



THE STATE OF OUR ENVIRONMENT

State of the Environment Report
for South Australia 2003



Pictured on this page (l-r)

Seagrass

Photo: V. Neverauskas, PIRSA

Church, Burra, Clare Valley, South Australia

Photo: South Australian Tourism Commission

Students monitoring salinity in the Little Para River

Photo: Waterwatch SA

Bool Lagoon, Naracoorte, Limestone Coast, South Australia

Photo: South Australian Tourism Commission

© Environment Protection Authority 2003

This document may be reproduced in whole or part for the purpose of study or training, subject to the inclusion of an acknowledgment of the source and to its not being used for commercial purposes or sale. Reproduction for purposes other than those given above requires the prior written permission of the Environment Protection Authority.

For further information please contact:

Information Officer

Environment Protection Authority

GPO Box 2607

Adelaide SA 5001

Telephone (08) 8204 2004

Facsimile (08) 8204 9393

Free call 1800 623 445 (country)

Web site: www.environment.sa.gov.au/soe2003

State of the Environment Education Resource:

www.environment.sa.gov.au/reporting/education.html

Project Team: Clare Nicolson, Julie Payne and Jacob Wallace
(Office of Sustainability, Department for Environment and Heritage)

Cover Photographs

Clouds © Corporate Profile

Sturt Desert Pea, Gawler Ranges © Anthony Robinson

Leafy Sea Dragon, marine emblem of South Australia

© David Muirhead, courtesy of the Marine Life Society of South Australia Inc.

Vineyard in the Mount Lofty Ranges © Kym Nicolson

Rundle Mall, Adelaide, South Australia © South Australian Tourism Commission

Creek in the Flinders Ranges © Kym Nicolson

The Palm House, Adelaide Botanic Gardens

© Richard Humphrys

Inside photographs, where unsourced, are

© Environment Protection Authority or Kym Nicolson

ISBN 1 876 562 617

November 2003

This report is printed on 100% recycled,
Australian-made paper with vegetable-based inks.

Foreword

I am pleased to present the *State of the Environment Report for South Australia 2003*.

The new Board of the Environment Protection Authority, with its enhanced independence and corporate governance responsibilities, recognises this report as both a statutory obligation and a window of opportunity to provide Government with independent and expert advice on the state of the South Australian environment.

This is the fourth State of the Environment report for the State. The first was released in 1988 and there is now a requirement under the *Environment Protection Act 1993* to publish a State of the Environment report at least every five years. The previous State of the Environment report for South Australia was released in 1998.

State of the Environment reporting is guided by the principles of ecologically sustainable development and the need for environmental measures to track our progress towards sustainability. This report discusses the current state, or condition, of our environment and the pressures upon it. It also identifies trends over time so that we can assess the effectiveness of our efforts to deal with these pressures and measure our progress towards achieving a healthy environment that supports a prosperous economy and a vibrant and cohesive society. Importantly, the report makes a series of recommendations on how we can improve our efforts to meet these objectives.

For its part, the new Authority's priorities include building its environmental policy development capacity, implementing best practice environmental regulation, adopting a risk-based approach to environmental management using the best available information, and developing targeted community engagement and business sustainability strategies.

The information in this report is structured around seven major themes: Atmosphere, Inland Waters, Coasts and the Sea, Land Resources, Biodiversity, Human Settlements and Heritage. Within these are a total of 22 chapters that focus on major environmental issues, including, for the first time, a separate chapter on the River Murray.

A Supplementary Report on CD-ROM is included with this report. This provides more detailed information on the issues, including data and maps.

A major aim of this report is to provide scientifically credible information and assessments that will help drive the future environmental agenda for South Australia. Based upon the assessments made in this report, the Board of the Environment Protection Authority has identified a number of major environmental priorities that require our foremost attention. These priorities fall into two categories: the major environmental issues currently facing South Australia that need urgent attention, and the underlying and essential processes that must be addressed before we can hope to achieve the necessary change.

A further aim is to inform and stimulate community debate on the significant environmental issues that confront us. While Government can provide leadership and direction, it is important that we take a collective responsibility for protecting and enhancing our environment. To this end, it is hoped that all South Australians support the recommendations in this report.

To ensure that important environmental messages from this report are widely disseminated, an education resource has been developed that makes the issues real and accessible to schools.

The Environment Protection Authority, via its governing Board, has overseen the report preparation process, and has used the expertise of the State of the Environment Report Steering Committee and the project team, from the Office of Sustainability, Department for Environment and Heritage, in coordinating and compiling this report.

Finally, I wish to express my deep appreciation to the many people who gave freely of their time in contributing to, and peer reviewing, the various chapters of the report.

I commend the *State of the Environment Report for South Australia 2003* to Government and encourage all South Australians to act upon it to ensure a sustainable future for our State.



Dr Paul Vogel

CHIEF EXECUTIVE and CHAIR
ENVIRONMENT PROTECTION AUTHORITY



Preface

The *State of the Environment Report for South Australia 2003* provides an objective assessment of significant environmental issues facing South Australia's environment. It aims to inform South Australians about the current state of their environment and provide an assessment of our efforts to deal with significant environmental issues.

The preparation of this report has been overseen by the Board of the Environment Protection Authority through its State of the Environment Report Steering Committee. Many individuals, Government and non-government agencies have contributed information.

Production of this report was coordinated by the State of the Environment Report Steering Committee. Its members were:

Dr David Cruickshanks-Boyd (Chair), State Manager, Parsons-Brinckerhoff

Dr Paul Vogel, Chief Executive and Chair, Environment Protection Authority

Ms Kathryn Bellette, Director, Strategic Planning, Planning SA

Mr Peter Gardner, Director, Environment Information, Department for Environment and Heritage

Mr Bryan Harris, Acting Director, Knowledge and Information, Department of Water Land and Biodiversity Conservation

Ms Anne Harvey, Director, Office of Sustainability, Department for Environment and Heritage

Mr Andrew Johnson, Acting Director, Natural Resource Management Support, Department of Water, Land and Biodiversity Conservation

Mr Oleg Morozow, Manager, Sustainability, Santos Ltd

Mr Jeff Tate, City Manager, City of Onkaparinga.

Significant effort has been made to present a concise report in a simple and accessible format, while providing a broad context for the issues addressed. More detail is provided in the *State of the Environment 2003 Supplementary Report* included on CD-ROM with this report. The use of technical terms has been avoided where possible. Individual chapters were peer reviewed by experts in their field to ensure the integrity of the content.

On behalf of the State of the Environment Report Steering Committee I would like to thank the many people who contributed to the compilation of this report. In particular the members of the project team, namely Ms Clare Nicolson, Ms Julie Payne and Mr Jacob Wallace, from the Office of Sustainability, Department for Environment and Heritage, whose dedication and commitment has been essential to achieving this high quality, comprehensive document.

I hope this report will be used widely by the community and decision-makers and its recommendations acted upon. Future reports will build on this experience and I invite your comments on how future reports might be improved or made more effective.

Dr David Cruickshanks-Boyd

CHAIR, STATE OF THE ENVIRONMENT REPORT STEERING COMMITTEE

Acknowledgements

The assistance of the many people who contributed information, ideas and constructive criticism during the preparation of this report is gratefully acknowledged.

Contributors

Agriculture Fisheries and Forestry Australia:
Albert Caton

Animal and Plant Control Commission:
Peter Bird, David Cooke, Dr Bob Henzell,
Paul Jupp, Greg Mutze, Mark Ramsay,
Dr Ron Sinclair, Mark Williams

City of Onkaparinga: Lisa McDonald

City of Port Adelaide and Enfield: Verity Saunders

Clean Up Australia: Eleanor Ashton

**Commonwealth Scientific and Industrial
Research Organisation:** Dr Rob Fitzpatrick,
Dr Glen Walker

Conservation Council of South Australia:
Peter Cale

**Department for Aboriginal Affairs and
Reconciliation:** Helen Cooke, Heidi Crow

Department for Environment and Heritage:
Peter Alexander, Patricia von Baumgarten,
Lindsay Best, Michaela Birrell, Monique Blason,
Annie Bond, Tim Bond, Leanne Burch,
James Cameron, Sandy Carruthers, Peter Copley,
Emma Crossfield, Phil Donaldson, Trish Drioli,
Doug Fotheringham, Brenton Gear, Mike Harper,
Colin Harris, Dr Christopher Holden, Tony Huppertz,
Bill Jeffries, Mark Lusi, Craig Macauley,
Matthew Miles, Dr Sue Murray-Jones,
Faye Mitchell, Trish Mooney, Dr Kym Nicolson,
Tim Noyce, Peter Pfennig, Stuart Pillman,
Brian Samuels, Dr Adrian Stokes, Trixie Tan,
Dr Murray Townsend, Jason Van Weenen,
Renate Velzeboer, Andrew West,
Dr Stephanie Williams

Department of Human Services:
Dr David Cunliffe, Dr Monika Nitschke,
Dr Ted Maynard

**Department of Water Land and Biodiversity
Conservation:** Martin Allen, Dr Steve Barnett,
Jim Barratt, Phil Cole, David Cresswell,
David Deane, Tim Dendy, Russel Flavel,
Glenn Gale, Michael Good, Paul Gould,
Bryan Harris, Colin Harris, Darryl Harvey,
Paul Harvey, Clare Heathcote, Tony Herbert,
Bob Inns, Andrew Johnson, Sandra Keane,
Brendan Lay, Russell Martin, David Olsson,
Richard Payne, Jan Rowland, Lloyd Sampson,
Peter Stace, Tony Thomson, Bart Van Der Wel,
Adam West, Craig Whisson

Environment Protection Authority:

Rachel Barratt, Tony Circelli, Dr John Cugley,
David Duncan, Mike Fanning, Jill Fitch,
Sam Gaylard, Robyn Gill, David Gooding,
Peter Goonan, Linda-Marie Hall, Phil Hazel,
Greg Hill, Dr Keith Plastow, Jeff Todd, Sam Wade

Forestry SA: Detlev Vogt

Keep South Australia Beautiful: John Phillips

**Local Government Association of South
Australia:** Fiona Jenkins

**Northern Adelaide and Barossa Catchment
Water Management Board:** Kym Good

Office of Zero Waste: Ian Harvey, Vaughan Levitzke

Passenger Transport Board: Luke Condon,
Jack Turner, Tom Wilson

Planning SA: Kathryn Bellette, Gavin Burgess,
Lara Daddow, Shelley Fitzgerald, Kiralee Flynn,
Malcolm Govett, Ian McQueen, Chris Rudd,
Dr Ross Steele, Greg Wise

Primary Industries and Resources SA:

Rod Anderson, John Bourne, Paula Brown,
Carina Cartwright, Dr Micheal Deering,
Iris Dobrzinski, Trevor Dooley, John Gilliland,
Michael McManus, Vic Neverauskas,
Ian Nightingale, Marilyn Nobes, Corinna Pereira,
Jon Presser, Daniel Rossetto, Sean Sloan,
Will Zacharin

**River Murray Catchment Water Management
Board:** Amy Morley, Melissa Schliebs, Prue Tucker,
Peter Waanders

Saltwatch SA: Bruce Munday

SA Water: Peter Faggotter, Cathryn Hamilton,
Tim Kelly, Grant Lewis, Lee Morgan, Karen Rouse,
Vince Sweet

South Australian Research and Development

Institute: Steven Clarke, Dr Tony Fowler,
Dr Keith Jones, Dr Stephanie Seddon, Dr Ib Svane,
Dr Tim Ward, Dr Qifeng Ye

Transport SA: Tracey Brealey, Dr Phil Morgan,
Neil Murphy, Dr Alan Perkins, Jill Tideman

University of Tasmania: Professor Gustaaf
Hallegraeff

Maps

Jacqui Oates, Department for Environment and Heritage

Communications and marketing

Wayne Barbour, Bethany Caddy, Jayne Osborne, Kate Zealand, Department for Environment and Heritage

Terry Clark, Environment Protection Authority

Assistance with writing

Dr Geoffrey Bishop, G. C. Bishop and Associates
Dr Andrew Lothian, Environmental Policy Solutions

Independent reviewers

Dr Peter Bell, Heritage Consultant

Professor Don Bursill, Chief Scientist, Australian Water Quality Centre

Dr Anthony Cheshire, Chief Scientist, Aquatic Sciences, South Australian Research and Development Institute

Richard Clark, Richard Clark and Associates

Caroline Dorr, Catchment Care Officer, Onkaparinga Catchment Water Management Board

Alex Eadie, Parsons-Brinckerhoff

Tony Flaherty, State Coordinator, Marine and Coastal Community Network

Steven Gatti, Project Manager, Onkaparinga Catchment Water Management Board

Dr Peter Gies, Senior Research Scientist, Australian Radiation Protection and Nuclear Safety Agency

Dr Ann Hamblin, Visiting Fellow to the Centre for Resource and Environment Studies, Australian National University

Professor Graeme Hugo, Professor of Geography, University of Adelaide

Dr Tim Milne, Nature Conservation Society of South Australia

Dr Monica Oliphant, Consultant Research Scientist in Renewable Energy and Residential Energy Efficiency

Dr David Paton, Senior Lecturer, Environmental Biology, University of Adelaide

Ann Prescott, Science Communicator, Ann Prescott and Associates Pty Ltd

Dr John Radcliffe, Advisor to the Commonwealth

Scientific and Industrial Research Organisation

Vicki-Jo Russell, Threatened Species Network

Dr Simon Stone, Chair, Wildlife Advisory Committee

Professor Michael Taylor, Transport Systems Centre, University of South Australia

Matthew Turner, Scientific Officer, Nature Conservation Society of South Australia

Tom Whitworth, Manager, Atmosphere and Noise, Environment Protection Authority/Clean Air Society of Australia & New Zealand

Executive Summary

Towards Sustainability

KEY FACTS

- We all have a responsibility to reduce our consumption of resources and protect the environment for our children and future generations.
- Many aspects of the environment have not improved significantly since the last State of the Environment Report in 1998.



Adelaide and the River Torrens



Around half of our mains water is used to water the garden



Drowned River Red Gums, River Murray

This report sets major challenges for communities, industry and governments.

Unless these challenges are met now – by all of us – they will diminish not only the state of the environment but our quality of life.

Introduction

The *State of the Environment Report for South Australia 2003* provides an objective assessment of the condition of South Australia's environment, the nature of the pressures upon it and current responses to those pressures. It does this by reporting against a series of environmental indicators for a broad range of issues and analysing, where possible, the changes since previous State of the Environment reports (1998, 1993 and 1988). The report also comments on the adequacy of our responses and makes a series of recommendations on how we can improve efforts to protect the environment.

The information in this report is intended to inform public debate on environmental issues and underpin policy and program development aimed at restoring the environment and preventing future problems.

On the whole the news is not good.

Many aspects of the environment have not improved significantly and in some cases have deteriorated since the *State of the Environment Report 1998*. Resource consumption is rising as is the amount of the waste we generate. Around one tonne of solid waste per person went to landfill in South Australia in 2002, an increase of 14% over 1998 levels. Our energy consumption is rising each year; we are using water resources unsustainably; and our greenhouse gas emissions continue to rise.

There have been some improvements over the last five to ten years. Lead levels in the air in Adelaide are negligible and no longer a concern; improved land management practices have helped reduce soil loss; and the recovery of a number of threatened species, including the Yellow-footed Rock-wallaby, the Kangaroo Island Glossy Black Cockatoo and the Brushtailed Bettong has been a success story.

Short term economic drivers still tend to over-ride all other considerations and it will take a fundamental change in attitudes to see environmental, and indeed sustainability, principles integrated into major economic decision-making. If we continue to degrade or over-use our environmental resources – the water we rely on to drink and sustain agriculture and industry, the soil in which we grow our food, the animals and plants that we live with and the air we breathe – we will undermine the economy and leave future generations with a serious and increasing environmental debt.

We are not powerless to deal with many of the environmental issues that face us, but to do so effectively will require tough decisions, ongoing commitment and cooperation, and policy integration. We all share the responsibility for looking after the environment – urban and country dwellers alike.

Government can provide leadership and direction but we have a collective responsibility for action – as corporate citizens and as individuals.

We must take a long term view of environmental management. Many of the problems that we face today were set in train by historical land management decisions and actions that have been exacerbated by current management practices. The consequences have become apparent over many years and may take an equally long time to fix.

Not all the problems can be remedied. Investment programs must therefore use a risk assessment approach to identify priorities and then develop and implement cost-effective and practical solutions.

The *State of the Environment Report 2003* identifies four major environmental priorities for South Australia. For each priority, the Environment Protection Authority Board makes recommendations that are essential to achieve the required changes.

Major environmental priorities

Water – use and quality

The future prosperity of South Australia relies on a secure water supply and its limits are a fundamental constraint that must be managed. Water supports human life and sustains the environment. A reliable supply of good quality water underpins sustainable industrial, agricultural, mining and urban development.

Since European settlement, water resources in South Australia – rivers, streams, wetlands and groundwater – have suffered pollution, excessive extraction, weed invasion, altered flow regimes, drainage and rubbish dumping. Now water quality is degraded, the health of dependent plants and animals is diminished and ecosystems are disrupted.

The *Water Resources Act 1997* requires the management of water resources to recognise and provide for environmental needs, as well as social and economic needs. This is an important legal step forward but significant problems remain.

Despite the licensing of water use, groundwater is still being used beyond estimated sustainable limits on the Northern Adelaide Plains and in areas of the South East to support increasing irrigation. This is starting to affect water quality, particularly in some of the major grape-growing districts in the South East. Water allocation plans for these regions provide management policies that seek to address these issues.

We do not know how much water is being used in areas of the State where use is not licensed. In particular, there is cause for concern about the amount of water being used in the Mount Lofty Ranges. This prompted an announcement by the State Government in October 2003 that water resources in the Eastern Mount Lofty Ranges are to be prescribed in order to ensure their more sustainable use. All water users in the region will require a license to take and use water.

The frequent detection of unacceptable levels of water-borne parasites such as *Cryptosporidium* and *Giardia* in rivers and streams that flow into major reservoirs in the region is also cause for concern.

Addressing the declining health of the River Murray is now high on the public agenda. Sustainable use of the River Murray is seriously threatened

because too much water is being taken from across the entire Murray-Darling river system, primarily for irrigation: around 80% of all the water we use in South Australia is for irrigation.

In metropolitan and outer metropolitan areas South Australians rely on the River Murray for an average 60% of domestic water supply, while potential alternative sources of water, such as stormwater and treated wastewater, remain under used. Every year around 110 gigalitres¹ of stormwater is discharged to the sea – about the same volume that is piped from the River Murray to supplement Adelaide's water supplies. The WaterProofing Adelaide initiative aims to provide a long term, integrated strategy for ensuring water use in Adelaide and adjacent areas is sustainable.

The recent drought has highlighted the fragile nature of the River Murray and demonstrates that our water management regimes do not adequately take into account the risks posed by the natural drought cycle. This is having an impact on rural and urban communities as regulated water use, water restrictions and water conservation measures come into force.

Increasing salinity in the River Murray poses a serious threat to the quality of South Australia's drinking water over the next 50 years unless further action is taken to intercept saline groundwater as it drains towards the river – the consequence of intensive irrigation development and the clearance of native vegetation in the river's catchments.

And climate change – with predicted lower rainfall and higher temperatures over the next 30 years – poses an additional and serious threat to water resources.

On a more positive note, efforts to improve the management of the River Murray have attracted increasing public recognition. There is now widespread acceptance of the fact that if current degradation continues, the consequences will be significant environmentally, and potentially catastrophic economically and socially.

It is not just up to the South Australian Government to solve the problems of the River Murray – we need the cooperation of upstream States and the Australian Government. And we can all take action that will make a difference. The *River Murray Act 2003* is a significant and innovative development and the \$30 per household River Murray levy is a start.

The use of alternative water sources such as treated wastewater and stormwater for uses other than drinking is gaining acceptance. South Australia is a national and international leader in this field. In the last five years the largest wastewater re-use scheme in Australia has been constructed at Bolivar. Most new urban subdivisions now incorporate water re-use facilities, primarily for irrigation purposes. These achievements, though significant, must be complemented by placing a greater priority on water conservation and efficiency measures, and development of technologies for using non-traditional water resources.

Recommendations for action

Focus the management of water resources in South Australia on the key areas of salinity, diffuse pollution, environmental flows, wiser use, and better integration and coordination of water policy development, regulation and operations.

Evaluate the environmental water requirements of major rivers, streams and wetlands and take action to restore environmental flows. In particular, give the River Murray the additional water it urgently requires to restore its health.

Give priority to the development of policy that encourages water conservation and efficiency by all users, and fosters water recycling and re-use schemes throughout urban areas.

*For detailed recommendations and more information on these issues please read the chapters on the **River Murray, Water Consumption in Urban Settlements, Water Quality and Water Use.***

Marine and coastal environment

South Australia's marine and estuarine waters provide habitat for a diverse range of plants and animals, including internationally and nationally important species. Ecosystems in our marine waters are among the richest and most diverse in the world, with many species found only in southern Australia. Our beaches are a source of recreation for the community, and an intrinsic and important part of our culture.

The waters also support large commercial and recreational fisheries, as well as a rapidly growing aquaculture industry. By protecting the marine environment we can preserve these environmental, social and economic values into the future.

Poor marine water quality and environmentally insensitive coastal development continue to threaten the marine and coastal environment, including some important seagrass and mangrove communities and reef systems. We still discharge large quantities of stormwater and treated wastewater into the sea and locate industries, infrastructure and urban development in environmentally sensitive areas.

Lack of information on the marine and coastal environment makes it difficult to prioritise actions and develop informed policy. The Adelaide Coastal Waters Study will provide valuable information about the impact of human activities on this area and will underpin sustainable management strategies. Similar baseline studies are required for other areas of the State.

Aquaculture has great economic potential for the State but we do not know enough about the cumulative impact of aquaculture on the marine environment. We must proceed with caution – and put the most appropriate legislative, regulatory and policy arrangements in place – to ensure that the industry is truly sustainable.

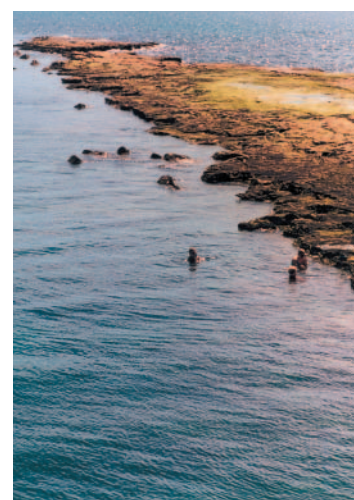
Our fisheries are, on the whole, being managed within sustainable limits. However, the management

KEY FACTS

- The availability of reliable and good quality sources of water is essential for the future economic prosperity of the State.
- Protecting the health of the River Murray is now high on the public agenda.
- We must place a higher priority on water conservation and efficiency measures.



Irrigation of dairy pastures



Port Noarlunga Reef



Port River dolphins
Photo: Mike Bossley

¹ One gigalitre would cover the Adelaide Oval to a depth of 50 metres.

EXECUTIVE SUMMARY

KEY FACTS

- Continuing degradation of marine water quality will compromise activities such as swimming, surfing, diving and fishing. It will also threaten unique marine plants and animals and may ultimately affect economic returns from commercial fisheries, aquaculture and tourism.
- Climate change is likely to have significant environmental, social and economic consequences for South Australians.
- In South Australia our greenhouse gas emissions continue to rise. If we are to make a difference we must all reduce our energy consumption.
- Development in some areas of the State is proceeding unchecked and without sufficient regard for cumulative environmental impact.
- 63% of mammals in South Australia are threatened.



Torrens Island Powerstation



Urban Traffic

tends to focus on individual species. There is insufficient information on the impact that fishing has on fishery habitats and ecosystems, information that can only be gained with a more holistic approach.

We are developing a number of programs that seek to improve sustainable management of marine and coastal areas, such as the *Living Coast Strategy*, which is due for release in December 2003. But we need to do more – improve planning, enlarge the information base, reduce pollutant loads to the marine environment and inform and educate the community.

Recommendations for action

Give priority to the conservation and sustainable use of the community's marine resources.

Take action to protect South Australia's coastline from unsustainable development.

Apply caution in developing aquaculture. Fully integrate aquaculture developments with marine and coastal planning and management processes. Ensure approval and regulatory functions are independent of industry development functions.

Focus fisheries management more on ecosystems than on individual fisheries.

Reduce the impact of urban stormwater, treated wastewater and industrial discharges on the marine environment.

*For detailed recommendations and more information on these issues please read the chapters on **Aquaculture, Fisheries and Health of the Marine and Coastal Environment**.*

Climate change

Climate change is probably the most significant global environmental issue that confronts us today. There is now little doubt that the last 50 years of global warming can be attributed to human activity, primarily through the production and consumption of energy which releases large amounts of greenhouse gases, such as carbon dioxide, into the atmosphere.

South Australia can expect extremely serious effects from the predicted increases in temperature (0.2–6°C) and the trend towards declining rainfall (-3% to -40%) over the next 30 to 70 years. During the ice age the global average temperature of 15°C fell to 10–11°C. The potential impact of a similar magnitude of change in the opposite direction requires immediate attention by Government.

Climate change is a long term issue that has the potential to change the extent and range of ecosystems, increase competition for scarce water resources, change the range and distribution of pests, reduce agricultural productivity, raise sea levels and the intensity of storm events, and impact adversely on human health.

In South Australia, our greenhouse gas emissions continue to rise, increasing from 21.48 tonnes of greenhouse gases per person in 1995 to 22.43 tonnes per person in 2001.

The two biggest contributors to greenhouse gas emissions in South Australia are the generation of electricity from powerstations (around 28% of emissions) and the use of transport (around 23%). Our emissions from energy use and generation continued to climb in 2000–01, rising by 3.6% over the two years since 1999.

Climate change is largely a global issue but we – as individuals and as a community – can still effect change.

The State Government has given its formal support to ratification of the Kyoto Protocol and its sustainable energy platform commits to the development of a South Australian Greenhouse Plan. The plan is a matter of urgency.

The predicted changes in climate are viewed as inevitable, even if greenhouse gas emissions ceased today. Thus adaptation to a changed climate must be a key theme of any greenhouse plan, which must also encompass all sectors and identify, among other strategies, least cost options to reduce greenhouse gas emissions.

If we are to make a difference we must all reduce our energy consumption. The State Government can play a significant leadership role for business and the community by providing and promoting an efficient and convenient public transport system, encouraging renewable energy industries with incentives and improved infrastructure, developing practical measures that reduce energy demand, and developing and implementing communication strategies and education campaigns.

The continuing success of the many programs and activities already underway rests on significant commitment from all South Australians.

Recommendations for action

Develop and implement a State Greenhouse Plan and Action Plan – containing key elements on adaptation, emissions reduction, carbon sinks and the roles of Government, industry and the community – as a matter of priority.

Develop transport policies, programs and measures that integrate transport planning more effectively with urban planning and urban form. Focus strategies and incentives on shifting transport use from the car to public transport, walking and cycling.

*For detailed recommendations and more information on these issues please read the chapters on **Climate Change, Energy and Transport**.*

Species loss

Today around one-quarter of all the plants and animals recorded in South Australia are considered to be threatened; for mammals the figure is 63%.

The historical loss of habitat before vegetation clearance controls came in to place is one of the most significant threats to our native plants and animals. Most of the agricultural zone has been cleared of native vegetation and much of the remaining vegetation is in small, isolated patches prone to disturbance and degradation.

Other threats include competition and land degradation by rabbits, feral goats and camels, livestock grazing, predation by feral cats and foxes, dieback caused by diseases such as *Phytophthora cinnamomi*, weed invasion, degradation of waterbodies, altered fire regimes and climate change. Our lack of information on many species adds to the risk of their decline.

Controls on the clearance of native vegetation in South Australia, introduced in 1983, have slowed the rate at which species are declining but many serious threats still persist. Plants and animals that are at risk today may be extinct in one or two generations unless we start seriously to address these threats on a landscape scale.

Many species and ecological communities that are declining at a regional level do not receive attention because they do not rate highly on national or State listings. There is a risk that while we focus our investment on the recovery of nationally threatened species, many more will become extinct regionally and across the State.

The State Government is set to address this issue by developing a *No Species Loss* strategy, which seeks to protect threatened species and ecological communities at regional and State levels. The commitment must be major and it must be long term.

State and Federal Governments are responsible primarily for addressing species loss but we will not arrest the decline with the present lack of community understanding. The community must become aware of the importance of biodiversity conservation in ensuring environmental stability and why it is critical to our future survival.

Recommendations for action

Restore habitat on a landscape scale in key regions. This should be adopted as a major principle of natural resource management planning and be incorporated into associated investment strategies.

Develop targeted education and awareness strategies that effectively communicate the critical importance of biodiversity to human society and its fundamental role in maintaining ecological balance.

*For detailed recommendations and more information on these issues please read the chapters on **Introduced Species, Native Vegetation and Threatened Species**.*

How do we achieve change?

There are three fundamental drivers for change that we need to address as a priority if we are to effectively tackle the major environmental issues that confront us: comprehensively reviewing our land use planning system and its administration; expanding our stocks of good quality environmental information and knowledge; and taking a greater responsibility, both as individuals and as a community, for caring for the environment.

Improved land use planning processes

Historically our approach to environmental management has been reactive. We must become proactive and avoid environmental damage in the first place. Economic development must lead to a better quality of life without degrading the environment.

A more informed and sophisticated land use planning process would integrate industrial, urban and infrastructure development with environmental and natural resource management imperatives. Current planning and development controls and environmental impact assessment processes do not have sufficient regard for the cumulative environmental impact of development at regional or catchment levels.

Adelaide's continuing urban sprawl into the Mount Lofty Ranges is polluting water resources, increasing bushfire risk, causing the loss of native vegetation and threatening prime agricultural land. The State Government's recent review of Hills Face Zone policies aims to achieve a more coordinated approach to controlling future land development in the region.

Development along the South Australian coastline, such as housing, marinas and boat ramps, is placing significant pressure on fragile marine and coastal environments. This development is proceeding largely unchecked and without due regard for its impact.

Action is needed now to place stronger controls on development across the State. The environmental impact assessment process must also ensure that all relevant environmental factors are given adequate attention early in the development approvals process so that cumulative impacts can be managed.

Land use planning processes can only be improved if they are coordinated and integrated and support effective partnerships between Government agencies, industry, and rural and urban communities.

Recommendations for action

Address the failure of South Australia's current land use planning system and its administration to deal effectively with the priority environmental issues identified in this report, as part of proposed changes to the land use planning system.

Review the environmental impact assessment process urgently to ensure a more integrated, strategic and across-Government approach to managing the cumulative impact of development.

*For detailed recommendations and more information on planning issues please read the chapters on **Health of the Marine and Coastal Environment, Land Use, and Population and Urban Form**.*

Reliable, consistent and accurate information

We still do not know enough about the plants, animals, soils and water resources that make up our natural systems and the cumulative impact of human activity



Housing development and associated vegetation clearance in the Mount Lofty Ranges

Photo: P. Hazell, EPA



Greater Bilby, threatened in South Australia

Photo: Peter Canty



Pink-lip Spider-orchid (Caladenia behrii) – threatened in South Australia

Photo: Peter Lang

EXECUTIVE SUMMARY

KEY FACTS

- **Sound environmental information gathered consistently over time is essential to underpin effective decision-making.**
- **Without community engagement future generations will not enjoy a healthy environment.**



Vegetation survey
Photo: S. D. Kenny



Computerised mapping



Revegetation of a degraded site
Photo: Youth Environment Council of South Australia

upon them. This leaves us vulnerable to the consequences of poor decision-making. Effective public policy relies on the best available information to prioritise action and allocate funding. Wise economic decisions are unlikely without a sound knowledge basis on which to assess the long term environmental risks and social costs and benefits of a course of action.

Neither should we wait for perfect information before acting. To do so would be irresponsible and highly risky as it may condemn parts of our environment to an irretrievable future. Under these circumstances, the application of the precautionary principle and adaptive management strategies are appropriate.

A shared vision for the need and importance of environmental information to underpin good decision-making, particularly among State Government agencies, is therefore essential.

The usefulness of State of the Environment reporting as a diagnostic tool to evaluate changes in our environment over time and the effectiveness of environmental management programs is contingent upon good quality and easily accessible information that is collected consistently over long time periods.

However, consistency between State of the Environment reports can be, and sometimes is, compromised by inconsistent standards and methods for collecting data, changing priorities for data collection, poor integration of Government databases, incomplete data sets, the uncertainty of funding, and the rate of change in data analysis capabilities and information technology.

We must place more emphasis on developing long term data collection and management programs that target priority areas if State of the Environment reporting is to achieve its true potential as a useful diagnostic tool. These priority areas must be clearly communicated to research institutions and an appropriate funding strategy put in place that sources funds from industry, and State and Australian Governments.

Recommendation for action

Develop a consistent and integrated approach to gathering, managing and sharing environmental information across Governments and key research institutions, with an emphasis on the information that strategically addresses South Australia's environmental priorities.

Working together

Action must be taken now to avoid further environmental degradation.

It is crucial that every South Australian believes that their actions can lead to a better environment for our children and ourselves. Without community engagement in environmental issues and an understanding that we *all* share the responsibility to protect and conserve, future generations will not enjoy a healthy environment.

Environmental education is the key to driving generational change. We now have many more courses covering environmental issues in universities

and schools than we did ten years ago. Many industries participate in environmental education and training and regional organisations such as Catchment Water Management Boards have made significant progress in engaging communities and increasing awareness about environmental issues. But we need widespread changes in attitudes and behaviour that can only come from effective partnerships between all sectors, including State and Local Government, the community, industry and business.

Over 80,000 South Australians now participate in organised community involvement, monitoring and education programs such as Waterwatch. These programs play an important role in raising awareness about environmental issues but many are subject to short term funding and are not strategic in the sense of offering long term solutions to environmental problems.

Real moves towards sustainability require a more sophisticated and targeted approach to successfully engage the whole community – a community that understands the complexity of the environmental issues that confront us, and the inextricable link between a healthy environment and a prosperous community.

Recommendations for action

Target and develop community education and awareness campaigns within a clear policy framework. Incorporate cost-effective and simple strategies to engage the whole community and emphasise campaigns that address South Australia's environmental priorities.

Establish processes that will build effective working partnerships between industry, residents, business and Government.

Develop and implement strategies that encourage all South Australians to know that, as individuals, they have a **crucial role** to play in protecting and conserving the environment.

State of the Environment Reporting

in South Australia

State of the Environment (SoE) reports set out to deliver useful and credible information about the current state of our environment, changes over time and the implications of those changes for people in a position to effect change, be they decision-makers or the general public. SoE reports also provide an opportunity to monitor the performance of environmental policy and programs in effecting actual environmental outcomes.

SoE reporting is a relatively new activity. While some countries started reporting in the 1970s, the reports were usually thematic and on issues such as water quality. The first comprehensive SoE reports, covering all aspects of the environment, did not appear until the mid 1980s. Most countries now undertake SoE reporting.

Australia produced its second SoE report in 2001 – the first was published in 1996. Most jurisdictions in Australia also produce SoE reports with the reporting cycle varying between once every two years in New South Wales to once every five years in Tasmania and South Australia. A similar reporting framework is used by all jurisdictions.

Many Local Governments also conduct SoE reporting. In South Australia a number of Councils have produced their own SoE reports.

History

The first comprehensive South Australian SoE report was published in 1988 – the first in Australia. This was acknowledged as an important benchmark of environmental conditions in South Australia and the Government made a commitment to produce subsequent reports on a regular basis. The 1988 report was a discursive document that addressed key environmental resources and sectors. A second report followed five years later in 1993 and was published in a similar format.

While the 1993 report was being prepared, more stringent SoE reporting requirements were written into the *Environment Protection Act 1993*. There is now a requirement for the Environment Protection Authority to publish an SoE report at least once every five years. Furthermore, the Act specifies that these reports must:

- include an assessment of the condition of the major environmental resources of South Australia;
- identify significant trends in environmental quality based on an analysis of indicators of environmental quality;
- review significant programs, activities and achievements of public authorities relating to the protection, restoration or enhancement of the environment;
- review the progress made towards achieving the objects of the Act;
- identify any significant issues and make any recommendations that, in the opinion of the Authority, should be drawn to the attention of the Minister.

The Act also requires that the Minister must ensure a copy of the SoE report is tabled before Parliament within twelve sitting days of receiving the report.

The *River Murray Act 2003* was assented to on 31 July 2003, and came into operation in October 2003. The Act effected an amendment to the *Environment Protection Act 1993* that requires State of the Environment Reports for South Australia to provide a specific assessment of the health of the River Murray. In particular it requires SoE reports to address the 'Objectives for a Healthy River Murray' as outlined in the *River Murray Act 2003*. Accordingly this report provides the first assessment of the health of the River Murray. This assessment will be repeated in future reports to track our progress towards restoring the health of the River Murray.

About this report

In keeping with the national SoE reporting framework and the *State of the Environment Report 1998*, this report is structured around seven major environmental themes: Atmosphere, Inland Waters, Coasts and the Sea, Land Resources, Biodiversity, Human Settlements and Heritage. Significant environmental issues are identified for each theme.

To some extent this is an artificial grouping as many of the environmental issues are inter-connected and affect different parts of the environment. Where an issue is directly related to other chapters in the report, those chapters are cross-referenced.

For the first time in South Australia, this SoE report includes some discussion of the social and economic implications of the environmental issues discussed, in recognition of the increasing trend towards sustainability reporting at both Government and Corporate levels.

Similarly to the *State of the Environment Report 1998* this report is based on a modification of the pressure-state-response model for SoE reporting developed by the Organisation for Economic Cooperation and Development (OECD) in the early 1990s. This model, or a variation of it, forms the basis for most SoE reports within Australia and internationally.

The OECD model is based on the premise that humans exert *pressures* on the environment that change the *state* or *condition* of natural resources. Society *responds* to these changes through the implementation of programs and policies that aim to ameliorate the pressures on the environment (Figure 1).

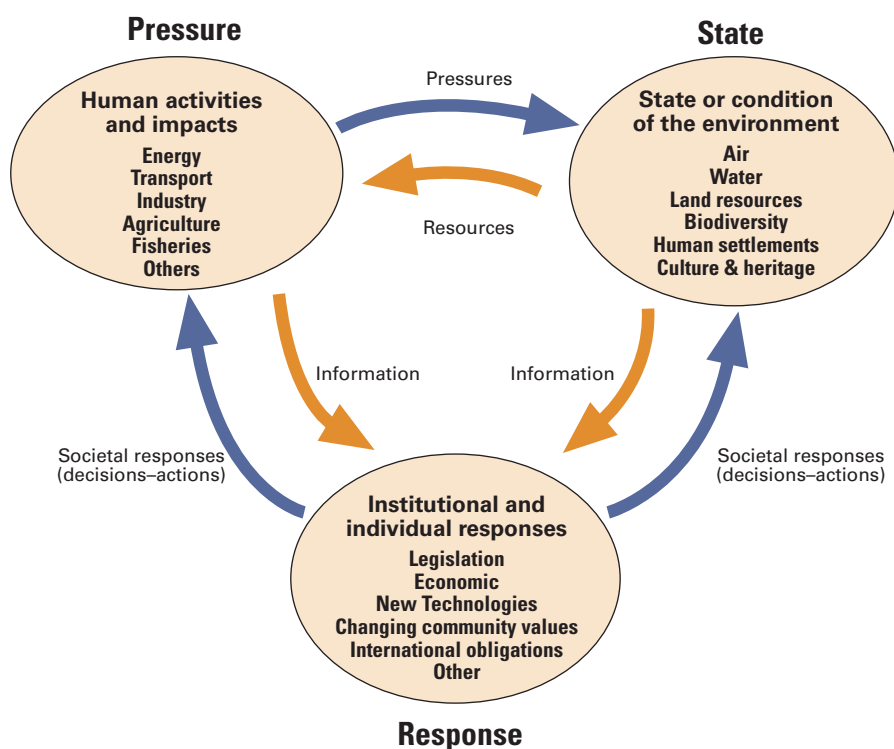
SoE reports therefore attempt to describe the state or condition of the environment, the pressures that have caused, or are still causing, problems and the nature of our responses to those problems in terms of the programs and policies that are developed. To extend the scope of SoE reports there is an increasing trend towards addressing the *adequacy* of our responses and proposing new and amended policies and actions for dealing with key environmental issues.

Environmental indicators

A review of the SoE reporting process in 1994 demonstrated the difficulty of evaluating the effectiveness of many programs without agreed environmental indicators to provide an indication of environmental trends. To continue to report without

STATE OF THE ENVIRONMENT REPORTING

Figure 1: The pressure-state-response model



SOURCE: Environment Australia (adapted from the OECD)

such measures meant that any reporting process would remain qualitative rather than quantitative and therefore largely subjective.

To this end, a set of environmental indicators was developed for use in the *State of the Environment Report 1998* across all major environmental themes. These indicators are reported on again in 2003 for consistency and to assess trends over time. A number of new indicators are also reported on in keeping with an agreed national set of environmental indicators developed by the Australian and New Zealand Environment and Conservation Council (ANZECC, 2000). All jurisdictions have committed to reporting on these whenever possible to ensure a consistent approach.

Three categories of environmental indicators are reported on here:

- **CONDITION INDICATORS** – provide a measure of the severity and extent of the issue;
- **PRESSURE INDICATORS** – provide a measure of the cause of the issue;
- **RESPONSE INDICATORS** – provide a measure of society's response to the issue.

Environmental indicators form the basis of SoE reporting. They allow an assessment of the current state of play and also, if reported on consistently over time, indicate environmental trends and therefore allow an assessment of the effectiveness of our efforts to deal with environmental pressures.

The usefulness of environmental indicators, however, depends upon the availability of consistent and complete data sets that are easily accessible and collected over a long period of time. Inconsistent

standards and methods for collecting data, incomplete data sets and changing priorities in terms of data collection still pose problems for SoE reporting and hamper our efforts to develop adequate and effective responses to the environmental challenges that face us.

Making a difference

SoE reporting is an important diagnostic tool that seeks to inform decision-makers and the community about the condition of the natural environment, whose health is essential to the continued well-being and prosperity of human society. However, for the diagnosis to be worthwhile, it is important that the recommendations made in SoE reports prompt action.

To this end, the Board of the Environment Protection Authority makes a number of recommendations to ensure that the messages in this report result in appropriate actions.

A Government response

Consideration is being given to amending the *Environment Protection Act 1993* to require Government to provide a formal response within four months of receiving future SoE reports. It is anticipated that in such a response the Government will indicate the recommendations that it proposes to adopt, the resulting strategies it intends to pursue and reasons for not adopting other recommendations.

While it is unlikely that this legislative change will be in effect for the *State of the Environment Report for South Australia 2003* it is considered that, given the policy commitment, the Government should act as though the change had been made.

Recommendation for action

The Government should prepare a response to this report within four months of its being tabled in Parliament.

Monitoring progress

An important factor in ensuring that the Government's response to the SoE report is followed through is the establishment of a regular reporting process. The discipline of reporting can play a major role in promoting the active pursuit and achievement of goals.

It is understood that the Government will be addressing a recommendation from the Economic Development Board for the adoption of performance measures and benchmarks for the State. These will embrace the full range of Government activity. It would be sensible if this report and the Government's response to this report are taken into account as those benchmarks and measures are developed.

There is, at present, an emergence of what might be regarded as a plethora of reporting against indicators of one form or another. SoE reporting has a long history in the State and there is now the emergence of *Green Print SA*, *Indicators of the State of South Australia (Business Vision 2010)* and presumably some form of reporting against performance measures and benchmarks developed in response to the Economic Development Board's recommendation. The Premier also issues an annual report on the State Planning Strategy.

While there may be a legitimate reason for a variety of reports of this nature there is always the risk that this will be a source of confusion for business and the community more generally. There would be merit in reviewing the purpose and timing of the various indicator reports that are emerging to ensure that consistent and appropriately timed messages are delivered.

Ensuring delivery

The development of a State Strategic Plan, as recommended by the Economic Development Board, should take into account the Government's response to this report in the process of developing the plan. This will ensure that as agencies across Government seek to play their part in implementing the State Strategic Plan the Government's policy response to this report is incorporated into agency planning and budgets.

The confluence of a number of factors, including the publication of the Economic Development Framework, the publication of this report and the publication of the first edition of *Green Print SA*, provides a significant opportunity for the Government to consider embedding broad principles of sustainability in whole-of-Government strategic planning processes.

Recommendation for action

The Government should incorporate its policy response to this report into the process for developing a State Strategic Plan. Priority should also be given to embedding broad principles of sustainability into whole-of-Government strategic planning processes.

References

Australian and New Zealand Environment Conservation Council (ANZECC), State of the Environment Reporting Task Force (2000). *Core Environmental Indicators for Reporting on the State of the Environment*. Environment Australia, Canberra.

Recommendations for action

The Government should commit to annual reporting on progress in relation to the strategies put in place in its response to this SoE report.

This report and the Government's response to it should be taken into account as the Government adopts the Economic Development Board's suggestion for the development of performance measures and benchmarks for the State.

Consideration should be given to the range of indicator-based reports produced, or about to be produced, within Government to ensure that there is efficiency of effort and clarity of purpose, and that the timing of reports is appropriate for decision-making purposes and for providing enhanced clarity about Government directions.

Progress Against Priorities

Identified in the *State of the Environment Report 1998*

The *State of the Environment Report 1998* identified 18 recommendations based on the assessment of the condition of the environment at that time. The following describes progress made since 1998 in addressing these recommendations.

There should be a whole-of-Government commitment to improving the collection, storage and retrieval of environmental data to enable evaluation of change in our environment over time and to monitor our environmental management performance.

There have been some improvements in the collection, storage and management of environmental information over the past five years. This has largely been driven by improvements in technology rather than directed effort to improve environmental information or through a whole-of-Government commitment. A significant problem still exists because most environmental information is collected to support operational activities rather than to monitor the performance of environmental management programs.

There should be a whole-of-Government commitment to pursuing integrated natural resource management at local and regional levels through the development and adoption of Integrated Catchment Management strategies.

A Natural Resource Management plan has been developed and accredited for the Mount Lofty Ranges and Greater Adelaide region. Plans have been submitted for accreditation for Kangaroo Island, the Northern and Yorke Peninsula Agricultural District, the South Australian Murray-Darling Basin and the South East, while three other regions are developing plans. A draft Natural Resource Management Bill is due to go before State Parliament in late 2003. It is essential that commitments to ongoing funding are made to ensure the excellent planning work and relationships formed can be translated to positive outcomes on-ground.

Groundwater management strategies should be developed based on a reliable, well-maintained hydrogeological database, as part of the water resource management responsibilities of the newly established Catchment Water Management Boards.

The Department of Water, Land and Biodiversity Conservation (DWLBC) maintains a reliable hydrogeological database that is used to develop management strategies. Groundwater monitoring data was made accessible to the public via the internet in 2002 (<https://info.pir.sa.gov.au/obs/obsWell/MainMenu/menu>). DWLBC, the Catchment Water Management Boards and Natural Resource Management groups are cooperating to establish centralised management for all relevant groundwater data. However, progress has been slowed due to uncertainty surrounding the new Natural Resource Management Boards and the development of an appropriate cost-sharing model.

Complete a comprehensive survey of the status of the State's wetlands and develop and implement a State-wide wetlands management program based on the assessment.

Inventories of selected wetlands in the Northern Agricultural Districts, Mount Lofty Ranges and on Kangaroo Island and the Eyre Peninsula were completed in 2002; however, additional study is needed to refine the data and expand the regional coverage. A *Wetlands Strategy for South Australia* was released in 2003. It provides for the first time a framework for an integrated approach to the management of all wetlands in the State. Partnerships between Government, industry, private land-holders, researchers and regional and local communities underpin successful implementation of the strategy. It is important that appropriate and ongoing funds are now committed to enable its implementation.

Continue to monitor the condition of fisheries stocks closely and ensure that effective control programs are in place to achieve sustainability.

A review of the *Fisheries Act 1982* is underway and new legislation will include increased consideration of sustainability issues. From the information available, most of the State's fisheries are being sustainably managed; however, better monitoring and regulation of recreational catch must be encouraged as this sector takes a significant proportion of many fish species. It is also important that management of fisheries moves away from the single species, stock level style of management and towards ecosystem-based management.

Additional effort should be committed to monitor and limit by-catch.

There has been progress in this area, most notably in the prawn fisheries. Information about the level and composition of by-catch in most fisheries remains inadequate for understanding the impact of fishing on the ecosystem. Further enhancements of logbooks and fishery independent monitoring is required to continue to reduce by-catch in all fisheries.

The development and implementation of the *Our Seas and Our Coasts Strategy* is strongly endorsed. This must include an effective program for monitoring the key indicators identified in this report (*State of the Environment Report 1998*).

The *Our Seas and Our Coasts Strategy*, released in 1998, was the first attempt by State Government to provide an integrated management framework for marine issues. Many of the goals of this strategy were either fully or partially achieved, however, some were not addressed. The *Living Coast Strategy*, due for release in late 2003, will seek to build upon this and address gaps in the previous strategy.

The precautionary principle should be adopted in decisions on the allocation of new licences and the development of new areas for aquaculture.

There has been an improvement in the environmental management of some sectors of the aquaculture industry, both in terms of regulation and monitoring following proclamation of the *Aquaculture Act 2001*. While monitoring requirements, environmental assessment and a regionalised approach to management have all been enhanced or developed as a consequence of the Act, there remains insufficient knowledge about the full range of potential environmental impacts arising from aquaculture activities and how these risks can be minimised.

A comprehensive, effective and multi-pronged program should be developed to monitor the physical status of soils across the State.

The Land Condition Monitoring Program, run by DWLBC, commenced in 1999. The Program aims to determine long term changes in the risk of wind and water erosion and soil acidity resulting from changes in land management practices. This information will be used to help inform land management strategies across the State.

State and local planning authorities must improve coordination of their activities to ensure that suitable buffer zones for all potentially noxious industries are implemented as part of planning controls.

Most metropolitan Councils that have substantial industry areas have indicated an intention to address this issue. Work on the new Planning Strategy for South Australia is investigating how the application of buffer areas might constrain/direct development in metropolitan Adelaide.

A coordinated program should be established to monitor and evaluate land use change across the State.

Strategic land use mapping has now been undertaken for most regions of the State, with the exception of the north-western region. The information gathered as a result of this mapping will be used as a baseline to monitor future changes in land use. More detailed monitoring of land use and management changes has been undertaken for targeted areas of the State, namely the Mount Lofty Ranges and the South East.

Planning authorities should adopt land capability and suitability methodologies as criteria for assessing development proposals and evaluating changes to land use zoning.

Virtually all Plan Amendment Reports now take land capability into account. However, the broad approach that Development Plans take to land use zoning means that often the cumulative and long term impact of developments are not taken into account. This can result in pressures being placed on the environment (e.g. an overuse of water resources). This issue must be addressed more effectively by the planning system.

The Department for Environment and Heritage should contribute to the establishment of a complete, adequate and representative national reserve system (for both marine and terrestrial ecosystems).

Neither the terrestrial or marine reserve systems can at present be described as complete, adequate and representative, or even near to achieving this goal. It is recognised that, in the past, Marine Protected Areas in South Australia were not established with the specific aim of conserving a representative sample of biodiversity. Some progress has been made toward developing additional Marine Protected Areas to ensure they are more representative. *Marine Protected Areas – a shared vision* was released in 2001 and community consultation has begun over a number of proposed Marine Protected Areas. The Department for Environment and Heritage has a strategy for establishing a comprehensive, adequate and representative terrestrial reserve system and, through the Natural Heritage Trust and other sources, is seeking funding to purchase land to include in the reserve system to conserve important and/or under-represented ecosystems. Progress is slow, however, and considerable work is needed to achieve the ultimate goal.

Promotion of broadscale revegetation within a framework of regional strategic plans.

Regional natural resource management initiatives are underway across the State, incorporating the development of plans and investment strategies. These plans and strategies include provision for broadscale revegetation to meet a number of natural resource outcomes. However, at present the plans make the unjustified assumption that revegetation to ameliorate land degradation issues (such as salinity) will also have biodiversity benefits. There is a paucity of information presently available for regional groups to improve broadscale revegetation for biodiversity. To address this need, the Large Scale Habitat Re-establishment Working Group was formed in 2002. The Group's focus is the provision of strategic direction for ecological restoration through large-scale habitat re-establishment, encompassing issues such as planning and legislation, resourcing, socio-political considerations and technical principles.

All organisations that are involved in re-establishing and regenerating areas should use species that maximise the biodiversity value of revegetated areas.

The majority of revegetation activities being undertaken by organisations across the State are still not specifically designed to address biodiversity conservation considerations, and typically rely upon the use of a very limited range of easy to propagate species. However, there are several large-scale ecological restoration trials being undertaken that involve key revegetation organisations and research

PROGRESS AGAINST PRIORITIES

institutions. These trials are setting specific biodiversity goals for their re-establishment and regeneration activities and are evaluating the results of the work against these goals. The intention is for these trials to act as a learning process, identifying ways of improving the value of plantings for biodiversity conservation.

Develop and implement integrated approaches for the control of pest plants and animals.

This has occurred over the past five years in certain regions. Specific programs include the Kangaroo Island Pest Plant and Pathogen Program, the West Coast Integrated Pest Program and Bridal Creeper Control Programs, Operation Bounceback in the Flinders Ranges, habitat restoration initiatives in the Gawler Ranges National Park and the Fleurieu Asparagus Weed Management Strategy in the Greater Mount Lofty Ranges. All of these have achieved considerable success. These programs focus on the recovery of threatened species and ecological communities and the rehabilitation of significant areas of native vegetation. Further progress in this direction is being made through a whole-of-Government commitment to the development of Natural Resource Management legislation, which will see the integration of the roles of the Animal and Plant Control Commission and Boards, the Catchment Water Management Authorities and Soil Conservation Boards.

All agencies with a responsibility for natural resource management should adopt an integrated approach to landscape management to improve the conservation and management of biodiversity in off-reserve areas.

In 2002 the State Government established *NatureLinks*, a major initiative that takes a long term landscape-based approach to biodiversity conservation. *Naturelinks* involves managing the State's reserve system as a series of ecological cores. Partnerships with landholders and others will be established to ensure that surrounding areas are managed and developed as 'links' thus creating connected habitat across the landscape. Existing ecological restoration and revegetation projects will be incorporated into *Naturelinks*. All agencies with an active involvement in natural resource management are involved in this initiative.

Develop and implement a sustainable energy policy to increase energy efficiency, increase use of renewable energy resources and reduce greenhouse gas emissions.

A Sustainable Energy Policy Framework is being developed as a part of the Government's response to the Electricity Demand Side Measures Task Force.

Air Quality

Air quality in metropolitan Adelaide

- **Improving** and generally good by national and international standards.

Air quality in regional centres

- **Improving** in Port Augusta.
- Sulphur dioxide and lead levels are still **unacceptable** in some areas of Port Pirie.
- Particulate matter in Whyalla is **worsening**.

● *Heading in the right direction*

● *Proceed with caution*

● *Cause for concern*

Climate Change

Greenhouse gas emissions in total in South Australia

- **Up** 7.8% since 1995. Emissions from the generation of electricity and industrial activity in particular continue to grow.

Greenhouse gas emissions per person

- **Up** from 21.48 tonnes in 1995 to 22.43 tonnes in 2001.

Ozone Depletion

Concentration of ozone-depleting substances in the atmosphere above Australia

- **Decreasing**, predictions indicate that signs of ozone recovery will start to be noticed over southern Australia in the next ten to fifteen years.

River Murray

Salinity levels in the River Murray

- Predicted to **increase** significantly over the next 50 years without further remedial action.

Other water quality in the River Murray

- **Moderate to poor**; no significant change since 1998. Water quality in general shows a marked deterioration progressively downstream towards Tailem Bend.

Use of water from the River Murray

- **Increasing** – too much water is being taken for irrigation from across the Murray-Darling river system.

Rivers, Streams and Wetlands

Health of rivers, streams and wetlands

- **Variable** but generally in decline due to increasing extraction and drainage for industrial, domestic and agricultural purposes.

Water Use

Water use in areas where use is required to be licensed

- **Relatively stable** in most areas, use of groundwater is currently above the estimated sustainable limit on the Northern Adelaide Plains and in parts of the South East.

Water use in areas where use is not required to be licensed

- **Uncertain and likely increasing**, use of surface water is currently above the estimated sustainable limit in the Mount Lofty Ranges.

Water Quality

Water quality in rivers and streams of the Mount Lofty Ranges

- **Moderate to poor**; no significant change since 1998.

Groundwater quality

- **Declining** in some regions, particularly on the Northern Adelaide Plains and in parts of the South East. The single biggest threat to groundwater quality across the State is salinity.

THE STATE OF OUR ENVIRONMENT AT A GLANCE

● Heading in the right direction

● Proceed with caution

● Cause for concern

Health of the Marine and Coastal Environment

Area of seagrass along the Adelaide coastline

● **Decreasing**, with 720 hectares lost between 1995 and 2002.

Area of mangroves

● **Decreasing** in selected locations along the South Australian coastline.

Development along the South Australian coastline

● **Increasing**

Pollutant loads in wastewater discharged into Gulf St Vincent

● **Decreasing**

Marine Protected Areas

● **Up** from 3.5% of total State waters in 1996 to 4.4% in 2002.

South Australia's fisheries

● Most are **fully exploited**, Snapper in Gulf St Vincent and Northern Zone Rock Lobster are **overfished**.

Volume of aquaculture production

● **Increased** 349% from 3883 tonnes in 1996/97 to 13,548 tonnes in 2001/02.

Dryland Salinity

Extent of dryland salinity in South Australia

● **Stable now but increasing** in the long term.

Land Use

Residential land use

● **Increasing** in semi-urban regions with resulting pressures on biodiversity, water resources and agricultural land.

Change from relatively low intensity land uses to higher intensity uses

● **Increasing** in some regions, notably the Mount Lofty Ranges.

Awareness and acknowledgement of site contamination

● **Increasing**, since the *State of the Environment Report 1998* there have been significant advances in our knowledge and understanding of site contamination.

Soil Acidity and Erosion

Extent of acid soils and rates of soil acidification in South Australia

● **Increasing** and will continue to increase unless the level of remedial action is also significantly increased.

Rates of soil loss to water and wind erosion in South Australia

● **Slowly declining** but unsustainable levels of soil loss still occur during extreme weather events.

Introduced Species

Rabbit numbers

● A **decline** since introduction of Rabbit Haemorrhagic Disease (RHD, also known as calicivirus) although the extent of the decline varies across the State.

Fox numbers

● **Down** in high priority conservation areas due to large-scale baiting programs; **still a problem** in other parts of the State.

Feral camel and deer numbers

● **Up**

Feral goat numbers

● **Declining** across the State.

Feral pig numbers

● **Unknown**

Mundulla Yellows and *Phytophthora cinnamomi*

● **Spreading**

Extent of terrestrial pest plants

● **Increasing**

Native Vegetation

Broadacre vegetation clearance

● **Halted** except under regulated conditions.

Area of land held under Heritage Agreements

● **Up** 12% (60,749 hectares) since 1998.

Area of land held in National Parks and Wildlife Reserves

● **Up** 1.6% (334,937 hectares) since 1998.

Revegetation activity

● **Stable**; no change since 1998.

Threatened Species

The number of plants and animals and ecological communities at risk

● **Increasing** particularly at the regional level.

Recovery efforts for threatened species

● Have **increased** significantly across the State but remain less than is required to minimise the potential for species loss.

Energy

Total energy consumption

- **Up** by 10% between 1993/94 and 1998/99, per capita consumption increased by a similar percentage.

Proportion of the State's power generation capacity that is powered by renewable resources

- **Increasing** from 0.1% in 1998 to approximately 4.6%, when windfarms approved in the past year are constructed.

● Heading in the right direction

● Proceed with caution

● Cause for concern

Population and Urban Form

South Australia's population growth

- **Declining** from 2.4% per year in the 1960s to 0.5% per year between 1996 and 2001.

The availability of undeveloped land for new housing development

- **Declining**

The number of new homes being built on redeveloped sites within metropolitan Adelaide

- **Increasing**

Population density

- **Increasing** in the metropolitan area.

Average household size

- **Declining** – this will probably continue to increase the demand for housing faster than the growth in population, posing challenges for the natural environment of Adelaide and surrounding areas.

Transport

Trips by car in metropolitan Adelaide

- **Up** by 12% on weekdays, 5.7% on Saturdays and 0.3% on Sundays between 1986 and 1999.

The number of people using public transport

- **Increased** 6% between 2000 and 2002 following a decade of decline.

Vehicle registrations

- **Up** 3% between 1998 and 2002.

Road freight tonne-kilometres travelled

- **Up** by 0.762 billion tonne-kilometres between 1997/98 and 2000/01.

Age of South Australia's vehicle fleet

- **Slight decline** from 12.1 years in 1998 to 11.9 years in 2002 – still above the national average of 10.5 years.

Waste

Amount of solid waste sent to landfill

- Approximately one tonne of solid waste for every person in 2001/02.

Household participation in recycling

- **Up** from 1996 to 2000 particularly for clothing and rags (up 19%), plastics (up 14%) and garden waste (up 9%).

Litter

- **Up** 3% since 1998 after a downward trend from 1998 to 2000.

Amount of hazardous waste

- **Up** 60% since 2000.

Water Consumption

Per capita water consumption in the Adelaide metropolitan area

- Remains **steady** at 460 litres per day in 1997/98 and 445 litres per day in 2001/02.

The quality of mains water supplied to the Adelaide metropolitan area

- **Continues to comply** with the national drinking water quality guidelines.

Re-use of treated wastewater

- **Up** from 7.6% in 1995 to 15% in 2002.

Heritage

Number of items added to the State Heritage Register

- **Up** by 85 places or 4% since 1998.

Number of shipwrecks declared historic

- **Up** by 32 shipwrecks or 20% since 1998.

Verification of sites on the Central Archive of Aboriginal heritage

- **Less than** what is required.

Awareness of the importance of cultural landscapes

- **Increasing**

Index

Abalone farms, 62, 63

Aboriginal heritage

Central Archive of Aboriginal Heritage, 159, 161
impacts on, 159, 161
significance of, 157, 161

acidification (of soil) *see* soil, acidification

Adelaide

air quality, 18–22
Coastal Waters Study, 79
condition of coastal waters, 74, 77
population growth, 131–134
vehicle traffic levels, 139, 141
water consumption, 151, 153
waste generation, 145–148

African Boxthorn, 107

agricultural chemicals, 94–95, 153

agricultural industry, 26, 90, 91, 96, 97

air quality 18–22 *see also* individual pollutions

air toxics, 21
emerging issues, 21
fine particles, 21
indoor, 21
issues, 18
monitoring of, 22
odour emissions, 19, 21
particulate matter, 19, 20
pollutant levels, 18, 21
pressures on, 18, 139, 142

algae, blue-green, 34, 154

aquaculture, 5, 60–64

impact of, 60, 62–63
issues, 60
land based, 62
legislation, 13, 63
licence conditions, 63
management, 60, 63
marine, 61–62
value of, 61

aquifer storage and recovery (ASR), 58, 155

Ark on Eyre program, 109, 123

Atlantic Salmon farms, 62

atmosphere, *see* air quality; climate change

Australian River Assessment Scheme (AUSRIVAS),
34, 40–41, 46

Barker Inlet, 74

beaches

condition, 70, 77, 78
sand replenishment program, 78

**biodiversity *see* native vegetation, threatened
species, introduced species**

birds

extinction of, 120
threatened species, 119–121
Birds for Biodiversity Program, 121

Blackberry, 107

Blue Crab fishery, 66

Blue Mussel farms, 62

Bolivar Waste Water Treatment Plant, 57, 72, 79, 155

Boneseed, 107

Branched Broomrape, 109

Bridal Creeper, 107, 109

Bridal Veil, 107, 109

bycatch *see* fisheries

Calamary fishery, 67

Calicivirus *see* Rabbit Haemorrhagic Disease, 104, 105,
106, 109

camels, feral, 105, 106

carbon dioxide

emissions, 24–25
sources, 24–25

carbon monoxide, 20

Carp, European, 108

Cars, motor *see* vehicles

cats, feral, 104, 106

chlorofluorocarbons (CFCs), 29, 31

Clare Valley, groundwater, 57

climate change 6, 23–28

adaptation to, 26
causes of, 23–24
convention commitments, 27
impacts of, 25–26, 57
predictions, 26
responses to, 27

coastal waters *see also* beaches

Adelaide Coastal Waters Study, 79
condition, 74, 77
development of, 7, 77–78
pollution of, 74, 77–78
sand movement, 78
water quality, 74

Container Deposit Legislation, 149

contaminated sites *see* site contamination

cultural landscapes *see* landscapes, cultural

dairy industry, 90, 97

deer, feral, 105, 106

Designated Primary Industry Areas, 96

dryland salinity, 81–86

causes of, 81
costs of, 85
impacts of, 83–84
regions affected, 83, 84

economy, State, 4

effluent *see* wastewater,

El Niño (Southern Oscillation effect), 24

electricity *see* energy,

energy, 124–128

biomass, 127
consumption by sector, 126
efficiency programs, 27, 127–128
environmental impact, 124, 126
geothermal, 127
primary, 126
policy, 14, 127–128
renewable, 27, 127
secondary, 126
solar, 127
wind, 127

Energy Efficiency Action Plan, Government, 128

Environment Improvement Programs, 19, 22, 53

environmental indicators, 4

Environmental Management Systems (EMS), 96, 97

Environmental Protection (Water Quality) Policy
(Water Quality EPP), 38, 46, 49, 53, 79

Index

erosion, 98–103

- area affected, 98–100
- management, 12, 102
- water, 99–100
- wind, 98–99

European Carp *see* Carp, European,

European fan worm, 108

extinct species, 118

Eyre Peninsula, 42, 43, 72, 74, 78, 153

Far North, 42, 44, 46, 58

farm dams, 55, 56

fire management plans, 114

Firewood, removal, 113–114

fish

- native species, 37, 119, 121
- pest species *see* introduced species,

fisheries, 165–169 *see also* individual fisheries

- bycatch, 12, 65, 67
- conservation status of stocks, 65–67
- inland fisheries, 67
- issues, 65
- legislation *see Fisheries Act 1982*
- management committees, 68
- marine fisheries, 66–67
- recreational, 65, 68
- Fisheries Act 1982*, 12, 68

Flinders Ranges

- Operation Bounceback *see* Operation Bounceback
- watercourses, 42

Forestry, impact on water resources, 90, 94

forestry industry, 90, 94, 96, 97

fossil fuels, 24, 124, 125

fox, European red, 104, 106, 109

freight, road, air and rail *see* transport, freight

freshwater ecosystems, 40–47

Garfish fishery, 67

geological monuments, 157, 160

Glossy Black Cockatoo, 4, 122

goats, feral, 104, 106, 109

Goolwa Cockle fishery, 67

Gorse, 107

Great Artesian Basin

- bore capping program, 56, 58
- management plan, 46, 56
- water resources, 56
- wetlands, 46

Green City Program, 130, 136

greenhouse gases

- emission levels (by sector), 25
- emissions per capita, 24
- impacts of, 25–26, 126
- reduction, 27
- sources, 6, 23, 126
- State Greenhouse Plan, 6, 23, 27

groundwater

- in the South East, 52, 57
- Northern Adelaide Plains, 52, 55, 56, 57,
- nitrate contamination, 52
- salinity, 52, 57
- quality, 48, 49, 52–53
- use, 55, 57

Gulf St Vincent

- fishery, 66–67
- seagrass meadows, 72
- water quality, 74, 75

halons, 29, 30–31

hazardous wastes, 145, 147–148

Heritage Agreement Scheme, 111, 114–115

heritage

- Aboriginal *see* Aboriginal heritage
- Areas *see* State Heritage Areas
- built, 157, 159
- geological, 157, 160
- legislation, 161–162
- maritime, 159, 161–162
- mining, 160
- shipwrecks *see* shipwrecks
- register *see* State Heritage Register

Hindley Street, air quality, 20

human population *see* population

housing, demand for, 134

hydrochlorofluorocarbons (HFCs), 29, 30, 31

Indigenous Protected Areas, 114, 159

industry eco-efficiency practices, 149

introduced species *see also* individual species

- animals, 105–106, 18
- plants, 107, 108, 109
- environmental weeds, 107
- impacts of, 109
- management of, 14, 105–110

irrigation

- use of wastewater, 5, 58, 155
- use of water, 4, 5, 32, 33, 36

Kangaroo Island, 42, 43, 72, 74

King George Whiting fishery, 67

Kyoto Protocol, 23, 27

Lakes Alexandrina and Albert, 34, 35

land

- contamination *see* site contamination
- erosion *see* erosion

Land Condition Monitoring Program, 13, 102

land use

- change, 91–94, 95
- conservation and natural environments, 89
- dryland agriculture, 90
- forestry, 90, 94, 96, 97
- incompatible uses, 7, 87, 88, 91, 94, 95
- intensive, 90–91
- irrigation, 90
- in the Mount Lofty Ranges, 7, 87, 88, 91–94, 95, 96
- pastoral, 89–90
- State-wide, 7, 89

land management, sustainable, 102

landscapes, cultural, 157, 158, 159–160, 162

lead

- air pollution, 19, 20
- in petrol, 19

litter

- amounts, 145, 147
- composition, 147

Living Coast Strategy, 6, 71, 79
Lower Lakes *see* Lakes Alexandrina and Albert

macroinvertebrates, 40, 41

mangroves, 71, 73, 74

marine ecosystems

- conservation, 13, 78
- pollution of, 74–77
- water quality, 74–75

Marine Protected Areas (MPAs), 13, 68

marine reserves *see* Marine Protected Areas

Marine scalefish fishery, 67

Mesquite, 105, 107

methane, 24

methyl bromide, 29

Metropolitan Open Space System (MOSS), 138

Metropolitan Planning Strategy *see* Planning Strategy

migration *see* population, migration

mining, land use impact, 90–91, 97

Montreal Protocol, 31

Mount Gambier, 20

Mount Lofty Ranges

- Catchment Program, 54, 96
- farm dams, 56
- groundwater, 57
- land use, 91, 92, 93, 95, 96
- water use, 56
- watercourses, 41–42, 48–49, 52, 54
- Watershed Protection Office, 54, 96
- wetlands, 43, 56

Mundulla Yellows, 105, 108, 109, 110

Murray Cod fishery, 67

Murray River *see* River Murray

National Action Plan for Salinity and Water Quality, 46, 53, 84

National Electricity Market, 126

native vegetation, 111–117

- area, 111, 113
- clearance, 7, 113
- condition, 113
- fire management, 114
- firewood removal, 113–114
- management, 115–116

Natural Resource Management, 12, 53, 112

NatureLinks program, 112, 116

nitrates, in groundwater *see* groundwater

nitrogen dioxide, 20

Northern Adelaide Plains, groundwater resources, 52, 55, 56, 57

oil, pollution and spills, 74

Olives, 107

open space *see* Metropolitan Open Space System

Operation Bounceback, 109, 121, 122

Oyster, Pacific farms, 62

ozone depletion, 29–31

- causes, 28
- impacts of, 31
- issues, 29
- responses to, 31
- ozone layer, condition of, 30

parks and reserves *see* reserves

particulate matter *see* air quality

pastoral land use *see* land use

Pastoral Lease Assessment Program, 113

Patawalonga, Lake, 71, 77

pesticides, 95

***Phytophthora cinnamomi*, 104, 105, 108, 109**

pigs, feral, 106

Pilchard fishery, 66

Planning Strategy, 13, 130, 136

plants, native *see* native vegetation,

threatened species

pollution *see* air quality, site contamination;

water quality

population

- age structure, 134
- density, 134
- growth, 131–134
- migration, 131–132
- regional change, 132–134

Port Adelaide Wastewater Treatment Plant, 155

Port Augusta, air quality, 18, 20

Port Pirie, air quality, 18, 19, 20, 22

Port River, condition of, 71, 74, 75, 77

Port Stanvac oil refinery, 20, 95

Prawn fishery *see* Western King Prawn Fishery

pressure-state-response model, 10

protected areas *see* reserves

public transport *see* transport, public

Rabbit Haemorrhagic Disease, 104, 105, 106, 109

rabbit, European, 104, 105, 106, 109

radiation, ultraviolet *see* UV radiation

Ramsar Convention, 44

Recovery Plans, 118, 120–121

recreational fishing *see* fisheries, recreational

recycling

- amounts recycled, 145, 148–149
- domestic, 149
- economic benefits, 148
- industrial, 148

reefs, condition of, 74

renewable energy sources, 127

reserves

- Heritage Agreements, 114–115
- Indigenous Protected Areas, 114
- Marine Protected Areas, 78–79
- National Parks and Wildlife, 114

reservoirs, 151, 153

revegetation, 13, 115

River Murray, 32–39

- blue-green algae, 34
- environmental flows, 33, 37–38
- floodplain health, 32, 37
- health, 34, 37, 40–43, 46, 52
- Improvement Program, 36
- Levy, 36
- management, 44, 46
- Murray Mouth closure, 32, 38
- salinity, 4, 33, 34
- salt interception schemes, 38
- water quality, 32, 33, 34–35, 38
- water use, 32, 33, 36, 57
- wetlands, 36, 37

Index

River Murray Act 2003, 5, 32, 33, 37, 45, 49
Rock Lobster fishery, 66
rubbish *see* waste

salinity

dryland *see* dryland salinity
groundwater, 52, 57
River Murray, 5, 34, 38
surface water, 49

seagrass meadows, 72

sewage treatment plants *see* wastewater

shipwrecks, 157, 159, 162

Snapper fishery, 67

site contamination, 94–95

soil

acidification, 98, 99, 100
contamination, 94–95
erosion *see* erosion

solar energy *see* energy, solar

South Australian Glossy Black Cockatoo *see* Glossy Black Cockatoo

South East, 43, 44, 52, 57, 72, 153

Southern bluefin tuna farms, 61–62

Southern calamary fishery *see* Calamary fishery

Species Recovery Plans *see* Recovery Plans

Spencer Gulf, 67, 72, 74, 77, 79

State Heritage Areas, 159, 160

State Heritage Fund, 161

State Heritage Register, 159

State of the Environment reporting, 9–11

State Transport Plan, 140, 143

State Water Plan 2000, 44, 58

stormwater

re-use, 155
volume discharged to sea, 77
management, 156

sulphur dioxide, 18, 19, 20

threatened species, 118–123

nationally, 120
number of, 118–120
recovery programs for, 120–121

traffic trends *see* vehicles

transport, 139–144

bicycles, 143
emissions, 25
freight, 141–142
noise, 142
public, 142
use of, 141–143

tuna *see* Southern bluefin tuna farms

unleaded petrol, 19–20

Upper South East Drainage Scheme, 85

urban containment boundary, 130, 136

urban growth, 134–135

urban consolidation, 134–135

UV radiation, 30–31

vegetation *see* native vegetation

vehicles

age of, 141
emissions, 19, 20
ownership per capita, 141
registrations, 141
use of compressed natural gas, 143

viticulture, 57, 90, 91, 97

waste

building and construction waste, 147
domestic waste, 145, 147
generation by sector, 147
generation per capita, 145, 147
impact of waste, 148
liquid waste, 147
litter *see* litter
policy and programs, 149
recycling *see* recycling
radioactive and hazardous waste, 147–148

wastewater

discharge of, 77
re-use of, 4, 79, 154–155
treatment plants (WWTPs), 72, 74, 79, 155
Water Resources Act 1997, 4, 45, 48, 56, 57, 58

water

consumption by sector, 57, 153
consumption per capita, 153
country supplies, 154
groundwater *see* groundwater
metropolitan supplies, 153
prescribed areas, 55
quality, 4, 48–54, 74
reservoirs *see* reservoirs
surface waters, 40–47
use, 4, 55–59
watercourses, 40–47

Waterwatch, 46, 54

weeds *see* introduced species

Western King Prawn fishery, 66

wetlands

condition, 143–144
ecological importance, 40, 44
extent of, 43–44
loss of, 40, 43–44
management, 12, 44, 46
of international importance, 44–45
of national importance, 44–45
issues, 40
Wetlands Strategy for South Australia, 12, 33, 46

Whyalla, air quality, 18, 20

wind energy *see* energy, wind

wine industry, 97

wood, fuel *see* firewood

Yellow-footed Rock-wallaby, 4, 122

Yellowtail Kingfish farms, 62, 63

Zero Waste SA, 146, 149



“

We, as the custodians of our continent, owe a duty to our community, to our environment, to the world and to the future, to achieve a sustainable Australia. To the extent that we fail to discharge that duty, we risk being justly condemned by future generations as vandals of our own time and despoilers of theirs.

Sir William Deane, in support of the launch of
“*Natural Advantage: A Blueprint for a
Sustainable Australia*” October 2000

”

For further information please contact:

Information Officer

Environment Protection Authority

GPO Box 2607

Adelaide SA 5001

Telephone (08) 8204 2004

Facsimile (08) 8204 9393

Free call 1800 623 445 (country)

Web site: www.environment.sa.gov.au/soe2003



Government
of South Australia



South Australia