² or some seventy per cent of the Australian continent. In this area permanent surface water is scarce and droughts are frequent. The only widespread utilisation of the arid region is for grazing sheep or cattle. Mining and tourism affect small areas.

In Australia desertification tends to occur in small areas especially those of sensitive vegetation or soil type. Desertification of large, contiguous areas has been infrequent. The most common cause of desertification is excessive grazing by sheep, cattle or rabbits which is most likely to occur during drought and periods of adverse economic conditions.

3.1.4 Coastal waters and marine

Marine Pollution - The development of marine protection measures in Australia over the last twenty years has been influenced by an increased interest in the exploitation of both biological and mineral marine resources, together with international moves towards protecting the marine environment.

Australia's basic position in relation to the developing Law of the Sea reflects its geographic and economic position as an island continent. In 1953, by proclamation, Australia declared its sovereign rights over the continental shelf. As a first step towards the establishment of an exclusive economic zone and consistent with the emerging text from the United Nations Conference on Law of the Sea, Australia established a 200 nautical mile fishing zone with effect from 1 November 1979.

Extension of Australia's offshore rights has highlighted internal differences of view concerning the division of responsibilities between the Commonwealth and State Governments in offshore areas. As a consequence, Commonwealth and State Governments have been involved for the past 10 years in detailed negotiations in relation to a wide range of offshore activities including mining, fishing, navigation, establishment of marine parks and control of marine pollution. Recently it has been agreed to give each State the same powers with respect to the adjacent three mile territorial sea (including the seabed) as it would have if the waters were within the limits of the State. In essence, States will exercise control over their immediate offshore areas, whilst the Commonwealth Government will retain control beyond the territorial sea. Because of the complex practical problems involved, detailed terms of agreement are to be developed separately for all offshore activities.

Although Australia is surrounded by extensive bodies of water, the majority of the population is settled in a few large urban centres on the coastal margin, so localised marine pollution problems of an urban or industrial nature are generally localised. Dumping of wastes and other matter at sea is not practised on a large scale in Australia. The majority of dumping operations are small in volume and are carefully controlled.

There have been no major ship-based pollution incidents in Australian waters. Significant incidents have, however, occurred involving the discharge of hydrocarbons, chemicals, sewage and garbage from ships. Australia is signatory to a number of international conventions concerned with ship-based pollution and marine dumping. Work is being undertaken to ratify these conventions.

Expansion of off-shore production of natural gas and petroleum is expected to be of growing importance as a potential hazard to the Australian marine environment. There has been petroleum production for many years at Barrow Island in Western Australia and in Bass Strait. Vigorous exploration activity is occurring in several locations around the Australian coast.

Australia has established a National Plan to Combat Pollution of the Sea by Oil from Ships. The Plan is administered by the Commonwealth Government with the cooperation of State Governments and industry. Equipment and chemicals to combat oil spills are located at major ports.

An example of Australia's acceptance of the need for international cooperation and responsibility to protect the marine environment is the treaty between Australia and Papua New Guinea, commonly referred to as the "Torres Strait Treaty", which was signed by both countries in December 1978. The Treaty, which is presently being implemented, includes provision for signatories to take all necessary measures to prevent, reduce and control pollution from all sources, in a protected zone and adjacent waters. The Treaty also provides for a moratorium on all mining and drilling in the protected zone for ten years and establishes arrangements for cooperation, management and research related to protection of the marine environment. Similar provisions also exist in relation to the protection of endangered species.

The Great Barrier Reef - The Commonwealth Government decided in 1979 that there should be no further exploration for petroleum and no renewal of petroleum exploration permits in the Great Barrier Reef Region until the results of both short and long term research into the reef ecosystem are known. This was re-affirmed by the Queensland and Commonwealth Governments on 14 June 1979.

The Great Barrier Reef Marine Park Act 1975 provides for the establishment, control, care and development of marine parks in the Great Barrier Reef Region. The Commonwealth and Queensland Governments have agreed to establish joint consultative mechanisms for management and preservation of the region.

Under these arrangements the Capricornia section of the reef has been proclaimed as the first section of the Great Barrier Reef Marine Park. Zoning plans are being prepared for this section. An area of reef adjacent to Cairns is being examined for possible proclamation as the next section of the marine park.

Whale Protection - Australia was a foundation member of the International Whaling Commission (IWC) in 1946 and has played a leading role in the management and conservation of whales. Australia initiated the IWC International Observer Scheme under which officials from foreign countries are present to record details of every whale caught during whaling operations and to report any infractions to the IWC. Australia continues to support the IWC and the funding of research into whales.

An Australian inquiry into whales and whaling, headed by Sir Sydney Frost, was undertaken in 1978. In April 1979, following the tabling of the report in the Commonwealth Parliament, the Prime Minister announced that all whaling within the Australian 200 mile fishing zone was to be prohibited. The import of whale products and goods containing whale products is banned from 1 January 1981.

In June 1980 the Commonwealth Whale Protection Bill received Royal Assent. The Bill will be proclaimed when appropriate arrangements for implementing the legislation have been concluded with the State and Northern Territory Governments. The legislation prohibits the killing, capturing, injuring or interference with a whale, dolphin or porpoise in the 200-mile Australian fishing zone with penalties up to \$100 000.

3.1.5 Outside environmental pressures on the country

Overseas investment in companies operating in Australia has been growing over a number of years. There was a large increase in capital inflow in the period 1965-66 to 1967-68 coinciding with the Australian mining boom. A significant increase in foreign investment is also likely to take place over the next few years, associated with projected mineral and energy resource development. Foreign investment is significant in a number of companies associated with major development projects eg. coal, uranium, bauxite, alumina, woodchips and tourist developments. Many of these projects present potential major impacts on the environment.

Both Commonwealth and State Governments have adequate legislative and administrative arrangements to ensure environmentally sound practices are followed. For example, the Commonwealth Environment

Protection (Impact of Proposals) Act can be applied to proposals where foreign investment or export control approval is required from federal authorities.

3.2 RESEARCH AND MONITORING

Wide ranging environmental research and monitoring is conducted at both the Commonwealth and State levels.

3.2.1 Monitoring

The principal focus for environmental monitoring is at the State level. Agencies in most States conduct routine monitoring of air and water quality. The Commonwealth's involvement in environmental monitoring includes the following:

- a. Air quality - a National Air Quality Data Centre has been established by the Commonwealth to collate and file data from State authorities so that comparable statistics can be compiled and made readily available for research and to guide development of national policies. The Australian Baseline Air Pollution Station, in Tasmania, is operated by the Commonwealth as part of the worldwide baseline atmospheric monitoring network sponsored by the United Nations Environment Programme and coordinated by the World Meteorological Organisation. Recordings are made of those constituents of the atmosphere which may have long-term effects on the world's climate. Establishment of a supporting network of stations is being considered.
- b. Marine quality - a national marine pollution monitoring network is being established by the Commonwealth, in cooperation with State Governments and research agencies. It is designed to be compatible with international monitoring programs such as the International Oceanographic Commission, Global Investigation of Pollution in the Marine Environment (GIPME), and is presently at the pilot stage of implementation. A series of workshops in analytical methods is being held in association with the program to coordinate and improve methods of marine pollution analysis among the various Commonwealth and State research organisations.
- c. Water quality - the Commonwealth has provided financial assistance to the States for the assessment of water quality under the National Water Resources Program. The monitoring of water quality in rivers and estuaries is undertaken primarily by State authorities.
- d. Australian Environment Statistics Project - the ability of Australian Governments to analyse and respond to specific issues of current concern is naturally dependent, at least in part, upon the state of knowledge of environmental conditions and trends. Social and economic statistics are for the most part collected by national agencies (principally the Australian Bureau of Statistics). Data on environmental conditions are collected mainly by State authorities. Accordingly there are inevitable problems in achieving comparability between States,

which make the preparation of national statistics difficult in practice. Commonwealth agencies are involved in preliminary studies leading to the preparation of a report on the state of the Australian environment. The report will provide information and statistical data on environmental conditions (e.g. air and water quality, land use, environmental levels of hazardous substances, distribution of flora and fauna, etc.) in key areas of economic activity. Statistics will be presented in relation to 100 defined environmental regions of Australia.

3.2.2 Research

Environmental research is conducted in a wide range of Government, industry and tertiary education organisations. An estimate of funding of environmental research and development prepared by the Australian Science and Technology Council (ASTECC)* is as follows:

ESTIMATED ANNUAL EXPENDITURE BY
SECTOR AND AREA OF ACTIVITY (\$million)

<u>Research Category</u>	<u>Cwlth Govt</u>	<u>State Govt</u>	<u>Non-govt Industry</u>	<u>Total</u>
Environmental Pollution	6	5	4	15
Environmental Management and Conservation	14	9	0.4	23
Land Use Management and Planning	2	0.2	0.3	3
Mathematical Applications in Environmental Analysis and Management	0.4	0.5		1
<u>TOTAL</u>	22	15	5	42

The conclusions reached by ASTECC on research and development needs in the environment area are shown in Appendix 1.

4. MANAGEMENT

4.1 Status of Resources

By world standards Australia is well endowed with natural resources. Some resources, however, such as soil, water and forests have been degraded in the past and now require careful husbandry in order to continue as a sustainable resource. The decision to develop a National Conservation Strategy has signified a commitment to strive for the sustainable use of natural resources in Australia.

* ASTECC. Science and Technology in Australia 1977-78. Australian Government Publishing Service. Canberra 1978.

4.1.1 Soils

A collaborative Commonwealth/State national study of land degradation and soil conservation was completed in 1978. The report recommended increased activity in soil conservation. Commonwealth involvement was recommended in education, research, policy coordination and the provision of funds for State soil conservation programmes.

The Report demonstrated the need for increased soil conservation activity showing that 2.7×10^6 km², or 51%, of land used in Australia for agricultural or pastoral purposes (with fixed investments of about \$12 billion) requires treatment by some form of soil conservation. For 44% of this area, changes in management practices alone would prevent degradation or reverse current deterioration. It was indicated that both appropriate management practices and physical works were required over other areas subject to land degradation.

4.1.2 Water

Australia is not well endowed with water resources. The rainfall is characterised by extreme locational, seasonal and annual variations. Few rivers and streams are perennial and over fifty per cent of annual runoff occurs in areas distant from centres of demand, notably in remote tropical locations. Groundwater underlies much of the continent, but varies in quantity and quality. Much of inland Australia is dependent on these supplies for stock water and domestic use.

Water resources readily accessible to centres of demand are already substantially committed, although there is widespread recognition of the considerable scope for increased efficiency in the use of existing supplies. However, in many areas the availability of water supply is becoming a key factor in continuing economic development.

In 1975, the Australian Water Resources Council adopted a statement of policy which sets out basic principles and goals underlying the approach to development and management of water resources in Australia. This policy states that conservation and management of water resources must take place in a broad framework not only of development and management of resources generally, but also of overall economic, environmental and social planning. The policy identifies the following desirable goals:

- a. the provision of water supplies, adequate in quantity and quality-
 - (i) to meet the needs of people throughout Australia;
 - (ii) to meet the needs of, or to stimulate primary and secondary industry in such a way as to be compatible with projected market outlooks for the commodities concerned, and compatible with the resources and characteristics of the region concerned;
- b. the development and management of water resources so that where practicable and desirable other purposes such as flood mitigation, power generation, recreation and wildlife conservation are achieved in parallel with the purposes referred to above:

- c. the development of waste water treatment facilities in conjunction with water supply systems and the encouragement of recycling and re-use where appropriate;
- d. the adoption of water pricing policies which enable water needs to be met at a fair and reasonable price, but which provide an incentive to all water users to avoid wasteful and environmentally harmful practices and which encourage the efficient allocation of resources;
- e. the continued development of policies and practices, as far as possible consistent throughout Australia, aimed at achieving appropriate water quality objectives, and the highest practicable level of pollution abatement;
- f. the adoption of the general principle that direct costs, or costs related to loss of amenity attributable to pollution, should be borne by the polluter. Although the immediate and full implementation of this principle may not be feasible, it is none-the-less a goal to be pursued;
- g. the zoning of flood-prone land, with a view to its orderly management;
- h. the maintenance of an adequate sample of undisturbed aquatic environments as reference areas and the preservation of appropriate wetlands for the benefit of native wildlife;
- i. implementation of a program of public education aimed at ensuring a proper understanding of the factors affecting the development and use of water resources and a sense of responsibility in these matters; and
- j. the encouragement of an active interest and involvement of the community in the planning and management of water resources.

4.1.3 Forests

Australian forests total about 0.42×10^6 km², or 5.6% of the land area. Of this, some 31% is publicly owned land primarily reserved for forest production, 5% is national parks or similar conservation reserves and 44% is publicly owned but not specifically reserved for timber production. Some 20% of forested land is privately owned with no government control of timber rights.

The Forestry and Wood-Based Industries Development Conference of 1974 was authorised by the Australian Forestry Council. Senior representatives from industry and government were represented at the Conference. The report of the Conference states the following in relation to forest management objectives in Australia:

"It is axiomatic that forest management must always comply with conservation principles given that conservation is the use of resources to the greatest advantage to man. Conservation is a process of optimisation and the aim of forest management must be to ensure that the maximum benefits from the forest accrue to the community.

A management decision may prescribe a single purpose forest use or include a number of concurrent uses with one or more of these assuming greater importance according to the immediate social and economic requirements. Optimisation of forest management may also preclude one use in favour of one or more others.

A most important consideration which is common to all forest management is that it be carried out in a way which will meet the specified objectives and include the prevention of adverse long term effects on the environment. This is the basis of forest management in Australia as it applies in particular to the areas permanently dedicated for the production of timber. By the careful use of skills and technology and by affording measures of protection that were formerly not available it can be expected that not only will the forest environment be preserved but that the produce of the forest can be used to satisfy man's material requirements."

4.1.4 Crops

In 1977-78, crops occupied approximately 0.17×10^6 km² or 2.2% of the land area. Wheat and winter cereals are by far the most important agricultural crops. In 1975-76, the area of wheat, oats and barley occupied some 82% of the total area under cultivation for crops. Climate has determined the extent of the wheat belt and within this belt, soils used vary widely. The main feature of cereal cultivation practice is that approximately 50% of the crop is still sown on cultivated fallow land. Advantages of this practice have been stated as conservation of soil moisture, accumulation of nitrate, reduction of weed competition, and promotion of tilth and a firm seed-bed for the crop. The disadvantage of cultivating fallow land is the more rapid breakdown of organic matter, which releases nitrogen for the ensuing crop, but involves accelerated exploitation of the soil.

4.1.5 Animal husbandry

Cattle are bred in all States, the main object in certain districts being production of stock suitable for slaughtering purposes and in others for dairy herds. While dairy cattle are restricted mainly to coastal districts, beef cattle are more widely distributed in areas such as the tropical area of northern Queensland, the Northern Territory and the Kimberley district in the north of Western Australia. Beef cattle husbandry in southern Australia has improved considerably in the last decade. In the north of Australia, beef productivity has been improving with introduction of new breeds, more resistant to higher temperatures and ticks, and introduction of a legume, 'Townsville Stylo'.

The sheep industry is the most important rural industry in Australia. In 1977-78 provisional data showed that the combined value of sheep slaughtered and wool accounted for over one-fifth of the gross value of all agriculture. The principal environmental problems for the sheep industry are drought and imported weeds, pests and diseases.

4.1.6 Fisheries

Although about 200 species of fish are sold by Australian commercial fishermen, the industry is dominated by luxury items such as rock lobster, prawns, oysters, abalone, scallops and tuna. Production of these items accounted for nearly 75 percent of the total annual value of production (\$200 million) in 1976/77. Fin fish of importance, apart from tuna, are shark, whiting, gemfish, snapper, mullet, morwong, flathead, mackerel and Australian salmon. Fisheries agencies generally base management on the concept of maximum sustainable yield for the species of interest.

Fishery resources around Australia are not rich by world standards. Compared with some other waters such as those off the west coast of Africa and off Peru, the waters adjacent to Australia are poor in nutrients. Declaration of the 200 mile Australia fishing zone has offered the opportunity for expansion of the Australian fishing industry.

4.1.7 Conservation, parks and reserves

Each Australian State and Territory has one or more systems of parks and reserves. Legislation, systems of nomenclature, administrative arrangements and management philosophies differ from State to State. Unpublished data available to the Department of Home Affairs and Environment indicates that approximately 0.29×10^6 km² or 3.76 percent of the total land area of the continent is dedicated as parks and reserves. In general, the various Australian national parks Acts state that the purpose of national parks and reserves is to maintain the natural environment to include all flora and fauna for such uses as recreation, education, and to provide for, and encourage public enjoyment of, these areas.

4.1.8 Endangered Species

The Australian biota (flora and fauna) has long been recognised as being among the most distinctive in the world, with many groups that are either restricted to Australia or are best represented here. This is well known in the case of the monotremes (platypus and echidna) and the marsupials, but it is also true of many other plant and animal groups. Other life forms, while not unique to Australia, are remnants of ancient, previously widespread groups and thus are of considerable scientific interest. Eighty three species of birds, mammals and reptiles have been identified by the Council of Nature Conservation Ministers (CONCOM) as endangered. In addition 2053 species of plants have been identified as being at risk. These represent 10 percent of the known Australian plant species.

The States have the main responsibility for protecting endangered flora and fauna through the declaration of parks and nature reserves, the protection of habitats and controls over the taking and holding of wildlife. Export and import of fauna into and out of Australia, including fauna on the Appendices to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is regulated by the Commonwealth.

4.1.9 Local energy sources

Australia has substantial reserves of uranium, coal, oil and natural gas as well as considerable potential for alternative sources of energy. Australia's reasonably assured resources of uranium are estimated to be 289 000 tonnes. The largest deposits are in the Alligator Rivers Region of the Northern Territory and at Yeellirie, Western Australia. Most locally produced crude oil is obtained from the Bass Strait oilfields. Indigenous crude currently accounts for 70 percent of refinery feedstock.

Coal is Australia's largest single export earner. Production of saleable black coal rose from 23 million tonnes in 1960 to 71 million tonnes in 1977 and the expansion continues at an accelerating rate. Resources of black coal have been estimated at not less than 200 000 million tonnes, most of which are in New South Wales and Queensland.

In terms of energy conservation the broad policy is to seek oil substitution. A national program has been initiated involving the Commonwealth and State Governments, industry and the community. The Australian policy of maintaining world-parity pricing for oil products has been claimed to be one of the most successful energy conservation programs in the world. A major expansion of energy research and development in Australia, which is being encouraged through Government allocation under the National Energy Program, is seeking to expedite the use of alternative energy forms.

4.1.10 Mineral resources

Australia is among the world's major producers of minerals and metals. For example: Australia is the second largest iron ore producer in the world; the largest source of bauxite and alumina; a major producer of lead and zinc; and the largest producer of heavy mineral sand concentrates: zircon, ilmenite and monazite. Australia is also an important source of copper, nickel and phosphate rock.

4.1.11 Human resources

At June 1980, the Australian population was 14 615 900. For historical, climatic and economic reasons the population of Australia is concentrated in capital cities and other major towns, mainly on the south and east coasts of the Continent. In June 1977, some 70 per cent of the population lived in the six State capitals and five other major towns of 100 000 or more people. Projected total population of Australia by the year 2001 is between 16.7 million and 18.1 million (the latter with net immigration of 50 000 per year).

Australian towns and cities generally have clean, reticulated water for drinking and other purposes. Rural areas are more likely to rely on stored rainwater, rivers or bores. Prolonged droughts cause water shortages during which consumption is restricted. Australia has a sophisticated health system available to all at reasonable cost. Disadvantaged groups are given special attention, including free or subsidised treatment and preventative counselling.

Australia produces a wide variety of foods and is a major exporter of some items. Housing in Australia is characterised by a high proportion of home ownership and by a preponderance of single family units on suburban blocks. Only the severely disadvantaged do not have access to an adequate diet and at least rental accommodation.

Children are required to attend school between the ages of six and fifteen or sixteen years and an extensive free government school system is operated. Private schools, many of them church backed, provide an alternative. There is also an extensive range of post secondary technical colleges, colleges of advanced education and universities. Most Australians are therefore well educated.

Australia's labour force in November 1980 was estimated to be about 6.67 million people, or about 60 per cent of those aged 15 or more. Less than seven per cent work in primary industry and most work in the tertiary sector. Unemployment was estimated to be about 6.3 per cent of the work force in December 1980. Minimum wages for the vast majority of Australians are determined by Federal or State industrial tribunals.

Australia's culture reflects the ethnic origins of the country. The dominant culture reflects British traditions, modified for a harsher Australian environment, with major additions from European and, more recently, non European, migrants. Aboriginal and North American cultures have had some impact.

4.1.12 Infrastructure

Transport and communications have always presented major challenges for Australia. The heavy concentration of population in and around the six State Capitals and sparse rural population make transport and communications links long and costly. Each State has its own pattern of electric power development and, with the exception of the New South Wales and Victorian systems which are linked through the Snowy Mountains Scheme, none of the State systems are inter connected with one another. Gas and water are piped for considerable distances to urban centres.

4.1.13 Reefs and Lagoons

The most significant Australian reef system is the Great Barrier reef. This lies on the continental shelf of north-east Australia and extends for more than 2 000 kilometres from just south of the Tropic of Capricorn to coastal waters off Papua New Guinea. The Great Barrier Reef is subject to actual or potential damage from many causes. Natural phenomena such as cyclones and infestation by the crown-of-thorns starfish have caused and continue to cause damage. Increased human pressures offer the potential for damage through such activities as unregulated tourism and fishing, and pollution from various sources including oil production and mining. A significant body of literature has been prepared on many facets of the Reef.

4.2 MAJOR DEVELOPMENT TRENDS

4.2.1 Human settlements

Considerable public and private investment has gone into Australian cities and according to Seddon*, "the main cities are so dominant that the only major future option can be to try to make them work better, and to adapt them to changing needs". Factors influencing location of Australian cities have included the need for port services, water and land for agriculture. Water and energy appear to be the main environmental factors likely to affect the future of Australian human settlements.

In Adelaide and Perth, water could pose some constraints on future development if demands are to be met from traditional sources. Energy, however, is a more significant factor because of the high dependence on the motor car in the capital cities. As fuel prices increase there may be a reduction in discretionary travel and consequently living standards. Satisfactory alternative sources of energy or transport modes will be needed if expansion of the urban fringe in the capital cities is to continue as at present.

Over recent years there have been several moves to promote the development of new cities. The joint Commonwealth/State Government support for growth of Albury-Wodonga, on the Victorian/New South Wales border, has been the most successful.

4.2.2 Industrial development

The prospects for industrial development in Australia are provided in the report to the Commonwealth Government by the Study Group on Structural Adjustment**. In its conclusions the Group considered that growth opportunities in the manufacturing sector lie in industries that are capital and skill intensive. Because of the limited size of the domestic market, growth will be dependent on access to export markets. This matter was identified in a submission to the Study Group by the Department of Industry and Commerce as follows:

"From recent trends in manufacturing production and capital investment those industries which appear likely to be the principal growth industries in Australian secondary industry will be based on the processing of Australian raw materials, in many cases export oriented, generally capital intensive and where dependent upon the domestic markets will have a high degree of natural protection or specialisation. They are the industries that have exhibited above average development in the period during the current decade and generally receive little or modest levels of protection."

* Seddon, G. Urban Function and Structure in Land and Water Resources of Australia. Hallsworth, R.G. and J.T. Woodcock eds. Australian Academy of Technological Sciences. 1979.

** Australia. Study Group on Structural Adjustment Report. Australian Government Publishing Service. Canberra, March 1979.

The submission considered that industries exploiting particular aspects of the Australian environment, such as the need for irrigation equipment, generally exhibited higher rates of growth. Industries identified by the Department of Industry and Commerce paper as offering domestic and export opportunities included the following:

- a. alumina/aluminium and other mineral processing, petroleum refining, chemicals including petrochemicals;
- b. food and beverage processing e.g. processed meat, flour, vegetable and fish products, beverage and certain cheese and fruit juice products;
- c. engineering related to the development and servicing of the industries referred to above including a wide range of mining and mineral processing machinery, such as conveyors, mills, crushers, rotary drills, mine winders, overhead cranes and cement plant;
- d. some highly competitive components of an otherwise declining industry, e.g. small ship building;
- e. cement and concrete products and other non-metallic mineral products, basically as finished goods or intermediate inputs to building materials;
- f. plastics and certain leather products, paper and paper products; and
- g. other specialised or naturally protected activities e.g. production of leisure-oriented products, printing, higher quality furnishings and decor-type industries.

The importance of mineral and energy resources in the Australian economy has already been mentioned. An estimate by the Government of 'aggregate anticipated total costs' for proposed projects at 'committed' and 'final feasibility' stages as at May 1980 is \$30 billion. Major developments are likely to continue in the areas of coal, uranium, iron ore, bauxite and oil and gas.

Increasingly, environmental requirements are being imposed on exploitation of natural resources for industrial purposes. Examples of cases where significant environmental requirements have been imposed include mining for uranium in the Alligator Rivers Region of the Northern Territory, coal extraction in the Hunter Valley of New South Wales and the extraction of bauxite and alumina refining in South West Australia.

No overall studies have been undertaken on the costs to Australian industry of meeting environmental requirements. However, it is unlikely that average costs in Australia differ significantly from those in other developed countries. Studies developed by the Organisation for Economic Cooperation and Development (OECD) have shown that:

- a. in the short term the (net) effects of environment protection and pollution abatement policies on employment have been positive;

- b. the impact of such policies on inflation has been moderate;
- c. the impact on rate of economic growth in the short term has been neutral, perhaps even slightly positive; and
- d. the influence on balance of payments is uncertain, but available evidence suggests that it has been relatively minor.

4.2.3 Agriculture

Australia is a major agricultural country, exporting significant quantities of various agricultural commodities. Agriculture has been developing in Australia since European settlement and has been determined by interacting factors such as profitable markets, development of new land and technical and scientific achievements. Subsistence farming, recurring gluts, low prices and losses to farmers were gradually overcome, historically, by the development of an export trade. Factors affecting the likely future development of agriculture include: local and overseas opportunities and environmental, technical, institutional, and economic limits.

Increases in productivity of Australian agriculture have been, and will continue to be, constrained to some extent by sociological and institutional limits. Increases in rural productivity as a result of technological advance have been impeded by such problems as legal constraints on consolidation of holdings and difficulties in obtaining finance for reconstruction. Nevertheless technology has been a major factor in increasing Australian agricultural productivity. Economic incentives and prices are also major factors affecting Australian agricultural productivity.

The main environmental constraints on agriculture in Australia are climate, soil type and terrain. Problems have been encountered with biocide residues, increasing salinity, and soil erosion following cultivation or destruction of vegetative cover by clearing and overgrazing. In South Australia, water from the River Murray is used to irrigate citrus and stonefruit trees, vines, vegetables, lucerne and pasture. Increasing salinity in the River Murray poses a direct threat to all agricultural areas which use the water for irrigation.*

4.2.4 Forestry

Indigenous Timber Production - Productive and potentially productive native Australian forests, occupy an area of some 0.42×10^6 km².** During 1970-71, the log and pulpwood removals from native forests totalled 9.2 million cubic metres. Native log removals

* Fedorowicz, T. The Costs of River Murray Salinity in South Australia. Paper for Workshop on Measuring Environmental Damage Costs. Sydney. 14-16 May, 1979.

** Australian Forestry Council. Forwood. Report of the Forestry and Wood-Based Industries Development Conference. 1974. Australian Government Publishing Service. Canberra. 1975.

represented about 81 percent of the output from all Australian forests - both indigenous and plantation forests. It is anticipated that by the year 2010, the utilisable roundwood availability from the native forests will increase slightly to 10 million cubic metres. It is anticipated that this output will represent only 35 percent of the total logs and utilisable pulpwood suitable for industry. The balance of supplies will need to come from plantations.

Plantation Timber Production - Plantation forestry was begun in Australia both to alleviate a natural hardwood-softwood imbalance which has always existed and also to provide a source of wood for industry from within concentrated areas of management. By 1978 approximately 660 000 hectares of plantations, mainly exotics had been established. This represented one percent of total productive forest area. The Forestry and Wood Based Industries Development Conference in 1974 recommended that plantations be increased to 1.14 million hectares by the year 2010 (3% of productive forest area and 65% of total Australian wood requirements).

Water Catchments - Expected increases in water consumption mean that higher priority will be needed for water supply over timber production in catchment areas. Despite general compatibility of timber production and water catchment values, some compromises may be required.

Recreation - The use of forests for recreation will increase at a rate in excess of the growth in population. The pressure on forested and other open areas will be greatest in areas close to major population centres.

Dependence on environmental factors - Two of the most significant factors which could affect future forest productivity in Australia are dieback and the effect of harvesting on soil nutrients. Dieback of Eucalyptus species caused by the fungus, Phytophthora cinnamoni, has been identified in several forest areas. The fungus attacks root systems of trees. An important commercial forestry threat posed by Phytophthora is in the forests of Western Australia. There, dieback is moving through Jarrah forests at a rate of 3 600 ha per year.* Dieback also exists in the forests of the Eastern States.

Australian forest soils are generally poor in nutrients compared with forests in Europe or the United States of America. Some research has been undertaken in Australia on the effects of logging and other forest management operations on the nutrient balance of native forest soils. Insufficient information is available to determine whether the loss of plant nutrients through removal of timber and leaching will have a significant effect on forest production. A report of the Senate Standing Committee on Science and the Environment**, was sufficiently concerned to state:

* Salt Problem in Perth's Hills. Ecos. No 4. May 1975.

** Woodchips and the Environment. Report from the Senate Standing Committee on Science and the Environment. Australian Government Publishing Service. Canberra. 1977.

"Because of the extreme uncertainty in the present state of knowledge of soil nutrients, and because of indications from research that time in excess of 100 years is required to replenish phosphorous removed by clearfelling, all clearfelling woodchips projects requiring relatively short crop rotation periods are viewed with concern."

4.2.5 Fisheries

The Australian Fisheries Council is currently considering the possibilities for expansion of the Australian fishing industry. According to Bowen*, there are three main categories of fisheries around Australia:

- a. Fisheries already developed. This category includes the inshore scalefish (e.g. mullet and whiting), rock lobsters, prawns, east coast trawl fish species, Australian salmon and juvenile southern bluefin tuna;
- b. Fisheries currently being, or likely to be, developed by Australian fishermen. Included in this category are the south eastern deep water trawl fish species, Great Australian Bight trawl fish species, and pelagic species such as skipjack tuna, jack mackerel, snoek, pilchards and anchovy, and Spanish mackerel; and
- c. Fisheries not being currently exploited by Australian fishermen on a commercial basis. This category includes north and north-west trawl fish species, adult Southern bluefin tuna, Northern bluefin and yellowfin tuna, lantern and light fish, squid, and shark in northern waters."

4.3 MANAGEMENT APPROACHES

4.3.1 Coastal Zone Management

Statutory planning systems, controlled by the States, provide for the planning and management of the coastal zone. State Governments usually on the advice of local Government Authorities, determine the broad land use zones, such as rural, residential and industrial, and other activities that are allowed within these zones. Standards of coastal zone conservation and development vary from State to State, depending on the relationships between the State and local government and the degree of control exercised by the State. The role of coastal protection agencies varies from the provision of advice and erosion control works in declared districts to complete coordination and control of activities in the coastal zone.

* Bowen, B.K. Fishery Resources and Management in Hallsworth E.G. and J.T. Woodcock. Land and Water Resource of Australia. Australian Academy of Technological Sciences. 1977.

4.3.2 Disaster Planning

The Commonwealth Natural Disasters Organisation and the State and Territory emergency service organisations constitute the core civil defence structure for Australia. The Natural Disasters Organisation has a communication centre in Canberra to provide a focal point for the national coordination of natural disasters and civil defence emergencies. Commonwealth support for an emergency, which includes assistance from the communication centre and Defence Forces, is only provided following a request from a State or Territory emergency service. Such assistance may be followed up by Commonwealth financial assistance for victims or property through normal government administrative procedures.

4.3.3 Regional Contingency Plan

The Commonwealth and State emergency services have regional contingency plans for emergencies. An example is the National Plan to combat pollution of the sea by oil which has been in operation since October 1973. A joint plan has been prepared by the Commonwealth and State governments, with the assistance of the oil industry, to combat the threat posed to the marine and coastal environment around Australia by oil spills from ships. Informal cooperative arrangements for dealing with oil spills exist with New Zealand.

4.3.4 Population policies

Policies on long term population levels are currently being reviewed by the Commonwealth Government following a major inquiry headed by Borrie.*.

4.3.5 Land use plans

As discussed in Section 4.3.1, land use planning, zoning and development control is the responsibility of the States and Territories under statutory planning legislation.

4.3.6 Rehabilitation of degraded areas and resources

There is now general acceptance in Australia of the need to minimise as far as possible degradation of areas and resources, or where this is unavoidable to provide for rehabilitation. Government approvals for projects normally require rehabilitation plans as part of the project approval. For example, Commonwealth approval of the Ranger uranium project in the Alligator Rivers Region of the Northern Territory requires rehabilitation of the mine site, including the mine pit.

In earlier years restoration of damaged sites was not always a condition of project approval. Consequently in some cases it has been necessary to carry out restoration of damage sites well after the project has been completed. For example under the Captains Flat (Abatement of Pollution) Agreement Act 1978 the Commonwealth has provided financial

* Borrie. Population and Australia. Demographic Analysis and Projection. (Several Reports). Australian Government Publishing Service. Canberra, 1975.

assistance to the Government of New South Wales for a program of works, involving shaping and revegetation of mine waste spoil dumps, to abate the pollution of the Molonglo River from mine waste dumps at Captains Flat in that State.

5. REQUIREMENTS FOR NATIONAL ACTION

5.1 NEW ACTIONS

The most significant new national action is the proposal announced by the Prime Minister that the State and the Northern Territory Governments had agreed to collaborate with the Commonwealth in developing a National Conservation Strategy. The National Conservation Strategy will review the state of the environment, and formulate national conservation objectives. Action plans and priorities will then be identified for achieving these objectives. The development of the National Conservation Strategy will represent the first attempt to identify national priorities for action in the area of nature conservation, environment protection and living resource management.

5.2 REQUIREMENTS

5.2.1 Education

School Programs - State governments are responsible for formal education from kindergarten to year 12 and there is a diversity of approaches to environmental education between States. Some schools, for instance, are free to develop their own education programs. Secondary school subjects such as agriculture, biological science and social science usually include the study of issues of environmental interest.

Primary education is interdisciplinary and particular schools and teachers may develop a strong environmental emphasis in their teaching. Many primary schools use the outdoors as an extension of the classroom.

Materials to assist environmental education in schools have been prepared by the Curriculum Development Centre in Canberra. Its Environmental Education project has produced primary level materials (source book, activity guides and a planning simulation), while secondary level material suitable for general secondary use and for use in the humanities, home economics, manual arts and outdoor education areas will be published early in 1981. The Centre has also produced a kit 'Investigating the National Estate' for use in secondary schools.

All State education departments have recognised the need for students to experience and investigate a number of ecologically different sites and have set up a network of field studies centres. Queensland presently has the best developed network of environment field studies centres and in addition has established a mobile field study centre to service its south west region. Non government organisations involved in environmental education, such as the Gould League and various associations of teachers of the sciences, geography and environment, also produce curriculum materials for schools.

Existing Public Information Program - Both Commonwealth and State Government instrumentalities have public information programs. The Commonwealth undertakes various activities in the environmental education area. For example the audio visual program 'Australia For All Our Tomorrows' to educate migrants about caring for the Australian environment. The Commonwealth lends films and videotape on environmental topics to educational organisations and community groups and works with the States on the preparation and distribution of leaflets and posters each year for World Environment Day.

State Government bodies responsible for environment, conservation and pollution control produce a wide variety of materials for public information and education. The State national parks and wildlife services also disseminate information to the public by leaflets, through interpretation centres and by providing speakers to conferences and meetings of interested community groups. Each year State governments also mount community education programs centred on World Environment Day and Earth Day.

Each State also has one or more non-Government Environment Centres. These bodies provide an information and referral service to the public and facilities for coordination of associated environmental and conservation groups. An Australian Conservation Foundation Education directory* currently lists 1 159 groups concerned with matters of environment and conservation interest. Museums, zoos, botanical gardens and nature reserves provide environmental education programs for schools and the community. Other bodies which generate significant impacts on the environment are also increasingly realising and accepting their responsibility to provide an environmental education service.

Need for Programs or Materials in School Curriculum - Australia already has a wide variety of environmental education programs or materials in school curricula. The greatest current need is to coordinate the use of materials now available. Directories of materials and resource books are required. Some State National Parks and Wildlife Services have begun to compile regional resource books. It is proposed to develop this activity further at the state and national levels. Curricula still requiring further development include:

- a. English, art, citizenship education, home economics, economics and manual arts which do not yet have an environmental education emphasis. Programs demonstrating the relevance of such an orientation need to be developed for teachers and learners in these subjects. The integration of the humanities in activities designated as environmental education has been a continuing trend since early in the last decade.
- b. Problem solving, decision making and participation components of environment education have been largely neglected. If students are to be assisted to achieve these skills, schools should be involved in solving problems and making decisions in relation to the school environment.

* Australian Conservation Foundation. The Green Pages: Directory of Non Government Environment Groups in Australia. August 1978.

Need for Programs or Materials in Public Education - The World Conservation Strategy has designated various priority groups towards which environmental education material should be directed eg decision makers, planners and youth organisations. Public environmental education in Australia is likely to focus on target groups such as these, as well as continuing with community wide education programmes.

5.2.2 Personnel

Availability of Trained Manpower - Trained manpower in Australia is mainly local rather than expatriate. Information is not available on the number of personnel currently engaged in environmental monitoring, management or education programs.

Existing Training Programs - There are fifty four institutes in Australia which train primary school teachers. Almost all of the one hundred and seven different courses offered include an environmental education component. Secondary teacher training concentrates on specialist discipline areas such as agriculture (five courses), health and physical recreation (twenty seven courses) science (forty seven courses) social science (twenty six courses). All of these courses have some environmental education component. Currently there are 2 secondary teacher training courses with an environment specialisation and more are being planned.

Public information officers are trained either through communication or journalism courses offered at universities or colleges of advanced education or on the job. In general this training does not involve environmental education. Training for urban and regional planning is available in thirty four different courses. Eleven courses are currently available in resource management and 3 in park administration. Twenty two courses are offered in environment studies, 3 at undergraduate level and eleven at masters degree level.

Technicians for pollution analysis and monitoring are trained in institutes of technology and colleges of advance education. There are 4 courses available specifically on biological laboratory techniques. Courses in applied science and science at the associate diploma level also produce trained technicians. In addition, it is possible to study laboratory technology at degree and higher degree levels.

5.2.3 Facilities and Equipment

A wide variety of facilities and equipment is available for environmental research, training and other activities at research organisations, such as the Commonwealth Scientific and Industrial Research Organisation, in the universities and other tertiary institutions, and from Commonwealth and State Government authorities and private industry.

5.2.4 Outside expertise

Australian institutions, both public and private, use consultants as appropriate. Requirements are assessed on a case by case basis. Australia is a participant in the United Nations Environment Programme's INFOTERRA (International Referral Systems for Sources of