3 Sustainable natural resource management

Vision for Western Australia

Western Australia's vast landscape and seascape, intricate web of biodiversity and other natural resources are conserved, managed and used sustainably for the common good, and the community is involved in management and planning processes that are transparent and visionary.

Goal

Value and protect our environment and ensure the sustainable management and use of natural resources.

Priority areas for action

> SUSTAINABLE NATURAL RESOURCE MANAGEMENT

Since European settlement in 1829, much of Western Australia's economic wealth and sense of identity has come from the use of natural resources. Agriculture, forestry, fishing and the production of minerals and petroleum all provide employment, development opportunities and wealth. Tourism is also a significant contributor to the economy and employment and relies heavily on Western Australia's natural assets.

Western Australia is the biggest sub-national state in the world with a population of under two million people. By way of comparison, it is equivalent in size to the whole of Western Europe with a population in excess of 200 million people. The sheer size of Western Australia also creates certain unique challenges to the way we use natural resources sustainably. For this reason, separate sections consider aquatic systems, the coastal and marine environments and the rangelands.

Western Australia's 27,000 km coastline is largely undeveloped and relatively pristine. Some areas of the coast are developing rapidly and in need of careful management while others are under considerable threat of cumulative impact or have become degraded or irreversibly damaged and require more urgent or remedial action. Western Australia's marine and inland waters are vitally important natural assets that are used for many and sometimes competing uses. While the marine environment remains relatively intact, the same cannot be said for our inland waters, which are often degraded by surrounding land use and management.

The rangelands are similarly vast, occupying about 90% of the total area of the State. Of this area, about 40% is under pastoral lease. Much change has occurred in the rangelands in recent years, with traditional pastoralism existing alongside traditional use by Aboriginal people, and land managed for conservation purposes, tourism, mining and horticulture.

This section of the Strategy focuses on the sustainable management and use of natural resources.

Our past experience

Over the last 200 years, some of our natural resources have been used to generate wealth without understanding their place in the landscape and the consequences of upsetting balanced ecosystems. Often the mistakes of the past were exacerbated because 'development' occurred at a rate that was faster than the rate at which degradation became apparent. Examples of this are the clearing of native vegetation for broad-acre agriculture leading to waterlogging and salinity, and the overstocking of pastoral country leading to degradation of native vegetation and erosion.

The clearing of native vegetation has had a large impact on the state of our natural resources. Twenty-five shires have between 0% and 10% native vegetation cover, twenty-two shires have between 10% and 20% native vegetation cover and 685 of Beard's 305 vegetation complexes found in the south west of the State have less than 30% of their original area remaining.[17]

Native vegetation management must be considered in the context of Western Australia's unique natural heritage. The south west is one of the world's twenty-five biodiversity hotspots, and much of the region has plant species numbers in the order of 80–100 species per 10 m by 10 m square quadrat. In some areas, such as Mt Lesueur, the number is as high as 120 species per quadrat.

The present

Much activity is occurring to identify the challenges and enhance the sustainability of our environment and our industries. The State Government, the regional natural resource management groups, non-government organisations, local governments and others are developing strategies and plans of their own, but more generally in partnership, to address natural resource management issues.

[17] D.P. Shepherd, G.R. Beeston and A.J.M. Hopkins 2001, Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth.

What do we mean by natural resource management?

The Natural Resource Management Council has recently commissioned work to better define what the term 'natural resource management' means and to consider how this should be interpreted in a Western Australian context.

The term 'natural resources' is used to encompass renewable resources such as forests, water, wildlife, soils, etc., and non-renewable resources such as coal, oil, and ores, all of which are natural resources. 'Management activity' is defined as an activity undertaken by humans for the purpose of harvesting, transporting, protecting, changing, replenishing, or otherwise using resources.[18]

Sustainability in natural resource management is seen as addressing the triple bottom line of economic development, ecological integrity, and social and cultural wellbeing.

Thus, the concept of sustainable natural resource management is defined as using, conserving and enhancing natural resources so that ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased.

Core objectives

- To enhance individual and community well being and welfare by following a path of natural resources management that improves productivity and safeguards the welfare of future generations
- To provide for equitable allocation of natural resources and the involvement of affected stakeholders in natural resource decisions
- To protect biological diversity and maintain ecological processes and life support systems.

Guiding principles

- Provide a long-term vision for natural resource management based on sustainability, and intergenerational, social, economic and political equity.
- Recognise the intrinsic value of biodiversity and natural ecosystems, and protect and restore them.
- Build on the characteristics of ecosystems in the development and use of natural resources.
- Enable users of natural resources to minimise their ecological footprint.
- Recognise the distinctive characteristics of natural resources including their human and cultural values, history and ecological systems.
- Empower stakeholders in natural resource management, clarify roles of the community and other players, foster participation and establish cooperative networks to work towards a common sustainable future.
- Enhance individual and community wellbeing and welfare while having regard for intergenerational equity.
- Protect the productive capacity of the land.
- Promote sustainable production and consumption through appropriate use of environmentally sound technologies and effective demand management.
- Achieve long-term economic security.
- Monitor and evaluate outcomes and where deviations from sustainability are identified adapt the management approach to accommodate those deviations.

[18] J Dunster and K Dunster, Dictionary of Natural Resource Management, UBC Press, Vancouver 1996

BOX 34 THE NATURAL RESOURCE MANAGEMENT GOVERNANCE FRAMEWORK IN WESTERN AUSTRALIA

Western Australia has developed institutional arrangements in natural resource management over the last decade or so that have been created through community interest and government support. The arrangements are not legislated, so the structure has flexibility and the ability to respond to changing circumstances.

The State Government has a Cabinet Standing Committee overseeing policy and other developments in natural resource management, sustainability, the environment and associated areas (Cabinet Standing Committee on Environmental Policy). The Committee comprises the Minister for the Environment (chair), the Minister for Agriculture, Forestry and Fisheries, the Minister for Planning and Infrastructure, the Minister for Local Government and Regional Development and the Minister for Peel and the South West. A Natural Resource Management Council advises the Minister for the Environment on natural resource management policy issues and provides leadership in the community on natural resource management generally. The Council comprises thirteen members, eight community members chosen through an expression of interest process based on their expertise in natural resource management matters and five Directors General of State agencies involved in natural resource management.

Six regional community-based Natural Resource Management Groups have developed over the years to cover the State geographically, to focus and integrate the community input into managing natural resources. These groups are:

- The Avon Catchment Council
- The Swan Catchment Council
- The South West Catchments Council
- The South Coast Regional Initiative Planning Team
- The Northern Agricultural Catchments Council, and
- The Rangelands Natural Resource Management Coordinating Group.

The State Government and these Regional Natural Resource Management Groups, along with the Natural Resource Management Council, have signed a Natural Resource Management Memorandum of Understanding to work together to better manage natural resources within the regions and the State as a whole.

Many other groups are involved in natural resource management such as Local Government, statutory authorities (e.g. the Environmental Protection Authority and Conservation Commission) non-government organisations (such as the Conservation Council of Western Australia, Greening Australia (WA), World Wide Fund for Nature), community groups, production groups (such as the Oil Mallee association, WA No-tillage Farmers Association, Saltland Pastures Association, Liebe Group, Environmentally Responsible Agriculture Organisation) and industry. Further details on natural resource management are available on www.nrm.org.au.

The social challenge

Until recently the focus of effort in natural resource management has largely been on integrating biophysical sciences and economics. Western Australia has been at the forefront of this effort in fisheries, agriculture, mining and forestry as well as in the management of water resources such as estuaries, rivers, wetlands and groundwater. The more recent challenge for natural resource management and for sustainability generally is how to better incorporate community values–an important aspect of the social dimension of sustainability.

The importance of incorporating community values into natural resource management is perhaps best exemplified by the long-running debate on the management of native hardwood forests in Western Australia. Previous government attempts to determine appropriate management regimes failed to incorporate the groundswell of deeper community responses to the forest as a recreational resource and as an ecosystem that needed to be retained for its biodiversity and intrinsic values. In other words, the social dimension of sustainability, which included ethical considerations about the inherent environmental character of an area, had not been adequately reflected in forest management plans. The government's old-growth forests policy and proposed new Forest Management Plan represent a major step in incorporating community values, as well as scientific information and economic modelling, into forest planning and management.

Similarly the Department of Fisheries has recently released the Policy for the Implementation of Ecologically Sustainable Development for Fisheries and Aquaculture in Western Australia. The policy acknowledges the need to expand on the social and economic components of sustainability, particularly as this applies to allocation issues.

Agriculture and pastoralism have contributed to (and been impacted by) land degradation issues as well as declining commodity prices for many years. While the landcare movement and various funding sources have supported a range of actions, land degradation continues. Recent documentation by the National Land and Water Resources Audit has made very apparent the importance of the social dimension in agriculture's future. In many parts of Australia, the demography of agriculture is changing so that social considerations such as the general aging of the farming population and rural population decline are increasingly important in the debate about sustainable agriculture.

Threats to water bodies and water quality such as salinity and eutrophication are closely related to land management. Research on the Hardy Inlet, Cockburn Sound and the Peel-Harvey Estuary has provided an understanding of options to improve the management of inland and marine waters. Recent work has explicitly recognised the importance of community values in developing water management options. For example, the development of the Draft Environmental Protection Policy and Environmental Management Plan for Cockburn Sound reflects the community's values associated with the use of the sound for recreation and the protection of natural and cultural heritage, as well as productive uses.

In addition, the Department of Environment is allocating water based on biophysical research, economic analysis and community values reflecting the extent to which water should be allocated to the environment.

A strategy is proposed below to proactively support the incorporation of community values with biophysical research and economic analyses to enable sustainable natural resource management through improved use of statutory and non-statutory planning mechanisms.

Providing a statutory basis for natural resource management

There is already significant statutory power to support the sustainable management of natural resources in Western Australia and to incorporate community values in adopting these statutory processes. For example, the *Fish Resource Management Act 1994* provides for the ecologically sustainable management of fisheries through various mechanisms, including the creation of Fisheries Management Plans, while the *Conservation and Land Management Act 1984* provides for the establishment of management plans for conservation reserves and State forests.

The current work of the six natural resource management regional groups in developing regional natural resource management strategies offers a mechanism for identifying economic, social and environmental values. The close involvement of local government and interaction with the Department for Planning and Infrastructure will enable use of a variety of statutory mechanisms to support the sustainable use of natural resources at a regional scale, particularly land, water and biodiversity. This is supported by the accreditation process for regional natural resource management strategies and the recently developed Statement of Planning Policy No. 2 Environment and Natural Resources Policy.

The regional natural resource management strategies will be reviewed by the Natural Resource Management Council and the State/Commonwealth Steering Committee before being accredited by the State and Commonwealth Ministers in order to receive funding through the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust. The accreditation process, in part, requires setting clear environmental targets for resource condition and management actions and an evaluation process.

The regional natural resource management groups have agreed to involve local government more in natural resource management. Local government has significant statutory planning powers that could be used to support the implementation of the regional natural resource management strategies. Further, it may also be desirable to give effect to the regional natural resource management strategies through various statutory mechanisms, such as Environmental Protection Policies and regional Statements of Planning Policy as set out in *Sustainability and governance*.

The existing State-Local Government Working Group on Natural Resource Management could explore this model as part of the deliberations of the Sustainability Roundtable. This process should examine whether and how local government, including regional councils of local government, could support the institutionalisation of natural resource management, building on the work of natural resource management regional organisations in developing regional natural resource management strategies.

Pastoralists in the southern rangelands planning their properties using the EMU approach (see Sustainable rangelands management*).*

Source: Angas Hopkins

> SUSTAINABLE AGRICULTURE

Greening Australia (WA) believes that current agricultural land-use practices are far from sustainable. Consequently, we believe that it is necessary to formulate a new vision for our rural landscapes prior to examining the methods required to achieve this vision.

Greening Australia (WA)

Developing sustainable systems for farmers is pointless if they have no understanding of the processes involved and the adoption benefits. Hence the benefit in developing systems in partnership with farmers.

WA No-Tillage Farmers Association Inc.

The State Sustainability Strategy is largely about change. WAFarmers recognises that the agricultural regions have serious environmental, social and economic issues that need to be subjected to the change process to ensure sustainability into the future.

The Western Australian Farmers Federation (Inc)

Agriculture continues to be an important economic driver for Western Australia. The value of the State's agricultural exports for 2000-01 was estimated at $3,802 million, which represents 15% of the state's total export and 16% of national agricultural exports.

However, the 1998 Western Australian State of the Environment Report[19] identified that the economic contribution of agriculture has come at the cost of widespread land degradation associated with current farming and grazing systems. More recently, the 2001 Australian State of the Environment Report[20] concluded that, while strenuous attempts are being made to improve environmental, economic and social sustainability in many regions of established agricultural land use, serious doubts exist as to whether agricultural industries can finance the adoption of remedial and truly conservation-oriented farming systems. The Department of Agriculture[21] also notes that changing community goals and values since agriculture was established as an industry in Western Australia mean that many agricultural practices do not meet today's societal expectations of sustainability.

There are many definitions and different understandings of sustainable agriculture. The Standing Committee on Agriculture and Resource Management[22] (now the Natural Resource Management Standing Committee) identified a number of guiding principles for sustainable agriculture:

- farm productivity is sustained or enhanced over the long term
- adverse impacts on the natural resource base of agricultural and associated ecosystems are ameliorated, minimised or avoided
- residues resulting from the use of chemicals in agriculture are minimised
- the net social benefit derived from agriculture is maximised
- farming systems are sufficiently flexible to manage risks associated with the vagaries of climate and markets.

[19]Government of Western Australia 1998, Environment Western Australia 1998: State of the Environment Report, Government of Western Australia.

[20]Hamblin, A 2001, Land, Australia State of the Environment Report 2001 (Theme Report), CSIRO Publishing on behalf of the Department of the Environment and Heritage, Canberra.

[21]Department of Agriculture 2002, Submission to the State Sustainability Strategy.

[22]Standing Committee on Agriculture and Resource Management 1993, Sustainable Agriculture: Tracking the indicators for Australia and New Zealand. Report No. 51.

The Department of Agriculture[23] proposes a definition of sustainable agriculture that attempts to recognise the contribution of agriculture to the sustainability of rural communities:

Ensuring profitable agricultural systems that conserve our environment whilst contributing to the economic and social well being of rural Western Australia.

The significant environmental impacts of agriculture such as salinity and rangeland degradation coupled with declining terms of trade and, in most rural areas, diminishing populations all indicate that there are very real and significant challenges to achieving sustainable agriculture in Western Australia.

Primary producers, community organisations and government agencies are recognising the significant challenges that the move to sustainable agriculture presents and much is being done to determine how best to meet the considerable challenges that exist. For example, the widespread adoption of minimum tillage has had significant benefits in reducing erosion and runoff.

The State Sustainability Strategy will not attempt to address challenges to sustainable agriculture individually—many government and community programs are already attempting this. It will, however, propose strategies to address the most significant challenges that agriculture will face in the near future, and recommend actions which can be taken to seek out the opportunities that these challenges present and explore the role of government in addressing these.

The Department of Agriculture's submission provides a useful overview of the existing challenges to sustainable agriculture in Western Australia by considering the trends impacting on vibrant rural communities, profitable agricultural systems and conservation of the environment over the last twenty-five years as well as future challenges and emerging trends. These are summarised in Table 5 below.

However, while there is considerable awareness of the need to act on these issues, and the landcare movement has supported action in many areas, it is becoming increasingly obvious that the incremental change approach adopted has not resulted in significant change at the scale necessary to achieve sustainable agriculture. There is an expectation that sustainable agriculture in the future would look very different from the agriculture of today.

As well as the challenging trends outlined in Table 5, a number of priority issues will affect the future sustainability of agriculture in Western Australia. These are summarised below.

Table 5 Trends influencing sustainable agriculture in Western Australia

Vibrant rural communities	Profitable agricultural systems	Conservation of the environment
• Depopulation of rural areas	• Weakening relationship between farm and food prices	• Salinity
• Decreasing rural employment with increased mechanisation, comparatively low wages for the rural workforce and low diversity of job opportunities	• Decreasing terms of trade	• Loss of soil structure
• Reduction of services in rural towns	• Deregulation of markets	• Water-repellence of some soils
• Increasing isolation for those remaining in rural communities	• Relative importance of agriculture in the nation's economy is declining	• Waterlogging
• Rationalisation of country towns into large regional centres	• Introduction and spread of quality assurance schemes	• Wind erosion
		• Traffic hard-pans
		• Deterioration in remnant vegetation
		• Destruction of habitat
		• Nutrient runoff causing pollution problems
		• Soil acidity
		• Loss of biodiversity values

[23]Department of Agriculture 2002, Submission to the State Sustainability Strategy.

Salinity

Salinity is considered to be the greatest environmental threat to Western Australia and impacts significantly on broadacre agriculture, biodiversity, water supplies, rural towns and infrastructure such as roads.

It is unlikely that the process of salinity can be reversed within current farming systems. In May 2001, the Minister for the Environment and Heritage appointed a Salinity Taskforce to review the existing salinity program and to recommend future directions. The government responded to the Taskforce recommendations in July 2002 and indicated it would continue to protect high value public assets, invest in new technologies and industry development and provide incentives for on-ground work on private land. The government has also appointed a Natural Resource Management Council, indicated its support for natural resource management regional organisations and regional strategies and will provide increased attention to drainage, biodiversity and adjustment issues.

Soil acidity

The removal of product from paddocks and leaching of nitrogenous fertilisers is increasing the acidity of many soils in agricultural regions. Acidity damages plant root structure, reduces plant water use and changes soil nutrient availability, resulting in reduced productivity. Acidity is manageable; however, in the long term it could have a major impact on the productive potential of soils unless it is recognised as a factor limiting production and appropriate management is widely adopted.

Water quality, availability and drainage

Water quality in the South West of Western Australia is declining due to processes such as salinity, sedimentation and eutrophication, and agriculture is a significant contributor to these processes.

In addition about 40% of Western Australia's water use is for agriculture and the future development of agriculture depends on continued access to water resources. Irrigation could increasingly compete with uses such as public water supply and industrial activity.

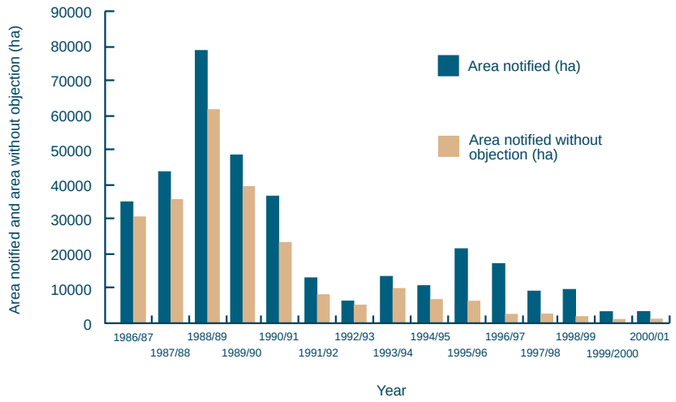
The use of drainage in rural areas is a significant issue and was highlighted in many submissions. The government's response to the Salinity Taskforce report acknowledges the important role that drainage may play in treating salinity in certain circumstances and many farmers have installed surface and sub-surface drainage. However, regional drainage schemes have not been developed and the difficult issue of likely downstream impact is largely unresolved. The government has established a high-level review of the regulatory framework for large-scale drainage, including planning, approval, maintenance and environmental impact and has funding to assist this process.

Biodiversity

Biodiversity and the conservation of natural areas as well as the preservation of important ecosystem services is very important for the maintenance of agricultural systems. Recent amendments to the *Environmental Protection Act 1986* significantly strengthen the protection of biodiversity in rural areas through regulating land clearing. Figure 7 shows that the applications to clear land and the area that was not objected to under the *Soil and Land Conservation Act* have declined significantly.

Much more effort will be needed to preserve biodiversity in some areas, particularly with the potential risk to existing reserves in the wheatbelt from salinity. New ideas are emerging, such as the development of bushland corridors linking reserves (the Wildcountry Gondwana Link project or the Malleefowl Link concept) and the proposal to trial the EMU Plus process being successfully implemented in the rangelands.

Figure 7 Clearing applications under the Soil and Land Conservation Act (1986 - 2002)



Source: Department of Agriculture

Greenhouse gas emissions

The agriculture sector is the second biggest contributor to greenhouse gas emissions through the emission of methane and nitrous oxide by livestock. The National Greenhouse Gas Inventory estimates that agriculture contributes approximately 18% of total national greenhouse emissions, although in Western Australia agriculture is estimated to contribute approximately 30%. Being a major contributor to emissions, agriculture will be expected to reduce emissions, a challenge for an already efficient system. In 2002, Western Australia's greenhouse gas emissions from agriculture were 115% of 1990 levels. Agriculture production in 2000 was about 145% of that in 1990. Agricultural efficiency, per tonne of greenhouse emissions, has therefore increased by 30%. Put another way, the intensity of emissions, per unit of agricultural production, has decreased. This trend is likely to continue as farming practices improve. Plantations have now become a net sink for carbon as clearing of agricultural land has declined (see detail in Greenhouse Strategy).

Climate change

Climate change as a consequence of greenhouse gas emissions is expected to have a significant impact on the agricultural sector. Generally Western Australia is expected to become warmer and drier, particularly in the south of the State. This could mean a reduction in crop yields in some areas as a result of a shorter growing season and less winter rainfall, though agriculture has shown considerable capacity to adapt to these conditions over the last decade. For example, a recent study of the effect of climate change on the economics of eastern Wheatbelt farms suggests that although profitability declines under a warmer and drier climate, this can be compensated by technological improvements. In other, higher rainfall areas, reduced waterlogging risk will increase the prospects of viable cropping. For many areas, the risk of damaging frosts could decline in the longer term. There is likely to be considerable spatial variability in the response of agricultural systems to climate change.

Projected increases in temperatures have implications for variety selection and breeding for cropping, pasture and horticulture enterprises. Crops dependent on a 'chill factor' to produce fruit such as vines and stonefruit in particular may be adversely affected. Tree crops are more sensitive to temperature trends because of the longer lead times associated with their establishment and development compared with annual crops. In many cases there are variety and/or management options available to adapt to a warmer climate, but they commonly incur increased production costs or changes to product quality.

A mitigating factor for crops such as wheat is that yields increase under higher CO_2 concentrations. However, existing varieties show yield reductions as warming increases beyond about 1 degree of mean temperature. Impacts on plant diseases and insect activity are uncertain due to the complex interaction between climate and pathology.

Climate change is likely to affect pasture growth in the southern rangelands. Projected increases in temperature and rain over the southern rangelands may result in increased pasture growth but could also bring changes in species competition and fire regime. Some pasture species could become extinct or restricted in range – leading to a decrease in biodiversity.

Climate change could also affect milk and meat production due to increased heat stress on livestock. There are management responses to adapt to this, but at increased cost of production.

There is likely to be a major issue with water supply, both on- and off-farm sources being affected by changes in the frequency and duration of runoff events. Decreased runoff into farm dams would require improvements to dam catchments and dam design, while there is also likely to be increased competition from the metropolitan area for regional water resources.

Climate change will affect natural resource management as well as production risk. Interactions between rainfall, temperature and evaporation could easily result in an increased risk of wind erosion, but could provide a benefit by potentially slowing the spread of salinity.

A final factor to consider is that agriculture in Western Australia may be affected just as strongly by changes in agricultural production overseas. The future economic climate will be as important as the atmospheric climate.

The challenge exists for agriculture to adapt to climate change and respond to increasing pressures to reduce greenhouse gas emissions; however, it is not yet clear that farmers will be able to make sizable emission reductions through changes in management practices.

Weeds, pests and diseases

Current agricultural systems are heavily reliant on the use of chemicals to control weeds, pests and disease. A number of pests and diseases are already expressing tolerance to chemical control methods, threatening the productivity of agricultural systems. Resistance is expected to be a continuing problem. Exotic weeds, pests and diseases could establish themselves in Western Australia, threatening many existing agricultural systems as well as the natural environment.

Biotechnology

Biotechnology will be a main influence on broadacre farming in the future. Farmers have readily adopted genetically modified crops in a number of other major grain exporting regions.

A number of submissions raised concerns about the risk associated with genetically modified organisms in agriculture. The Western Australian Government is adopting a cautious approach to this matter. Small-scale field trials are being undertaken to provide further information about these crops in Western Australian conditions, and consultation has been undertaken on the application of genetic modification free zones within Western Australia. The Department of Agriculture actively monitors market trends for GM grains.

While the Federally-based Office of the Gene Technology Regulator is responsible for ensuring human safety and environmental protection, each State is responsible for putting measures in place to safeguard its own produce and industries from a marketing perspective.

Maintaining vibrant agricultural communities

Agricultural trends and other pressures have resulted in the depopulation of rural areas. To maintain vibrant rural communities a number of challenges facing rural communities will need to be addressed. In particular a tension exists between the desire to revitalise rural communities and economic pressures encouraging farm businesses to grow and consolidate by buying out or leasing adjacent lands.

As Barr and Cary[24] note:

> In many areas 'sustainable agriculture' will be as much about industry restructuring as about agricultural systems and agronomy. This raises larger questions about the acceptable rate of community change and the desirable form of rural communities.

It appears the economic and social components of sustainability are in direct opposition to each other under traditional farming systems. Consequently the challenge exists to develop rural industries that maintain or revitalise rural communities (see case study on the Oil Mallee Project) through new, diversified, low-impact crops and farming systems with employment and environmental benefits.

Opportunities for sustainability

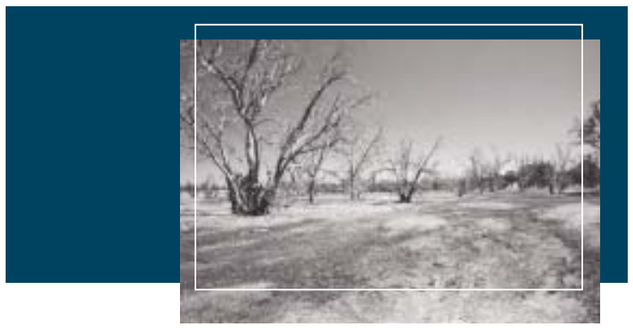
When all of the existing and possible future challenges to agriculture are considered, it is easy to be overwhelmed by the scale of the changes necessary to address these. As the Australian Natural Resource Atlas[25] suggests:

> The task of improving catchment health, particularly reducing the predicted future impacts of salinity, is a massive undertaking. A sustainable long-term solution implies significant and major changes in catchment landscapes. If we look at this task in short time frames, it is easy to become overwhelmed. History tells us that societies do not achieve such massive changes in landscape in short time frames without social disruption.

Further, the Australian Natural Resource Atlas concludes that land use change is always occurring, and in most cases this change is being driven by economic and social factors unrelated to natural resource management policy.

Attempts to pursue sustainable agriculture in Western Australia must promote all three dimensions simultaneously by developing and supporting forms of agriculture that are profitable, environmentally beneficial and contribute positively to people living in rural areas by maintaining social capital. While fundamental changes will be necessary, this will only occur in the longer term.

A number of submissions called for a new vision for our agricultural and rural landscapes as the basis for putting in place policies and processes to assist the transition to a more sustainable agriculture (see Box 35 Wildcountry: Gondwana Links). The new Natural Resource Management Council could assist with this, by advising government on the appropriate mechanisms to support sustainable agriculture.



Salinity is the most significant environmental issue in Western Australia threatening the productivity of agricultural lands, biodiversity values, aquatic systems and water supplies, as well as rural infrastructure including roads and buildings. This photo shows the impact of salinity in the Wellington catchment.

Source: Jiri Lochman/ Department of Conservation and Land Management

[24] N Barr & J Cary, Influencing Improved Natural Resource Management on Farms: A guide to understanding factors influencing the adoption of sustainable resource practices, Bureau of Rural Sciences-Discussion Paper, Department of Agriculture, Fisheries and Forestry-Australia, Canberra, 2000, p. 4.

[25] Commonwealth of Australia 2001 http://audit.ea.gov.au/ANRA/People/docs/adjust_fact_sheet/future.html

BOX 35 WILDCOUNTRY: GONDWANA LINKS

Can we halt ongoing biodiversity loss and build sustainable rural communities?

That's the challenge a partnership of non-government groups has set itself in the Gondwana Link partnership. Made up of Greening Australia, the Wilderness Society, Fitzgerald Biosphere Group, Friends of Fitzgerald River National Park, Australian Bush Heritage Fund and the Malleefowl Preservation Group, the partnership is restoring links from the inland woodlands around Kalgoorlie to the karri forest of the wetter south western corner.

The partnership's main focus at present is on re-vegetating farmland between the Stirling Range and Fitzgerald River National Parks as well as securing conservation protection and management for the vast mosaic of woodland, mallee and heathlands that stretch east of the cleared wheatbelt.

The partnership uses a range of innovative approaches. Philanthropic donors have assisted with the purchase and revegetation of farms, researchers are developing biodiverse farming systems, farmers have been encouraged to put covenants on the bushland, conservation investors have purchased bushland areas and conservation science approaches have been developed to focus on the fundamental ecological processes that operate across southern Australia.

The project takes part of its inspiration from similar continent-scale processes underway in the United States, including the ambitious 'Yellowstone to Yukon' conservation network currently under development. The partnership is also working with the United State's largest conservation group, The Nature Conservancy, to build Western Australia's ability to attract private funding to large-scale environmental works.

Opportunities that exist to support a transition to more sustainable agriculture include:

- Developing more sustainable agricultural industries that have well-developed and applied best management practices (see Box 36), including low-input agriculture to meet future market needs.
- Further developing accreditation methodologies for agricultural systems that enable access to markets through verified compliance with production processes that ensure food safety/quality and/or sound environmental management.
- Significant research and development of new industries and innovations that are profitable and environmentally responsible, such as bio-fuels.
- Exploring new opportunities for agriculture that could be provided through the concept of valuing ecosystem services through market-based instruments.
- Supporting the development of carbon sequestration opportunities, including commercial plantations, alley farming and landcare plantings to offset greenhouse gas emissions that could provide salinity benefits as well as large renewable energy resources for power generation. These plantings could be strategically developed to support programs like Wildcountry in creating important bush links across the landscape.

BOX 36 ENVIRONMENTAL MANAGEMENT SYSTEMS AND ACCREDITATION FOR SUSTAINABLE AGRICULTURE

The Commonwealth and State governments have been working together to investigate the opportunities and possibilities associated with environmental management systems in agriculture. Similarly, the World Wide Fund for Nature and others have been investigating the place of accreditation for sustainable agricultural systems.

This work is in recognition of the international trends in the adoption of environmental management systems to other forms of primary production and the possible application to simultaneously assist with making agriculture more sustainable and benefiting agricultural producers.

The term 'environmentally responsible agriculture' reflects the inter-generational equity and precautionary principles of sustainability. This is demonstrated through the adoption of management practices judged as sustainable through a transparent and scientifically rigorous process. The Department of Agriculture is developing the framework to describe processes and outputs for the achievement and demonstration of environmentally responsible agriculture. The framework will define the roles, responsibilities and communication strategies that underlie the processes and outputs and will be developed in consultation with relevant stakeholders from industry, community and government. The major processes and outputs described in the framework are outlined below:

- engagement of relevant producer and community groups
- environmental condition assessment using spatially defined zones
- natural resource management outcome targets
- industry performance standards linked to natural resource management outcome targets
- best management practices underpinned by these standards which allow for profitable agriculture and address environmental outcomes
- sign-off and reporting to a third party on compliance with best management practices,
- evaluating and reporting progress towards natural resource management outcome targets.

Volunteers involved with the Gondwana Links project help revegetate 70ha of cleared land with native species. Revegetation will re-link a large area of bush with a nearby nature reserve (see Box 35*).*

Source: Amanda Keesing

In short...

Vision

Agriculture achieves a new balance in Western Australia with production becoming more efficient and diverse while restoring ecological integrity in the landscape. Natural bush and regenerated land are linked in corridors across the State. New bio-industries based on local species are creating employment in rural towns.

Objectives

- Develop and identify agricultural systems designed to maintain or improve the condition of the State's natural resources.
- Facilitate the widespread adoption of best management practices that minimise environmental impact while improving profitability.
- Facilitate appropriate landuse change.

Actions underway

- The Department of Agriculture and other State and Commonwealth government agencies such as CSIRO and Land and Water Australia support or directly undertake considerable research, development and extension of sustainable agriculture techniques, such as best management practices for farmer groups and individuals, including the development of best management practices for irrigators in the south west irrigation area.
- The Department of Agriculture and the Great Southern Development Commission are undertaking the Central South Coast Strategic Analysis to identify the constraints impeding adoption and implementation of change to more sustainable agricultural practices.
- The Western Australian Government has responded to the Salinity Taskforce's report and outlined its strategic priorities for salinity management in Western Australia.
- The government will continue to lobby the Federal Government for a greater share of national salinity funding to ensure appropriate recognition of the significant extent of Western Australia's dryland salinity.
- The Western Australian Government is amending the Environmental Protection Act to provide for improved management of land clearing.
- The Cooperative Research Centre for Plant Based Solutions to Dryland Salinity has been established.
- Research into the productive use of pastures on saline land has increased. The aim is to improve the sheep grazing value of saltbush-based pastures by optimising the combination of shrub and under-storey plants and their utilisation.
- The University of Western Australia in collaboration with the State Government has established a Centre of Excellence in Natural Resources Management at its Albany campus.
- Organisations like the Western Australian No-Tillage Farmers Association are researching more sustainable agricultural practices.
- In May 2001, the government announced an interim 5 year moratorium on the commercial production of GM food crops to allow issues associated with market impacts, identity preservation and the feasibility, risks and benefits of establishing GM and GM-free zones to be fully debated in the community. The GM Crops Free Areas Bill 2003 will enable the government to designate areas where commercial cultivation of specified GM food crops is prohibited. The Gene Technology Bill 2001 has been examined by the Standing Committee on Public Affairs and Environment that reported to the Legislative Council in July 2003. Passage of both bills is expected in 2003.

In short cont'd...

Actions

3.1 Through the Natural Resource Management Council, the Sustainability Roundtable and the Sustainability and Development Assessment Committee of the Western Australian Planning Commission, support the increased involvement of local government in planning for natural resource management, including issues of agricultural sustainability, particularly regional drainage, biodiversity conservation, regional revegetation programs, water quality and soil acidity.

3.2 In collaboration with regional natural resource management groups conduct resource risk assessments and develop regional targets for natural resource condition, for incorporation into regional natural resource management plans.

3.3 Carry out strategic land use analyses in relation to resource condition targets and support diversification and landscape scale change towards sustainable land use.

3.4 Continue to develop the Western Australian Government's policy on genetically modified food crops including through the enactment of the Gene Technology Bill 2001 and the Genetically Modified Crops Free Area Bill 2003.

3.5 Research and extend the productive use and rehabilitation of saline lands including management of the Western Australian component of the Sustainable Grazing on Saline Lands program involving participative research by up to sixty farmer groups in agricultural areas.

3.6 Develop with industry participation, standards and best practices for agricultural systems at regional and enterprise scale to provide the basis for accreditation of sustainable agriculture practices and to support regulatory processes.

3.7 Investigate economic incentives and innovative instruments such as biodiversity offsets, integrated ecosystem services trading, tax incentives and environmental stewardship rebates as well as land purchase, as drivers of land use change towards more sustainable use.

3.8 Support the sustainability of farming enterprises and improved self-management of price, climate and other risks associated with agriculture through:

- research into improved risk prediction mechanisms, e.g. seasonal weather forecasting
- promoting a better understanding and use of risk management strategies such as enterprise diversification, Farm Management Deposits, price risk management and off-farm investment, and
- reforms to support schemes such as Exceptional Circumstances to ensure they meet broader sustainability needs.

3.9 Investigate the application of the EMU Plus process developed in the rangelands as a means of empowering farmers and catchment groups, building capacity, facilitating change and leveraging private investment towards sustainable agriculture.

3.10 Work with grower groups to implement Water Wise on the Farm, a training program for irrigators to improve irrigation skills and conduct research and extension programs to improve the productivity, efficiency and sustainable use of water.

In short cont'd...

3.11 Manage bio-security threats to sustainability through:

- pre-border and border controls to minimise the introduction of non-established animals and plant pests and diseases
- maintaining a capacity and capability to manage incursions of non-established animal and plant pests and diseases, and
- reviewing, with the Agriculture Protection Board, industry, community and local government participation, the funding and decision-making arrangements for management of widespread declared plant and animal pests.

3.12 Work towards a greenhouse neutral agriculture including by collaborating nationally on research to quantify the emissions of non-CO_2 greenhouse gases from agriculture and quantifying the impacts of changed management on these emissions.

3.13 Promote industry development opportunities such as bio-energy production and 'carbon farming'.

Global opportunities

Resolution of many of the issues affecting agriculture in Western Australia, such as salinity, soil acidity, the impact of climate change and the need to reduce greenhouse emissions, is integral to achieving sustainable natural resource management. These issues are being experienced in other regions of the world. Through joint research as well as involvement in aid projects Western Australians will continue to contribute positively to resolving agricultural sustainability challenges in our State with the knowledge of global experience. The more that Western Australia participates in this process the more globally relevant experience the State will gain. This will benefit farmers, consultants, industry groups and government agencies.

Further information

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> SUSTAINABLE FISHERIES AND AQUACULTURE

Fisheries management and sustainability is one of the good news stories in Western Australia. This is due to a powerful regulatory system and technology and resources for monitoring and reporting, as well as strong cooperation and partnerships with industry and the community. The Western Australian Government has adopted a policy on the ecologically sustainable management of fisheries that is a world first.

The achievement of ecosystem-based management is hampered by the absence of an overarching, bio-regional, marine planning system and the lack of integration between the implementation of the marine reserve system ... fisheries management and the Commonwealth's Oceans Policy.

Environmental Alliance

The WA Rock Lobster industry is the world's first fishery to receive Marine Stewardship Council certification.

Worldwide Fund for Nature

The rock lobster industry is global best practice in many ways, its management techniques should be translated to other fisheries, including aquaculture.

Australian Corporate Citizenship Alliance

In 2001-02, commercial fisheries, including aquaculture, accounted for $615 million of Western Australia's income per annum, of which over $600 million comes from exports. These exports represent about 25% of the national total, making Western Australia the leading State in terms of fisheries. Additionally, an estimated 600,000 Western Australians contribute a further $570 million in annual economic activity from recreational fishing and aquatic eco-tourism. In some regional towns in the Gascoyne and Kimberley regions, fisheries activity provides the main form of employment.

A key feature of our coastal waters is the diversity of fish. This supports well-developed commercial and recreational fisheries. Within Western Australia there are thirty-four managed commercial fisheries, five licensed recreational fisheries and a number of emerging aquaculture industries. These fisheries are mainly coastal and have developed under conditions of low productivity compared to western shores of the other continents in the southern hemisphere.

Many of the target species are demersal and rely on specific habitats, for example coral reefs, mangroves or algal reefs that are limited in number and extent. This scenario leads to the possibility of over-exploitation that could compromise the sustainability of these fish stocks and other interdependent non-target species and their habitats. Fish Habitat Protection Areas are being established as an integral part of fisheries management plans and strategies.

Fisheries management

The *State of the Fisheries Report 2001-2002* reports comprehensively on the status of Western Australian fish stocks, associated fishing activities and aquaculture development as well as the associated impacts of these industries. The report indicates that the majority of the fish stocks are in a healthy condition and are being exploited at sustainable levels. The report notes that the southern pilchard stocks, which were severely depleted as a result of a virus in 1999, are now showing good signs of recovery. The remaining commercial fishery of concern is the southern and west coast demersal gillnet and demersal longline fishery for shark which is responding to management, but is also being impacted by other offshore fisheries not under Western Australia's jurisdiction.

Over-exploitation of our natural biological resources can compromise sustainability. The sustainability of fish stocks and conservation of their habitats are desired government outcomes reflected in the *Fish Resources Management Act 1994*. The objects of this Act are consistent with sustainability objectives and guiding principles. In addition, Commonwealth Government legislation now requires that all export fisheries undergo an assessment against guidelines for sustainability.

BOX 37 ACCREDITATION FOR SUSTAINABLE FISHERIES AND THE WESTERN ROCK LOBSTER FISHERY

The Marine Stewardship Council is an independent global organisation established to harness consumer purchasing power to generate change and promote environmentally responsible stewardship of the marine environment. The Council has been operating independently since 1999, though it was first established in 1997 with international food company Unilever and the Worldwide Fund for Nature.

The Western Rock Lobster Fishery is widely recognised as one of the best managed fisheries in the world and is Australia's most valuable single species fishery, at a value of $300 to $400 million annually. In March 2000, it became one of the first fisheries in the world to receive certification from the Marine Stewardship Council.

The foundation of this success was a management package introduced by the Department of Fisheries in 1993-94 to rebuild severely depleted breeding stock. In 1997-98 and 1999-2000, these management measures resulted in bumper catches and economic prosperity for commercial fishers and the State.

The Council's accreditation process is now also paving the way for the fishery to meet its requirements in demonstrating ecological sustainability to Environment Australia—a necessary requisite for all future export fisheries under the Commonwealth's *Environmental Protection and Biodiversity Conservation Act 2000*.

Approximately twelve to twenty-five fisheries worldwide are in various stages of assessment for accreditation by the Marine Stewardship Council. The Council has established an Asia-Pacific presence in Sydney that will allow it to better respond to the increasing demand for its accreditation services with considerable benefit to Australian fishing industries.

The government has recently committed $15 million to the development of a new fisheries research institute and associated community education initiatives to promote the sustainable use and management of marine resources.

The Department of Fisheries has also released a Policy for the Implementation of Ecologically Sustainable Development for Fisheries and Aquaculture in Western Australia.[26] This policy outlines how sustainability can be implemented within the fisheries sector. It focuses on environmental components of sustainability that are necessary to complete the assessments for export that Commonwealth Government legislation now requires. Future revisions of the policy will expand upon the social and economic components of sustainability and consider resource allocation issues.

The policy requires the preparation of sustainability assessments for each fishery, with the report being made available for public comment. Effort is currently directed towards commercial fisheries, particularly those with a substantial export component. Work has also commenced on a reporting framework for aquaculture.

The Department of Fisheries has identified the following key issues as requiring consideration in the future:

- an increased public requirement for accountability in respect to the maintenance of biodiversity and the ecologically sustainable use of the marine environment

[26]Department of Fisheries 2002. Policy for the Implementation of Ecologically Sustainable Development for Fisheries and Aquaculture within Western Australia. Fisheries Management Paper No. 157, Perth.

- additional pressure placed on inshore fish stocks as a result of continuing population growth, coastal development, improved access and fishing technology, together with a growing recreational sector
- the development of high-quality recreational fisheries and low-impact eco-tourism experiences in some regions to meet increasing community interest and tourism potential
- direct involvement of the Commonwealth Government in the day-to-day management and planning of Western Australia's marine environment through the implementation of the Commonwealth's Oceans Policy initiative, and
- Indigenous fishing issues and the development of the law in respect to Native Title.

There is also increasing pressure on the marine environment from a variety of users, including those in the aquaculture, fishing and tourism sectors, together with a growing community desire for unfettered access to the marine environment and for conservation of important areas, habitats and species. For certain types of aquaculture, there is a shortage of high-quality marine sites. Suitable sites tend to be in high-use areas and close to major townsites. This often results in a high level of conflict between aquaculturalists and other users and the general community.

A number of State government agencies are involved with planning for the marine environment[26]:

- The Department of Fisheries prepares plans for fish habitat protection areas, aquaculture plans, fisheries management plans, regional recreational fishing management plans and fisheries environmental management plans.
- The Department of Environment prepares water management programs for estuaries and inlets.
- The Department of Industry and Resources plans for resource development in State waters.
- The Department of Conservation and Land Management plans for marine nature reserves, marine parks, marine management areas and for management of marine wildlife.

There is currently no legislative framework for planning in the marine environment and existing land use planning processes for coastal lands often do not integrate the use of the adjoining marine environment. Government has gazetted a State Coastal Statement of Planning Policy that requires the marine impacts of coastal land use decisions to be taken into account. A marine planning strategy is proposed to provide an integrated planning framework for the marine environment. This strategy would complement State and regional land planning strategies. This need has been recognised in the government's response to the Report of the Ministerial Taskforce on Coastal Planning and Management 'Coasts WA: Better Integration'. The report outlines an integrated coastal planning and management framework. The framework proposes the development of a State Coastal Strategy and State Marine Planning Strategy that will provide mechanisms for a more integrated planning framework for the marine environment.

Marine and freshwater biodiversity conservation

The Marine Parks and Reserves Authority and the Department of Conservation and Land Management have responsibility for establishing and overseeing the management of marine parks and marine nature reserves under the Conservation and Land Management Act, and for the protection of biodiversity in them. The Department also has responsibility for the conservation of marine mammals, reptiles and birds in Western Australian waters. The government is committed to the expansion of the marine conservation reserve system, including six new marine reserves by 2005.

Lead responsibility for management of populations of all other marine organisms is with the Department of Fisheries under the *Fish Resources Management Act*. For the purposes of that Act, all those marine organisms are fish (this includes algae and marine invertebrates). Under the Fish Resources Management Act, the Minister for Fisheries may declare fish habitat protection areas for conservation of fish and marine ecosystems, for fish research and for appreciation of fish in their natural surroundings.

While the *State of the Fisheries Report* indicates that the majority of commercial, recreational and aquaculture fisheries are being managed sustainably, there is concern about the status of the freshwater fish populations, particularly in the south west corner of the State. There are fourteen species of freshwater fish in the south west of Western Australia and eight of these are endemic. Most are affected to some extent by habitat loss and five are considered potentially vulnerable because of this. In the south west, habitat degradation of freshwater systems has occurred because of salinity, the clearing of native vegetation, point source pollution, eutrophication, silting and the loss of riparian vegetation. Considerable effort needs to be directed to planning for the protection and management of freshwater fish. The Department of Fisheries has a responsibility for freshwater fish.

In short...

Vision

Marine fisheries and aquaculture are sustainably managed in a way that ensures all species, including the non-commercial species, can survive and that people can enjoy the benefits of recreational activities in marine environments. Inland aquatic systems are managed so that no further decline in fish species occurs.

Objectives

- To protect biodiversity and maintain essential ecological processes of the marine environment.
- To provide effective legal, institutional and economic frameworks for ecologically sustainable development of fisheries based on sound science.

Actions underway

- The Department of Fisheries is compiling ecologically sustainable development assessment reports for commercial fisheries for export approval under the Commonwealth's Environment Protection and Biodiversity Conservation Act. Assessment of other sectors will follow.
- The State Government is involved in implementing the National Oceans Policy, particularly in northern Australia and commencing in the south west in 2004.
- The government has committed $15 million to the establishment of a new fisheries research institute and associated community education initiatives to promote the sustainability of marine resources.
- Fish habitat protection areas have been established at the Abrolhos Islands, Lancelin Lagoon, Cottesloe Reef and Miaboolya Beach.
- Six marine parks (Ningaloo, Marmion, Shark Bay, Shoalwater Islands, Rowley Shoals and Swan Water Estuary) and one marine nature reserve (Hamelin Pool) have been established. The Marine Parks and Reserves Authority and the Department of Conservation and Land Management are continuing to implement identified State Government priorities for further reservations, including new marine parks or reserves at Jurien, Montebello/Barrow Islands, Dampier Archipelago, Leeuwin-Naturaliste and Walpole-Nornalup Inlets, as well as extensions to existing parks particularly Ningaloo.

In short cont'd...

- Fisheries environmental management reviews are being prepared on a region-by-region basis for all fisheries and fishing activity in Western Australia's marine waters out to the 200 nautical mile Exclusive Economic Zone boundary.
- Regional recreational fisheries management strategies have been developed for the Gascoyne and West Coast regions. Planning is underway for the Pilbara-Kimberley and South Coast regions. Aquaculture development plans are being developed on a regional and/or sectoral basis.
- The Western Rock Lobster Fishery has been certified by the Marine Stewardship Council, an independent body that accredits fisheries on their environmental sustainability.
- Work is being undertaken to preserve freshwater fish stocks, including research, retaining breeding stocks, working with other relevant departments, and working with a freshwater fish reference group to identify issues associated with the conservation of native fish and establish priorities for management.
- The Great Southern Development Commission is undertaking work to assess the capacity of the local fishing industry to add value to the local fish resources, find markets and make a better return.
- The Aboriginal Fishing Strategy Working Group released a discussion paper on a proposed Aboriginal fishing strategy.

Actions

3.14 Expand the scope of the existing and proposed environmental assessments of fisheries and aquaculture sectors to include social and economic components in order to meet government policy and legislative objectives.

3.15 Develop a State marine planning strategy through the Coastal Planning and Coordination Council.

3.16 Develop a long-term aquatic ecosystem strategy to rehabilitate freshwater ecosystems and establish a freshwater native fish sub program within the Department of Fisheries to conserve and protect the native freshwater fish populations of the State.

3.17 Continue to establish fish habitat protection areas to complement the marine park and reserve system.

3.18 Continue to expand the State's marine conservation reserve system, by meeting the government's commitment to establish five new marine parks and reserves over the next 18 months.

3.19 Continue and expand targeted education and training programs to promote sustainable fisheries and aquaculture throughout Western Australia.

3.20 Support the development of an integrated fisheries management strategy and supporting processes taking into account the needs of all stakeholders on a bioregional basis (e.g. commercial, recreational, conservation, Indigenous, tourism, pearling and aquaculture).

In short cont'd...

Global opportunities

Global fisheries are not managed sustainably, particularly in the developing world. There are many international projects that could utilise Western Australia's expertise in sustainable fisheries, aquaculture management and marine planning processes leading towards sustainable management of marine environments.

Further information

Department of Fisheries 2000-2001, *Policy for the Implementation of Ecologically Sustainable Development of Fisheries and Aquaculture within Western Australia*, Fisheries Management Paper No.157, Department of Fisheries, Perth, viewed August 2002, http://www.fish.wa.gov.au/esd/index.html

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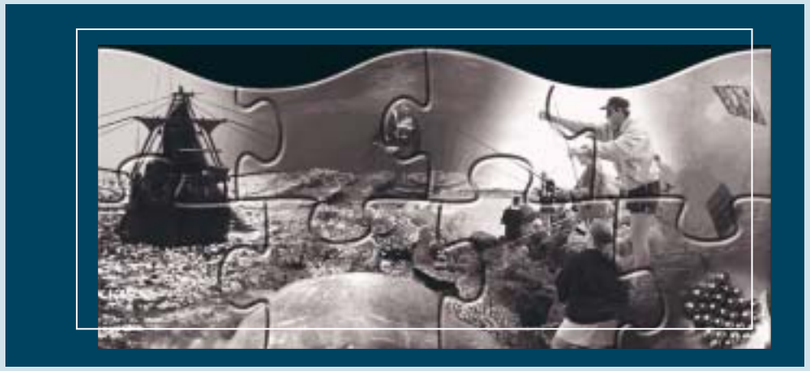

Department of Fisheries believes that sustainability is like a jigsaw: people, fish, marine ecosystems, technology and science, all fitting together for a long term future.

Source: Department of Fisheries

> SUSTAINABLE FORESTRY AND PLANTATIONS

The Western Australian Government has ended logging in old-growth forests on public land and is proceeding to incorporate these areas into secure conservation reserves, including thirty new national parks. As part of this process the government has put in place programs to restructure the timber industries to maintain social capital and regional development opportunities. This $151 million package is an essential part of how sustainability applies to forests.

Increasing global attention is being directed to our attempts to save forests, create habitat for rare and endangered species, manage feral animals and weeds. Can this become a new economic opportunity for the State? How can this help communities in rural areas?

Environmental Alliance

Western Australia's State forests and timber reserves are vested with the Conservation Commission of Western Australia and managed according to an approved management plan. A Draft Forest Management Plan for the State's south west forests was released for public comment in August 2002 as part of the development of the new plan to implement the government's forest policy. The government is committed to maintaining the ecological integrity of forests and woodlands, and will achieve this through the application of ecological sustainable forest management principles.

The Draft Forest Management Plan proposed refinements in the way in which levels of sustained yields of timber from native forests are calculated, to provide more accurately for risks and impacting processes that can affect future yields. It also proposed to formalise adaptive management: a systematic approach to defining management actions, implementing them, monitoring their impacts and then adapting the management practice based on the results of the study. Further research and monitoring to improve the knowledge base underpinning ongoing management decisions will be required. The proposals are consistent with the precautionary principle. These actions were carried forward in the Proposed Forest Management Plan that has been endorsed by Cabinet to be forwarded to the Environmental Protection Authority for assessment.

Potentially the greatest single threat to biodiversity values in the south west, *Phytophthora cinnamomi*, sometimes referred to as jarrah dieback, is estimated to affect around 4000 species of native plants and to cause major, permanent and irreversible changes to vegetation structure and habitat values for native animal species. Other species of *Phytophthora*, species of *Armillaria* and a range of insect pests also cause significant damage.

Phytophthora species continue to pose a significant risk to the sustainability of forests in Western Australia. Disease management needs a strong commitment, such as rigorous controls on movement of vehicles and other vectors into likely uninfested areas, including those in State forest and timber reserves, national parks and nature reserves in the south west. A commitment to evaluate rehabilitation requirements of areas degraded by *Phytophthora* is also required.

The forest plantation industry has an important role to play in the future sustainability of the State. Plantations have the potential to produce timber to compensate for the declining production from native forest. They can be a sink for greenhouse emissions earning carbon credits on a world market. In addition, plantations can help deal with salinity and other land degradation issues and, if placed correctly with appropriate species, can help restore biodiversity values, especially through linking existing conservation reserves and other remnant vegetation. Plantations can also be the basis of new bio-industries including bio-energy (see *Sustainable energy*).

The Forest Products Commission has developed an Action Plan for Tree Farming for the south west that includes sawlog eucalypts, maritime and radiata pines, oil mallees and blue gums. The Commission is also developing a suite of salt-tolerant eucalypts to provide commercial revegetation options for land affected by salinity, and is working with the Department of Conservation and Land Management to develop new woody tree crops. The Forest Products Commission's INFINITREE™ initiative seeks to maximise the economic, environmental and social benefits of tree farming in medium rainfall areas of the agricultural zone.

The sandalwood industry has considerable potential to contribute to diversification in the rangelands. The opportunities that the sandalwood industry provides for diversification should be reviewed. Such a review would oversee the development of an integrated business and resource management plan that ensures the resource is managed on an ecologically sustainable basis, that maximises environmental, social, regional development benefits as well as providing adequate financial returns to the State. The review should also examine and report on mechanisms to support further development of sandalwood plantations in the agricultural region. The Forest Products Commission has commenced trials with pastoral leaseholders to reduce and where possible eliminate feral goats from sandalwood production areas.

As for other sustainability issues, there will be an ongoing need to continue to involve the community in the planning and decision-making in relation to forest management.

In short...

Vision

Western Australia's native hardwood forests are managed on an ecologically sustainable basis that provides for a wide range of uses, all of which reflect the unique values of these forests. Regeneration of native forests is also a major focus, with strong community involvement. Production of sawlogs, pulpwood and other timber products from sustainably managed plantations is integrated with native forest use. Rural communities have adjusted to support the changed focus in use and management of native forests and the ongoing development of plantations throughout the south west, including their role in restoring degraded landscapes creating new bio-industries and providing other environmental services such as carbon sequestration. Woodlands and sandalwood resources are also used and managed sustainably, with sandalwood production providing the basis for a new industry in the rangelands.

Objective

- Ensure that Western Australia's forests, woodlands and sandalwood resources are managed according to sustainability principles.
- Encourage the expansion of tree farming to achieve environmental, social and economic benefits.

Actions underway

- The Conservation Commission has prepared a proposed forest management plan incorporating ecologically sustainable forest management principles, which is being assessed by the Environmental Protection Authority.
- The government has ended logging in the remaining old-growth forests on State-owned land and is working towards the creation of thirty additional national parks and two new conservation parks to expand the reserve system in the forested south west.

In short cont'd...

- The Forest Products Commission has developed an Action Plan for Tree farming covering the south west. In medium rainfall areas, this is being implemented through the Commission's INFINITREE™ initiative to maximise economic, environmental and social benefits.
- An agreement to develop a LVL plant from the Gnangara pine plantation creating over 100 jobs and improved groundwater management possibilities.
- New bio-industries (and bio-energy) based on tree plantations are being created around Oil Mallees, pine plantations and bluegum plantations as well as from trees like sandalwood.

Actions

3.21 Continue to support restructuring of the native forest timber industry, giving particular support to value-adding opportunities in the timber processing and wood working areas, especially production and marketing of fine timber products made from specialty native hardwoods.

3.22 Promote the efficient use of all logs, development of high value-added timber utilisation, and forest structure based on maintaining the full range of forest values including sawlog production.

3.23 Actively support the Action Plan for Tree Farming in Western Australia and the Forest Products Commission's INFINITREE™ initiative for the further development of a plantation industry on previously cleared agricultural land within the guidelines being developed by the Western Australian Planning Commission to retain viable rural communities. Particular attention should be given to production of sawlogs as a substitute for the declining yield from native forests and for carbon credits,

3.24 Work to create new bioindustries including bio-energy from plantations across the state.

3.25 Finalise the boundaries of the thirty new forest national parks committed to by the government after consultation with the public.

3.26 Review the sandalwood industry in Western Australia, the present and projected resource availability, the manner and pattern of exploitation of the resource, and the role that it might play in regional development and ecologically sustainable management of the rangelands. Develop sandalwood management having regard to principles of ecologically sustainable forest management.

3.27 Seek to minimise the loss of natural values from State forests and timber reserves and all other reserve categories within the south west as a consequence of the extraction of low-value bulk commodities such as sand and gravel.

3.28 Create a comprehensive dieback strategy to:

- establish and maintain a database on the distribution of *Phytophthora* species throughout the south west for use in planning timber harvesting operations and other activities
- develop and implement rehabilitation plans for selected disease-affected areas
- promote the use of best practice hygiene procedures in the Western Australian nursery industry to help eliminate *Phytophthora* species from all seedlings and propagating material
- work with relevant Commonwealth agencies to help prevent the introduction of new plant diseases into Australia that could impact on forest ecosystems and forest-based industries

In short cont'd...

- develop an education program for the general public, and private and public organisations whose activities involve use of land in dieback susceptible vegetation types, and
- examine the establishment of a centre of excellence for *Phytophthora* research into ecological impacts on key elements of the biota, methods of managing and counteracting impacts of diseases, and monitoring spread.

3.29 Support accreditation of native forest and plantation management to sustainability standards as an important part of maintaining sustainable forest management in Western Australia.

Global opportunities

The decision to stop the logging of old-growth forests in the south west of Western Australia and a move towards sustainable forest management has attracted interest from around the world. When fully implemented, monitored and evaluated, this area of sustainability will be of considerable global value as the world's forests continue to decline at an alarming rate.

Further information

Conservation Commission of Western Australia
http://www.conservation.wa.gov.au

Department of Conservation and Land Management
http://www.naturebase.net

Forest Products Commission
http://www.fpc.wa.gov.au

Oil mallee plantations and alley plantings are providing an alternative and perennial crop on cleared agricultural land with multiple benefits.

Source: Department of Conservation and Land Management

> SUSTAINABLE MINING AND PETROLEUM PRODUCTION

The mining and petroleum industries are important contributors to Western Australia's economy and are part of the State's rural landscape. In the past twenty years they have been at the cutting edge of developments in environmental science and management. It is accepted that assessment of resource projects on local environmental criteria is now well advanced but that the integration of social, economic and strategic issues needs more attention.

> *From a mining industry perspective, many of the practices of years gone by are no longer valid. There has been a gradual recognition that a healthy economic bottom line will only come if environmental and social goals are pursued in tandem. The growth of factors such as ethical investment, community expectations and human rights movements are driving significant change in the resources sector.*
>
> Rio Tinto

In Western Australia, the mineral and petroleum resources sector accounts for 25% of Gross State Product, 49% of investment, 71% of exports and 17% of direct and indirect employment. The Western Australian resources sector is 50% of Australia's total mineral resources production and accounts for 47% of the investment in mining nationally.

The resources industry contributes to sustainability by providing the raw materials to underpin the global economy and by demonstrating how to do this with environmental and social responsibility. Western Australia's minerals sector produces a huge variety of mineral products. Some, like iron, nickel and alumina, are refined into metals that can be recycled for generations. Others, like mineral sands and silicon, are high-value inputs into high-technology industries that are increasing the efficiency of the global economy, helping manufacturers to achieve more and more with less and less raw materials and energy. The petroleum industry also provides feedstocks for high-value industrial processes. More importantly, it supplies the fuels to satisfy most of the vital energy needs of our society and will continue to do so through the transition to the fuels of the future, in particular to gas and the hydrogen economy.

A number of key sustainability innovations have been developed in the Western Australian resources sector, including land and water rehabilitation, eco-efficiency in mineral processing and, more recently, a range of social innovations, for example the training and employment of Aboriginal people. Four sustainability case studies and a background paper describe some of these innovations.

The international minerals sector has been one of the most pro-active industries in embracing sustainable development. A series of bodies beginning with the Global Mining Initiative (GMI) through to the International Council on Mining and Metals (ICMM) have tackled the implications for the industry, and where industry can best lead the pursuit of sustainable outcomes. Key work in this area has seen the Mining, Minerals and Sustainable Development (MMSD) report, Breaking New Ground, which examined key issues for the sector in depth, to which the Australian sector contributed a large amount of work, culminating in a dedicated Australian regional report under the MMSD framework. Other key initiatives have been the GMI Toronto Conference in 2002 and the Toronto Declaration, contribution to the World Summit for Sustainable Development in Johannesburg, and the ICMM Sustainable Development Framework and Principles which outline the ways members of the ICMM seek to take action in ten key areas (see Box 38). Agreed principles of sustainability in resources operations are important for the public to recognise where net benefit considerations are occurring. It is also important for the public to see where regulations are being applied and the monitoring and reporting processes that are in place. Sustainability reporting should be in accordance with internationally developed formats to aid comparison and understanding of the data.

BOX 38 ICMM SUSTAINABILITY FRAMEWORK: SUSTAINABILITY PRINCIPLES

1. Implement and maintain ethical business practices and sound systems of corporate governance.
2. Integrate sustainable development considerations within the corporate decision-making process.
3. Uphold fundamental human rights and respect cultures, customs and values in dealings with employees and others who are affected by our activities.
4. Implement risk management strategies based on valid data and sound science.
5. Seek continual improvement of our health and safety performance.
6. Seek continual improvement of our environmental performance.
7. Contribute to conservation of biodiversity and integrated approaches to land use planning.
8. Facilitate and encourage responsible product design, use, re-use, recycling and disposal of our products.
9. Contribute to the social, economic and institutional development of the communities in which we operate.
10. Implement effective and transparent engagement, communication and independently verified reporting arrangements with our stakeholders.

It is also important that industry be allowed sufficient flexibility to find innovative ways to achieve sustainability goals. The State has facilitated this in the petroleum industry through the safety case framework, where each oil or gas facility must come up with a unique site-specific risk mitigation plan according to the framework. This has assisted in mitigating the environmental, health and economic risks of petroleum production in a cooperative way with government.

To move ahead, action items include ensuring that government decision-making processes are open to public input and scrutiny, and address better the potential social and environmental impacts of all aspects of the sector's activities. The State Sustainability Strategy can provide an avenue for this to occur through a partnership similar to that developed with local government.

Economic sustainability

Some submissions to the State Sustainability Strategy suggested that Western Australia should move away from being an economy based so heavily on the resources sector. Diversification of the economic base is a goal of the State, and the resources industry can underpin a diversified economy by providing opportunities for downstream processing and inputs for elaborately transformed manufactures, as well as being an important client for the services sector.

The expertise required to develop the State's vast resource base is significant and, in Western Australia, the processes of exploration, development, processing and rehabilitation are world class. This expertise is now being exported to numerous countries with an estimated benefit to the national economy of $1 billion, with Western Australia gaining 60% of this benefit (see Box 39).

The case studies on mining (see below) document how a number of companies have created long-term futures by creative use of technology and innovative thinking. They demonstrate that mining is a lot more than digging up the ground and are finding clever solutions to their problems. It is clear from these examples why the companies have chosen to use sustainability for the framework they used for their innovation. And it is clear that Western Australia is at the global forefront in the application of sustainability to mining. Box 40 below sets out how the HIsmelt process has created a long-term future for Pilbara iron ore.

BOX 39 EXPORTING SUSTAINABILITY SERVICES IN THE MINING SECTOR

Ivanhoe Mines Mongolia Inc. is undertaking a mine development scoping study for a significant copper-gold porphyry deposit located in southern Mongolia. The scoping study is using Perth-based mining consultants to complete planning and pre-feasibility studies for the project. Ivanhoe Mines recognise that the success of the project relies upon the integration of economic, social and environmental concepts into the early mine planning phase of development, i.e. to demonstrate sustainability.

The challenges for planning mineral resource development to meet sustainability objectives include consideration of economic, social and environmental demands made during the life of the project and beyond. For the Oyu Tolgoi Project, the planning phase establishes rigorous and internationally accepted objectives for water management, air quality, conservation of natural systems, waste management and community amenity. Through the implementation of an effective environmental management system, Ivanhoe Mines is able to plan to achieve these environmental objectives, through a continual process of planning, implementation, monitoring, and review.

As a demonstration of this commitment to achieving best practice environmental management, Ivanhoe Mines successfully achieved independent accreditation of the Oyu Tolgoi Project Environmental Management System to the internationally recognised ISO 14001 series (Environmental Management Systems).

The Oyu Tolgoi scoping study identifies feasible mine development options and establishes the basis for ongoing project planning. Oyu Tolgoi is a remote and sparsely populated arid region of Mongolia with almost no existing infrastructure. The study also includes options for the provision of power, water and services in a manner that is sensitive to the future needs of the Mongolian people. The project offers opportunities for developing social infrastructure including employment and training that will assist in the alleviation of current widespread poverty in rural communities.

Sustainability Pty Ltd, a Perth-based consultancy, provide technical and practical support and guidance to Ivanhoe Mines Mongolia Inc. in the identification and implementation of best practices, to ensure the continued achievement of the sustainability project objectives. Sustainability's ongoing involvement in the project planning phase is a further example of Western Australian exports in knowledge and expertise, particularly in the field of sustainable development.

BOX 40 HISMELT TECHNOLOGY: A GLOBAL INNOVATION FROM WESTERN AUSTRALIA

HIsmelt technology is a globally innovative technology breakthrough from Rio Tinto developed in Kwinana. This technology has been researched and developed by Rio Tinto with support from government over the past twenty years. The project was approved in late 2002 by the Minister for Environment and Heritage for full-scale application at a company-owned plant in the Kwinana industrial area along the coast south of Fremantle.

In terms of sustainability the technology is a breakthrough on several fronts. First, it enables vast areas of previously uneconomic high phosphorus iron ore to become economic, giving the Pilbara region a much longer lifetime as a producer of quality iron ore. Second, it is a fundamental change to how iron is produced, with significant potential to reduce energy consumption and greenhouse gases.

The process combines a hot air blast system, ore pre-heater and vertical smelt reduction vessel to smelt a continuous ore/coal/flux feed into high purity iron ore without the use of coking ovens or sinter plants. The key innovation is the use of a direct smelting rather than a shaft furnace process, which greatly increases the range of suitable and economically viable ferrous feed stocks, due to its ability to separate impurities efficiently on a continuous basis. Phosphorous, which is captured in the pig iron in a traditional blast furnace and is an impurity for steelmaking, is no longer a hindrance. After a downstream sulphur removal stage, the end-result is a high-grade pig iron, which is highly sought after by steel manufacturers.

The design of the plant will also allow for the capture of thermal energy produced in the smelting process that can then be used for energy production. This new efficiency is called a 'Factor-X' gain (a term used in industrial ecology to denote ecologically beneficial efficiencies in a production process that are gained through producing multiple products where formerly there was only one). In this case, the dual outcomes of iron production and energy means a much-reduced greenhouse gas output as compared to the production of these two commodities independently. This is a precursor to the next wave of production technology and regulatory requirements, which will eventually result in the retirement of older, less greenhouse efficient, stand-alone energy plants.

The sustainability benefits of the HIsmelt process are many. Locally, the Perth area gains a new industry and a value-added technology. Regionally, both the Perth metropolitan area and the Pilbara benefit through the extended life of an industry that is of vital importance to both in terms of employment and economic stability. The State of Western Australia also benefits in a similar manner. At a national level, technologies such as HIsmelt will be crucial to Australia's commitment to reduce greenhouse gases, as well as ensuring a role for this country in an emerging global market through the steady progression of agreements, such as the Kyoto Protocol.

On a global scale, licensing this technology will mean that steel production can be combined with energy production in many areas (such as China, which is both heavily coal dependent and a major steel manufacturer), merging the greenhouse emissions of the two industries into one. Finally, the energy and iron/steel industries benefit through a more secure future, steel and energy production efficiencies, reduced need for carbon offset trading, fewer emissions and a greater potential ore body to mine. Furthermore, this technology, through the expanded range of viable feedstocks will facilitate the eventual merger of the iron mining and iron recycling industries. This is a microcosm of a similar transition, which is expected to occur across the mining industry over the next fifty to one hundred years. Through HIsmelt, Australia has the opportunity to be a leader in this development.

The question of global consumption is sometimes linked to the production of resources. The State Sustainability Strategy recognises the need for greater diversity in the Western Australian economy and this is occurring quite rapidly in terms of employment. Indeed, resource development projects are often able to make a global contribution to sustainability through demonstrating best practice. Solving the problem of over-consumption of resources would not be assisted at all by stopping resources development. This can only be addressed by consumers and by eliminating processes that support over-consumption, not those who extract the resources. Global processes to reduce over-consumption and waste through eco-efficiency (see *Sustainability and business*) and lifestyle changes are underway but in the short to medium term there is growing demand for non-renewable resources.

Western Australia's largest resource sector developments are mainly associated with gas extraction off the north west coast. Some submissions suggested that these developments should not be supported. As outlined in *Contributing to global sustainability: Oil vulnerability, the gas transition and the hydrogen economy*, these developments are an important part of the global transition from oil and can assist in creating the hydrogen economy. Recent gas contracts with China will continue the process of replacing Chinese coal which has already been associated with significant economic, greenhouse and health benefits.

Environmental sustainability

Over the past twenty years, the minerals and petroleum production sector has developed some sophisticated land management and rehabilitation techniques so that mined land can be returned to some form of production or conservation after mining. There have also been mining activities showing net environmental benefit, for example where companies purchase pastoral leases to mine a small proportion and manage the majority of those leases for nature conservation. Western Australia's industry is recognised as being world-class in environmental management, and the annual Golden Gecko award for environmental excellence is coveted by industries across the State.

Social sustainability

The next challenge in this industry sector is to develop the social aspect of sustainability. This will go beyond philanthropy and shift to strategic investment by companies into projects and programs that can make a difference, informed by engagement with the communities of which they are a part. The most obvious way they can help local and regional communities is by providing local employment. Not only will local communities benefit but travel costs are reduced and workforce health and safety can be improved. However, this policy of localisation can only work if significant commitment is made to training of local people – many of which are Aboriginal. Significant advances in this direction are now emerging (see Box 41 and other examples below). The government is also committed to working with Indigenous and industry stakeholders to meet jointly agreed targets for Indigenous employment in major new resource development projects (see *Indigenous communities and sustainability*).

The Aboriginal training programs within Woodside, Rio Tinto and BHP in the Pilbara are examples of this focus (see case study *Sustainability and Iron Ore in the Pilbara: a Regional Perspective*). After five years, many local Aboriginal people are employed in the mining industry and young Aboriginal people are supported to undertake tertiary and other further education. Argyle Diamonds in the Kimberley has supported an Aboriginal training program so that by 2002 there was 14% Aboriginal employment at their mine. By 2007 the goal is to have some 40% of their staff Aboriginal and 80% Kimberley locals. This innovation in training is becoming an industry standard, providing a clear example of how major resource companies can achieve a level of Indigenous employment that is equivalent to the region's Indigenous population. The Aboriginal training programs are an innovation in social sustainability that has occurred with limited government involvement.

Various submissions have suggested that there is a real need for government involvement in the social side of sustainability. For example, through sustainability assessment, the government could ensure that mining companies liaise with local Aboriginal communities, local pastoralists and shires. Most companies do this already, but this will become even more advanced in the future and more apparent through the sustainability assessment process.

BOX 41 WOODSIDE INVESTING IN LOCAL TRAINING AND EMPLOYMENT.

Woodside, through the Warrgamgurdi Yirdiyabura program, provides funding for training and employment opportunities for Aboriginal people within the Shire of Roebourne, in partnership with its major contractors in Karratha, other industry members, the Aboriginal community and government agencies. Under this program, local Aboriginal people have been assisted to develop their potential so that they can compete effectively for employment within the general labour market. Fifty per cent of trainees have successfully gained employment in the Pilbara.

The benefits of this program are recognised within the community. These include not only the increased opportunity for employment, but the development of individual skills and self-esteem, and providing successful, local role models for the community.

In short...

Vision

A Western Australian resources sector that underpins a sustainable global economy, by consistently enhancing its technological edge and the development of the State through continuous improvement in safety, health and environmental management, superior product, excellence in risk management, transparent governance, and in-depth engagement of communities across Western Australia.

Objective

- Ensure that minerals and petroleum production in Western Australia remains at world best practice and the industries help to establish the standard for sustainability.

Actions underway

- Environmental impact assessment has helped establish environmental bottom lines for the minerals and petroleum production sector.
- The State's royalty regime helps ensure that the community receives an economic return from the development of mineral and petroleum resources (revenue in 2000-01 was $1.14 billion).

Actions

3.30 Work towards sustainability assessment of complex or strategic mining and petroleum projects using sustainability criteria (consistent with the Keating Review).

3.31 With key stakeholders, develop a set of agreed sustainability operating principles for the mining and petroleum sectors through a working group or groups managed through the Department of Industry and Resources and the Sustainability Roundtable.

In short cont'd...

3.32 Foster local community involvement (particularly Aboriginal communities, pastoralists and local shires) as part of the sustainability assessment process.

3.33 Establish transparent processes to enable community awareness of the day-to-day regulatory system for exploration, mining and minerals processing including through the web site of the Department of Industry and Resources.

3.34 Work with industry on the development of voluntary accreditation for mining and petroleum industry sustainability.

3.35 Implement strategies that support the use of local employment in mining ventures, particularly using regional centres as employment hubs, and encourage mining companies to maximise their purchasing of goods and services within regions.

Global opportunities

Western Australia is a world leader in mining and petroleum production, especially in advancing sustainability and mining. There are already numerous examples where global opportunities in mining and sustainability have been taken by Western Australian consultants and companies. The opportunities in this area will continue to grow.

Further information

International Council on Mining and Metals 2002. *ICMM Toronto Declaration*. http://www.icmm.com/html/pubs_pubs.php.

International Council on Mining and Metals 2003. *ICMM Sustainable Development Framework: ICMM Principles.* http://www.icmm.com/html/pubs_pubs.php.

Miles, N 2002, *More Sustainable Approaches in Mining: Encouraging Progress at the Granny Smith Gold Mine*, sustainability case study, Department of the Premier and Cabinet, Perth, viewed 15 August 2002, http://www.sustainability.dpc.wa.gov.au/CaseStudies/grannysmith/grannysmith.htm

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Stanton-Hicks, E & Newman, P 2002, *Argyle: Creating a Future*, sustainability case study, Department of the Premier and Cabinet, Perth, viewed 15 August 2002, http://www.sustainability.dpc.wa.gov.au/CaseStudies/Argyle/Argyle.htm

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Argyle Diamonds has instituted strong commitment to Indigenous employment, including in its rehabilitation of alluvial mining areas that includes the use of 'bushtucker' species. These images show the induction of a local employee into the workforce and Sam Samaraweera (Sustainability Specialist) reviews the progress of rehabilitation growth.

Source: Argyle Diamonds

> SUSTAINABLE TOURISM

The tourism industry plays an important role in supporting sustainability. Not all tourism needs to be nature-based to be sustainable. From the largest five-star hotel to the smallest nature- based tour operator, all participants in the industry can have an impact on the environment or the social fabric of a local community. Western Australia has a unique opportunity to champion sustainable tourism development.

> *Tourism isn't a benign thing that's going to protect the environment. It has to be controlled…we need to support programmes that try to protect nature, to restore nature, to allow people to make a living from nature without destroying it.*
>
> David Suzuki, 2000

In the year 2000, 700 million people travelled around the globe. Of this, 4.8 million (0.7%) visited Australia, and 590,000 visited Western Australia.

Niche markets

In a global context, Western Australia is a niche destination. The advantages Western Australia offers to the visitor include our untouched nature, our wide-open spaces, unique lifestyle and the fact that we are a safe destination. Western Australia is well positioned to capitalise on these advantages to attract a tourism audience.

In order to ensure the long-term sustainability of Western Australia's tourism industry, it will be imperative to protect these inherent advantages. A sustainability approach to all tourism development within Western Australia is therefore vitally important. This will include a focus on preserving the natural environment, operating tourism businesses with a focus on minimal impact and protecting cultures and communities within which the tourism industry operates.

Tourism demand across the world is growing. Within this overall market, there are a number of niche markets that are developing, for which Western Australia holds key strengths.

Nature based tourism

Nature-based tourism is growing at a rapid rate. Around the world, people are beginning to want more subtle, low-impact and more natural kinds of experiences. Consequently, nature-based tourism accounts for nearly 30% of all domestic travellers in Australia. In 2000, 47% of all tourists visited a National Park. See Box 42 about Rottnest Island's work to become a sustainable tourism destination.

Western Australia is recognised internationally for its biodiversity, wilderness areas and other special places. Places such as the Kimberley, Ningaloo Reef, the Shark Bay World Heritage Area and the forests of the south west have put Western Australia on the map as a tourism destination. It is these natural features that differentiate Western Australia and it is these that must be protected to ensure the long-term sustainability of the nature-based tourism industry.

Nature-based tourism already contributes to regional economies, and the trend is for this to increase. For example, it is estimated that more than 100,000 tourists visit Exmouth each year, of whom around 50% are international visitors and around 15% are from interstate. Most of these visitors cite the Ningaloo Marine Park as the reason for their visit. It is estimated that they spend in excess of $85 million per annum in the local economy and a further $42 million in Western Australia getting to Exmouth, visiting other places in the region, and equipping themselves for their holiday.

The projected substantial growth in nature-based tourism will need to be managed in order to protect biodiversity and natural assets. As the Western Australian Tourism Commission states:

> There is an opportunity to design and construct innovative, low impact tourism facilities, in a range of locations throughout the State, positioning Western Australia as a world leader in low-impact tourism development.

A nature-based industry will also require cooperation between the tourism industry, government and protected area managers. Tourism in natural areas needs to be managed to ensure that visitor impacts are kept at sustainable levels. The Memorandum of Understanding between the Department of Conservation and Land Management and the Western Australian Tourism Commission will contribute to ensuring this occurs.

The Western Australian Government has committed to the creation of additional parks and reserves to protect Western Australia's biodiversity. Thirty new national parks are being created following the decision to end old-growth forest logging. The management of parks and reserves will need to ensure that natural values are maintained and visitor impacts minimised. Management planning is vital and will need to acknowledge carrying capacities and provide facilities and services adequate for the market and to ensure impact is minimised.

Educating visitors about sustainability will be a key to reinforcing sustainability values amongst visitors to Western Australia. It is imperative that nature-based tourism is delivered in a way which educates local and overseas visitors. Visitors increasingly seek learning experiences and there is much scope to develop nature-based experiences whereby visitors learn about and contribute to conservation initiatives. The 'Be Touched by Nature' Environmental Tourism Package initiative of the Western Australian Tourism Commission is one such initiative. Additional opportunities exist to promote Western Australia as a place where people can become involved directly in research and management programs in parks and reserves as part of a genuine learning experience, as demonstrated in the Landscope Expeditions concept.

Significant activity is already occurring in tourism accreditation. The Western Australian Tourism Commission supports three programs: the National Tourism Accreditation Program from the Tourism Council Western Australia; the Nature and Ecotourism Accreditation Program from the Ecotourism Association of Australia; and Green Globe 21.

The government can assist tourism professionalism and quality through increased involvement in national and international accreditation systems; these need to be expanded and promoted in Western Australia so people enjoying and using these natural places gain maximum value from the experience with minimal impact. There is an opportunity to promote these experiences regionally to support sustainable regional development.

The development of walk trails and other interactive activities throughout Western Australia can contribute to the sustainability of the tourism industry. The Bibbulmun Track and the Cape to Cape Trail attract large numbers of walkers. There is a growing demand for small-scale economic development associated with these trails, such as bed and breakfast facilities (just as railways and roads have facilitated growth in the past). It is vital that product development has a sustainability focus and hence the development of a niche product development role within the Sustainable Product Development Unit of the Western Australian Tourism Commission will be valuable in this process.

Cultural tourism

Visitors are also increasingly demanding cultural experiences. Visitors seek learning experiences where they can interact with the host culture, learn about a place's history or participate in local festivals. The Western Australian Tourism Commission is focusing on developing linkages between cultural industries and the tourism industry to ensure that tourists can gain an authentic cultural experience while they are in Western Australia. The development of a cultural tourism strategy will facilitate this.

BOX 42 ROTTNEST ISLAND: A MODEL FOR SUSTAINABILITY

Rottnest Island is a holiday destination valued by West Australians, with around 500,000 visitors each year.

The elements of sustainability are a dominant factor in the management of Rottnest Island. A Strategic Goal of the Authority is 'Rottnest Island's environment and heritage are conserved and enhanced as a model of sustainability'. The vision Rottnest: Forever Magic, reflects the community's wish that the unique Rottnest Island experience be preserved for future generations of Western Australians. The Rottnest Island Management Plan has formalised the Authority's commitment to sustainability and demonstrated the relevance of this concept to Rottnest Island.

The Authority is proceeding with a range of sustainability initiatives including visionary projects that demonstrate sustainability in action. These include:

- Active recycling and composting that has resulted in a 30% diversion of waste to landfill since 1998-99. The recyclable waste stream has increased by 126% since 1998-99.
- The use of desalination plants significantly reduces reliance on rainfall dependent water sources for potable water supply. It is anticipated that solar desalination will be established by the end of 2005.
- The reduction in fossil fuels through the installation of a wind turbine (by April 2004), the trailling of biodiesel in Island vehicles and the use of solar energy for some infrastructure requirements.
- The management of visitor impacts and behaviour through formal and informal interpretation programs. These include guided and self-guided tours, walk trails, dive trails, brochures, signage, school holiday activities and education activities for school groups.
- Recognising and respecting the significant Aboriginal heritage through interpretation, site protection and discussion with Aboriginal people.
- Conservation and interpretation of the Island's cultural heritage for current and future visitor use and enjoyment.
- Implementing disability access with; measures for visitors such as provision of specifically designed accommodation, beach-going wheelchair facilities, transport for mobility impaired recreational fishers and beach access facilities.
- Provision of affordable accommodation for Western Australians through a range of options from camping to heritage accommodation.
- Restoring the Island's original woodland environment by planting 50,000 woodland seedlings annually.
- Rehabilitating the Island's swamps providing suitable surface water for fauna to encourage the re-establishment of frog populations.
- Being signatories to the Greenhouse Challenge Program, Green Globe Accreditation and Cleaner Production Statement.

Given the large number of Island visitors this commitment to sustainability principles is being communicated widely on a local, national and international front.

In addition, the Heritage Council of Western Australia is developing a Heritage Tourism Strategy. It will be vital that these two strategies are linked and can work together to ensure preservation of our 'sense of place' and our unique culture.

Cultural infrastructure which is iconic can actively contribute to tourism as well as to a greater sense of place. Development of this infrastructure should be seen as a tourism and cultural investment.

During the 2000 Sydney Olympics 80% of visitors indicated they wished to have an authentic Indigenous cultural experience in Australia. The development of Indigenous tourism is a key focus for government. The formation of the Western Australian Indigenous Tour Operators Committee (WAITOC), which represents Indigenous tourism operators, is taking a strong leadership role. A key initiative of WAITOC is the development of an accreditation program that guarantees the authenticity of Indigenous tourism product.

Tourism plays an important role in the development and sustainability of Western Australian regional communities. In using tourism for economic development it is important for communities to identify and preserve a 'sense of place' that is defined by its people, its buildings, its places and natural environments and its culture. Importantly, communities need to be aware of the social and economic benefits sustainable tourism offers.

In short...

Vision

To make Western Australia the world's natural choice.

Objective

All tourism developments and organisations are encouraged to focus on sustainability.

Actions underway

- Various accreditation programs exist for the tourism industry.
- The government has implemented a nature based tourism strategy.
- A Memorandum of Understanding operates between the Western Australian Tourism Commission and the Department of Conservation and Land Management.

Actions

3.36 Promote the sustainable development of niche markets for which Western Australia has a unique advantage, in nature-based, cultural and heritage tourism.

3.37 Help to reinforce Western Australia's sense of place and the sustainable development of cultural, heritage and nature-based tourism within Western Australia.

3.38 Support the Western Australian Indigenous Tour Operators Committee.

3.39 Support development of materials on the Aboriginal names of places in Western Australia.

3.40 Focus on developing sustainable niche product sectors such as trails, dive tourism etc.

3.41 Link tour operator licensing and marketing with accreditation to foster private sector commitment to sustainability principles.

3.42 Support the expansion of existing sustainable tourism accreditation in Western Australia.

3.43 Support the application of appropriate accreditation to a local government area as a way of demonstrating area-wide tourism sustainability.

3.44 Develop accreditation for authentic Indigenous tourism operations.

3.45 Create partnerships between the arts and tourism industries to maximise cultural tourism opportunities and foster 'sense of place', and universities and tourism industries wishing to build on the global market for wilderness and Indigenous-based learning experiences.

Global opportunities

Nature-based, Indigenous, cultural and heritage tourism are growth areas of the worldwide tourism industry. Western Australia's special status as a marine and terrestrial biodiversity 'hot spot' is a significant global marketing opportunity along with our unique cultural attributes.

Further information

Contact the Sustainable Industry Sector Development Unit within the Western Australian Tourism Commission on 9220 1700.

> PROTECTING DRINKING WATER AND AQUATIC SYSTEMS

There are many threats to our drinking water and our aquatic systems—wetlands, rivers and estuaries—and it is an enormous challenge to protect and enhance these precious assets.

> *A common thread running through much evidence reviewed by the Committee is that to maintain the quality of Perth's water the first priority should be to protect the water through good land use planning to protect the catchment providing the water, whether surface or groundwater. Using treatment to deal with contamination is a second-best option. The Committee found support for adopting catchment protection as the major weapon in preventing contamination of water supplies.*
>
> Standing Committee on Ecologically Sustainable Development

> *From our perspective as a community group dedicated to the conservation of wetlands we would like to see some emphasis placed on the need to conserve biodiversity and water resources in the State Sustainability Strategy.*
>
> Wetlands Conservation Society

The Swan – a warning to us all

Aquatic systems are the visible expression of catchment health as was graphically demonstrated in June 2003 when thousands of fish died in the Swan River. What we do on the land ends up in the river. Thus the whole catchment needs to be considered and this therefore involves everyone as we all live in catchments. A clean and biologically alive Swan River is important for the economy of Perth and also for all residents who see it as a 'sacred site'. It also vitally important to protect those catchments that provide our drinking water. Riverplan was launched by the Government in July 2003 as a comprehensive management plan and implementation strategy to address these issues at a catchment level.

This section considers the protection of drinking water and the sustainable use and management of rivers, estuaries and wetlands. The sustainable management of the water supply system is addressed in *Our water future*. The high biodiversity value of aquatic systems is addressed in *Maintaining our biodiversity*. Long-term water sustainability issues are addressed in *Sustainability and governance: Research and development for sustainability*. There are also linkages in the management of aquatic systems with *Sustainable natural resource management* (agriculture, fisheries/aquaculture, forestry, tourism, coastal environments and rangelands management) and with the State Salinity Strategy.

Aquatic values

Western Australia's rivers, estuaries and wetlands are an integral part of our heritage. They have important social and economic values including traditional and cultural use by Aboriginal people, commercial fishing, recreation and leisure, drinking, and industrial uses. These values are set out in Table 6.

Table 6 Range of values of aquatic systems

Environmental	Social	Economic
• Natural land drainage • Flood conveyance and storage • Drought refuge • Ecological corridors • Water quality maintenance (filtering, sedimentation) • Habitats (migratory birds, fish) • Biodiversity/ food web/ indigenous flora and fauna/rare & threatened species and communities • Riparian/fringing vegetation • Scientific research • Uniqueness	• Recreation and tourism (water quality, views) • Aesthetics/ landscape • Heritage and spiritual • Drinking water • Public infrastructure • Conservation • Education & awareness	• Drinking water • Water use – industrial, agriculture/pastoralism, aquaculture/ fisheries • Disposal • Water quality • Stock protection (from storms and sun) • Use of flora and fauna (bioharvesting, biotechnology)

Drinking water protection

Fresh water is one of the most important natural resources of Western Australia. The community expects that its drinking water will be safe to drink and that sufficient amounts will be available to meet current and future consumer requirements (see *Our water future*). Public drinking water supplies are obtained from groundwater and surface water resources. Groundwater and rivers feeding town water supply are obviously critical to our economic and social survival. In Western Australia, there are approximately 140 sources that need to be protected (see Box 43 for a summary of mechanisms to protect water catchments).

The major groundwater aquifers in the Perth Metropolitan Region are the Gnangara and Jandakot Mounds. In the Perth metropolitan area approximately 50% of the public water supply comes from surface water and the remainder from these groundwater sources. Other groundwater aquifers also supply water to towns north of Perth and the major regional centres of Geraldton, Bunbury and Albany. The majority of surface water supplies come from dams in the Darling Scarp and the south west of the State.

Both surface water and groundwater catchments are under pressure from competing uses including industry, intensive agriculture, recreation and urban development. Care is needed to ensure that incompatible land use and development does not contaminate groundwater and surface waters, making them unsuitable for human consumption.

The importance of protecting public water supplies is recognised in the:

- Select Committee Report on Metropolitan Development and Groundwater Supplies (1994)
- State Planning Strategy (1997)
- Standing Committee Report on the Quality of Perth's Water Supply (2000)
- State Water Quality Management Strategy for Western Australia (2001)
- Statement of Planning Policy No. 2.7: Public Drinking Water Source (2003)
- Statement of Planning Policy No. 2: Environment and Natural Resources Policy (2003) and
- State Water Strategy (2003).

The Select Committee Report on Metropolitan Development and Groundwater Supplies outlined a long-term vision for sustainable development and recognised the conflicts that exist between the need for progress and land development and the need to ensure that our water supply is secure. The report found that cleaning up a contaminated source costs many more times that of establishing drinking water catchment protection.

The report also found that if we are to avoid the mistakes made by others, there is a need to coordinate a whole of government approach to planning that considers community aspirations for a safe water supply; community involvement in decisions relating to drinking water source protection; future drinking water supplies; and the need for social and economic development.

Aquatic systems

Aquatic systems also perform important ecological functions. Rivers, estuaries and wetlands form important links between landforms and are home to a wide range of plants, animals, and micro-organisms. Permanent pools within a river system are an important refuge for fauna during prolonged dry seasons, and estuarine basins provide unique conditions for fresh and marine species. Wetlands provide drought refuges and are critical for the survival of migratory birds. Flora and fauna species diversity is generally very high within wetlands, particularly within seasonally inundated or waterlogged wetlands. Rare or endangered species and threatened ecological communities are often associated with aquatic systems. Often a riparian or fringing corridor is the only connection between remnant natural bush habitats.

Sometimes there can be conflicting values between different users of aquatic systems and hence sustainability approaches are needed to resolve these.

BOX 43 MECHANISMS FOR ENSURING DRINKING WATER CATCHMENTS ARE PROTECTED

- A key strategic statement in the *State Planning Strategy* is to 'ensure that water resources are conserved and their quality protected'. This is recognised in various criteria for plans and key actions in the Strategy to protect existing and future public drinking water supplies.
- The *Statement of Planning Policy No. 2.7: Public Drinking Water Source Policy* requires consideration and inclusion of drinking water protection objectives in strategic plans, regional and local statutory schemes, conservation and management strategies, and other relevant plans or guidelines, as well as through the day-to-day process of decision-making on subdivision and development applications. It also recognises the importance of land use and water management strategies that have been prepared, or are proposed, for public water supply areas to assist in the protection of water resources as well as ecological features.
- Existing and future drinking water sources are protected by declaration of water reserves, catchment areas and underground pollution control areas under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* and the *Country Areas Water Supply Act 1947*. The legislation enables government to control potentially polluting activities, regulate land use, inspect premises and take steps to prevent or clean up pollution within these areas.
- The Department of Environment has an ongoing program to prepare drinking water source protection assessments and plans for all public drinking water sources in the State. State and local government agencies need to consider these documents and how best to incorporate the proposed drinking water protection management strategies into appropriate planning schemes and strategies.
- The Western Australian Planning Commission (WAPC) has prepared land use and water management strategies for the Jandakot Mound and Gnangara Mound. *Statement of Planning Policy No. 6: Jandakot Groundwater Protection Policy* (1998) was subsequently prepared to implement recommendations of the Jandakot Strategy. *Statement of Planning Policy No. 3: Gnangara Mound Crown Land* (1995) is concerned with the protection of groundwater resources relating to Crown land over the Gnangara Mound. This is currently being reviewed to incorporate outcomes of the *Gnangara Land Use and Water Management Strategy* (2001).
- Within the Perth Metropolitan Region, the Water Catchments reservation and, more recently, the Rural Water Protection zone have been introduced into the Metropolitan Region Scheme (MRS) to identify surface and groundwater catchments and to ensure that local government town planning schemes give effect to strategies for the protection of public water supply sources.
- The Department of Environment has published a Water Quality Protection Note on *Land Use Compatibility in Public Drinking Water Source Areas* that shows the compatibility of different land uses within drinking water catchments. The protection note lists compatible, incompatible, and conditional land uses against a three-tiered priority classification system used to categorise land within a drinking water catchment. This information has been prepared to support the *Public Drinking Water Source Policy (No. 2.7)* described above.
- Ongoing promotion and development of best management practices that minimise adverse water quality impacts from land uses and activities. These include State Government policies (the Draft Policy for Recreation in Public Drinking Water Source Areas), Environmental Guidelines (Environmental Guidelines for Mining and Mineral Processing, Code of Practice for Vegetable and Potato Growers etc.) and Water Quality Protection Notes and brochures. These are available via the Department of Environment web site at www.wrc.wa.gov.au (prior to December 2003) or www.environment.wa.gov.au (after December 2003).

Wetlands

The Wetlands Conservation Policy for Western Australia (1997) provides broad objectives for all aquatic systems. Although river systems, estuaries and nearshore marine areas are within the scope of the Statement of Policy, their specific conservation and management needs are addressed through other programs and processes such as Floodplain Management Taskforce, Waterways WA Program and Environmental Water Provisions Policy. The Policy also provides a strategy for the management of wetlands, which includes sixty-two action items. Implementation is overseen by the Wetlands Coordinating Committee that has membership of relevant government agencies and other stakeholders.

Wetlands on the Swan Coastal Plain have been mapped and assigned management categories (Conservation, Resource Enhancement and Multiple Use). The State Government has recognised Conservation category wetlands as 'valuable' requiring protection and management. Significant loss and degradation of wetlands has occurred since European settlement. On the Swan Coastal Plain, 80% of wetlands have been lost or degraded and this continues as most wetlands, including Conservation category wetlands, are not legally protected. Over many other areas of the State, there is insufficient knowledge of the location and condition of wetlands to properly gauge the loss that is likely to be occurring in those regions.

Waterways

There are 208 major waterways in Western Australia, with a combined length of more than 25,000 km. Those surface water sources used for drinking water supply have been protected and are generally in good condition. Many other waterways and associated catchments are degraded as a result of human activities. Water quality in non-protected catchments is generally declining across the State, with some waterways carrying high loads of nutrients, sediment, and organic matter, and in some cases toxic chemicals. A large number of rivers are also becoming increasingly saline.

Freshwater and estuarine fish habitats are being lost as a result of declining water quality and flows. This has resulted in the decline in native fish populations and threatens the recreational marron fishery that is an important part of Western Australian culture. Extensive algal blooms are signalling that aquatic systems are no longer able to accommodate the changes we have made in catchments. The sedimentation and erosion of many systems is resulting from increased flows from increasingly cleared catchments. Many of the causes of aquatic system decline are derived from a combination of cumulative impacts that over time exceed the system's capacity to accommodate.

Estuaries are the receiving water bodies for catchments via river networks and their fates are intertwined. Estuaries are highly impacted both from the population pressure in close proximity and by the highly degraded, generally agricultural catchments which drain into these estuaries. Estuaries are a mixing zone of fresh and marine water and can influence the condition of near-shore environments. The clean-up of the Peel Estuary after the Dawesville Cut has demonstrated that engineering can help but if continued nutrient build-up occurs in the catchment then once again algae blooms will happen in the estuary.

In agricultural areas habitat destruction, land salinisation and water abstraction have reduced water quality over large areas. In some cases these effects are exacerbated by wastewater and mine discharges. The current pattern of use for many of our rivers and estuaries is clearly unsustainable in that the water quality and habitat value are both declining. In urban areas development and habitat destruction are at least as important as contaminant discharge in affecting environmental health.

No Statewide river and estuarine management framework currently exists although a strategy is in the development stages. In the past a number of estuarine management approaches have been explored, most notably with authorities managing across key estuaries at risk. This approach provided a framework for community involvement in decision-making and was one of the first of its kind in Australia, forming a foundation for the way much community decision-making happens today. Newer models of community decision-making have been developed for the Vasse-Wonnerup (GeoCatch) and Cockburn Sound (Cockburn Sound Management Council) that are proving effective. The Swan River Trust is the only actual estuarine management entity in Western Australia with planning and decision powers.

Climate change has led to a reduction in rainfall in the south west of the State since the 1970s and is a significant threat to many aquatic systems. Many systems and natural seeps have stopped flowing, resulting in significant impacts on the ecology of these systems. In this same period total water use in Western Australia has doubled and is expected to double again by 2020. In response to decreasing inflows to dams and increasing water demands, the State has accelerated its Water Source Development Program with plans for developing new water sources within a relatively short timeframe (see *Our water future*).

In the context of accelerating water resource development it is important to balance environmental water needs with community water supply needs. Environmental water provisions (EWPs) are water allocations provided to protect water-dependent ecosystems and values such as aquatic biodiversity, water quality, riparian zone vegetation and key ecological processes such as nutrient processing. They are established through the water allocation process, under the *Rights in Water and Irrigation Act 1914*, in accordance with the Environmental Water Provisions Policy for Western Australia, 2000.

Rangeland aquatic systems are diverse, ranging from spectacular gorges, spring-fed pools and complex floodplain channels, to seasonal lakes, dry sand filled rivers and small rocky headwater creeks. These unique and varied characteristics, together with seasonal changes and cycles of drought and flood, defy many traditional notions of aquatic systems and influence decisions about their management.

Drainage

The constructed drainage systems in Western Australia are designed to improve land utility and prevent flooding either by conveying away stormwater runoff or by lowering the groundwater table. Consequently the traditional emphasis of stormwater management has been one of efficiently collecting and conveying runoff and groundwater from residential, commercial, industrial and rural areas into nearby lower areas such as natural water bodies, wetlands, streams, rivers, estuaries and the marine environment. Little or no consideration has traditionally been given to the 'downstream' consequences of a conveyance-dominated approach, leading to problems in water quality and reduced recharge of groundwater systems.

Contemporary stormwater management is aimed at reducing the impacts of development on the natural water cycle by considering all water as a resource. Stormwater management now emphasises water quality, health of aquatic ecosystems and public amenity, in addition to managing water quantity. New approaches in stormwater management aim to prevent pollution at source, maximise infiltration in appropriate areas to reduce stormwater runoff and recharge groundwater, and minimise change to the natural water balance. By necessity, urban stormwater management needs to be broadly based, requiring multi-disciplinary inputs. A notable shift has also occurred in the reduced emphasis on 'end of pipe' water quality treatment solutions, and an increased emphasis on the application of 'preventative' measures (see *Sustainable urban design*).

The State Government has created the Drainage Reform Group with CSIRO to achieve better management of drainage and related water management. The government is investigating solutions to reform drainage governance and look at how Western Australia can better integrate the management of surface and groundwater. Total water cycle management is a fundamental principle for drainage management as it ensures that all aspects of the hydrological cycle are considered when planning in a catchment. Areas such as integrating statutory management with water sensitive urban design and regional natural resource management Groups, including major catchment groups are also seen as fundamental to improving our aquatic systems. Research and trialling innovative approaches are the key to sustainable drainage management.

Community focus

The ever-increasing pressure on aquatic systems requires a commitment to change through a catchment focus, community participation and involvement in decision-making. The focus of management effort has generally been in the most populated south west of the state. Aquatic systems in the rangelands (Goldfields, Central Deserts, Pilbara, Kimberley) are less well understood and the best approaches for the long-term management are more uncertain (see Ord-Bonaparte Project Box 22).

The current focus of natural resource management planning is through the development of community-based regional strategies. Government agencies are working in partnership with the community to develop these regional natural resource management strategies. These strategies will describe key actions and management options (including legislative tools) that will contribute to the sustainable management of all natural resources including aquatic systems. As aquatic systems cannot be managed in the long term without understanding the catchment influences on the systems, this regional approach conects aquatic systems and catchments. The regional strategies will also propose environmental values, objectives and criteria (targets) for aquatic systems. The National Action Plan for Salinity and Water Quality and the second phase of the Natural Heritage Trust provide opportunities to implement large-scale improvements in aquatic systems.

In short...

Vision

Drinking water sources are fully protected for future generations. All other aquatic systems are sustainably managed in a way that ensures that the widest range of values is maintained now and for the future. The ecological, geomorphological and hydrological processes of all aquatic systems are understood. The community and government work in partnership to develop environmental values to ensure the protection, management and restoration of all aquatic systems.

Objectives

- Ensure that land uses do not contaminate drinking water catchments.
- Improve understanding of aquatic systems and link this to the management of all aquatic systems.
- Protect all drinking water catchments and all aquatic systems of high environmental/conservation, scenic and heritage significance.
- Manage aquatic systems to agreed conditions for a range of environmental values through a catchment management context.
- Incorporate social and cultural values when managing aquatic systems.
- Increase community awareness and involvement in the management and protection of drinking water catchments and all aquatic systems.
- Ensure that abstraction of water does not exceed the water requirements of aquatic ecosystems.
- Provide for the protection of water-dependent ecosystems, while allowing for the management and development of water resources to meet the needs of current and future users.
- Ensure stormwater is recognised as a valuable component of the total water cycle and management objectives incorporate the sustainability of the receiving environment.

Actions underway

State planning

- The Draft Environment and Natural Resources SPP has been finalised and a Water Resources SPP is proposed. This will help to incorporate the assessment of impacts of development in decision-making and planning processes. This will provide local government with a stronger role in water resource management.
- The Environmental Protection Authority's Bulletin 1078 provides a framework for the development of environmental values, environmental quality objectives and environmental quality criteria (indicators and targets) that can be given a legislative base for significant aquatic systems.

State policies and strategies

- The State Water Quality Management Strategy implements the National Water Quality Management Strategy for the protection of drinking water and aquatic systems.
- Development of the Waterways WA Framework, incorporating the State Algal Management Strategy, will establish key priorities, principles for waterways management, and a framework for waterways management across Western Australia. The framework includes Waterways WA: Policy for the management of Waterways in Western Australia and the development of a framework strategy in

In short cont'd...

2003. A Statewide waterways management needs assessment methodology has been developed as a means of designating priority groupings of waterways across the State, based on an assessment of their condition, pressures, values and level of management response. A total of 208 waterways have been assessed via this process and a report released.

- The draft State Water Conservation Strategy was released in 2002 and was incorporated into the State Water Strategy in 2003, together with the results of the State Water Symposium held in late 2002

Institutional reforms

- Investigation of the solutions to reform drainage governance and look at how we can better integrate the management of surface and groundwater.
- Department of Environment's Interim Stormwater Position Statement – Principles and Objectives (2003). To complement this the WA Planning Commission's Planning Bulletin on stormwater management is being drafted.
- Drainage Reform Group coordinated by CSIRO is preparing a position paper on institutional issues associated with drainage management in Western Australia.
- Regulatory Design for Water Quality Management in Perth WA (2003) has been prepared as an Australian Research Council project being undertaken by the Australian National University for the Department of Environment

Regional NRM planning and coordination

- Geocatch—a major river restoration and catchment management initiative—has been implemented for Geographe Bay. A whole of catchment restoration program has commenced for the Watershed-Torbay catchment and the Wilson Inlet Action Plan has been completed. The community-based Ord Land and Water Management Strategy is moving towards regional scale initiatives.
- The Swan-Canning Cleanup program aims to understand the mechanisms that trigger algal blooms and control their growth, reduce the frequency of their occurrence, help maintain water quality now and in the future, help change land uses, planning and development to reduce nutrient inputs, and inform and involve the public in the process. It includes the development of Riverbank ($500,000 Restoration and Revegetation Program for Perth's river shorelines) and Landscape Precinct Policy.
- The Western Australian Government is presently working with local governments in the Peel-Harvey catchment to develop and implement a water quality improvement plan for that catchment. Almost $3 million will be spent over the next three years in an attempt to better manage the nutrient inputs and water flows to the estuary.

Legislation

- Significant steps are currently being taken to protect conservation category wetlands on the Swan Coastal Plain through the development of the Environmental Protection (Swan Coastal Plain Wetlands) Policy that is a revision of the existing Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (Lakes EPP).
- Other EPPs that are in place that deal with aquatic systems include South West Agricultural Zone Wetlands 1998, Western Swamp Tortoise Habitat 2002, Swan and Canning Rivers 1998 (including Riverplan), Peel Inlet - Harvey Estuary 1992 and Gnangara Mound Crown Land 1992. A State Coastal Zone EPP (which could include estuaries) is being considered by the EPA.

In short cont'd...

- Protection of drinking water catchments through legislation and planning process requirements (see Box 43).
- The government's proposed environmental legislation makes it an offence to clear without approval and this will help to protect vegetation around aquatic systems. The proposed contaminated sites amendments to the *Environmental Protection Act 1986* will assist in reducing contamination of aquatic systems.

Community education and capacity building

- A River Restoration Manual that defines Western Australian solutions to restoration issues has been completed, and community and local government training has been undertaken through River Restoration workshops since 1998. In addition, technical support and advice is provided to community groups who are undertaking river restoration activities.
- A wetland restoration and management manual that provides information to landowners and community groups about wetland processes, functions, management and restoration is being prepared.
- Extensive support and capacity building for river and wetland management has occurred through State-Federal funding agreements such as the Natural Heritage Trust.
- Revision of the 1998 Manual for Management of Urban Stormwater Quality to more fully incorporate a total water cycle management approach and water sensitive design principles.
- Support the development and application of the Australian Runoff Quality Management Manual, prepared by the Institution of Engineers, Australia, as a companion document to the WA manual.

Actions

3.46 Develop benchmark environmental quality criteria for aquatic systems to assist in the long-term assessment of progress towards meeting objectives, for example to assist community water quality monitoring programs of aquatic systems such as Ribbons of Blue.

3.47 Develop processes that ensure social, environmental and economic values of aquatic systems are incorporated into regional sustainability strategies and regional natural resource management plans, and embed these within appropriate management tools, for example planning schemes.

3.48 Work to ensure all present and future drinking water sources are fully protected.

3.49 Expand the assessment of the ecological water requirements of the State's rivers, wetlands and estuaries, especially of existing regulated systems or systems planned for water resource development, and continue to allocate water to the environment through the State's allocation process, incorporating this approach in regional, sub-regional and local water resource management planning.

In short cont'd...

3.50 Implement and assess strategic and statutory planning processes and documents to achieve better protection of aquatic systems, including:

- the development of model scheme texts to assist local government in incorporating aquatic systems management into planning schemes
- developing a water resources statement of planning policy to describe key management actions to protect aquatic systems for incorporation into the planning system
- continuing the work of the State Wetlands Coordinating Committee to ensure that the objectives and actions of the State Wetlands Conservation Policy are implemented, and continuing the update of the classification and evaluation method for Swan Coastal Plain wetlands and inventories of wetlands throughout Western Australia, and
- continuing the process of nominating significant wetlands for inclusion on the Ramsar Convention list of Wetlands of International Importance.

3.51 Ensure that activities in catchments are actively managed and sustainable, and that environmental values are not compromised, degraded or destroyed, through:

- management
- community partnerships and education
- development and implementation of best management practice guidelines,
- legislation
- transferable rights, incentives that encourage and aid landowners to protect and manage aquatic systems on their properties, and pollution offset schemes
- integrated property management plans for accredited water cycle management
- investigation of the impact of active catchment management strategies that enhance water quality and quantity outcomes, and
- a whole of government review of irrigation activities throughout the State that may also lead to better management of off-site discharges.

Lake McNess—one of the important wetlands in the South West of Western Australia.

Source: Dr Jenny Davis, Murdoch University

In short cont'd...

Global opportunities

Protecting aquatic systems is a priority the world over. All global indicators show that water availability and quality is in decline. Western Australia's ability to protect and manage aquatic systems could provide a significant contribution to global effort.

Further information

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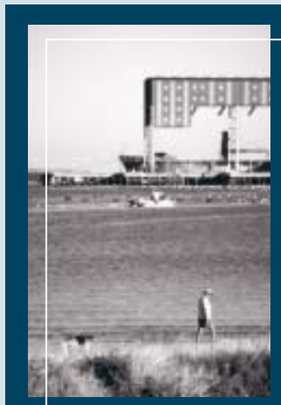

Cockburn Sound south of Perth has many social, economic and environmental values to those who use and enjoy it. These values have been incorporated into the Cockburn Sound Environmental Protection Policy that provides for the management of the sound.

Source: Department of Environment

> SUSTAINABLE COASTAL AND MARINE ENVIRONMENTS

The coast and the marine environment are highly significant to Western Australians; many of our settlements cling to the coast and much of our recreation, leisure and tourism rely on the ocean, beaches and surrounds.

> *I am at the beach looking west with the continent behind me as the sun tracks down to the sea. I have my bearings...*
>
> Tim Winton[27]

Western Australia's coast and marine waters are important community assets and their sustainable use and management are closely interrelated. The vast majority of the State's population lives within 20 km of the coast. Urban and industrial development in Western Australia generally has a coastal focus and shipping ports are associated with most of these coastal developments. Commercial fishing of wild stocks is an important industry and aquaculture is expanding rapidly (see *Sustainable fisheries and aquaculture*). Petroleum exploration and production activity is high and focused on the offshore waters of the North West Shelf and the Timor Sea. Domestic recreation has a strong marine focus and fishing is a popular recreational pastime. Nature-based tourism on the coast servicing both the domestic and international market is growing.

Western Australia is fortunate to have much of its coastline largely undeveloped and in a relatively pristine state. Some areas are developing rapidly and in need of careful management to ensure their values are not adversely affected while others are under considerable threat of cumulative impact or have become degraded or irreversibly damaged, for example through development occurring on primary dune systems, and require more urgent or remedial action.

In July 2003 the Premier announced that the Coral Coast Marina development would not proceed, that new options for management along the Ningaloo coastal area would be canvassed and that Cape Range and the Ningaloo coast would be fast tracked for World Heritage nomination.

Western Australia's special features

Western Australia's coastline is some 27,000 km long and spans a range of climatic zones, grading from temperate on the south and lower west coast, through tropical semi-arid on the north west coast to monsoonal in the north. Tides range from less than 1 m in the south to over 10 m in the north.

Coastal waters on the south and west coast are generally nutrient poor and very clear whereas inshore waters along the north west and northern coast contain higher suspended sediment loads and are more turbid. The Leeuwin Current flows southward along the continental shelf break in winter, maintaining relatively high seawater temperatures and providing a mechanism to transport tropical species into temperate waters. The current also prevents significant 'up-welling' of nutrient-rich waters from the deep ocean that sustain the highly productive anchovy/sardine fisheries off the west coast of South America and South Africa. This physical setting has produced a wide variety of ecosystem types with many unique features. For example:

- extensive arid-zone mangrove communities (Pilbara coast)
- a 270 km long fringing coral reef less than 6 km offshore (Ningaloo Reef)
- an inverse-estuarine ecosystem maintained by 20,000 km^2 of seagrass meadows (Shark Bay)
- an extensive high latitude coral reef complex (Abrolhos Islands)

[27] T Winton 1993. Land's Edge, p.6

- nutrient-poor coastal lagoons/embayments protected by limestone reefs and characterised by highly diverse and endemic seagrass flora (central west and south coasts), and
- nutrient-poor high-energy coast with granite reefs and cliffs and highly diverse and endemic floral and faunal assemblages (lower west and south coasts).

As a result of these unique conditions the marine biodiversity of Western Australia is exceptionally rich (see *Maintaining our biodiversity*) with the area from North West Cape to Perth being recognised as one of the world's eighteen marine biodiversity 'hotspots', and in endemism it is ranked second. Recognition of the unique costal environment has occurred through the Shark Bay World Heritage listing and is behind the Premier's fast tracking of Cape Range – Ningaloo for World Heritage listing. As well, the Premier has called for the creation of five new marine parks and other reserves to ensure the special features of the Western Australian coastal and marine environment are preserved and managed for perpetuity.

Threats to the marine environment

Contamination of the marine environment can come from a range of human-derived sources as well as natural sources. The human-derived sources enter the marine environment through point source discharges from pipelines and drains and from diffuse sources like groundwater and air. The Department of Environment has established a generic inventory of contaminant sources to coastal waters. This inventory has been completed for the metropolitan coastal waters to the south of Perth, including Cockburn Sound, and is currently being completed for the North West Shelf region between Exmouth and Port Hedland.

Existing and possible future marine pest incursions are one of the most significant threats to the Western Australian marine environment. At present there are approximately 250 species of introduced marine animals in Australia and it is considered that approximately one in six will reach pest proportions. Approximately ninety have established in Western Australia including the Asian mussel and European fan worm that are recognised globally as pest species. One incursion of black striped mussels at Broome has been eradicated. Incursions of serious pests including the north Pacific seastar, Japanese seaweed and *Caulerpa taxiflora* are established in the Eastern States and are considered a serious threat to the Western Australia marine environment. Marine pests can be introduced in a number of ways including ballast water, aquaculture, aquarium trade and vessel hull fouling on yachts, ships, barges, dredges and petroleum drilling rigs.

Management of the marine environment

The many unique features of Western Australia's marine environment pose a challenge to sustainability because traditional management methods developed for overseas or east coast ecosystems are often not appropriate for our conditions. To achieve sustainability, management must be underpinned by a sound understanding of our ecosystems and the effects of human-induced pressures on the structure of these systems and on the key ecological processes that sustain them. This in turn relies on a fundamental understanding of the key ecological processes that sustain the system naturally and the identification and understanding of key threat-response pathways for each combination of activity and ecosystem type.

The State Water Quality Management Strategy is being developed to protect and enhance the quality of our water resources while maintaining economic and social development. This Strategy is underpinned by the National Water Quality Management Strategy and relies on defining environmental values and specific environmental quality objectives through consultation with the community. Environmental quality criteria are established as benchmarks from which environmental quality can be judged. This environmental quality management framework has been implemented for Cockburn Sound via the draft Cockburn Sound Environmental Protection Policy and associated interim Environmental Management Plan for Cockburn Sound and its catchment.

A fundamental requirement of environmental management for sustainability is knowledge of how the natural environment functions and varies naturally, and how it responds to human-induced pressure. The Western Australian Government has established a strategic marine research fund to support a collaborative partnership between State government agencies and Commonwealth and local research institutions to underpin the sustainable management of Western Australia's marine environment. It is envisaged that an important output of this study will be the establishment of key baseline reference sites to understand natural variability and separate natural from human-induced change.

However, even with the best understanding of an ecosystem and its variability, and of the consequences of a particular human activity, there is always a risk that something that was unlikely or unforeseen will occur and damage part of the environment and the biodiversity it supports. To offer the best chance of preserving all components of our marine biodiversity it will be important to ensure the establishment of a comprehensive, adequate and representative system of secure marine protected areas. In the interim, areas of high conservation significance must be identified and protected from threatening activities.

Management of the coast

Many submissions to the State Sustainability Strategy related to the marine environment and particularly the near-shore coastal environment. It is clear that the State Sustainability Strategy should highlight the value of the coast and recommend a way forward to simultaneously accommodate sensible and diverse uses of the coast along with protection of the marine environment. The strategy should seek to protect the natural values of our coast and near-shore waters without compromising social and economic opportunities for future generations.

The government is committed to bringing a greater transparency to planning and decision-making processes for coastal areas, providing a more integrated approach and delivering more sustainable outcomes. This will be achieved by more effective community input into decisions to be made about coastal planning and management. The government will create a Coastal Planning and Coordination Council as a prescribed committee of the Western Australian Planning Commission. The new Council will lead a robust, integrated, coastal planning and management system that includes all levels of government, the community and industry.

One of the tasks of the Council will be to develop a marine planning strategy which focuses on the identification of areas and issues where direct management intervention, detailed planning studies or on-ground works are required. Current and existing on-ground works will be reviewed in light of the strategy.

The strategy will:

- define strategic issues facing the marine environment in Western Australia
- define the principles and goals of quality strategic planning in the marine environment
- document what is currently happening in the marine environment in terms of strategic planning and coastal planning and highlight any gaps, overlaps or limitations
- define the opportunities and constraints for developing a marine planning strategic framework for Western Australia
- develop a strategic framework within which future conflict between uses can be resolved and an integrated approach to planning can be undertaken (it is not intended to replace existing conflict resolution mechanisms designed for specific purposes), and
- identify the areas and priorities for marine strategic planning and management in Western Australia.

In the final stage of the project, following completion and adoption of the strategy, the State's agreed highest priority actions will be implemented.

The State Sustainability Strategy is suggesting a model for implementing the Strategy through regional strategic planning processes guided by the State Coastal Planning Policy (Statement of Planning Policy 2.6) and other policies. Establishment of a Coastal Planning and Coordination Council, together with the development of the proposed marine and coastal strategies, should provide an effective management framework. There may be a need to address particular coastal areas where development issues are so complex that a separate sustainability assessment or regional sustainability plan is required as has been done on the Ningaloo coast.

In short...

Vision

Western Australia has healthy, sustainable marine ecosystems. Its coast and marine environments remain accessible to the public and are protected through statutory policies, strategic plans and other mechanisms that reflect community values.

Objectives

- Enable coastal areas to be managed in a way that reflects their special value for Western Australians.
- Establish effective marine planning throughout the State's marine waters to enable appropriate marine biodiversity management.
- Establish sustainability principles in coastal planning and management.
- Protect and maintain the ecological integrity of our marine ecosystems, and the habitats and communities dependent upon them.

Actions underway

- Release of the 'Future Directions' paper seeking public comment on tourism and land use plans for the Ningaloo coast in a sustainability framework.
- *Coasts WA: Better Integration* sets out the Government's response to the report of the Coastal Ministerial Taskforce and establishes a new integrated framework for coastal planning and management, including the creation of a Coastal Planning and Coordination Council as a prescribed statutory committee of the WAPC.
- A State Coastal Planning Policy (Statement of Planning Policy 2.6) has been developed to provide specific high-order guidance for planning decisions affecting the coast. This is supported by the ongoing activities of the Coastal Planning Program, which partners with local government to keep coastal plans up to date.
- Coastwest has been a catalyst for the creation of partnerships between community and coastal managers and continues to provide funds to address pressing coastal and marine management needs across the State.
- An environmental quality management framework that utilises community-derived environmental values and quality objectives is being developed for the marine waters of the State starting with Cockburn Sound.
- The Cockburn Sound Management Council has been established to facilitate the multiple-use and sustainable management of the marine waters of Cockburn Sound to ensure the objectives of the Cockburn Sound Environmental Protection Policy are met.
- A marine habitat protection policy is being developed to help protect ecological integrity and the dependent biodiversity of our coastal waters.

In short cont'd...

- Contaminant input inventories are being developed for the North West Shelf region to identify pressures and threats to the environmental values, and inform management.
- Multi-disciplinary environmental studies are being conducted to facilitate multiple-use management and protection of the marine ecosystems on the North West Shelf.
- A strategic marine research fund has been established to support an ongoing collaborative partnership between State government agencies, Commonwealth and local research institutions to underpin the sustainable management of Western Australia's marine environment.
- The Marine Parks and Reserves Authority, together with the Department of Conservation and Land Management, is establishing a comprehensive, adequate and representative system of marine reserves, to facilitate conservation and multiple-use management.
- The Department of Environment is conducting a community consultation process to assist the Environmental Protection Authority in establishing an agreed set of environmental values and quality objectives for the coastal waters between Exmouth and Port Hedland to guide environmental impact assessment and management.
- A State Coastal Zone Environmental Protection Policy is being developed.
- The Department of Fisheries has undertaken community awareness programs to increase public awareness regarding introduced marine pests and to assist in early detection of some of the species which are considered a major threat. Officers have also been trained in emergency response and a contingency fund has been established to enable a rapid response to incursions.
- The Department of Conservation and Land Management is developing a Biodiversity Conservation Act and a Biodiversity Conservation Strategy that will address marine biodiversity conservation issues.
- The State government is working collaboratively with the National Oceans Office to develop regional marine plans that encompass State and Commonwealth waters off the Western Australian coast.

Actions

3.52 Ensure that the management regime for the Ningaloo coast, following public consultation, provides for the proper protection and appropriate and sustainable development of this unique area.

3.53 Complete the Carnarvon-Ningaloo Coastal Regional Strategy to define the location and character of preferred development and use of the coast in the context of the proposed World Heritage nomination. Ensure adequate planning and development controls are established to implement the outcomes of the Strategy.

3.54 Create five new marine reserves by 2005 to ensure Western Australia's unique coastal and marine environment is preserved in perpetuity.

3.55 Progress the survey of marine biodiversity, especially in the State's marine biodiversity hotspots.

3.56 Develop a State Coastal Strategy and a State Marine Planning Strategy with appropriate consultation.

3.57 Progressively identify the environmental values and designate environmental quality objectives for all of the State's marine ecosystems on a priority basis.

In short cont'd...

3.58 On a priority basis, progressively implement scientific programs to derive environmental quality criteria for all of the State's marine ecosystems.

3.59 Reinforce and promote the principles of best management practice in coastal and marine management and continuous improvement for existing activities, and ensure they are demonstrated for new proposals.

3.60 Recognise and consider the potential for cumulative impacts and synergistic effects of multiple activities on coastal and marine systems in environmental impact assessments of new proposals and in the management of ongoing activities.

3.61 Evaluate the findings of the North West Shelf Joint Environmental Management Study in terms of a decision-making strategy based on the principles of sustainability.

3.62 Prepare an introduced marine pest response strategy for Western Australia to exclude pests that already occur in other parts of Australia or may be introduced from overseas.

3.63 Work with the Commonwealth Government for regional marine planning beyond three nautical miles to ensure effective and integrated marine planning and adequate, comprehensive and representative marine planning.

Global opportunities

The way Western Australia manages its coastal and marine environment provides real opportunities to tap a different kind of global market, a growing tourist niche for those wanting a natural or wilderness experience.

Further information

Government of Western Australia 2003, *Coasts WA: Better Integration The Western Australian Government's Response to the Coastal Taskforce Report*, http://www.dpi.wa.gov.au/planning/coast/coast.htm

McAuley, H 2002, *Cottesloe Reef: Community Managed Natural Resources*, sustainability case study, Department of the Premier and Cabinet, Perth, viewed 15 August 2002, http://www.sustainability.dpc.wa.gov.au/CaseStudies/CottesloeReef/CottesloeReef.htm

Ningaloo Coast
http;//www.ningaloocoast.wa.gov.au

The Cottesloe Reef Fish Habitat Protection Area was created in September 2001 and provides many recreation opportunities.

Source: Glen Cowans, CMPG.

> SUSTAINABLE RANGELANDS MANAGEMENT

There is concern about ongoing degradation of the rangelands and the commensurate loss in productivity and profitability, as well as the loss of social capital from the regions.

> *Across Australia's extensive semi-arid and arid pastoral lands, stocking rates as perceived by early squatters (usually viewed during better seasons), have been as rosily optimistic as humpback whale quotas perceived by eager whalers. Over recent decades as environmental degradation of pastoral lands proceeded faster than cuts in stocking rates, the carrying capacity of grazing lands has declined despite token management measures - paralleling the decline of humpback stocks and the cuts in annual quotas. And within our strictly limited areas of arable land, degradation (in the forms of salination, erosion, compaction, acidification, loss of organic debris & species diversity, etc.) are now cutting into the high hopes of sustainable yields.*
>
> Graham Chittleborough

The rangelands of Western Australia account for some 90% of the State's land mass. Many different land uses occur in the rangelands including pastoralism, mining, tourism, horticulture as well as traditional use by Aboriginal people. Almost half of these rangelands are vested as pastoral leases, and a considerable proportion of the remainder is unallocated Crown land and Crown land reserved for particular uses.

The *Land Administration Act 1997* provides the legal framework for the administration of much of the land in the rangelands. This Act establishes the Pastoral Lands Board with responsibility for managing pastoral leases on behalf of the Western Australian Government. The Act specifically requires that the Board ensure that leases are managed on an ecologically sustainable basis. All pastoral leases are due to expire in 2015; all but six will be renewed, and ninety-one lessees have been notified that some land may be excised from the present leases for public purposes. Negotiations on these excisions are due to be finalised by October 2004.

It is clear that management decisions and practices on the pastoral rangelands have not often been based on the principles of sustainability. While recognising real efforts of some within the industry, much of the rangeland under pastoral management is severely degraded, with a greatly reduced productive capacity. Both natural and social capital have been seriously eroded. Moving to a position of sustainability in the long term will require rebuilding this capital, and wise management of the intact portions. The task of rebuilding presents some enormous challenges; however, they are challenges that must be met for the sake of future generations, in accordance with the principles of sustainability.

The Western Australian Government is committed to achieving sustainable resource management in the areas of agricultural and pastoral production, and to building markets based on clean and green accreditation. The government has continued support for the rural reconstruction strategy in the Gascoyne-Murchison region, which has been a useful pilot project for the State's rangelands as a whole.

The government has established five working groups to review the key issues facing the pastoral region, with the Government's response to the groups' recommendations expected early in 2004 to provide future direction to the industry. The Pastoralism for Sustainability Working Group is providing recommendations to the government on means to achieve sustainable land management on pastoral rangelands. The Working Group will also identify ways to achieve nature conservation outcomes on pastoral lands. This will help define required reserves as well as off-reserve conservation measures.

The other aspects of the pastoral industry under review are: alternative models of land tenure; Aboriginal access; access to pastoral leases; and pastoral industry economic monitoring requirements. The outcomes of the deliberations of these groups will assist to move towards sustainable pastoral land management.

The sandalwood industry has considerable potential to contribute to local economies and to diversification in the rangelands. Elsewhere in this draft Strategy (see *Sustainable forestry and plantations*), it is recommended that the sandalwood industry be reviewed, to enable the development of an integrated business and resource management plan that ensures sandalwood is managed on an ecologically sustainable basis that maximises environmental, social, regional development benefits as well as providing adequate financial returns to the State.

Biodiversity conservation is not well catered for in the rangelands. The Conservation Through Reserves Committee Review in the early 1970s did not deal with those regions under pastoral management. This deficiency was acknowledged in the Gascoyne-Murchison Strategy (see Box 45), a comprehensive regional initiative to address the long-term decline of that region. A specific allocation was made within this initiative for land acquisition for the conservation estate, as part of a lease adjustment program. To date, around fifteen whole pastoral leases and parts of fifteen other leases have been acquired for conservation. The Gascoyne-Murchison Strategy has also piloted an innovative program to embed sustainability into pastoralism through the Environmental Management Unit Project (EMU Plus). The components of this project are described in Box 45.

BOX 45 GASCOYNE-MURCHISON STRATEGY

The Gascoyne-Murchison Strategy (GMS) is a regional initiative addressing critical economic development, structural adjustment and natural resource management needs of the pastoral industry in the Gascoyne- Murchison region of Western Australia.

Pastoralists in the Gascoyne-Murchison region are progressing toward sustainable production. The GMS has assisted pastoralists to formulate and coordinate a number of sustainability initiatives. The GMS comprises four core programs, one of which is the Regional Environmental Management Program. The aim of this program is to improve natural resource management from the paddock scale through to the regional scale encompassing advancement of sustainable pastoral production. The EMU Plus project was developed under the Regional Environmental Management Program; this is now being implemented successfully across the southern rangelands.

Key components of the EMU Plus project are:

- making provision for biodiversity conservation in the matrix (off-reserve conservation)
- empowering managers of leases to better manage each lease through an understanding of landscape processes
- providing tools for monitoring and an adaptive management framework
- providing access to markets through accreditation of products and services
- providing options for diversified local and regional economies, and
- ensuring that all activities are consistent with sustainability principles and practices through developing Environmental Management Systems for all scales of management.

There are significant opportunities for the pursuit of sustainability to contribute to a viable future for the rangelands. There is potential to extend the work of the Gascoyne-Murchison Strategy EMU Plus project to other parts of the rangelands to ensure sustainable management into the longer term. Such a process could provide the mechanism by which the government would recognise accreditation prior to consideration of lease renewal, so that the state in its capacity as land owner and landlord can be confident that future management will be consistent with sustainability principles. There could also be a review of the existing system under which permits are issued, in support of enterprise diversification across the rangelands.

Beyond the rangelands that are managed for pastoral purposes, remote areas face significant management problems. These management issues include the presence of feral herbivores including goats, camels and donkeys, the presence of foxes and feral cats, invasion by weeds including buffel grass, unmanaged access by 4WD vehicles, and uncontrolled wildfires.

The State's rangelands are now recognised as a Natural Resource Management (NRM) Region for the purposes of the Natural Heritage Trust. Preparation of an NRM strategy and investment plan has commenced; it is expected that there will be a high level of community consultation and engagement, and that the relevant local governments will be involved to an increasing degree. The focus of the strategy will be the move towards sustainability, and developing the mechanisms to achieve this.

In short...

Vision

Twenty years from now, human activity in the rangelands will have become richer. Pastoral enterprises will be efficiently and effectively managed to provide a level of return that enables people to stay on the land, while also protecting biodiversity and natural processes across the landscape. The new generation of pastoral lease managers will adopt risk management approaches to business and grazing management, focused on the condition of the land and its vegetation. Monitoring and evaluation of natural resource conditions will be a condition of leases and open up marketing opportunities for 'sustainable' products. Pastoralists have adopted new technology and best practice management systems and many have diversified their enterprises. Government regulations and incentives have supported these changes, but the primary driver of change has been the pastoralists' own business decisions. Pastoralists take responsibility and action for the control of animal pests, weeds and fire, and work actively to rehabilitate degraded areas. Sustainability is accepted as a fundamental goal and all landholders, including the Crown, use regional indicators and targets for environmental management.

The range of livestock grazed has expanded, and other forms of land use are common—horticulture, aquaculture, native foods, tourism, and rural retreats. In addition, there are many different kinds of businesses operating across the rangelands; they are all contributing in a significant way to a generally robust community in these outback regions. Mining continues to make a substantial contribution to regional economies and begins to engage effectively with local communities.

Objectives

- Ensure the Western Australian pastoral rangelands are managed sustainably in accordance with the requirements of the *Land Administration Act 1997*.
- Ensure that the conservation reserves within the rangelands are managed to protect their biodiversity values, and in a manner that reflects the department's good neighbour policies.
- Provide support for off-reserve conservation of biodiversity to complement the conservation reserve system.
- Provide opportunities for diversified and sustainable production from the rangelands.
- Ensure that all areas of unallocated Crown land in the rangelands are managed in a way that adequately reflects their biodiversity conservation values and potential future uses.

In short cont'd...

Actions underway

- The Gascoyne-Murchison Strategy has piloted a range of initiatives in support of sustainability in the rangelands, particularly through its Regional Environmental Management Program (the EMU Plus project).
- The Minister for Planning and Infrastructure has established five working groups to review and make recommendations on the key issues facing the pastoral region. The working groups examined:
  - alternative models of land tenure
  - Aboriginal access
  - access to pastoral leases
  - pastoralism for sustainability, and
  - pastoral industry economic monitoring requirements.

  The recommendations of these working groups will be released at the Gascoyne Muster II in October 2003. The government's response, providing the future direction of the pastoral industry, will be released in early 2004.
- The Western Australian Rangelands Monitoring System provides regular up-dates on the condition and trends of native vegetation on pastoral leases; this system is due to be expanded to incorporate explicitly some key biodiversity values.
- The rangeland condition assessment program provides status reports to the Pastoral Lands Board on the condition of pastoral leases; the assessment is being expanded to include biodiversity elements and sustainability benchmarking information.
- Comprehensive biological surveys of the Nullarbor, eastern Goldfields the southern Carnarvon Basin and the Great Sandy Desert have been completed, and parts of the Little Sandy Desert and the Kimberleys have been surveyed.
- The program of mapping land systems across the pastoral rangelands of the State is almost complete and provides a sound basis for on-ground management including locating water points and fences.

Actions

3.64 Implement policy initiatives arising from the government's response to the five pastoral industry working groups: alternative models of land tenure; Aboriginal access; access to pastoral leases; pastoralism for sustainability; and pastoral industry economic monitoring requirements.

3.65 In making the government response to the five pastoral working groups, take account of the vision for the rangelands and identification of priority issues for sustainability in the rangelands provided by the Rangelands Working Group of the Natural Resources Management Council.

3.66 Complete the negotiations for the 2015 pastoral lease exclusion process to define the future structure of the pastoral estate and future use of the excluded land.

3.67 Review the arrangements for managing unallocated Crown land within the rangelands to ensure that these arrangements are appropriate to protect the biodiversity conservation values and potential future uses of these lands.

In short cont'd...

3.68 Support the roll-out of the EMU Plus project across the southern rangelands and into the Pilbara and Kimberley, recognising the potential of this project to improve environmental management through building capacity in the rangelands, and to underpin future accreditation.

3.69 Further develop the environmental management systems currently being trialled within the Gascoyne-Murchison Strategy Regional Environmental Management Program to provide a framework for accreditation of sustainable pastoralism in the rangelands, and consider the application of the accreditation process for the new pastoral lease arrangements after 2015.

3.70 Support the development of regional and sub-regional natural resource management strategies for the rangelands region as the basis for future investment under the Natural Heritage Trust, and the involvement of local governments and local communities, including Indigenous communities, in that process.

3.71 Encourage universities to do more research and teaching on sustainable rangeland management in recognition of the significance of the region to Western Australia.

Global opportunities

Rangelands throughout the world are under severe pressure and desertification is a major concern of the United Nations Environment Program. Successful development of a model sustainable rangelands program will have important potential applications in other parts of the world, especially north and southern Africa and the Middle East.

Typical rangelands vegetation on Nerren Nerren Station, in the Murchison.

Source: Angas Hopkins