

6 Recommendations and Implementation

The Regional Biodiversity Plan for the metropolitan area seeks to guide community and Government agencies. For implementation to be successful, specific and concerted efforts by all land managers are required. The following actions are of particular importance:

- retention of remnant vegetation
- restoration and regeneration of remnant vegetation
- revegetation with appropriate species and genotypes in high priority areas
- construction and management of wildlife corridors.

6.1 Native Vegetation Conservation

Retention

With little more than 12% of the total native vegetation remaining in the Adelaide Metropolitan Area, all remnant vegetation is considered important. Intact remnant vegetation has many types of plants, from grasses and shrubs to trees, which in turn support many native animal species. Intact remnant vegetation is self-sustaining and therefore requires less input in the form of active management. Consequently, retention of remnant vegetation is cheaper and must be considered as cost effective. The loss of remnant vegetation from land clearing cannot be offset and compensated by replanting in other “more appropriate” areas (Croft *et al.* 1999).

Retention of remnant vegetation in the Adelaide Metropolitan Area is achieved in a number of ways. The *Native Vegetation Act 1991* is intended to “...control the clearance of native vegetation.” The *Native Vegetation Act 1991* however, does not provide protection to native vegetation over a large portion of the metropolitan area. The recent amendment to the *Development Act 1993* will offer some protection to ‘significant trees’ in the metropolitan area. The legislation declares any tree (except proclaimed plants) significant if the circumference at one metre from the ground is greater than 2.5 metres. Further to this, council may in their Development Plan, declare a tree as significant if:

1. it makes an important contribution to the character or amenity of the local area; or
2. it is indigenous to the local area and its species is listed under the *National Parks and Wildlife Act 1972* as a rare or endangered native species; or
3. it represents an important habitat for native fauna; or
4. it is part of a wildlife corridor or a remnant area of native vegetation; or
5. it is important to the maintenance of biodiversity in the local environment; or
6. it is a notable visual element to the landscape of a local area.

It is unlikely that this legislation will offer protection to other native plants aside from trees.

Retention of remnant vegetation requires some input in the form of fencing, destocking, fire management and problem species control (Willoughby 2000).

There are also other non-legislative means of retaining remnant vegetation. For example, the UFBP has:

- encouraged the integration of priorities into local government decision-making and land management practices
- commented on a number of Planning Amendment Reports and Development Plans
- fed priorities into the 1998 Metropolitan Planning Strategy
- worked closely with industry to identify, conserve and manage priority sites (eg SA Water, United Water, Penrice).

Restoration and Regeneration

Because of past and present management practices, much of the remnant vegetation in the metropolitan area is in a degraded condition. These inappropriate management practices have resulted in thinning of the tree canopy and a reduced diversity of understorey plants. These areas are likely to have a substantial portion of their seed bank stored in the soil. If fenced from herbivores (rabbits in most cases, but also kangaroos in some areas) and managed to reduce the competition from weeds, these areas will regenerate with minimal further input. The removal of herbivores and weeds (using minimum disturbance techniques) to facilitate natural regeneration is a higher priority than replanting with native species.

Successful restoration and regeneration cannot be achieved in the short term. Instead, such projects must assess results over several years. The ultimate aim of restoration and regeneration is to reinstate the processes of natural regeneration (Croft *et al.* 1999).

Priority for restoration and regeneration should firstly be directed towards threatened plant communities (these were outlined in [Chapter 4](#)) and secondly to regionally threatened communities such as the Reedbed communities and *Callitris gracilis* Low Woodland. However, local remnancy must also be considered. In areas that have suffered widespread clearance, a small degraded patch of native vegetation is important simply because of its local remnancy. This is especially pertinent to suburban areas close to the city. These areas were cleared for agriculture very early following European settlement, and since then they have been developed for residential use. The result being that very little in the way of remnant vegetation remains.

The work undertaken by The National Trust of South Australia at Watiparinga Reserve is a fine example of successful restoration and regeneration. Using minimum disturbance techniques, control of rabbits and weeds received highest priority; consequently, the number of native plants found in the reserve has risen significantly—all a result of natural regeneration (Robertson 1999).

A general rule suggests that restoration of existing native vegetation should be a higher priority than revegetation of cleared areas. Biodiversity continues to decline in existing areas, while it is already lost in cleared areas. Resources need to be directed to sites where the **rate of decline** is greatest. As cleared areas have little or no current biodiversity value, their rate of decline is minimal. Most existing native vegetation is currently being degraded at a much greater rate and therefore demands urgent conservation efforts.

Revegetation

Revegetation is the re-establishment of perennial vegetation in an area that has been completely or partially cleared. Revegetation within the context of biodiversity conservation has a narrower definition than in other contexts. For example, revegetation for biodiversity conservation must plant only species that were originally found in that location, and use seed from plants that are as near as possible to the planting site.

The use of indigenous plants of suitable provenance is important for a variety of reasons, not least because planting provenance species maintains the genetic integrity of a particular area. Revegetation projects using plants from a local seed source are adapted to local weather conditions and can cope with extreme events such as drought and flooding. Locally indigenous species have the best capacity to provide habitat, food and other resources for wildlife. Furthermore, local plants are a part of natural and cultural heritage and their continued existence is fundamental to maintaining these heritage values.

Successful revegetation for biodiversity takes careful planning. Ideally, revegetation projects should be completed over several stages. Establishment of grasses and other pioneer species should be done first to avoid competition with larger trees and shrubs.

Revegetation may involve the planting of tubestock, but it is far more economical and successful to use direct seeding with many species (Croft *et al.* 1999). However, the suitability of direct seeding must be considered within the context of availability of locally sourced seed, ease of germination and low rainfall conditions. It is estimated that direct seeding uses as much as 5-10 times the amount of seed when compared with planting of seedlings (Mortlock 2000). Furthermore some species are best grown from cuttings and therefore require the use of tubestock. Using a combination of both direct seeding and tubestock is likely to achieve optimum results.

Stock and pest species management is an integral component of any revegetation project (Dalton 1998). Stock will damage native plants through grazing, trampling and ringbarking. They also damage the soils through compaction and can bring in the seeds of certain invasive weeds. Weeds compete with native plants for space, moisture, nutrients and light (see [Chapter 5, Environmental Weeds](#)). Animal pests such as rabbits and hares eat native natives and if left unmanaged can destroy revegetation efforts (Dalton 1998).

Within the context of revegetation for biodiversity conservation, the State Revegetation Strategy (SRC 1996) defines revegetation broadly to include regeneration, and active management of remnant vegetation. The Strategy, offers some useful guidelines when revegetating for biodiversity, including:

- the use of indigenous plants from local seed sources;
- establishing and maintaining understorey species, with the aim of enhancing the value of vegetation for wildlife habitat and to establish stable ecosystems;
- actively managing remnant vegetation, which includes controlling pest plants and animals;
- establishing vegetation corridors linking areas of remnant vegetation, with particular attention given to ridge tops, streamlines and roadsides;
- fencing off areas of remnant vegetation areas near isolated trees to prevent stock grazing and to encourage natural regeneration of remaining native species;

- use of buffer zones around remnant vegetation to assist in the protection of these areas from invasion by weeds;
- a recognition of the importance of dead and fallen trees and rocky outcrops in providing habitat for flora and fauna.

Priorities (from Willoughby 2000) for revegetation projects should be given to:

- buffers to existing stands or remnant trees or blocks of remnant vegetation;
- providing feeding or breeding habitat for nationally threatened species;
- re-establishing regionally important plant communities;
- establishing linear vegetation or ‘stepping stones’ which link blocks of remnant vegetation;
- establishing ‘bulges’ along linear remnants which link blocks of remnant vegetation.

Wildlife Corridors and Other Links

The remnant vegetation of the Adelaide region is highly fragmented; it is found as small islands in a sea of suburbia and agriculture. The establishment of links between these fragmented remnants will allow the movement of fauna between these patches, thus maintaining genetic diversity and allowing escape and re-colonisation following catastrophic events such as wildfire (Croft *et al.* 1999). To be effective wildlife corridors should:

- have a short distance between remnants (<1km) and be as wide as possible (>50m);
- be replanted with suitable species to the area and landform, from locally collected seed (<5km);
- include understorey species; and
- be protected from grazing (Croft *et al.* 1999).

Road, railway or watercourses with remnant vegetation may already provide a link between remnants. These existing linkages however, frequently suffer from excessive weed competition and herbivory. Additional fencing, strategic management of weeds and in some cases revegetation would enhance the design and performance of these existing corridors.

In Adelaide, watercourses in particular lend themselves as suitable wildlife corridors. Although highly degraded, they frequently have some canopy species remaining, are usually situated away from roads and are natural linkages between remnant vegetation.

6.2 Strategic Management of Conservation Threats

Adaptive management

Natural resource management is full of uncertainties and precise outcomes of our management actions are rarely known. Adaptive natural resource management is a means of addressing these uncertainties while still implementing on ground actions.

It is a process of implementing management actions in a way that generates information to improve future management, while at the same time attempting to achieve other management objectives (Petterman 1998). Adaptive management forces us to acknowledge uncertainty, and to follow a plan by which decisions are modified as we learn by doing (Parma *et al.* 1998).

The framework for adaptive management is essentially a five-step process (Forest Practices Branch 1999):

- 1) **assess the problem**- here the scope of the management problem and measurable objectives are defined.
- 2) **design a management plan and monitoring program** that is both informative and provides reliable feedback.
- 3) **implement and monitor the plan**, documenting any deviations from the plan.
- 4) **evaluate the plan** by comparing anticipated outcomes with actual outcomes.
- 5) **adjust the plan** according to the results obtained in step 4.

6.3 Target Groups

Land managers of remnant vegetation in the metropolitan area are faced with a tremendous opportunity to halt the loss of biodiversity for the benefit of our own and future generations.

The UFBP has identified six main target groups who can make a practical contribution to the conservation of biodiversity in the Metropolitan Adelaide Region. The groups are:

- **Property owners**- owners of urban fringe land, commercial horticulturists and industry
- **Field operators**- council and government agency field operators, horticultural landscapers
- **Members of Parliament and Councillors**
- **Teachers**
- **Community** - individuals and groups
- **Planners and Developers**

The importance of biodiversity conservation and what these groups can do to assist is covered in a series of six brochures produced by the UFBP, the main text of which is reproduced here (UFBP 2000). In addition, other groups and organisations have an essential role to play in the conservation of biodiversity. Some of these are community-based organisations working in bushcare projects and others are owners of large tracts of bushland in the region.

Property Owners/Managers

Owners of bushland within the region include private individuals and companies, local government, National Parks and Wildlife South Australia, Forestry SA, SA Water and the National Trust of South Australia. Many areas owned by these agencies now have 'friends' groups associated with them.

Landowners are in an ideal position to determine the future management of remnant vegetation on their land and many are already participating in bushcare programs.

The preparation and implementation of a management plan is a fundamental component of the management of remnant vegetation. Those involved in management of remnant vegetation should have the skills associated with bushland management. Important skills include native plant and weed recognition, weed control (in particular minimum disturbance methods), seed collection and propagation.

Landholders will ideally work together to address issues that require an integrated approach. In particular, weeds and feral animals require a regionally integrated approach to their management.

Landholders living adjacent to remnant vegetation have a greater responsibility to control domestic animals ([Chapter 5, Predation](#)) and plant appropriate plants ([Chapter 5, Environmental Weeds](#)) on their land.

Field Operators

Field operators, whether working with local government, government agencies, golf courses, schools, or as professional horticulturists and landscapers, are in a leading position to help protect our natural biodiversity.

Field operators who are aware of the loss of native flora and fauna and are committed to redressing the balance when the opportunity arises, are vital in restoring Adelaide's regional biodiversity.

Field operators, like property owners are frequently the ones who implement, and sometimes develop management plans for areas containing remnant vegetation. Knowledge of native plant/weed identification, and seed collection/propagation are important in the field operator's role of remnant vegetation management.

Field operators can also encourage their organisation to use local native species in any plantings that may occur in their area. Species chosen for planting should:

- come from a seed source as close as possible to the area being planted, and
- include all levels of vegetation structure (grasses, groundcovers, shrubs, and trees).

Before slashing activities, but in particular major works activities, a site assessment pertaining to the presence of native plants should be carried out. The dissemination of information regarding the presence of native plants to those persons actually doing the work is critical.

Teachers

Teachers are in a position to impart knowledge about what biodiversity is and how it is important (see [Chapter 1, Values of biodiversity](#)). Teachers can inform students on what they as individuals can do to aid biodiversity conservation.

Teaching and learning about biodiversity and its importance is essential if we as a community will effectively conserve biodiversity. At the Earth Summit in 1992, 150 nations including Australia endorsed Agenda 21. In it, world leaders asserted that:

'... education is critical for promoting sustainable development and improving the capacity of people to address environment and development issues.... It is also critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decision-making.'

The most appropriate focus for the study and protection of biodiversity is a bioregion. This term combines life (bios) and territory (region or area of understanding). Bioregional strategies refer to the restoration of the earth's natural plant and animal diversity with a regional framework and of the necessary cultural adaptations to achieve it in specific bioregions. Ecology, language studies, poetry, Aboriginal studies, art in all its forms, Society and Environment, environmental education and cultural history are all tools to be used in bioregional studies.

All teachers, class teachers or subject teachers, can therefore help develop in students a "sense of place" in relation to their bioregion, where they live, go to school and play. This means appreciating what Adelaide was originally like, understanding what it is like now, and then developing in students a "sense of place" so that they want to protect and restore Adelaide's diverse natural areas. If students understand and take on environmental responsibilities and projects, our environment will benefit.

Community Groups

Community groups involved in local bushland conservation include Friends of Parks, Friends of National Trust Reserves, Friends of the Forests, Landcare, Coastcare, Bushcare, Adelaide Plains Flora Association, school and service groups. Projects are currently underway in bushland owned or managed by private individuals and companies, local government, National Parks and Wildlife South Australia, Adelaide University, Forestry SA, SA Water and the National Trust of South Australia.

These projects rely extensively on volunteer workers, although many are supported financially by the Natural Heritage Trust, UFBP, Catchment Water Management Boards, local government, other organisations and agencies.

Community groups, often have people in them who are well versed in the threats and management of remnant vegetation. These groups are an extremely valuable resource, often coordinating and implementing tasks frequently undertaken by government bodies such as NPWSA.

Community groups like property owners and field workers as discussed above, are frequently involved in the on-ground management of remnant vegetation. Community groups need to have an understanding of similar issues such as native plant and weed recognition, minimum disturbance weed removal, and other management issues.

Planners and Developers

Planners, builders and developers can support the community and government in enhancing the biodiversity of the Adelaide region, in our backyards, open spaces, roadside verges and recreational areas, by familiarising themselves with the *National Strategy for Ecologically Sustainable Development*. This strategy aims for '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'.

Decisions by local authorities on development applications should take ecologically sustainable development (ESD) goals, including biodiversity, into account. The extent to which this is possible will depend upon:

- councils being proactive and strategic about promoting good development practices, and
- the policies and controls in the relevant Development Plan(s) for the area.

Councils are required to prepare strategic plans for their area (*Local Government Act 1999*) and to regularly review the effectiveness of their Development Plan (*Development Act 1993*). These processes provide a sound basis for determining the extent to which local planning decisions reflect ESD goals as set out in the Government's Planning Strategy and other policy documents.

Councils have a significant opportunity to guide development that embraces ESD and biodiversity conservation principles. Ideally, councils will have a comprehensive resource inventory on the biodiversity of the council area.

Does the Council Development Plan:

- Use zoning to protect sensitive areas (eg coastal areas, remnant vegetation, watercourses, floodplains) from inappropriate development?
- Support Council-wide objectives and principles with more detailed zoning provisions - including performance measures to promote environmental compliance and give greater certainty?
- Contain policies to ensure that new development supports catchment-wide strategies for managing stormwater?
- Promote energy efficiency in subdivision and building design?
- Seek to ensure that open spaces in newly developing areas are linked in ways that accommodate the movement of wildlife and/or enhance the viability of biological communities?

A range of resources are available to assist Councils in preparing Development Plan amendments that will provide clearer policies regarding ESD and biodiversity principles. For example, the Planning SA website (www.planning.sa.gov.au) contains information on performance-based policies for development in industrial, residential and rural areas. Planning SA is also working jointly with the Torrens and Patawalonga Water Catchment Management Boards to release a package of policy information and design guidelines dealing with planning and managing urban stormwater.

Assessment practices also have an important role to play:

- Is pre-lodgment consultation encouraged as a means of improving the design quality and compliance of applications?
- Are applicants asked for site assessments so that impacts on adjacent properties and key site features are considered in the design process?
- Is there a register of significant trees or remnant bushland areas to assist applicants?
- Are Land Management Agreements (or Heritage Agreements) used to provide a framework for improved environmental management on key development sites?

Builders and developers can contribute to biodiversity conservation:

Conserve what is already there

- Seek professional advice to identify remnant native species on the land being developed.
- Retain native vegetation and plan development as far away as possible from remnant vegetation.
- Protect native grasses and shrubs by the use of boardwalks in ecologically sensitive areas rather than cement paths.
- Protect and conserve biodiversity from pollution, eg water run-off from roads, by directing road run-off water into culverts and not natural creeklines.
- Site access paths to housing areas outside and around, but not through, bushland areas.
- Include the regeneration of remnant areas (open space) to extend natural areas within new housing developments.
- Use indigenous species when landscaping the subdivision and encourage residents or other property owners to do the same in order to bring native wildlife into the area.
- Maximise the use of recycled materials in developments to resist increasing the use of new materials from natural areas.

Plan for environmental quality

- Create developments that are in harmony with the natural surroundings; for example choice of building materials, style of building and use of colours.
- Minimise pollution of air, water and soil by planning for energy and water efficient homes.

Protect the natural environment

- Conserve remnant vegetation, bushland corridors and open space in urban subdivisions.
- Restore natural ecosystems as part of subdivision developments.
- Voluntarily move towards a 10% standard of maintaining the local biodiversity, eg on any large scale housing development of 40 ha or more,
- establish and maintain wildlife corridors alongside watercourses.
- Plan for 'cluster-housing' in new areas to minimise encroaching on remnant vegetation, bushland and wildlife habitats.
- Plan for community open spaces, eg linking individual backyards with community open spaces.
- Maximise the use of local native plant species in cleared areas not required for development to encourage native wildlife by increasing the area available to them and by establishing corridors.
- Use cleared land for community purposes and avoid areas with remnant vegetation.

Plan movement and access

- Encourage the use of linear parks and multi-purpose trails for cyclists and walkers that avoid remnant bushland.
- Use boardwalks to pass over sensitive areas rather than establish walkways going through them.

- Plan suburbs so that residents are not dependant on cars. For example walkways that are placed to connect streets and siting commercial areas in a central location.

Educate self and others

Become familiar with the aims of biodiversity conservation and bushland restoration. Increase expertise of customer service staff and housing consultants in giving advice on local species, biodiversity conservation and restoration principles, and actions so that they can pass this on to homebuyers.

Styles of planning need to be innovative and involve best practice to encourage sustainable use and development of natural resources – the protection of the atmosphere, the seas, the land and their biological diversity are challenges to be embraced by all planners and developers.

State Government Agencies

National Parks and Wildlife SA

As little as 5% of the metropolitan area is afforded protection under the NPWSA Act. However, almost 25% of the remnant vegetation in the Adelaide area is afforded protection. These areas house many rare and threatened species and plant communities. Consequently, they are the foundation of biodiversity conservation in the metropolitan area. However, the biodiversity in these areas remains under threat from weeds, introduced animals and inappropriate recreation. The resource information in this document and its priorities provide a regional context for reserve management plans. The numbers of rare and threatened plants and animals in these areas combined with clear threatening processes requires a long-term financial commitment that values biodiversity and is serious about addressing biodiversity decline.

SA Water & Forestry SA

Large areas of remnant vegetation exist on both of these state government owned lands. Some of these habitats house nationally significant species and vegetation communities. In these instances, their potential inclusion in the national system of reserves should be addressed. The resource information in this document and its priorities provide a regional context for management of these areas.

6.4 Information Gaps

Detailed information on species, ecosystems, populations, threats and other ecological processes is the cornerstone of the biodiversity planning process. In many areas, this information is sparse, especially for invertebrates and other life forms such as fungi, lichen and algae. Even plants and vertebrates are poorly understood within the context of ecological interactions. Research into these areas will further consolidate the required information base for allocating limited resources to priority conservation activities.