

Towards a policy program for conservation of native biodiversity in rural Victoria: defining the problem, expanding the toolkit, and engaging the community

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Abstract

The past decade has seen our understanding of the causes of the loss of biodiversity improve markedly, as has our ability to estimate the scale of the loss and its implications, and to identify priorities for responding to the problem. This paper develops a conceptual framework to provide order and logic in a policy program to meet the nature conservation objectives set out in Victoria's Biodiversity Strategy. Examples of current projects are used to demonstrate what the framework means in practical terms. The role of an improved understanding of land use changes and their potential impacts on biodiversity can be located within this framework. The alignment of several recently commenced studies, including the state government's 'Ecologically Sustainable Agriculture Initiative' land use change project, will help the state's conservation program be proactive rather than reactive.

Keywords

biodiversity action planning, biodiversity conservation, community engagement, ecologically sustainable development, environmental management systems, research and development

Introduction

The adoption of the principles of ESD (ecologically sustainable development) is a recent direction for Victoria, and one that has many challenges and opportunities. Engaging with the challenges presented by native biodiversity conservation, a core objective in the 1992 national strategy for ESD (Commonwealth of Australia 1992) is important if Victorians are to have the opportunities for a productive and socially cohesive future in an environment where our biodiversity assets are protected and enhanced. This paper tries to open up discussion about the strategic actions needed to bring biodiversity conservation goals closer to mainstream government and community activities and thus closer to fruition.

Victoria's Biodiversity Strategy, the Flora and Fauna Guarantee Strategy published in 1997 (NRE 1997a,b,c) articulates the state government's policies for biodiversity and has strong links to other elements of the government's planning agenda, as outlined in the Growing Victoria Together statement (www.growingvictoria.vic.gov.au).

There is already a strong practical basis for moving forward to achieve biodiversity conservation. Under the directions for management defined in the Biodiversity Strategy, agencies within and outside the Department of Sustainability and Environment (DSE) have an ongoing series of agreed actions to enhance biodiversity conservation within their sphere of influence. This model needs to be applied to all Victorian agencies. Similarly, under bioregional approach, networks have been operating throughout Victoria to bring land and water managers together to examine biodiversity assets and set priorities for threatened species and ecological vegetation communities for all land tenures.

Embedding ESD principles (outlined in the national strategy) and consequent actions into the decision-making processes throughout government will provide the necessary leadership

and strategic alignment within government agencies, local government and the private sector. These actions will offer agencies new opportunities and perspectives to better fulfil their responsibilities.

Consumers (through informed choices), industry (through approaches such as the 'triple bottom line' and environmental management systems incorporating biodiversity) and community groups and individuals (through active involvement) will all contribute to the momentum of this new direction. We will also need to develop new tools to reach a broader range of landholders to improve biodiversity outcomes across rural Victoria.

Victoria's Biodiversity Strategy recognises that greater transparency and accountability about our performance in biodiversity conservation is required. On the broader scale, the government's actions to establish an ESD Commissioner and to re-introduce State of the Environment reporting support this thrust, while at the local government level *A Sensible Balance* (Thwaites 1999) and the national local government biodiversity strategy (Berwick 1998) promote access to biodiversity data for all the community.

This paper attempts to describe the variety of approaches that are available to facilitate more choices for the community in deciding the future of native biodiversity in the rural landscapes of Victoria. The approaches also promote and enhance a better understanding of the challenges through information sharing and decision-making. Together these will lead to better biodiversity outcomes.

Background

The core objectives of the National Strategy (Commonwealth of Australia 1992) are to:

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

The National Strategy also identifies the following guiding principles:

- Decision-making processes should effectively integrate both long-term 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 recognised.
- 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.

In the last few decades, we believe that the environmental considerations of ESD have largely been focused on three key elements:

- **Biodiversity protection.** Where valued biodiversity assets occur (e.g. diverse natural ecosystems, threatened species and communities, wilderness), how can we ensure their protection, both for our purposes and for their own right to exist?
- **Sustainable consumption.** Where natural resources are directly harvested (e.g. fish, native forests, water), how can we adjust our consumption patterns to bring them in line with the ability of these resources to be replenished?

- **Repair of critical damage.** Where parts of the physical environment have suffered catastrophic or chronic damage (e.g. soil loss, salinity, pollution, greenhouse climate change), how can we minimise further impacts and repair past damage?

More recently, in addition to these important elements, the concept of ‘ecosystem services’ has been used to better recognise the interdependence of all elements in ecosystems through the explicit identification of ecosystem functions as capital assets to be accounted for when making economic and social choices. The services provided by healthy, productive ecosystems are the basis of sustainable natural resource-based economic development, and of the quality of life of the community that lives and works within them. Beyond its intrinsic and utilitarian values, biodiversity is the life force that allows ecosystems to be healthy and productive. Biodiversity captures and transfers energy and nutrients, builds complex products, filters and regenerates wastes, and buffers and stabilises landscapes and seascapes in the face of climatic events.

If biodiversity is to be fully included in our move to ESD, we need to recognise and respond to issues and opportunities that arise in all natural resource-based activities (Figure 1). The inherent competing interests that arise must be resolved in practical ways. New approaches are required which increase the recognition of the role that biodiversity plays in ecosystem services, and which quantify this role in terms that are understandable in economic and community decision-making processes.

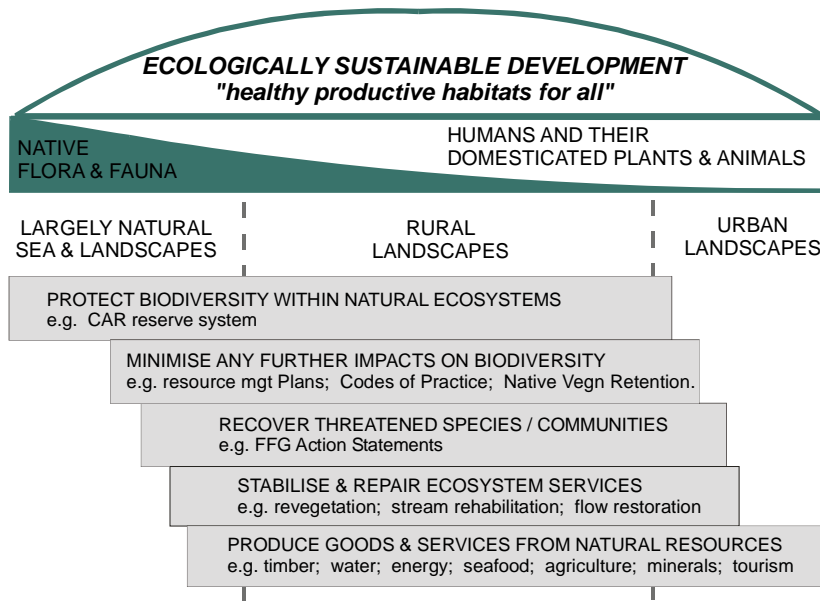


Figure 1 Incorporating biodiversity conservation into ESD.

The Way Forward

Tangible goals are important to focus actions and measure performance. The goals for biodiversity management are to ensure that within Victoria:

- there is a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation and habitats, leading to a net gain
- the ecological processes and the biodiversity dependent upon terrestrial, freshwater and marine environments are maintained and, where necessary, restored
- the present diversity of species and ecological communities and their viability is maintained or improved across each bioregion
- there is no further preventable decline in the viability of any rare species or of any rare ecological community
- there is an increase in the viability of threatened species and in the extent and quality of threatened ecological communities.

The task of meeting these goals is a substantial one. The current state of biodiversity in rural landscapes, and of the ecosystem services that we all depend on, is a legacy generated by a long period of (what we now know to be) often inappropriate land management practices. Not only have the consequences been severe for some of Victoria's natural resource assets, but some impacts will continue to unfold even though they are widely recognised and tackled (e.g. salinity, climate change). And although there has been an increasing recognition of the biodiversity conservation challenges in the last decade there has not always been a corresponding response in our biodiversity conservation effort. We need to revitalise and renew our efforts in accordance with a practical and widely shared strategic plan.

Key considerations for translating policy into action

This section outlines the way forward by identifying key considerations for translating policy into action, and then identifies the broad actions to be pursued in the medium term, using a framework of different landscapes and key integrating themes.

Developing a common understanding of the challenge

Victoria's Biodiversity Strategy uses bioregions as a natural framework for recognising biodiversity values and responding to the related management challenges. Recent work undertaken by Bioregional Networks (consisting of representatives of key natural resource managers for neighbouring bioregions) has used this framework to identify the needs and priorities for threatened species and communities (Lowe et al. 2000). The cross-tenure nature of bioregions has allowed responsibilities to be clarified and opportunities for partnerships to be better understood. The common understanding that is emerging from this process is being transferred into the various regional strategies and management plans (such as the CMAs' Regional Catchment Strategies) and will also provide a basis for reporting overall progress.

Engaging people through the right mix of approaches

Even where a common understanding exists it is important to recognise that the motivations and potential contributions of people from across the spectrum will differ. These differences must be understood and respected in order to establish the most useful policy mechanism or mix of 'mechanisms' for each situation. Approaches include:

- voluntary actions, both individual and collective (e.g. Land for Wildlife, Trust for Nature, Landcare, Friends groups)
- landholder actions supported by public funds (e.g. Bushcare)
- public land manager actions (e.g. parks and reserves and state forests management, Good Neighbour Program)
- commercial actions (e.g. private forestry, environmental management systems)
- consumer actions (e.g. 'clean and green' product promotion)
- regulatory actions (e.g. native vegetation retention controls).

The State's biodiversity objectives (NRE 1997a,b,c) will be achieved most effectively by maximising the complementary nature of these approaches so that gaps are minimised and overlaps are well understood.

Sharing the investment

Engaging such a wide range of players raises the question of the most appropriate way to share the investment required to meet the biodiversity objectives. The conservation of biodiversity for its' intrinsic value is a 'public good' activity that is coordinated by government on behalf of the community, but the importance of biodiversity as part of ecosystem services means that there are also private benefits to be gained by natural resource-based industries. Regulatory actions and 'duty of care' (Binning and Young 1997) provide a safety net to ensure that we do not continue to add unnecessarily to the challenges we face. Substantial efforts to redress the consequences of past commonly accepted but unsustainable practices are also required. Voluntary and in-kind efforts by landholders already make a valuable contribution, and this will continue to be encouraged, but we need to recognise the risk of 'burn-out' and work within the

practical limitations of this effort. Given these limitations and the magnitude and urgency of the task it is widely recognised that public investment is appropriate to lead this recovery. Equitable and transparent mechanisms are required to find the right balance between public and private investment and to facilitate the most cost-effective outcomes.

Maximising the outcomes

Biodiversity conservation is better achieved if we maximise synergies with the wide range of other programs that are required to achieve sustainable landscapes. Land protection activities (including those that address salinity, water quality and soil erosion) and activities to ameliorate climate change can contribute both to general ecosystem needs and to specific native flora and fauna habitat requirements. Approaches are required which can facilitate the multiple benefits that can flow from better integration.

Thinking regionally, acting locally

Biodiversity conservation management is first and foremost about what happens ‘on the ground’ to native animals and plants and their habitat, but we also need to think at other scales. The regional scale gives us the context for understanding the significance of assets and the related responsibilities (particularly for public agencies), and allows the strategic planning of priorities. The local landscape scale gives us the ability to think about ecological functions (e.g. groundwater and surface drainage issues) and about the viability of native flora and fauna populations (e.g. the size and linkage of remnant stands of native vegetation), and this allows the tactical planning of intervention (e.g. the most appropriate type and location of revegetation).

There are a variety of regional plans driven by different but often related issues (e.g. salinity, native vegetation, private forestry, waterway management, nutrient management). While these issues can be integrated *in principle* through more broadly conceived regional plans (e.g. catchment management strategies) they also need to be integrated *in practice* at the local level. Mechanisms are required which can integrate these issues to maximise multiple benefits and minimise unintended impacts at the local level.

Learning to work with the complexity and uncertainty of natural ecosystems

Biodiversity and natural ecosystems are inherently diverse and our knowledge of these assets is limited. Additionally, the complex character of these systems means they naturally function in a ‘chaotic’ manner, that is with a high level of uncertainty with respect to predicting specific outcomes. The consequences of this for biodiversity conservation are several:

- We need to be cautious when making decisions that could have significant consequences, leaving adequate room for errors that may arise from overly simplistic or optimistic scenarios.
- We need to accept that answers to our questions may not be clear-cut, but may only be able to be expressed as ‘best guesses’.
- We need to identify surrogates which help to simplify diverse or complex issues, but remain mindful of their limitations.
- We need to encourage and increasingly use new modes of research which model this complexity and allow us to incorporate uncertainty into decision-making.

Ensuring meaningful accountability

Given the diversity and complexity of biodiversity, it is important that common approaches and concepts are the basis of accountability processes. Key datasets (e.g. threatened species status and occurrence, vegetation type and condition mapping) and frameworks (e.g. bioregions, State of the Environment indicators) provide a common basis for identifying responsibilities and reporting performances. Due diligence for regulated processes can be undertaken with reference to this basis, as can risk management programs conducted by government agencies and other businesses.

These strategic approaches need to be considered in developing management approaches to the broad landscape types and themes that are identified in the Biodiversity Strategy as the most meaningful way to address the biodiversity objectives in practice.

Management approaches and actions

The strategic directions and themes for conserving biodiversity have previously been described in *Victoria's Biodiversity — Directions in Management* (NRE 1997c) and will not be reiterated in detail here. This document uses the key management approaches in these environments as the architecture upon which we can refine our medium-term strategic actions and outcomes. The strategy also contains a series of key directions for each major environment (natural, rural, etc.). These key directions will be used to derive actions that will be embedded in a reportable action program for all agencies.

In general, the approaches depend on the extent of biodiversity assets that remain, the integrity of ecological processes and the related level of human habitation and use. In largely natural systems there are greater possibilities to allow the continuation of broad-scale ecological services such as production of goods, regeneration processes, stabilisation processes, life-fulfilling functions and preservation of options.

In areas where natural ecosystems are more fragmented — a situation that is typical of rural Victoria — natural ecological processes (reproduction, migration, etc.) have been significantly altered at the broad scale by the history of clearing and land use. In these landscapes our approaches, in partnership with landholders, therefore need to be more proactive and focus on management practices and habitat restoration. Here there is great capacity for community engagement in the social and economic development of rural Victoria that is in harmony with restoring the landscape and biodiversity. For example, restoring native vegetation can have ecological, hydrological, economic and social benefits. In the urban systems, where the 'footprint' (Wackernagel and Rees 1996) of human habitation dominates, the impacts and ongoing pressures on biodiversity are greatest, but opportunities for enhancing a modern philosophy of stewardship (restoration) and education are also significant. People in these areas can contribute to improvement in other landscapes by their consumption choices and direct involvement in restorative activities with our rural communities.

In rural landscapes

The rural landscapes of Victoria are characterised by private-sector farming enterprises conducted by families and corporations producing food and fibre for local and export markets. These enterprises are dependant on the wide range of resources and ecosystem functions provided by nature, such as soils, water, minerals, construction materials, and services such as pest control, pollination and water purification. The wise use of these resources on an ecologically sustainable basis is fundamental to this sector of the Victorian economy. Rural landscapes also service the wider demands of society for potable water, tourism, recreation, and energy services.

Biodiversity assets in this environment now persist as remnants of the original ecosystems, with vegetation, wetlands and rivers on private and public lands. Because of past practices, such as clearing for agriculture and disturbance due to mining, much of our biodiversity in the rural landscape is heavily depleted in extent or in poor condition but has conservation significance. For example, around 60% of the extent of threatened vegetation communities and 30% of populations of threatened species occur on private rural lands. Further inappropriate grazing by domestic stock on remnant vegetation can cause the loss of native species and degradation of the ecological community. The loss of native vegetation has led to rising groundwater and the salinisation of both farming and natural areas. Poor land management practices can lead to the inefficient use of water and run-off of nutrients and chemicals into our waterways.

The condition of streams in rural landscapes is quite poor, with only 5% in good or excellent condition and 65% in poor or very poor condition. The diversion of water for human purposes has placed moderate to high stress on 104 rivers and streams during normal low-flow periods, whereas only 69 rivers and streams release sufficient water to prevent downstream

stress during low flow periods. (NRE 2002b) The condition of vegetation along the streamides is poorest in the rural landscapes. These results reflect the major effects that have occurred on native aquatic biodiversity that use these habitats.

Information about biodiversity

Developments in the policy and planning arena over the last decade have created new demands for information about biodiversity and changes in its status, both in Victoria and elsewhere in Australia. There are several key needs:

- an inventory involving the mapping of type, extent and condition of native vegetation (within each vegetation class), native species, wetlands and rivers
- a consistent set of rules for classifying each asset class and type according to priority for conservation
- a capacity to monitor change over time, and estimate historical change.

The Native Vegetation Management Framework (NRE 2002a) proposes systems for the bioregional conservation status, and an accounting system to address priorities and for monitoring for native vegetation (Parkes et al. 2003) that is based on these three elements. The inventory of vegetation in Victoria at the level of ecological vegetation class has just completed a 'first draft' coverage for the entire state. The Bioregional Network Analysis for threatened species (Lowe et al. 2000) establishes the bioregional conservation status for these species. The River Health Strategy (NRE 2002b) identifies tasks to achieve these, while a draft discussion paper for wetlands identifies a hierarchy — Ramsar, nationally important, bioregionally important — for wetlands (J. Holmes, pers. comm.). Such information is a key input to the Natural Heritage Trust and the National Action Plan for Salinity and Water Quality.

The information gathered from assessments of particular sites contributes to an overall picture of biodiversity management within a subcatchment or larger unit. This information will be a key input into policy, specifically into the design of regulations, planning systems, incentives and revegetation programs. The net gain concepts, based on habitat hectares, can help set priorities under each approach, and can help to judge the effectiveness of different mechanisms for achieving policy outcomes.

An estimate of the current situation in Victoria is shown in Table 2. It is based on limited data, and it should be noted that the proposed accounting system is not yet in place.¹

Table 2 Estimate of current progress in Victoria towards net gain - private land (NRE 2000).

Type of change in native vegetation	Estimated amount of change
Losses in extent	– 1000 habitat hectares/year
Losses in quality	– 4000 habitat hectares/year
Gains in extent	+ 100 habitat hectares/year
Gains in quality	+ 1500 habitat hectares/year
Total change in extent and quality	– 3400 habitat hectares/year

Improvements in decision-making at the landscape level

In the previous section, new mechanisms that directly influence landholder behaviour, and how improved biodiversity information is influencing them, were outlined. In this section, the integration of new information about biodiversity into decision-making at regional and catchment scales is outlined.

Integrated planning at the bioregional and catchment scale must be promoted to achieve multiple and integrated natural resource outcomes. We need to develop new tools for the community to visualise possible land use futures and undertake adaptive management research

¹ 'It is based on mapped information of extent, estimations of quality statewide, improvements in quality due to incentive programs and gains in extent through revegetation for salinity and greenhouse.' (NRE 2000)

and projects to optimise the mix of options for sustainable development. To achieve this, biodiversity outcomes must be embedded in all state-wide, regional and local government development and management plans for natural resource management, such as Regional Catchment Strategies and Municipal Strategic Statements. The publication and promotion of the Biodiversity Planning Practice Note (Department of Infrastructure 2002) is aimed at enhancing awareness of objectives for biodiversity conservation in local government. Supporting staff training and providing more accessible and useful information systems for biodiversity, such as the State's BioSites databases and the vegetation maps, will contribute to this aim. With this in place, regular reporting on biodiversity outcomes in state-wide, regional and local government development and management plans will provide feedback on the effectiveness of these activities.

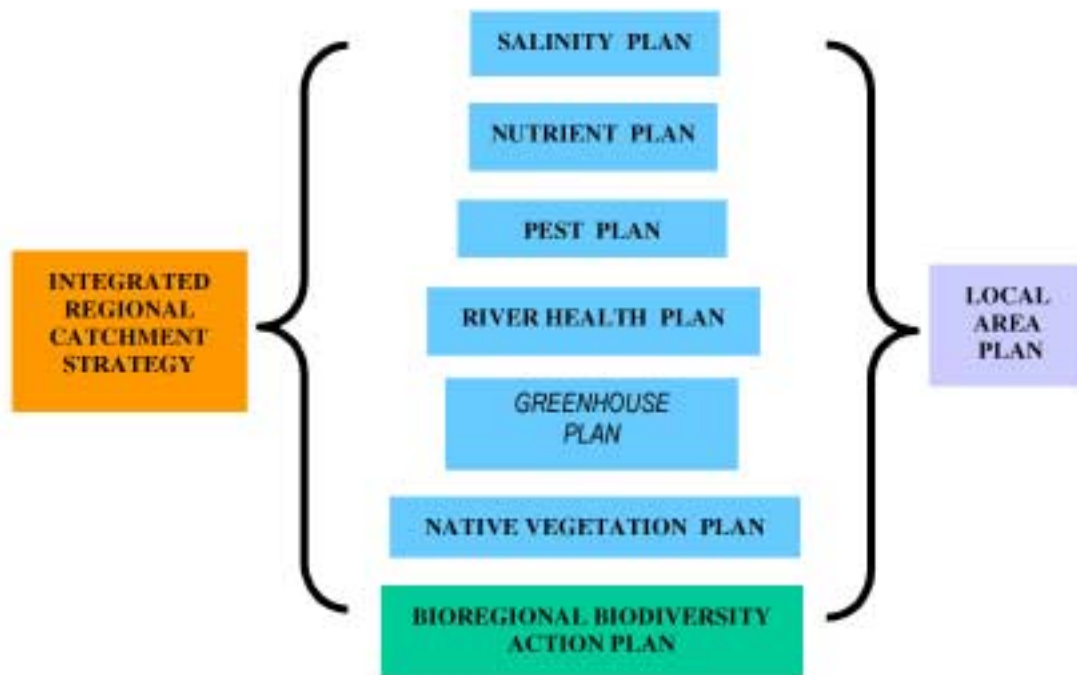


Figure 2 Integrating biodiversity into planning.

Biodiversity action planning is Victoria's way of getting biodiversity embedded further into integrated catchment management (Platt and Lowe 2002). The Regional Biodiversity Strategy prepared under this planning process provides details and maps of the priority biodiversity assets within the area and the actions that are required to progress towards the state-wide biodiversity goals. Detailed local landscape plans for conserving biodiversity within each bioregion are being developed within each region as partnership projects between the key stakeholders, principally the Catchment Management Authorities and DSE.

The strategy for each bioregion will have the following aims:

- Model a regional approach, rather than a single-species approach, to biodiversity management.
- Identify mechanisms for more efficiently conserving key biodiversity assets (threatened vegetation communities, threatened taxa, wetlands and rivers) in the bioregion, by focusing on the management of key threats across all land tenures.
- Identify priorities for the protection, management and restoration of biodiversity.
- Present priorities in spatial form so that they can be overlain with those of other environmental programs, such as salinity control and greenhouse amelioration, to encourage synergies.

Bioregional planning provides a framework for thinking through how landscapes (agricultural systems, lifestyle properties, public land frontages along creeks, etc.) might be redesigned to deliver biodiversity benefits, as well as other public and private benefits. Such planning will identify priority assets to be protected, as well as areas where revegetation is required to expand or buffer areas of high conservation significance or important habitat for threatened species. Landscapes that are thus 'designed' for maximising biodiversity outcomes can be matched to scenarios that maximise agricultural production, water use, greenhouse sequestration and other functions.

In Victoria, biodiversity information is being fed into the landscape scale biophysical models, within the national Landmark project (MDBC 2002), that is being built to study water use and revegetation scenarios in the Goulburn Broken Catchment. Economic modelling to determine the impacts of each scenario is to take place in a later phase of the project. Data about biodiversity that is about to be incorporated into this model includes:

- data layers for all ecological vegetation types
- criteria relating to size, quality and connectivity of vegetation patches that reflect the requirements of selected threatened species.

Scenarios are being developed within the model that reflect the different extent to which biodiversity conservation requirements are achieved. It is expected that changes in habitat hectares under each scenario can be indicated for each subcatchment or ecological vegetation class. While the machine rules for incorporating biodiversity into the model are relatively crude, the project is providing useful contributions to understanding and setting biodiversity targets that are required as part of integrated planning at the bioregional and catchment scale. The National Action Plan for Salinity and Water Quality (NAP) is funding enhancement of this work and its transfer to the other NAP regions in Victoria. Wilson and Lowe (in these proceedings) summarise aspects of this work.

The recently released Victorian River Health Strategy is another important contribution to the landscape approach to biodiversity attributes and the highlights the restoration of riparian vegetation. Key institutional activities in the strategy include finalising the bulk water entitlements and environmental flow regimes across the Victorian water sector ensuring adequate water for the environment.

Mechanisms for influencing property-level decisions about biodiversity

The advances in information systems for biodiversity are now being linked to the development of new mechanisms for achieving public conservation goals on private land. These advances can be broadly grouped as:

- how payments for conservation services are delivered,
- the incorporation of biodiversity standards into environmental management systems
- how priorities are set within voluntary programs, and
- farm business approaches

In each case, the advances in knowledge are helping to prioritise sites to be protected, enhanced and restored, and are ensuring maximum result for a given effort (whether public or private effort).

Payments for conservation services

Payments to landholders for conservation management has generally taken the form of one-off grants in Australia. In other countries, payments have been more frequently linked to management agreements lasting over time.

In order to overcome information problems associated with negotiating individual agreements with farmers and with standard payment systems, DSE with the Department of Primary Industries is experimenting in the BushTender trial with auction systems (Stoneham et al. 2000). The first BushTender trial took place in northern Victoria. The next trial, to take place in Gippsland, has recently been announced.

As part of the BushTender trial, DSE has developed a 'Biodiversity Benefits Index' that links conservation significance and vegetation quality to the cost of undertaking management actions necessary to maintain or enhance native vegetation. The relative conservation value of each site, the amount of habitat service being offered by each landholder and the cost of each bid will be combined into a Biodiversity Benefits Index using the following calculation:

$$\text{Biodiversity Benefits Index} = \frac{\text{Conservation Value Score} \times \text{Habitat Services Score}}{\text{Cost}}$$

The Conservation Value Score reflects the value of the vegetation now, and is based on type of vegetation and its conservation status and quality, presence of threatened species, and position in the landscape. The Habitat Services Score captures the extra value that the landholder has committed to provide through maintenance or improvement. It incorporates an area multiplier. If the landholder forgoes a use right (e.g. collecting firewood), this is treated as effectively providing a service. If the habitat score (see Table 1) includes a score of 15 out of 25 for the understorey component, they will get this score for maintenance actions, but zero if they continue with actions that lead to loss of understorey. Cost is the sum that the landholder has tendered.

The Biodiversity Benefits Index concept can be used in standard payment grant programs. It will help to focus effort on high-priority actions whenever landholders are paid for revegetation efforts or other conservation actions. Stoneham et al. (in these proceedings) describe this approach in more detail.

Incorporating biodiversity standards into environmental management systems

Victoria's Biodiversity Strategy explicitly refers to the potential of environmental management systems (EMS) to deliver biodiversity outcomes in agriculture. Such EMSs would provide information to farmers about the direction in which their management should change in order for them to be part of a recognised scheme. Consequently, considerable effort has been given to investigating what the biodiversity module of an EMS would look like in practice.

Meeting performance standards would be an integral part of meeting the biodiversity management requirements of an EMS (Anderson et al. 2001; see also Mech and Young 2001 on the place of performance standards in EMS). Scoring vegetation quality and identifying the increase in score that is likely to follow from adopting certain management actions is the basis for such a performance standard.

At the present time few farms have adopted environmental management systems that are consistent with the ISO 14001 system, but this is likely to change in the next few years. Biodiversity will be an integral part of such systems if they are to meaningfully claim environmental credentials. DSE is trialling the application of a biodiversity module for EMS systems; Anderson et al. (2001) have proposed how this might be done. Field trials are under way with the GippsBeef and the Southern Farming Systems (grains) groups to develop practical methods to apply the theoretical modules. Seymour et al. (in these proceedings) describe another trial EMS approach that includes some elements of native biodiversity.

Ultimately, EMS systems involve providing the information to consumers that allow them to focus their preferences on conservation values that are most significant, and for farmers to offer conservation services that meet those preferences. Consumers will be informed, for instance via labelling and certification, that a product has met the relevant standards. The producer will require detailed information from a biodiversity assessment, and management recommendations that capture the critical elements of native biodiversity on their property.

Other voluntary programs

For many years the Land for Wildlife program has been the public face of NRE's (and now DSE's) conservation efforts on private land. It is complemented by the extension programs of Trust for Nature, Greening Australia (Victoria) and Catchment Management Authorities.

DSE's Parks, Flora and Fauna Division has established links at state and national levels with 'mainstream' extension programs to ensure that biodiversity messages are included. The Division is having input into the national FarmBis program, and is writing a biodiversity module for NSW Agriculture. Collaboration is occurring with industry-specific programs such as the national Sustainable Grazing System program, funded by Meat and Livestock Australia. A new initiative involves working closely with the Sustainable Grazing Project, funded by the Wool Program of the Department of Primary Industries (DPI). In support of all such initiatives, a package of information directed at extension officers, and their programs, has been produced by the Living Systems project. This package, available on CD-ROM and the Internet, is being rolled out at forums across the state.

Biodiversity and farm businesses

Exploring how biodiversity priorities established at a landscape level are translated to the farm business level is an important question. It is particularly relevant where the farmer lacks information on the implications for the farm business of adopting technical options associated with biodiversity.

Crosthwaite & Malcolm (2000) have recently explored the opportunities for farm businesses to maintain long-term viability while adopting conservation measures. This involves evaluating alternative conservation and investment options in terms of expected profitability, cash flow and risk. The aim is to identify possible business paths that allows for farmer goals and sustainability. What incentives are then required to shift individual farmers onto such a path can then be considered.

Two new projects have recently commenced in this area:

- 'Marrying biodiversity conservation and productivity in wool production landscapes – vision, practicalities and how to make it happen'. This project is funded under the Land, Water and Wool partnership program of Australian Wool Innovations and Land & Water Australia (DAV39).
- 'Incorporating landscape visions for biodiversity into farm businesses in northern Victoria – making it a reality'. This project is funded by the Murray-Darling Basin Commission, with supporting funds from DSE Catchment & Water Services, under the Native Vegetation R&D program managed by Land & Water Australia (DAV40).

These projects explicitly seek to relate landscape-level priorities for biodiversity to farm business realities.

R&D into ecologically sustainable agricultural systems

DSE and DPI are involved in several initiatives that foster research and development (by both public and private sectors) of best practice land management and innovative farming systems that are 'biodiversity friendly' or restorative of biodiversity or ecosystem functions. Most of these projects fit within the Ecologically Sustainable Agriculture Initiative (ESAI). These projects are applied R&D in that they involved either acquiring new knowledge directed towards specific aims or drawing on existing knowledge in new ways.

At a national level, Land and Water Australia (LWA) has shown a particular interest in engaging with these biodiversity projects and have encouraged the development of the two farm business projects outlined above.

The topics of these initiatives are outlined in Table 1.

Table 1 Current rural landscapes R&D projects involving Parks, Flora and Fauna Division.

6 ESAI projects 1 Land use change 2 Threatened species 3 Shelterbelts 4 Water use 5 Riparian zone 6 Grazing	3 agribusiness-related projects 7 Best agricultural practice – grazing industries (NVI) 8 Environmental impacts of raised bed cropping (GRDC) 9 Biodiversity conservation and productivity in wool production landscapes (LWA-WI)	1 catchment-focused project 10 Landscapes & farm businesses (LWA-MDBC)
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Conclusion

The past decade has seen our understanding of the causes of the loss of biodiversity improve markedly (NRE 1997a,b,c), as has our ability to estimate the scale of the loss and its implications, and to identify priorities for intervention to respond to the problem. Now is a good time to move from being reactive to proactive; by identifying possible land use changes and forecasting their potential impacts, thus creating an ability to avoid the major negative impacts on biodiversity. The ESAI land use change project, which organised the conference leading to these proceedings, is an opportunity to contribute to our community's understanding and provide knowledge so that more informed choices can be made. This proactive approach requires a different technology and mode of operation than does the reactive approach. The 'new way' includes developing a better understanding of global, national, local and personal drivers, which is a focus of the current policy and research project. Interestingly, these new tools will enhance the tools we use in the reactive approach. This would seem to improve the chances of biodiversity being 'OK'.

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