Securing Our Natural Future

A white paper for land and biodiversity at a time of climate change

A Victorian Government Initiative

Victoria The Place To Be

land & biodiversity

The Government of Victoria proudly acknowledges and pays its respects to Victoria's Native Title Holders and Traditional Owners and the rich culture and intrinsic connection they have to Country.

The Government also recognises and acknowledges the contribution and interest of other Indigenous people and organisations in the management of land and natural resources.

The Government acknowledges that the past injustices and continuing inequalities experienced by Indigenous peoples have limited, and continue to limit, their proper participation in land and natural resource management processes.

Farmland in south-western Victoria, along the Great Ocean Road. Photo: Tourism Victoria

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Premier's foreword

Victoria's Land and Biodiversity White Paper – *Securing Our Natural Future* – is released at a time of significant challenge and opportunity.

Governments around the world are now focusing on both reducing greenhouse gas emissions and adaptation to climate change. The impact of climate change is adding further complexity to the already difficult task of balancing the sustainable management of our land, water and biodiversity, while achieving economic growth and sound social outcomes.

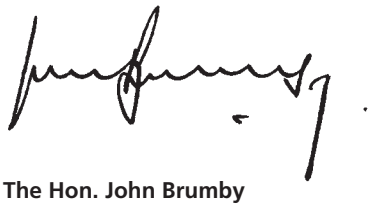
Victoria is well placed to meet these challenges, but Victorians must recognise that we face a very different world in the future. As Victoria enters its thirteenth year of drought and climate change impacts become more apparent, we can expect to see major differences in the environment. Change is already happening - species such as the Baw Baw Frog are being found in places where they have not previously been sighted; important wetlands have little or no water; and stressed eucalypts have failed to flower, leading to a crash in bird numbers in central Victoria.

While we cannot control all the changes in the environment, there is a lot we can do to manage the transition. The Government will play a leadership role - working with the community, business, industry, and non-government sectors to focus attention on areas that need it most. By identifying priorities and being clear about our objectives, we will make it easier for volunteers, farmers, 'friends' groups and the corporate and philanthropic sectors to join with the Victorian Government in securing our natural future.

The Government will make its institutions more flexible and better able to deal with environmental problems. The Government will ensure a regulatory environment that supports private investment in biodiversity and ecosystems services, alongside continued Government investment in environmental programs.

Victoria can benefit from the changing climate. New businesses in landscape restoration are already emerging and generating green jobs in rural and regional areas. Already, the demand for natural resource managers and environmental specialists outstrips supply. We anticipate this trend for green skills will continue to grow and the Government will identify opportunities to nurture this burgeoning industry. Better pricing of ecosystem services puts a value on their protection. Government action on pricing environmental values will provide the potential for Victorian farmers and other private land managers to generate additional income through the provision of ecosystem services.

This White Paper sets out the Government's vision, policy and actions for land and biodiversity at a time of climate change. It builds on the Water White Paper *Securing Our Water Future Together (2004)* and will be complemented by the forthcoming Climate Change White Paper. Together, the three White Papers provide a foundation for managing changes in Victoria's natural environment.



The Hon. John Brumby
Premier

Minister's foreword

Victoria is a wonderful place to live and work. Its varied environments are home to over 5 million people and thousands of species of plants and animals.

Our current prosperity and quality of life have been built on healthy natural environments and the ecosystem services they support. Ecosystems supply us with clean air and water. They help form soil, supply pollinators, detoxify and decompose wastes and stabilise the climate.

Demographic change, population pressures and our lifestyle are putting unprecedented pressure on ecosystems across the state. In addition, the last decade has seen Victoria experience a severe drought and catastrophic fire events. The 2009 Victorian bushfires were devastating for the community with a terrible loss of life and property, but they also resulted in a significant loss of habitat for birds and small mammals.

We must plan for population growth and the very real prospect that the prolonged drought conditions may continue. We must reverse the degradation of our ecosystems and the loss of biodiversity.

Victoria is fortunate to have dedicated scientists, land managers and volunteers working to improve the situation. I am proud that our state has led the way with innovative programs and institutions. Landcare began in Victoria and has spread around the world. Victoria established the first catchment management authorities and it is world-leading in designing policy responses that use market solutions to better value natural resources and biodiversity.

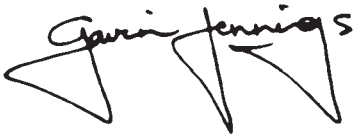
Many Victorians spend hours of their time volunteering to repair the environment. Victorians in their thousands are weeding, planting trees, creating habitat, counting frogs, monitoring bird numbers, cleaning up waterways and controlling pest animals. The Government commends them and will continue to support their work.

More Victorians than ever are aware of the impact of their everyday decision-making on the environment. By being careful with our consumption we can make sure we don't waste our natural resources.

Securing our Natural Future sets a new framework for action that will safeguard our environment by building ecosystem resilience, protecting natural assets in flagship areas and improving ecological connectivity in biolinks.

The Government recognises the importance of involving Indigenous communities in land management, conducting ongoing research to fill the gaps in our knowledge and measuring the performance of our efforts.

The Government's vision is 'Victorians acting together to ensure that our land, water and biodiversity are healthy, resilient and productive'. By taking action together we can create a sustainable future for all Victorians where we live and prosper on the interest created by our ecosystems without eating away at the natural capital.



Gavin Jennings MLC
Minister for Environment, Climate Change and Innovation

Message from Sir Gustav Nossal
Chair, Scientific Reference Group

This Land and Biodiversity White Paper is a statement the time for which has come. In the nearly two centuries since European settlement, Victoria has become an important source of food, fibre, minerals and energy but at the same time has suffered severe ecological decline. Our land, vegetation and biodiversity have been left with little resilience. The length and severity of the drought since the mid-1990s, the effects of climate change and our recent frightening bushfires have taken a heavy toll on Victoria's terrestrial, freshwater and marine ecosystems.

The Scientific Reference Group is deeply convinced that the time for 'business as usual' is over, and the need for action to stem ecological decline is urgent. Restoration needs to be statewide, broad-scale and well coordinated, with strong participation from both public and private sectors.

It has been a privilege to chair the Scientific Reference Group alongside five distinguished experts on the science and sociology of ecosystems. We have worked closely with outside experts, and colleagues in the Department of Sustainability and Environment. We have enjoyed robust debates, particularly in areas where the science is not settled.

We believe the White Paper is a valuable roadmap to guide action over the next 20 to 50 years towards a strategic approach to landscape and biodiversity restoration. We see the White Paper as a living document, capable of evolution as we gain new knowledge, new experience, new perspectives and new scientific tools. We emphasise the need for Government leadership, statewide planning for ecological management and sensitivity to the long time frames involved in ecosystem restoration.

We emphasise the role of biolinks to strengthen ecological connectivity and ecosystem resilience; capitalising on carbon markets for biosequestration of carbon and for biodiversity outcomes; optimising partnerships between government, the corporate and philanthropic sectors and individuals; and administrative, regulatory and legislative changes to streamline natural resource management. The complex interactions between all elements of ecosystems, living and non-living, make an interdisciplinary approach mandatory.

Victoria has a strong history of community action. Many Victorians have worked hard and lovingly to reverse land degradation and biodiversity loss. All of us need to build on this dedication and embrace the shared goal of making our landscapes and the people who live in them healthy, resilient and productive. The Scientific Reference Group has pursued its task with unity of purpose and bonhomie and is proud of the result. We commend the Victorian Government for the bold step of producing this White Paper and we encourage all Victorians to play their part in its progressive implementation.

Message from Mick Murphy
Chair, Stakeholder Reference Group

Since the launch of the Land and Biodiversity Consultation Paper in April 2007, I have observed a broad set of ideas develop into a comprehensive and long-term approach for managing Victoria's land, water and biodiversity. This would not have been possible without the valuable input from key stakeholders and the Victorian community as a whole.

In my role as chair of the Stakeholder Reference Group, I have experienced first hand the commitment of the 26 member organisations of that group to the White Paper process.

The members, who represent the gamut of interests on the subject of natural resource management - conservation, agriculture, industry and community - demonstrated a high level of respect during meetings, and a willingness to listen to and constructively discuss different views.

I was impressed by the excellent response from the Victorian community to the suggested approaches and questions posed by the Government in the Consultation Paper and Green Paper. Many hundreds of submissions were received to the Consultation Paper and Green Paper.

I attended many of the workshops held across Victoria during the Green Paper consultation period and was able to witness first hand the community's passion for the health of the natural environment as well as their commitment to protecting it for future generations.

I was very pleased to hear about the great work of individuals and organisations to improve the health of Victoria's environment. I learnt of their successes and their challenges from both a local and state-wide perspective.

As the White Paper was refined, consultation involved engagement with environmentalists, community groups, scientists, primary producers, policy makers and politicians.

The input of so many diverse groups and individuals is the foundation of the White Paper's vision to work together to improve the health, resilience and productivity of our land, water and biodiversity. The result is a White Paper that has extensively considered the views of the community and key stakeholders.

The White Paper is a long-term commitment to the future of land, water and biodiversity in Victoria. I look forward to being involved in its implementation and thank the members of the Stakeholder Reference Group for their good humour and robust debate over more than two years of development. It has been an honour to have chaired this group.

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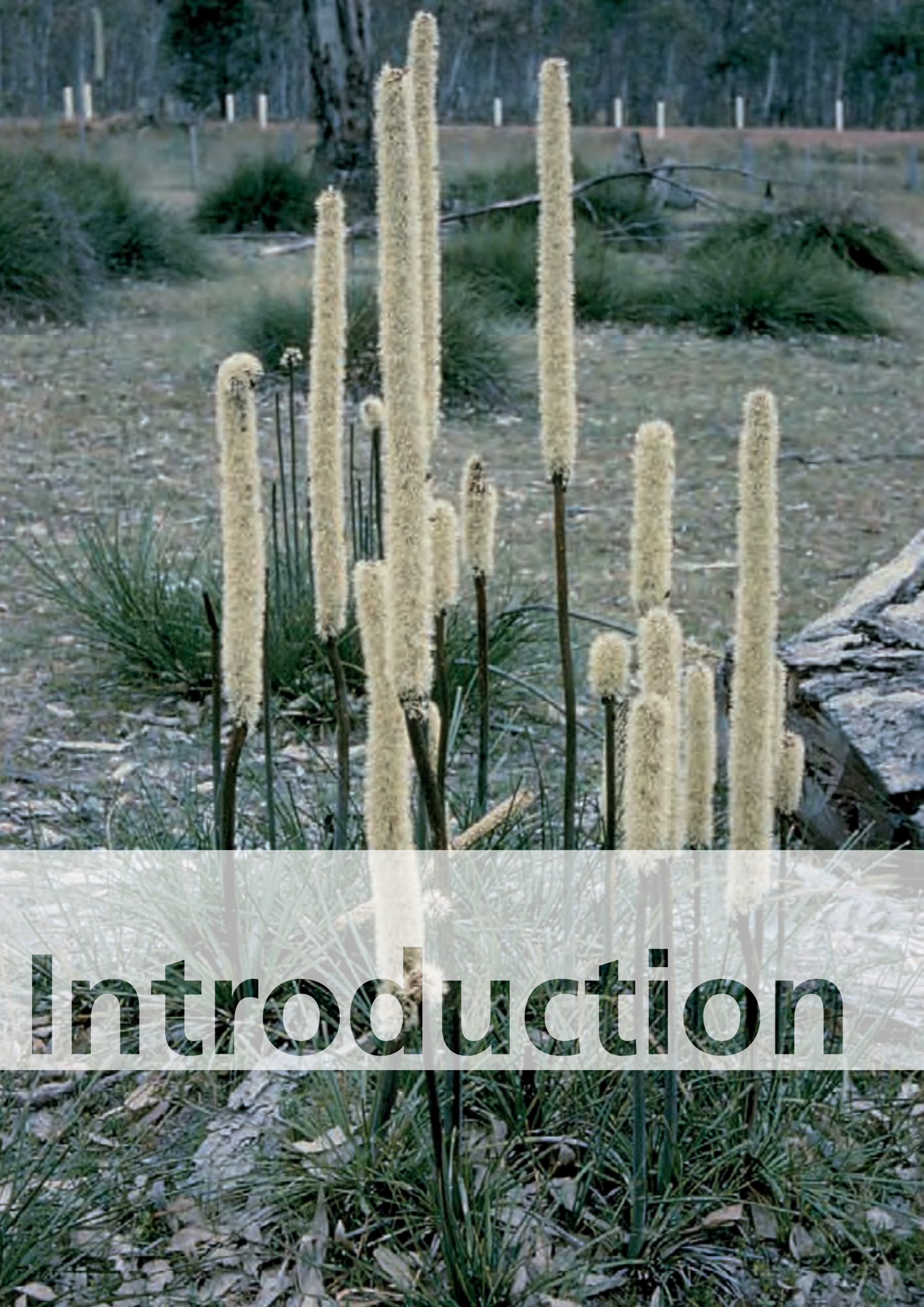


Introduction

About the White Paper

Securing Our Natural Future: A white paper for land and biodiversity at a time of climate change is the product of a three phase process that commenced in 2006. The White Paper was an action in *Our Environment, Our Future: Sustainability Action Statement* and an election commitment.

A Consultation Paper was released in April 2007. Over 360 submissions from individuals, industry, conservation and farming groups were analysed and informed the ideas presented in a Green Paper, which was released in April 2008. The Green Paper presented the nature and scope of the land, water and biodiversity problems and policy issues that Victoria faces, and proposed suggested approaches to address them. It posed a series of discussion questions on which community feedback was sought.

Victorians were very interested in the issues raised. A three month community engagement period included 13 workshops in regional locations and metropolitan Melbourne. The workshops were attended by more than 600 representatives from community, conservation, farming and industry groups, as well as Landcare representatives, local government and State government agencies. Follow-up panel hearings on key themes provided additional input. These processes were complemented by Indigenous consultation workshops under the auspices of the Victorian Traditional Owner Land Justice Group.

More than 1400 submissions to the Green Paper were received. These varied from short letters of support and/or concern, through to lengthy documents addressing each of the discussion questions and suggested approaches. The input and debate over the three-year process has informed the policies and actions in the White Paper.

Submissions on the Consultation Paper and the Green Paper, and key themes raised in the workshops, may be accessed at www.dse.vic.gov.au/landwhitepaper. Appendix 2 of the White Paper includes a summary of submissions and the issues raised in the workshops.

The development of the Green Paper and the White Paper has been informed by a Scientific Reference Group, chaired by Sir Gustav Nossal AC, CBE, and a Stakeholder Reference Group, chaired by Mr Mick Murphy OAM. Appendix 3 lists the membership of these groups.

The White Paper has been finalised while the 2009 Victorian Bushfires Royal Commission, chaired by the Hon. Bernard Teague AO, is being conducted. The final recommendations of the Royal Commission will be considered as the White Paper is implemented.

The White Paper is aligned with national strategies including *The National Biodiversity and Climate Change Action Plan (2007); Australia's Biodiversity Conservation Strategy 2009;* and *Australia's Strategy for the National Reserve System 2008-2030*. It is also consistent with Victorian Government policy documents such as the *Future Farming Strategy (2008)* and *Living with Fire – Victoria's Bushfire Strategy (2008)*.

This White Paper complements the policies and initiatives in the Victorian Government's Water White Paper - *Securing Our Water Future Together (2004)*. The Water White Paper and four regional Sustainable Water Strategies set the policy framework for the long-term sustainable management of our water reserves. *Securing Our Natural Future* addresses water in the environment, recognising that the health of aquatic and terrestrial ecosystems are inextricably linked.

The Victorian Government is also finalising a Climate Change White Paper. Together, the three White Papers provide a foundation for managing rapid changes in the environment.

Moonlight Head, The Great Ocean Road. Photo: James Lauritz / Tourism Victoria

Opposite page - Small Grass-tree, *Xanthorrhoea minor.* Photo: DSE

Introduction

The Victorian Government is releasing *Securing Our Natural Future* at a significant point in the evolution of Victorian environmental policy.

Scientists around the world are making increasingly dire predictions about the scale and rate of global warming and its implications for the health of both terrestrial and aquatic ecosystems and the populations they support.

As one of the hottest and driest continents on earth, Australia is particularly vulnerable to climate change. Severe drought and reduced water availability are already affecting Victoria's productive land and ecosystems.

Despite significant efforts made by governments and the community, the overall health of Victoria's land, water and biodiversity continues to decline. Strong and decisive action is needed to reverse this. A better targeted effort is required to manage adaptation to the impacts of climate change.

The White Paper is a long-term, strategic framework to secure the health of Victoria's land, water and biodiversity in the face of ongoing pressures and a changing climate over the next fifty years.

The vision

The vision for managing Victoria's environment is:

Victorians acting together to ensure that our land, water and biodiversity are healthy, resilient and productive.

Outlook from Mt Rouse, Penhurst, Grampians. Photo: Tourism Victoria, courtesy of Southern Grampians Shire

This vision and the Government's policy agenda have been developed to guide Victoria through the challenges ahead to a different, but ultimately more sustainable future. The vision underpins the Government's approach to land, water and biodiversity and will inform natural resource management investment decisions for the medium to long term.

The impacts of climate and demographic change mean we must change the way we manage land, water and biodiversity to secure our natural future.

The community has made a clear call for reform, while also confirming that many of the fundamentals of land, water and biodiversity management remain sound. *Securing Our Natural Future* reflects this community feedback.

Achieving the vision

The White Paper has five inter-related goals. Chapters 2 to 6 have been structured around the goals and a series of linked outcomes as shown in Table A. Strategic directions are the mechanisms and processes that will be used to steer change.

Some of the goals and outcomes will be achieved in the short to medium term. Others are longer term and more aspirational in nature. They will guide the incremental steps necessary to realise improvements in landscape function over a fifty-year timeframe.

Glassons Grasslands. Photo: Eris O'Brien / Trust for Nature

Goals and outcomes

Table A - Goals and outcomes

Chapter 2	A new framework for action
Goal	To safeguard Victoria's land, water and biodiversity by building ecosystem resilience, maintaining ecosystem services and improving connectivity
Strategic Directions	- Reposition natural resource management to build ecosystem resilience across Victoria - Manage flagship areas to maintain ecosystem services - Improve connectivity in areas identified as biolinks
Outcomes	2.1 Victorian ecosystems are healthy, productive and resilient 2.2 Assets within flagship areas are managed to maintain ecosystem services 2.3 A system of biolinks strengthens connectivity across Victoria
Chapter 3	**Increasing government effectiveness**
Goal	To reform and realign Victorian Government processes and institutions which lead and facilitate the sustainable management of Victoria's land, water and biodiversity
Strategic Directions	- Restructure natural resource management organisations and associated legislation - Improve decision making at the regional level - Better target investment processes - Improve monitoring, knowledge and information management
Outcomes	3.1 Victoria has effective and responsive natural resource management arrangements 3.2 Decision-making is improved at a regional level 3.3 Investment is targeted to building ecosystem resilience, Victoria's flagship areas and biolinks 3.4 Knowledge and information management underpin improved decision-making 3.5 Modern, streamlined legislation provides the regulatory foundation for natural resource management in Victoria
Chapter 4	**Fostering environmental markets and leveraging investment**
Goal	To increase market demand for land, water and biodiversity outcomes
Strategic Directions	- Identify and support regional economic opportunities around sustainable management and landscape repair - Leverage biodiversity outcomes from biosequestration of carbon - Improve facilitation and promotion of private investment to complement public investment
Outcomes	4.1 Victorian landholders are rewarded for protecting biodiversity and providing environmental goods and services 4.2 New environmental markets drive investment in biodiversity and ecosystem services 4.3 Land, water and biodiversity outcomes are linked to the biosequestration of carbon 4.4 Information that supports biodiversity outcomes in the carbon market is accessible and widely used 4.5 Negative environmental impacts of the carbon market are minimised and addressed 4.6 Increased corporate and philanthropic investment is directed to Victoria's land, water and biodiversity

Chapter 5	Supporting community action
Goal	To encourage all Victorians to work together as responsive and effective stewards of our land, water and biodiversity
Strategic Directions	- Embed consideration of land, water and biodiversity into everyday decision-making - Empower Traditional Owners in natural resource management decision-making - Increase support for stewardship by private land managers - Strengthen the landcare model for community natural resource management
Outcomes	5.1 All Victorians consider the health of land, water and biodiversity in their daily decision-making 5.2 Indigenous communities are actively involved in the management of Victoria's land, water and biodiversity 5.3 Victorians actively improving the natural environment are encouraged, supported and valued 5.4 Land managers are supported to meet their responsibilities as active stewards of Victoria's land, water and biodiversity 5.5 Victoria's farmers are supported to incorporate environmental outcomes into their farm systems

Chapter 6	Building healthy and resilient ecosystems across the landscape
Goal	To restore the ecological processes and resilience that underpin the health of Victoria's land, water and biodiversity
Strategic Directions	- Build climate change adaptation into the management of land, water and biodiversity - Better manage public land and the ecosystem services it provides - Better integrate environmental and productivity outcomes in rural and agricultural landscapes
Outcomes	6.1 Natural resource management strengthens resilience and productivity 6.2 Public land is managed as the core of resilient ecosystems 6.3 Rivers, wetlands and estuaries are managed so they continue to provide ecosystem services 6.4 Riparian lands protect waterways and increase productivity, connectivity and amenity 6.5 Coastal and marine environments are healthy and productive 6.6 Rural and agricultural landscapes contribute to ecosystem resilience and support productive industries 6.7 Urban, peri-urban and green wedge areas host diverse values and resilient ecosystems

Principles

The policy and actions in the White Paper are underpinned by a set of principles designed to guide implementation of the White Paper. The principles are flexible, responsive and inclusive and recognise the complexity, uncertainty and risk involved in managing ecological systems, and the need to incorporate social and economic factors in decision-making. The principles are consistent with those agreed for natural resource management by the Australian, State and Territory Governments.

Table B - Underpinning principles

Principle	
1	All Victorians share responsibility for sustaining the environment for future generations.
2	Natural resource management should build ecological resilience and contribute to the ongoing provision of ecosystem services.
3	Prevention of ecosystem damage and species decline is more cost-effective than attempting rehabilitation or recovery.
4	Preference should be given to actions that support species living in their natural habitat, rather than in offsite locations.
5	Actions should be planned at the appropriate biological, spatial and temporal scales, recognising the complexity and linkages within natural systems.
6	Community engagement and the involvement of landholders is crucial to the effective implementation of natural resource management programs.
7	The skills, knowledge and perspectives of Indigenous people should be incorporated into natural resource management.
8	State investment should be targeted to achieve the greatest benefit for Victoria, ensuring transparency, value for money and effective use of taxpayer funds.
9	Decision-making should be based on the best available knowledge and modelling (including climate and population modelling). Decisions should not be avoided solely due to lack of scientific certainty.
10	Decision-making frameworks should optimise environmental, social and economic outcomes.
11	Programs should be flexible enough to adapt to changing circumstances or improved knowledge.

Important concepts

The following section explains important concepts central to understanding the White Paper.

Land, water and biodiversity

Throughout the White Paper, the term 'land' refers to landscapes of all tenures regardless of whether it is in public or private ownership. 'Water' refers to water in the environment and includes both freshwater elements such as rivers, streams and wetlands as well as marine elements. It includes surface and groundwater.

> Biodiversity, or biological diversity, is the variety of all life on earth including the different plants, animals and micro-organisms, their genes, and their terrestrial, marine and freshwater ecosystems.

Healthy land, water and biodiversity form the basis of Victoria's primary production and tourism industries. Maintaining environmental integrity and productivity is essential for our future economic prosperity.

Climate change adaptation

Adaptation is about taking deliberate actions to avoid, manage or reduce the consequences of a hotter, drier climate (with more extreme weather events) and to take advantage of the opportunities such changes may generate. Adapting to climate change must be built into the normal planning and risk management activities of individuals, businesses, community groups and government agencies.

Adaptation can take many different forms. It may include education and training about climate change; it may involve proactive responses such as the development of emergency plans to deal with severe weather events, large scale tree planting or providing greater protection for coastal communities; or it may require more technical and scientific solutions, such as developing drought-resistant crops, increasing energy efficiency and changing agricultural and industry practices.

Climate change, and adaptation to it, will affect different aspects of Victoria's society, economy and environment in different ways. We need to ensure that one sector's adaptation to climate change does not hinder or negate the adaptation of other sectors and that, as we adapt with the landscape, irreplaceable loss or expensive retrofitting is avoided.

Stawell Road bridge, Horsham. Photo: David Fletcher

Ecosystems and ecological processes

An ecosystem consists of a diverse and changing set of living organisms that form a community, interacting with each other and with the physical elements of the environment in which they are found.

Ecological processes can be defined as the interactions and connections between living and non-living systems, including the movements of organisms, energy, nutrients and other substances such as carbon.[1]

Ecosystems and ecological processes are fundamental to sustaining life and its diversity. They are also crucial to human survival and perform functions that contribute to human wellbeing and underpin much of the world's economic activity.

In addition to nature's intrinsic value, human society depends on ecosystem goods such as food, timber, other fibres, fresh water and medicines; and ecosystem services such as photosynthesis, water filtration, waste decomposition, pollination, flood regulation, carbon sequestration, soil retention and pest control. For brevity, references in the White Paper to ecosystem services includes ecosystem goods.

The diagram on the following pages depict a range of goods and services provided by healthy ecosystems.

Ecosystems are dynamic and will continue to evolve in response to environmental change. In coming decades, more rapid change is likely. Attempting to understand how ecosystems will adapt to climate change in particular, is a challenge. We can expect to see changes to the components of an ecosystem (stocks) and the pathways within and between ecosystems (flows). Information on these important concepts, and more detail on ecological processes, are explained in Appendix 4.

White faced heron. Photo: Alison Pouliot

Resilience

Resilience will be the key to an ecosystem's capacity to adapt. Resilient ecosystems are able to respond to disturbances such as fire, disease and extreme weather without losing their fundamental structure and function.

> Resilience is the capacity of a system to experience shocks while retaining essentially the same function, structure and feedbacks, and therefore identity. The more resilient a system, the larger the disturbance it can absorb without shifting it to an alternative state. In the context of climate change, ecosystem resilience might be considered as the extent to which species, ecosystems, landscapes and seascapes can undergo change without loss of values; that is, species do not become extinct and ecosystems continue to function as they change.[2]

Biodiversity brings resilience to ecosystems by spreading risk and making ecosystems more able to reorganise and adapt after change and disturbance. Ecosystems are particularly resilient if there are many species contributing to the same service. Species will replace or compensate for each other when ecosystems are disturbed.

Gradual loss of resilience can cause the unexpected collapse of an ecosystem. An ecosystem with low resilience can appear to be managing and continuing to deliver ecosystem services until the point at which even a minor disturbance causes it to exceed a critical threshold. It can be difficult, expensive and even impossible to repair ecosystems once they have reached this state.

For example, lakes can often appear to be unaffected by increased nutrient concentrations until a critical threshold is reached, following which once clear waters are smothered with algal bloom. Other aquatic vegetation disappears and the water becomes unsuitable for sustaining plant or animal life, or for stock and domestic consumption. Substantially lower nutrient levels than those at which the change occurred are needed to restore the system. The economic, ecological and social intervention required to restore a lake to health can be complex and expensive.

With climate change now altering factors such as fire regimes, water availability and the distribution of invasive species, there is an urgent need to improve the resilience of Victoria's ecosystems. Resilient ecosystems will be better able to absorb these disturbances and continue to supply essential goods and services for current and future generations.

Goods and services provided by healthy ecosystems

Biodiversity and the ecosystems it supports are fundamental to life and to our lifestyles. They provide a diverse range of goods and services, the value of which is difficult to calculate in dollar terms.

Indigenous cultural heritage

For Indigenous Australians, ecosystems are intertwined with their cultural, social and spiritual systems. Indigenous people have a long and ongoing association with the natural environment and there are many sites of cultural significance throughout Victoria.

Prevention and mitigation of natural degradation

Trees, grasses and plant roots help protect landscapes against erosion, salinity, nutrient loss and landslides. Vegetated ecosystems can help absorb floodwaters and prevent coastal erosion.

Income

Healthy ecosystems are essential to Victoria's economy. Victoria's natural resources underpin primary industries.

Pollination and crop production

Insects and birds transport pollen and seeds that are needed for the pollination and reproduction of many flowering plants, including food crops.

Habitat

Plants and animals depend on particular environmental conditions to live and thrive. Vegetation, waterways, the seas and soil provide homes for Victoria's native biodiversity.

Water quality and supply

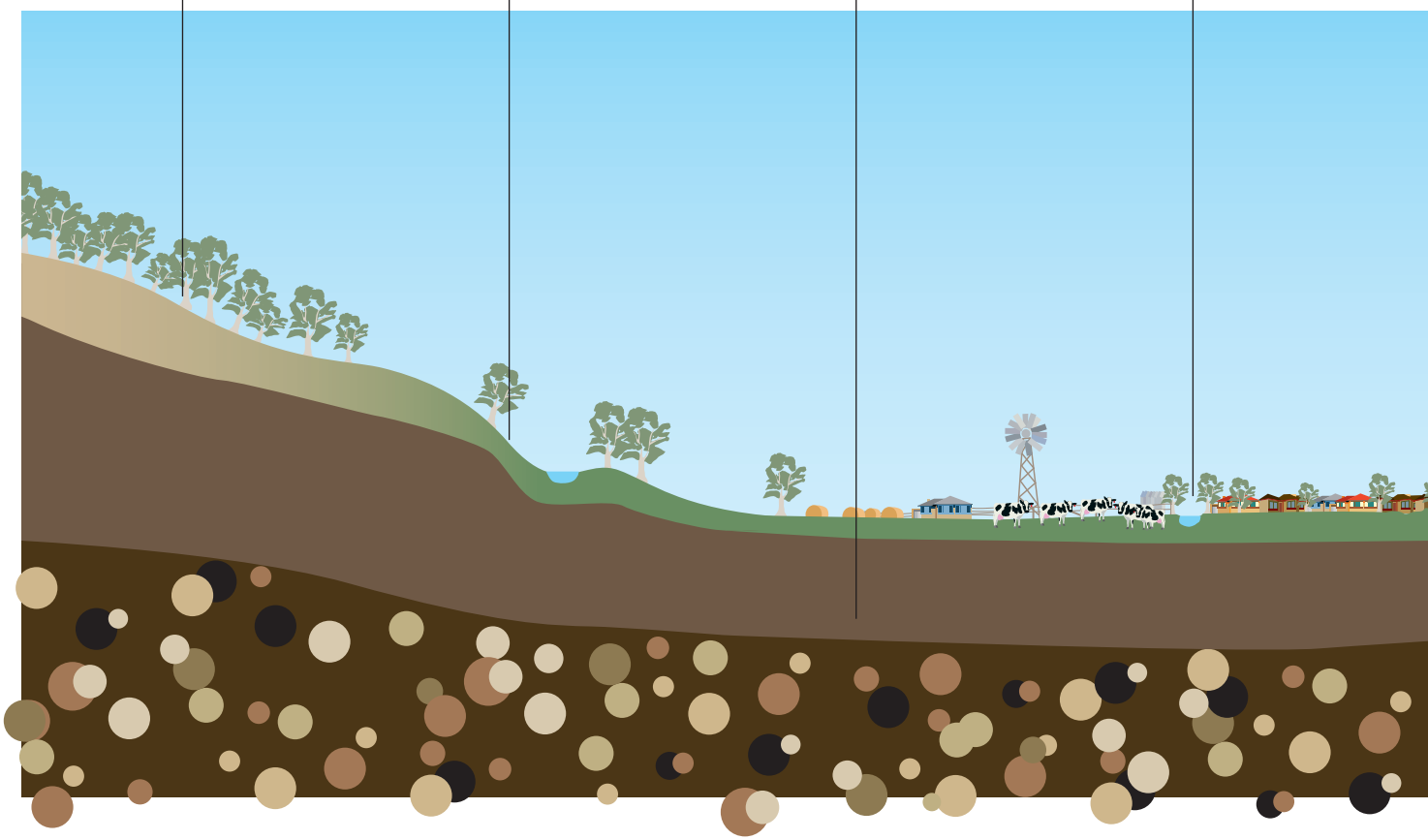
Ecosystems absorb and recycle essential nutrients and help purify water. Vegetation in ecosystems regulates the water balance and also helps prevent erosion and silting of waterways.

Pest control

Some crop pests can be managed by other organisms such as insects, birds and fungi.

Food security

Agricultural systems rely on ecological processes such as nutrient cycling to produce the majority of our food. Victoria's commercial and recreational fishing industries depend on the food sources, breeding areas and shelter provided by marine, wetland and estuarine habitats.



Air quality

As plants grow, they capture carbon dioxide (the main greenhouse gas contributing to climate change) and produce oxygen.

Detoxification and decomposition of wastes

Microbes and organisms living in soils break down organic wastes as well as many industrial wastes, such as detergents and oils.

Climate stabilisation

Plants and other organic materials in land and ocean ecosystems absorb carbon, helping slow the build-up of carbon dioxide in the atmosphere. In hot climates, forests release moisture causing rainstorms in local areas and in cold areas they insulate regions.

Health

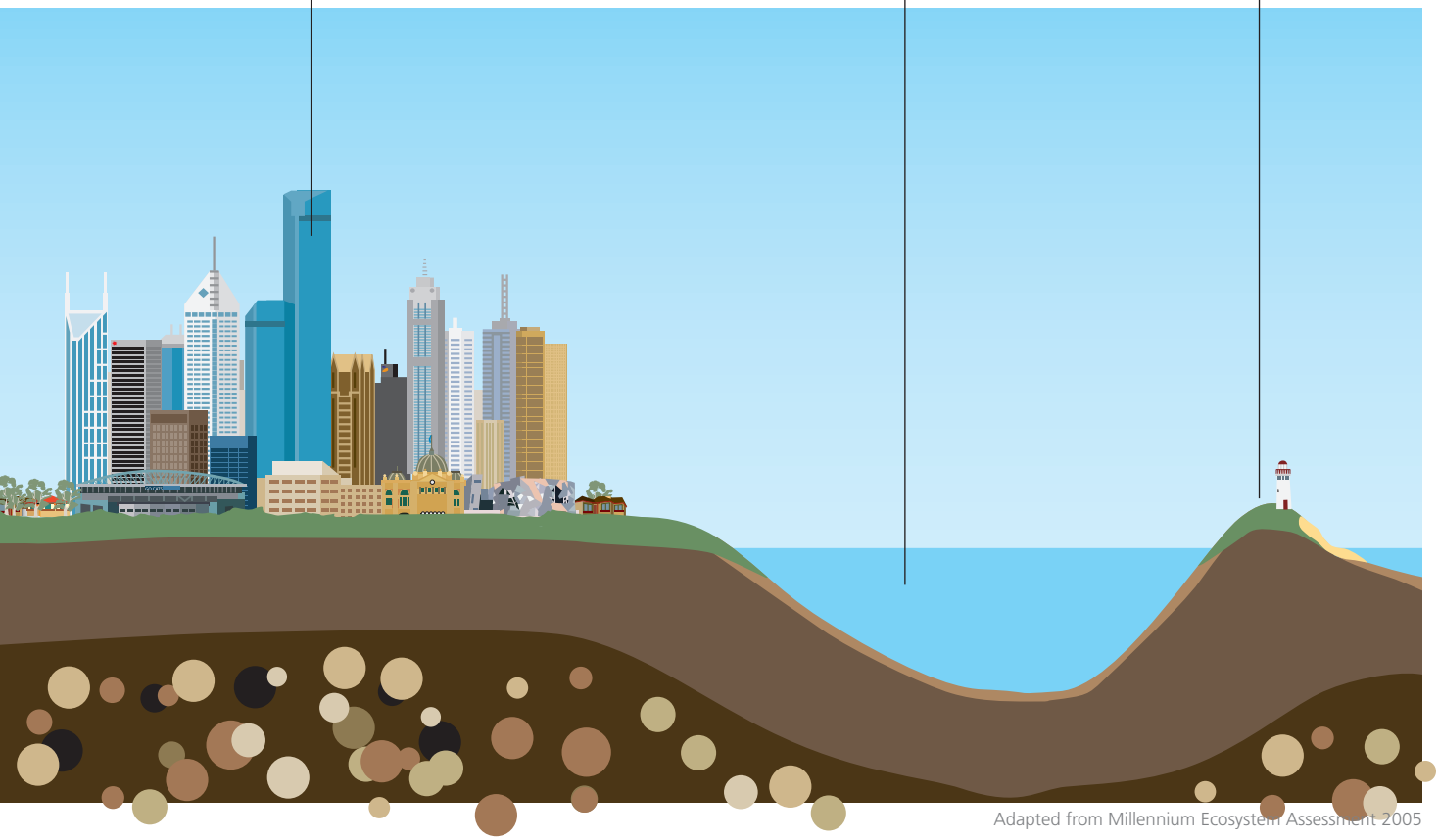
The environments we enjoy spending time in are important to our general wellbeing. Studies have found that connecting with nature can help reduce depression and improve overall health and wellbeing.

Tourism and recreation

Natural spaces in both metropolitan and rural areas are used for a wide range of recreational pursuits that keep Victorians fit and active.
The beauty and function of our ecosystems underpin the billions of dollars that tourism contributes to the Victoria's economy.

Spiritual and cultural value

Just knowing that natural environments exist is important to many people. Natural features help make cities and towns liveable. Many landscapes have important cultural heritage values.



Adapted from Millennium Ecosystem Assessment 2005

One

Chapter 1
Setting the scene

Victoria is a state of great natural diversity with a rich array of native plants and animals, many of which occur nowhere else in the world. Victoria's topography, climate and rainfall variability have created a range of landscapes and environments. There are woodlands, grasslands, alpine peaks, estuaries, rivers and wetlands stretching from the semi-arid scrub lands of the Mallee through to the lush rainforests of East Gippsland.

Victoria's 2000 kilometres of south-facing coastline takes in sandy beaches, rocky shorelines, cliffs, bays and inlets. The Victorian marine environment includes mangroves and salt marshes, kelp forests, sponge gardens, seagrass meadows and underwater sandy plains.

These landscapes and environments are a part of the State's cultural and spiritual identity, especially for Victoria's Indigenous people. From national parks and wilderness areas to local creeks and suburban open space, they contribute to our health and well-being.

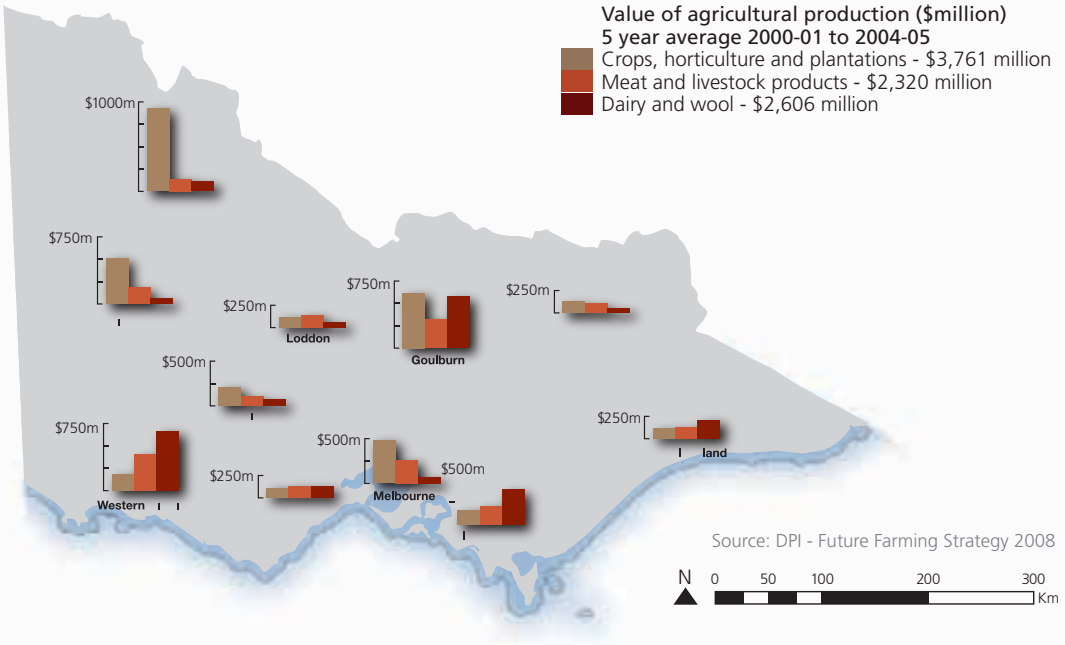
Opposite page - Regrowth after fire. Photo: Alison Church / DSE

Current situation

Indigenous Australians have contributed to the shape of the Australian landscape over many thousands of years, most notably through the use of fire as a tool. In the two hundred years since European settlement, the landscape in the area now known as Victoria has been transformed, often to the detriment of our ecosystems and biodiversity.

Victoria's abundant natural resources have contributed to the prosperity and liveability for which Victoria is renowned. Many of the actions that enabled us to build the lifestyle we now enjoy were encouraged by successive governments and undertaken to meet the needs of a growing population. These needs included a secure food supply, comfortable housing and economic development. Figure 1.1 demonstrates the economic value of the agricultural industries that are an important part of Victoria's economy.

Figure 1.1 - Broad agricultural landscapes of Victoria



However, the benefits we have gained from this prosperity have come with an environmental cost. Two centuries of intensive use of Victoria's natural resources has altered the functioning of many of our ecosystems.

Rapid population growth, increasing consumption and development have led to:

- the loss, fragmentation and degradation of habitat
- the unsustainable use of many natural resources
- the introduction of invasive species
- marine and coastal pollution
- changes to the aquatic environment and water flows
- changes to natural fire regimes.

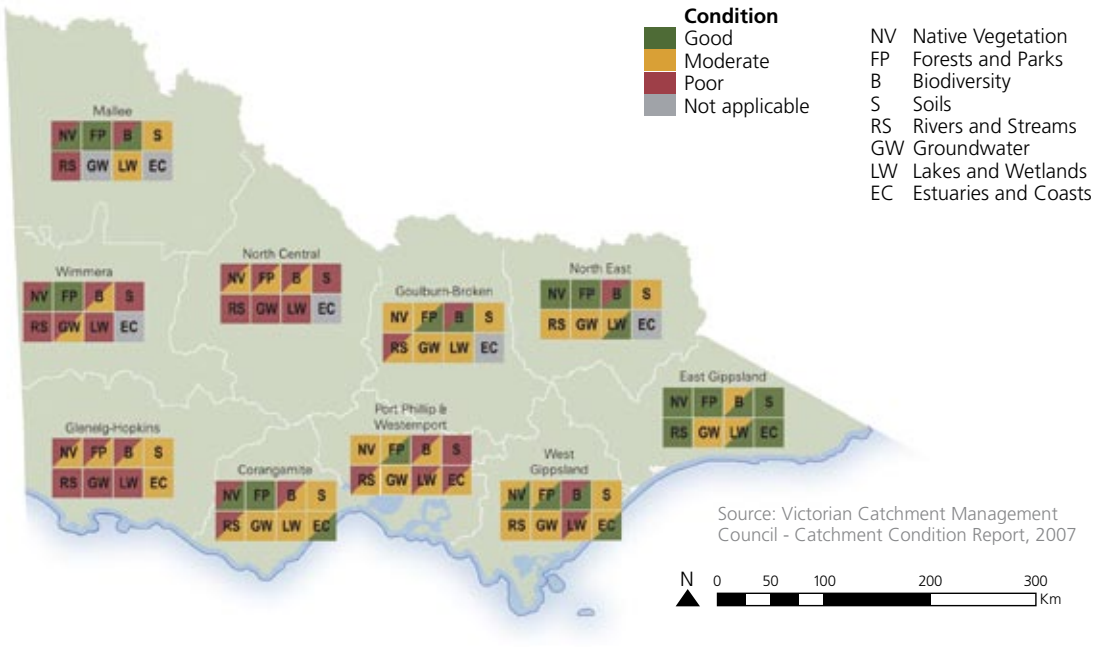
Millennium Ecosystem Assessment

Biodiversity is declining across the globe. In 2005, the United Nations Environment Program first *Millennium Ecosystem Assessment* report concluded that the world is either on the cusp of, or has already entered, a period of rapid mass extinction not seen since the demise of the dinosaurs. This sixth extinction phase is unlike all the others.

The report found that humans have contributed to climate change and changes to ecosystems over the past 50 years in an unprecedented way. It concludes that nearly two thirds of the critical services nature provides to humans are in decline, and warns that we face even greater loss of biodiversity over the next 50 years.

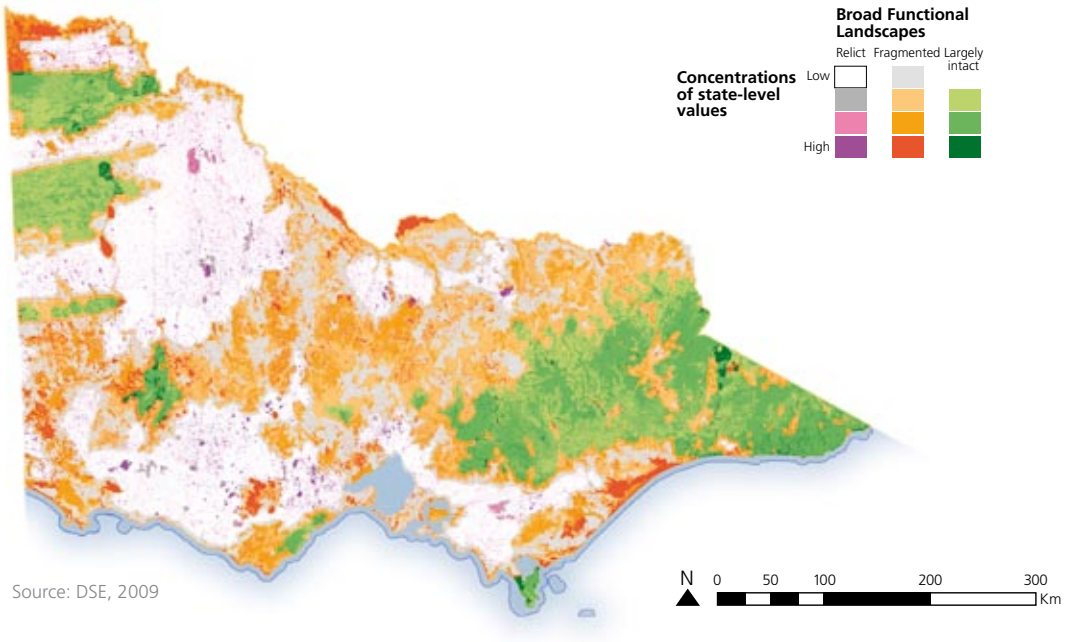
Victoria has the highest proportion (48 per cent) of bioregions in Australia considered to be in poor landscape condition. The *National Land and Water Resources Audit (2001)* found that many Victorian ecosystems are under serious stress. The picture has not improved since the audit. The *Victorian Catchment Condition Report (2007)* found that most of Victoria's catchments were rated moderate to poor in a number of assessment categories, reflecting a general decline in condition of land, water and biodiversity since 2002.

Figure 1.2 - Qualitative summary of catchment condition, 2007



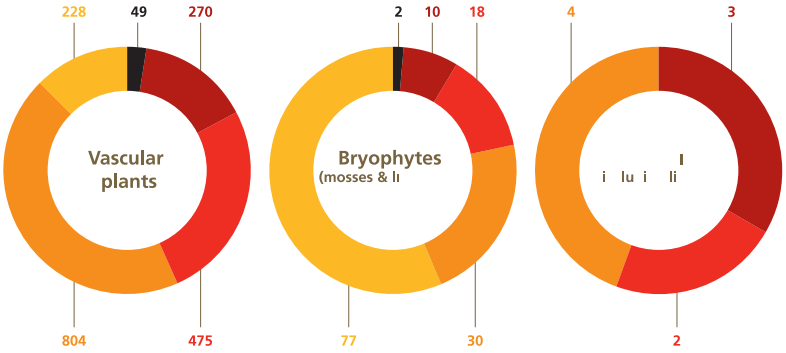
The Catchment Condition Report noted that in the forests and parks that make up the majority of our public land, biodiversity was in good condition. Elsewhere it was poor and declining. The Victorian *State of the Environment (2008)* report affirmed these trends. Figure 1.3 provides an overview of Victoria's biodiversity values.

Figure 1.3 - Biodiversity values



More than a thousand of Victoria's native species are known to be threatened with extinction. Whole communities of plants and animals, including native grasslands, rainforests, woodlands and alpine bogs are at risk due to a variety of threatening processes. Figures 1.4 and 1.5 summarise the status of Victoria's threatened plants and animals, excluding marine species.

Figure 1.4 - Summary of threatened plants in Victoria, 2005[1]



Presumed Extinct in Victoria - not recorded in Victoria during the past 50 years.

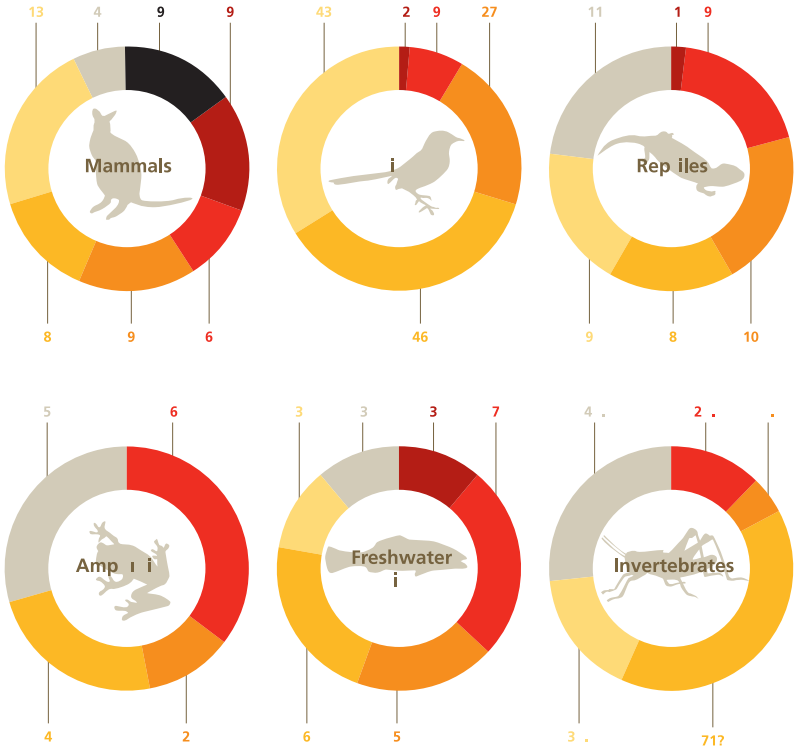
Endangered in Victoria - at risk of disappearing from the wild state if present land use and other causal factors continue to operate.

Vulnerable in Victoria - not presently endangered but likely to become so soon due to continued depletion - continued threats or low likelihood to recover from disturbance.

Rare in Victoria - rare but not considered otherwise threatened - relatively few known populations or restricted to a relatively small area.

Poorly Known in Victoria - poorly known and suspected, but not definitely known, to belong to one of the above categories within Victoria. Accurate distribution information is inadequate.

Figure 1.5 - Summary of threatened animals in Victoria, 2007[2]



Extinct - no reasonable doubt that the last individual has died.

Regionally extinct - no reasonable doubt that the last individual in Victoria has died. May occur in other states.

Critically endangered - considered to be facing an extremely high risk of extinction in the wild.

Endangered - considered to be facing a very high risk of extinction in the wild.

Vulnerable - considered to be facing a high risk of extinction in the wild.

Near Threatened - close to likely to qualify for a threatened category in the near future.

Data Deficient - inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status.

Grey crowned babbler at Killawarra.Photo: Chris Tzaros/ Birds Australia

Despite an improved understanding of environmental issues and the collective action of recent decades, the condition of Victoria's land and biodiversity continues to decline. While the scale of the challenge we face is immense, we have many opportunities to affect positive changes for future generations.

Over time, as our understanding of ecosystems has grown, Victorians have changed their behaviours and taken positive action. Successive Victorian Governments have conserved significant areas of the State in parks and protected areas, and enacted a range of legislation to protect and sustainably manage our natural assets. Industries are directly addressing the threats to their resource base and many landholders provide significant voluntary contributions to improving land and biodiversity. Victoria has strong community-based natural resource management and volunteer networks whose contribution to the environment cannot be underestimated.

This 'social capital' gives us a strong foundation to continue to work together to restore our natural capital.

Adoption of better farming practices in the Mallee

The benefits of many years' work have become visible in the Mallee. Department of Primary Industries staff have been working with farmers in the region to increase the adoption of dryland farming practices that lead to increased profitability and environmental outcomes. Practices such as direct drilling and no till sowing techniques have been instrumental in reducing the impact of wind erosion, historically a major issue in the Mallee.

By 2006-07, direct drilling had been introduced to almost 300,000 hectares – the majority of the most erosion prone land in the Mallee. As the rate of adoption continues to increase, so will the benefits on increased crop yields, reduced wind erosion and stubble retention. In turn, these will lead to increased profitability and sustainability.

Drivers of change

Climate Change

While scientists have been warning of the impacts of climate change for over a decade, it is only since the release of the documentary "An Inconvenient Truth" and the *Stern Review on the Economics of Climate Change*, both in 2006, that most of the world citizens have started to take more notice. New research on the rate and scale of climate change is released on an almost daily basis. The most authoritative recent references include the *Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC, 2007) and the *Garnaut Climate Change Review: Final Report* (2008). Australian emissions are tracking at the upper bounds of the most pessimistic scenarios modelled by the IPCC in their Fourth Assessment Report.[3]

The report found that Australia is vulnerable to the changes in temperature and rainfall projected over coming decades. The IPCC noted that 'climate change is the greatest social, economic and environmental challenge of our time. Scientific evidence confirms that human activities, such as burning fossil fuels (coal, oil and natural gas), agriculture and land-clearing, have increased the concentration of greenhouse gases in the atmosphere. As a consequence, the earth's average temperature is rising and weather patterns are changing. This is affecting rainfall patterns, water availability, sea levels, storm activity, droughts and bushfire frequency, putting at risk Australian coastal communities, health outcomes, agriculture, tourism, heritage and biodiversity for current and future generations'.

Modelling indicates that the Victorian climate will be warmer and drier, particularly in northern Victoria. The latest projections from the CSIRO and the Bureau of Meteorology signal that climate change in Victoria will continue to manifest itself in a variety of ways. Change is likely to include:

- more days over 35°C
- less annual rainfall, but more intense rainfall events
- fewer frosts
- more days with very high and extreme fire danger
- more extreme weather events (floods and droughts).

Climate change is expected to influence the composition of ecosystems and the spatial distribution and abundance of species and communities. Likely impacts will include changes to:

- water flows in rivers and wetlands
- groundwater recharge
- dryland and estuarine salinity levels
- fire intensity and frequency
- weed and pest distribution
- timing of pollination and flowering
- marine acidity
- sea temperatures and sea levels.

This suggests that the drought/fire/flood cycle that plays a large part in determining Victorian environments will be intensified. Ecosystems will change as a result, although it is impossible to predict exactly how. The changes will affect our biodiversity as some plants and animals will not be able to adapt to the altered conditions. Some localised extinctions may occur. Landscapes and natural environments will change as biodiversity self adjusts.

Modelling is being undertaken to estimate the impacts of various climate change scenarios on species distribution and abundance, the amount and quality of habitat and the movements of climate envelopes. Climate-induced migration has already been noted globally in both marine and terrestrial environments under relatively slight warming.

United Nations Framework Convention on Climate Change

In 1994, many countries around the world joined an international treaty – the United Nations Framework Convention on Climate Change (UNFCCC).
The Convention sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.

In December 1997, a smaller number of nations adopted an addition to the Convention. The Kyoto Protocol has more powerful, legally binding targets for the reduction of greenhouse gases amounting to an average of five per cent against 1990 levels over the five-year period 2008-2012. While Australia signed the Kyoto Protocol in 1998, it did not ratify it until December 2007.

By the end of the first commitment period of the Protocol in 2012, a new international framework needs to have been negotiated and ratified that can deliver the stringent emission reductions recommended by the IPCC. The next round of formal negotiations under the Convention will occur in Copenhagen in December 2009.

The world's top climate scientists gathered in Copenhagen in March 2009, as preparation for these negotiations. Scientists confirmed emission trends and drew attention to new satellite studies and measurements that suggest that ocean levels could rise by a metre of more in some areas – several times higher than earlier predictions.

Since then, a series of other meetings has taken place. In September 2009, world leaders met in New York in an effort to give some impetus to the coming negotiations. The objective will be to harness recent momentum and agree on an ambitious and effective international response to climate change.

More information of the UNFCCC can be found at www.unfccc.int

Science is indicating a hotter, drier climate is already impacting on Victorian species. Recent research shows a marked collapse in bird numbers and breeding events due to the lack of water in the landscape. This is affecting food sources for many birds, such as species that rely on the nectar of flowering gums.

Victoria's agricultural and forestry sectors will be significantly impacted by climate change. Land managers will face greater uncertainty and risk. Invasive species may increase and extend their range and new or dormant pest plants and animals may emerge. On the positive side, it is possible that climate change may reduce the distribution of other pests.

Water stress may drive a shift in agriculture towards less intensive production, or new activities that suit changed local conditions. Primary industries will inevitably adapt to changed conditions. New crop varieties that are drought-tolerant, or less water intensive, will be developed.

The Victorian marine environment has been assessed as the second most vulnerable of the seven marine domains of Australia.

The Victorian Government, through the *Victorian Coastal Strategy*, released in December 2008, has adopted a precautionary approach to sea level rise. The Government's policy is to plan for a rise in sea level of not less than 0.8 metres by 2100. This policy will be reviewed as scientific data becomes available or when national benchmarks are established.

We need to plan for the expected increased frequency of severe climatic events, and to recognise and manage the adverse outcomes of climate change. It is with these realities in mind, that the policy and actions of the White Paper have been developed.

Additional information on climate change impacts in Australia generally and in Victoria in particular can be found in Appendix 5 and on the following websites:

- www.bom.gov.au
- www.climatechange.vic.gov.au
- www.climatechange.gov.au

Population growth and land use change

Since the release of the *Land and Biodiversity Green Paper* in April 2008, new research has revealed that the Victorian population is increasing more quickly than had been previously thought. *Victoria in Future 2008* projections indicate that Victoria will grow by 2.3 million people in the next 30 years. This will include 1.8 million additional people in metropolitan Melbourne and about 477,000 in regional Victoria. This growth will require over 284,000 dwellings to be established in Melbourne's growth areas which will add to the pressures on biodiversity in the urban fringe and regional centres.

Demographic changes result in changes to land use. As the population grows and consumption increases agricultural land will be under increased pressure for example, from demand for new housing and other infrastructure. Shifting populations can bring new rural landowners who may lack experience in natural resource management.

Alpine National Park in Victoria's high country. Photo: Tourism Victoria

Two

Chapter 2
A new framework for action

Goal: To safeguard Victoria's land, water and biodiversity by building ecosystem resilience, maintaining ecosystem services and improving connectivity

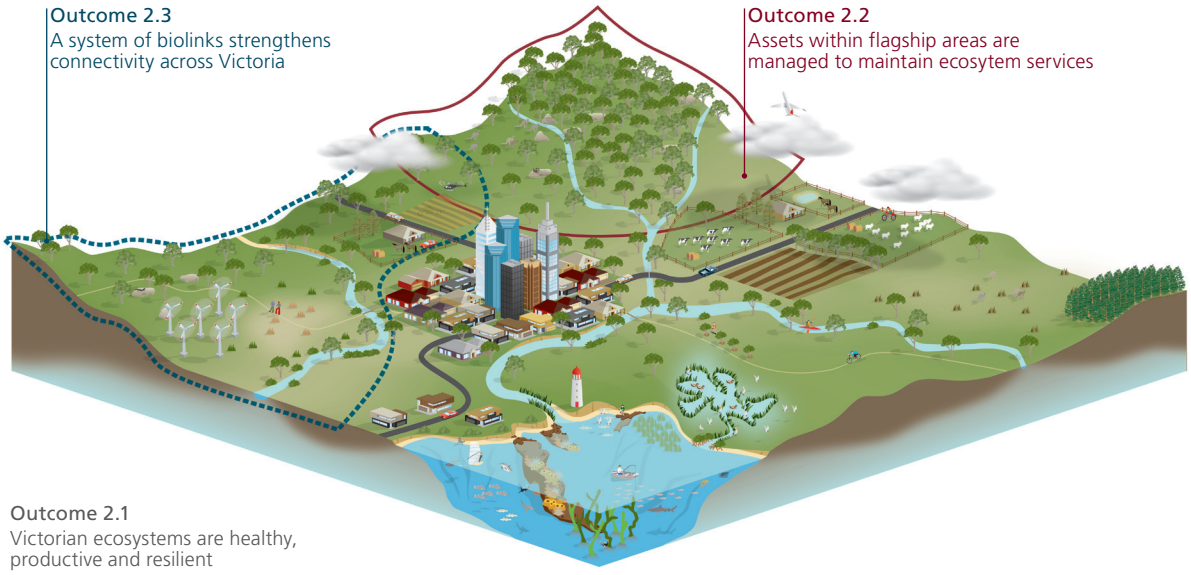
Strategic directions

- Build ecosystem resilience across Victoria
- Manage flagship areas to maintain ecosystem services
- Improve connectivity in areas identified as biolinks

This chapter sets out the Victorian Government's agenda for land, water and biodiversity over the next five decades.

There are three inter-related elements to the new framework for action: build resilience of Victoria's ecosystems; manage flagship areas to maintain vital ecosystem services; and improve connectivity within important landscapes identified as biolinks.

A snapshot of what Victoria's new framework for action will mean at the regional level is provided at the end of this chapter, along with a map (Fig. 2.3) that illustrates how the three elements combine together.



Opposite page - Yarra river. Photo: Andrew Chapman

Outcome 2.1 Victorian ecosystems are healthy, productive and resilient

The first element of the Government's framework for action is to build ecosystem resilience across Victorian landscapes.

Climate change is going to cause more intense and frequent disturbances to Victoria's ecosystems. Building the resilience of ecosystems by sustaining biodiversity and ecological processes will allow ecosystems to adapt and self-organise as circumstances change.

The Government's focus for building ecosystem resilience will be directed towards:

- maintaining the gains made by Victoria's long history of investment in natural resource management
- promoting sustainable land management practices that recognise and respond to climate change
- keeping emerging risks at manageable levels
- maintaining and strengthening the capacity of volunteer networks and Landcare groups to manage their local priorities
- managing dispersed assets such as threatened species.

This will have implications for Victoria's natural resource management practices and programs. Strategies to boost the capacity of individuals and community groups to build ecological resilience are outlined in Chapter 5. Improved approaches to managing native vegetation, water resources, environmental water, fire, soils, invasive and native species are outlined in 6.1. Measures to build the resilience and health of Victoria's public land, rivers, wetlands and estuaries, riparian land, coastal and marine environments, agricultural and rural landscapes and urban, peri-urban and green wedge landscapes are described in 6.2 to 6.7.

Building ecosystem resilience across Victoria's landscapes will require risk assessment and adaptive management, along with a new focus for investment. It will also need to be underpinned by effective knowledge management.

Adaptive management processes acknowledge uncertainty and anticipate change. Adaptive management entails a cycle of continuous evaluation which allows for the identification of risks and iterative action. By recognising indicators of gradual change and early-warning signals of ecosystem stress, natural resource managers can respond effectively to changing situations.

Risk management in the context of natural resource management is the systematic identification, assessment, and prioritisation of risks to natural assets and values based on an assessment of likelihood and consequence. It should be followed by coordinated and cost-effective action to minimise, monitor, and reduce the probability and/or impact of ecosystem collapse or decline.

The Government is seeking to embed rigorous risk assessment by having agencies involved in natural resource management adopt consistent, robust approaches to planning and investment around clearly articulated State priorities. This approach will be supported by strengthened institutional arrangements, a sound legislative framework and a renewed focus on knowledge management. These issues are discussed in Chapter 3.

Policy

The Victorian Government will focus on building the resilience of ecosystems across the state. This will involve support for individuals, institutions and communities to manage change, the adoption of risk and adaptive management approaches, effective knowledge management and landscape-scale management of land, water and biodiversity.

Hopetoun Falls, Beech Forest near Otway National Park. Photo: Holger Leue/ Tourism Victoria

Outcome 2.2 Assets within flagship areas are managed to maintain ecosystem services

The second element of the Government's framework for action is to focus attention on landscapes that provide the people of Victoria with important ecosystem services.

Many submissions to the Green Paper emphasised the need for a clear articulation of State priorities to better guide the work of regional natural resource management agencies.

Thirteen flagship areas with important environmental, social and economic values have been identified. This was achieved by mapping and overlaying a series of statewide data sets to reveal areas with significant natural assets that had multiple values. Appendix 6 contains a more detailed description of the process and includes the criteria used to validate the environmental, social and economic values of the areas.

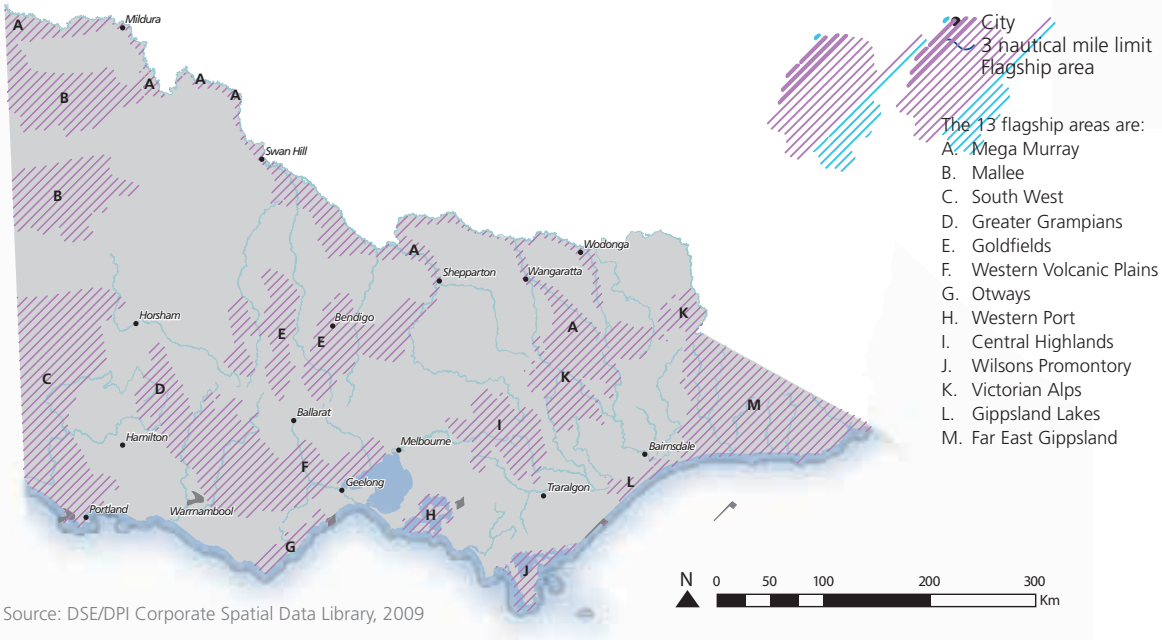
The importance of these flagship areas to Victoria means that special management and protection is warranted in the face of climate, land use and demographic change.

Natural assets within flagship areas

Victoria has important natural assets across terrestrial, river, wetland and estuarine, marine and agricultural ecosystems. Natural assets are defined as 'spatially explicit biophysical features of the environment that have value to humans from an ecological, social, cultural or economic perspective due to the ecosystem services that they provide'.

Natural assets may include native vegetation, soils, wetlands, forests, river reaches, estuaries, marine or geomorphological features. Natural assets may cross public and private land and may comprise relatively undisturbed ecosystems such as forests, through to agricultural landscapes that have economic and natural values.

Figure 2.1 - Flagship areas



Source: DSE/DPI Corporate Spatial Data Library, 2009

Identifying these flagships areas has been the first step. Marine ecosystems are currently under-represented due to our limited knowledge of the marine environment outside of marine protected areas. Work to identify further marine flagship areas is underway.

The new approach to planning and investment (see 3.3) will enable policies and programs to be better targeted. This will include the process of identifying threats to natural assets within flagship areas (to be included in future Regional Catchment Strategies), and assessing the feasibility and cost-effectiveness of management options.

Threats to natural assets may occur outside the boundary of a designated flagship area and therefore management activities may also be focused outside the flagship area itself. For example, the health of the Gippsland Lakes depends on the health of the catchments, streams and marine waters that feed into them.

Setting objectives for the long-term management of flagship areas will be progressed through a new Victorian Natural Resource Management Plan (NRM Plan) (see 3.2). Management will be underpinned by research and development, monitoring, evaluation and review (see 3.4). Priorities and responses may change as new knowledge comes to light. This will ensure those assets continue to support the well-being of the Victorian community, and contribute to ecosystem resilience in the face of climate change.

Policy

The primary objective for the management of flagship areas is the protection and enhancement of the natural assets within them focussing on the ecosystem services they provide.

Priorities and objectives for flagship areas will be articulated in the Victorian NRM Plan and reflected in Regional Catchment Strategies (see 3.2).

Regional Catchment Strategies will set regional management objectives across the flagship areas using an asset-based approach. Management actions will be articulated in landscape action plans (see 3.3).

Investment proposals put forward under the Victorian Investment Framework will address key State management objectives to maintain ecosystem services in flagship areas (see 3.3).

Management of flagship areas will be regularly reviewed to ensure performance against objectives, and continued value to the Victorian community. This will be based on up-to-date knowledge, underpinned by research and development, and will include ongoing monitoring and reporting, evaluation and review. Research and development will focus on:

- long-term mapping and monitoring
- understanding the nature, magnitude and distribution of threats
- investigating and developing protection and risk management systems.

Actions

2.2.1 Articulate state level management objectives and priorities for each of the flagship areas in the Victorian Natural Resource Management Plan by 2010

2.2.2 Identify further marine flagship areas and establish management targets and management plans by 2014

Bridle's Bend - Genoa River, East Gippsland before 1989. Photo: DSE

Bridle's Bend - Genoa River, East Gippsland 2009. Photo: Sean Phillipson
This image demonstrates the outcomes that can be achieved through a focus on biolinks.

Outcome 2.3 A system of biolinks strengthens connectivity across Victoria

The third element of the Government's framework for action is to improve connectivity within important landscapes identified as biolinks.

Many of the connections between Victoria's natural habitats have been severed by land clearing and changed land uses, leaving some habitats isolated within a matrix of farmland, urban land or other altered areas. Climate change makes it increasingly important for species to be able to migrate and for ecosystems to reorganise as they adapt.

Biolinks are broad geographic areas identified for targeted action to increase ecological function and connectivity, improving the potential of plants and animals to disperse, recolonise, evolve and adapt naturally.

Connectivity refers to the links between different ecosystems and species within a landscape. The degree of connectivity affects ecological and evolutionary processes. Re-establishing appropriate connectivity for Victoria's ecosystems is a necessary part of building ecosystem resilience and sustaining the productivity of landscapes. Increasing ecological function and connectivity will improve the potential of plants and animals to disperse, recolonise, evolve and adapt.

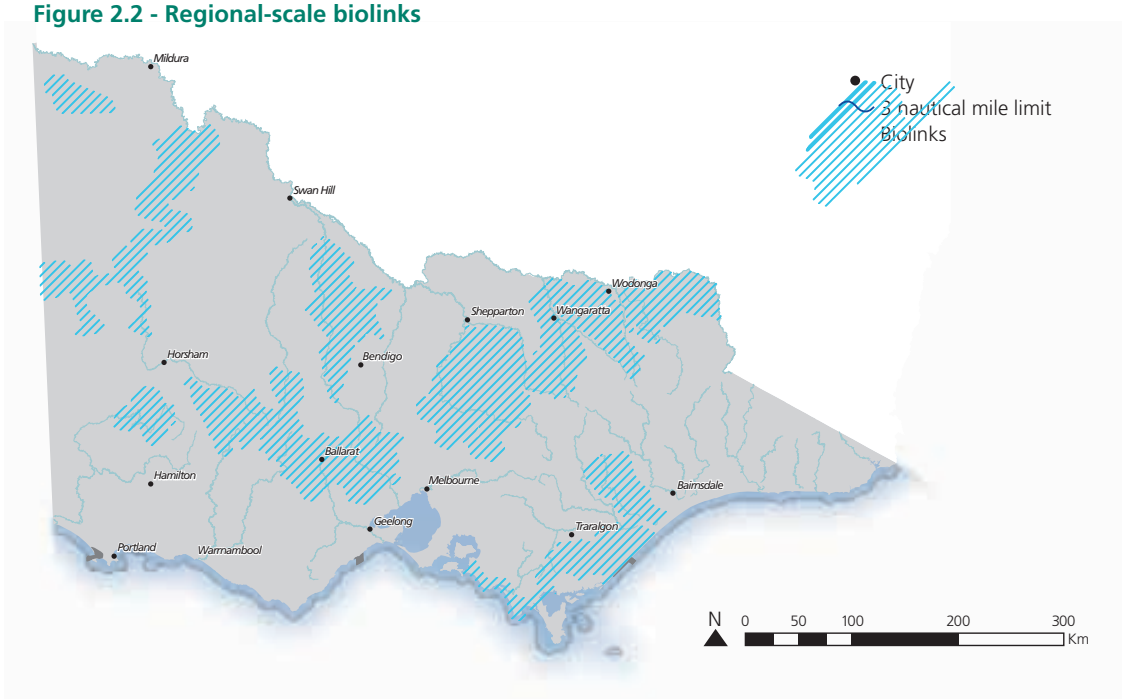
Increasing connectivity within biolinks could involve works to improve the condition of existing habitat, facilitate the connection of ecological processes like water flows, fish passage and pollination, or connect habitats including streams, wetlands, bushlands and marine and estuarine systems. This will involve a range of projects from the local to the regional scale.

Biolinks can contain different elements that together can help improve connectivity. Examples include national parks and marine sanctuaries, buffer areas, habitat corridors, public land reserves, riparian areas, small areas of protected remnant vegetation, dispersed native vegetation and climate change refugia. To build ecosystem resilience, the biolink system and the habitats being linked should include the full extent of environmental gradients (such as temperature and rainfall) across different geographic areas.

Connections to and within marine environments are also important to support natural processes like nutrient flows which span across the catchment, coast and marine spectrum. Changes in water temperature and sea levels due to climate change will cause shifts in the boundaries between coastal, freshwater and terrestrial ecosystems, increasing the need for connectivity.

Regional-scale biolinks have been identified for Victoria based on an analysis of continental climate shifts, major riparian links and local climate gradients (see Appendix 7).

Figure 2.2 - Regional-scale biolinks



Implementing biolinks

Landholders, community groups and local governments are already working to improve connectivity. The Government's approach to biolinks will build on activities that are already happening in many regions of Victoria.

Implementing a system of biolinks will require a significant increase in shared investment, action and co-operation over the next 50 years or more. Habitat development can take many decades, so early and sustained action is necessary. Partnerships between the community, government and private sector are needed across public and private land. Private landowners in biolinks will be encouraged and supported to take actions to improve connectivity and improve habitat. Local and regional communities will require support and resources. Corporate and philanthropic investment will be vital. These issues are discussed in Chapters 4 and 5.

Existing natural areas of public land, including national parks and reserves, are the building blocks of biolinks. Ongoing investment and action to manage their natural values is needed. Smaller public land areas such as appropriate unused road reserves and Crown river frontages will be important elements. Compatible management in adjacent private land may also be required. These issues are discussed in Chapter 6.

Victoria's agenda for biolinks is consistent with the draft of *Australia's Biodiversity Conservation Strategy.*[1] The implementation of biolinks will be informed by the Victorian Environment Assessment Council's Remnant Native Vegetation Investigation and the recommendations of the 2009 Victorian Bushfires Royal Commission. Ongoing implementation will be guided by successive Victorian Natural Resource Management Plans (NRM Plan) and Victorian Biodiversity Strategies. This is discussed in Chapter 3.

Habitat 141 – a green artery connects three states

Case Study

Xanthorrhoea australis. Photo: Ron Dodds

Grampians at sunset. Photo: Steffen Schultz

Isolation is one of the biggest threats to our native plants and animals. The widespread clearing of Victoria's native habitat has resulted in a landscape dotted with patches of native bush surrounded by a sea of farmland.

The loss of connectivity between areas of natural bush has greatly reduced the ability of many species to move through the landscape, placing the long-term survival of many in doubt.

Habitat 141 is an ambitious 50-year plan to restore rivers, wetlands and bushland and reconnect some of our most ecologically important parks and reserves. Habitat 141 straddles South Australia, New South Wales and Victoria and is named after the 141st line of longitude that runs in parallel to the Victoria and South Australia border.

Habitat 141 has grown out of Project Hindmarsh which linked the Big and Little Deserts by planting hundreds of hectares of native trees and shrubs along roadsides and on private property near the towns of Nhill, Jeparit and Rainbow.

Project Hindmarsh achieved its aim in just 10 years after forging enduring links between local farmers and city dwellers from Melbourne through its annual planting weekends.

Habitat 141 is the largest environmental restoration project ever tackled in Victoria. It will connect national parks from the outback to the ocean. The vast heathlands and mallee bushlands of the Murray-Sunset, Big Desert, Wyperfeld and Little Desert parks will be linked through to the threatened Buloke Grassy Woodlands, red gum country, extensive wetlands and rich limestone coastal plains near Portland.

Ron Dodds from Greening Australia, a leading advocate for Habitat 141, said the project will not only attempt to restore natural connections between national parks and other areas of native vegetation, but it will also tackle pest plant and animal pressures and restore the health of ecosystems to help species cope with climate change.

"Habitat 141 recognises that state borders are meaningless when it comes to restoring ecosystems. This is a true landscape-scale project. Hopefully it will be the first of many more to come."

Members of the White Paper Scientific Reference Group advised that as a rule of thumb, communities should aim to restore at least a third of the habitat across the landscape in biolink areas. The amount will vary according to land use, but this scale is what science indicates is necessary to support species adaptation, especially birds.

Regeneration of vegetation from in-situ seeds and root stock is generally preferable to replanting. This allows for natural selection as the best suited plants regenerate. In some areas increasing connectivity will require revegetation. The Standards for Revegetation will be updated to provide advice on selecting suitable species and genotypes taking into account future climate change scenarios and including guidance on vegetation community replacement. These guidelines will be relevant to all revegetation whether in biolinks or elsewhere in the landscape.

A clear spatial description of the functional needs of species, including connectivity and threat management, will be required for each biolink. This will ensure a consistent and transparent technical basis for planning actions and will inform decisions on land use change. Mapping that can be adapted to new data and science, and that can reflect progressive changes in land management, is required.

In some cases increased connectivity can have adverse effects, such as changing the distribution of invasive species or changing fire behaviour. These issues will be considered as part of the planning and implementation of biolinks.

Policy

The Victorian Government will instigate a system of regional-scale biolinks to focus activity on restoring local and regional connectivity, ecosystem function and resilience.

Management of public land within areas defined as regional-scale biolinks will require an increased focus on enhancing natural values and a whole of landscape approach. State forests within regional-scale biolinks will be managed consistent with the *Code of Practice for Timber Production (2007)* and the Timber Industry Strategy.

Biolinks will be implemented on private land through a range of voluntary approaches including market-based mechanisms and conservation covenants.

Connectivity will be increased from the catchments to the sea.

The detailed planning, implementation and management of regional-scale biolinks will include consideration of invasive species issues to avoid adverse outcomes. Best practice bushfire risk management within an integrated fire management planning framework will be applied.

The management objectives for Victoria's biolinks will be reflected in the Victorian NRM Plan and Regional Catchment Strategies and will be considered in land-use planning and investment decisions (see Chapter 3). Modelling tools will be applied to ensure positive catchment outcomes from works undertaken, with particular attention to accounting for hydrologic effects. Restoration efforts will focus on areas where cost efficient outcomes can be achieved.

Dynamic modelling and iterative planning will inform implementation of regional-scale biolinks, recognising that intervention decisions and land use changes will be made progressively. New biodiversity and climate science will be analysed to provide a shared evidence-base for planners, investors and land managers and inform ongoing implementation.

Where roadside vegetation and transport corridors are included in the implementation of biolinks, careful consideration will be given to health and safety issues to ensure that connectivity outcomes are compatible with road and fire safety objectives and with operation of the transport corridor.

Connectivity in riparian zones on both public and private land will be an early priority for improvement.

The Victorian Government will encourage the development of community initiatives and partnerships such as through Landcare and conservation management networks to support the implementation of biolinks.

Victorian Government investment and incentive programs will take into account the focus on connectivity in biolinks.

Actions

2.3.1 Map the functional and connectivity needs of Victoria's species and ecosystems by 2012

2.3.2 Identify and map areas within biolinks where ecosystems have natural regenerative capacity by 2012

2.3.3 Update the Standards for Revegetation by 2011

Implementing the new framework for action across Victoria

The following regional snapshots outline the characteristics of the broad geographic regions of Victoria. Reference is made to the different challenges faced by each region in relation to ecosystem resilience and how flagship areas and biolinks will differentiate management priorities at the regional level.

Lake Albacutya. Photo: David Fletcher

The Wimmera and Mallee

The Wimmera-Mallee region has the greatest diversity of reptiles in the state and is home to many endemic species, particularly birds and small mammals. The range of birds is quite distinctive to the region and includes the well-known Malleefowl and a large number of parrot species. Tourism is one of the major industries, along with broad-scale agriculture.

The Mallee is characterised by low rainfall and vast undulating sandy plains of low fertility. The region supports irrigated horticulture along the Murray River as well as extensive dryland production of wheat, barely and sheep. It boasts a surprisingly diverse ecology, including impressive stands of remnant River Red Gums and Black Box woodlands and has high heritage values, with many significant Indigenous and European sites.

The Wimmera also contains a diverse range of landscapes including mountains, plains and desert, moist foothill forests, box ironbark forest, woodlands, grasslands, mallee heath and mallee woodlands. It includes the Wimmera River, the largest inland river in Victoria.

Although large areas such as the Big Desert and Sunset Country have been set aside in conservation reserves, the region faces many challenges as remnant vegetation and native animals continue to be at risk from weed invasion, predation, feral animals and fire.

Flagship areas include the Mallee (B) and the lower reaches of the Mega Murray (A). The Mallee flagship area, in particular, requires management of pest species and fire to build resilience and to protect the flora and fauna values.

Biolinks in the region provide major north-south connectivity and connectivity between flagship areas. This will allow for regeneration and recolonisation of native biota, and provide environmental pathways in anticipation of climate change.

Mt Sturgeon at Dunkeld. Photo: James Pevitt

South-western Victoria

The south-west of the state is rich in land and marine biodiversity. It contains the Point Addis and Twelve Apostles Marine National Parks plus many onshore areas of ecological significance including the Great Otway National Park. Though a large proportion of this region has been cleared for agricultural use, a diverse range of landscapes remain, from extensive wetlands to lakes, plains and highlands. It is home to a wide range of flora and fauna, including numerous threatened and/or endemic species.

The region supports important agriculture, tourism and fisheries industries and one of the world's great deepwater ports at Portland. The spectacular coastline of the Great Ocean Road brings important tourism income to this region.

The south-west includes significant Aboriginal cultural heritage with evidence of the oldest aquaculture systems in the world which were used by Indigenous people for generations.

The majority of the Western Volcanic Plain flagship area (F) is in this region, which will be managed to protect a large number of rare and threatened flora and fauna species, while accommodating expanded cropping and intensification of agriculture. The Greater Grampians (D) and South West (C) flagship areas provide significant habitat, water quality as well as nature-based tourism and recreational services. Habitat 141, the largest landscape restoration project ever tackled in Victoria, is an important project straddling the South West flagship area.

The Otways flagship area (G) provides largely intact habitat with a high diversity of flora and fauna. It is a popular tourism and recreational area with potential for enhanced nature-based activities.

Biolinks include a major riparian link between the Greater Grampians and South West flagship areas. Providing for movement and habitat consolidation between the climatic gradients of the south-west region and the north-west and north-central regions will be a key focus for improving connectivity across a diverse topography. The Otway Ranges have been ecologically 'isolated' by the western volcanic plains for a long period.

Red Gums. Photo: Sandra Volk, North Central CMA

North and central Victoria

Particularly significant for tourism and conservation, the north-central region supports vast iconic River Red Gum forests, several internationally important wetlands, native grasslands and grassy woodlands including Terrick Terrick – the largest northern plains grassland.

North-central Victoria is part of the Murray-Darling Basin and includes four major river catchments – the Campaspe, Loddon, Goulburn and Broken. Irrigated agriculture covers much of the northern Loddon and Campaspe riverine plains and cropping and grazing occur in the dryland areas.

North-central Victoria has important Indigenous cultural heritage and is a major tourism destination for its historic gold-rush era diggings, buildings and streetscapes.

The Goldfields bioregion, which occupies much of north-central Victoria, is dominated by rolling plains and low hills. Though a large proportion of the region has been cleared for agriculture, fragmented native forests and woodlands still can be found.

The Goldfields flagship area (E) has been identified for its habitat values as well as its significant tourism and cultural heritage values. The region also contains the middle reaches of the Mega Murray flagship area (A).

Biolinks within north-central Victoria include a major riparian link between the Mega Murray and Goldfields flagship areas focussed on the Loddon and Goulburn Rivers as well as 'foothill to mountain' links providing environmental pathways southward towards the Central Highlands.

Sawtells Inlet, Tooradin. Photo: Mark Chew / PP&W CMA

Metropolitan Melbourne and the bays

The region around Port Phillip and Western Port bays is the major population centre of Victoria, and also an important production area for agriculture. There is a mix of urban and rural landscapes, parks and reserves, and important rivers and wetlands.

In and around metropolitan Melbourne, biodiversity values remain in metropolitan parks, urban gardens and the wildlife corridors flanking waterways. Many of the larger tracts of remnant bushland in the peri-urban and green wedge areas have been well preserved, enabling threatened reptile, bird and wildflower species to persist. However, population growth and consequent habitat degradation are placing increasing pressure on these ecosystems.

The flagship area Western Port (H) is characterised by a wide variety of marine habitats ranging from deep channels to extensive sea grass flats, fringing mangroves and saltmarsh and wide tidal mudflats, which guard against erosion, improve water quality and support fish nurseries. Popular recreation activities include boating, fishing, swimming, diving, nature study and bird watching. It is a commercial port and has designated aquaculture reserves. It also has marine protected areas and important Ramsar sites.

This region includes part of the Western Volcanic Plains identified as a flagship area (F). This area forms a nationally endangered landscape with high numbers of threatened flora and fauna.

Alpine National Park. Photo: Parks Victoria

North-eastern Victoria

A highly diverse area, the north-east of Victoria includes ecosystems from sub-alpine areas to tall wet rainforests, box-ironbark forest, heath, dry forest and grassy dry forests. North-east Victoria hosts the highest number of threatened flora and fauna species and the highest number of endemic species in the State.

The region supports the only occurrence of alpine ecosystems and the main occurrence of sub-alpine ecosystems in Victoria, much of which is protected within Alpine National Park. The snowfields of the Victorian Alps include Victoria's highest peak – Mount Bogong.

This region has many culturally important Indigenous sites and had extensive past industries in mining and grazing. Its rivers are important for tourism and recreation whilst other industries include wine, forestry and value-added processing in Wangaratta and Wodonga.

The Victorian Alps flagship area (K) recognises the important services provided by the alpine and sub-alpine ecosystems including water quality and quantity, carbon storage and habitat. Maintenance of these services, as well as the cultural and tourism services will be challenging in the face of climate change.

The Mega Murray flagship area (A) begins in the North-east region along the upper reaches of the Ovens River and the Kiewa River. These rivers are important for connectivity and support adjacent biolinks. They will be managed to maintain ecosystem services such as water quality which impacts on the protection of values in the subsequent parts of the Mega Murray flagship area.

Biolinks in this region aim to improve connectivity along major riparian links from the north to the alpine areas and build environmental pathways to enable species to adapt to climate change. Modelling has suggested large-scale changes in the distribution of the moister forest species following regeneration events (fire, harvesting) around mid century. Connectivity will optimise the capacity for natural systems to self adjust to future climates.[2]

Gippsland Lakes. Photo: DSE

Gippsland

Gippsland is characterised by its extensive eucalypt forests with small isolated islands of settlement in the river valleys, coastal plains and tablelands. The region contains undisturbed habitat including long coastal reaches with undeveloped estuaries, ocean beaches, headlands and a rich diversity of native plant and animal life. It contains major rivers including the Mitchell, which is the largest unregulated river in Victoria. The region supports the only Victorian populations of the Eastern Bristlebird, Diamond Python and Stuttering Frog, which are threatened species.

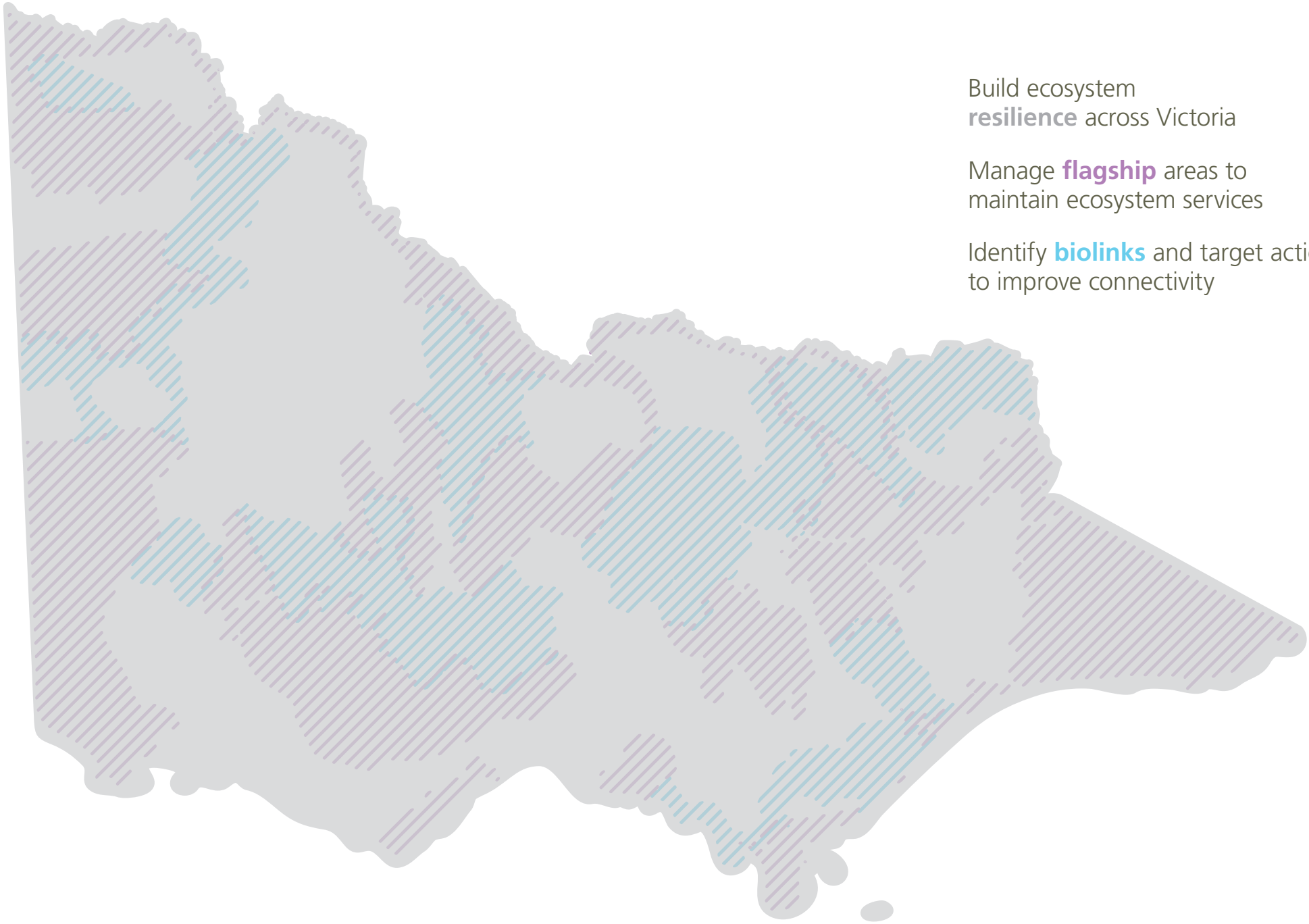
In East Gippsland about 80 per cent of the land is in public ownership as state forests or national parks. The continuity of native vegetation, the variety of vascular and non-vascular plants, mammals, reptiles, fish, forest-dwelling birds and birds of prey make East Gippsland one of the most ecologically diverse regions in the state. The Gippsland Lakes is the largest estuarine lagoon system in Australia and is a major tourism destination.

Flagship areas in the east include Far East Gippsland (M), Victorian Alps (K), and the Gippsland Lakes (L) and focus on these areas will maintain important ecosystems services such as habitat, carbon storage, and water quality and quantity.

The Wilsons Promontory flagship area (J) recognises the importance of the iconic Wilsons Promontory National Park, and Victoria's largest Marine National Park. The area contains the largest remnant of threatened coastal grassy woodland community and includes the Corner Inlet Ramsar site. As well as a high diversity of flora and fauna, the area has important European heritage values, recreation and tourism values.

West and southern Gippsland are less forested but have abundant natural resources which support industries including electricity production, dairy, native and plantation forestry, fisheries, tourism and recreation. The Central Highlands (I) flagship area is the source of 60 per cent of Melbourne's water storage capacity and will be managed to ensure important ecosystem services continue.

The biolink between the Alps and the Gippsland Lakes is a major riparian link. This, together with the biolink between the Gippsland Lakes and Wilsons Promontory through to the Strzelecki Ranges, provides for movement between climate gradients, enhances coastal connectivity and ameliorates adverse effects of longer term isolation.

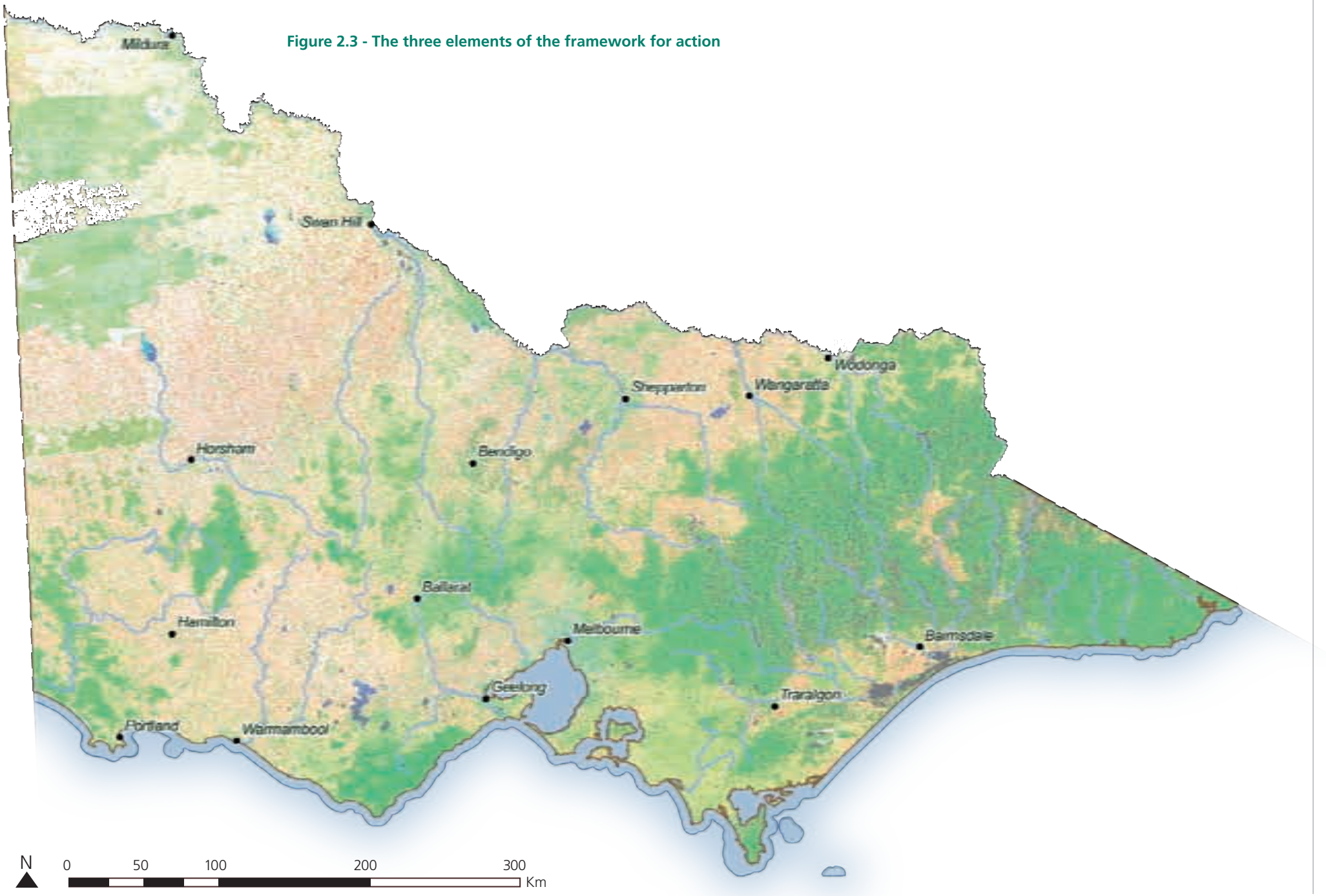


Build ecosystem
resilience across Victoria

Manage **flagship** areas to
maintain ecosystem services

Identify **biolinks** and target actions
to improve connectivity

Figure 2.3 - The three elements of the framework for action



Three

Chapter 3
Increasing government effectiveness

Goal: To reform and realign Victorian Government processes and institutions which lead and facilitate the sustainable management of Victoria's land, water and biodiversity

Strategic directions for reform

- Restructure natural resource management organisations and associated legislation
- Improve decision-making at the regional level
- Better target investment processes
- Improve monitoring, knowledge and information management

The Victorian Government has led the development of catchment-based natural resource management in Australia and remains committed to this approach. The strengths of this approach are that it enables communities to take action supported by policies and investment at the state level.

The new framework for action set out in Chapter 2 requires the Victorian Government to reform and realign its processes and institutions. Catchment-based natural resource management in Victoria will need to build ecosystem resilience, manage natural assets in flagship areas and build connectivity in biolinks.

This chapter outlines the Government's reforms which will improve priority setting by the State, align regional and State priorities, integrate natural resource management with the planning system and build on the strengths of the community-driven model.

Opposite page - Melbourne from Yarra Bend. Photo: Andrew Chapman

The Victorian Government is responsible for leading the development, communication and implementation of a vision for the environment. The Government provides strategic leadership and priority-setting and ensures knowledge is available to support decision-making and maximises investment outcomes.

Climate change means it is no longer possible to plan for the future based on our experience of the past. A risk management approach that is adaptive and flexible is needed. The challenge of adapting to climate change and the pressures of population growth increase the urgency of updating Victoria's environmental legislation and streamlining regulatory requirements. Feedback on the Green Paper made it clear that current roles and responsibilities are confused and in some cases overlapping.

Principles of catchment management

The principles on which Victoria's catchment-based natural resource management are based are set out below. They are consistent with the broader principles on page x.

1. Ecologically Sustainable Development

Victoria's whole of catchment approach to natural resource management seeks to deliver social, economic and environmental outcomes for the community and reduce our ecological footprint.

2. Community empowerment

Catchment management is a partnership between community and government. Planning and implementation of natural resource management programs should maximise opportunities for community engagement.

3. Integrated management

Management of natural resources should understand and recognise the linkages between land and water and that the management of one component can impact on the other.

4. Targeted investment

Government and communities need to ensure that resources are targeted to address priorities and deliver maximum on-ground benefits.

5. Accountability

Those making decisions on natural resource management should be clearly accountable to government and the community, both in a financial sense and for biophysical outcomes.

6. Administrative efficiency

To maximise on-ground results, catchment management structures should facilitate more efficient procedures and practices.

The Government is addressing these issues through strategic and institutional reform. Clear, unambiguous priorities for investment will be articulated through a Victorian Natural Resource Management Plan (NRM Plan) (see 3.2). This will be supported by reform of organisational structures, policy and planning, investment, knowledge management and legislation. Integration and coordination will be improved – impacts on surface and groundwater, land and catchments, productivity and biodiversity, and coastal and marine environments will be considered in an holistic way.

The reform agenda comprises:

- structural reform of natural resource management organisations, focussing on Catchment Management Authorities (CMAs) and Regional Coastal Boards (RCBs)
- administrative and enabling reforms, including changes to rules, systems and processes, governance arrangements, organisational culture and capacity-building
- improved investment frameworks
- better management of knowledge
- a modern legislative framework.

The reforms will create a sector that is well positioned to respond to the risks of climate change by aligning policy, decision-making, investment and regulation within an adaptive management context, and embedding risk assessment processes.

Australasian Darter *(Anhinga novaehollandiae)*. Photo: Faye Bedford

Outcome 3.1 Victoria has effective and responsive natural resource management arrangements

Victoria's catchment-based natural resource management approach seeks to deliver positive social, economic and environmental outcomes for the community.

Good natural resource management recognises the links between land, water and biodiversity and acknowledges the interconnected nature of the environment. Strong emphasis is also placed on community engagement and involvement.

'Natural resources' refers to land, soil, water in the environment, plants and animals – summarised as land, water and biodiversity. 'Natural resource management' in this context does not include the management of mineral resources.

Victoria's Catchment Management Authorities (CMAs) have had an important integrating function in the management of Victoria's land, water and biodiversity. The Victorian Government continues to support catchment-based natural resource management. However, the Government recognises that the current institutional arrangements are unduly complex and that change is needed to reflect present-day expectations and meet new challenges. The current arrangements are inadequate to support a whole-of-landscape approach and agencies lack the capacity and coordinating role to implement the new framework for action set out in Chapter 2.

The management of environmental water, for example, has emerged as a complex and critical task that requires new institutional arrangements. Providing a coordinated response across catchments, coasts and oceans also requires a realignment of processes and institutions.

The Government has determined that structural reform of key delivery organisations in Victoria's natural resource management sector – principally the Catchment Management Authorities, Regional Coastal Boards and associated peak bodies – is required to deliver:

- the ability to set and sustain priorities
- greater and early clarity about strategic regional objectives
- increased effectiveness of boards
- greater depth and breadth of skills to drive innovation and deliver priorities
- the ability to plan regionally and act locally
- effective integration across sectors and landscapes such as catchments, coasts and oceans
- a risk management approach to prioritise natural resource management across regional areas.

Victoria has three important and influential bodies, the Victorian Catchment Management Council, the Victorian Coastal Council and the Victorian Environmental Assessment Council. The realities of rapid environmental change, the maturing of public land use planning processes and the need to think holistically about our natural assets requires better linking of these capabilities.

Policy

Natural Resource & Catchment Authorities will be established by the end of June 2011 to bring agencies together according to the groupings in Table C. Final arrangements and boundaries for NRCAs will be determined following consultation.

In transitioning to the new Natural Resource & Catchment Authorities, agencies will commence integrating delivery of statutory functions and aligning strategic planning responsibilities through streamlined administrative arrangements. Maintaining and prioritising community connection will be a key role of the Authorities through mechanisms such as implementation committees.

Melbourne Water and Port Phillip and Westernport CMA will commence the process of merging immediately. Unlike other Catchment Management Authorities, Port Phillip and Westernport CMA does not have responsibility for the management of waterways and river health, which is the role of Melbourne Water. The merging of these two organisations, and ultimately the Central Coastal Board, will deliver integrated catchment, coastal and waterway management outcomes, better link strategic planning with on-ground activities and provide more effective use of resources.

Natural Resource & Catchment Authority board members will be appointed on the basis of skills and expertise, not proportional representation, and this will be reflected in updated legislation (see 3.5). Specific selection criteria will be used to secure regional expertise including management of irrigation areas, alpine zones and coastal and marine areas. Traditional knowledge and perspectives will be included in the selection criteria to increase the participation of Traditional Owners.

A new peak body, the Victorian Natural Resource & Catchment Council, will be established to provide coordinated land, water and biodiversity advice to Government. This will include preparing the Catchment Condition Report - encompassing public and private land; providing advice on the Victorian Natural Resource Management Plan (see 3.2); and advising on management standards and procedures for the Natural Resource & Catchment Authorities.

The Natural Resource & Catchment Council will encompass the roles and responsibilities of the Victorian Catchment Management Council, and in due course the Victorian Coastal Council, and the Victorian Environmental Assessment Council. The new council will draw upon their joint capabilities. It will build on the strengths of the three bodies and their resources, including expertise in spatial data, land use, biodiversity and community engagement.

The Victorian Coastal Council will be retained in the short term to drive implementation of the Victorian Coastal Strategy released late in 2008.

Similarly, the Victorian Environmental Assessment Council will be retained as a separate council until completion of its current investigations. Amendments will be made to legislation to enable the Minister to appoint specific advisory panels to advise on appropriate land use and the land tenure of public land on a case by case basis.

Following amalgamation of the current councils, the new Natural Resource & Catchment Council will establish action groups to address specific issues as required.

The effectiveness of these reforms will be reviewed after ten to twelve years.

The Victorian Government recognises the important role of Traditional Owners in speaking for country and caring for country and will acknowledge this through formal decision-making processes and arrangements. The fundamental importance of Indigenous land, sea and cultural aspirations to achieving health and well being outcomes for Indigenous people is also recognised.

A new statutory body - the Victorian Environmental Water Holder will be created to manage environmental water across Victoria, and to coordinate watering programs with the Commonwealth Environmental Water Holder. This will clarify responsibilities of the Natural Resource & Catchment Authorities regarding environmental water (see 6.1.3).

Actions

3.1.1 Constitute the Victorian Natural Resource & Catchment Council by December 2010

3.1.2 Incorporate the ongoing roles and functions of the Victorian Coastal Council and the Victorian Environmental Assessment Council into the Natural Resource & Catchment Council by June 2012. Specific references may still be established by the Minister

3.1.3 Amalgamate Melbourne Water, Port Phillip & Westernport Catchment Management Authority and the Central Coastal Board by June 2011

3.1.4 Establish the Natural Resource & Catchment Authorities by June 2011

3.1.5 Establish the Victorian Environmental Water Holder by December 2010

Large Duck-orchid, also called Flying Ducks *(Caleana major)*.
Photo: Gary Backhouse, DSE

Table C - Alignment of new Natural Resource & Catchment Authorities

New Authority	Current Bodies
Melbourne Water & Catchment Authority	Melbourne Water Port Phillip / Western Port CMA Central Coastal Board
Gippsland NRCA	East Gippsland CMA West Gippsland CMA Gippsland Coastal Board Gippsland Lakes Taskforce
Western Districts NRCA	Glenelg Hopkins CMA Corangamite CMA Western Coastal Board
Wimmera–Mallee NRCA	Wimmera CMA Mallee CMA
Northern Rivers NRCA	North Central CMA Goulburn Broken CMA North East CMA

Outcome 3.2 Decision-making is improved at a regional level

The current catchment-based approach to natural resource management has effectively devolved action at a regional level to improve river health and biodiversity, address salinity and tackle soil erosion.

Historically, policy and investment directed at the management of these single issues, has often occurred in isolation.

The Government's new framework for action with a focus on ecosystem resilience, flagship areas and biolinks requires planning at a landscape scale using an integrated systems approach. This means all natural resource management issues are viewed as part of a whole system, rather than managed in isolation. Delivering these outcomes will require a stronger, more coordinated natural resource management sector. The reformed sector will need:

- improved allocation of roles and responsibilities
- enhanced integration and coordination
- support for improved performance
- a secure funding base.

Roles and Responsibilities

The State Government, local governments, Parks Victoria, Catchment Management Authorities, committees of management, Regional Coastal Boards and water corporations are all responsible for planning and delivering the management of land, water and biodiversity in Victoria (see Appendix 8). The effective and efficient management of Victoria's natural resources depends on the structure, culture and function of these organisations.

However, environmental issues rarely fit precisely within organisational boundaries, necessitating effective cooperation and collaboration between agencies.

Victoria's Catchment Management Authorities develop and implement Victoria's Regional Catchment Strategies in partnership with the community and relevant natural resource management agencies. The authorities were established under the *Catchment and Land Protection Act 1994*. They evolved from Catchment and Land Protection Boards – community bodies responsible for strategic catchment planning and providing advice to government. Victoria's Catchment Management Authorities are also responsible for waterway-management, and more recently they have taken on the co-ordination of more than $75 million a year of Federal and State investment in catchment management.

While CMAs currently engage with regional decision-makers on a range of matters, there is a need to better streamline and strengthen these institutional relationships to ensure a more strategic management approach to a number of issues. Greater integration of regional natural resource management outcomes in local planning schemes is also required.

Policy

The roles and responsibilities of government agencies will be streamlined and consolidated to reduce duplication and overlap. Exact arrangements will be clarified through the implementation of the White Paper policy directions. It is not intended that this clarification will increase the regulatory burden on land managers.

The specific roles and responsibilities of Natural Resource & Catchment Authorities in providing natural resource management advice to planning authorities and other decision-makers will include:

- Acting as referral authorities for certain planning decisions beyond floodway management. For example, significant development and/or land use and management change proposals, or land use activities that impact on water in the environment.
- Developing their capacity and role to support local government decision-making. This relates to the natural resource implications of strategic planning decisions and providing up-to date data, guidance and assistance to planning authorities in the application of planning instruments, such as overlays and associated schedules.
- Providing regional interpretation of the Victorian Coastal Strategy and the Victorian Marine Plan (refer to 6.6).

Natural Resource & Catchment Authorities will have responsibility for advising on the environmental values in regional water planning and decision-making processes. This will include the following:

- Water corporations will refer applications for new water use licences for surface water and groundwater extraction to the Natural Resource & Catchment Authorities, for advice on environmental implications. The responsibility for issuing water use licences will remain with water corporations.
- Natural Resource & Catchment Authorities will be consulted in the development of management plans for surface water and groundwater, to ensure environmental values are protected.

These measures will formalise and strengthen the current arrangements.

Actions

3.2.1 Clarify the roles and responsibilities of government agencies in natural resource management

3.2.2 Assign responsibility for advising on environmental values in regional water planning and decision making processes to Natural Resource & Catchment Authorities by June 2011

Integration and Coordination

Integrated catchment management requires a shared commitment from all partners to the State's natural resource management objectives. Regional decisions must be cognisant of implications beyond administrative borders. Integrated catchment management can be improved through improved collaboration between agencies and greater consistency between the state-wide vision, regional priorities and local action.

A strong call for better alignment between land use and statutory land management planning was articulated during the Green Paper consultation process. Better integration of Regional Catchment Strategies into local government planning is required. Improved partnerships between local government and Natural Resource & Catchment Authorities will assist with this challenge.

Kookaburra *(Dacelo novaeguineae)*. Photo: Tracey Koper

Policy

The Victorian Government will prepare a Victorian Natural Resource Management Plan (NRM Plan) to prioritise management goals, standards, processes and approaches for the State. The Victorian NRM Plan will establish a coherent, holistic framework under which the Regional Catchment Strategies will be developed to ensure alignment with the State's goals and outcomes. It will integrate approaches in theme based strategies such as the Victorian Coastal Strategy, the River Health Strategy and the revised Biodiversity Strategy (see Appendix 9). It will cover all forms of land tenure and also incorporate coastal and marine environments. The Victorian NRM Plan will set the State's priorities for the next six years, with a three-yearly update and provide an important link to regional strategic planning processes.

A key objective of the Government's Native Title Settlement Framework is to increase the involvement of Victoria's Traditional Owners. A Traditional Owner Natural Resource Management Collaborative Body will be established to provide a forum for Traditional Owners and the State to engage and exchange information on natural resource management issues.

Regional Catchment Strategies set regional natural resource management priorities in line with the State's objectives. The scope of Regional Catchment Strategies will be reviewed to ensure that they adequately span all land management, including public land, and clearly articulate the relationship between regional catchment management and land use planning. Strategies will be implemented in partnership with key agencies and stakeholders, given effect through planning schemes and supported through the use of landscape action plans.

Regional Catchment Strategies will also:

- Include a planning addendum to align regional and local planning and express how its priorities should be implemented via regional and local land use planning decisions. Each addendum will set out the priorities for local planning in each municipality and identify areas that can and cannot be developed without affecting important catchment values. It will also set standards for development outcomes.
- Include a model schedule for an Environmental Significance Overlay to improve the alignment of whole-of-catchment land use and planning. This will encourage the consistent application of planning scheme overlays to protect and identify significant catchment features, such as wetlands and high value biodiversity areas.

- Clearly identify regional priorities for the protection of remnant vegetation. Appropriate planning scheme responses will be developed in partnership with local authorities. The potential impacts of wildfire and the importance of protecting appropriate assets will be carefully considered.
- Better capture and plan for whole-of-landscape values. The Regional Catchment Strategies will link to the Government's *Blueprint for Regional Growth* and reflect action under the Future Farming Strategy to design approaches that ensure regional development operates in concert with natural resource sustainability.

Natural Resource & Catchment Authorities will nominate priority locations for the aggregation of native vegetation offsets in line with State and regional strategic priorities for protection of assets and restoration of ecological connectivity and resilience. This will improve the flow of private capital into protecting and enhancing vegetation to achieve multiple catchment scale benefits and biolink priorities.

Natural Resource & Catchment Authorities will work with local government to undertake a review of the application and appropriateness of zones and overlays in relation to the latest natural resource information and assessments. The review will examine the location and suitability of existing overlays as responses to natural resource management issues, including biodiversity and native vegetation, and make recommendations for any necessary amendments to planning responses.

In consultation with local government, Natural Resource & Catchment Authorities will provide input into the early stages of future land use and settlement planning when there is the greatest flexibility to integrate natural resource management priorities with wider planning considerations.

A minimum standard for community engagement for the development of plans and project delivery will be established.

Actions

3.2.3 Release the first Victorian NRM Plan by 2010

3.2.4 Include a planning addendum in each new Regional Catchment Strategy by 2012

3.2.5 Determine governance arrangements for the Traditional Owner Natural Resource Management Collaborative Body by 2010

Improved Performance

Changes in responsibilities will need to be matched by strengthened governance arrangements, improved resourcing and clearer accountability to government and the community.

Policy

The governance of the new Natural Resource & Catchment Authorities will be improved and regularly reviewed. Early measures will include:

- Provision of consistent and coherent policy frameworks to guide regional policy development and frameworks.
- Establishing a hierarchy of management goals with an increased focus on performance reporting and outcome-based indicators.
- Standardising approaches by providing clear and integrated requirements and expectations through the Statements of Obligations and other agreements.
- Providing ongoing governance training and assistance to board members.
- Strengthening reporting requirements to government.

The knowledge, skills and understanding within Natural Resource & Catchment Authorities of the protocols for engaging Indigenous communities will be strengthened.

Actions

3.2.6 Provide clear requirements to Natural Resource & Catchment Authorities as part of a strengthened governance framework

Outcome 3.3 Investment is targeted to building ecosystem resilience, Victoria's flagship areas and biolinks

Effective natural resource management will be achieved through better alignment of investment processes with the policy and planning cycle, and clearer accountability and transparency around natural resource management investment.

Good decision making about investment in natural resource management projects at all levels can be very challenging. It requires the systematic integration of biological, physical, economic and social information. It may also require difficult trade-offs in the course of striking a balance between potentially competing priorities. Appendix 10 outlines some key factors to be considered when making such decisions.

The extent to which the government should invest directly versus leaving actions to the private sector is another challenge. For some issues, the best response will be to foster market signals or use 'market-like' mechanisms.

Previous State investment has been provided through a regional service delivery model with separate investment streams for separate programs such as native vegetation management, river health, agriculture, coasts and threatened species.

There are some good examples of programs that have operated across land tenures and management arrangements. The Glenelg Ark pest management program, for example, is benefiting biodiversity in south-western Victoria with a partnership approach to fox control across public and private land. Projects such as this demonstrate the benefits of investing through strategic and holistic models.

These successes reinforce the need for government to apply systematic and consistent processes for planning and investment across Victoria's landscapes – poor integration of many different programs can lead to duplication, inconsistency and in some cases, counter-productive efforts.

Investment focus for NRM funding

Through this White Paper, the Government has clearly outlined the agenda for action over the coming decades. Future investment will focus on flagship areas and biolinks covering both public and private land to ensure the State's objectives for these priority areas are achieved. Transparent and consistent planning and prioritisation approaches at the State, regional and local levels will be important to ensure investment delivers the State's objectives.

The Government recognises that there are natural resource management issues beyond these areas which also warrant investment. A third area of focus will be based on building ecosystem resilience across landscapes. Different approaches to planning and prioritisation will be necessary when approaching these issues, which aim to provide greater autonomy in regional service delivery and recognise the importance of community input in regional decision making.

The annual Regional Catchment Investment Plan process has been streamlined and refocussed into a new Victorian Investment Framework (VIF) which will be the key mechanism for directing investment towards the three areas of focus.

Grampians National Park. Photo: Tourism Victoria

Ecosystem resilience across landscapes

Outcome 2.1 describes the Government's approach to building ecosystem resilience. A proportion of natural resource management program funding will be directed towards achieving this outcome.

Investment will include core funding for the administrative and statutory obligations of Natural Resource & Catchment Authorities (NRCAs). This funding will not be considered under the Victorian Investment Framework.

A further component will fund activities to support resilience across landscapes, particularly regionally important outcomes. Consistent with the focus outlined in 2.1, funding may be directed towards projects that:

- protect and enhance regionally significant assets
- mitigate threats and improve the adaptive capacity for threatened species and ecological communities
- build on successful investments made over the past decades (for example weed and pest control programs),
- contribute to or maintain community capacity (for example Landcare or community volunteer projects, sustainable farming programs)
- enhance capacity within natural resource organisations (for example improved knowledge management).

Regional strategic planning is the primary tool for articulating priorities and management objectives in this sphere.

Investment approval for projects put forward through the Victorian Investment Framework will be based upon their consistency with Regional Catchment Strategies, as well best practice governance and the considerations for investment decisions related to natural resource management as outlined in Appendix 10.

Flagship areas and biolinks

An asset-based approach will be used for planning and prioritisation across flagship areas and biolinks.

An asset-based approach can be applied at the State, regional and local scale. At the State level the approach will be used to set broad management objectives for protecting and enhancing flagship areas and building ecological connectivity through biolinks. These objectives will be articulated, and periodically reviewed through the Victorian Natural Resource Management Plan (NRM Plan). The asset-based approach will provide a mechanism for the State to determine its priorities for investment in these areas.

NRCAs will apply an asset-based approach and use consistent methodologies for setting management objectives for flagship areas and biolinks at the regional level. Regional level management objectives will be articulated by NRCAs in Regional Catchment Strategies.

An asset-based approach can accommodate planning and prioritisation for biolinks by placing appropriate weighting on criteria around enhancing ecosystem services and functionality through connectivity. The feasibility and cost effectiveness of achieving ecological connectivity objectives will be paramount in the analysis.

Management options which are appropriate to achieving these objectives need to be identified, including consideration of the best mix of market-based mechanisms such as BushTender, and other policy tools.

The asset-based approach requires management priorities to be spatially explicit. At the regional level, this will facilitate the development of landscape action plans, where programs of action to maintain and enhance assets in flagship areas, and within biolinks are clearly described. This will lead to greater investment transparency and more effective monitoring of actions and change.

The use of a consistently applied asset-based approach will ensure the State funds the most cost-effective and efficient mix of projects from the best available service providers.

Asset-based approach for flagship areas and biolinks

An asset-based approach is a systematic method of managing natural resources. The approach is constructed around the ecosystem services provided by natural assets (such as clean air, water filtration, flood regulation, carbon sequestration and soil stability).

An asset-based approach provides a framework and common language to describe specific priorities for natural resource management planning and investment. The approach shifts the focus to outcomes (asset protection and enhancement) rather than activities, and is applied equally to public and private land management.

Using a robust and objective decision-making process and clearer accountability for investment, an asset-based approach also provides greater clarity about what is possible with limited resources, and allows for transparent comparison across project proposals as to the cost-effectiveness of investment.

There are a range of asset-based approaches used at the State level, each with a number of common elements, but with some differences in language and stages. To ensure consistent application of the approach, and enable transparent comparison across outcomes, a number of common features need to be instituted.

The common features of an asset-based approach are :

1. Identifying and valuing assets
2. Identifying and valuing the ecosystem services provided by those assets and the ecological processes that support them
3. Identifying and measuring threats to the assets and services
4. Applying risk-assessment principles to determine the likelihood and consequence of threats to ecosystem services
5. Assessing the feasibility or cost-effectiveness of management options
6. Linking the results to planning and investment

With regional information support, local government, through mechanisms such as Local Environment Strategies, could also apply an asset-based approach and use the same methodology for setting local management objectives around local priorities.

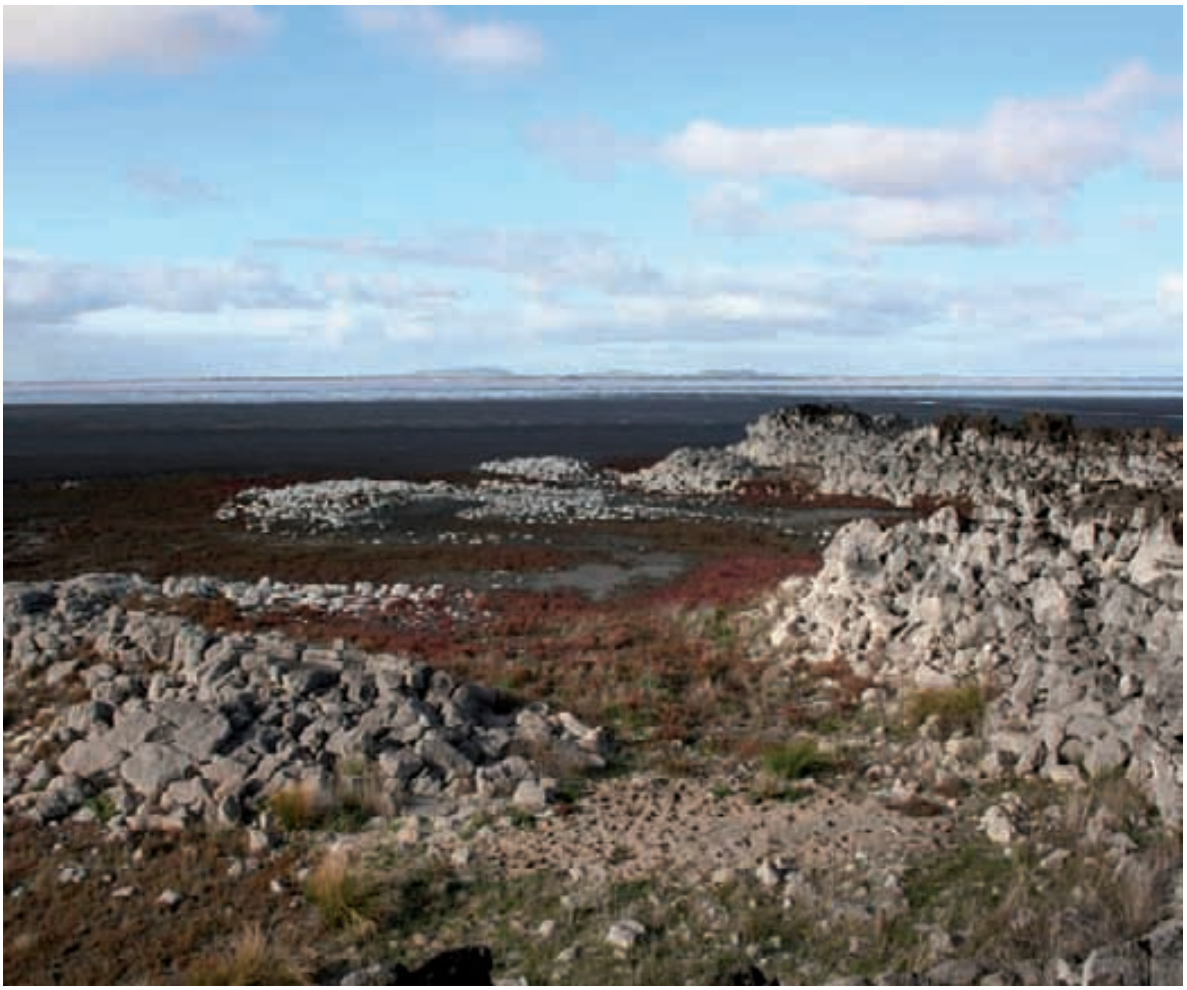
Decision support tools that facilitate the application of asset-based approaches are currently under development. Such tools will be continually improved under an adaptive management approach, as knowledge and understanding of assets and management effectiveness improves.

Decision support tools to support an asset-based approach

The Investment Framework for Environmental Resources (INFFER) is a decision support tool currently being used by several CMAs across the State to assist in determining investment priorities.

One of the strengths of the INFFER model is a public / private benefits framework. This framework determines the appropriate policy tools for managing an asset to return the maximum public good on investment. As a principle, it is important that public investment does not distort signals for private investment. Further development of decision support tools for asset-based approaches should be underpinned by a public / private benefits framework.

The Environmental Systems Modelling Tool (EnSym) also provides decision support by modelling environmental goods and services such as water yield, habitat improvement and carbon sequestration that are predicted to arise from actions at a site scale. This provides information on the level of ecosystem service which can be purchased by investment in particular actions, and supports investment decisions.



Lake Corangamite wetland. Photo: Corangamite CMA

Policy

The focus for future investment in the management of Victoria's land, water and biodiversity will be in three areas: supporting ecosystem resilience, managing assets within flagship areas to maintain and enhance ecosystem services, and building ecological connectivity through biolinks.

The Victorian NRM Plan will outline the proportions of investment to be directed through these three areas of focus. The proportions will be reviewed through update and review of successive Victorian NRM Plans.

Adaptive management principles will underpin future investment through ongoing monitoring, evaluation and review of the Victorian NRM Plan, Regional Catchment Strategies and the Victorian Investment Framework, including the application of asset-based approaches and decision support tools.

Ecosystem resilience

Regional Catchment Strategies will articulate State, regional and local priorities to enhance resilience across landscapes. Community engagement through the development of the Regional Catchment Strategies will be paramount.

Through the focus on ecosystem resilience, consideration will be given to investment in regional and local priorities that are clearly described in Regional Catchment Strategies. Project approval will require demonstration of value for money, and feasibility, but not necessarily using the same processes as flagship area and biolink projects that are proposed through an asset-based approach.

Flagship areas and biolinks

State level management objectives for flagship areas and biolinks will be established using an asset-based approach and articulated in the Victorian NRM Plan.

The Victorian Investment Framework will be used to direct funding towards State priorities in flagship areas and biolinks consistent with the Victorian NRM Plan.

At the regional level, an asset-based approach will be consistently applied in planning and developing projects to address State management objectives for flagship areas and biolinks. These objectives will be articulated in Regional Catchment Strategies and landscape action plans.

Decision support tools, including INFFER, will be further developed to assist in the application of asset-based approaches. These tools will be underpinned by a public/private benefits framework. INFFER will be utilised for the next five years or until an alternative is developed.

The ongoing application of decision support tools for the asset-based approach will be evaluated through review of the Victorian NRM Plan and Regional Catchment Strategies.

Actions

3.3.1 Set the proportion of investment to be allocated towards ecosystem resilience, flagship areas and biolinks for the 2011/12 Victorian Investment Framework round

3.3.2 Publish guidelines to assist Victoria's natural resource management agencies in the consistent application of an asset-based approach to guide planning and project development for flagship areas and biolinks by 2011

3.3.3 Utilise INFFER and further develop other decision support tools for applying asset-based approaches to planning and investment for flagship areas and biolinks by the 2011/12 Victorian Investment Framework round

3.3.4 Provide training and support in the application of INFFER and other decision support tools by 2011

Kings Billabong. Photo: Bob Merlin, Mallee CMA

Outcome 3.4 Knowledge and information management underpin improved decision-making

The sustainable management of Victoria's land, water and biodiversity requires reliable information of their condition, the trends that affect them and the threats that they face.

It requires understanding of ecosystem function and resilience of ecosystems. It also requires effective means of sharing information and knowledge across the range of sectors, organisations and communities involved in management.

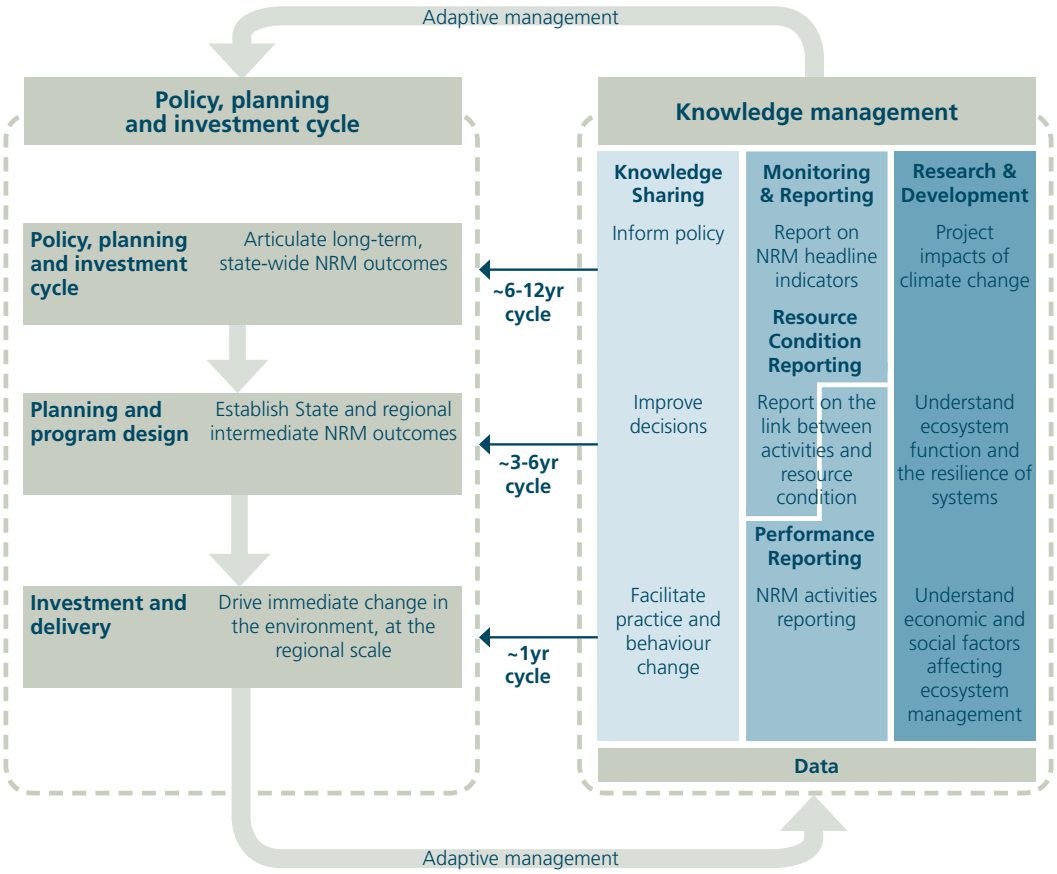
Long-term baseline monitoring of environmental condition is needed so that the impacts of climate change, drought and other stressors can be measured. Tools that can build understanding of the economic and social factors affecting ecosystem resilience are also needed. All knowledge management systems should allow for the limitations of current knowledge and be able to deal with the inherent uncertainty of climate change.

This White Paper is informed by the principle of adaptive management. The Government recognises that ongoing learning is an explicit part of adaptive management. The importance of knowledge management to an effective adaptive management framework was recognised in submissions to the Green Paper:

"Knowledge of the status and trends of land health and biodiversity are essential for their effective conservation and management. Comprehensive baseline data collection and regular public reporting of systematic long-term monitoring are essential if we are to know whether or not we are making progress towards our targets...It is vital that Victoria fosters strong ecological science to underpin investment and management decisions."

Victoria Naturally Alliance

Figure 3.1 - An adaptive management cycle showing the relationships between Victoria's integrated knowledge management framework and the policy, planning and investment cycle



The *Catchment Condition Report (VCMC 2007)* stated that there are opportunities for a broadening of investment levels available for ecosystem protection and catchment health to augment the traditional government and community partnership approach. Both the levels and timelines for investment will be increased with new markets for ecosystem services, but they must be supported by new knowledge development and appropriate ongoing knowledge management. The ongoing development of metrics for market-based instruments is an opportunity for new knowledge.

It is important to consider not only formal, conventional sources of knowledge, but also informal tacit knowledge that rests with local people and communities. A knowledge management framework needs to recognise the importance of dialogue and relationships with communities. Measures to promote the development of social networks through relationship building and community dialogue mechanisms should be addressed.

Victoria's Traditional Owners and Indigenous people have experience and knowledge of their lands gained over many thousands of years. This knowledge can add value to natural resource management. The dispossession of Indigenous Victorians from their land and culture has caused the loss of some traditional knowledge. We need to provide better support to Traditional Owners to enable knowledge retrieval and protection, and to discover how best it can be shared and used to inform current land and natural resource management practices.

Effective natural resource management requires consistent, high quality and relevant long-term data to underpin a knowledge management framework. Key data gaps and consistent processes for collecting, acquiring, managing and curating data are needed. Specific issues associated with data management are outlined in Appendix 11.

Policy

The Victorian Government will implement a knowledge management framework (Figure 3.1) which will guide the manner in which knowledge is identified, created, captured, stored, shared and used. The framework will support the Government's policy, investment and planning cycle for land, water and biodiversity management. It will ensure that efforts in research and development, monitoring and reporting, knowledge sharing and data management, provide a cohesive and strategic view of priority tasks and inform effective decision-making.

The framework will also help identify gaps in understanding and directions for future investment in knowledge and will allow for review and assessment of the effectiveness of the framework itself.

The framework will be implemented in collaboration with key service delivery partners. The capacity and capability gaps of stakeholders will be identified to ensure that the framework is both appropriate and effective. Appropriate governance mechanisms across key agencies will ensure the knowledge management framework aligns with policy, planning, investment and decision making.

Consistent and complementary mechanisms for acquiring, managing and integrating natural resource data across government and partner organisations will be established. Access to information databases will be provided to agencies and local government to improve linkages with existing legislation and statutory processes.

Chocolate Lily *(Arthropodium strictum)*, Volcanic Plains.
Photo: Corangamite CMA

Actions

3.4.1 Develop performance indicators to measure effectiveness of integrated knowledge-management by 2010

3.4.2 Identify key data gaps and actions to address them by 2010

3.4.3 Prepare data collection standards and protocols to support communities, service delivery agencies and researchers in fit-for-purpose data collection by 2011

3.4.4 Develop a common information platform for Natural Resource & Catchment Authorities and other agencies

Knowledge sharing

As the volume and complexity of information about the environment grows it is increasingly important that effective policies and processes for the sharing of knowledge are in place. Effective knowledge sharing contributes to improved policy development, better decision making, and supports practice change.

Technological platforms such as databases and web-based tools are important, but knowledge sharing systems must also support human interfaces and engagement. These methods can include knowledge brokering, community monitoring, extension, partnerships and networks and online forums.

Improving knowledge sharing across the knowledge management framework will build social capital and create broader cultural change around the collection of data, science, monitoring and learning.

Farm-level monitoring. Photo: DPI

Policy

The Victorian Government's priorities for improving the sharing of knowledge are:

- Developing knowledge brokering approaches so that natural resource management agencies and communities can access, share, build and apply knowledge at the local and regional level.
- Improving support systems for knowledge sharing and embracing emerging technologies, such as on-line forums.
- Ensuring that decision-makers and land managers, in particular local governments, Natural Resource & Catchment Authorities, committees of management, landholders and community groups, have access to relevant and useable data sets and information.
- Improving mechanisms to support Traditional Owners and other Indigenous people in data collection, storage, maintenance and retrieval of traditional knowledge. The Government will work with Traditional Owner groups to identify and support their traditional knowledge needs through implementation of the Native Title Settlement Framework and the settlement and review of native title claims.

Actions

3.4.5 Work with three Traditional Owner groups to identify their traditional knowledge needs by 2011

3.4.6 Pilot three local Indigenous knowledge hubs, to be managed by Traditional Owners involved in the co-management of public land, for the recording and sharing of local/regional traditional knowledge by 2013

Research and development

The Government is responsible for maximising the value of investment of public funds in research and development and ensuring that investment is targeted to gathering knowledge that solves problems and delivers action against policy priorities. A strategic approach to investing in research and development is required.

To support the policy priorities of building ecosystem resilience across the State requires an understanding of ecosystem function, the impacts of climate change, and the resilience of systems. Expanding the knowledge base to support the protection of strategic assets, and the restoration of ecological connectivity are also priorities.

Building understanding of community social capacity and the dynamic socio-economic profile of rural communities along with their interests, motivations and drivers is a further priority. The new Climate Change Adaptation Research Centre is a collaborative effort between Government and the Victorian university sector and will undertake vital research towards a more sustainable environmental future. This will provide a better understanding of how landscapes and communities can adapt to climate change.

This knowledge is needed to strengthen community engagement, networks and partnerships for delivering natural resource management outcomes at scale as is research that integrates traditional land management practices with scientific knowledge to inform contemporary management.

Investment will be directed at research that addresses these priorities as well as priorities articulated in key state-wide natural resource management strategies such as the Victorian Coastal Strategy and the Biodiversity Strategy, the Victorian Natural Resource Management Plan (NRM Plan) and Regional Catchment Strategies. These research and development priorities will be clearly documented and reviewed every three years.

Most ecological processes operate over long time frames. It is important to project future scenarios while recognising uncertainties and adjusting management approaches appropriately. The aim is to develop a rigorous experimental approach that will lead to the effective interpretation and extrapolation of data. This approach requires research that is multi-disciplinary, multi-dimensional, scalable, information-driven and predictive. The use of virtual models in tandem with field research and community involvement is required. To this end, long-term support of scientific capability and capacity within public institutions, as well as maintenance of infrastructure and key research sites is essential.

Government has a further role in ensuring effective and timely exchange of knowledge between scientists, policy developers and decision makers. Mechanisms may include: specifying minimum knowledge exchange requirements in research design and business and performance plans, secondments of research staff to policy positions and vice versa, setting targets for the number of PhDs on priority policy issues, and setting specific proportions of investment in policy projects towards research and development. Research outcomes need to be made more accessible through the internet and conferences, seminars and communities of practice. Electronic platforms for sharing research progress and outcomes across government and partner organisations require consideration.

Policy

The Government is committed to maximising its investment in research and development that contributes to a knowledge base that recognises and solves problems, delivers action against natural resource management priorities, and strengthens the evidence-base of public policy.

Future research and development will be targeted towards understanding significant threats to land, water and biodiversity, particularly climate change, and the impacts of policy and management on ecosystem function.

Collaborative partnerships between government agencies and other research institutions will be supported to deliver research and development targeted at an agreed set of natural resource management priorities and establishing a comprehensive knowledge platform.

The Government will invest in a strategic combination of short-term research to inform current management and service delivery needs, along with long-term research to build knowledge of emerging issues and future needs.

The Government will support mechanisms to mobilise knowledge exchange across natural resource management agencies and between science, policy and decision making.

Research that integrates the land management knowledge and practices of Indigenous people with current scientific knowledge will be promoted.

The Government will invest in research and development exclusively for the public good and support the human capabilities and facilities within research institutions that deliver public good research and development.

Actions

3.4.7 Implement an integrated and strategic investment process for research and development in natural resource management by 2010

3.4.8 Implement mechanisms to improve knowledge exchange between government policy practitioners and research providers by 2010 and evaluate every three years

Monitoring and reporting

Monitoring and reporting is a core function for all natural resource management agencies. It provides knowledge and information that allows agencies to adapt quickly to risks and opportunities and refine management interventions. There are clear legislative, policy and program requirements for the monitoring and reporting of resource condition, and the performance of government. Monitoring and reporting has an important function in an adaptive management framework as it feeds data into the ongoing evaluation and review process.

Changes to resource condition are often difficult to measure because of incomplete information, the indirect nature of many program interventions and the long time frames across which environmental change occurs.

For this reason, performance measuring has typically focussed on program activities or outputs (such as kilometres of fence built) rather than the environmental outcomes required. This has limited assessment of the impact of programs on changes in resource condition or longer-term environmental outcomes. Describing the links between government intervention and key natural resource management outcomes presents a significant challenge in monitoring and reporting.

There has been a recent shift towards assessing the impact of government programs using measurable intermediate outcomes as surrogates for longer-term environmental outcomes. This provides an opportunity to address the shortcomings of existing performance measurement based on program activities as well as provide a logical connection between program activities and longer term resource condition outcomes.

An integrated program of monitoring and reporting will be implemented with reporting against a set of headline indicators to provide a high level snapshot of changes in resource condition over time. This program will include measuring performance against intermediate outcomes using a broader set of indicators, which then feed into the headline indicators.

An adaptive management approach recognises that headline indicators will be refined and strengthened as understanding and knowledge improves over time. Formal review periods will be established for each of the headline indicators. This may require reconsideration of how progress from baselines is reported.

Accountability for monitoring and reporting must be clear, and at the level appropriate to the functions of the NRM agencies involved. The monitoring and reporting program needs to be supported by adequate data capture and information management.

Timely information and knowledge from monitoring and reporting is important to feed into policy evaluation and planning review. Formal legislated reporting requirements will be amended to align with the six yearly review periods.

Traditional Owners and other Indigenous people will have greater opportunity to contribute skills towards improvements in monitoring and reporting.

Policy

The Victorian Government will implement a consistent and strategic statewide monitoring and reporting program based on long-term resource condition monitoring and reporting and intermediate performance measuring.

Headline indicators relevant to key natural resource management themes will be used to track changes in resource condition over time (refer Table D).

In addition to resource condition reporting, it is intended that other indicators will be developed. This includes a community capacity index, an index describing environmental stewardship and an index to enable tracking of the productivity of land resources.

The Government will support performance reporting that links management and investment impacts to intermediate outcomes. A natural resource management performance report will be prepared annually, along with three-yearly reports linking performance measurement and resource condition assessment. This will be timed to feed into the three yearly, mid-term update of the Victorian NRM Plan. State of the Environment Reporting, currently undertaken every five years by the Commissioner for Environmental Sustainability, will be changed to six yearly.

A resource condition report will be prepared by the Victorian Natural Resource & Catchment Council and will be timed to feed into the six yearly revisions of the Victorian NRM Plan. Legislation will be amended to require condition reporting on a six yearly basis to align with the policy, planning, investment and decision making framework.

Processes to support accountability at appropriate levels within natural resource management agencies and collaboration in performance measurement will be established, ensuring accessibility, consistency, transparency and adaptability in monitoring and reporting.

The Government will ensure that information collected through monitoring is supported by appropriate data management tools and applications.

The Government supports the role of landholders and community groups, such as Waterwatch in monitoring land, water and biodiversity outcomes at local and regional scales.

Mechanisms will be established in consultation with Traditional Owner Groups and Indigenous communities to improve Indigenous participation in natural resource management monitoring and reporting activities.

Table D - Headline Indicators for natural resource management themes.

Theme	Headline Indicator	Theme and Indicator Description
Biodiversity	Native Vegetation Extent and Quality (Interim HI)	Indicator includes changes in native vegetation extent and quality.
	Biodiversity Condition Index	Index to include measures of biodiversity asset condition, functional condition and trends across terrestrial, inland, aquatic and marine environments, including changes in native vegetation extent and quality.
Inland aquatic ecosystems	Index of Stream Condition	Describes the condition of rivers, wetlands, estuaries and groundwater. The current index includes physical form, hydrology, stream side-zone (vegetation), invertebrates and water quality for stream condition.
	Indices of Inland Aquatic Ecosystem Condition	Over time wetland, estuary and groundwater condition indices will be included as components of the headline indicator to measure inland aquatic ecosystems.
Marine ecosystems	Marine Biodiversity Condition Index	Index to include measures of marine biodiversity asset condition and dynamics, including pressures and threats.
Land health	Land Health Index	Index includes salinity, erosion, vegetation, pest plants and animals and land management practices.
	Productivity Index	Index to include productivity in the context of the underlying resource base
Community capacity	Community Capacity Index	Describes capacity of communities to support NRM outcomes through specific skills, knowledge, onground activities, as well as levels of organisation through groups and networks Index to include group health index and standard capacity indicator.
Environmental Stewardship	Land Under Active Stewardship	Describes the level of active environmental stewardship on both public and private land. Index includes for example, land under management plans and agreements for land protection.

Actions

3.4.9 Develop and implement headline indicators with baseline reporting to commence by 2010

3.4.10 Establish processes and protocols to inform and govern ongoing applications and systems by 2010

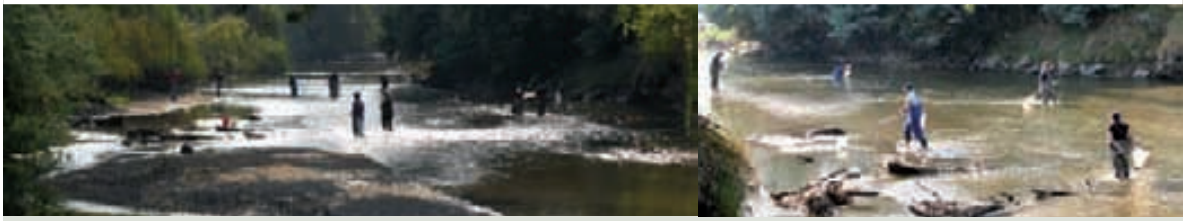
3.4.11 Amend legislation so that catchment condition reporting and 'State of the Environment' reporting occur at six yearly intervals.

3.4.12 Trial opportunities for Indigenous participation in natural resource management monitoring and reporting by 2010

Royal Spoonbills, Lake Victoria. Photo: Faye Bedford

Stream index guides decision-making

Case Study



Waterwatch officers undergo training for ISC water quality monitoring on the Yarra River at Alphington. Photo: DSE

In 1996 the Victorian State Government embarked on an ambitious project to benchmark the condition of all of the State's rivers and streams. A monitoring program called the Index of Stream Condition (ISC) was developed. In 1999 the ISC was used to assess 26,000 kilometres of the State's major rivers and streams, producing the first comprehensive study of stream condition anywhere in Australia.

The ISC measures five key aspects of stream health: hydrology, water quality, streamside zone, physical form and aquatic life. These measures are then combined to form an integrated score of stream health. The ISC is completed every six years and is conducted jointly by DSE and the CMAs. Scientists are currently fine tuning the third ISC which will be completed in 2010.

Dr Ian Rutherfurd, director of integrated river health policy for DSE, says the ISC is an invaluable tool for setting long-term management objectives for streams, developing priorities for action, and evaluating the effectiveness of past efforts in improving stream health.

"The ISC allows us to identify areas of high value and areas that are under particular threat. Using the principle that it is cheaper and more efficient to protect high quality areas, and reduce the degradation of areas that are declining, we can pinpoint improvement programs and allocate investment," Ian said.

ISC scores (along with other more local measures) are used to monitor the long-term condition of the stream before and after a works program so that the impact and effectiveness of the program can be assessed. Works can include removing willows, fencing and revegetating riparian areas, removing fish barriers and many other actions.

The results of the 1999 and 2004 ISC benchmarking showed that no major changes had occurred to the condition of Victoria's major rivers and tributaries over the five year period. No general improvement was detected, but importantly, overall deterioration in stream condition appeared to have been controlled, despite years of drought.

Dr Ian Rutherfurd says the ISC means that decisions can be based on facts rather than opinions.

"The drought has meant there is much less water available. The flow stress ranking provided by the ISC has shown us that some streams we believed were most stressed by low flows are doing okay, while other less prominent reaches are suffering more. This sort of data can fundamentally change our understanding of how rivers and streams respond to drought – and inform the management decisions that we make in the future."

The ISC is constantly evolving and responding to new developments in science and technology, including the use of climate change scenarios. This will help to identify areas that are likely to be resilient to climate change, and those that are likely to deteriorate.

While remote sensing technology will be central to the recent development of the ISC the collection of on ground data is also critical. The 2010 ISC will be the first to include data collected through the Waterwatch community monitoring program. Landholders and community groups are being trained and accredited to measure a consistent set of variables at 250 sites across the State.

Dr Ian Rutherfurd believes the ISC is a critical tool for improving the health of Victoria's rivers and streams though accurate reporting and accountability.

"Having condition data at state scale means that we have a basis for comparing the value of streams across the State, and the threats to those values." Ian says.

Outcome 3.5 Modern, streamlined legislation provides the regulatory foundation for natural resource management in Victoria

Legislative reform will underpin structural, knowledge management and investment changes to deliver on the Government's agenda. This will provide a stronger foundation for catchment-based natural resource management.

Victoria has been a world leader in the development of legislation on land, water and biodiversity management, however, much of this legislation is now dated. It fails to reflect recent advances in knowledge and understanding, including the impact of climate change. It also fails to reflect contemporary, flexible approaches to natural resource management.

In responding to the Green Paper, the community called for the creation of a coherent overarching legislative framework to clarify Victoria's current land, water and biodiversity statutes. Developing that framework will strengthen the efforts of all Victorians in achieving the natural resource management outcomes they are working towards.

New environmental legislation must be flexible so that it remains relevant as the landscape changes and as new threats, such as climate change, are identified and addressed. It is also vital that legislative changes are not made in isolation – changes will be considered in a co-ordinated way, so that a holistic environmental outcome can be achieved.

The draft Victorian Competition and Efficiency Commission report *A Sustainable Future for Victoria: Getting Environmental Regulation Right* discusses best practice principles for the design and implementation of environmental regulation, including the application of ecologically sustainable development (ESD) principles. The 1992 Intergovernmental Agreement on the Environment and the National Strategy on Ecologically Sustainable Development both refer to ESD and its core objectives and principles. These objectives and principles will be applied to the revision of Victoria's natural resource management legislation.

A review of the *Planning and Environment Act 1987* is currently underway. The review will assist the Government to improve and modernise the operation of the Act. The Government is also considering the role of a Climate Change Bill as part of Victoria's response to the challenges of climate change. These processes will inform, as well as be informed by, the natural resource management legislative reform process.

Ecologically Sustainable Development

Goal:

Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

Core Objectives:

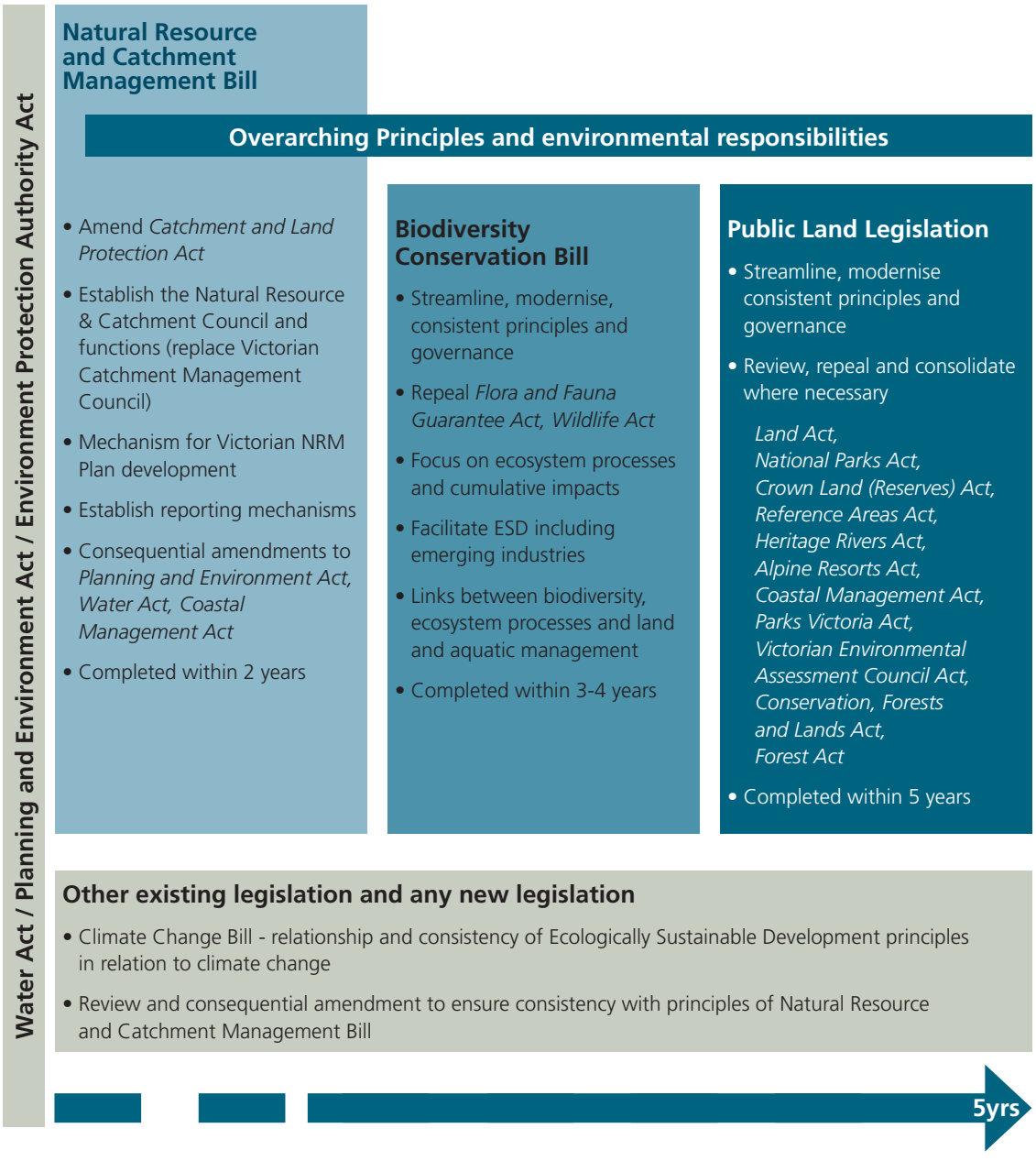
- To enhance individual and community well being and welfare by following a path of economic development that safeguards the welfare of future generations
- To provide for equity within and between generations
- To protect biological diversity and maintain essential ecological processes and life-support systems.

Guiding Principles:

- Decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations
- Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- The global dimension of environmental impacts of actions and policies should be recognised and considered
- The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognized
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised
- Cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms
- Decisions and actions should provide for broad community involvement on issues which affect them.

These guiding principles and core objectives need to be considered as a package. No objective or principle should predominate over the others. A balanced approach is required that takes into account all of these objectives and principles to pursue the goal of Ecological Sustainable Development.

Figure 3.2 - Framework for Legislative Reform



Policy

The Victorian Government will develop a new legislative framework to support a consolidated and co-ordinated natural resource management sector (figure 3.2). The new legislation will reflect a common set of overarching ecologically sustainable development (ESD) principles. The legislation will clarify the environmental responsibilities of land managers in the natural resource management sector. The Government will consult widely in preparing this legislation.

The new Natural Resource and Catchment Management Bill will underpin these institutional reforms by providing greater clarity on the roles and responsibilities of organisations and the hierarchy of tools they employ. This will include setting principles and clarifying environmental duties to create the operating framework for relevant natural resource management legislation.

The new Natural Resource and Catchment Management Bill will detail the functions and powers of the Victorian Natural Resource & Catchment Council and will provide clear obligations and responsibilities for the new regional Natural Resource & Catchment Authorities. This will be done through revising and consolidating relevant provisions currently spread across the *Catchment and Land Protection Act 1994*, the *Water Act 1989*, and the *Planning and Environment Act* 1987.

The *Flora and Fauna Guarantee Act 1988* and *Wildlife Act 1975* will be reviewed. A new, streamlined, Biodiversity Conservation Bill will be introduced to Parliament within three years. The Bill will establish links between biodiversity, ecological processes and land and water management, and will address issues raised through the Victorian Auditor General's review of the *Flora and Fauna Guarantee Act 1988*.

The Victorian Government will evaluate all public land legislation to review, repeal and consolidate regulations. The evaluation will deliver streamlined legislation with consistent principles and governance (specific detail on reforms are included in Chapter 6).

Actions

3.5.1 Introduce new natural resource management legislation to Parliament by December 2011

3.5.2 Introduce new biodiversity and conservation legislation to Parliament by December 2012

3.5.3 Introduce consolidated public land legislation by 2014

Coastal bike path, St Kilda. Photo: Port Phillip and Westernport CMA

Four

Chapter 4
Fostering environmental markets and leveraging investment

Goal: To increase market demand for land, water and biodiversity outcomes

Strategic directions

- Identify and support regional economic opportunities around sustainable management and landscape repair
- Leverage biodiversity outcomes from biosequestration of carbon
- Improve facilitation and promotion of private investment to complement public investment

The Government's framework for action is ambitious. The path and speed for realising its vision will depend on the resources that can be harnessed and directed towards building ecosystem resilience, managing ecosystem services in flagship areas and improving ecological connectivity in biolinks. Aligning private and public investment can significantly improve results. Environmental markets can send price signals that reward actions that protect land, water and biodiversity.

This chapter is concerned with new directions in the relationship between the economy and the environment. It builds on recent ideas from environmental and ecological economics that are changing the way governments approach environmental problems.

Opposite page - Shining Gum, Saint Gwinear Road Erica. Photo: Christian Pearson, Misheye Photography

Our economy has been underpinned by the false assumption that biodiversity and ecosystem services are in endless supply, or are able to be substituted. Many land use and land management decisions are made without reflecting the scarcity of natural resources or the cost of environmental damage. The cumulative result of these decisions is land degradation and water and biodiversity decline.

There are several reasons why the economy currently does not deliver optimal environmental outcomes:

- environmental harm is not factored into the full cost of production activities
- benefits of good environmental management may not flow to the individual producing them
- benefits of good environmental management cannot be captured and/or traded
- knowledge to inform decision-making does not exist, or is costly to acquire or access.

Governments have traditionally used regulatory powers to counter negative environmental impacts with prosecution or fines for harmful practices. Market-based mechanisms[1] are being developed around the world to work alongside traditional approaches to help solve environmental problems by rewarding actions that benefit the environment.

Market-based mechanisms are instruments or regulations that encourage behaviour through market signals rather than through explicit directives. Market-based mechanisms establish or redefine the incentives facing firms and individuals so that the social benefits of improved environmental outcomes converge with private interests.

The public policy reasons for using market-based mechanisms are varied. Market-based mechanisms can:

- attempt to improve the efficiency of government investment in the environment by ensuring that maximum environmental benefits are achieved for each dollar of investment spent
- seek to redefine private decisions regarding natural resource use and management by ensuring that individuals account for the environment impacts of their choices and are provided with strong financial incentives to invest in the environment
- encourage non-profit driven private investment (philanthropic and corporate social responsibility investment) in the environment by improving the quality of environmental investment opportunities and providing confidence to individuals that their investment is achieving environmental outcomes.

Government has an important role in ensuring that market-based mechanisms protect the community interest. A well designed market-based mechanism can create an incentive to deliver environmental outcomes through efficient private choice.

A design challenge is to think about how the operation of one environmental market does not result in negative impacts on other environmental values. For example plantations to sequester carbon may reduce the water available for other plants and animals and could potentionally impact biodiversity. The benefits and costs need to be carefully assessed.

Market mechanisms can be designed to reward good land managers, deter practices that damage the environment, and encourage private sector investment in ecosystem services.

The Victorian Government's priorities are to:

- improve market signals that support sustainable resource use and allow the full costs of production to be factored into decision-making
- develop mechanisms that reward people for good practices and for producing environmental goods and services
- identify gaps in knowledge and understanding that hinder informed decision-making
- identifying opportunities for co-investment and leveraging private investment to support public good outcomes, in particular biodiversity.

"Environmental markets require sound policy, strong science, and most of all, timely and transparent information. For markets to work, people need to know they exist, and participants need to see, with clarity and ease, who is buying, who is selling, and at what price. There also needs to be a clear understanding of the policy changes that drive these markets, as well as the science that underpins them."
www.ecosystemmarketplace.com

Wimmera land owner Karen Ware and EcoTender project office Garry Cheers.
Photo: DSE

Outcome 4.1 Victorian landholders are rewarded for protecting biodiversity and providing environmental goods and services

Victoria started investing in market-based mechanisms with the development of BushTender. This program uses an auction to identify value-for-money investment proposals through a tender process.

BushTender allocates funds to landholders to improve the management of native vegetation on private land, based on an environmental benefit assessment of the proposed actions of the land holder.

EcoTender further extends the assessment to include other environmental services, such as salinity mitigation and wetland protection. Funding under the *Sustainability Action Statement (2006)* is supporting the trial of three EcoTender projects to pay farmers to improve the environment on and around their land. Market-based mechanisms have also been developed to allocate aquaculture licences, and fund water quality improvement activities – StormwaterTender and RiverTender.

Victoria's investment has focused on linking science to economics and developing models to estimate outcomes. There is a concentration on design, and on developing methodology to encourage and identify value-for-money bids using tenders. The use of contracts is also an important feature.

Catchment Management Authorities (CMAs) are also experimenting with payments for environmental goods and services. The Wimmera CMA is operating Catchment Tender and Habitat Tender. Corangamite CMA and Port Philip and Westernport CMA are hosting EcoTender pilots.

Some submissions to the Green Paper expressed concern about the application of market-based mechanisms and payments for biodiversity and other environmental services in Victoria. There is concern that market-based mechanisms may displace or crowd-out community-driven natural resource management, and concern about the Government adopting a competitive rather than a collaborative approach. Market-based mechanisms, like a BushTender auction, help Government articulate its objectives, and measure what outcome it is purchasing on behalf of the community. Competitive approaches are not appropriate for all conditions or objectives. Market-based mechanisms and community-driven natural resource management can inform each other. The strengths of each should be harnessed and applied across all natural resource management programs.

Within the new framework for action, the Victorian Government will target its investment to flagship areas and biolinks.

There are other ways that landholders can be rewarded. Well managed bush properties are attractive to the increasing numbers of people seeking a rural lifestyle. There are opportunities for landholders to receive a financial benefit for good land management through schemes such as the Macedon Ranges Voluntary Environmental Resource Inventory (see case study in 6.1.5) which records the environmental attributes of a property at the point of sale.

Demographic change, changing community values and increased demand for lifestyle properties will see a steady increase in the premium paid for well-managed properties.

Policy

Market-based mechanisms will continue to be used to identify value-for-money projects for the Government to invest in biodiversity outcomes and other environmental goods and services. The Victorian Government recognises the valuable extension function of this approach. Investing in the improved knowledge and increased capacity of landholders to manage biodiversity is beneficial, irrespective of a successful tender result.

The design of all current and future Victorian Government biodiversity and natural resource management programs should reflect community-driven programs and local knowledge as well as the strengths of market-based mechanisms. The cost-effectiveness of all programs will be continually assessed, including the costs of design and administration.

Victorian Government programs that pay landholders for environmental goods and services will be evaluated appropriately. Landholders will be consulted on their reasons for choosing to participate, or not to participate. The cost-effectiveness of tender programs and community-based collaborative programs will need to be demonstrated.

Actions

4.1.1 Identify opportunities to apply tender approaches to peri-urban and coastal landscapes by 2010

Outcome 4.2 New environmental markets drive investment in biodiversity and ecosystem services

Systems to value and trade in environmental goods and services are being developed around the world. The United States Government has established an Office of Ecosystem Services and Markets in the United States Department of Agriculture, and announced a Conservation and Land Management Environmental Services Board to advise the new administration.

There are over 700 voluntary and compliance-based environmental markets in the United States. These include programs for filtering water pollution and offsetting habitat destruction. There are present-day, functioning markets that trade in wetland and threatened species credits. The Chicago Climate Exchange operates a voluntary, legally-binding integrated trading system to reduce greenhouse gas emissions. NSW has developed a Biobanking program for offsetting impacts on threatened species, and Queensland has developed an environmental offsets policy. Environmental markets are operating in Mexico, Costa Rica and South Africa.

New businesses are being created to respond to these trends. A New Zealand company, TZ1, has been appointed as a global registry for tradeable biodiversity securities sold by the Malua Biobank in Sabah, Malaysia. A Sydney-based forestry investment firm is a major partner in this project.

Victoria needs to position itself to be a part of this new green economy. Some gains have already been made – VicSuper is investing in the landscape and developing expertise to respond to new environmental markets. Trading of native vegetation offsets is underway through BushBroker. Restrictions on clearing native vegetation and the offset requirement have enabled landowners who are able to supply offsets to receive a payment for them. The buyers of offsets are generally developers.

There is a lot of potential in Australia for new environmental markets to be created. These could be linked to, or separate to, the carbon market.

Soil has the capacity to contribute to carbon sequestration measures and further research to support this is required. These markets may provide a source of income for good land stewards either by themselves or combined with other incentives.

Research for the Department of Sustainability and Environment[2] suggests a new business model for investment in regional economies is required to capitalise on the opportunities that environmental markets present. This will require our understanding of farming to expand to encompass provision of environmental goods and services. The carbon market has potential to encourage farmers to grow trees to sequester carbon. We need to think creatively about giving a value to previously unpriced environmental goods and services to encourage investment in them.

New opportunities through environmental markets

Buyers of environmental goods and services can include government, non-government organisations and corporate and philanthropic organisations.

Sellers can include landholders (as individuals or working co-operatively), community groups, or any entity willing and able to provide biodiversity and other environmental goods and services.

Environmental markets offer new opportunities for landholders to receive payments for making environmental improvements to their land by selling to government and corporations who want to secure environmental outcomes such as habitat, water quality or carbon sequestration.

Ideally, a landholder should be able to run a farm business that delivers environmental goods and services alongside a wheat crop, a dairy herd or horticulture. A landholder should be able to sell their product into a market that values its sustainable production. The landholder should also be able to secure a payment for the additional environmental goods and services they have provided through good land management.

The current economy lacks opportunities to value environmental outcomes through markets. This means there are few incentives for farmers to invest in protecting the environment other than for personal benefit.

The Victorian Government has a role in creating an environment that is conducive to investment. The recommendations of the Victorian Competition and Efficiency Commission's Inquiry into Environmental Regulation in Victoria will be considered for the future design of environmental markets in Victoria.

Policy

The Victorian Government will support the investigation of new environmental markets and payments for environmental goods and services. This will encourage investment to flow to landholders who can provide biodiversity and other environmental outcomes.

The Victorian Government will investigate the applicability of the NSW biobanking concept for threatened species as part of the review of biodiversity legislation. Other opportunities for investigation include wetlands, floodplain restoration, protection of riparian areas and water quality.

Advice from the private sector is required to inform the development of a business model for investment in biodiversity/landscape conservation and rehabilitation. Victoria will take a leadership role in progressing environmental markets at the national level. This will include an analysis of global initiatives in environmental markets.

The Victorian Government will undertake further work to examine:

- Rules and regulation that act as a barrier to investment in conservation.
- The positive and negative impact of using environmental management systems, standards, codes of practice and certification schemes as incentive frameworks and as an alternative to regulation.
- Issues of equity associated with changing regulatory frameworks and policy responses that meet social and environmental objectives.
- Governance for environmental markets.

The Victorian Government will identify any legal barriers to environmental markets for environmental goods and services. As part of the new legislative package (see 3.5), clear legal principles will be established for the ownership, trading and protection of market components to encourage investment in complete, rather than fragmented, markets.

The Victorian Government will foster a culture of experimentation and innovation at the regional scale to identify opportunities for rewarding good land managers with payments for biodiversity and other environmental goods and services. It will support Natural Resource & Catchment Authorities to experiment with market-based mechanisms to secure priority catchment services. This could include water quality in open catchments and wetland protection and remediation.

The Victorian Government will engage with biodiversity and natural resource management businesses and providers in regional Victoria to identify opportunities for support and expansion. This will ensure that Victoria's priority land, water and biodiversity management projects can be implemented.

Actions

4.2.1 Develop a program to support landholders to package environmental goods and services for sale to investors by 2011

4.2.2 Establish an on-farm advisory service to improve landholder capacity to access developing ecosystem markets by providing information and decision-making tools by 2011

4.2.3 Prepare a national level discussion paper to identify opportunities to accelerate the development of environmental markets

4.2.4 Establish a short-term taskforce to inform the development of a new business model

Melbourne at night. Photo: Tourism Victoria

Wind generators in the Challicum Hills, near Ararat. Photo: Andrew Chapman

Outcome 4.3 Land, water and biodiversity outcomes are linked to the biosequestration of carbon

Following water reform, the carbon market will be the next major national environmental market to be created. This outcome sets the policy direction for achieving multiple outcomes with carbon biosequestration and for balancing carbon reduction against other environmental goals.

Biosequestration is the storing of carbon in trees and other vegetation. Vegetation, including trees, shrubs and grasses, is a source of emissions as well as a carbon sink. Forests absorb carbon dioxide as they grow and store carbon molecules in stems, branches and roots. Carbon is released back into the atmosphere as plants decay. As forests age the decay increases, while growth decreases. Eventually the decay and growth rates equalise and the forest no longer acts as a carbon sink, although it does continue to provide a living store of carbon. Soils also store carbon, but drought, decomposition and disturbance such as tillage release carbon from the soil.

A voluntary market for carbon offsets currently operates in Australia. Consumers and businesses that want to reduce their emissions and enhance biodiversity can purchase offsets from providers who plant biologically diverse native vegetation. The scale of carbon plantings for offsets in Victoria is currently small compared to other land uses. This may change depending on new policy development by the Australian Government and at the international level.

The Australian Government released the *White Paper on the Carbon Pollution Reduction Scheme* (CPRS) in December 2008. Reforestation[3] will be included, on a voluntary basis, from the commencement of the CPRS.[4] This means that Kyoto-compliant forestry and environmental plantings can receive permits under the CPRS. Most forests established under the CPRS are expected to be non-harvestable forests grown on marginal or less productive farmland.[5]

The Australian Government is also developing a National Carbon Offsets Standard (the Standard) to provide consumers with greater confidence in the carbon claims made by businesses that provide voluntary offsets.

Brett Mills, Susan Taylor, and Robyn Mills on a seeding count. Photo: Brett Mills

Demand for reforestation projects[6] will depend on many factors, including the cap set by the Australian Government, the carbon price, accounting rules, the economic competitiveness of alternate land uses, as well as biophysical constraints – including water interception. On public land, the extent of Kyoto-compliant public land available for reforestation projects is likely to be limited, but further assessment of this is required.

Opportunities for small-scale private landholders to undertake reforestation projects are likely to be through the voluntary offsets market. The extent of these opportunities will depend upon Australian Government rulings on the scope of the Standard, its relationship to the CPRS and the decision on whether agriculture should be included in the CPRS. The role of soil carbon is also not clear but it has the potential to help mitigate climate change as well as improve soil health (see 6.1.5)

An experimental tender project in Victoria (using the EcoTender model) with a hypothetical price for carbon, demonstrated a return for landholders, and improved cost-effectiveness. This means that, with linked markets, governments could purchase more environmental outcomes with the funds available.

Victoria is investigating the design of a framework that could link reforestation projects under the CPRS with other environmental markets.

Carbon Pollution Reduction Scheme

The Carbon Pollution Reduction Scheme limits the amount of carbon able to be emitted by the scheme. Permits allowing the emission of carbon dioxide up to the limit allocated to companies are able to be traded between them. Companies are then faced with the decision to pollute and bear the cost of buying permits, or mitigate and sell existing permits or save the cost of buying them. Therefore mitigation becomes a business decision in response to the price of permits.

Policy

Actions

4.3.1 Design a framework that links reforestation projects under the Carbon Pollution Reduction Scheme with biodiversity and ecosystem markets by 2011

4.3.2 Assess the public land estate to identify areas of land suitable for reforestation projects compliant with national rules

4.3.3 Amend the *Forestry Rights Act 1996* and consequential legislation to ensure Victoria's system for recognition and transfer of carbon rights is compatible with the framework established for reforestation projects under the Carbon Pollution Reduction Scheme by 2010

4.3.4 Assess the opportunities for offsetting Victorian Government vehicle fleet emissions through biodiverse plantings and active regeneration, in light of the Carbon Pollution Reduction Scheme by 2011

4.3.5 Invest in research to improve understanding of the role of soil carbon

Victorian Government Black Balloons Campaign. Photo: DSE

Outcome 4.4 Information that supports biodiversity outcomes in the carbon market is accessible and widely used

The credibility and robustness of markets is threatened if information about the goods or services being traded is uncertain or unavailable.

Investment in science, knowledge and measurement of biodiversity and ecosystem services is required to underpin markets. Standards and accreditation help to provide information and can assist consumers in differentiating between products. An ideal environmental standard provides information on a range of inter-linked, socially desirable objectives.[7]

In the context of the carbon market, measuring the carbon sequestered in any form of vegetation is important for accounting purposes. Measurement is complex and the science continues to develop. Scientific information on sequestration of, and emissions from, all types of forests is needed for international and national policy development and for reforestation projects. The Australian Government has invested in the National Carbon Accounting Tool which will include data on reforestation.

Mixed farming systems that incorporate different land uses are effective in spreading the investment risk. A reforestation project on a farm can provide benefits to the farming system and to the business as a whole. Land in high rainfall areas with good soils will be attractive for reforestation projects and agriculture. The right information can help farmers make decisions on the best land use for their farming system.

The Katoomba Group

The Katoomba Group is an international network that advances the use of markets and payments for ecosystem services. It operates a website to provide the information required for the proper functioning of environmental markets, including details on prices, transactions, measurement and packaging of services, and the location of buyers and sellers.[8]

Policy

The Victorian Government is focusing on developing science that supports statewide decision-making and investment. This means obtaining accurate data on the carbon in Victorian forests, the sequestering capabilities of Victorian ecological vegetation classes, and the positive and negative impacts on ecosystem services.

The lack of current standards or accreditation to substantiate claims for biologically diverse reforestation projects is a barrier to investment. User-friendly information to support Victorian biodiversity outcomes will be developed in light of the final design of the Carbon Pollution Reduction Scheme and the National Carbon Offset Standard.

Actions

4.4.1 Invest in the research and development of metrics for the National Carbon Accounting Tool that are appropriate to Victorian landscapes and support investment in biologically diverse plantings

4.4.2 Develop a Victorian standard to substantiate claims for consumers investing in biologically diverse reforestation projects by 2012

4.4.3 Develop an event-based estimation of carbon stocks on public land to better understand the asset and impacting factors by 2010

Wind turbine. Photo: DPI

Outcome 4.5 Negative environmental impacts of the carbon market are minimised and addressed

Large scale or cumulative reforestation projects and other types of land use have the potential to intercept significant amounts of water.[9] Reforestation projects can have other negative impacts including the loss of biodiversity, increased fire risk, amenity harm and the invasion of seedlings beyond plantation boundaries.

The CPRS regulator will not be required to account for natural resource management issues when assessing whether a forest should receive a permit. The responsibility and framework for managing reforestation will sit with the States and Territories.[10]

Nevertheless, the Australian Government has recognised there are potential environmental and natural resource management impacts and has made guidelines in relation to the establishment of trees for the purpose of carbon sequestration under the *Income Tax Assessment Act 1997*.[11]

Victoria has a well established framework to manage plantation development. Legislation and regulations include the *Planning and Environment Act 1987*, the Victoria Planning Provisions, the *Code of Practice for Timber Production (2007)* and requirements for fire suppression.

Action 2.20 in *Securing Our Water Future Together (2004)* is identifying the impact of plantations and other land uses on different hydrologic systems and the development of appropriate planning, management and/or regulatory measures. These measures will apply to a range of land uses, including commercial-scale plantations managed for timber production, and to commercial-scale reforestation projects. This will be linked to improvements in the regional decision-making process (see 3.2).

The Victorian Government will review its approach as policy development evolves at a national and international level.

Policy

Positive and negative impacts of commercial-scale reforestation projects on biodiversity and ecosystem services need to be considered. Positive impacts will be encouraged. Negative impacts will be identified, accounted for and managed.

Actions

4.5.1 Finalise action 2.20 under *Securing Our Water Future Together (2004)* and implement its recommendations

Pine plantation and native forest, Wonga State Forest. Photo: Christian Pearson, Misheye Photography

Outcome 4.6 Increased corporate and philanthropic investment is directed to Victoria's land, water and biodiversity

There is an existing market for non-government purchasing of environmental outcomes. Buyers include companies investing in the environment to build their green credentials, philanthropic investment, and consumers buying green products.

Corporate and philanthropic investment is playing an important role in conserving and restoring our degraded landscapes. The Government wants to encourage increased private investment. Investing in biodiversity and ecosystem services is a recent opportunity for business, as well as a mechanism to satisfy corporate social responsibility objectives.

Corporate social responsibility is increasingly seen in Australia to be part of a company's standard business operations. The 2006 Community Business Partnership Study[12] found that the business case is the predominant driver for companies to engage in corporate community investment. Australian companies are involved in a variety of corporate community investment activities, including strategic collaborations with not-for-profit partners for mutual interest, employee volunteer programs, sponsorship activities, research partnerships and local community programs. These sources of funds need to be tapped and directed towards landscape-scale restoration.

There is growing demand from private investors for opportunities to invest in the environment, but many corporations and philanthropic organisations lack information about who can provide what they are looking for, or what the strategic priorities of the Government are.

Private investors need to be confident that their investment is achieving environmental outcomes. Government can support this by priority setting and accrediting environmental products. There is a role in supporting regional and local groups to develop and package investment options that will be attractive to private investors.

Clear articulation of the Victorian Government's priorities through identifying flagship areas and biolinks will assist private investors, but more can be done to link individuals and groups who produce biodiversity and other environmental goods and services with investors.

Corporations and philanthropic institutions currently face barriers and disincentives from our tax system, to invest in land, water and biodiversity projects. Taxation is primarily Australian Government responsibility, but from Victoria's perspective it would be useful to reduce distortions within the current tax system that discriminate against investment in environmental outcomes compared to others. Removing distortions will remove a disincentive and support the development of the growing interest of the private sector to invest in the environment. This view is consistent with the Victorian Government submission to the Henry Review.

Policy

The Victorian Government will work towards the creation of a regulatory environment that supports corporate and philanthropic investment in biodiversity and ecosystem services.

Corporate and philanthropic investors should not be financially disadvantaged for making investment decisions that benefit the protection and sustainable management of Victoria's land, water and biodiversity. Environmental investment products should be treated equally to other products that attract private investment.

The Victorian Government encourages the Henry Review of Australia's tax system to investigate the tax treatment of private investment in land, water and biodiversity projects for environmental outcomes. Removing current tax system impediments to such investments will ensure the tax system does not unfairly favour other types of investment over land, water and biodiversity projects.

The Victorian Government will improve the information available to corporate and private investors in environmental markets by examining information needs, and encouraging continuous improvement in environmental management and certification schemes. It will provide support for Natural Resource & Catchment Authorities, other land managers and non-government organisations to identify projects with philanthropic and corporate investment opportunities.

Actions

4.6.1 Commission a Natural Resource & Catchment Authority to develop the concept of a regional prospectus by 2010

4.6.2 Monitor the ongoing work of the Henry Review to assess the implications of its findings for Victoria's land, water and biodiversity outcomes

Old growth Buloke. Photo: mecu

Stumpy-tailed Lizard *Tiliqua rugosa.* Photo: mecu

Victorian based credit union mecu has developed a Conservation Land Bank to help offset the loss of biodiversity associated with its business of banking.

For every new property mecu finances an equivalent area of native bushland will be set aside in the Landbank. Properties purchased by the Landbank will be protected by a Trust for Nature Conservation Covenant against any future development.

To launch the project mecu purchased a 201 hectare property in Victoria's west Wimmera region. The important conservation property was purchased from the Trust for Nature Revolving Fund.

mecu Chief Executive, Phylip Doughty, said the property has one of the largest stands of old growth Buloke on private property in Victoria and provides important habitat for the endangered South-eastern Red-tailed Black Cockatoo.

"There's only an estimated 1000 endangered South-eastern Red-tailed Black Cockatoos remaining in the State and this property is very important to their survival."

"mecu's vision is to develop the biodiversity of the property to support wildlife and build and protect the native bushland. The Landbank will also assist mecu to achieve its commitment to become carbon neutral by June 2010," Phylip Doughty said.

mecu also plans to trade in net gain biodiversity offsets from its Landbank, providing developers with an opportunity to offset the environmental impact of their own developments.

mecu has appointed Landcare Australia to project manage the Landbank and Trust for Nature to oversee the quality of conservation works.

The mecu Landbank sends a strong signal to business that they have a real part to play in enhancing biodiversity and protecting declining habitat.

Five

Chapter 5
Supporting community action

Goal: To encourage all Victorians to work together as responsive and effective stewards of our land, water and biodiversity

Strategic directions

- Embed consideration of land, water and biodiversity into everyday decision-making
- Empower Traditional Owners in natural resource management decision-making
- Increase support for stewardship by private land managers
- Strengthen the landcare model for community natural resource management

To be effective, the Government's framework for action requires the support of all Victorians. A sustainable future comes from sharing responsibility. This chapter outlines a plan to foster a culture of stewardship and awareness of our impacts on land, water and biodiversity.

The Victorian community is diverse. Victorians connect to the environment in different ways and have different levels of interest and capacity.

Victoria's Traditional Owners and other Indigenous people have a strong cultural relationship with country and many desire better opportunities to be involved in its management. Many Victorians have an emotional or spiritual connection to the bush, the local rural landscape, the coast, or a nearby urban park. Some people rely directly on the environment for their livelihoods through agriculture, fishing, forestry or tourism.

The Victorian Government recognises and values the diverse ways that people connect with the environment and is committed to creating opportunities, partnership and participation at all levels. The aim is to build on the successes of our long history of community action to ensure that all Victorians have the knowledge, skills and capacity to consider land, water and biodiversity in the decisions they make in their daily lives.

Opposite page - Landcare volunteers. Photo: Andrew Chapman

Outcome 5.1 All Victorians consider the health of land, water and biodiversity in their daily decision-making

The daily choices and decisions that every Victorian makes – whether at home, at work, in the supermarket or on holiday – can have an impact on Victoria's land, water and biodiversity.

Decisions about what to plant in the garden can encourage or deter local wildlife. Wise use of water can leave more for rivers and wetlands. Behaving responsibly in a local park can help maintain habitat for native species.

Consumer decisions, such as choices in food, building materials and cleaning products can also impact the environment. Moderating consumption and carefully considering purchases to reduce waste and resources will help to minimise our impact. By strengthening the demand for products and services that enhance rather than degrade the environment, Victorians can drive change.

Changing the daily decision-making of Victorians requires increased levels of environmental understanding and appreciation. This is particularly important in urban communities that make up the majority of the state's population. Urban residents often don't recognise the link between their choices and environmental impacts because these impacts can occur a long way away or over an extended period of time.

Equipping all Victorians with the knowledge and skills to consider land, water and biodiversity in their daily decision-making requires a culture of lifelong learning, starting in childhood. Today's children are tomorrow's decision-makers – their understanding of behaviours that improve land, water and biodiversity is critical to safeguarding their future.

Awareness of the natural environment should begin during the most important developmental stage – in the years before children start school. There are many individuals and organisations already delivering early childhood land and biodiversity education in Victoria. More training and support for early childhood professionals, and better coordination of programs, will help reach more young children.

Learning about land water and biodiversity throughout a child's education will help embed sustainable behaviours. Many schools in Victoria are already teaching concepts such as biodiversity and healthy ecosystems. While schools are at different stages, it is a trend that has been growing over the last decade. Activities range from excursions to zoos, gardens and national parks to planting native species, creating wetlands and enhancing biodiversity in school grounds.

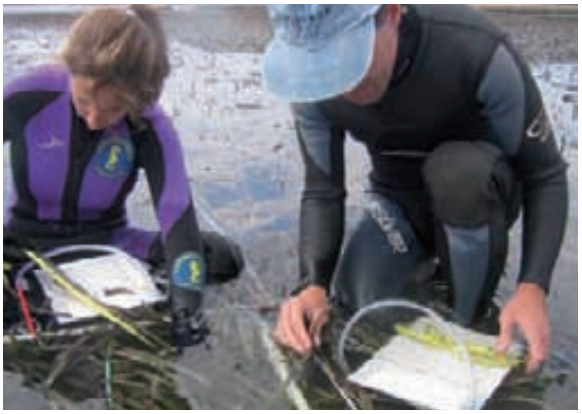
Victoria delivers education for sustainability in schools through the Victorian arm of the Australian Sustainable Schools initiative, known as ResourceSmart AuSSI Vic. Schools can choose to undertake biodiversity education through the AuSSI Vic program. While some Victorian schools are leaders in biodiversity education, many teachers and principals do not have the awareness, skills, training or resources to effectively adopt this program.

Research shows that children are more likely to care about the environment later in life if they have direct interaction with nature as part of their learning experience. Linking land and biodiversity education programs with community projects and other outdoor experiences can give children firsthand experience of the bush.

Adult education for land and biodiversity is currently provided by Ecoliving centres, local sustainability networks and a range of community organisations and private providers. While community education programs for waste, water and energy conservation are generally strong, resources for land and biodiversity education are limited.

By increasing efforts in awareness-raising, capacity-building and education, all Victorians will be able to play their part in building healthy and resilient ecosystems.

Kathryn Goyen – LandLearn Education officer and students. Photo: DPI



Seagrass monitoring at Corner Inlet. Photo: Rebecca Koss

Policy

The Victorian Government will encourage Victorians to consider land, water and biodiversity in their everyday behaviour and decision-making, recognising that land and biodiversity education is important at all stages of life. The Victorian Government will develop land and biodiversity education and awareness programs across the community.

The Victorian Government recognises the importance of including land and biodiversity in the formal education sector, particularly for early childhood. Opportunities to better support and integrate biodiversity education programs will be investigated with particular emphasis on hands-on learning experiences.

Environmental sustainability will be recognised as a core component of the school curriculum.

Sustainability Victoria will be the co-ordinating agency for government and non-government partners who deliver biodiversity-related school education programs through ResourceSmart AuSSI Vic.

Actions

5.1.1 Prepare a targeted community education program to increase awareness and encourage actions that improve land, water and biodiversity outcomes by 2010

5.1.2 Develop a second edition of *Biodiversity Resources for Teachers* by 2010

5.1.3 Develop a suite of programs that strengthen land and biodiversity training for existing and new educators by 2013

5.1.4 Establish stronger coordination and support arrangements for delivery of the biodiversity module of AuSSI Vic by 2011

Students participating in the Murray Darling Basin Commission's 2008 Youth Environment Conference, Mildura. Photo: David McKenzie

Outcome 5.2 Indigenous communities are actively involved in the management of Victoria's land, water and biodiversity

Indigenous people have a strong desire to be actively involved in all areas of natural resource management, particularly to enable connection with country.

There is a growing body of research drawing connections between improved health, education and community wellbeing of Traditional Owners with greater access to and management of country.

Traditional Owners have a strong spiritual connection to their traditional country that goes back thousands of years. They have unique perspectives and invaluable local knowledge. Traditional Owners have special rights and interests, including speaking for their traditional country.

Indigenous cultural heritage is part of the Victorian landscape. The *Aboriginal Heritage Act 2006* provides Indigenous groups, who are generally also Traditional Owners, with decision-making roles that have direct implications for land management and statutory planning.

Consultation with Traditional Owner groups after the release of the Green Paper indicated that they desire a more active and formal involvement in managing Victoria's land, water and biodiversity. A stronger role in natural resource management will enable a greater connection to country, especially for those whose connection to country has been disrupted.

Increasing the capacity and opportunities for participation of Traditional Owners in natural resource management will also ensure their knowledge and experience helps to improve Victoria's land, water and biodiversity (see 3.1 and 3.4). Ensuring equitable access to employment in natural resource management is important for Indigenous people whether they are living on their traditional country or not.

Traditional Owners face many barriers to their involvement in managing their country. Few Traditional Owner groups have the financial or technical resources to participate effectively in natural resource management. Victoria's Native Title Settlement Framework has been developed by the state in partnership with the Traditional Owner Land Justice Group. It will establish formal arrangements to help increase Traditional Owner participation in natural resource management. By clearly defining rights and access rules, the framework will also enable Traditional Owner groups to capitalise on sustainable economic development opportunities on their country.

A key challenge for Traditional Owners and other Indigenous people seeking work in natural resource management has been the lack of suitable pathways to long-term employment. While there has been a range of Indigenous career training programs, many graduates have been unable to find ongoing work in the field, or maintain long-term employment.

Increasing the involvement of Indigenous people in natural resource management will require considerable support by government and greater levels of collaboration and respect by government agencies and other natural resource managers. Improving the way government consults and works with Indigenous communities will be an important first step.

Shane Lavell teaching trainees how to use diatapes - Lake Tyers Land Management Traineeship Project. Photo: Malcolm Pleydell

Policy

The Victorian Government recognises Traditional Owners as the original custodians of Victoria's land, water and biodiversity and acknowledges their culture, heritage and unique knowledge.

Better opportunities for Traditional Owners and other Indigenous people to be involved in natural resource management will be sought by building effective partnerships between the Government and Indigenous communities. These partnerships will aim to improve health, education and economic outcomes for Indigenous communities, at the same time as achieving better management of Victoria's land, water and biodiversity. Traditional Owners will be supported to prepare natural resource management strategic plans for country, including identifying regional economic opportunities.

A program that addresses persistent barriers to the ongoing employment of Indigenous people in natural resource management will be developed.

Case management programs will be established to support Indigenous graduates of natural resource management traineeships to improve pathways to long-term employment.

The Victorian Government will take a respectful and co-ordinated approach to engaging with Traditional Owners and other Indigenous people. In the context of native title settlements, agreements will be developed with Victorian Traditional Owners on how agencies should engage on natural resource management matters.

Actions

5.2.1 Implement a natural resource management Indigenous employment and development strategy that includes:

- traineeships
- a cadetship program
- the employment of Indigenous staff
- a mentoring program to provide support for new Indigenous staff and their supervisors

5.2.2 Establish a case management program that links Indigenous natural resource management traineeships to ongoing employment by 2012

Aboriginal scar tree, Central Victoria. Photo: Alison Pouliot

From left, Roe Lavers, Chris Dormer, Sharon Edwards, Cheryl Cameron, and Jacqueline Tansy weaving local plants from the North East. Photo courtesy of the Border Mail.

Landcare group members in Victoria's Indigo and Kiewa Valleys have discovered new ways to utilise native reeds after attending four weaving workshops run by local Indigenous artists.

Sharon Edwards, a Ngiyampaa woman who was taught to weave by Gunditjmara Elders, led each workshop. Landcare group members were taught how to weave with local plant fibres and are now planning to use the native *Eleocharis* species for revegetation on their properties to ensure future supplies of this traditional resource.

The workshops were organised by the North East CMA and Indigo Shire Council, with funding support from Regional Arts Victoria, culminating in a travelling exhibition that toured the region for three months.

Local farmer Cathy McGowan said the learning that took place was unique and valuable.

"It is exactly the type of learning experience which builds capacity, enables knowledge to be passed around and most importantly enhances relationships between Koorie and local landowners," Cathy said.

There has been a surge of interest in the weaving workshops, providing further voluntary and paid employment opportunities for the Indigenous artists involved and generating connections with weavers around Victoria.

The artists have run workshops for Albury Museum, Albury City Council, Wiradjuri Elders Yarn UP and the West Albury Community Centre. They have also travelled to Swan Hill.

The sale of baskets and other woven items has inspired members of the local Indigenous community to find new ways to use traditional materials to generate income.

The North East CMA plans to support the artists in the further development of the weaving enterprise by assisting them to find natural materials to create and sell their products and undertake their own business administration.

Outcome 5.3 Victorians actively improving the natural environment are encouraged, supported and valued

Natural resource management is a partnership between community and government. Many different community groups and networks are committed to improving Victoria's land, water and biodiversity.

Victorians have a long and successful history of community involvement in Landcare groups and networks, Coast Action/Coastcare groups, Waterwatch groups, Friends groups, recreational and industry associations, conservation management networks and volunteer committees of management. From occasional tree-planting and weeding days through to delivering complex, landscape-scale programs, these groups bring a broad range of skills, resources and aspirations to improving Victoria's natural environment.

Community groups and networks are important for the local knowledge they hold, the local priorities they champion and the on-ground works that they achieve. They make a significant contribution to the health of Victoria's land, water and biodiversity. In return, groups report benefits from maintaining a strong connection to the natural environment and being active in their communities.

Landcare

Participation in Landcare and other community-based programs not only contributes to improving environmental health, but disseminates knowledge, builds capacity and improves land management skills within communities. Landcare members are 88 per cent more likely to exclude stock from agricultural areas affected by land degradation.

In addition, non-Landcare members rate Landcare as an important source of information about sustainable farming practices and there is evidence that adoption of these practices is higher amongst non-Landcare participants in Landcare areas compared to non-Landcare areas.[1]

Seedling ready to plant. Photo: Stephanie Cam / DSE

Over the past 20 years, Landcare and other community-based natural resource management groups have become increasingly sophisticated. Many groups have well-established administrative arrangements and strategic, forward-looking programs of action. Recognising the capacity of these groups and better aligning property, group, regional and statewide planning will enable the community and the government to work towards common landscape goals. Local knowledge and participation will be particularly important in flagship areas and biolinks.

Many of Victoria's community-based natural resource management groups are facing barriers that hinder their operation. Drought, economic pressures, volunteer burn-out and an ageing and moving population are leading to declining membership in some groups and networks. The numerous requirements in project reporting, funding applications, occupational health and safety standards and liability insurance, often well exceed the resources they have available. This causes ongoing and increasing strain and takes valuable time and effort away from on-ground works. Addressing these barriers will help groups to maintain momentum and continue to work towards landscape repair.

Some sectors of the Victorian community (such as young people, multicultural groups, urban communities and absentee landholders) have had limited opportunity to be involved in natural resource management activities. Finding ways to better link these people into existing networks will help to boost participation and create a more inclusive and representative sector.

The impacts of climate change will create further challenges for community groups and networks. They need to be adequately resourced and supported in their work to improve the resilience of Victoria's land, water and biodiversity.

Catchment management officers. Photo: Corangamite CMA

Policy

The Victorian Government values the work of community-based natural resource management groups and environmental volunteers. The Government will continue to support groups and networks to improve their ability to achieve outcomes and to capture the enthusiasm of their local communities.

Victorian Government investment will be targeted to groups and networks working in flagship areas, or on projects that contribute to biolinks and ecosystem resilience.

Individuals, groups and networks will be given a stronger voice in setting regional priorities for land, water and biodiversity projects. Open discussions will be required where community and government priorities do not match.

Natural Resource & Catchment Authorities will bring together community-based natural resource management networks to link local and regional priorities, to encourage knowledge sharing and innovation and to promote collaboration.

The Victorian Government will improve access to training in spatial mapping and information tools for community-based natural resource management groups.

Stronger links between community-based natural resource management networks and urban and peri-urban volunteers will be encouraged.

Actions

5.3.1 Develop a five-year strategic action plan that builds on the landcare model to strengthen community participation in natural resource management by 2010

5.3.2 Streamline reporting mechanisms and funding application processes for community-based natural resource management groups by 2010

5.3.3 Identify suitable landscapes for the future establishment of conservation management networks, with particular focus on flagship areas and biolinks by 2012

Coast Action/Coastcare summer program. Photo: Stephanie Cam/ DSE

Outcome 5.4 Land managers are supported to meet their responsibilities as active stewards of Victoria's land, water and biodiversity

Victoria's land managers are stewards of the environment. Stewardship is the ethic of care and responsibility that encompasses avoiding environmental harm as well as providing positive environmental change.

In 1999 the Australian Government's Industry Commission reported that landowners are, in effect, leasing the land from future generations, and have responsibility for ensuring that each generation does not compromise the potential wellbeing of the next.[2]

On public land and in the marine environment, the Victorian Government has a responsibility to demonstrate leadership in land stewardship and to manage public assets for the benefit of the community. It is reasonable for the community to expect that public land leased or licensed by private individuals is managed to acceptable standards. It is also reasonable for the community to expect public land managed by government to be managed appropriately. Priority-setting for public land management will follow an asset-based approach to ensure effective and efficient allocation of resources.

On private land, landholders have the right to earn an income from the natural resources provided by their land and have responsibility for the health of the land, water and vegetation that they manage. Victorian Government legislation, including the *Catchment and Land Protection Act 1994*, articulates the range of environmental duties required of landholders. These include taking all reasonable steps to avoid causing harm to other landowners, to conserve soil and to protect water resources.

Some of Victoria's environmental regulations are unclear, inconsistent with other regulations or lack effective enforcement mechanisms. For legislation to be effective, it must be clear on the obligations of individuals, to enable them to comply with the law. It must also have appropriate enforcement mechanisms.

Communities also have their own norms and expectations for land management in their area. Community expectations can be close to, or well above, the legislated minimum. Victoria's farm businesses are increasingly subject to community scrutiny of their methods, environmental impact and performance. A credible mechanism is needed to enable farmers to demonstrate to the community that they are good land managers.

It is not appropriate for the government to pay for actions that a land manager is expected to undertake by law, and it is not an efficient use of public funds for government to pay for actions that are already expected by the community.

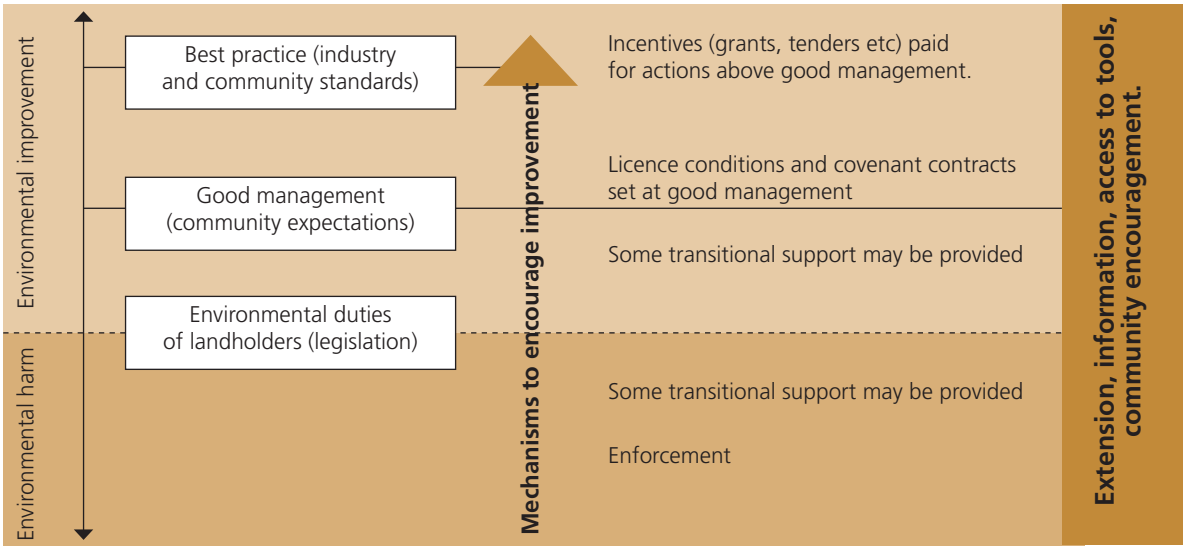
Many land managers across Victoria undertake best practice management, as determined by communities or industries. Best practice management should be recognised through the market price of goods or rewarded through incentives.

A consistent and well-communicated approach is needed to:

- implement the framework for environmental responsibilities
- support communities to define local standards
- provide incentives for best practice management.

This will provide greater clarity and certainty for all land managers and lead to improved environmental outcomes.

Figure 5.1 - Victorian framework for environmental responsibilities and stewardship



Policy

Legislated environmental duties reflect the right of land managers to undertake any action on their property provided they do not cause harm to neighbours or undermine opportunities of future generations.

The Victorian Government will clarify and better implement the existing legislated environmental responsibilities of private land managers. It is not intended that this clarification will increase the regulatory burden on land managers or add to their environmental duties. Implementation of the framework for environmental responsibilities will recognise the impacts of past land uses and the unavoidable impacts of climate change and other natural processes.

The Victorian Government recognises that communities have local standards for good management. The Victorian Government will reflect community expectations when promoting and encouraging good land management and when providing incentives for the provision of public goods from private land. Local standards will form the basis of Crown land licence conditions and government incentives for the provision of environmental public goods and services.

The Victorian Government will aim to manage public land to at least the standard expected of the adjoining private land. Priorities will be guided by the level of available resources and will be informed by public land management plans that are developed according to an asset-based approach and in consultation with the community.

Actions

5.4.1 Provide information to landholders on their responsibilities "to take all reasonable steps to… conserve soil and protect water resources" under the *Catchment and Land Protection Act 1994* by 2010

5.4.2 Provide Terms of Reference for the Victorian Competition and Efficiency Commission to review the efficiency and effectiveness of regulation that articulates the environmental responsibilities of land managers by 2011

5.4.3 Clarify the environmental responsibilities of landholders in the new Natural Resource and Catchment Management Bill by 2013, following advice from the Victorian Competition and Efficiency Commission

Rob Loats testing water on his property in Laen. Photo: Yvette Bettini

Preparing the land for autumn planting at Silvan. Photo: Andrew Chapman

Land stewards on the Bass Coast

Case Study

Participants on the Bass Coast Landcare Network's farm planning course use aerial photographs to develop action plans for their properties.

In 2003 staff from the Bass Coast Landcare Network in south-west Gippsland set out to develop a farm planning course for their members. They started by interviewing farmers and asking them what information they needed to make their businesses profitable and sustainable. The answer was emphatic – many had participated in whole farm planning before, but information specific to the soils, pasture and native vegetation of their local farming district was not available.

The Network took the request for detailed information seriously and developed a year-long course centred on place-based learning principles and using the Environmental Best Management Practices and DairySAT workbooks.

Many of the sessions on the course are conducted on farms where participants share problems and solutions through supportive discussion.

The course is based around the theory of action learning with 5-12 landholders in each group. The Network is committed to delivering the course to all interested landholders, but it also recruits specific landholders where a sub-catchment level response is sought, or a landscape connectivity link can be made.

By the end of the course each landholder has developed a detailed action plan for their property. The landholders graduate into a continuing practice group where they work together to consolidate the lessons learned. Some stay in the group for a year; some need more support and stay longer.

A Land Management Practices Score Card is introduced to the continuing practice groups. The score card is a self-assessment tool where landholders score their actions under broad headings like soil and pasture management, effluent management, weeds and pests, revegetation and water quality.

If landholders achieve 50 per cent or more of the eligible points they qualify as entry level stewards. With over 75 per cent of the eligible points they are considered to be comprehensively managing their properties and are given the title of Whole Farm Land Stewards.

Moragh Mackay, Training Co-ordinator with the Bass Coast Landcare Network, says landholders find the score card a useful way of identifying areas for improvement and tracking their progress. It also assists with allocating grants and incentives.

"We've trialled a market-based instrument approach," she explains.

"Landholders who attain the level of stewardship required are invited to tender for the natural resource management works they have planned. The DSE Environmental Systems Modelling Platform (EnSym) is used to calculate the environmental benefit of each project, rank them objectively and allocate funds. Each project is plotted on a graph so the landholders can see where their project sits in relation to other projects. Then they submit bids for payments to carry out the proposed projects."

According to Moragh, the score card has been well supported by landholders, however there are mixed feelings about the tendering process. Landholders involved in the trial have participated in pre and post-tender interviews to evaluate the process.

"The community and landholders are aware of the duty of care involved in land management, but we are often hazy in defining what that duty of care actually is. Our Network has addressed the question head-on. We have done it by demonstrating land management solutions that are local, relevant and practical and by applying a local benchmark through the score card," Moragh says.

Outcome 5.5 Victoria's farmers are supported to incorporate environmental outcomes into their farm systems

Victoria's farmers produce the essential food and fibre that we rely upon, and manage many of our land, water and biodiversity assets. Farmers have an important role in safeguarding the health of Victoria's natural environment.

Farmers face cycles of prosperity and adversity. Changes in climate and markets have challenged the resilience of farmers. The sector is under pressure from drought, water scarcity, labour shortages and competition from overseas markets. The health of many of Victoria's agricultural landscapes is declining and both environmental and productive values are becoming increasingly threatened. Climate change will further exacerbate this situation.

The Victorian Government's *Future Farming Strategy (2008)* highlights the need for Victoria's farmers to adapt their practices so they are in a better position to manage land, water and environmental risks, and improve the natural resource base.

Farmers are generally best-placed to manage the risks that they face, and many farming communities are already leaders in finding innovative ways to improve production systems. The Victorian Government has a role in providing information, advice and tools to help farming systems remain resilient and sustainable in the face of climate change.

Protecting the natural environment and ensuring that agricultural lands remain productive are complementary interests. Through improved environmental management and the adoption of sustainable practices, farmers can increase the resilience and long-term productivity of farm ecosystems. Ongoing research is required to further explore these synergies.

A range of tools such as eMapp, whole farm planning and Environmental Best Management Practices, are available to assist landholders to develop integrated property, business and environment management plans. The success of these tools will require wider uptake and better reflection of environmental standards.

Opportunities are emerging for farmers to produce environmental goods and services as part of their farm business. New markets for ecosystem services such as habitat provision, salinity mitigation and carbon sequestration have the potential to boost on-farm income, while addressing pressing environmental issues.

Some consumers are willing to pay a premium for sustainably produced goods. For this market to be effective, information on the environmental credentials of products needs to be accessible and credible. A range of accreditation systems already exist, but there is little guidance for either producers or consumers about their relative merits, and no process to guard against false claims.

Some producers who already undertake environmentally sensitive farming are unable to gain recognition for their efforts, and others lack the market drivers to make it profitable to shift towards more sustainable production systems.

While the domestic market for sustainable products is currently small, global demand for certified sustainable products is rising. Australia is well placed to respond to these emerging markets. Improving information along the value chain, and to consumers will allow markets for sustainable products to become more transparent and more competitive. Validated certification systems can provide landholders with a means of demonstrating that they are meeting community expectations for land management.

The Victorian Government needs to work in partnership with farming communities to better understand their social, environmental and business aspirations. Locally-derived solutions and co-operation are a key to ensuring the long-term profitability, competitiveness and sustainability of Victoria's farming sector.

This property-scale approach will link in with strategies to improve ecosystem resilience at a landscape scale (see 6.6).

Policy

Future adaptation and practice change programs for farming communities will be based on knowledge of how farm businesses are responding to climate change.

Where the Victorian Government invests in agricultural research, priority will be given to the development of practices that improve productivity while achieving environmental outcomes.

Co-operative research projects involving landholders, industry and government that support local innovation and provide opportunities for sharing knowledge across local and regional areas will be encouraged.

Social research will be undertaken to better align farm extension services and farming research with community aspirations and capacities.

All landholders will have access to base level tools and information to improve sustainable land management practices. Additional training, extension and support will be provided to landholders in flagship areas and biolinks.

Producers and consumers will be provided with better access to information about the relative environmental merits of different production and accreditation systems.

Actions

5.5.1 Make existing property management planning tools available to landholders online by 2011

5.5.2 Focus extension, training and technical support to landholders in flagship areas to assist them to develop plans that integrate business, property and environmental considerations

Action

5.5.3 Develop an approach to validating the environmental claims of producers, in collaboration with other state and territory governments by 2015

Environmental Management Systems (EMS) keeps Kiewa farmers on track

Rhonda and Peter Serpell run a beef, and until recently berry, enterprise in the Kiewa Valley south of Wodonga. In 2003 they participated in an EMS project run by the North East CMA with input from Department of Primary Industries.

The EMS project used adult learning principles to promote sustainable farming. It had a strong emphasis on environmental and production monitoring and used the ISO 14001 process (the international specification for an environmental management system).

The Serpells are not new to farming – or to sustainability principles. They have been on the property for more than 20 years and the rehabilitation of the environment is one of their key interests. Peter and Rhonda work on the premise that what is put on the farm stays on the farm. Fertilisers are spread with a buffer to all waterways, which are fenced and maintained with riparian vegetation. Chemical use is minimal.

"We've always known the benefits of increasing the biodiversity on the property for improving our soils and productivity. The EMS was a way of recording and formalising a lot of the work we have done previously," Rhonda explains.

The EMS process took over 18 months. Peter and Rhonda worked with a group of other local farmers who were involved in the peer review of each other's properties. Rhonda says some farmers baulk at the paperwork involved in EMS, but she believes the initial effort more than pays off.

"EMS has helped us to move forward and focus on what we needed to do to guarantee that our current practices could be verified. The EMS is specific to our farm, but was based on the Australian EMS model which caters for a number of farming enterprises on the one property. It is practical and relevant – even our fire and drought survival plans are incorporated. We update the EMS every quarter."

The EMS has also helped the Serpells with marketing. In 2003 they were operating an intensive horticulture business growing raspberries. Their produce was sold to Australian manufacturers who processed them into ice cream, wine and fine jams that were exported around the world.

When one of their overseas clients was hit by a trade barrier in the European Union, their ability to demonstrate that some of their suppliers were growing fruit under the guidance of an ISO EMS helped them to break through.

Peter and Rhonda Serpell have used an EMS process to plan and record the management of their beef and berry enterprise in the Kiewa Valley.

The last few years have been difficult for Peter and Rhonda. In 2003 and again in 2006 the region was inundated with smoke for several months from huge fires in the nearby alps. In February 2009, they lost 65% of their property in the devastating Black Saturday fires. The combination of these events plus low yields led to a decision to shut down the berry operation on the farm. Rhonda believes the low yields were also partly due to the effects of climate change.

"In 2006 we picked 2.2 tonnes of berries instead of 30 tonnes. The winter was warmer than usual and we experienced severe frosts at flowering time, then the effects of smoke at harvest time. In 2007 we didn't pick one berry – instead of 2000 hours below 10 degrees Celsius we only had 1500 hours – not enough for the plants to set fruit," Rhonda says.

"It will take us ten years to get the farm back to where it was, but we remain committed to EMS and are constantly encouraging other local farmers to go ahead with an EMS. The more of us involved in monitoring and evaluating what we do the better," Rhonda says.

Six

Chapter 6
Building healthy and resilient ecosystems across the landscape

Goal: To restore the ecological processes and resilience that underpin the health of Victoria's land, water and biodiversity

Strategic directions for reform

- Build climate change adaptation into the management of land, water and biodiversity
- Better manage public land and the ecosystem services it provides
- Better integrate environmental and productivity outcomes in rural and agricultural landscapes

This chapter sets out management directions by program areas and landscape types to support the Government's new framework for action.

The scale, pace and range of climate change will have far-reaching effects on Victoria's environment. This is a critical point in time to build options for the future by increasing and sustaining the resilience of our ecosystems. An increased emphasis on risk management and adaptive management is required. A landscape scale approach will help maintain ecological processes and ecosystem services.

The framework for action has broad implications for Victorian Government policies and programs, and actions on the ground. It changes the way we manage natural resources generally and will have different implications in different landscapes.

Opposite page - Yarra Valley. Photo: Andrew Chapman

Victoria's approach to building ecosystem resilience

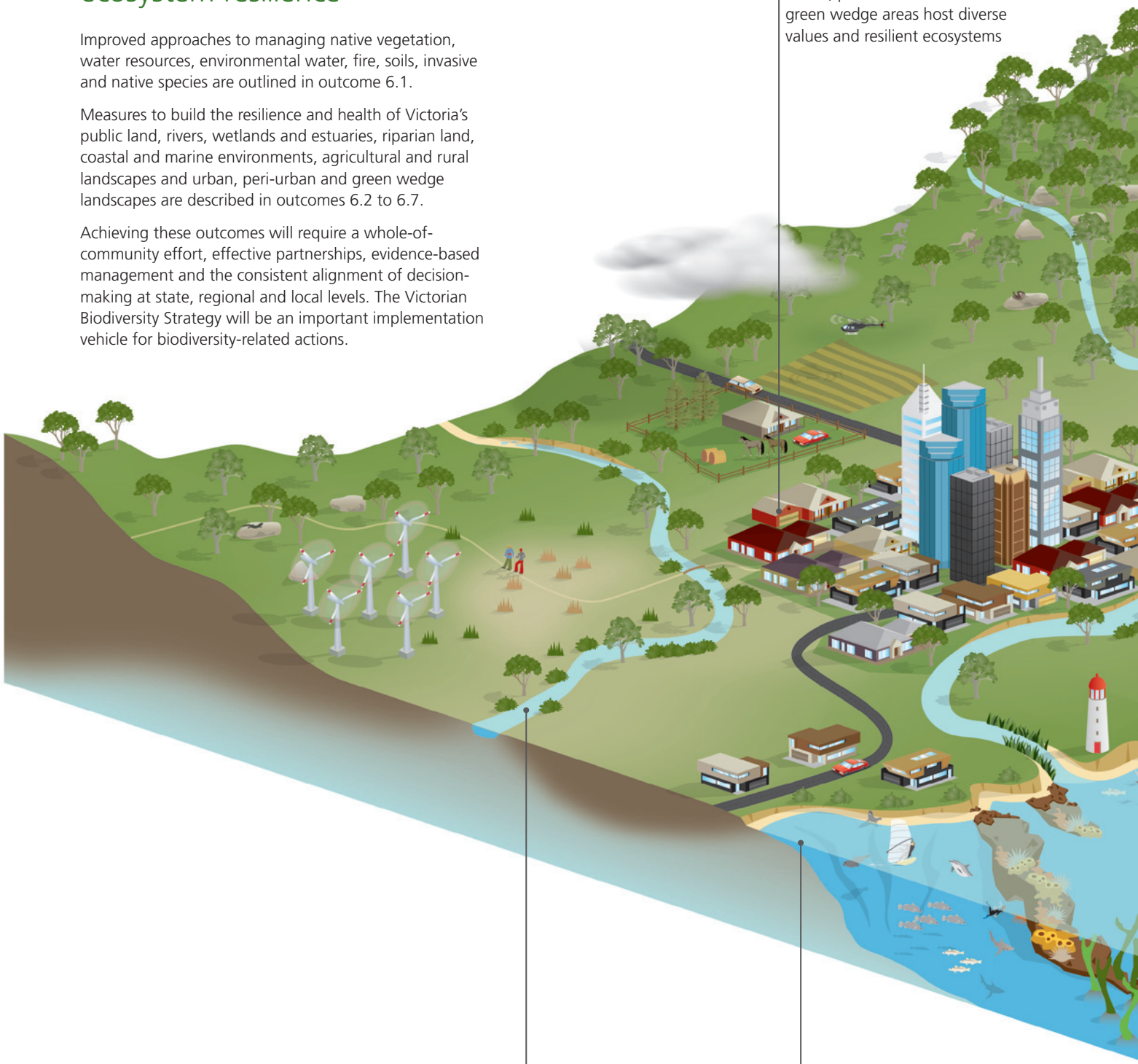
Improved approaches to managing native vegetation, water resources, environmental water, fire, soils, invasive and native species are outlined in outcome 6.1.

Measures to build the resilience and health of Victoria's public land, rivers, wetlands and estuaries, riparian land, coastal and marine environments, agricultural and rural landscapes and urban, peri-urban and green wedge landscapes are described in outcomes 6.2 to 6.7.

Achieving these outcomes will require a whole-of-community effort, effective partnerships, evidence-based management and the consistent alignment of decision-making at state, regional and local levels. The Victorian Biodiversity Strategy will be an important implementation vehicle for biodiversity-related actions.

Outcome 6.7

Urban, peri-urban and green wedge areas host diverse values and resilient ecosystems



Outcome 6.4

Riparian lands protect waterways and increase productivity, connectivity and amenity

Outcome 6.5

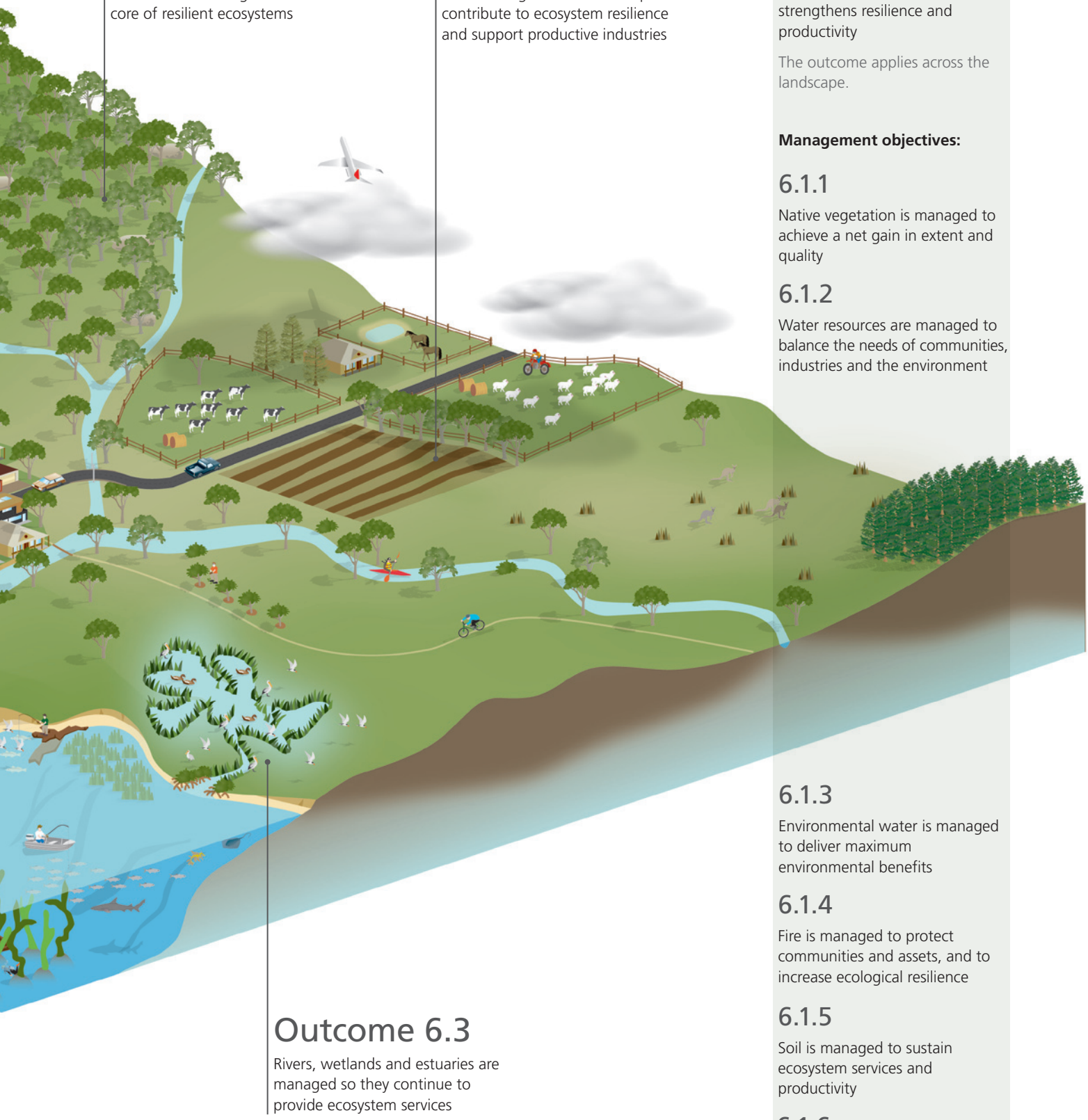
Coastal and marine environments are healthy and productive

Outcome 6.2

Public land is managed as the core of resilient ecosystems

Outcome 6.6

Rural and agricultural landscapes contribute to ecosystem resilience and support productive industries



Outcome 6.3

Rivers, wetlands and estuaries are managed so they continue to provide ecosystem services

Outcome 6.1

Natural resource management strengthens resilience and productivity

The outcome applies across the landscape.

Management objectives:

6.1.1

Native vegetation is managed to achieve a net gain in extent and quality

6.1.2

Water resources are managed to balance the needs of communities, industries and the environment

6.1.3

Environmental water is managed to deliver maximum environmental benefits

6.1.4

Fire is managed to protect communities and assets, and to increase ecological resilience

6.1.5

Soil is managed to sustain ecosystem services and productivity

6.1.6

Invasive species are managed through a biosecurity approach

6.1.7

Native species are protected through threat management and attention to ecological processes

Outcome 6.1 Natural resource management strengthens resilience and productivity

6.1.1 Native vegetation management

Around half of Victoria's native vegetation has been cleared since European settlement, with more than 80 per cent of vegetation cover removed from the state's private land. Native vegetation provides vital ecosystem services. It stores carbon as it grows, shields soils from erosion and protects productive land from dryland salinity. Vegetation helps to filter and regulate water through Victoria's catchments. Decline in the quality and amount of vegetation results in less resilient ecosystems and threatens the survival of many native species. Vegetation clearing is likely to be a contributing factor in increased surface temperatures and decreased rainfall in eastern and south-western Australia.[1]

Victoria's *Native Vegetation Management Framework (2002)* (NVMF) sets out the Government's policy on vegetation management. The goal of the NVMF is a reversal across the entire landscape of the long-term decline in the extent and quality of native vegetation, leading to a net gain.

The removal of native vegetation in Victoria is regulated through a permit system with the aim of preventing a net loss of vegetation. This underpins actions towards implementing the broader policy of net gain. Land clearing is avoided wherever possible. Where clearing is unavoidable, its impact is minimised, and where clearing is permitted it must be offset with gains in the extent and quality of native vegetation elsewhere.

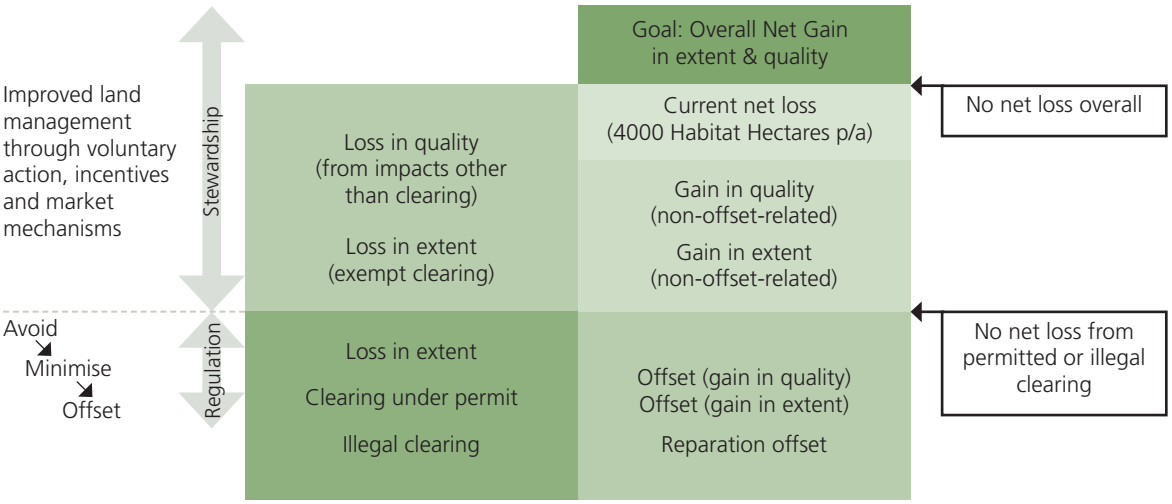
This policy operates alongside ongoing investment aimed at achieving net gain. Land stewardship programs such as BushTender support management and restoration of native vegetation to increase extent and address the widespread decline in condition and quality.

A net gain in the extent and quality of native vegetation is important. Native vegetation strengthens the resilience of catchments, productive lands and native ecosystems. Native vegetation management needs to be balanced with other considerations, such as the interception of water by plantings[2] and the risk of bushfire. Bushfire issues are being investigated by the 2009 Victorian Bushfires Royal Commission. The Government has recently announced simpler rules for bushfire protection around homes.

The Government has drawn on the work of the Victorian Competition and Efficiency Commission to inform policies and actions that will improve the effectiveness and efficiency of native vegetation regulation.

The Government proposes improved arrangements for assisting local governments to monitor compliance on private land with the *Code of Practice for Timber Production (2007)* through actions 4.2 and 9.2 of the Timber Industry Strategy public consultation draft.

Figure 6.1 - Relationship between outcomes sought from native vegetation regulations
(no net loss in extent and quality of native vegetation as a result of permitted clearing) and from broader stewardship measures (net gain in extent and quality across the entire landscape)



Policy

The Victorian Government remains committed to achieving an overall net gain in the extent and quality of Victoria's native vegetation. Regulation of vegetation clearing will continue to aim for no net loss in the extent and quality of native vegetation through the clearing permit system.

The Victorian Government will ensure timely, efficient and consistent outcomes under the *Native Vegetation Management Framework*. Where organisations engage in native vegetation and offset planning on a recurring basis, this will include case management and memoranda of understanding. Proponents will be encouraged to address and resolve issues early in the project planning cycle and be rewarded if they exceed requirements.

Native vegetation offsets will be strategically implemented. This will apply, for example, where urban growth and native grassland conservation are in conflict, and in managing ongoing investment in the development of Victoria's mineral resources. BushBroker franchises will be examined as a tool to increase the number of potential providers to build up the store of credits and the supply of offsets.

The Victorian Government will provide industry with appropriate and timely information on the application of the *Native Vegetation Management Framework*. The use of Native Vegetation Precinct Plans will be strategically expanded. Co-ordination with the Australian Government in undertaking strategic assessments under the *Environment Assessment and Biodiversity Conservation Act 1999* will be pursued. A case management approach will be developed to assist and encourage proponents in meeting their obligations under the *Native Vegetation Management Framework*.

The Victorian Government will apply the goals and principles of the *Native Vegetation Management Framework* to the management of public land in a way that is consistent with the *Code of Forest Practices* and the *Timber Industry Strategy*. Offsets for government projects that involve unavoidable clearing will be directed towards implementing biolinks and building ecosystem resilience.

The Government will promote the use of regional framework planning and native vegetation precinct planning with a strategic focus on regional growth centres and growth corridors. It will provide guidance on the economic, environmental and social impacts of clearing to be considered in applying the *Native Vegetation Management Framework* three step approach to strengthen the avoidance and minimisation steps.

Compliance with the *Native Vegetation Management Framework* permit system will be strengthened by providing for larger reparation offsets as a disincentive to illegal vegetation clearing. Offsets on private land will need to be secured through one of the existing statutory on-title agreement options. A community of practice system with support for regulatory officers will be examined.

The scope for provision of offsets on public land for clearing under permit will be expanded, subject to transparent funding arrangements to ensure that works funded under these offsets supplement and do not displace public funding for public land conservation and management, or distort prices in the emerging market for native vegetation.

A comprehensive net gain progress report will be prepared as part of the three and six yearly resource condition reports based on remote sensing, and with input from agencies, non-government organisations, volunteers, and other partners (see 3.4).

Actions

6.1.1.1 Investigate amending the rules under the *Native Vegetation Management Framework* to expand the scope for offsets to be located on public land by 2010

6.1.1.2 Examine the use of BushBroker franchises to expand the supply of offsets by 2010

6.1.1.3 Investigate the use of payment-in-lieu for small and low-risk native vegetation offsets by 2010

6.1.1.4 Simplify the rules for assessing low-risk applications for clearing native vegetation by 2011

6.1.1.5 Establish the Volcanic Plains grasslands reserve to Melbourne's west by 2012

6.1.1.6 Publish an annual vegetation management summary report with data on permits, offsets and illegal clearing

6.1.1.7 Report on net gain progress as part of the three and six yearly resource condition reports

Old Eucalypt. Photo: mecu

6.1.2 Water resource management

Victoria's water resources (groundwater and surface water) support towns and cities, agriculture and other industries as well as our natural environment. Water resources are under pressure from climate change and climate variability, land use change and increasing demands for water.

While Victoria's rainfall is naturally variable, there is growing evidence that the severe, dry conditions of the last 12 years are due to climate change. Frequent periods of dryer than average conditions are predicted for coming decades.

In addition to decreased rainfall, runoff to streams and water availability will also be reduced. Water availability is a primary determinant of ecosystem productivity and underpins the health of Victoria's lands, rivers and wetlands.

Many rivers and floodplain wetlands are already in relatively poor condition due to river regulation and the extraction of water for consumptive use. They will now be subject to more frequent and longer droughts, longer dry spells and less frequent floods because of climate change. Reduced surface water availability is already increasing demand for groundwater.

Under Victoria's water allocation framework, climate change will have a greater impact on the environment than on consumptive use. The framework is set out in *Securing Our Water Future Together (2004)* and continues to be developed though regional Sustainable Water Strategies (SWSs). The framework takes a whole-of-system approach that considers all water for both consumptive and environmental purposes. Sustainable water strategies will maximise the outcomes from existing environmental water and identify options for water recovery.

In regulated catchments, the majority of environmental water currently comes from passing flows and above cap water. With climate change there will be less water, and reduced passing flows. Where aquifers are recharged by rainfall, the low rainfall and increased extraction rates will reduce the critical baseflows in some rivers. This will add to the stress on surface streams, as well as stressing ecosystems that rely on groundwater for some, or all, of their water requirements.

Victoria is contributing to the Council of Australian Governments (COAG) National Water Initiative to draw on national and interstate experience in water resource management.

Significant investment in water recovery for the environment has been made through The Living Murray Initiative, Snowy Water Recovery and the Wimmera-Mallee Pipeline (see 6.1.3).

In urban areas the replacement of natural landscapes with hard, impervious surfaces and stormwater drainage systems leads to dehydrated landscapes, and polluted runoff entering urban waterways. Realigning urban water pathways through gardens, parklands and other available land spaces will create more opportunities for water to interact with vegetation and soils.

To reduce the vulnerability of cities to the impacts of climate change, integrated urban water management will minimise the risks of low water availability and extreme flood events, and help protect urban waterways and vegetation.

There are also opportunities to draw on other local water sources such as wastewater to help improve land, water and biodiversity outcomes in urban areas.

Victoria is building Australia's largest desalination plant. This will be a new climate-independent source of water for Victoria's largest urban population, and will significantly improve water security for Melbourne and reduce pressure on the Yarra and Thomson Rivers.

Eildon reservoir near empty. Photo: Bruce Cumming

Evidence of drought in the Wimmera. Photo: Tracey Koper

Policy

Water resources will be managed sustainably through the implementation of Victoria's water allocation framework and integrated management framework, as defined in *Securing Our Water Future Together* and the Sustainable Water Strategies under the *Water Act 1989*.

The Victorian Government will continue to balance water needs for consumptive use and the environment as per *Securing Our Water Future Together*. Water allocation will address the impact of climate change and the likelihood of less water for consumptive use and the environment.

The Victorian Government will continue to develop its water allocation framework to ensure all significant water use is accounted for. The interactions between surface water and groundwater will be more accurately assessed. The needs of groundwater-dependent ecosystems will be considered when determining the maximum extraction volumes for consumptive use of groundwater. Where relevant, groundwater management plans will be prepared prior to the assessment of development proposals.

Natural Resource & Catchment Authorities will be responsible for protecting the environmental values in regional water planning processes and will act as referral authorities for planning decisions that impact on water resources, strengthening the link between catchment and water management (see 3.2).

The interface between water resource management, regional development and planning for land use change will be strengthened. This will include identifying options for regional towns and centres to transition into more water-sensitive design and greater consideration of water resource implications in regional planning.

The Victorian Government is committed to conducting a long-term statutory review of water resources in 2019.

Integrated urban water management proposals that improve urban environments will be supported.

Actions

6.1.2.1 Complete the development of four regional Sustainable Water Strategies and outline their associated implementation programs by 2010

6.1.2.2 Clarify objectives for stormwater to improve planning and management, in consultation with local government and industry by 2012

Genoa Bridge, East Gippsland before 1989. Photo: DSE

Genoa Bridge, East Gippsland 2009. Photo: Sean Phillipson

6.1.3 Environmental water management

Climate change increases the need for Victoria's scarce environmental water resources to be managed efficiently to deliver maximum environmental benefits.

The Environmental Water Reserve (EWR), introduced by the Government in 2005, provides legal recognition of the amount of water set aside to provide environmental benefits to water-dependent ecosystems. The EWR is comprised of three types of water: callable volumes in storage (entitlements), which can be released from storage by an environmental water manager to meet specific environmental needs; rules-based water such as passing flows; and rules-based, above-cap flows, which are released from storage, or made available to the environment by a storage operator or licensing authority.

Only six per cent of the EWR consists of actual water entitlements in storage. The majority of the remaining 94 per cent comes from passing flows, above cap water and reservoir spills. This water is highly vulnerable to the impacts of climate change.

Victoria's approach to environmental water management has been developed using the experience of managing the state's rivers and wetlands through the current drought. Victoria's Sustainable Water Strategies are identifying water-use efficiencies. These include carrying over environmental water for use in future years, use of water at multiple sites through capture and reuse of returned flows and use of consumptive water en-route to maximise environmental outcomes.

Significant volumes of environmental water have already been recovered and future water recovery projects are likely to substantially increase this volume. The Victorian Government will invest in major water recovery projects for the environment through water savings generated by infrastructure improvements. This includes 75 GL as part of the Northern Victorian Irrigation Renewal Project, 83 GL as part of the Wimmera Mallee Pipeline Project and 7 GL as part of the Macalister Irrigation District 2030 program.

To deliver maximum environmental benefits, the Government is investigating the integrated management of environmental water across the State and throughout the Murray-Darling Basin.[3] Structural works such as pumps and regulators to deliver environmental water are also being investigated.

Significant investment in structural works at key sites is underway through the Living Murray program. The impact of climate change makes it even more important that environmental water is delivered in a targeted manner to achieve maximum environmental benefit.

Policy

The Victorian Government will continue to encourage all water users to use water as efficiently as possible. It will identify ways to increase the environmental water reserve and continue to maximise the outcomes from available water.

Management and trade of environmental water will be governed by the new office of the Environmental Water Holder (see 3.1). The Environmental Water Holder will also oversee co-ordination of watering programs with the Commonwealth Environmental Water Holder. Victoria will continue to implement an adaptive approach to managing environmental water to improve the survival of rivers and wetlands during dry sequences and support recovery during average and wetter years.

Environmental water will be managed to anticipate and respond to varying water availability. Improved efficiency will maximise the outcomes for available water. Additional environmental water entitlements for rivers and wetlands will be obtained, where required, through the water allocation framework, via regional Sustainable Water Strategies.

To increase the efficiency of environmental water use, the Government will develop a range of tools under Sustainable Water Strategies.

The Victorian Government will recommend the Northern Region Sustainable Water Strategy's environmental water recovery targets to the Australian Government as a guide for water purchase programs in the southern Murray-Darling Basin.

Actions

6.1.3.1 Develop a program of structural works for the efficient delivery of environmental water to priority rivers and wetlands, including potential partnerships with the Australian Government

Redgum Forest, Hattah Kulkyne National Park. Photo: Andrew Chapman

6.1.4 Fire management

Victoria is one of the most fire prone areas in the world. Fire, together with climate, topography and other ecological factors has influenced the nature and extent of Victoria's forest, scrub and grassland ecosystems over tens of thousands of years. Fire is continuously resetting and regenerating the mix of species and habitat structures, contributing to habitat diversity across the landscape.

Many species and ecosystems have evolved and adapted to specific fire regimes and rely on fire to regenerate and maintain health. Victoria's recent intense fires have had tragic and costly consequences for people and communities, as well as significant impacts for ecosystems and individual species. Inappropriate fire regimes are one of the major threats to the health of Victoria's land, water and biodiversity.

A key challenge is to manage fire in landscapes that are often fragmented and closely-settled. Fire management needs to achieve the multiple objectives of protecting human communities and built assets, values such as Aboriginal cultural heritage and meeting ecological needs. Fire regimes are managed through planned burning, fire suppression and managing fuel loads.

The impacts of climate change are a further challenge. Hotter and drier conditions increase the risks involved in managing fire. These risks have to be recognised, shared and managed by the Government and the community to achieve the best outcomes for all.

Living with fire – Victoria's Bushfire Strategy (2008) outlines Victoria's future vision for bushfire management. The strategy will be refined in light of the final recommendations of the 2009 Victorian Bushfires Royal Commission.

The Government's agencies will continue to assess the impacts of land and fire management activities on ecosystems and biodiversity.

Policy

The Victorian Government will respond to the recommendations of the 2009 Victorian Bushfires Royal Commission in developing future fire management policy and action.

Fire response in Victoria will continue to be strengthened while building on the State's fire recovery efforts.

Victoria's planned burning program will be increased, including the use of landscape-scale mosaic burns based on ecological and risk management objectives to complement the existing strategic asset protection burning approach. The program will work to balance community protection with improved ecosystem health and resilience, through developing greater understanding of appropriate fire regimes. Planned burning will consider ecological values and ecosystem services, including the management of fire sensitive vegetation types.

The Victorian Government will work to improve community knowledge of the role of fire in the environment. The need for a shared responsibility for the risk, prevention and preparedness for bushfires will be promoted.

A skilled, fit and experienced fire fighting force will be maintained to deliver the increased planned burning program, meet rising response needs and provide support to volunteers.

Improved risk management tools will be provided to planners and the community. The Integrated Fire Management Planning program will be accelerated to achieve multi-agency and community involvement in the management of fire across all tenures including the use of fire to reduce fuels.

Fire recovery specialist teams for public land will be deployed and resourced to assess risk to social, economic and environmental assets, implement immediate recovery needs and prepare recovery plans.

A more responsive approach to the management of bushfires will be developed based on continuous learning and improvement. This will include inter-agency risk modelling, statewide scenario planning and improved ecological research and monitoring.

Community and ecosystem resilience to fire will be increased by improved planning of how and where development occurs and by integrating conservation, production and risk reduction into land management

Research priorities for fire, including fire regimes for ecological resilience, scenario-planning and risk assessment, will be identified through implementation of an adaptive management approach. Increased research and monitoring programs, greater sharing of information and the development of dynamic risk management frameworks will also be pursued (see 3.4).

Actions

6.1.4.1 Implement a community awareness program about fire management strategies by 2010

6.1.4.2 Respond to the recommendations of the 2009 Victorian Bushfires Royal Commission

6.1.5 Soil management

Soil health is the continued capacity of a soil to function as a living system. Healthy soils sustain biological productivity, maintain air and water quality and promote plant, animal and human health. The health of a soil is a product of its inherent properties and its management or use.

Soil underpins all of Victoria's terrestrial ecosystems. Soil receives, stores and releases water, recycles nutrients, sequesters carbon, enables the growth of plants and absorbs waste. It is habitat for a vast array of organisms.

In agricultural landscapes soil is valued for its productive potential. Agricultural productivity relies on fertile and stable soils.

Poor soil management threatens the capacity of soils to produce ecosystem services due to soil structure decline, nutrient decline and acidification. It can also produce negative offsite impacts, including eutrophication and sedimentation of rivers and water storages, and wind-borne soil can pose health risks.

Poorly managed soil can threaten other natural assets and soil can also be considered as a dispersed asset in its own right. Victoria's soils need to be managed in both of these ways.

Victoria has a long history of soil conservation by land managers and governments, recognising the combination of private and public benefits of good soil management. This has been complemented by significant action to tackle dryland salinity.

Dry conditions are undermining many of the soil conservation practices of the past, increasing the risk of erosion, threatening public assets and undermining options for future land uses. The impact of climate change on soils and soil health is not well understood. A renewed focus on soil research is needed, alongside action to identify risks and better integrate soil issues into natural resource management activities.

To secure the future productivity of agriculture and its important contribution to Victoria's economy, we need effective market signals to protect and enhance future soil health.

While many land managers undertake practices that improve soil health, the value of long-term soil health is not well integrated into property prices or commodity markets, and the role of soil in supporting ecosystem services is not always recognised. Finding ways to better reflect the value of healthy soils in decision-making processes, including farm management systems, will drive more sustainable soil management into the future.

The capacity of soil to sequester carbon needs to be considered in the context of greenhouse gas mitigation. At times soil will be a source of carbon emissions rather than a carbon sink. The Australian Government will make a decision by 2013 on whether to include agriculture in the Carbon Pollution Reduction Scheme (CPRS). Research into the sequestration potential of soil and whether an appropriate metric can be developed is underway.

Irrespective of the role soil carbon may play in the CPRS, there are multiple benefits for maximising the carbon sequestered in soil through improving soil health. Actions that increase soil carbon will also increase microbial activity, assist the uptake of nutrients and reduce the need for nutrient inputs, like fertilisers.

Improving our understanding of how Victoria's soils will respond to climate change and finding innovative ways to manage these responses are important. Targeted research, systematic monitoring, and support for the development and sharing of local innovation is needed.

Farmer overlooking his eroded gully. Photo: Bruce Cumming

Soil profile of an eroded bank. Photo: Bruce Cumming

Policy

The Victorian Government will maintain a risk management approach to soil. Decisions to act will be based on risks of permanent or irreversible damage to soils and where soil management threatens current high value land, water or biodiversity assets.

Soil programs will focus on limiting offsite impacts or threats to other natural assets and preserving choices for future generations.

Soil considerations will be better integrated into modelling tools such as the Environmental Systems Modelling Platform (EnSym), Regional Catchment Strategies, investment processes and farm management planning.

Existing models such as the Macedon Ranges Shire's Voluntary Environmental Resource Inventory, that enable informed decision-making at the point of property purchase, will be further explored.

Soil research will be directed to projects that:

- Build understanding of the spatial distribution of Victoria's soils, their current and potential health, their relationships with land use and land management practices and the impacts of fire and flood.
- Improve knowledge of soil responses under climate change and different management systems.
- Increase understanding of carbon in Victorian soils and identify areas where soil management can deliver public benefits, including carbon sequestration.
- Improve soil management through the development of techniques that deliver public benefits, productivity and ecosystem services.

Actions

6.1.5.1 Develop a statement on soil conservation, soil health and dryland salinity by the end of 2011

6.1.5.2 Develop an action plan to update modelling tools and farm planning tools to include a more complete range of soil management issues by 2012

6.1.5.3 Develop and implement a strategy to capture and retain knowledge on soils and soil management by 2012

Soil with high organic matter. Photo: Bruce Cumming

Sandy soil with low organic matter. Photo: Bruce Cumming

Rewarding VERI good land management

Case Study

Andrew Scanlon from the Macedon Ranges Shire with Liz Dormontt, a local real estate agent, trialling the VERI initiative in the Macedon Ranges.

For many people, land purchase is one of the most significant lifestyle or financial investments they will ever make. Potential purchasers are often new to a region, and many will have little or no land management experience or knowledge. They may be unaware of the environmental issues that face land managers on a daily basis.

The Macedon Ranges Shire has created a scheme that rewards landholders for good management when they come to sell their properties. The Voluntary Environmental Resource Inventory, or VERI, is a toolkit for prospective land vendors to describe the environmental condition of their land before sale.

A property with a VERI can provide important planning information to potential purchasers and help to link them with local knowledge and resources. The VERI can be voluntarily submitted with the Vendor's Statement provided under Section 32 of the *Sale of Land Act 1962*, or it can be simply provided as general information for potential purchasers. Once completed the VERI is a confidential document between the vendor and potential purchaser.

Vendors can use the VERI as a platform to showcase property assets and relevant management issues, such as weeds, improved pasture and waterway fencing. Prospective purchasers can use the VERI to appraise the condition of land and water resources before purchase. The VERI provides vendors and purchasers with a method for factoring sustainability principles into land sale negotiations. The scheme is an effective way of rewarding quality land management.

The VERI takes approximately 30 minutes to complete. The vendor includes as much information as possible to give the purchaser a good picture of the property in question. Chess Real Estate agent Liz Dormontt is positive about the scheme.

"The VERI has allowed me to adequately describe the environmental condition of a rural property, even in drought times when land doesn't look its best. The VERI gives the buyer more information than I otherwise could have provided," Liz said.

For more information go to http://www.macedon-ranges.vic.gov.au/

6.1.6 Invasive species management

Invasive plants, animals and pathogens are a major threat to the health and resilience of Victoria's land, water and biodiversity. Invasive species contribute to the extinction of indigenous species, affect the diversity and function of ecosystems, reduce productivity, damage amenity, lessen tourism opportunities, reduce water quality, and may increase fire risk. The spread of invasive species creates significant costs. Weeds alone cost the Victorian economy over $900 million each year.

Climate change is expected to favour the spread of some invasive plants, animals and pathogens, and to affect the way in which these species interact with other species. Species that are not currently a threat may expand in range and abundance, impacting on other species and the way that ecosystems function. Cost-effective investments in invasive species management are of increasing importance as the management challenges increase.

Local and regional differences in species' behaviour and impact need to be accounted for in assessing risks, devising management approaches and setting standards. Good risk management and decision-making tools are needed to analyse the ecological, social and economic costs and benefits of actions.

A successful invasive species program depends on people working together to achieve change at the required scale. Shared goals across public and private land and water, clear roles and responsibilities and co-ordination of effort is needed – especially in emergency situations of high impact incursions.

When invasive species are well established, it is more complex and expensive to manage their impacts. The prevention and eradication of initial incursions is preferred and can be more cost-effective than attempting to treat outbreaks once they have become established. However, it is important that invasive species are managed to protect high priority assets at a landscape scale.

Raising awareness and building the capacity for key stakeholders to participate in the management of invasive species will be increasingly important. Chapter 5 describes policy and actions on landholders' environmental duties and stewardship.

Policy

The Victorian Government will increase the co-ordination of policy and legislative frameworks for invasive species and pathogens within and across land, freshwater, and marine systems through the implementation of the *Biosecurity Strategy (2009)* and development of an Invasive Plants and Animals Policy Framework.

The Victorian Government will use a biosecurity approach to strengthen the management of invasive species, including marine invasive species. A biosecurity approach incorporates:

- Preparedness and prevention – including surveillance, risk assessment and monitoring
- Eradication – including incursion planning, emergency response and eradication where risk and cost-benefit assessment supports action
- Containment – where an organism is beyond eradication, but still expanding its range, to manage risks by preventing further spread
- Asset protection – ongoing management to enhance high priority assets and protect them from the impact of established invasive species, using a risk management approach
- Partnerships – clarifying roles and responsibilities for key stakeholders and working with industry and other partners to manage invasive species.

The Government will use scientific evidence to make decisions on government investment for the greatest public benefit. Climate change projections will inform the risk management approach to invasive species.

The Government will develop programs with key stakeholders, industries and agencies to increase the prevention and early intervention components of invasive species management. Community volunteer detection and control programs will be extended to include a broader range of participants and invasive species.

The Government recognises that programs aimed at invasive species management may pose a threat to Aboriginal Cultural Heritage and will ensure programs take this into consideration.

The Government will update and improve Victoria's protocols for marine invasive species incursions. This will include meeting obligations under a national system to prevent and manage marine pests and supporting national best practice guidelines for managing biofouling and ballast water.

Program design will be reviewed to ensure consistency with priorities and integrate objectives for the control of invasive species with other land management outcomes and land use decisions. Programs and investments will need to demonstrate a case has been made for government intervention.

Programs that tackle invasive species will be implemented at a landscape scale, building on initiatives such as the Southern Ark program in Gippsland.

Actions

6.1.6.1 Develop the Invasive Plants and Animals Policy Framework by 2010

6.1.6.2 Progressively undertake risk assessments covering environmental weeds, freshwater and marine species, pest animals, diseases and pathogens

6.1.6.3 Update Victoria's protocols for marine invasive species incursions by 2010

6.1.7 Threatened and native species management

Through the Green Paper consultation process, the Victorian community articulated a clear aspiration to protect threatened native species and biodiversity. The intrinsic value of nature and individual species was recognised.

Chapter 2 of the White Paper describes the central role of biodiversity in maintaining ecosystem processes, services and resilience. More than a thousand of Victoria's native species are known to be threatened with extinction. Whole communities of native plants and animals are at risk due to a variety of threatening processes including damage to habitat, changes to fire regimes and the impact of invasive species.

Climate change is placing additional pressure on both individual species and whole ecosystems, posing a severe threat in its own right as well as exacerbating the effects of other existing threats. Any change to the local ecological niche of species may place them near the limits of their physiological tolerance.

As a result, many species and ecological communities are at serious risk of decline or extinction this century. With both environmental and ecological factors changing, it may prove very difficult to maintain the current distribution and abundance of all species and communities.[4]

As the number of species at risk grows, implementing individual species management programs will become increasingly challenging. While this method will still be necessary for some species, approaches that benefit a range of species (both threatened and those that may yet become vulnerable) will be preferred.

Climate change also necessitates an increased focus on fundamental ecological and evolutionary processes and on facilitating the self-adaptation and re-organisation of terrestrial and aquatic ecosystems. This will require clear understanding of the composition, structure, function and adaptive responses of ecological communities.

The traditional approach of conserving species in their current locations and environments must be broadened to better encompass climate adaptation and the maintenance of ecosystems under changed conditions.[5] This can be achieved through programs aimed at achieving broader, landscape-scale outcomes through threat mitigation and the maintenance of ecological and evolutionary processes.

This approach will have flow-on benefits for many common species, and potential benefits for less well known and researched species such as fungi, invertebrates, non-vascular plants and many marine species whose threats and habitat requirements may not yet be understood.

Clear priorities are needed for increasing and applying knowledge of species and ecological and evolutionary processes. It is also necessary to improve systems for monitoring and reporting on our actions in managing native species.

The Victorian Auditor General's Office has drawn attention to significant issues with the effectiveness, implementation and utility of the *Flora and Fauna Guarantee Act 1988*. The Act is the principle legislative tool for managing threatened species and many non-threatened plant species in the State. The Government is reviewing the Act in light of the challenges of climate change and new scientific understanding about ecosystem processes and resilience.

This is part of the broader review of legislation (see 3.5) which will identify ways to better integrate biodiversity conservation, natural resource management and land use planning, and to align Victorian threatened species legislation with the Commonwealth legislation.

The review will also include an examination of the *Wildlife Act 1975*, which governs management of many common animal species in Victoria.

Expanding urbanisation, habitat fragmentation and changes in available food resources have brought people and wildlife into closer contact. This has led to growing concern about animal welfare, community safety and damage to assets and enterprises.

There are varied community expectations on how conflict between people and wildlife should be managed. The complex nature of many of these interactions and the likelihood of significant shifts in the distribution and abundance of wildlife with climate change underlines a need for a strategic approach.

The Victorian Government recognises the need to plan for and manage the interactions between people and wildlife. Local communities should be involved in determining appropriate solutions.

The challenge of threatened and native species management is recognised by the United Nations Convention on Biological Diversity. Victoria also works under various national and State policy and legislative frameworks to guide its work in conserving threatened species. The renewed *Victorian Biodiversity Strategy* due for completion in 2010, will guide the implementation of Victorian Government policy on threatened and native species.

Policy

The Victorian Government shares the community's aspiration to protect threatened species and recognises that nature conservation and biodiversity are fundamental to protecting ecosystem services and building resilient ecosystems. This presents a long-term challenge for all Victorians.

The Victorian Government will maximise gains for threatened species and ecological communities through threat mitigation and attention to ecological and evolutionary processes at a landscape-scale. Priority will be given to actions that produce the greatest benefit for a wide range of species and communities.

The adaptive capacity of species and ecological communities and the cumulative impacts of threats will be taken into account. Where necessary landscape-scale and multiple outcome approaches will be augmented with targeted approaches. These will include threat management programs and population reintroduction/ supplementation programs, where threats have been adequately mitigated and the risk of extinction can be substantially reduced.

A risk management framework that optimises the outcomes from investment and intervention will be applied. Intervention decisions will take into account criteria such as species' conservation status, endemicity and phylogenetic distinctiveness, their role in the functioning of ecosystems, their social or cultural importance and their vulnerability to climate change and other threats.

The Victorian Government will support and encourage community efforts, partnerships, Landcare groups and networks and conservation management networks to improve habitat and manage threats.

The Victorian Government is seeking a nationally consistent approach to assessing the conservation status and listing of threatened species. It will work with the Australian Government and other states to achieve this through the review of the *Environment Protection and Biodiversity Conservation Act 1999*.

Victorian legislative and administrative arrangements relating to threatened species and communities will also be reviewed and updated and will address the risks to species, communities and ecological and evolutionary processes posed by climate change and other threats (see 3.5).

Action Statement provisions in the *Flora and Fauna Guarantee Act 1988* will be reviewed to optimise efforts for threatened species and ecological communities. The review will consider the use of bioregional-based Action Statements to detail the management of some listed items, and the requirement for Action Statements to outline how they propose to monitor progress and evaluate the effectiveness of actions.

Interactions between humans and common or abundant wildlife will be managed under a new approach. This will include improved management of wildlife rehabilitation and development of management plans for particular species. Improved arrangements will be made for handling emergencies involving native species, such as whale strandings and pollution events.

Modelling, risk assessment and decision support tools, including intervention criteria will be further developed to evaluate options for management and investment. This will enable priorities for action to be assessed at community, taxonomic group and species level. These will incorporate assessments of vulnerability to climate change and use of information from the Actions for Biodiversity Conservation database. Records of native species in the landscape will be collated in a Victorian Biodiversity Atlas.

The Victorian Government will conduct an analysis of monitoring and research needs, to enable adaptive management of threatened species and communities and of ecological and evolutionary processes at a landscape scale.

Actions

6.1.7.1 Release the renewed Victorian Biodiversity Strategy in the International Year of Biodiversity, 2010

6.1.7.2 Implement the Actions for Biodiversity Conservation system including modelling the links between actions and outcomes

6.1.7.3 Complete the development of the Victorian Biodiversity Atlas by 2011

6.1.7.4 Release a Living with Wildlife Strategy, including improved arrangements for wildlife rehabilitation by 2010

6.1.7.5 Invest in resilience of threatened species through habitat improvement, including three demonstration projects on landscape-scale management by 2011

6.1.7.6 Include revised provisions for Action Statements in the new biodiversity and conservation legislation by 2012

Outcome 6.2 Public land is managed as the core of resilient ecosystems

Victoria has a wonderful array of natural and built environments that make up our public land estate. From national parks to forests, foreshore reserves and marine national parks, our public land is diverse and precious, providing many benefits to the people of Victoria and visitors from interstate and overseas.

Around one third of Victoria's land area is in public ownership. Covering approximately 8.5 million hectares, this public land encompasses almost all major landscape and ecological types found in Victoria. Virtually all of Victoria's marine area is public land, including Port Phillip Bay and Western Port.

The Victorian Government has adopted a comprehensive system of land-use categories (tenures) for public land that has been applied across the state. These categories define the way each area should be managed and protected. While categories such as national parks, State forests and conservation reserves are very familiar, they comprise less than a third of the total area of public land. Some categories of public land, such as coastal reserves or recreation reserves, are relatively small in size but form some of the most intensively used areas of public land in Victoria. Resource use areas (including plantations, mines and water storages) plus services and utility areas (including roads, ports, pipelines, government offices and depots, cemeteries and fire stations) are also classified as public land but do not form a major consideration for the White Paper.

Figure A6.3 in Appendix 6 shows the major tenures of public land across the state. Table E on page 87 lists the major categories of public land and the primary legislative bases under which they operate. The number of categories and pieces of legislation illustrate the complexity of current public land management arrangements. The legislative arrangements need to be reviewed and streamlined to respond to the challenge of climate change, including adopting a landscape-scale approach (see 3.5).

Public land makes a major contribution to Victoria's economy by providing ecosystem services like clean water, carbon storage, biodiversity protection, recreation and timber products. Coastal, marine and estuarine systems support food resources (fisheries habitat and breeding grounds), recreation and nature-based tourism. Public land provides social, cultural and health benefits for the community and has a role in building awareness and understanding of ecology and natural resource management. Encouraging visitors to the public land estate through nature-based tourism and recreation helps to educate people about public land values.

Public land is of immense cultural and spiritual significance to Victoria's Traditional Owners. Victoria's Indigenous people cared for Victoria's land, water and biodiversity for many thousands of years. Their knowledge and involvement in the management of Victoria's natural environment brings a unique perspective and makes an important contribution to stewardship.

Management of public land needs to take into account these perspectives and the Aboriginal cultural heritage values inherent in the landscape.

Public land management needs to address the risks associated with climate change. The public land estate will be impacted by sea level rise, increased frequency and intensity of fires and the impacts of invasive species. Our parks, reserves and sanctuaries comprise the core biodiversity conservation values on public land and are an important store of carbon. They will play a key role in efforts to protect biodiversity and ecosystem resilience. Adaptation to climate change requires early planning and intervention to manage risks, avoid future costs and maximise priority outcomes.

State forests support sustainable timber harvesting and a range of other productive land uses. They contain large areas of important habitat for native species. Within these forests, areas are also set aside for special protection of biodiversity and ecosystem services to support the formal reserve system. State waters absorb carbon dioxide and provide habitat and species important for commercial fisheries, recreation and tourism.

Climate change will affect whole terrestrial and marine environments. Co-ordination within and across public and private land is needed to manage threats to ecosystem diversity and resilience.

Victoria's approach to public land management is already being strengthened. Victoria is well advanced in establishing a comprehensive, adequate and representative (CAR) reserve system as part of the Australian National Reserve System. Consideration is being given to the changing nature of ecosystems, and to climate change refugia, along with representation of both ecological and environmental diversity within the reserve system. Further work is needed to address under-represented ecosystems like native grasslands. The Victorian Environmental Assessment Council's Remnant Native Vegetation investigation will provide recommendations about the management of smaller public land areas.

Table E - Major categories of public land and their primary legislative bases

National, wilderness and State parks (including wilderness areas in national parks)	*National Parks Act 1975*
Regional parks	*Crown Land (Reserves) Act 1978*
Nature conservation reserves	
Natural features reserves, including public land water frontages	
Historic areas and historic reserves	
State forest (including reserved forest and protected forest)	*Forests Act 1958, Land Act 1958*
Wildlife reserves	*Wildlife Act 1975*
Alpine resorts	*Alpine Resorts Management Act 1997*

Grampians National Park. Photo: Tourism Victoria; courtesy of Southern Grampians Shire

Policy

The Victorian Government recognises that many tenures of public land provide habitat and support resilient ecosystems and biodiversity. Public land provides a range of important social, cultural and economic benefits.

The Government will continue to invest in improved management of public land. It will build the ecological resilience of formal conservation reserves through an increased emphasis on the management of their natural values and ecosystem processes, and those of adjacent public land and surrounding waters. This includes close attention to planned burning for fire protection and ecological management. Carbon storage and sequestration is a long-term management objective for Victoria's public land, along with protection of strategic assets, implementation of biolinks and maintaining resilient ecosystems.

Community involvement in the use and management of public land will be actively supported and promoted. This recognises the important role played by committees of management, friends groups, conservation management networks, Coast Action/Coastcare, Landcare groups and networks, and recreation and industry associations.

Traditional Owners and other Indigenous Victorians will be supported to become more involved in the management of Victoria's public land and natural resources. Access to land for Victoria's Traditional Owners will be improved through agreements under the Victorian Native Title Settlement Framework (see 5.2).

Legislative and governance arrangements for public land will be strengthened and reformed to establish consistent principles, and performance standards for ecological land management and integrated management and reporting.

The management of public land, parks and protected areas will be strategically linked with private land management priorities across Victoria to facilitate delivery of landscape-scale outcomes, including biolinks and the enhancement of flagship areas. Forest, parks and fire plans will be better integrated with Regional Catchment Strategies. A range of partnerships, market-based instruments, stewardship and land management incentives will be used to support complementary use and management of land and waters adjacent to priority public land.

The Victorian Government recognises the importance of managing public land to achieve fire protection for both communities and ecosystems. The report of the 2009 Victorian Bushfires Royal Commission will provide further guidance on this issue.

The Victorian Government will work with the Australian Government to further develop the National Reserve System to enable it to remain resilient and adaptable to climate change. This may include scientific research on climate change risk, systematic conservation planning, species and ecosystem dynamics and adaptive management approaches into the development and management of the National Reserve System.

Measures for developing the protected area system in the context of surrounding land use, complementary off-reserve land management and connectivity objectives will be pursued. Victoria is committed to include in the National Reserve System:

- Examples of at least 80 per cent of the number of regional ecosystems in each Interim Biogeographic Regionalisation for Australia (IBRA) bioregion as a measure of comprehensiveness by 2015.
- Examples of at least 80 per cent of the number of regional ecosystems in each IBRA subregion as a measure of representativeness by 2025.
- Critical areas to ensure the viability, resilience and integrity of ecosystem function in response to a changing climate by 2030.

The Victorian Government will support and work in partnership with non-government, community and volunteer organisations to build the National Reserve System, and to build ecosystem resilience across public land.

Dynamic modelling, risk assessment and monitoring and reporting approaches will be developed to inform the management of parks, forests and other public lands in the context of climate change.

Milkmaid *(Burchardia umbellata)*, Volcanic Plains.
Photo: Corangamite CMA

Satellite image of Wilsons Promontory. Photo: Geoscience Australia

Actions

6.2.1 Develop the legal and policy framework for co-management of public land by Traditional Owners by 2010

6.2.2 Implement a framework for managing Victoria's parks and protected areas that complements the Regional Catchment Strategies and the Victorian Natural Resource Management Plan

6.2.3 Develop improved valuation techniques to account for the ecosystem services provided by parks, forests and other public land by 2013

6.2.4 Implement the Healthy Parks Healthy People campaign by 2010

6.2.5 Establish stewardship agreements between public land managers and interested adjoining private land managers by 2013

6.2.6 Develop a timetable for the completion of public land management plans that outline Government's local public land management priorities by 2012

Gunbower Forest. Photo: DSE

Outcome 6.3 Rivers, wetlands and estuaries are managed so they continue to provide ecosystem services

Rivers, wetlands and estuaries constitute only a small portion of the Victorian landscape, yet they support an important part of Victoria's economy. They also have important ecological and social values.

Rivers, wetlands and estuaries support commercial activities such as water supply and storage, fishing, timber harvesting and tourism. They are rich in cultural sites and provide opportunities for recreational activities, such as swimming, boating, fishing and nature study. They provide water, habitat and breeding places for native species and form vital connections between land and sea environments.

Many of Victoria's rivers, wetlands and estuaries are in moderate or poor condition and many of the native plants and animals that depend on them are threatened. In the context of climate change, rivers, wetlands and estuaries will play a central role in providing habitat refugia and connectivity.

The *Victorian River Health Strategy (2002)* and *Securing Our Water Future Together (2004)* set out the framework for managing Victoria's rivers. Within this framework 10 regional River Health Strategies identify rivers of high community value as investment priorities. Regional River Health Strategies also establish management objectives for rivers and outline integrated work programs. Since this framework was developed, planning for drought and climate change, and integration of the management framework for rivers with that for wetlands and estuaries have become paramount.

Better integration of rivers, wetlands and estuaries with management of the surrounding landscape is required, as many threats stem from land use in the wider catchment. A landscape approach is needed that encompasses management of land under public and private tenure and considers the interplay between surface water and groundwater, and between freshwater and marine ecosystems.

The Victorian Government is implementing a landscape-scale approach, with investment into large-scale river rehabilitation projects across the state. This work is currently funded by the environmental contribution levied on water charges.

This approach aims to ensure that priority ecosystems are healthy enough to survive through drought periods and to recover during wetter years. Investment will focus on the priority areas and systems that are able to sustain biodiversity and ecosystem services under at least low climate change scenarios. Under climate change, it may not be possible to maintain the existing abundance and range of every species, ecological community, or aquatic system. Difficult decisions will have to be made about priorities for investment.

Protection of sites, natural assets and ecosystem services must be undertaken strategically in the context of landscape-scale objectives, such as water quality protection and connectivity through biolinks. Rivers, wetlands and estuaries are a central focus for biolinks. They provide diverse interlinked habitats, environmental water flows, stepping stones of riparian and floodplain vegetation, and a system of drought and climate change refugia. Estuaries also play a vital role in the connections between catchments and marine environments.

Activities in rivers, wetlands and estuaries should be managed to minimise adverse impacts on the environment and wildlife. Incentives and market-based approaches can be used to encourage good management of rivers, wetlands and estuaries on private land.

Victoria has international obligations for wetland conservation under the Ramsar Convention and there are bilateral agreements for the conservation of migratory waterbirds with Japan, China and the Republic of Korea.

The Council of Australian Governments (COAG) National Water Initiative defines obligations to identify, protect and enhance the values of high conservation value aquatic ecosystems. Victoria is also contributing to the management of the Murray-Darling Basin through the Murray-Darling Basin Ministerial Council, which is providing advice on the development of a new Basin Plan by the Murray-Darling Basin Authority.

Lake Wendouree, Ballarat. Photo: Christian Pearson, Misheye Photography

Policy

The Victorian Government will take an integrated approach to river, wetland and estuary health, encompassing environmental, economic and social considerations and founded on an adaptive approach to climate change.

An integrated approach will take into account the relationship of these systems with terrestrial catchments, groundwater and marine ecosystems and will integrate priority areas into regional networks of biolinks and refugia. In the Murray-Darling Basin this needs to be through a basin-wide approach.

Strategy development, asset identification and adaptive management will be aligned to recognise state priorities and regional priorities identified in Regional Catchment Strategies.

Management effort will focus on priority river, estuary and wetland systems that can provide the foundation for resilient biodiversity under climate change scenarios. An asset-based investment prioritisation system will be used to optimise the environmental, social and economic benefits of river, wetland and estuary systems. This will complement investment from the Australian Government in high-priority aquatic ecosystems.

Priorities for investment in high conservation value aquatic ecosystems will be determined in the context of their resilience under climate change.

Benchmarking, condition assessment and data collection systems for river, estuary and wetland ecosystems will continue to be developed to inform adaptive management. This will align with the broader monitoring, reporting and knowledge management approaches outlined in Chapter 3.

Regular condition assessment of each ecosystem, including monitoring by the community, will be undertaken to inform decision-making. The role of the Waterwatch network in community education, monitoring and reporting will continue to be supported.

Data collection, research and modelling priorities to inform the adaptive management of rivers, estuaries and wetlands under climate change, and to build understanding of their contribution to connectivity will be required.

Activities on private land that provide public good outcomes in river, estuary and wetland health will be supported, with a focus on priority systems.

Permitted activities in rivers, wetlands and estuaries will be managed to minimise adverse effects to the environment and wildlife.

The Government will continue to develop, implement and update plans to maintain the ecological character of Ramsar wetland sites and other high conservation value aquatic ecosystems.

Actions

6.3.1 Develop an integrated Victorian Strategy for Healthy Rivers, Estuaries and Wetlands by 2011

6.3.2 Produce complementary regional strategies for Healthy Rivers, Estuaries and Wetlands by 2012

6.3.3 Update the existing prioritisation system, including identification of high conservation value aquatic ecosystems by 2011

6.3.4 Complete the third Index of Stream Condition assessment by 2010

6.3.5 Establish a benchmark for Victoria's wetlands and estuaries using indices of condition by 2011

Recreational fly fishing. Photo: Tourism Victoria

Outcome 6.4 Riparian lands protect waterways and increase productivity, connectivity and amenity

Riparian land is the land adjoining a freshwater wetland, estuary, lake or stream. It is highly valued for agriculture and has significant recreational, aesthetic and cultural values.

Riparian areas often contain a diversity of plants and animals and therefore have an important role in linking habitats, providing a strong foundation for biolinks. Well-managed riparian land provides ecosystem services such as pollutant filtration, and sediment and nutrient trapping that give us good water quality and public health benefits. The community is increasingly valuing these important services and demanding better protection of riparian land.

The tenure of riparian land in Victoria is complex. On smaller streams in agricultural landscapes, riparian land is usually in private ownership. The State has a network of public riparian reservations known as Crown frontages, mostly on larger streams where the riparian land forms a boundary between properties. This network of reservations is unique to Victoria, and covers about a fifth of the length of the State's stream network. Streams that include Crown frontages are often of the highest priority for waterway protection and restoration.

Much of the native vegetation across Victoria's riparian land has been cleared or degraded by grazing. This has led to a decline in the health of the riparian environment and in stream condition. Direct stock access to rivers and streams has further degraded the State's waterways and water supplies. A statewide benchmarking exercise in 2004 showed that of 26,000 kilometres of riparian land, less than 14 per cent was in good to excellent condition, 54 per cent was in moderate condition, and 32 per cent was in poor to very poor condition.

Efforts to improve the condition of riparian land need to be accelerated. This means working closely with private landholders, licensees and land and river management agencies.

The protection and restoration of riparian land will require the progressive fencing of these areas to exclude stock, along with the provision of off-stream stock watering points. Access to public land water frontages for recreational purposes will be retained.

Livestock need to be managed to prevent direct access to the beds and banks of streams and wetlands. This is particularly important in streams that provide water for human purposes. The most practical way to achieve this is through fencing. Fenced and revegetated riparian land can provide many benefits for adjacent landholders including better management of stock, windbreaks and improved water quality.

Crown frontages have generally been licensed to an adjoining landholder for grazing purposes or for the cultivation of crops. More recently they have also been licensed for conservation purposes. There are currently about 10,000 licensed Crown frontages across Victoria.

Licenses are issued for five year periods with renewals scheduled in 2009, 2014, 2019 and finally in 2024. Licensees are responsible for managing weeds, pests and fire on the frontage and for maintaining public access for recreation. Many Crown frontages are currently being used by adjacent landholders, without a license, for purposes that require licensing.

A riparian management framework is being developed as part of the new Victorian strategy for healthy rivers, estuaries and wetlands. The framework will explore management options to ensure that stronger environmental outcomes are achieved. Work has commenced with a review of the conditions of licensed Crown frontages on streams that have been identified as having high community and environmental value under Regional River Health Strategies. The works will also review streams in declared water supply catchments and will be progressively extended to cover the full 30,000 kilometres of Crown frontages by 2029.

Successful management of riparian Crown land relies on cooperation with adjoining private landholders. The current statutory framework does not include objectives for the sustainable management of Crown frontages. The *Land Act 1958* was designed in an era when the intent was merely to require the licencing of certain Crown land uses, not to allow collaborative management between Government and licensees. Improvements to the statutory framework would enable Crown frontage licensing and management to more easily reflect wider community and environmental interests, as well as the interests of licensees and landholders.

A community planting along the Merri Creek, North Fitzroy.
Photo: Merri Creek Management Committee

Policy

The management of Victoria's riparian land will be improved to reflect community standards for good management of aquatic and terrestrial systems and water supplies. Riparian management will contribute to the implementation of biolinks and build ecosystem resilience in flagship areas and across the landscape.

Riparian areas will be progressively fenced, vegetated and actively managed to protect the catchment, water quality, public health and biodiversity values of the adjoining waterway. This will be achieved though a cooperative partnership approach including negotiated land management agreements and licensing arrangements.

The core management objective for Crown frontages is the protection and enhancement of ecosystem services and environmental values. This will be achieved while also delivering other economic benefits such as grazing. Central to these objectives is the management of stock access to the bed and banks of streams to avoid stock contaminating water and eroding banks. Public access for recreation will be maintained, along with high fire protection standards.

In consultation with the community, the Victorian Government will develop a suite of locally relevant standards for the management of riparian land. A mix of financial incentives, statutory mechanisms and institutional arrangements will be utilised to achieve these standards. This will be consistent with the approach to fulfilling the environmental duties and stewardship aspirations of landholders as discussed in Chapter 5.

Government will assist landholders to meet these standards by contributing towards the cost of fencing, revegetation, and provision of off-stream watering infrastructure for stock. The proportion of the cost covered by Government will depend upon the level of public benefit provided by the works.

On private riparian land, management will be underpinned by regular contact with landholders and by robust legal agreements. These will be negotiated with landholders on a voluntary basis. The Government intends to progressively strengthen and formalise partnership arrangements with landholders.

On Crown frontages, licences will recognise any voluntary agreements and contain performance requirements that reflect the objective of enhancing environmental values to the new management standards. Licenses may be extended to the maximum tenure period permitted under the *Land Act 1958*, subject to ongoing compliance with the agreement.

Underpinning these reforms is the capacity of Government to set standards, inspect Crown riparian land and fund riparian works for the public good.

Administrative, institutional, legislative and statutory arrangements will be reformed to enable the community and the Victorian Government to protect and restore riparian land, including Crown frontages and freehold land.

Improvements in riparian management will be rolled out progressively over the next two decades. At each five year Crown frontage license renewal, goals will be set for the number and location of licenses to be inspected and brought up to the new management standards. An equal priority is to identify parcels of Crown riparian land that are being used for activities that require licensing, but are not yet licensed or appropriately managed. The clear policy intention is that by 2029, all public riparian lands will be managed to the new standards.

The Victorian Natural Resource Management Plan will reflect these new arrangements.

Actions

6.4.1 Complete the current review of licensing arrangements for high priority Crown frontages, in consultation with licensees, by 2010

6.4.2 Reform administrative and legislative arrangements to enable enhanced riparian land management by 2014

6.4.3 Identify high-priority Crown frontages that are occupied but not licensed. Negotiate management agreements and license these areas by 2014

6.4.4 Complete the Riparian Management Framework and incorporate standards for managing riparian lands by 2014

6.4.5 Bring all riparian lands up to the new management standards with robust licensee or landholder agreements in place by 2029

Outcome 6.5 Coastal and marine environments are healthy and productive

Victoria's coastal and marine environments are rich in biodiversity. They contain mosaics of different habitats including saltmarshes, wetlands, reef systems, seagrass beds, kelp forests, sponge gardens and intertidal rock platforms.

Coastal and marine environments provide important natural, cultural and productive values that underpin our society and economy. They provide ecosystem services such as climate regulation and nutrient recycling, which are essential for human well-being. Indigenous links to sea country are central to Victoria's history and cultural heritage. Growing numbers of Victorians are moving to coastal areas to enjoy a change in lifestyle, leisure, entertainment and wellbeing.

Coastal and marine environments support commercial ports, tourism, fishing, shipping, aquaculture and some renewable energy industries. Together these industries contribute over $2.8 billion per year to the Victorian economy.[6] Most of these industries and activities rely on the health and ecological integrity of our coastal and marine environments.

Victoria's coast and marine environments are under pressure from coastal development, growing commercial and recreational extractive and non-extractive use, fishing, land-based impacts and pollution. Climate change is likely to pose significant new threats to coastal and marine environments, which may interact with the impacts of existing pressures in complex ways. Changes to ocean currents, increasing seawater acidity, higher temperatures and rises in sea level caused by climate change will lead to fundamental changes to habitats, systems and processes.

The management of coastal and marine areas is complex. Marine management is undertaken by sector, for example fisheries, shipping and conservation. Committees of management, local government and Parks Victoria are directly responsible for planning, managing, improving, maintaining and controlling sections of the coast. They also have a role in informing the broader community about coastal issues and involving them in decision-making processes.

A critical mass of expertise and resources is required to ensure consistent approaches to coastal planning and management. Rising sea levels and population pressures further increase the challenge. The development of planning tools and associated powers to assess and mitigate risks is essential (see 2.2 and 3.2).

Additional information on climate change impacts on the marine environment can be found on the following websites:

- www.climatechange.vic.gov.au
- www.climatechange.gov.au

Our understanding of coastal and marine environments is progressing. High-quality habitat maps now exist for most areas in our marine national parks and the Future Coasts program is examining the vulnerability of Victoria's built and natural coastal assets to climate change. However, substantial areas of Victoria's marine environment are not well understood. We need to develop further knowledge on the combined effects of activities. Monitoring condition and change is essential for informed decision-making.

Many of the species found in the south east Australian marine environment occur nowhere else in the world. If ocean currents change substantially as a result of climate change, there may be nowhere for these species to go. Subsets of these unique habitats are currently represented in the marine national parks, but we can no longer assume that historical trends will continue. Management for change is required – protecting a particular habitat or focussing on single species is no longer enough.

To enable adaptive and integrated management we need to manage the system as a whole (rather than just individual activities) and to work towards spatially based outcomes and objectives. This approach can help to streamline regulation and ensure the ongoing viability of the industries and activities that rely on marine environments, as well as maintaining the integrity of our coastal and marine ecosystems.

The Victorian Government needs to ensure that legislative and policy arrangements that guide the management of the state's coastal, estuarine and marine ecosystems are responsive and flexible. Legislative and policy tools need to be based on a sound understanding of the complex interface between changing oceanic and catchment conditions, demographic change and community expectations. In the context of climate change, better legislative and policy instruments will be needed to address identified risks and to realise emerging opportunities in the marine environment.

Seastar (*Tosia australis*) in the Point Addis Marine National Park.
Photo: Bill Boyle / Museum Victoria

Policy

The Victorian Government plans to progressively strengthen its science capability in coastal, estuarine and marine ecosystem functions:

- To understand the major risks and opportunities for aquatic ecosystems and dependent public and private interests due to climate change
- To inform decisions about the necessary adaptation actions.

Specific priority will be given to extending the State's science capabilities in coastal, estuarine and marine ecosystem functioning. It is proposed to start the research program for Western Port Bay in 2010; Gippsland Lakes and Corner Inlet by 2011; and selected estuaries on the west coast by 2012.

The program will build on the Victorian Government's current investments in the Port Phillip Bay Baywide Monitoring Program, and the *Victorian Climate Change Strategy for Fisheries and Aquaculture (2008)*, under the Victorian *Future Farming Strategy (2008)*. It will provide the necessary links with the CSIRO's investment in understanding the impacts of climate change on oceanic ecosystem functions and the work undertaken by Arthur Rylah Institute and the Department of Primary Industries on freshwater ecosystems.

The Government will develop a Victorian Marine Plan that:

- Gives effect to the directions in the *Victorian Coastal Strategy (2008).*
- Guides integrated conservation and resource development decisions across sectors.
- Increases certainty for management of development and resource use.
- Streamlines and consolidates referral and approval requirements consistent with government policy to reduce regulatory burden.
- Guides development and implementation of coastal and marine related plans, such as park management plans and regional catchment strategies.
- Recognises that all activities currently managed exclusively under the *Fisheries Act 1995* and key earth resources legislation will continue to be managed exclusively under these pieces of legislation and their associated policies and consultative arrangements.
- Enables decisions to be made based on a sound scientific understanding of estuarine and coastal ecosystem functions and the risks and opportunities resulting from climate change and other land and water use practices.

Victorian Marine Plan

The Victorian Marine Plan will include:

- a 'catchments to the sea' approach to recognising the connectivity between oceanic, coastal, estuarine and catchment ecosystem processes and human activities
- a definition of objectives and outcomes at a bioregional level, within an ecosystem-based management framework
- an approach to specify the environmental, social and economic objectives and outcomes for managing each catchment (including its estuary and adjacent coastal area), taking account of the natural, healthy modified, or substantially impacted status of its ecosystems and an explicit and transparent recognition of existing and potential uses and the trade-offs between uses
- a rigorous scientific assessment to identify the impacts of climate change and catchment land and water activities on coastal, estuarine and marine ecosystems, including fisheries and marine protected areas
- an analysis of existing and potential legislative and policy frameworks and instruments to determine their suitability to achieve the specified objectives and outcomes, including means to address current and emerging risks and opportunities
- identification of priority areas including natural assets, marine protected areas, fish habitats and fishing grounds; and priority areas for new industries such as wave energy; and areas of cross-sectoral importance
- a streamlined approach to development approvals
- a review of the development and application of State Environment Protection Policies
- a performance assessment system.

Bunurong Coast. Photo: West Gippsland CMA

Policy

Selected non-designated marine areas will be declared as a Coastal Waters Reserve under the *Crown Land (Reserves) Act 1978* with primary objectives that provide for a diverse range of activities that are compatible with long-term sustainable use. The selection process will involve the identification of areas that require targeted intervention to achieve intended environmental, social and economic objectives, taking account of identified risks, opportunities and trade-offs between uses.

The system of marine protected areas will continue to be comprehensive, adequate and representative, in line with the National System of Marine Protected Areas guidelines. Marine park management plans will take into account the impacts of climate change on estuarine and coastal ecosystems. The management of these parks and interconnected areas will be guided by considerations of ecosystem function and actions that facilitate adaptation.

Coastal and marine planning will accommodate changes in the distribution of habitats and species, particularly those that are expected to occur as a result of climate change. Decision-making tools and market-based instruments will be developed to support land management, land-use planning and investment strategies.

The *Coastal Management Act 1995* will be reformed as part of the broader review of public land legislation, to streamline coast and marine development approval requirements, clarify roles and responsibilities and link with other natural resource management and marine legislation (see 3.5).

Regional and local coastal and marine planning and management arrangements will be streamlined and integrated, including establishing more sustainable and equitable local coastal management arrangements (see 3.2).

Actions

6.5.1 Develop a research program to increase understanding of how climate change will affect coastal and estuarine ecosystem functions and dependent anthropogenic activities

6.5.2 Complete mapping of existing nearshore coastal and marine habitats by 2012

6.5.3 Prepare marine habitat condition assessments and establish further condition monitoring systems taking account of climate change and catchment processes by 2012

6.5.4 Develop a non-statutory management plan for Western Port, modelled on the plan developed for the Gippsland Lakes by 2012

6.5.5 Prepare vulnerability assessments of key coastal, estuarine and marine habitats and ecosystem processes by 2012

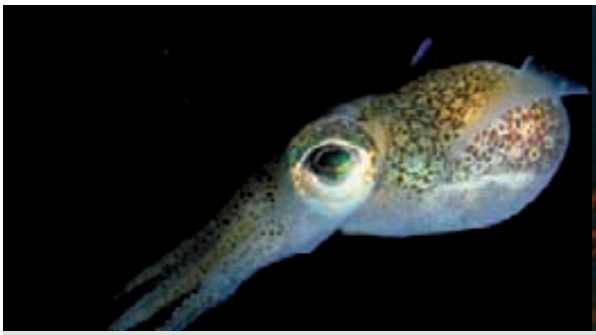
6.5.6 Develop decision-making tools and market-based instruments to address climate change impacts on coastal, estuarine and marine ecosystems by 2013

6.5.7 Review and revise coastal committee of management arrangements by 2012

6.5.8 Develop a Victorian Marine Plan, in response to the Victorian Coastal Strategy by 2014

6.5.9 Assess the implication of climate change for marine protected areas to inform adaptive management plans by 2014

6.5.10 Declare selected non-designated marine areas as a Coastal Waters Reserve by 2014



Southern Dumpling Squid *(Euprymna tasmanica)*.
Photo: Bill Boyle / Museum Victoria

Deep sea sponges.
Photo: Bill Boyle / Museum Victoria

Victoria's marine biodiversity mapping initiative has applied new sonar technology to reveal the ancient lakes, dune fields, lava flows and rare marine flora and fauna hidden under coastal waters.

The project produced the first ever high resolution maps of marine habitats along the State's coasts. This provides information to guide the development of policies that improve and refine the management of marine assets.

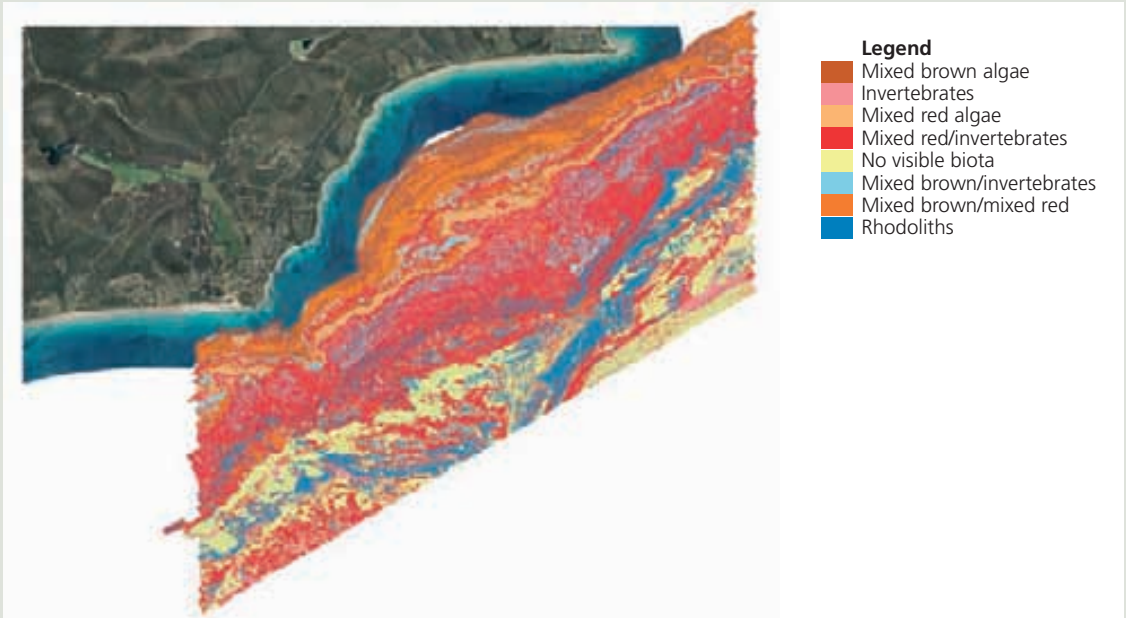
The project was jointly funded by the Victorian and Australian Governments with support from partner organisations including the Cooperative Research Centre for Coastal Zone, Estuary and Waterway Management, Fugro Survey, University of Western Australia, Parks Victoria, Tasmanian Aquaculture and Fisheries Institute, Australian Maritime College, Victorian Partnership for Advanced Computing, National Tidal Centre and the Marine and Coastal Community Network. The mapping was co-ordinated and undertaken by Deakin University.

Marine habitat mapping starts with the use of sonar to get the basic seafloor information. The sonar map shows the shape, depth and texture of the seafloor in great detail. Video surveys are used to ground-truth the sonar maps and check which species are living on the seafloor. The results of the video surveys are used to develop predictive habitat maps. Lastly, the predictive maps are overlaid onto the sonar map to give a final habitat map.

The maps provide a baseline, describing the current distribution of marine habitats. They reveal the location and extent of reefs, sponge gardens, kelp beds, areas of sandy sediment and many other habitats.

The mapping provides important information for the immediate and future management of marine and coastal areas. The maps can be used in a crisis like an oil spill, or to decide if recreational divers and fishers should be permitted to drop boat anchors in a particular area. The maps also have value for coastal navigation and for recreational users of marine waters.

Community-based habitat mapping has recently been conducted at the Merri and Rickett's Point Marine Sanctuaries. Community groups recorded information about habitat types in the sanctuaries against those shown on aerial photographs. The work of verifying the habitat data assists in the management of marine areas and increases community knowledge and awareness.



Marine habitat map, off Aireys Inlet and Anglesea. Deakin University, Warrnambool

Outcome 6.6 Rural and agricultural landscapes contribute to ecosystem resilience and support productive industries

Two thirds of Victoria's land area is privately owned. Most of these landscapes are used for food and fibre production that is an important part of the economy. Rural and agricultural landscapes also host many important biodiversity and ecosystem values.

Private landholders are central to maintaining and improving ecosystem resilience across the Victorian landscape.

Over the last two centuries, increasing areas of land have been used to feed and house a growing population and build a strong export economy. However, the natural environment that underpins the ecosystem services on which we rely has been significantly altered.

Many rural landholders are already providing environmental goods and services from their properties through sustainable land management practices and grassroots community action. Linking these property-scale actions (see 5.5) to achieve landscape-scale outcomes will be needed to deliver ecosystem resilience. Tools such as eFarmer provide a mechanism to plan for this. Further work is needed to clarify how to reward and recognise actions that build resilience.

Better alignment of property-scale action with regional and state natural resource management planning will enable community, industry and government to work towards common goals. Property environmental management planning tools will need to be supported by a simple, co-ordinated reporting mechanism to link with catchment planning and enable landholders to track their progress.

Private land conservation organisations and programs, such as Trust for Nature (Victoria) and Land for Wildlife, provide opportunities for landholders to take voluntary action to improve habitat for native wildlife on their properties. Trust for Nature (Victoria) reports increasing consumer interest in properties with secure environmental values. Rising property prices reflect the amenity of a well-managed bush property. Government has a role in advising private land conservation organisations on priorities for increasing resilience.

Indigenous Protected Areas are part of an Australian Government initiative that supports Indigenous communities to acquire and manage land for conservation, and contributes to the National Reserve System. These areas provide important opportunities for Indigenous people to connect with country and protect land, water and biodiversity outcomes on private land.

Many of Victoria's Landcare and other community-based natural resource management groups are increasingly sophisticated and are already shifting towards landscape-scale projects. The environmental outcomes of these activities will need to be monitored and secured.

Sheep farmer. Photo: DPI

Policy

Rural and agricultural land will be an important part of building ecosystem resilience across the Victorian landscape while maintaining economic growth and productivity.

The Victorian Government recognises the important contribution of farmers and other private land managers to the sustainable management of the Victorian landscape. The Government will continue to support them with practical programs to build ecosystem resilience, improve connectivity in biolinks and maintain ecosystem services in flagship areas.

Spatial planning at state, regional and local levels will assist landholders to ensure that community priorities are well represented in natural resource management planning and investment.

Private land conservation organisations and programs will be encouraged to link into strategic planning processes to build resilience across the landscape.

The Victorian Government will encourage the Australian Government to increase Indigenous Protected Areas in Victoria. These should be linked with flagship areas and biolinks where appropriate.

Community-based natural resource management groups will be supported to link with regional and state planning processes to better align their contribution to strategic outcomes.

Building on community effort, the Victorian Government will better target funding for land, water and biodiversity outcomes in biolinks and flagship areas. Investment in these activities will be underpinned by good science, and based on proposals that offer value for money.

Actions

6.6.1 Invest in the sustainable management of farmlands through tender based approaches (such as BushTender) and community grants (such as Landcare) that improve connectivity and resilience

6.6.2 Review the Land for Wildlife program to determine how it can best be supported in the future to align with Victorian Government priorities for building resilience by 2010

6.6.3 Investigate the use of existing tools such as eFarmer to enable landholders to link their actions to catchment outcomes by 2012

Food production on Bacchus Marsh Rd. Photo: Christian Pearson, Misheye Photography

Outcome 6.7 Urban, peri-urban and green wedge areas host diverse values and resilient ecosystems

Balancing different values and land uses is a key challenge in managing urban, peri-urban and green wedge areas. These areas absorb Victoria's growing population and host many industries.

Despite being highly fragmented, urban, peri-urban and green wedge areas supply many important land, water and biodiversity services. It is important to ensure that ecosystem functions are maintained within the urban environment – for example, micro-climate regulation, water infiltration and runoff control.

Peri-urban areas fall between metropolitan and rural land. They are the non-urban hinterland of Melbourne and Victoria's regional centres, and will shift over time as settlements expand. These areas support a mix of productive and lifestyle land uses, along with a range of services that support cities and towns including water and waste management facilities.

Green wedges are metropolitan areas that lie outside Melbourne's Urban Growth Boundary (UGB). They were declared to protect parts of peri-urban areas from inappropriate development.

Green wedges

Green wedges were created to:

- safeguard agricultural uses and production
- accommodate recreation and tourism
- preserve rural, scenic and open landscapes
- conserve areas of environmental and heritage significance
- provide locations for important service industries that support the function of Melbourne such as airports, waste treatment plants and quarries.

Changing social and economic trends, growing communities and the intensified demand for new housing and industry are increasing the pressure on urban, peri-urban and green wedge areas. The management of these areas needs to reflect their changing nature. Future development should recognise the value of natural assets and biolinks, minimise exposure to flood and fire risk, and support agricultural production. Impacts on native flora and fauna and significant habitat should be minimised. Consideration needs to be given to protecting ecosystem functions and processes, particularly across bays and waterways.

Loss of biodiversity may occur when habitat is fragmented by urbanisation. Retaining important habitat in the urban environment, while managing bushfire risk, poses challenges in the design of cities and urban areas. In some areas the co-location of urban development and biodiversity will not be compatible and limiting urban development will be necessary to ensure important habitats are retained.

An increase in the number of people moving to Melbourne has led to a growing demand for urban land. *Melbourne 2030 (2002)* is a plan for the growth and development of the metropolitan area. It provides a framework for governments to respond to the diverse needs of people who live and work in and around Melbourne, and visitors.

Melbourne@5 million (2008) notes that new communities need to be planned and designed with a number of factors, including biodiversity, in mind. For example, growth in Melbourne's west will be constrained by the significant western plains native grasslands classified as critically endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Metropolitan parklands are key areas for the protection of urban biodiversity, while also providing recreational opportunities. Many urban dwellers have a strong connection to metropolitan parklands and their value needs to be maintained in urban planning and management. As the need for housing increases, new urban parks will be required to support the liveability of developing suburbs. *Linking People and Spaces (2002)* is the Government's strategy to protect, improve and extend Melbourne's metropolitan parklands to serve urban communities, both now and in the future.

Strategic planning processes will be important in building the long-term resilience of ecosystems across urban, peri-urban and green wedge areas. Sustainable settlement strategies, Integrated Strategic Plans, Growth Area Precinct Structure Plans and Green Wedge Management Plans will address sustainable growth requirements and identify specific opportunities and constraints for development in these areas.

Many of Victoria's peri-urban and green wedge areas are in bushfire prone locations. The 2009 Victorian Bushfires Royal Commission is considering the suitability and design of dwellings in bushfire prone areas.

New developments proposed as a result of rural lot subdivision in peri-urban areas pose challenges where these areas are subject to significant bushfire risk, flooding or water availability constraints. The release of new rural zones in 2004 has improved the management of these issues, but careful assessment is still required. Local governments will need better information to effectively assess future settlement patterns and new development applications.

Rural residential development in close proximity to agricultural land can create difficulties between farmers and other residents. Conflict can arise over the spray, dust and noise associated with agricultural activities. Integrated planning processes can assist in preventing these conflicts. Urban residents who purchase semi-rural properties may also require support to improve their knowledge and skills for rural land management. This will be strengthened by improved opportunities for new residents to engage with, or establish, community natural resource management groups.

In June 2009 the Government released *Delivering Melbourne's Newest Sustainable Communities: A Report for Public Comment on the UGB Review*. The Government's objectives are to:

- ensure Melbourne's growth occurs in a sustainable way for addressing future settlements, employment and transport needs of Melbourne
- define a revised UGB to manage the growth of Melbourne's metropolitan urban areas
- identify opportunities for improving environmental outcomes within Melbourne's growth areas and protecting the values of adjoining green wedges including designating permanent grassland reserves in Melbourne's west.

Policy

Important environmental values will be considered in the early stages of developments to enable forward planning and ensure the protection of these values.

The Government will maintain Melbourne's Urban Growth Boundary and consider the timing of future boundary changes on the basis of updated forecasts, the development capacity of existing urban areas, longer-term urban growth issues (including future economic and employment opportunities) and transport investment requirements.

The Victorian Government will identify peri-urban areas that are likely to be required for climate change adaptation or mitigation responses, and ensure development occurs in a way that is sensitive to probable future land use needs.

Development in high risk or sensitive locations in peri-urban areas will be required to accommodate biodiversity values and manage the risks from fire and flood.

Fire risk will be better integrated into planning and development decision-making processes, including the application of the new Australian Standard for Design and Construction of Buildings in Bushfire Prone Areas, the directions in *Living with Fire – Victoria's Bushfire Strategy (2008).* Fire risk issues will continue to be reviewed in light of the findings of the 2009 Victorian Bushfires Royal Commission.

The policies outlined in *Melbourne 2030* will continue to guide decisions on land use, investment and development in green wedge areas.

Local governments will be provided with accurate, up-to-date information to inform strategic planning and management decisions and for use in amending local planning schemes.

New peri-urban residents will be provided with opportunities to develop their land stewardship capacity.

Actions

6.7.1 Undertake ecological-constraint, development-opportunity and risk-assessment analyses to inform regional strategic planning by 2013

6.7.2 Develop improved decision guidelines for areas at high risk from bushfire, flood events or threats to highly significant biodiversity, as part of the urban development process by 2012

6.7.3 Develop guidelines for urban ecological management to assist property owners and local councils by 2013

6.7.4 Review and update *Linking People and Spaces (2002)* in light of revised population and housing growth projections by 2013

Mt Helen. Photo: Christian Pearson, Misheye Photography

Appendices

Appendix 1 Summary of actions

Action		Lead Responsibility	Delivery Partners
Chapter 2	**A new framework for action**		
Outcome 2.2	Assets within flagship areas are managed to maintain ecosystem services		
2.2.1	Articulate state level management objectives and priorities for each of the flagship areas in the Victorian Natural Resource Management Plan by 2010	DSE	DPI, PV, NRCAs
2.2.2	Identify further marine flagship areas and establish management targets and management plans by 2014	DSE	
Outcome 2.3	A system of biolinks strengthens Victoria's ecological connectivity		
2.3.1	Map the functional and connectivity needs of Victoria's species and ecosystems by 2012	DSE	
2.3.2	Identify and map areas within biolinks where ecosystems have natural regenerative capacity by 2012	DSE	ARI, PV
2.3.3	Update the Standards for Revegetation by 2011	DSE	ARI
Chapter 3	**Increasing government effectiveness**		
Outcome 3.1	Victoria has effective and responsive natural resource management arrangements		
3.1.1	Constitute the Victorian Natural Resource & Catchment Council by December 2010	DSE	
3.1.2	Incorporate the roles and functions of the Victorian Coastal Council and the Victorian Environmental Assessment Council into the new Natural Resource and Catchment Council by June 2012	DSE	
3.1.3	Amalgamate Melbourne Water, Port Phillip & Westernport Catchment Management Authority and the Central Coastal Board by June 2011	DSE	
3.1.4	Establish the Natural Resource & Catchment Authorities by June 2011	DSE	
3.1.5	Establish the Office of the Environmental Water Holder by December 2010	DSE	
Outcome 3.2	Decision-making is improved at a regional level		
3.2.1	Clarify the roles and responsibilities of government agencies in natural resource management	DSE	
3.2.2	Assign responsibility for advising on environmental values in regional water planning and decision making processes to Natural Resource & Catchment Authorities by June 2011	DSE	
3.2.3	Release the first Victorian Natural Resource Management Plan by 2010	DSE	PV, NRCAs
3.2.4	Include a planning addendum in each new Regional Catchment Strategy by 2012	DSE	DPCD
3.2.5	Determine governance arrangements for the Traditional Owner Natural Resource Management Collaborative Body by 2010	DSE	DoJ
3.2.6	Provide clear requirements to Natural Resource & Catchment Authorities as part of a strengthened governance framework	DSE	
Outcome 3.3	Investment is targeted to building ecosystem resilience, Victoria's flagship areas and biolinks		
3.3.1	Set the proportion of investment to be allocated towards ecosystem resilience, flagship areas and biolinks for the 2011/12 Victorian Investment Framework round	DSE	
3.3.2	Publish guidelines to assist Victoria's natural resource management agencies in the consistent application of an asset-based approach to guide planning and project development for flagship areas and biolinks by 2011	DSE	DPI, PV, NRCAs
3.3.3	Utilise INFFER and further develop other decision support tools for applying asset-based approaches to planning and investment for flagship areas and biolinks by the 2011/12 Victorian Investment Framework round	DSE	DPI
3.3.4	Provide training and support in the application of INFFER and other decision support tools by 2011	DSE	
Outcome 3.4	Knowledge and information management underpin improved decision-making		
3.4.1	Develop performance indicators to measure effectiveness of integrated knowledge-management by 2010	NRCC	
3.4.2	Identify key data gaps and actions to address them by 2010	DSE	PV, DPI
3.4.3	Prepare data collection standards and protocols to support communities, service delivery agencies and researchers in fit-for-purpose data collection by 2011	DSE	NRCAs, PV, DPI
3.4.4	Develop a common information platform for Natural Resource & Catchment Authorities and other agencies	DSE	NRCAs, PV, DPI
3.4.5	Work with three Traditional Owner groups to identify their traditional knowledge needs by 2011	DSE	AAV, PV

Opposite page - Coastline along the Great Ocean Rd, near Apollo Bay. Photo: Christian Pearson, Misheye Photography

Action		Lead Responsibility	Delivery Partners
3.4.6	Pilot three local Indigenous knowledge hubs, to be managed by Traditional Owners involved in the co-management of public land, for the recording and sharing of local/regional traditional knowledge by 2013	DSE	AAV, PV
3.4.7	Implement an integrated and strategic investment process for research and development in natural resource management by 2010	DSE	DPI
3.4.8	Implement mechanisms to improve knowledge exchange between government policy practitioners and research providers by 2010 and evaluate every three years	DSE	NRCC, NRCAs, DPI
3.4.9	Develop and implement headline indicators with baseline reporting to commence by 2010	DSE	DPI, PV, NRCAs
3.4.10	Establish processes and protocols to inform and govern ongoing applications and systems by 2010	DSE	PV, DPI
3.4.11	Amend legislation so that catchment condition reporting and 'State of the Environment' reporting occur at six yearly intervals	DSE	
3.4.12	Trial opportunities for Indigenous participation in natural resource management monitoring and reporting by 2010	DSE	AAV
Outcome 3.5	Modern, streamlined legislation provides the regulatory foundation for natural resource management in Victoria		
3.5.1	Introduce new natural resource management legislation to Parliament by December 2011	DSE	DPI
3.5.2	Introduce new biodiversity and conservation legislation to Parliament by December 2012	DSE	PV
3.5.3	Introduce consolidated public land legislation by 2014	DSE	DPI, PV
Chapter 4	**Fostering environmental markets and leveraging investment**		
Outcome 4.1	Victorian landholders are rewarded for protecting biodiversity and providing environmental goods and services		
4.1.1	Identify opportunities to apply tenure approaches to peri-urban and coastal landscapes by 2010	DSE	Landholders
Outcome 4.2	New environmental markets drive investment in biodiversity and ecosystem services		
4.2.1	Develop a program to support landholders to package environmental goods and services for sale to investors by 2011	DSE	DPI
4.2.2	Establish an on-farm advisory service to improve landholder capacity to access developing ecosystem markets by providing information and decision-making tools by 2011	DPI	DSE
4.2.3	Prepare a national level discussion paper to identify opportunities to accelerate the development of environmental markets	DSE	DTF, DPC
4.2.4	Establish a short-term taskforce to inform the development of a new business model	RDV, PV	DSE
Outcome 4.3	Land, water and biodiversity outcomes are linked to the biosequestration of carbon		
4.3.1	Design a framework that links reforestation projects under the Carbon Pollution Reduction Scheme with biodiversity and ecosystem markets by 2011	DSE	DPI, DPC, PV
4.3.2	Assess the public land estate to identify areas of land suitable for reforestation projects compliant with national rules	DSE	PV
4.3.3	Amend the *Forestry Rights Act 1996* and consequential legislation to ensure Victoria's system for recognition and transfer of carbon rights is compatible with the framework established for reforestation projects under the Carbon Pollution Reduction Scheme by 2010	DSE	PV
4.3.4	Assess the opportunities for offsetting Victorian Government vehicle fleet emissions through biodiverse plantings and active regeneration, in light of the Carbon Pollution Reduction Scheme by 2011	DSE	DPC, PV
4.3.5	Invest in research to improve understanding of the role of soil carbon	DSE	DSE

Action		Lead Responsibility	Delivery Partners
Outcome 4.4	Information that supports biodiversity outcomes in the carbon market is accessible and widely used		
4.4.1	Invest in the research and development of metrics for the National Carbon Accounting Tool that are appropriate to Victorian landscapes and support investment in biologically diverse plantings	DSE	
4.4.2	Develop a Victorian standard to substantiate claims for consumers investing in biologically diverse reforestation projects by 2012	DSE	
4.4.3	Develop an event-based estimation of carbon stocks on public land to better understand the asset and impacting factors bu 2010	DSE	
Outcome 4.5	Negative environmental impacts of the carbon market are minimised and addressed		
4.5.1	Finalise action 2.20 under *Securing Our Water Future Together (2004)* and imlements its recommendations	DPI	DSE
Outcome 4.6	Increased corporate and philanthropic investment is directed to Victoria's land, water and biodiversity		
4.6.1	Commission one Natural Resource & Catchment Authority to develop the concept of a regional prospectus by 2010	DSE	DSE, PV
4.6.2	Monitor the ongoing work of the Henry Review to assess the implications of its findings for Victoria's land, water and biodiversity outcomes	DTF	DSE
Chapter 5	**Supporting community action**		
Outcome 5.1	All Victorians consider the health of land, water and biodiversity in their daily decision-making		
5.1.1	Prepare a targeted community education program to increase awareness and encourage actions that improve land, water and biodiversity outcomes by 2010	DSE	SV, NGOs, AAV,
5.1.2	Develop a second edition of *Biodiversity Resources for Teachers* by 2010	DSE	
5.1.3	Develop a suite of programs that strengthen land and biodiversity training for existing and new educators by 2013	DEECD	SV
5.1.4	Establish stronger coordination and support arrangements for delivery of the biodiversity module of AuSSI Vic by 2011	SV	DSE, DPI, PV
Outcome 5.2	Indigenous communities are actively involved in the management of Victoria's land, water and biodiversity		
5.2.1	Implement an natural resource management Indigenous employment and development strategy that includes: - traineeships - a cadetship program - the employment of Indigenous staff - a mentoring program to provide support for new Indigenous staff and their supervisors	DSE	PV, DoJ, DPI, AAV, PV, NRCAs
5.2.2	Establish a case management program that links Indigenous natural resource management traineeships to ongoing employment by 2012	DSE	DPI, NRCAs, PV, AAV
Outcome 5.3	Victorians actively improving the natural environment are encouraged, supported and valued		
5.3.1	Develop a five-year strategic action plan that builds on the landcare model to strengthen community participation in natural resource management by 2010	DSE	DPCD, DPI, AAV,
5.3.2	Streamline reporting mechanisms and funding application processes for community-based natural resource management groups by 2010	DSE	DTF
5.3.3	Identify suitable landscapes for the future establishment of conservation management networks, with particular focus on flagship areas and biolinks by 2012	DSE	PV, NGOs

Action		Lead Responsibility	Delivery Partners
Outcome 5.4	Land managers are supported to meet their responsibilities as active stewards of Victoria's land, water and biodiversity		
5.4.1	Provide information to landholders on their responsibilities "to take all reasonable steps to… conserve soil and protect water resources" under the *Catchment and Land Protection Act 1994* by 2010	DPI	DSE
5.4.2	Provide Terms of Reference for the Victorian Competition and Efficiency Commission to review the efficiency and effectiveness of regulation that articulates the environmental responsibilities of land managers by 2011	DTF	DSE, DPI
5.4.3	Clarify the environmental responsibilities of landholders in the new Natural Resource and Catchment Management Bill by 2013, following advice from the Victorian Competition and Efficiency Commission	DSE	DPI
Outcome 5.5	Victoria's farmers are supported to incorporate environmental outcomes into their farm systems		
5.5.1	Make existing property management planning tools available to landholders online by 2011	DPI	DSE
5.5.2	Focus extension, training and technical support to landholders in flagship areas to assist them to develop plans that integrate business, property and environmental considerations	DPI	DSE
5.5.3	Develop an approach to validating the environmental claims of producers, in collaboration with other state and territory governments by 2015	DSE	DPI, Aust and State Govts
Chapter 6	**Building healthy and resilient ecosystems across the landscape**		
Outcome 6.1	Natural resource management strengthens resilience and productivity		
Native vegetation management			
6.1.1.1	Investigate amending the rules under the *Native Vegetation Management Framework* to expand the scope for offsets to be located on public land by 2010	DSE	
6.1.1.2	Examine the use of BushBroker franchises to expand the supply of offsets by 2010	DSE	
6.1.1.3	Investigate the use of payment-in-lieu for small and low-risk native vegetation offsets by 2010	DSE	
6.1.1.4	Simplify the rules for assessing low-risk applications for clearing native vegetation by 2011	DSE	
6.1.1.5	Establish the Volcanic Plains grasslands reserve to Melbourne's west by 2012	DSE	
6.1.1.6	Publish an annual vegetation management summary report with data on permits, offsets and illegal clearing	DSE	LGAs, PV and other public land managers
6.1.1.7	Report on net gain progress as part of the three and six yearly resource condition reports	DSE	NRCAs, LGAs
Water resource management			
6.1.2.1	Complete the development of four regional Sustainable Water Strategies and outline their associated implementation programs by 2010	DSE	NRCAs
6.1.2.2	Clarify objectives for stormwater to improve planning and management, in consultation with local government and industry by 2012	DSE	Water Authorities, LGAs, Industry
Environmental water management			
6.1.3.1	Develop a program of structural works for the efficient delivery of environmental water to priority rivers and wetlands, including potential partnerships with the Australian Government	DSE	
Fire management			
6.1.4.1	Implement a community awareness program about fire management strategies by 2010	DSE	VicRoads
6.1.4.2	Respond to the recommendations of the 2009 Victorian Bushfires Royal Commission	DSE	CFA, PV

Action		Lead Responsibility	Delivery Partners
Soil management			
6.1.5.1	Develop a statement on soil conservation, soil health and dryland salinity by the end of 2011	DSE	DPI
6.1.5.2	Develop an action plan to update modelling tools and farm planning tools to include a more complete range of soil management issues by 2012	DSE	DPI
6.1.5.3	Develop and implement a strategy to capture and retain knowledge on soils and soil management by 2012	DPI	DSE
Invasive species management			
6.1.6.1	Develop the Invasive Plants and Animals Policy Framework by 2010	DPI	DSE, PV
6.1.6.2	Progressively undertake risk assessments covering environmental weeds, freshwater and marine species, pest animals, diseases and pathogens	DPI	DSE, PV
6.1.6.3	Update Victoria's protocols for marine invasive species incursions by 2010	DSE	DPI, PV, NRCAs
Threatened and native species management			
6.1.7.1	Release the renewed Victorian Biodiversity Strategy in the International Year of Biodiversity, 2010	DSE	
6.1.7.2	Implement the Actions for Biodiversity Conservation system including modelling the links between actions and outcomes	DSE	PV
6.1.7.3	Complete the development of the Victorian Biodiversity Atlas by 2011	DSE	
6.1.7.4	Release a Living with Wildlife Strategy, including improved arrangements for wildlife rehabilitation by 2010	DSE	
6.1.7.5	Invest in resilience of threatened species through habitat improvement, including three demonstration projects on landscape-scale management by 2011	DSE	
6.1.7.6	Include revised provisions for Action Statements in the new biodiversity and conservation legislation by 2012	DSE	
Outcome 6.2	Public land is managed as the core of resilient ecosystems		
6.2.1	Develop the legal and policy framework for co-management of public land by Traditional Owners by 2010	DSE	PV, DoJ
6.2.2	Implement a framework for managing Victoria's parks and protected areas that complements the Regional Catchment Strategies and the Victorian Natural Resource Management Plan	DSE, PV	ARI
6.2.3	Develop improved valuation techniques to account for the ecosystem services provided by parks, forests and other public land by 2013	DSE, PV	VicForests
6.2.4	Implement the Healthy Parks Healthy People campaign by 2010	PV	VicForests
6.2.5	Establish stewardship agreements between public land managers and interested adjoining private land managers by 2013	DSE	DPI, PV
6.2.6	Develop a timetable for the completion of public land management plans that outline Government's local public land management priorities by 2012	DSE	PV
Outcome 6.3	Rivers, wetlands and estuaries are managed so they continue to provide ecosystem services		
6.3.1	Develop an integrated Victorian Strategy for Healthy Rivers, Estuaries and Wetlands by 2011	DSE	NRCC, VCC
6.3.2	Produce complementary regional strategies for Healthy Rivers, Estuaries and Wetlands by 2012	NRCAs	DSE, NRCC, VCC
6.3.3	Update the existing prioritisation system including identification of high conservation value aquatic ecosystems by 2011	DSE	NRCAs, VCC
6.3.4	Complete the third Index of Stream Condition assessment by 2010	DSE	NRCAs
6.3.5	Establish a benchmark for Victoria's wetlands and estuaries using indices of condition by 2011	DSE	NRCAs

Action		Lead Responsibility	Delivery Partners
Outcome 6.4	Riparian lands protect waterways and increase productivity, connectivity and amenity		
6.4.1	Complete the current review of licensing arrangements for high priority Crown frontages, in consultation with licensees, by 2010	DSE	
6.4.2	Reform administrative and legislative arrangements to enable enhanced riparian land management by 2014	DSE	
6.4.3	Identify high-priority Crown frontages that are occupied but not licensed. Negotiate management agreements and license these areas by 2014	DSE	
6.4.4	Complete the Riparian Management Framework that incorporates standards for managing riparian lands by 2014	DSE	
6.4.5	Bring all riparian lands up to the new management standards with robust licensee or landholder agreements in place by 2029	DSE	
Outcome 6.5	Coastal and marine environments are healthy and productive		
6.5.1	Develop a research program to increase understanding of how climate change will affect coastal and estuarine ecosystem functions and dependent anthropogenic activities	DPI	DSE, PV
6.5.2	Complete mapping of existing nearshore coastal and marine habitats by 2012	DSE	NRCAs, PV
6.5.3	Prepare marine habitat condition assessments and establish further condition monitoring systems taking account of climate change and catchment processes by 2012	DSE	NRCAs, PV
6.5.4	Develop a non-statutory management plan for Western Port, modelled on the plan developed for the Gippsland Lakes by 2012	DSE	DPI, NRCAs, PV
6.5.5	Prepare vulnerability assessments of key coastal, estuarine and marine habitats and ecosystem processes by 2012	DSE	DPI
6.5.6	Develop decision-making tools and market-based instruments to address climate change impacts on coastal, estuarine and marine ecosystems by 2013	DSE	NRCAs, DPCD, Coastal LGAs
6.5.7	Review and revise coastal committee of management arrangements by 2012	DSE	
6.5.8	Develop a Victorian Marine Plan, in response to the Victorian Coastal Strategy by 2014	DSE	DPI, DOT, EPA, NRCAs, PV
6.5.9	Assess the implication of climate change for marine protected areas to inform adaptive management plans by 2014	DSE	DPI, PV
6.5.10	Declare selected non-designated marine areas as a Coastal Waters Reserve by 2014	DSE	DPI
Outcome 6.6	Rural and agricultural landscapes contribute to ecosystem resilience and support productive industries		
6.6.1	Invest in the sustainable management of farmlands through tender based approaches (such as BushTender) and community grants (such as Landcare) that improve connectivity and resilience	DSE	DPI
6.6.2	Review the Land for Wildlife program to determine how it can best be supported in the future to align with Victorian Government priorities for building resilience by 2010	DSE	DSE
6.6.3	Investigate the use of existing tools such as eFarmer to enable landholders to link their actions to catchment outcomes by 2012	DSE	DPI
Outcome 6.7	Urban, peri-urban and green wedge areas host diverse values and resilient ecosystems		
6.7.1	Undertake ecological-constraint, development-opportunity and risk-assessment analyses to inform regional strategic planning by 2013	DPCD	DSE, RDV
6.7.2	Develop improved decision guidelines for areas at high risk from bushfire, flood events or threats to highly significant biodiversity, as part of the urban development process by 2012	DSE	DPCD
6.7.3	Develop guidelines for urban ecological management to assist property owners and local councils by 2013	DSE	DPCD
6.7.4	Review and update *Linking People and Spaces (2002)* in light of revised population and housing growth projections by 2013	DSE	DPCD, PV

Appendix 2 Summary of consultation process and key themes

Stakeholder and community consultation played an integral part of the Land and Biodiversity White Paper development process. It provided valuable input and debate which informed the direction, policies and actions in the White Paper. The consultation process involved ongoing and regular meetings with key stakeholders and scientists, two twelve week public consultation phases and a targeted consultation phase that focused on issues specific to Indigenous Victorians.

A wide cross-section of the community participated in the White Paper consultation process including community conservation groups, Indigenous peoples, farmers, industry groups, local government, non-governmental organisations, state government agencies, natural resource managers, academics and other members of the general public.

Ongoing Consultation

A Scientific Reference Group and the Stakeholder Reference Group were set up as part of the White Paper's governance arrangements. These Groups played an important role in providing ongoing advice during the White Paper's development. For further details about membership of these groups see Appendix 3.

The Scientific Reference Group, chaired by Sir Gustav Nossal AC, CBE provided advice on the interpretation of science and ensured that policy was underpinned by the best scientific knowledge available.

The Stakeholder Reference Group, chaired by Mick Murphy OAM, consisted of representatives from 26 key community, industry and government bodies. The group acted as a testing ground for ideas and issues linked to the development of the White Paper, provided feedback on stakeholder and community engagement and acted as a conduit for information on the White Paper process to relevant stakeholder organisations.

Consultation Paper phase (April – June 2007)

The White Paper consultation process began with the release of the Consultation Paper, which posed a number of questions to the community regarding the future of land, water and biodiversity management in Victoria. The community responded by sending in over 360 submissions. The content of the submissions was analysed and collated into reports. This data informed the drafting of the Green Paper.

Green Paper phase (April – June 2008)

A comprehensive consultation process was undertaken after the Green Paper was released. The Green Paper outlined the nature and scope of the land, water and biodiversity problems and policy issues faced by Victoria in a time of climate change and proposed approaches to address them. The consultation sought feedback from the community on these suggested approaches through a call for submissions and community workshops across regional Victoria.

Submissions could be made electronically on the Green Paper website or by email or post. Of the 1400 submissions received, 531 were detailed written submissions and 888 were proforma submissions (703 from Victoria Naturally and 185 from Wilderness Society).

Thirteen facilitated workshops were held across Victoria. The aim of the workshops was to consult the broader community on the options presented in the Green Paper and provide an opportunity for people to comment on the Green Paper without writing a formal submission. There were 636 participants at the community workshops, including just over 70 government and agency staff. Of the workshop attendees, 148 also made submissions.

Data from the submissions and the workshops was analysed and collated according to key themes and used to inform the policy development for the White Paper

Major Themes from Green Paper Consultation

The major issues raised through community consultation are summarised below against the chapters of the White Paper where they are addressed.

New framework for action

- Support for a sophisticated approach to increasing connectivity in the landscape
- Calls for medium and long-term processes to manage the development of Biolinks
- Calls for government to make its priorities for natural resource management clear

Increasing Government effectiveness

- Support for better definition of the roles and responsibilities of government agencies including departments and statutory bodies
- Calls for better coordination across agencies at state, catchment and local levels, including greater consistency of investment, policy and planning between the various agencies
- Support for addressing gaps in policy and legislation
- Calls for better integration between Catchment Management Authorities and Regional Coastal Boards
- Concern about the strength and resource capacity of some agencies, particularly local government, to deliver on environmental planning responsibilities related to the protection of native vegetation
- Support for water strategies that are innovative and measurable, that include groundwater and are backed by legislation
- Calls for more research into areas where significant knowledge gaps exist
- Calls for data and information to be more accessible to the community
- Support for streamlining and simplifying monitoring and reporting arrangements across agencies
- Mixed views regarding the selection of the proposed headline indicators, what they will measure and how they will be communicated.

Fostering environmental markets and leveraging investment

- Mixed views regarding the effectiveness of market-based instruments in different circumstances
- Support for continued use of a range of other non market-based tools
- Support for mechanisms that encourage private investment that aligns with government priorities
- Mixed views regarding ways to increase the benefits and avoid the negative impacts of an emissions trading scheme on land, water and biodiversity and the demand for biodiverse plantings.

Supporting community action

- Calls for more government assistance, recognition and long-term resourcing for community groups and volunteers
- Support for improving the integration of state and local priorities in order to better coordinate volunteer and community group activities
- Support for encouraging environmental benefits on farms through voluntary and regulatory mechanisms
- Calls for an education and awareness raising campaign for landholders and the general community that communicates value of biodiversity, ecosystem services and sustainable living and that encourages participation in natural resource management and conservation activities
- Concern that the current legislative responsibilities of landholders are unclear and poorly defined, and communicated
- Support for investigating opportunities to improve biodiversity and ecosystem condition within urban and peri-urban areas

Building healthy and resilient ecosystems

- Support for greater protection of riparian areas through increased environmental flows and better land management
- Mixed views regarding increased planned burning, the robustness of the science that underpins burning regimes and the gaps in our understanding of the impact that fire has on species and ecosystems
- Support for more integrated management of coastal, marine and aquatic ecosystems
- Support for restoration of wetlands and riparian zones, particularly for their role in ecological connectivity
- Support for more resources for public land management
- Mixed views regarding the approach for managing threatened species and the pressures they face under climate change
- Support for an increased focus on prevention in pests and weeds management
- Concern about ongoing, incremental loss of native vegetation and demands for stronger enforcement and compliance and better protection measures

Indigenous Consultation phase (August - October 2008)

Twelve workshops were held across Victoria to inform the development of the White Paper on issues specific to Indigenous Victorians. The process was undertaken in partnership with the Victorian Traditional Owner Land Justice Group (VTOLJG).

Two Indigenous consultants were appointed to facilitate the consultation and a nominee from the VTOLJG assisted in identifying the Traditional Owner groups to be consulted. Ninety people attended these workshops and individual written responses were submitted by some who were not able to attend. The meetings were attended by 14 different Victorian Traditional Owner Groups, and other Indigenous people.

Major Themes from Indigenous Consultation

The major themes expressed by members of the Indigenous community were:

- Support for formally involving Indigenous people in all areas of natural resource management to enable a connection with country
- Support for improving the capacity of Traditional Owners with long-term resourcing and increasing involvement in natural resource management
- Calls for a greater recognition of the role of Traditional Owners in speaking for country and for being the first point of contact for government for Indigenous consultation
- Calls for government support to Traditional Owners to consolidate and conserve their knowledge, particularly within their own groups and to contribute to land, fire and biodiversity management more generally
- The need for improved government engagement processes with Traditional Owners.

Other Consultation

Other forms of consultation that informed the policy development for the White Paper included a series of panel hearings, independent forums and targeted roundtable discussions.

Further Information on the Consultation Process

To find out more about the consultation process and view submissions, workshop summaries, reports and analysis please visit the DSE website www.dse.vic.gov.au/landwhitepaper, click "What you've said" and follow the links.

Appendix 3 Members of the White Paper Reference Groups

Members of the Scientific Reference Group

Sir Gustav Nossal
DSE Chief Scientist

Prof. Barry Hart
Water Studies Centre,
Monash University

Prof. Ralph Mac Nally
Australian Centre for Biodiversity,
Monash University

Dr. Ruth Beilin
Faculty of Land and Food Resources,
University of Melbourne

Prof. Mark Burgman
Australian Centre of Excellence for Risk Analysis,
University of Melbourne

Prof. Ary Hoffman
Centre for Environmental Stress and Adaptation Research,
University of Melbourne

Members of the Stakeholder Reference Group

Alpine Resorts Co-ordinating Council

Australian Conservation Foundation

Catchment Management Authority Chairs Forum

Community Landcare

Environmental Management System State Steering committee

Environmental Protection Agency, Victoria

Environment Victoria

Gippsland Private Forestry

Grains Research and Development Corporation

Greening Australia

Minerals Council of Australia – Victorian Division

Municipal Association Victoria

Public Land Council

Traditional Owners Land Justice Group

Trust for Nature (Victoria)

Urban Development Institute of Australia

Victorian Employer's Chamber of Commerce and Industry

Victorian Association of Forest Industries

Victorian Catchment Management Council

Victorian Coastal Council

Victorian Environmental Assessment Council

Victorian Farmers Federation

Victorian National Parks Association

Victoria Naturally Alliance

Victorian Rural Fire Brigade Association / Country Fire Authority

Victorian Water Trust Advisory Committee

Further Information

For further information about the two reference groups including biographies and website links please go to www.dse.vic.gov.au/landwhitepaper and click "Governance" and follow the links.

Appendix 4 Ecological processes, stocks and flows

The interaction and flow of species and ecological processes needs to be sustained through time and space. This entails restoration and maintenance of the flows within and between ecosystems. This is central to the task of building ecosystem resilience, allowing ecosystems to adapt and self-organise as circumstances, including climatic factors, change.

Examples of ecological processes that are essential to all life, including humans and their wellbeing, include nutrient cycling, flows of water, dispersal of animals and seeds, local adaptation by species to changing climatic conditions, disturbance regimes associated with fires and flooding, and interactions between soils, plants and animals such as pollination, decomposition, predation and competition.[1]

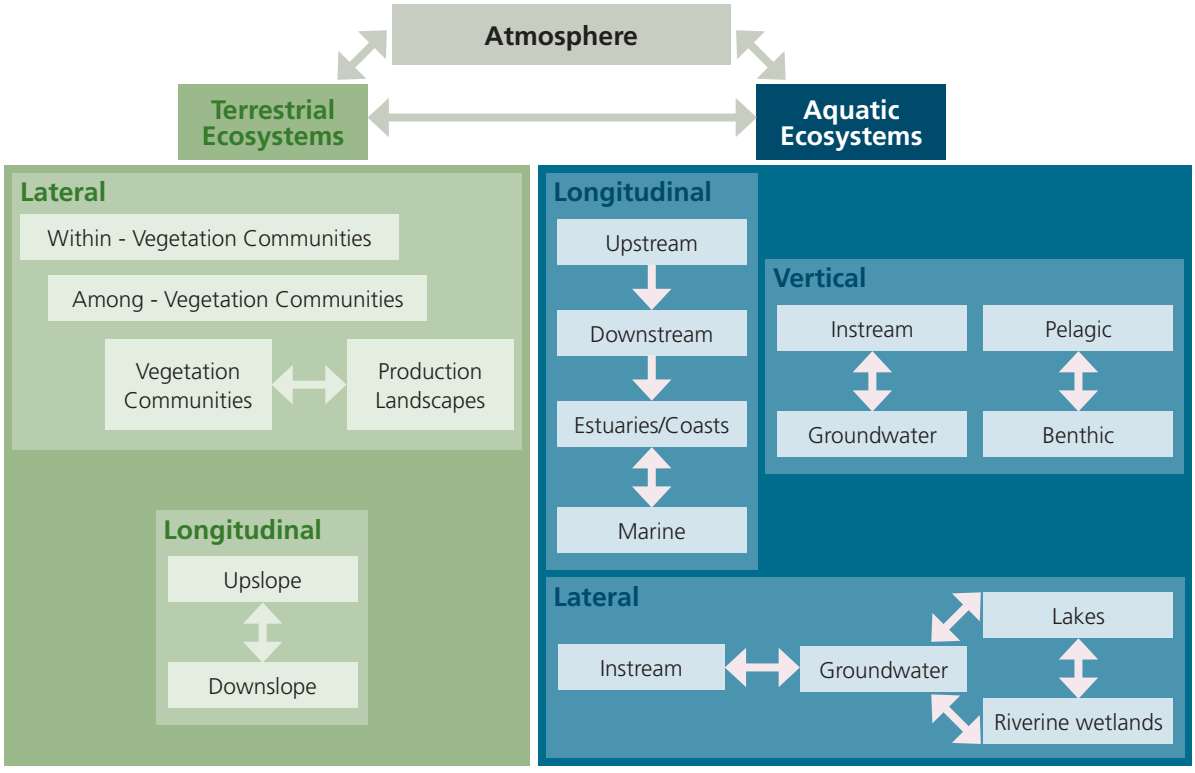
Grasping the concept of ecosystem resilience means understanding that ecosystems have and will always change, and that the coming decades will see particularly rapid environmental change. Understanding and accommodating the need for species, genes, nutrients and other elements of ecosystems (ecological stocks) to flow will be crucial. These flows will need to occur across geographic space (as with dispersal of spores and pollen), along climatic and environmental gradients (as with movement of fauna towards cooler, higher altitude areas), as well as through time (as with the build up and removal of biomass, or with the waxing and waning of population sizes). Figure A4.1 describes the major stocks and flows important to the functioning and resilience of ecosystems.

Ecological processes operate at multiple geographic scales, including the local scale (such as the dispersal of some insect species within particular vegetation communities) and the landscape scale. Ecological flow pathways across catchments, landscapes and seascapes are multi-faceted and interacting. The many relationships between major flow pathways (Figure A4.2) underline the importance of taking an integrated approach to management of land and biodiversity, including at a landscape scale.

Figure A4.1 - Characterisation of the main stocks of ecological importance and their spatial and temporal flows

Stocks	Temporal flows *(in situ)*	Spatial flows
Vegetation	Primary production Decomposition Metabolism Vegetation maturation Vegetation senescence	Litter fall Ash deposition
Animals	Mortality Natality Metabolism	Nomadism Dispersal Migration
Microbes/fungi	Biomass change Metabolism	Spores (aeolian, aquatic) Biovectors
Genes	Mutation Selection Population size	Gene flow Reproductive isolation
Water	Evapotranspiration Precipitation Infiltration	Land-water exchange Among-aquatic system elements Currents (marine)
Soils (inorganic component)	Soil chemistry change Soil structure change	Erosion flux (wind, aquatic)
Carbon Dioxide (CO_2)	Respiration Photosynthesis Burning	Animal movements Ash transport Land-water exchange
Nitrogen (N), Phosphorus (P)	Soil mineralization Denitrification	Land-water exchange

Figure A4.2 - Relationships of major flow pathways across catchments and landscapes, relating the stocks and flows in Figure A4.1



Appendix 5 Climate change impacts in Australia

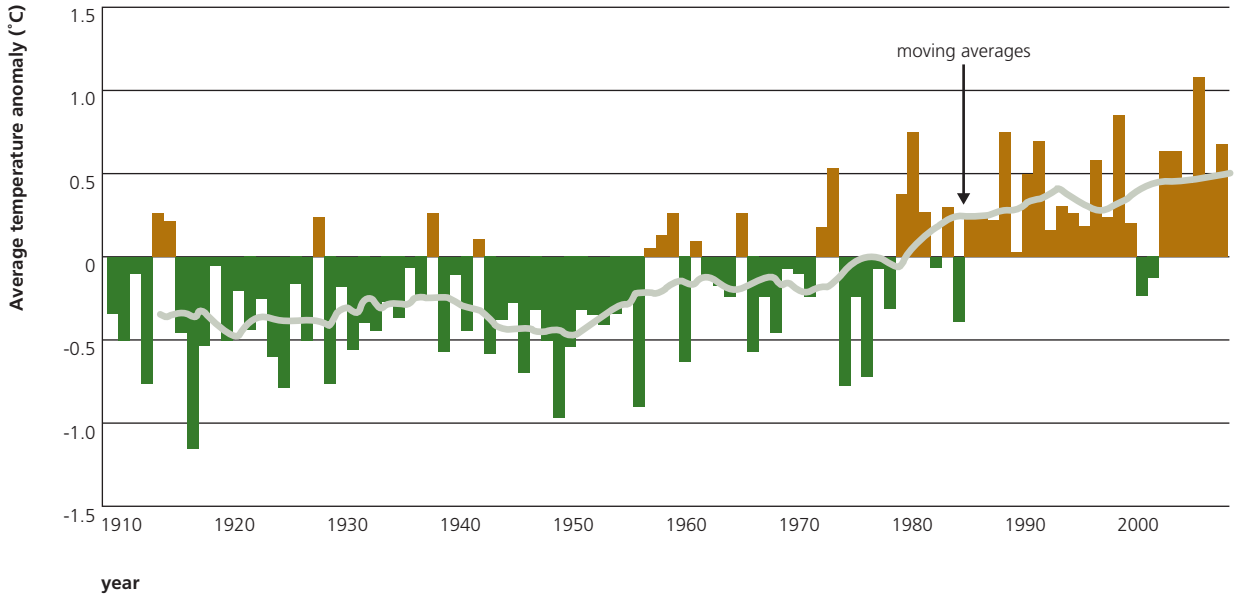
Changes in Australia's climate and its effects on human and natural systems are observable already. The magnitude of the impacts will likely grow as the climate continues to change. There is a clear pattern of more frequent and severe droughts and more extreme weather events. Most scientists now agree that these events are linked to climate change. Changes to both temperature and rainfall patterns against long-term averages are clearly observable as depicted below.

Figure A5.1 shows that the annual average temperature in Australia has increased by 0.9^{0}C since 1910.[2] Eleven of the past twelve years rank among the twelve warmest years in Australia since records began and we have experienced warmer than average mean annual temperatures for 16 of the past 18 years.[3]

Figure A5.2 shows that the warming trend since the middle of last century has not been uniform across the country. In south-eastern Australia including Victoria, average maximum temperatures have increased, resulting in hotter droughts. This in turn affects rainfall, evaporation and, more generally, water availability for human use.

By 2030, annual average temperature over Australia is expected to be around 1^{0}C above 1990 levels. To place this change in perspective, a 1^{0}C rise in temperature may lead to a 15 per cent reduction in stream flow in the Murray-Darling Basin due to factors such as increased evaporation.[4]

Figure A5.1 - Australian annual mean temperature anomalies



Note: The data shows temperature differences from the 1961–90 average. The black line shows 11-year running averages. Source: Bureau of Meteorology, Prepared for R Garnaut, The Garnaut Climate Change Review: Final report, Cambridge University Press, 2008.

From 1900 to the present, exceptionally hot years were recorded on average once every 22 years. The latest climate projections indicate that comparably hot years will occur every one to two years for the period 2010 to 2040.[5]

Since the 1950s, Australia has experienced major change in rainfall patterns, with large geographic variation (Figure A5.3). North-western Australia has seen a significant increase in annual rainfall, whereas most of the eastern seaboard and south-western Australia have seen a decrease.[6] There has been both an increase in exceptionally dry years and a near absence of very wet years, giving rise to drier soils and decreased river and dam inflows.

In 2009, Melbourne entered autumn with water storages at their lowest levels since the Thomson Dam was constructed in 1984. Over summer the city's water storages dropped almost 56 billion litres, with streamflows into the water storages recorded at 14.4% below the long-term summer average. All of Victoria's water storages continue to be low.

Figure A5.2 - Trend in annual mean temperature, 1950 – 2008, °C per decade

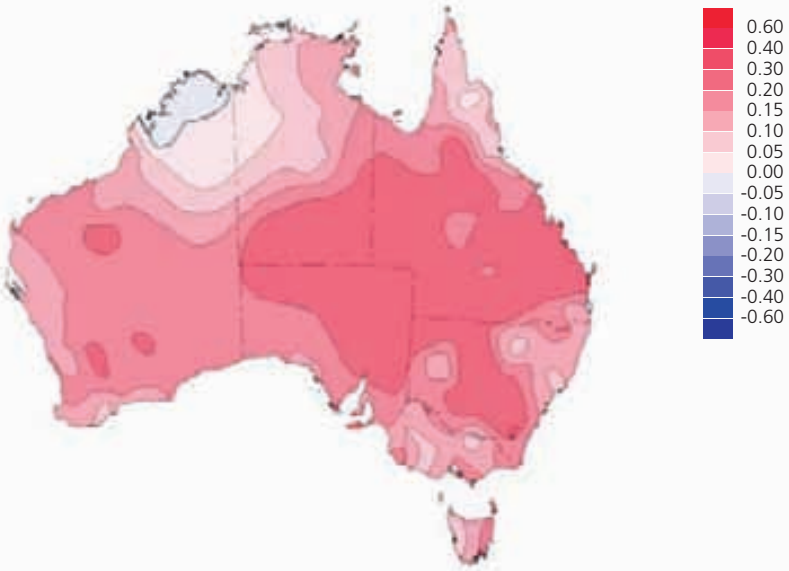
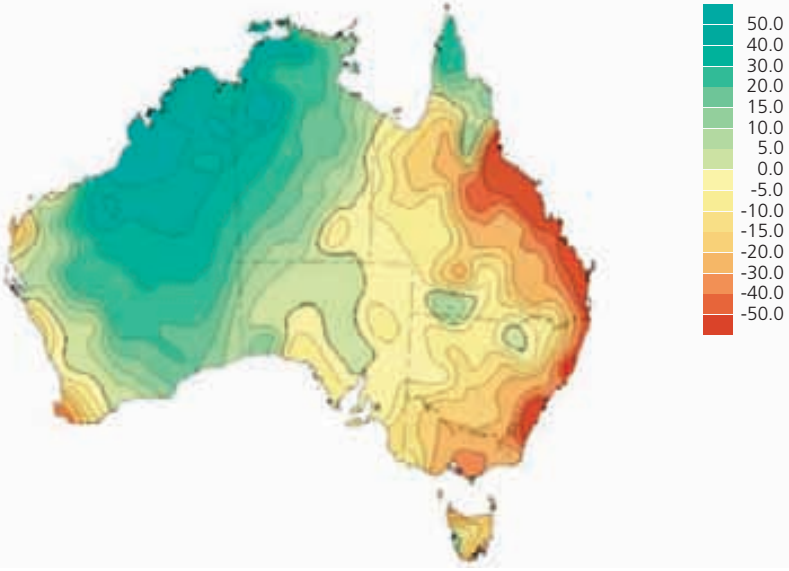


Figure A5.3 - Trend in annual total rainfall, 1950 – 2008, mm per decade



Appendix 6 Identifying flagship areas

Victoria's flagship areas are based on aggregations of ecological, social and economic values. Ecological values reflect the provision of ecosystem services, which underpin the identified economic and social values of the flagship areas.

To determine the flagship areas a range of criteria were agreed and refined by the White Paper Scientific Reference Group (see Table A6.1). The criteria were intended to explicitly and transparently specify how flagship areas for consideration should be identified and evaluated. Other technical inputs and a series of maps (see Figures A6.1 - A6.9) were also used as part of the process and assessed against the criteria.

Table A6.1 - Criteria for determining flagship areas

Ecological value
Rarity – the extent to which the area: - includes an outstanding example of a rare or threatened Victorian ecosystem - provides critical habitat for significant populations of endangered or threatened Victorian species - exhibits rare or unusual geomorphologic features and/or processes
Diversity – the extent to which the area: - supports a large diversity of ecosystems, communities or species
Condition – the extent to which the area: - contains ecosystems in natural or near-natural condition with a low degree of fragmentation and disturbance
Other – the extent to which the area: - provides critical habitat for unusually large numbers of a particular species (significant % of total Victorian population) - provides an important refuge in times of stress

Economic value
Food and fibre (productivity) – the value/significance of the area's: - contribution to the regional economy - contribution to the state economy
Other natural resources (productivity) – the value/significance of the area's: - contribution to the regional economy - contribution to the state economy
Tourism – the value/significance of the area's: - contribution to the regional economy - contribution to the state economy

Social value
The extent to which the area is valued for its: - Indigenous and cultural heritage values - Aesthetics - Recreational opportunities

Figure A6.1 - Bioregions of Victoria

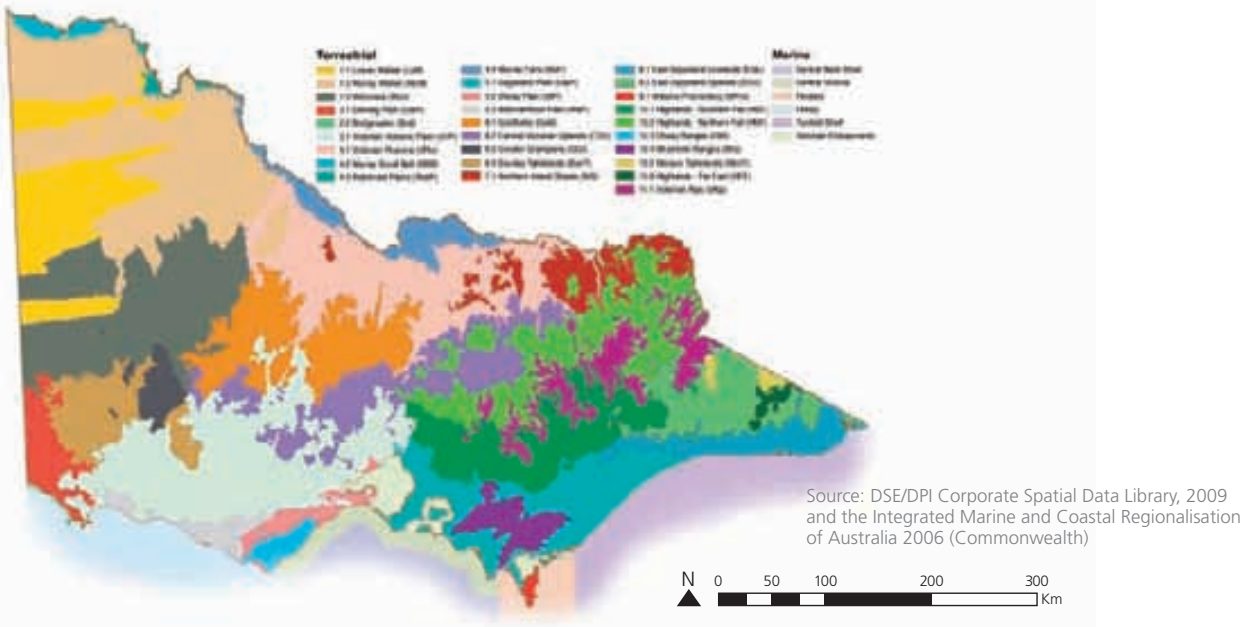
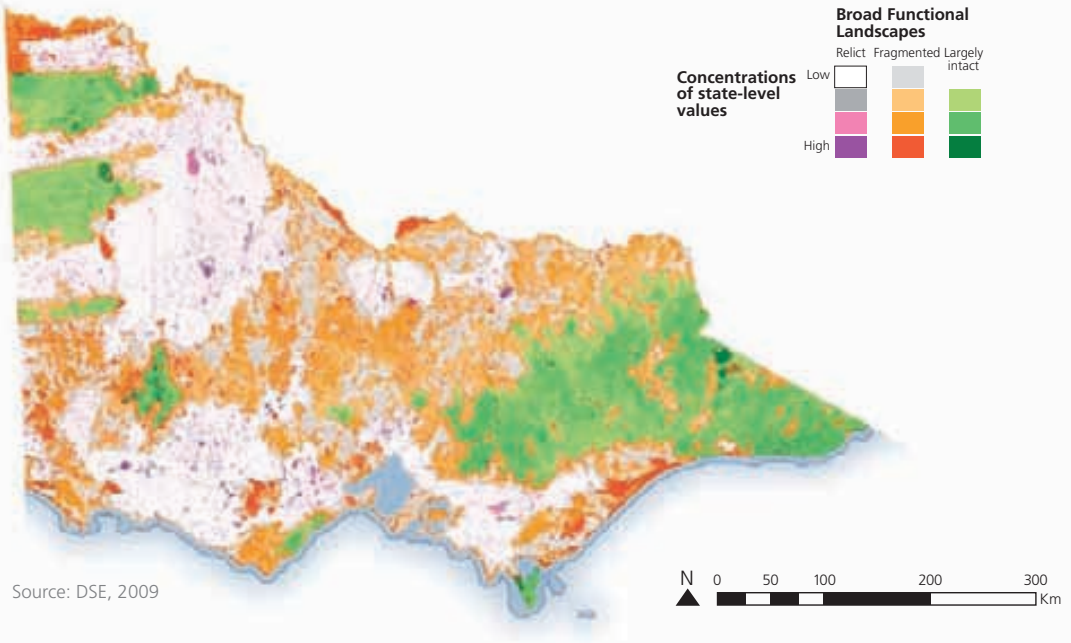


Figure A6.1 illustrates the 28 terrestrial bioregions of Victoria and the six marine bioregions covering Victorian coastal waters and adjacent areas. The bioregions are based on patterns of ecological characteristics and underlying environmental features.

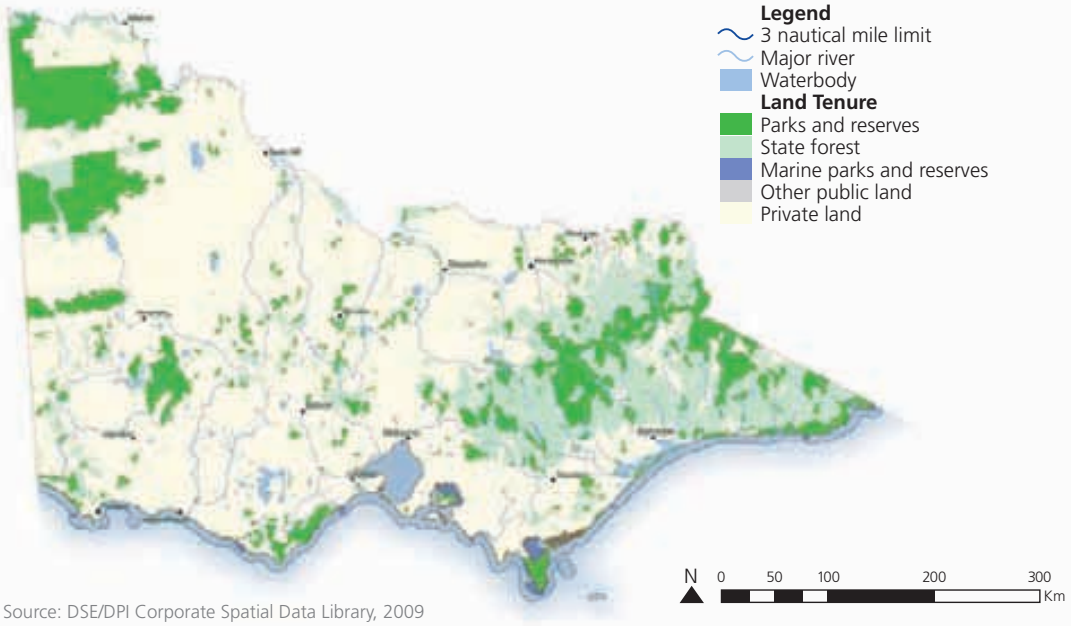
Figure A6.2 - Biodiversity values



Source: DSE, 2009

Figure A6.2 provides an overview of the distribution of biodiversity values based on naturalness (ranging from relict to largely intact) and level of threat (concentrations of threatened species and vegetation types).

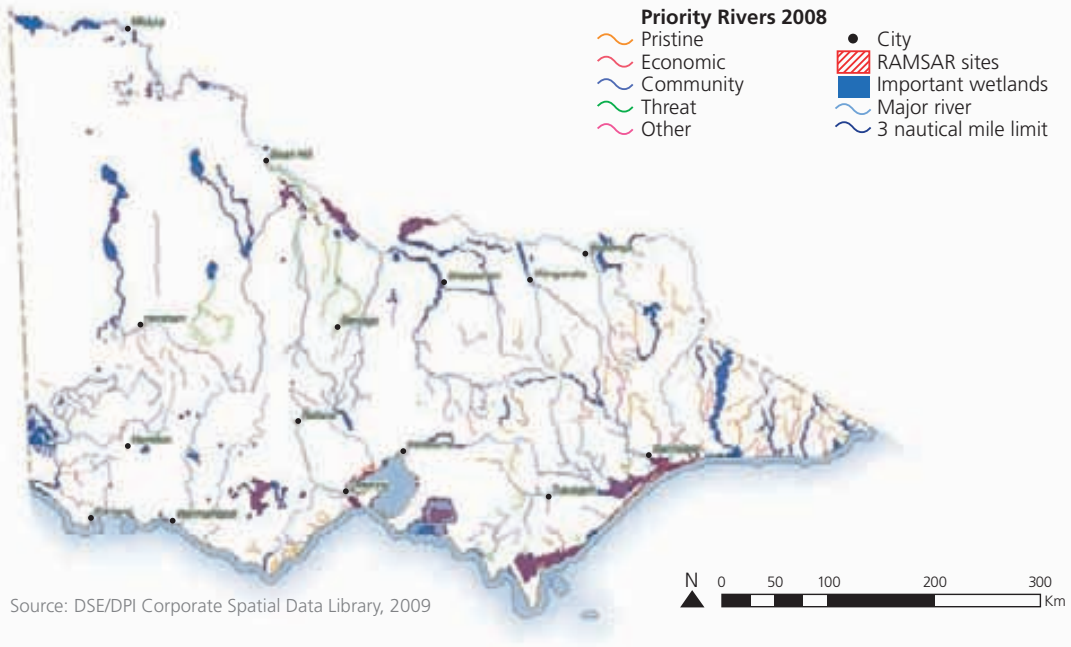
Figure A6.3 - Land tenure in Victoria



Source: DSE/DPI Corporate Spatial Data Library, 2009

Figure A6.3 shows areas of private and public land in Victoria, including marine parks, ranging from relatively undisturbed areas to mixed patterns of use containing valuable terrestrial vegetation. All of these areas provide a range of ecosystem services.

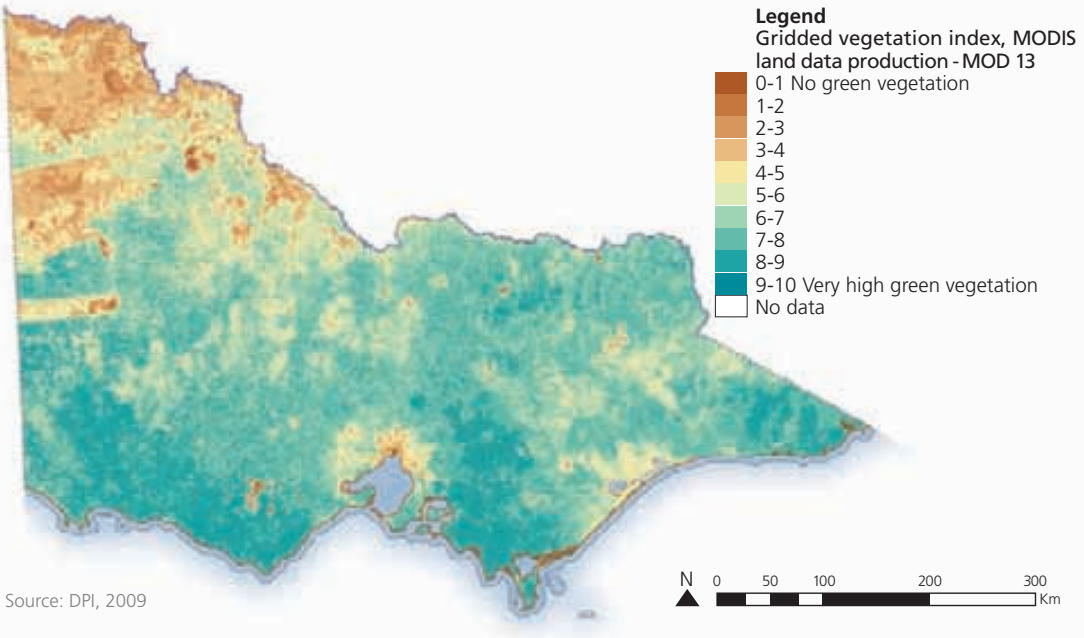
Figure A6.4 - Important wetlands and priority rivers in Victoria



Source: DSE/DPI Corporate Spatial Data Library, 2009

Figure A6.4 shows priority rivers classified according to their key values (e.g. community, economic) as well as important wetlands, including Ramsar sites.

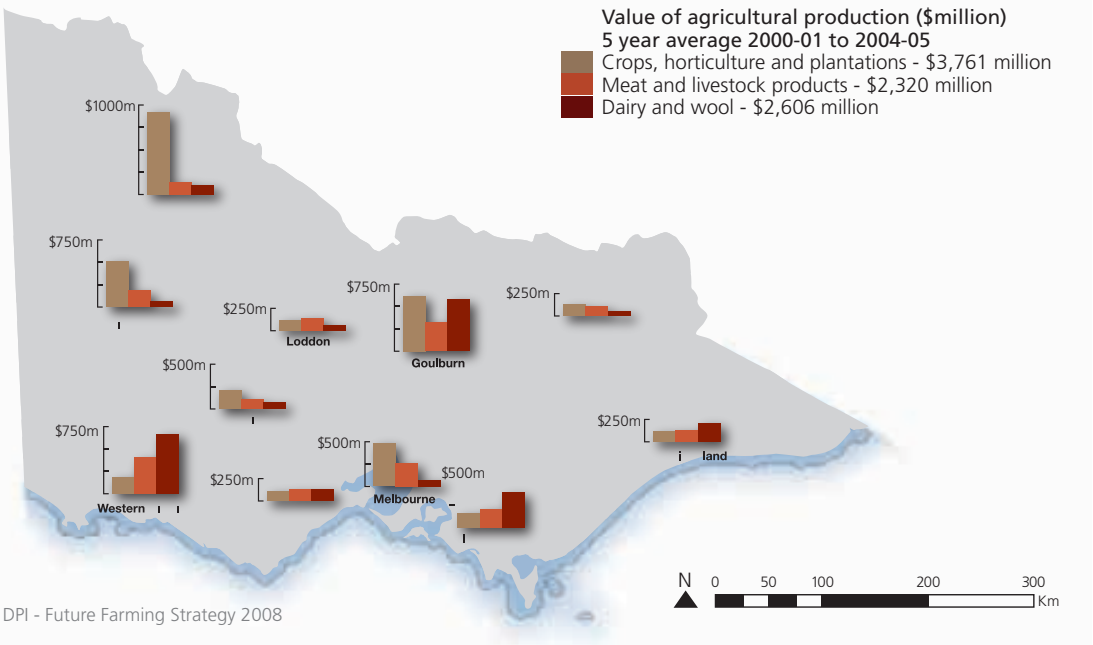
Figure A6.5 - Principal plant production in Victoria



Source: DPI, 2009

Figure A6.5 shows the production of green vegetation - largely a function of sunlight, nutrients and water availability. This indicates the productive potential of both public and private land.

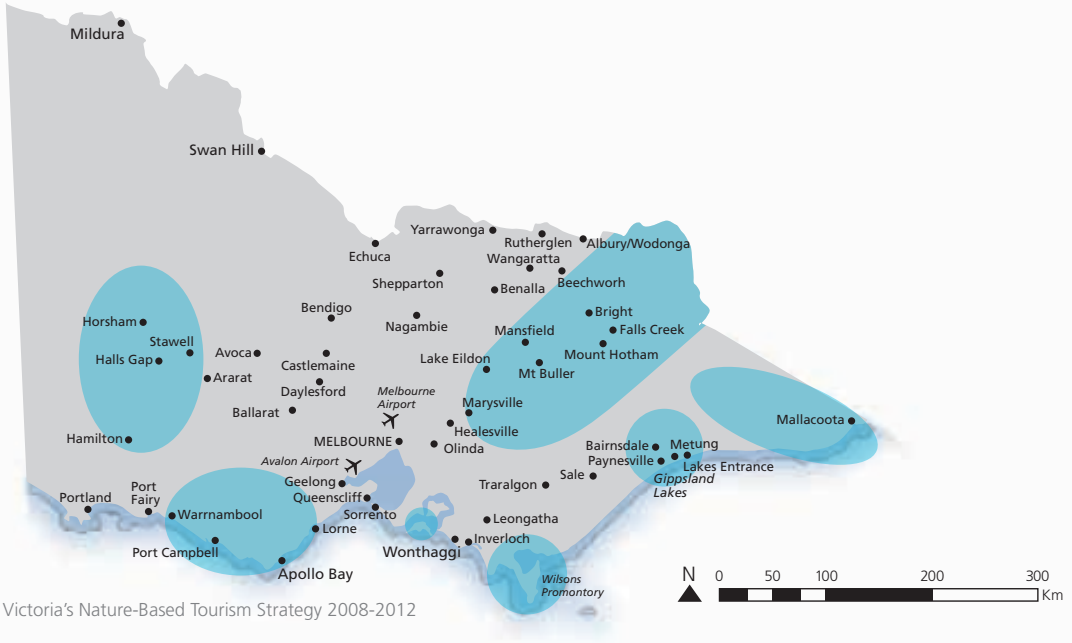
Figure A6.6 - Broad agricultural landscapes of Victoria



DPI - Future Farming Strategy 2008

Figure A6.6 provides the five-year averages of the value of agricultural production in Victoria according to sector.

Figure A6.7 - Nature-based tourism in Victoria – major project clusters



Victoria's Nature-Based Tourism Strategy 2008-2012

Figure 6.7 is a broad-based representation of the priority areas (known as 'clusters') that *Victoria's Nature-based Tourism Strategy 2008-2012* has identified for major projects and product development in the industry.

Figure A6.8 - Victorian cultural heritage

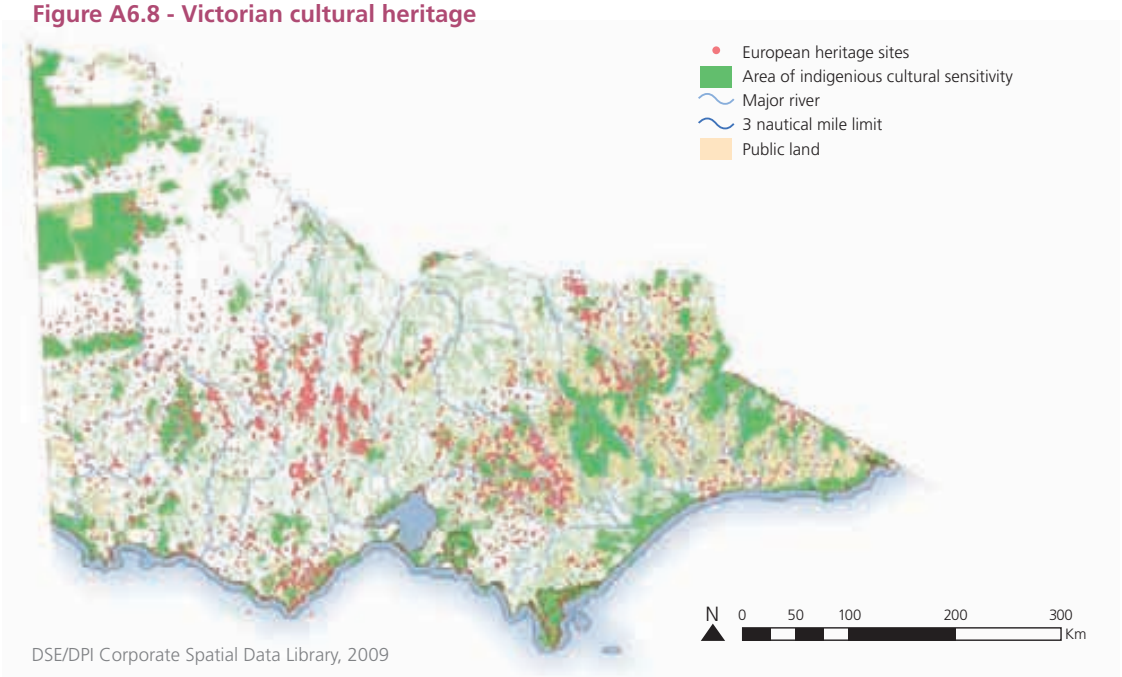


Figure A6.8 shows Indigenous and non-Indigenous cultural heritage. Indigenous heritage sites are very broadly represented, as many of the specific locations are confidential. Non-Indigenous heritage locations are represented in point form. There is a strong alignment of identified Indigenous heritage with rivers and protected areas (due to their relatively undisturbed state).

Figure A6.9 - Social landscapes of rural Victoria

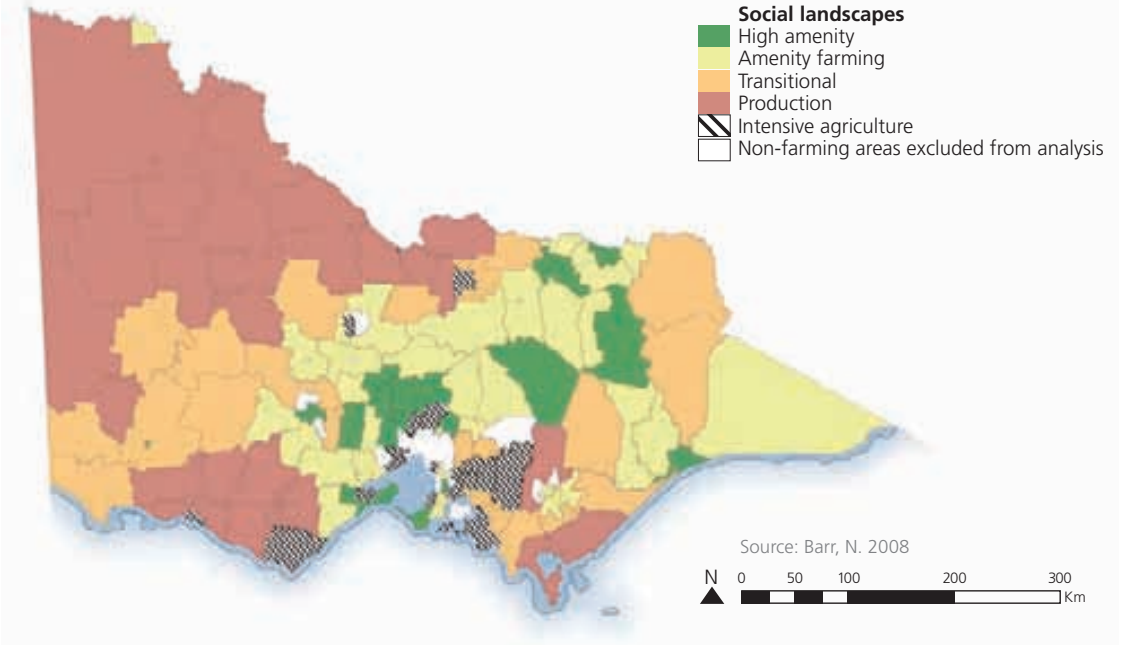
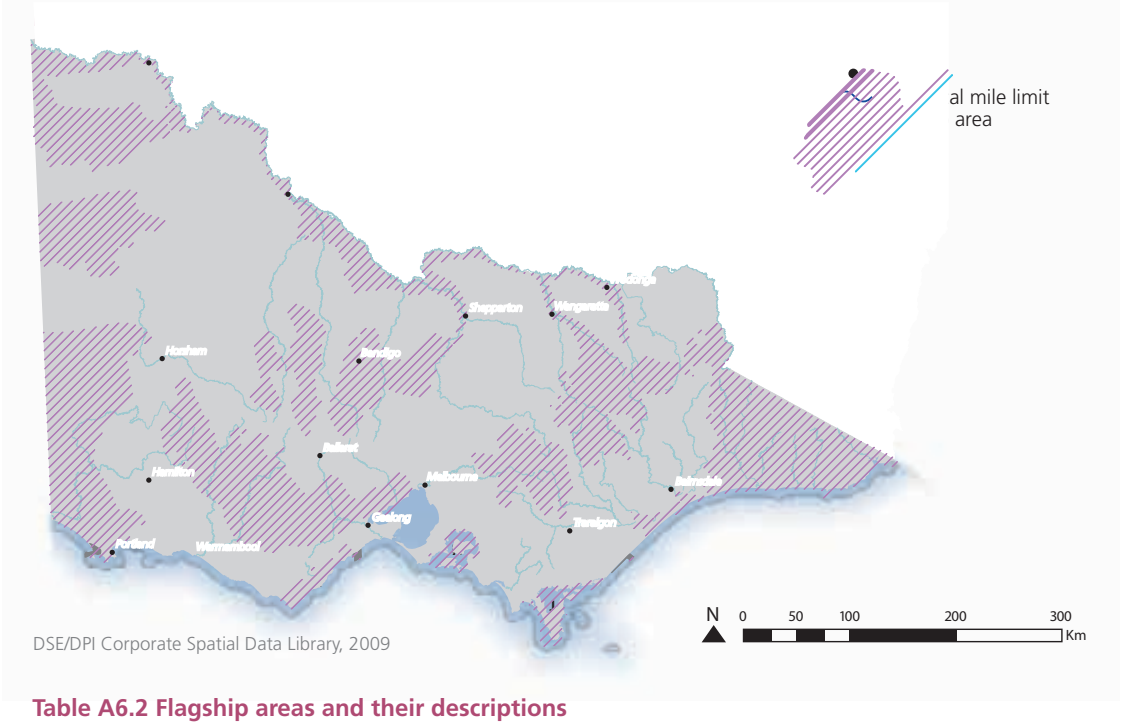


Figure A6.9 is a representation of the rural restructuring occurring across Victoria, based on local government area. It illustrates the competition in rural areas between agricultural production (where there is pressure to increase farm size to improve productivity) and land purchased for amenity purposes (smaller scale lifestyle properties). The result is the creation of five 'social landscapes' each with a divergent trajectory of rural restructuring. These range from areas where land is valued for its high amenity, through to land primarily valued for its agricultural production, with areas in between undergoing transition.

The flagship areas

Consideration of the nine maps (Figures A6.1 - A6.9) plus the criteria in Table A6.1 resulted in the identification of 13 flagship areas for Victoria (see Figure A6.10 below). Table A6.2 provides geographical description of the flagship areas.



DSE/DPI Corporate Spatial Data Library, 2009

Table A6.2 Flagship areas and their descriptions

Flagship area	Geographical description
A Mega Murray	Riverine and floodplain environment of the Murray River from the South Australian border upstream to Lake Hume and including Goulburn River to Murchison, Ovens River to Porepunkah, King River to Whitfield and the lower Kiewa River.
B Mallee	Northwest of Victoria from the Murray River south to include Big Desert Wilderness Park, Wyperfeld National Park, Hattah-Kulkyne National Park and Murray-Sunset National Park.
C South West	Southwest of Victoria from Discovery Bay north across the Glenelg Plain to Dergholm State Park, the Wimmera between Edenhope and Natimuk (excluding Mt Arapiles), and Little Desert National Park and the Discovery Bay Marine National Park.
D Greater Grampians	Region centred on the Grampians National Park and outlying Black Range Park, Mt Dundas and Mt Arapiles.
E Goldfields	Central Victoria stretching from Stawell eastwards to Rushworth and Wychitella southwards to Clunes. Includes significant remnants of box ironbark forest and woodland in protected areas.
F Western Volcanic Plains	The Victorian Volcanic Plains extending south-west from Melbourne. Major protected areas include Inverleigh Flora Reserve, Cobra Killuc Wildlife Reserve, and the Derrimut and Craigieburn Grasslands.
G Otways	The Otway Ranges and coast from Anglesea to Glenaire. Includes the Great Otways National Park and Otway Forest Park, Marengo Reefs Marine Sanctuary and Point Addis Marine National Park.
H Western Port	Western Port including all islands and surrounding shorelines and Yaringa, French Island and Churchill Island Marine National Parks.
I Central Highlands	Highland areas north-east of Melbourne surrounding Kinglake, Toolangi, Marysville, Cambarville, Matlock, Erica, Noojee, the Dandenongs, Gembrook, Warburton and Healesville.
J Wilsons Promontory	Wilsons Promontory National Park, Wilsons Promontory Marine Park, Wilsons Promontory Marine National Park, Wilsons Promontory Marine Reserve and Corner Inlet Marine National Park
K Victorian Alps	The alpine regions of north-east Victoria (above 600 metres), stretching from the NSW border south-westwards to Licola. Includes Alpine National Park.
L Gippsland Lakes	The Gippsland coastal lakes system between Sale and Lakes Entrance, centred on Lakes Reeve, Coleman, Wellington, Victoria, and King.
M Far East Gippsland	Snowy River Catchment to NSW border, all East Gippsland uplands and lowlands and the Buchan–Nowa Nowa limestone region. Includes the major National Parks of Snowy River, Coopracambra and Croajingolong, and the Cape Howe and Point Hicks Marine National Parks.

Appendix 7 Identifying biolinks

As a result of land use change since European settlement, many areas of high ecological value are isolated or have poor linkages with surrounding assets and ecosystems. Restoring these linkages is integral to restoring ecosystem function and resilience, especially at a time of climate change.

The term 'biolink' was coined through research into the potential effects of climate change on south-eastern Australian fauna in the early 1990s. This research suggested that changes in the distribution of species, trending southward and to higher elevations, with some clustering of some future distributions (climatic refugia), may be expected.[7] All native vegetation provides current and potential refugia and reservoirs of biodiversity at the local scale under climate change. Biolinks though, represent broader strategic priorities for restoration of ecosystem function and connectivity between and across local and regional landscapes. In biolinks, the overall habitat matrix will be enhanced and appropriately integrated with productive, multiple use landscapes to improve ecosystem function and opportunities for adaptation of species and ecosystems.

Ecosystems are complex, and predicting the impact of climate change on biodiversity is challenging, however there are some key factors that influence the opportunities available for species:

- the amount, quality and configuration of habitats in an area
- the broad environmental envelopes (landforms and vegetation types) that are the natural pathways already used by groups of species, and the current permeability and recoverability of these pathways in altered landscapes
- local environmental gradients (e.g. altitudinal, distance to water)
- continental climate shifts (noting that rainfall shifts are not the only factor to influence water availability regimes, and that rainfall and temperature factors may shift independently of each other)
- the inherent environmental and genetic 'plasticity' and adaptability of species, and gene flow characteristics between populations
- interactions between species (particularly novel interactions, and interactions between native and non-native species)
- 'stochastic' regimes (i.e. a process or system connected with random probability or chance), extreme events or potential interventions (e.g. fire, local extinction or re-introduction) that may influence outcomes, including any changes to these associated with climate change

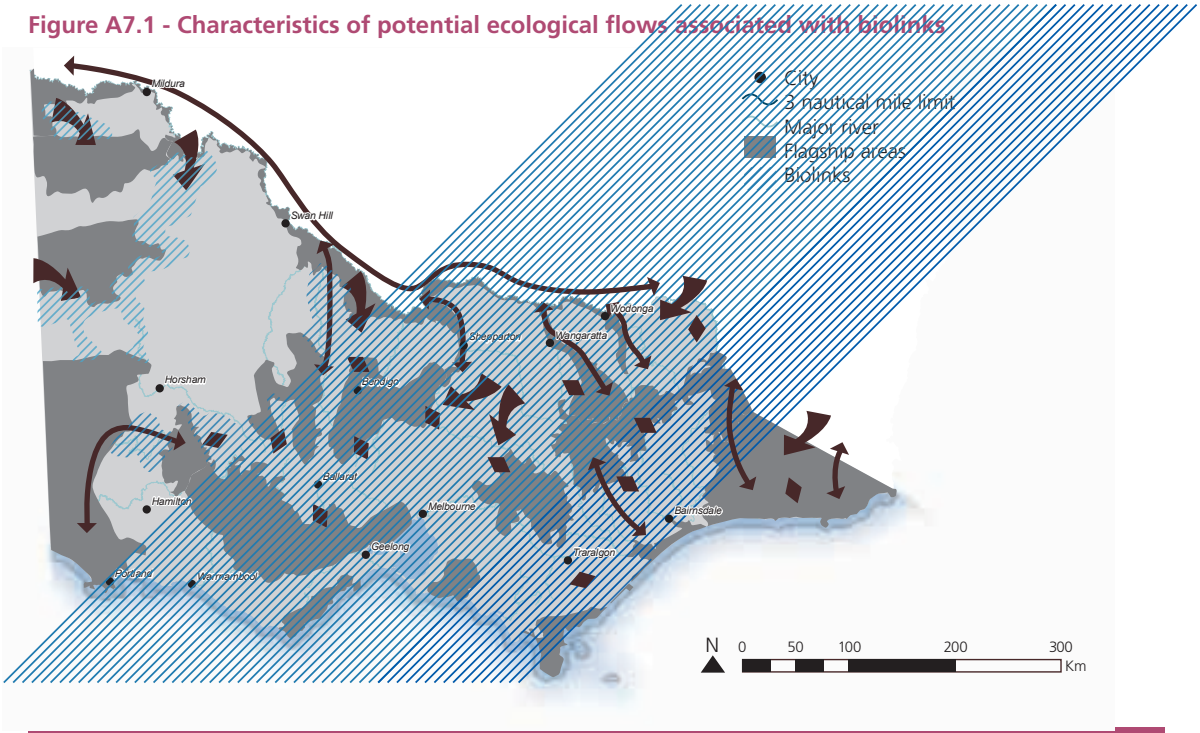
Connectivity refers to various kinds of connections including:

- the structural configuration of habitats or habitat patches in a landscape mosaic
- the permeability of the landscape mosaic for dispersal and movement of a specific species
- the presence or absence of barriers or impediments to the natural flux of water, nutrients or fire experienced in a landscape
- landscape permeability with respect to meta-population dynamics
- gene flows associated with micro and macro evolutionary processes.[8]

The science of addressing these considerations is being actively developed and new datasets and analytical tools are progressively allowing more detailed modelling of strategic options.

Drawing on this work, regional-scale biolinks have been determined that link flagship areas via areas of likely adaptive 'flow' based on the first four factors above (see figure A7.1).

Figure A7.1 - Characteristics of potential ecological flows associated with biolinks



Geographic biolink "clusters"	Continental climate shifts via broad environmental pathways	Major riparian links	Local climate gradients
Mallee	Generally southward via appropriate land systems including stranded beach-ridges but avoiding salinity risk areas	Murray River, supports an important transition zone between bassian and eyrean bio-climatic regions	Gradient between drier, warmer (north) and more moderate south
North & Central Victoria	Generally southward via the inland slopes of the Great Divide	Glenelg, Murray, Goulburn, Ovens & Kiewa Rivers asset areas Loddon River	Plains to foothill links & Foothill to mountain links with topographical variation
Gippsland	Connectivity with central Great Dividing Range and coast	Avon River	Plains to foothill links with coastal connectivity through moister Eastern Victoria

Appendix 8 Current natural resource management roles and responsibilities

These are current (2009) roles and responsibilities of natural resource management agencies. Some of these roles and responsibilities will change as a result of White Paper directions.

Current natural resource management roles and responsibilities	Key Legislation
Alpine Resorts Coordinating Council (ARCC)	
- Plan for and facilitate the establishment, development, promotion, management and use of alpine resorts. - Review and coordinate implementation of the Alpine Resorts 2020 Strategy. - Undertake research into alpine resort issues. - Liaise with and encourage cooperation of all parties involved in the development, promotion, management and use of alpine resorts. - Monitor the development and implementation of Strategic Management Plans for each alpine resort. - Make recommendations to the Minister for Environment on matters related to the provision and improvement of services and facilities in alpine resorts. - Coordinate, in conjunction with Tourism Victoria, the overall promotion of alpine resorts. - Attract investment for the improvement of the alpine resorts.	*Alpine Resorts Management Act 1997*
More Info: http://www.arcc.vic.gov.au/about.htm	
Catchment Management Authorities (CMAs)	
- Oversee whole of catchment planning for the ten catchment management areas of Victoria. - Maintain 5 year Regional Catchment Strategies (RCS). - Coordinate and monitor implementation of RCSs. - Develop and fund projects to achieve RCS outcomes. - Advise Minister for Environment on catchment condition, regional priorities, matters relating to catchment management and land protection and guidelines for integrated management of land and water resources. - Work with regional communities, Local Government and other partners to incorporate local priorities that are appropriately considered in to catchment plans and strategies. - Manage waterways, floodplains and manage the Environmental Water Reserve (except in Port Phillip and Westernport CMA where Melbourne Water is responsible).	*Catchment and Land Protection Act 1994*
More Info: http://www.ourwater.vic.gov.au >Water Industry & Governance > Catchment Management Authorities > Statement of Obligations www.dse.vic.gov.au/ > Land Management > Catchments > Catchment Management Authorities	

Current natural resource management roles and responsibilities	Key Legislation
Commissioner Environmental Sustainability Victoria (CES)	
Provide an independent voice that advocates, audits and reports on environmental sustainability by fulfilling the following objectives: - Report on matters relating the natural environment of Victoria. - Encourage decision making that facilitates ecologically sustainable development. - Enhance knowledge and understanding of ecologically sustainable development and the environment. - Encourage sound environmental practices and procedures to be adopted by the Government of Victoria and local governments as a basis for ecologically sustainable development. Provide an avenue to achieve the above objectives by completing the following tasks: - Complete the State of the Environment Report for Victoria. - Carry out the Environmental Management Systems Strategic Audit of state government agencies and public authorities. - Carry out the Public Education Audit, relating to ecologically sustainable development. - Advise the Minister for Environment in relation to any matter referred to the Commissioner by the Minister.	*Commissioner for Environmental Sustainability Act 2003*
More Info: http://www.ces.vic.gov.au/ > about us	
Committees of Management	
All committees are appointed under the *Crown Land (Reserves) Act 1978* to manage their reserve on behalf of the Minister for Environment and Climate Change, and have responsibility and authority to: - Manage crown land reserves in accordance with the purpose for which they were reserved (Crown land reserves support a whole range of amenities and uses such as halls, libraries, theatres, showgrounds, gardens, bushland, zoos, foreshores, sports ovals, tennis courts, playgrounds, swimming pools and rail trails). - Manage and develop the reserve. - Undertake financial transactions, including borrowing money (with the Victorian Treasurer's consent) and entering contracts. - Enter tenure arrangements, such as leasing and licensing, for part or all of the reserve, subject to Minister's approval. - Enforce regulations.	*Crown Land (Reserves) Act 1978*
More Info: www.dse.vic.gov.au/property > Publications > Crown Land Fact Sheets	
Commonwealth Department of Agriculture Fisheries and Forestry (DAFF)	
Responsible for activities which enhance the natural resource base on which DAFF portfolio industries rely by: - Developing national initiatives to address issues of sustainable resources management and use. - Conducting research to build an information base and encourage information-sharing. - Administering programs that promote widespread adoption of sustainable natural resource management practices.	*Natural Resource Management Act 1992 (Cwlth)*
More Info: http://www.daff.gov.au/	

Current natural resource management roles and responsibilities	Key Legislation
Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA)	
Develop and implement national policy, programs and legislation to protect and conserve Australia's environment and heritage and to promote Australian arts and culture.	*Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)*
More Info: http://www.nrm.gov.au/ http://www.environment.gov.au	
Department of Planning and Community Development (DPCD)	
- Conduct land-use planning and environment assessment in Victoria. - Manage the legal framework for the planning system in Victoria. - Provide advice on planning policy, urban design and strategic planning and information on land development and forecasting.	*Planning and Environment Act 1987*
More Info: http://www.dpcd.vic.gov.au > Planning > How does Planning Work	
Department of Primary Industries (DPI)	
- Enable transformation in Victoria's primary and energy industries. - Sustainably increase wealth and wellbeing while protecting and enhancing safety, community, animal welfare and the environment. DPI's key Natural Resource Management areas are: - Agriculture - Fisheries - Forests - Weeds and Pests - Soils - Drought.	*Greenhouse Gas Geological Sequestration Act 2008* *Domestic (Feral and Nuisance) Animals Act 1994* *Fisheries Act 1995* *Biological Control Act 1986*
More Info: http://new.dpi.vic.gov.au/about-us/what-we-do	
Department of Sustainability and Environment (DSE)	
Secure water resources for the future: - Deliver the major infrastructure and water saving projects. - Plan for climate change in the development of sustainable water strategies. - Develop a new policy framework for the next wave of water reforms. Respond to the increasing fire threat: - Increase and improving planned burning programs. - Engage communities more effectively in managing fire. - Consolidate and strengthening the delivery of fire services. Promote new standards for protecting the natural environment: - Reform processes for managing investment to achieve measurable outcomes. - Increase investment in ecosystem resilience and connectivity. - Build standards for environmental management into new developments. Ensure Victorians adapt effectively to the impacts of climate change: - Support the community to better account for climate change impacts. - Strengthen the capacity to model and map climate change impacts. - Respond proactively to the challenges and opportunities of a low carbon economy.	*Alpine Resorts (Management) Act 1997* *Catchment and Land Protection Act 1994* *Coastal Management Act 1995* *Flora and Fauna Guarantee Act 1988* *Forests Act 1958* *Land Act 1958* *Parks Victoria Act 1998* *Victorian Environment Assessment Council Act 2001* *Water Act 1989* *Wildlife Act 1975*
More Info: www.dse.vic.gov.au	

Current natural resource management roles and responsibilities	Key Legislation
Environmental Protection Authority (EPA)	
- Administer legislation to prevent pollution and environmental damage. - Set environmental quality objectives and establishing programs to meet them. - Develop and administer State Environmental protection policies to protect air, land, water, groundwater and reduce noise.	*Environment Protection Act 1970*
More Info: http://www.epa.vic.gov.au/	
Gippsland Lakes Taskforce (GLTF)	
- Oversee the development and implementation of priority projects relevant to the Gippsland Lakes Future Directions and Action Plan (GLFD&AP). - Advise the Minister for Environment each year of the GLFD&AP annual program and on the progress to date. - Direct the development and implementation of a strategic communications and media plan that keeps the community informed and aware of progress. - Facilitate the integration and coordination of key government actions related to the health of the Gippsland Lakes. - Ensure that an integrated monitoring and assessment program is implemented that provides information on the condition and management of the Gippsland Lakes and its catchment. - Regularly update the future directions and actions for the Gippsland Lakes and its catchment based on adaptive management principles. - Identify and address key information gaps required for the ongoing management of the Gippsland Lakes and its catchment. - Provide specific advice to the Minister on matters pertaining to the condition and management of the Gippsland Lakes.	
More Info: http://www.gippslandlakestaskforce.vic.gov.au/about.htm	
Local Government Authorities (LGAs)	
- Advocate and promote proposals which will benefit the local community. - Plan for and provide services and facilities for the local community. - Provide and maintain community infrastructure in the municipal district. - Undertake strategic and land use planning for the municipal district including: - Planning for sustainability in nature conservation, energy use and community involvement. - Administrator Victorian Planning Provisions.	*Constitution Act 1975* *Local Government Act 1989* *Planning and Environment Act 1987*
More Info: http://www.localgovernment.vic.gov.au/ http://www.mav.asn.au	
Murray Darling Basin Authority (MDBA)	
- Prepare the Basin Plan for adoption by the Commonwealth Minister for Climate Change and Water, that includes setting sustainable limits on water that can be taken from surface and groundwater systems across the Basin. - Advise the Commonwealth minister on the accreditation of state water resource plans. - Develop a water rights information service which facilitates water trading across the Murray–Darling Basin. - Measure and monitor water resources in the Basin. - Gather information and undertake research. - Engage the community in the management of the Basin's resources.	*Water Act 2007 (Cwlth)* *Murray Darling Basin Act 1993*
More Info: http://www.mdba.gov.au/about_the_authority http://www.mdba.gov.au/about/governance	

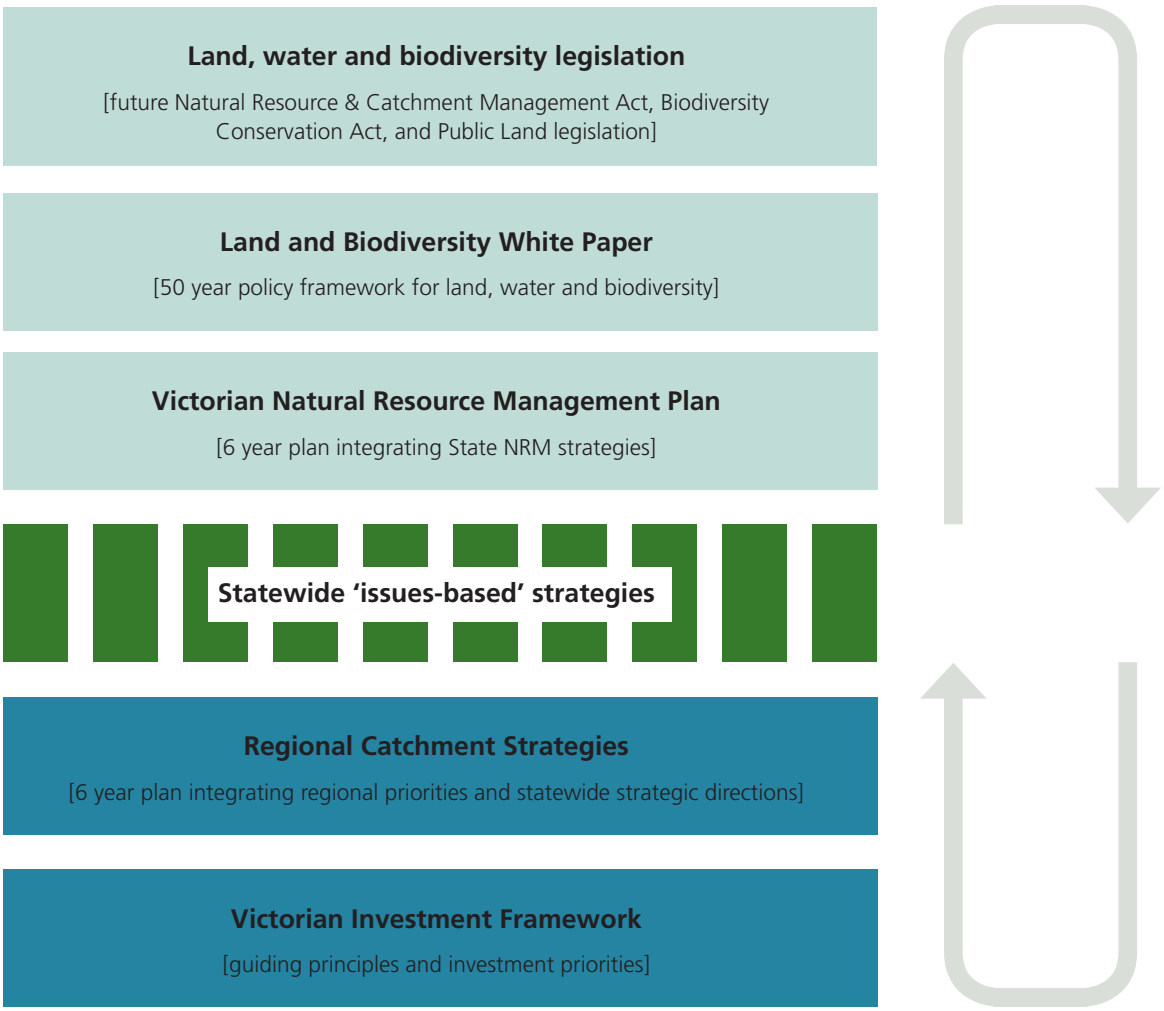
Current natural resource management roles and responsibilities	Key Legislation
Melbourne Water	
- Manage Melbourne's water supply catchments. - Treat and supply drinking water. - Remove and treat most of Melbourne's sewage. - Provide recycled water for non-drinking purposes. - Manage rivers and creeks and major drainage systems throughout the Port Phillip and Westernport region.	*Water Act 1989* *Water Industry Act 1994* *Corporations Act 2001*
More Info: http://www.melbournewater.com.au	
Parks Victoria (PV)	
- Manage a diverse estate of significant parks in Victoria, including the recreational management of Port Phillip Bay, Western Port and the Yarra and Maribyrnong rivers. - Conserve, protect and enhance environmental and cultural assets. - Responsibly meet the needs of customers for quality information, services and experiences. - Provide excellence and innovation in park management. - Contribute to the social and economic wellbeing of Victorians.	*National Parks Act 1975* *Parks Victoria Act 1998*
More Info: http://www.parkweb.vic.gov.au/1aboutus.cfm	
Regional Coastal Boards (RBCs)	
- Develop Coastal Action Plans within respective regions. - Manage significant coastal, estuarine and marine areas or issues. - Identify strategic directions and objectives for use and development in each region. - Provide for detailed planning of each region or part thereof.	*Coastal Management Act 1995*
More Info: http://www.ccb.vic.gov.au/index.htm http://www.wcb.vic.gov.au/ http://www.gcb.vic.gov.au/	
VicForests	
- Produce and sell timber from Victoria's State forests in the east and north east of the State as regulated by DSE.	*Sustainable Forests (Timber) Act 2004* *Forests Act 1958* *Forestry Rights Act 1996*
More Info: http://www.vicforests.com.au/ www.dse.vic.gov.au > Forests	
Victorian Catchment Management Council (VCMC)	
- Advise the Minister for the Environment, and any other Minister as requested, on land and water management issues. - Report every five years on the environmental condition and management of Victoria's land and water resources through the VCMC Catchment Condition Report. - Encourage cooperation between the major sectors of local government, community conservation and environment organisations, industry, state and federal agencies and regional catchment management authorities by facilitating communication through various projects and forums. - Provide the opportunity for CMAs to contribute to the policy and strategic picture at State level. - It is not responsible for the operation of CMAs, nor does it oversee their work.	*Catchment and Land Protection Act 1994*
More Info: http://www.vcmc.vic.gov.au/	

Current natural resource management roles and responsibilities	Key Legislation
Victorian Coastal Council (VCC)	
- Develop and coordinate the implementation of the statewide strategic coastal plans. - Develop and coordinate the implementation of the Victorian Coastal Strategy. - Provide advice to the Minister. - Facilitate the operation of Regional Coastal Boards. - Prepare and publish guidelines for the planning and management of the coast. - Liaise with and encourage the cooperation of Government departments, public authorities, municipal councils, industry, community groups and persons and bodies involved in the planning, management and use of the coast in furthering the objectives of the Act. - Provide opportunities for the public and interested groups to be informed of and involved in the work of the Council. - Encourage the work of volunteers in using and conserving coastal resources. - Give consideration to the needs of Indigenous people and other interested groups in relation to the coast.	*Coastal Management Act 1995*
More Info: http://www.vcc.vic.gov.au/about.htm	
Victorian Environmental Assessment Council (VEAC)	
- Conduct investigations as requested by the Victorian Government relating to the protection and ecologically sustainable management of the environment and natural resources of public land. - Carry out any other functions that are conferred on the Council by the *Victorian Environmental Assessment Council Act 2001* or any other Act.	*Victorian Environmental Assessment Council Act 2001*
More Info: http://www.veac.vic.gov.au/index.htm	
Water Authorities	

- Manage water, sewage, irrigation, domestic and stock services to customers in various parts of the State.
- Manage rivers and creeks and major drainage systems in the Port Phillip and Westernport region. In other regions management of these is the responsibility of CMAs.
- Meet the requirements of a statement of obligations issued by the Minister for Water under the Water Act. Major areas include:
  - preparing plans
  - community engagement processes
  - managing assets and safety
  - environmental management
  - corporate management.
	Water Act 1989
	Water Industry Act 1994
	Corporations Act 2001

More Info: http://www.ourwater.vic.gov.au/ Water Industry & Governance > Water Corporations	

Appendix 9 Relationship between natural resource and catchment management policy documents



Appendix 10 Considerations for State investment in natural resource management

The White Paper principles in Chapter 1 include one related primarily to public investment:

State investment should be targeted to achieve the greatest benefit for the people of Victoria, ensuring transparency, value for money and effective use of taxpayer funds.

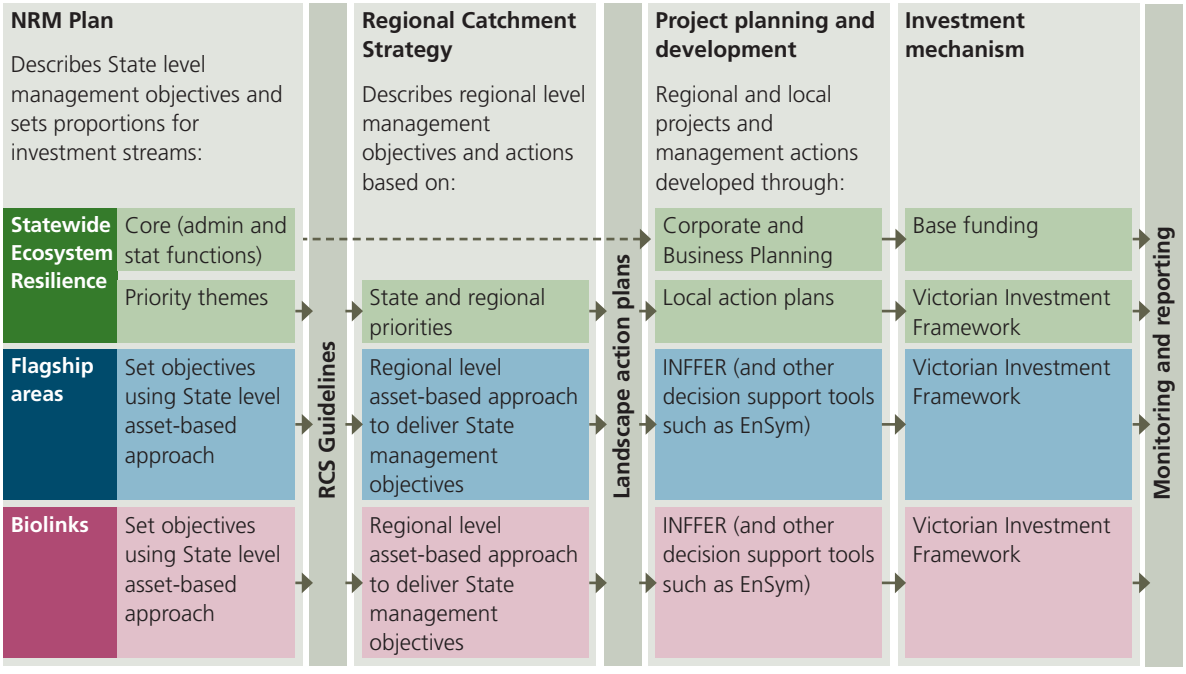
As outlined in Outcome 3.3, State investment in natural resource management will be directed through three areas of focus - building ecosystem resilience across Victoria, managing natural assets within flagship areas to maintain ecosystem services, and building connectivity through biolinks. Figure A10.1 shows how these investment streams will be targeted.

There are many competing uses for public funds and a range of considerations need to be taken into account when investing public funds in natural resource management. These may include trade-offs between addressing urgent problems in the short-term or longer-term issues that may ultimately be more important; between problems with high public profiles and others that are less prominent but at least as important; and between taking immediate action or spending money on collecting information to allow better decisions and more effective action later on.

The following key considerations will guide future investment decisions in natural resource management regardless of land tenure:

1. State investment will focus on providing public, rather than private benefit.
2. Investment will be more likely when the following factors are addressed in project proposals:
   - cost effectiveness including the urgency of any intervention, its feasibility and potential side benefits
   - the likelihood of a measurable improvement. This will include analysis of the causes as well as the symptoms of any threat, the level of threat, degree to which the threat is likely to respond to injection of State funds, availability of State funds and the level of funds and in kind support available from other sources such as:
     - Caring for Our Country (CfOC) funding
     - Local Government input
     - Philanthropic/corporate support
     - Support from community groups
   - the ability to apply an adaptive approach in the longer term including the degree of flexibility to change approaches as new information is gathered
   - the degree to which local/regional communities are likely to support the project, and the potential to inspire and catalyse public engagement in natural resource management
   - the available evidence, particularly whether the science and knowledge base is strong enough to justify the focus of investment.

Figure A10.1 - Future State investment framework for natural resource management



Appendix 11 Knowledge management priorities to support White Paper outcomes

The knowledge management framework outlined in Outcome 3.4 places explicit emphasis on the importance of properly managing knowledge to support the policy, planning, investment and decision making cycle, to provide the evidence base for policy, and to inform effective decision making at local, regional and State level. Outcome 3.4 provides policies and actions related to the knowledge management framework.

This appendix supports Outcome 3.4 by summarising all other knowledge management policies and actions that are articulated throughout the White Paper.

Where appropriate, some further discussion of issues and policy direction, in particular in relation to data management, is provided in this appendix to guide implementation of the knowledge management framework over the next six years.

Knowledge management policies and actions

Flagship areas and biolinks

Implementation of the strategic directions of managing flagship areas and biolinks will fundamentally shift the management of Victoria's landscape over the next five decades. To support these directions, knowledge management, in particular research and development priorities, will need to change, and be regularly reviewed and adjusted.

Priority research to support management of flagship areas includes: ongoing and long-term mapping and monitoring of key assets, understanding the nature, magnitude and distribution of threats and investigating and developing protection and risk management systems for key assets.

Priority research to support ecological connectivity through biolinks includes developing and testing ecosystem restoration models to enable effective re-linking of ecosystems through biolinks and habitat corridors, such as along riparian systems throughout rural landscapes.

Modelling tools will be important and will continue to be developed to assist implementation planning for biolinks. Such tools will help account for and manage unintended impacts around invasive species, hydrology and road and fire safety.

Specific knowledge management actions to support implementation of biolinks include:

2.3.1 Map the functional and connectivity needs of Victoria's species and ecosystems by 2012

2.3.2 Identify and map areas within biolinks where ecosystems have natural regenerative capacity by 2012

Ecosystem resilience across landscapes

The focus of the White Paper on landscape resilience shifts the priorities for knowledge management. There will be a greater emphasis on risk management requiring better understanding of the response of ecosystems, landscapes and landscape processes to predicted changes in climate, and which components of altered landscapes are at most risk from ecosystem collapse. Predicting thresholds of significant change will be important in this respect.

Specific knowledge management related policies and actions within the White Paper to support ecosystem resilience across landscapes are given in Chapter 6 and include:

Native vegetation management: Knowledge management priorities for native vegetation management are to provide timely and appropriate information to local government and industry on application of the Native Vegetation Management Framework, and to provide consistent and comprehensive reporting on progress with net gain.

Specific knowledge management actions to support native vegetation management include:

6.1.1.6 Publish an annual vegetation management summary report with data on permits, offsets and illegal clearing

6.1.1.7 Report on net gain progress as part of the three and six yearly resource condition reports

Fire management: The implementation of an adaptive management approach to fire management requires better understanding of fire regimes for ecological resilience, in particular understanding the impact of fire management activities related to wildfire control and planned burning. An important component will be to gain recognition amongst all fire management stakeholders and the broader community of the role of fire as a driver of ecological processes, and its potential use to achieve the dual outcomes of human asset protection and ecologically sustainable land management.

Priorities include: increased understanding of vital attributes (life history characteristics) of Victoria's flora and fauna. This includes increased knowledge of the role of fire in driving ecological processes through monitoring of wildfire and planned burns and application of modelling tools, development of information systems and information products to underpin fire management planning.

Providing education through effective communication and consultation with a broad range of stakeholders and developing accessible and relevant information materials is crucial as is encouraging and supporting participation by private land-owners, local councils and relevant statutory authorities in planning and implementing ecologically-sound Fire Management Plans, including planned ecological burns.

Soils: Improved soil management requires understanding of soil responses to climate change and improved management practices. This includes understanding the spatial distribution of soils, their health, their relationship to land use and land management practices and understanding of the impacts of fire and flood on soil health.

A better understanding of the capacity of soil to sequester carbon and actions which may increase soil carbon as well as development of appropriate metrics is needed.

Knowledge management priorities for soil include systematic monitoring, support for sharing local innovation as well as development of catchment modelling tools.

Specific knowledge management actions to support soil management include:

6.1.5.2 Develop an action plan to update modelling tools and farm planning tools to include a more complete range of soil management issues by 2012

6.1.5.3 Implement a strategy to capture and retain knowledge on soils and soil management by 2012

Invasive species: A biosecurity approach to invasive species management requires better scientific evidence to support cost-effective decision making. This includes the need to identify current distributions of major invasive species and project expansions and dispersal pathways with climate change.

A greater focus on prevention and early intervention will also necessitate expansion of community volunteer detection and control programs.

Early priorities include gaining improved understanding of the pathways and modes of invasion through retrospective and other studies, and developing information systems to support the identification, management and monitoring of invasive species, and support community involvement.

Threatened species: The broader focus for threatened species management in the White Paper, which encompasses climate adaptation and maintenance of ecosystems under changed conditions, requires improved understanding of the composition, structure and function of ecological communities. It requires improved understanding of adaptive responses, such as species-habitat and species-disturbance in response to climate change, and of ecological and evolutionary processes.

The White Paper places emphasis on the further development of modelling, risk assessment and decision support tools, including intervention criteria to enable priorities to be assessed at the community, taxonomic and species level and on improved monitoring to enable adaptive management.

Specific knowledge management actions to support threatened species management include:

6.1.7.2 Implement the Actions for Biodiversity Conservation system including modelling the links between actions and outcomes

6.1.7.3 Complete the development of the Victorian Biodiversity Atlas by 2011

Public land: Knowledge management policies for public land focus on the further development of science on climate change risk, systematic conservation planning, understanding species and ecosystem dynamics and adaptive management approaches to support the development and management of the National Reserve System.

The White Paper also recognises the need for dynamic modelling, risk assessment and improved monitoring and reporting across parks, forests and other public land in the context of climate change.

Specific knowledge management actions for public land include:

6.2.3 Develop improved valuation techniques to account for the ecosystem services provided by parks, forests and other public land by 2013

Rivers, wetlands and estuaries: Knowledge management for rivers, wetland and estuaries focuses on improvements to monitoring and reporting, including benchmarking and regular condition assessments across these ecosystems. This is to be supported by community education, monitoring and reporting through Waterwatch.

Specific knowledge management actions to support inland aquatic ecosystems include:

6.3.4 Complete the third Index of Stream Condition assessment by 2010

6.3.5 Establish a benchmark for Victoria's wetlands and estuaries using indices of condition by 2011

Coastal and marine environments: Although knowledge of coastal environments is improving, there remains an imperative to increase our understanding of both coastal and marine environments, particularly in relation to assets, habitats, systems and their vulnerability to climate change. Understanding the combined effect of activities and improved condition monitoring is also essential.

The White Paper places emphasis on extending the State's science capabilities in coastal, estuarine and marine ecosystem functioning with initial focus on Western Port, Gippsland Lakes and Corner Inlet and selected estuaries on the west coast.

Specific knowledge management actions to support coastal and marine management include:

6.5.1 Develop a research program to increase understanding of how climate change will affect coastal and estuarine ecosystem functions and dependent anthropogenic activities

6.5.2 Complete mapping of nearshore coastal and marine habitats by 2012

6.5.3 Prepare marine habitat condition assessments and establish further condition monitoring systems taking account of climate change and catchment processes by 2012

6.5.5 Prepare vulnerability assessments of key coastal, estuarine and marine habitats and ecosystem processes by 2012

Environmental markets and investment

Opportunities for broadening investment in ecosystem protection, including new markets for ecosystem services, must be supported by knowledge development and management.

Improved knowledge management will focus on identifying gaps in knowledge and understanding that hinder informed decision making and measurement of biodiversity and ecosystem services to underpin markets including scientific information on carbon sequestration and emissions.

The White Paper also supports progressing tax reforms at the national level which enable the flow of tax benefits for commercial research and development in environmental fields.

Specific knowledge management actions to support environmental markets and investment include:

4.3.5 Invest in research to improve understanding of the role of soil carbon

4.4.1 Invest in the research and development of metrics for the National Carbon Accounting Tool which are appropriate to Victorian landscapes and support investment in biologically diverse plantings

Community action

The White Paper recognises the importance of communities, and seeks to equip all Victorians with knowledge and skills to lead and participate in effective natural resource management. The strengths of community led responses to emerging problems, and the importance of tacit knowledge that rests with local people and communities is also recognised.

Knowledge management to support communities in natural resource management focuses on effective sharing of knowledge to inform policy, improve local and regional decision making and encourage behaviour and practice change. The importance of human interfaces such as knowledge brokering, extension and community monitoring are as important as technological platforms such as web-based tools, in promoting the sharing of knowledge.

Knowledge management priorities for communities will focus on:

- providing education and information to all Victorians to inform daily decision making
- acknowledging and supporting knowledge held by Indigenous communities, including supporting research that integrates traditional land management practices with scientific knowledge
- supporting natural resource based community groups and networks in delivering outcomes by encouraging knowledge sharing and innovation, promoting collaboration and streamlining reporting mechanisms and funding applications
- supporting land managers to meet their responsibilities through cooperative action research including development of sub-catchment stewardship indices
- providing tools and information to farmers to encourage sustainable land management.

The White Paper also recognises a need to conduct research into social capacity and understanding the socio-economic profiles of communities in order to understand their interests, motivations and drivers and strengthen community engagement. Research that integrates traditional land management practices with scientific research is also a recognised priority.

Specific knowledge management actions to support community engagement include:

5.1.1 Prepare a targeted community education program to increase awareness and encourage actions that improve land, water and biodiversity outcomes by 2010

5.3.2 Streamline reporting mechanisms and funding application processes for community-based natural resource management groups by 2010

5.5.1 Make existing property management planning tools available to landholders online by 2011

5.5.2 Focus extension, training and technical support to landholders in flagship areas to assist them to develop plans that integrate business, property and environmental considerations

Data management

To support the knowledge management framework, a strategic and integrated approach to data collection, storage, maintenance and use is needed.

State level natural resource management agencies, including DSE, DPI, PV and CMAs, collect and manage many significant datasets. These datasets support research and development, provide the basis of policy development and inform understanding of environmental condition and changes.

Natural resource management datasets are also collected and held by other individuals, agencies and organisations. These include universities and co-operative research centres, local government, statutory authorities, local community groups, Australian Government and international agencies, and the private sector.

New technologies and techniques for data-collection, storage and maintenance are continually emerging. Increasingly, agencies are able to draw on these new technologies, such as satellite imagery, to provide landscape level data. It is appropriate for Government to focus on data collection at this level whilst supporting regional and local level data collection at a range of scales and to inform multiple indicators.

Much of Victoria's biophysical data sets are ageing – some are more than 20 years old. A significant effort is required to review and update datasets to provide a baseline that can detect shifts due to climate change and other threats. Along with biophysical data, collection of social and economic data is also needed.

There is a need to recognise data as 'fit for purpose'. The levels of certainty needed in collected data vary depending on its use. Where high or known levels of certainty maybe required for intricate research, greater levels of uncertainty may be acceptable for qualitative reporting. In this sense, community monitoring will be supported as providing invaluable data useful for a range of purposes, whilst also contributing to important educational and practice change outcomes.

Building on existing data collection and management protocols, the collection, storage, maintenance and use of data at local and regional levels will be supported by:

- Establishing data collection standards and protocols for community monitoring groups, and providing quality assurance for data to be used for condition assessment and decision-making. These standards and protocols will draw on, and be consistent with, national protocols for data collection.
- Improving public access to Victorian Government environment data and data exchange through infrastructure, such as web-based tools.
- Providing mapped fit for purpose information at scales useful for decision making at local and regional levels.
- Improving mechanisms for data collection, assessment, storage, maintenance and the retrieval of traditional knowledge.

Specific actions in relation to data management include:

3.4.2 Identify key data gaps and ractions to address them by 2010

3.4.3 Prepare data collections standards and protocols to support communities, service delivery agencies and researchers in 'fit for purpose' data collection by 2011

3.4.4 Develop a common information platform for Natural Resource & Catchment Authorities and other agencies

Index

Abbreviations

AAV	Aboriginal Affairs Victoria
ARI	Arthur Rylah Institute
AuSSI	Australian Sustainable Schools Initiative
CaLP	Catchment and Land Protection (Act)
CAR	Comprehensive, Adequate & Representative
CFA	Country Fire Authority
CfOC	Caring for Our Country
CMA	Catchment Management Authority
COAG	Council of Australian Governments
CPRS	Carbon Pollution Reduction Scheme
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEECD	Department of Education and Early Childhood Development
DoJ	Department of Justice
DPC	Department of Premier and Cabinet
DPCD	Department of Planning and Community Development
DPI	Department of Primary Industries
DSE	Department of Sustainability and Environment
DTF	Department of Treasury and Finance
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation (Act)
EMS	Environmental Management System
EnSym	Environmental Systems Modelling Tool
ESD	Ecologically Sustainable Development
ESO	Environmental Significance Overlay
EVC	Ecological Vegetation Class
EWH	Environmental Water Holder
EWR	Environmental Water Reserve
FFG	Flora and Fauna Guarantee (Act)
FSV	Farm Services Victoria
GRI	Global Reporting Initiative
IBRA	Interim Biogeographic Regionalisation for Australia
IPCC	Intergovernmental Panel on Climate Change
INFFER	Investment Framework for Environmental Resources
IUCN	International Union for Conservation of Nature
LGA	Local Government Authority
MDBC	Murray-Darling Basin Commission
NGO	Non-Government Organisation
NRCA	Natural Resource & Catchment Authority
NRCC	Natural Resource and Catchment Council
NRM	Natural Resource Management
NRS	National Reserve System
NVMF	Native Vegetation Management Framework
PV	Parks Victoria
RCS	Regional Catchment Strategy
RCIP	Regional Catchment Investment Process
RDV	Regional Development Victoria
RRHS	Regional River Health Strategy
SV	Sustainability Victoria
SWS	Sustainable Water Strategy
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
VCC	Victorian Coastal Council
VCEC	Victorian Competition and Efficiency Commission
VCMC	Victorian Catchment Management Council
VEAC	Victorian Environmental Assessment Council
VERI	Volunteers Environmental Resource Inventory
VIF	Victorian Investment Framework

Glossary

adaptive management
A systematic process for continually improving management policies and practices by learning from the outcomes of operational programs and incorporating new information.

anthropogenic
Caused or produced by humans.

assets
See 'natural assets'

biodiversity
Biodiversity, or biological diversity, is the variety of all life on earth including the different plants, animals and micro-organisms, their genes, and their terrestrial, marine and freshwater ecosystems.

biolinks
Areas identified for targeted action to increase ecological function and connectivity, improving the potential of plants and animals to disperse, recolonise, evolve and adapt naturally.

biodiscovery
The collection and testing of samples of biological material for scientific, conservation or commercial purposes, including the identification of potentially valuable compounds or attributes.

biophysical
An interdisciplinary science that refers to the biological and physical elements of an environment.

bioregion
A broad scale mapping unit that captures the patterns and ecological characteristics in the landscape.

biosecurity
A set of measures to protect people and natural resources from the entry and spread of unwanted organisms capable of causing harm.

biosequestration
The capture and long term storage of carbon in soils, oceans and vegetation.

BushBroker
A native vegetation credit registration and trading scheme.

BushTender
An auction-based approach to improving the management of native vegetation on private land.

carbon market
An institution to enable the trading of permits to emit carbon dioxide.

carbon offset
A reduction in greenhouse gases relative to a business-as-usual baseline. Carbon offsets are tradeable and often used to negate (or offset) all or part of another entity's emissions.

Carbon Pollution Reduction Scheme
An Australian Government scheme to reduce pollution caused by emissions of carbon dioxide and other greenhouse gases.

carbon sink
An area such as a forest, grassland or open ocean (with phytoplankton) that absorbs and stores high amounts of atmospheric carbon dioxide.

catchment
An area which, through run-off or percolation, contributes to the water in a stream or stream system.

Catchment Management Authorities
Statutory authorities established under the *Catchment and Land Protection Act 1994* to provide coordinated management of land and water resources, using catchments as a basis.

climate change
Changes in climate attributed to the human-induced increase in concentration of greenhouse gases in the atmosphere. Climate change involves increases in temperature, sea level, and increased frequency of severe weather events such as storms.

Coast Action/Coastcare
A program linking and supporting community volunteer groups actively involved in on-ground works to protect and manage our coastal and marine environments.

conservation
The management of the environment in order to protect and preserve its natural assets.

conservation covenant
A voluntary agreement between a landowner and an authorised body to help the landowner protect and manage the environment on their property. It is usually registered on the title of the land and can apply to all or part of a property.

Crown frontage
A strip of Crown land that runs alongside a watercourse or coastline.

cultural heritage
Qualities and attributes possessed by places and objects that have aesthetic, historic, scientific or social value for past, present or future generations.

decomposition
The process where dead organic matter is broken down into simpler forms of matter.

ecological community
A naturally occurring assemblage of interacting species adapted to particular conditions of soil, topography, water availability and climate.

ecological connectivity
The links between different ecosystems and species within a landscape. The degree of connectivity affects ecological and evolutionary processes.

ecological processes
The interactions and connections between living and non-living systems including movements of energy, nutrients and species.

Ecological Vegetation Class
A native vegetation classification that is described through a combination of its floristic, life form, and ecological characteristics, and through an inferred fidelity to particular environmental attributes.

ecologically sustainable development
Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

ecosystem
A diverse and changing set of living organisms within a community, interacting with each other and with the physical elements of the environment in which they are found.

ecosystem diversity
The variety of ecosystems and their biological communities that interact with one another and their non-living physical environments.

ecosystem services
The goods and services provided by natural ecosystems that are valued because of the role they play in creating a healthy environment for human beings. This includes the provision of clean water; the maintenance of liveable climates; the pollination of crops and native vegetation; and the fulfilment of people's cultural, spiritual and intellectual needs. (See also environmental goods and services).

EcoTender
An auction-based approach to improving the management of environmental assets on private land.

ecotourism
Nature-based tourism that involves education and interpretation of the natural environment and is managed to be ecologically sustainable.

endemicity
The degree to which a species is uniquely located in a given place or region and not naturally located elsewhere.

environmental flow
Water regimes delivered to sustain the ecological values of aquatic ecosystems at a low level of risk.

environmental goods and services
The actions and products derived from human activity rather than benefits obtained directly from the natural environment. (See also ecosystem services).

Environmental Water Reserve
The share of water resources set aside to maintain the environmental values of a water system and other water services which are dependent on the environmental condition of the system.

environmental weed
Exotic or Australian native flora growing beyond their natural range that have, or have the potential to have, a detrimental effect on natural values.

erosion
The wearing away of soil and rocks.

estuary
A semi-enclosed coastal body of water where a river meets the sea.

ex situ conservation
The conservation of species outside their natural habitat.

externality
An effect or impact of a purchase or use decision, on those who did not have a choice in the decision and whose interests were not taken into account.

extinction
The end of an entire species.

fire regime
The frequency, intensity, season and scale of fire in a given area over a period of time.

flagship areas
Areas identified as needing focused attention due to their important environmental, social and economic values.

fragmentation
The separation of a landscape or habitat into smaller units, usually by human activity.

friends groups
Volunteer groups who work on projects to help conserve and protect our natural environment.

fuel reduction burn
The deliberate burning of vegetation by controlled fire kept at cooler temperatures to reduce ground fuel and therefore reduce the incidence and intensity of summer wild fires.

Green Gym
A program that engages people in practical conservation activities resulting in benefits to a participant's health and wellbeing as well as benefits to the environment.

greenhouse gas
Gases that regulate the earth's temperature - making it capable of sustaining life - by absorbing and emitting some of the incoming solar radiation that would otherwise reflect back into space.

green wedges
The non-urban areas of metropolitan Melbourne that provide opportunities for support infrastructure (such as airports). They safeguard agricultural uses, preserve rural and scenic landscapes, non-renewable resources and natural areas including water catchments, and provide opportunities for tourism, recreation and a network of open space.

groundwater
All subsurface water, generally occupying the pores and crevices of rock and soil.

habitat
An ecological or environmental area that is inhabited by a particular species. It is the natural environment in which a species lives, or the physical environment that surrounds (influences and is utilised by) a species population.

habitat hectares
A site based measure of quality and quantity of native vegetation that is assessed in the context of the relevant native vegetation type.

headline indicators
A set of indicators relevant to key natural resource management themes used to measure changes in resource condition over time.

incentive mechanism
A policy instrument used to encourage or reward desirable actions or dissuade undesirable actions.

in situ conservation
The conservation of species within their natural habitat.

intrinsic value
The value that something has in itself or for its own sake.

introduced species
A species occurring in an area outside its historically known natural range as a result of intentional or accidental dispersal by human activities.

invasive species
An animal pest, weed or disease that can adversely affect indigenous species and ecosystems.

invertebrate
An animal lacking a vertebral column.

Landcare
A community-driven movement that works in partnership with government and business to undertake practical projects to protect and repair the environment.

Landscape Action Plan
Sub-catchment scale plans that articulate how Regional Catchment Strategies will be implemented.

market-based mechanisms
Instruments or regulations that encourage behaviour through market signals rather than through explicit directives. Market-based mechanisms establish or redefine the incentives facing firms and individuals so that the social benefits of improved environmental outcomes converge with private interests.

market failure
A scenario in economics where the production and use of goods and services by the market is not efficient, and can include the situation where an individual's pursuit of self-interest leads to negative outcomes for society as a whole.

micro-organism
An organism of microscopic size.

monoculture
The cultivation of a single crop species.

native vegetation offset
Any works or other actions to make reparation for the loss of native vegetation arising from its removal or destruction (no net-loss). The offset must be permanent and ongoing, and linked to a specific clearing site.

natural assets
Spatially explicit biophysical components of the environment that provide ecosystem goods and services of value to the community.

natural resources
Land, soil, water in the environment, and plants and animals. This can be summarised as land, water and biodiversity.

net gain
Where, over a specified area and period of time, losses of native vegetation and habitat, as measured by a combined quality-quantity measure (habitat-hectare) are reduced, minimised and more than balanced by commensurate gains.

niche
A functional position of a species within an ecosystem.

nitrogen fixation
The chemical transformation of nitrogen into a form where it can be used in plant nutrition.

peri-urban
An area between the suburbs and the countryside, immediately adjoining an urban area.

philanthropy
Charitable donations of goods or services.

phylogenetics
The study of the evolutionary history of a group of organisms

photosynthesis
The process by which certain organisms, including plants, convert light energy, carbon dioxide and water into sugar and oxygen.

population (ecology)
A group of organisms, all of the same species, occupying a particular area.

property right
A legally enforceable arrangement that empowers a person to use or hold aspects of a resource.

public good
In economic theory, a good that meets two conditions: 1) its particular nature prevents it from being provided exclusively to any individual; for example, fresh air. The cost of making the good exclusive is greater than any individual would be willing or capable of paying to obtain the good; 2) consumption of the good by one person does not reduce the consumption of the good by any other person.

Ramsar
An international treaty on the protection of wetland habitat for waterfowl.

rare
Species with small populations or a very restricted distribution.

refugia/refuges
Places and/or habitats in a landscape that support population(s) of a species when changing environmental conditions (e.g. drought, fire, climate change) in the surrounding landscape make it unfavourable for the species to persist in the short or longer-term.

regeneration
The growing of plants and vegetation communities *in the wild* following an environmental disturbance (e.g. fire). Natural regeneration means the species present grow with minimal human effort (e.g. sprouting from lignotubers) and may be contrasted to intervention such as planting from tube stock or direct seeding.

Regional Catchment Strategy
Regional strategic plans developed by Catchment Management Authorities that describe how natural resource assets in a catchment are to be managed in a sustainable and integrated way.

Regional Coastal Boards
Strategic coastal planning advisory bodies which are responsible for the regional implementation of the Victorian Coastal Strategy and preparation of coastal action plans.

rehabilitation and restoration
The active intervention and management of degraded communities and landscapes usually caused by clearing, fire damage, forest road works, landings and mining in order to restore biological character, ecological and physical processes and their cultural and visual qualities.

remnant vegetation
Indigenous vegetation that has not been cleared, modified or replanted.

resilience
The capacity of a system to experience shocks while essentially retaining the same function, structure and feedbacks, and therefore its identity. The more resilient a system the larger the disturbance it can absorb without shifting it to an alternative state. In the context of climate change, ecosystem resilience might be considered as the extent to which species, ecosystems, landscapes and seascapes can undergo change without loss of values; that is, species do not become extinct and ecosystems continue to function as they change.

revolving fund
A fund used to finance activities, such as the acquisition of property and its subsequent sale with a conservation covenant attached to its title. This approach allows capital to be reused many times for the same purpose.

revegetation
To replant or regrow vegetation in an area following the loss of original cover.

riparian zones
The interface between land and a surface water body. Riparian zones play an important role in soil conservation, water quality, biodiversity and flood mitigation.

risk management
The identification, assessment, and prioritisation of risks followed by coordinated and economical application of resources to minimise, monitor, and control the probability and/or impact of unfortunate events.

River Tender
An auction style incentive program for landowners with river frontage.

stewardship
An approach where landholders are measurably and sustainably managing their properties so that it not only produces primary products but also a wide range of ecosystem services that support their business in the long term, and are of public value now and in future. It is based on a strong understanding of the systems they are farming and the landscape context (social, environmental and economic) in which they operate.

sustainable use
The use of resources in a way and at a rate that does not lead to their long term decline, thereby maintaining the potential to meet the needs and aspirations of present and future generations.

threatened species and/or ecological communities
Species or ecological communities that are in danger of becoming extinct and whose survival is unlikely if the causal factors continue. There are a number of different classifications of the level of threat depending on whether the species/community is listed internationally (e.g. IUCN Red List), nationally (e.g. EPBC Act) or at a state (eg FFG Act) or regional level. These classifications use terms which indicate increasing threat - such as vulnerable, endangered, critically endangered, regionally extinct etc.

threatening process
A physical process that increases the probability that biodiversity values at either the local, regional, national or global level will decline.

Traditional Owners
People who, through membership in a descent group or clan, have responsibility for caring for particular Country. A Traditional Owner is authorised to speak for Country and its heritage as a senior Traditional Owner, an Elder or a member of a group recognised by the Victorian Government.

trade-offs
A decision to take an action which will result in the loss or compromise of some other objectives. The full consequences of the decision should be understood before it is made.

vulnerable species
Species which could become 'endangered' if causal factors affecting their numbers continue.

Waterwatch
A community water quality monitoring program.

Weed Spotters
A community program whereby volunteers look out for and report serious uncommon weed species.

whole farm planning

A holistic planning approach that involves designing a property layout based on best management practices for a particular region and industry, taking into account the physical and ecological constraints of the land, as well as social and economic factors.

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Endnotes

Introduction

1. Adapted from Traill 2007.
2. Adapted from Steffen *et al* 2009.

Chapter 1

1. Adapted from DSE 2005a
2. Adapted from Clayton et al., 2006; DSE 2009 and Raadik, T. & Backhouse, G. (in prep)
3. Department of Climate Change 2008, *Carbon Pollution Reduction Scheme: Australia's Low Pollution Future*.

Chapter 2

1. National Biodiversity Strategy Review Task Group 2009.
2. Nitschke, C.R. & Hickey, G.M. 2007.

Chapter 4

1. Common terms include environmental markets, market-based instruments (MBIs), market-like instruments and payments for ecosystem services.
2. Martin, P. & Werren, K. 2009.
3. Reforestation, as defined for the first commitment period of the Kyoto Protocol, refers to the establishment of forest since 1990 on land that was previously cleared of forest.
4. See policy position 6.22 Carbon Pollution Reduction Scheme White Paper Page 6-50
5. Ibid p 6-48.
6. The term reforestation projects is used in this context as a generic term to cover projects that plant trees for carbon sequestration. It covers reforestation under a CPRS as well as carbon plantings for offsets. It covers small to large-scale plantings and includes the possibilities of monoculture, mixed species and biodiverse (EVC) plantings. It does not cover pasture.
7. See, for example, the Climate, Community and Biodiversity Standard at www.climate-standards.org
8. See www.ecosystemmarketplace.com.
9. See, for example, work being undertaken under the National Water Initiative including reports on interception activities www.nwc.gov.au
10. Department of Climate Change 2008
11. The Minister for Climate Change signed the instrument on 1 December 2008 and made it pursuant to subsection 40-1010(3) of the *Income Tax Assessment Act 1997*. A copy of the instrument and explanatory notes may be found at www.frli.gov.au (reference F2008L04546)
12. Centre for Corporate Public Affairs, 2007.

Chapter 5

1. Curtis *et al* 2008; Curtis, A. & De Lacy, T. 1996.
2. Australian Industry Commission, 1999.

Chapter 6

1. McAlpine *et al* 2007
2. Duggan *et al* 2008.
3. In July 2008, Victoria, along with the Commonwealth and the other Murray-Darling Basin States, signed the Intergovernmental Agreement on Murray-Darling Basin Reform, which entails new governance arrangements for the Basin, including for environmental water management.
4. Steffen *et al* 2009.
5. Cork, S. 2009; Williams *et al* 2008.
6. Victorian Coastal Council 2008.

Appendices

1. McGregor *et al* 2008.
2. Australian Bureau of Statistics 2008.
3. Bureau of Meteorology 2007b.
4. Cai, W. & Cowan, T. 2008.
5. CSIRO & Bureau of Meteorology 2008.
6. CSIRO & Bureau of Meteorology 2007.
7. Brereton, R., Bennett, S. & Mansergh, I. 1995.
8. Mackey, B., Watson, J. & Worboys, J. 2008.

Front Cover Photos:

Superb Fairy Wren.
Photo: Parks Victoria

Landcare volunteers, Torquay.
Photo: Andrew Chapman

Black Box at Ned's Corner -
a Trust for Nature property.
Photo: Paul Sinclair

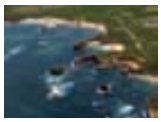
Lakes Entrance, East Gippsland.
Photo: Tourism Victoria; courtesy
of Destination Gippsland

Cattle in summer pasture,
near St Arnaud.
Photo: Andrew Chapman

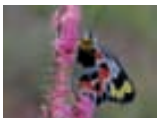
Razorback Ridge leading to Mt
Feathertop.
Photo: Tourism Victoria

Back Cover Photos:

Common Long-necked Turtle
Chelodina longicollis.
Photo: Bruce Cumming



Port Campbell.
Photo: Linda Jemmett

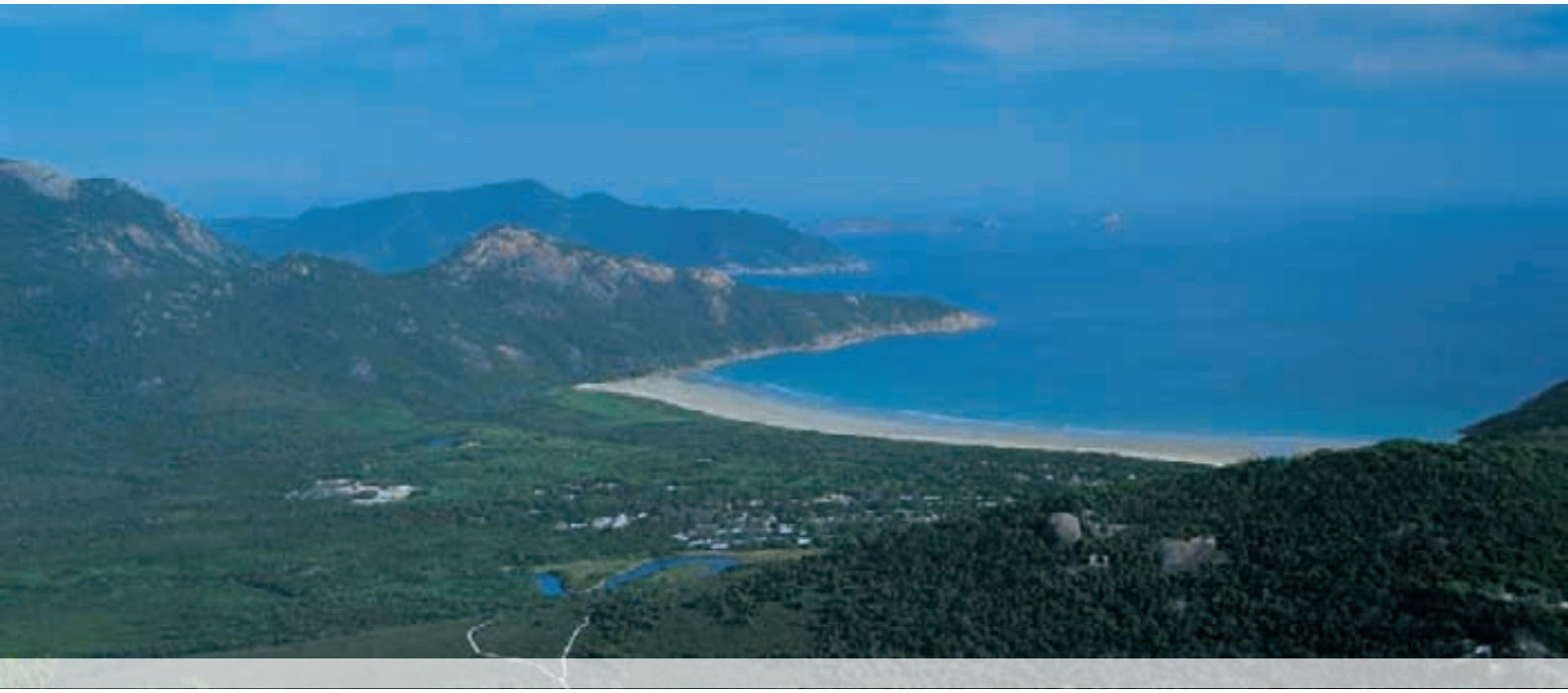


Imperial Jezebel or Imperial White,
Delias harpalyce.
Photo: Fay Gordes

Verco's Nudibranch,
Tambja verconis.
Photo: Jon Bryan

Mt Oberon, Wilsons
Promontory National Park.
Photo: West Gippsland CMA

Aboriginal scar tree,
Central Victoria.
Photo: Alison Pouliot



Mt Bishop, Wilsons Promontory. Photo: Tourism Victoria