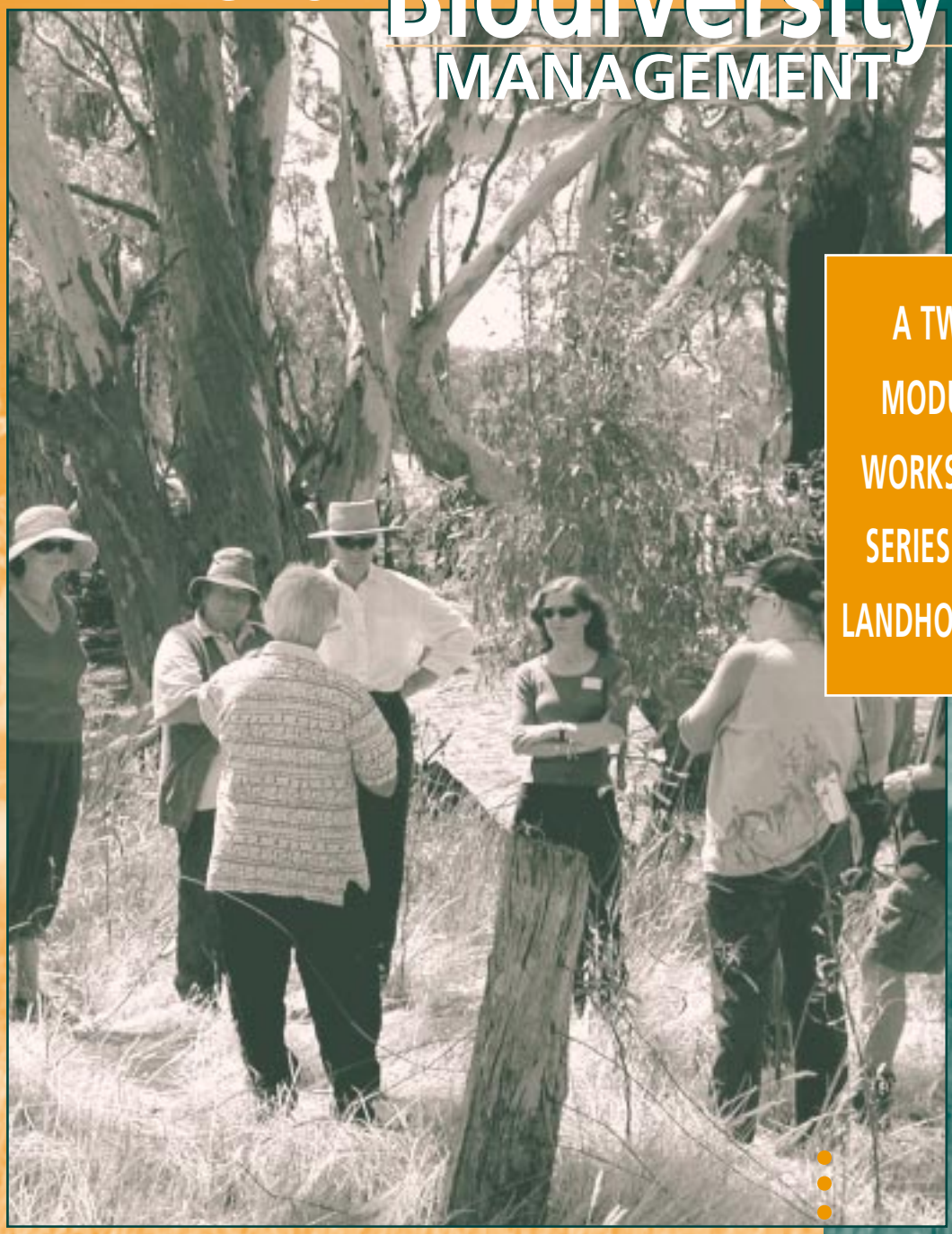
PLANNING FOR Biodiversity MANAGEMENT



A TWO MODULE WORKSHOP SERIES FOR LANDHOLDERS

Including Biodiversity in Property Management Plans

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Stuart McMahon, Lou Caskey, Judy Christie, the Biodiversity Project Steering Committee including Linda Bell, Claire Carlton, Susan Davis, David Goldney, Lloyd Kingham, Lynn Webber and Julie Woodroffe, and editing by Louise Brodie and Sally Ash.

This kit draws on a range of related publications. These include the Farming for the Future, Property Management Planning Workshop Series (1997), the Facilitator's Biodiversity Resource Kit (2001), the Community Biodiversity Survey Manual (2001) and the Save the Bush Toolkit (1997).

Illustrations from Biodiversity. A Teaching Guide. EPA, NPWS (1999) p.3.5; Property Planning. How to Produce a Physical Property Plan (1995) pp 4.4, 4.19.

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CONTENTS

ABOUT THIS RESOURCE

Who is this training kit for?

This kit has been designed to assist landholders to undertake assessments and surveys of the biodiversity on their properties and to lead landholders through the steps involved to include biodiversity protection and conservation as a management strategy in any property planning exercise.

What is the purpose of this training kit?

This kit provides a complete package for the delivery of two Biodiversity Planning workshops. The two workshops, Module One: Biodiversity Assessment and Survey and Module Two: Management Planning, can be delivered as part of the Farming for the Future, Property Management Planning (PMP) eight-part workshop series. Each module has been designed as a one day workshop and will enhance the scope of this series by specifically addressing native biodiversity management in property planning.

Module One and Module Two are also stand-alone workshops which can be delivered singly or as a two part sequence. Alternatively, sessions from each module can be combined for one workshop if appropriate to local needs. In most instances Module Two is only suitable for participants who have completed Module One.

How should you use this training kit?

The kit presents the information in an easy to access format. There are separate sections to guide facilitators (Sections 1&2) and workshop notes (Sections 3&4) and worksheets for participants which can be compiled to suit the needs of particular workshops. The worksheet sections comprise the forms landholders require to undertake surveys and assessments of their own properties, as well as proformas to assist in planning and management.

A series of Biodiversity Conservation Management Notes (Section 7) provide further information on specific topics relevant to the issues covered in the modules.

"This kit provides a complete package for the delivery of two Biodiversity Planning workshops."

FACILITATOR NOTES

1. FACILITATOR NOTES

1. INTRODUCTION

The Planning for Biodiversity Management Kit is a two module workshop series for landholders to develop skills and understanding of the principles of property management planning, and in particular techniques for the consideration and inclusion of biodiversity and habitats into the planning process, and the development of management strategies and actions.

It is intended that the Kit be delivered over two days, however the Kit has been prepared to allow flexible delivery of the two workshop modules to reflect the needs of participants and the local environment. Local knowledge and knowing your audience will be your best guide to maximising the effectiveness of these workshop materials for particular groups of participants.

The Kit has been prepared to provide background notes for the facilitators as well as notes, worksheets and management notes for participants. Facilitators will need to photocopy and assemble participants' workbooks to include these notes, worksheets, glossary and management notes. Sufficient copies of worksheets should be included so that participants can complete multiple surveys and assessments of their own properties.

Below is a summary of the contents of each section of the Kit.

1. Facilitator Notes

This section provides a brief overview of the aims and objectives of the workshop, and suggested session programming for each module, and includes resources and references. This section includes background notes on biodiversity, providing a general introduction with particular relevance for Module One, Session One. There is information on conducting baseline surveys and assessments of native vegetation, water bodies and other wildlife habitat features, relevant to Module One, Session Three. Finally there is some background on the techniques for undertaking a SWOTA analysis - relevant to Module Two, Session One. Facilitators may wish to distribute some of the tables and information provided here to participants.

2. Facilitator Resources

Overhead transparencies (OHT) are provided to assist with presentation. Facilitators can select whatever OHTs they wish to use. An Evaluation Form is also provided. Some of the overheads from the *Facilitator's Biodiversity Resource Kit* (2001) are also useful.

3. Module One: Biodiversity Assessment and Survey. Participant Notes

Module One contains participant's workshop notes. These notes need to be photocopied and distributed to participants.

4. Module Two: Management Planning. Participant Notes

Modules Two contains participant workshop notes. These notes need to be photocopied and distributed to participants.

5. Participant worksheets

These are worksheets which will be used during the workshop sessions and can also be used by landholders when undertaking property management planning on their properties at a later date. Accordingly, in some cases multiple copies will be required.

6. Glossary and references

A glossary and references list is included. The glossary should be included in the participant's notes. The references are a general list most relevant to facilitators. References for participants can be found in one of the Biodiversity Conservation Management Notes which are included in the final section of the Kit.

7. Biodiversity Conservation Management Notes

Biodiversity Conservation Management Notes provide additional information on selected topics to assist both facilitators and participants. Facilitators can include some or all of the notes with materials provided to participants.

The conservation management notes are available on the NPWS website at: http://www.nationalparks.nsw.gov.au/npws.nsf/Content/conservation_management_notes

2. MODULE ONE: BIODIVERSITY ASSESSMENT AND SURVEY

Module One is an introductory module with an emphasis on practically-based field activities. The first two sessions should ideally be conducted in an environment, where participants can discuss issues and carry out property mapping exercises, such as in training rooms, or halls with tables, chairs and space for a projector.

Session One of the module is an introduction to biodiversity and the terms used. The discussion questions, together with the use of visual stimuli, lend themselves to brainstorming activities. The *Facilitator's Biodiversity Resource Kit* (2001) provides extensive background reading, some of which is reproduced in the Additional Notes. There are also suggested activities in this Kit which facilitators may wish to incorporate into this session. *The Save the Bush Toolkit* (1997) also provides useful background.

Biodiversity in Property Management Planning - Living Systems Resource Kit. Victorian Natural Resources and Environment, 2002, available online at www.nre.vic.gov.au has relevant activities and information for facilitators delivering biodiversity planning workshops. Local case studies are appropriate for this first

session, which is also preparation for participants to develop their ecological vision for their own properties.

Session Two of the module involves participants doing mapping of their property including physical features and assets, requiring equipment such as pens and overlays. Participants need to have aerial maps of their property. Some participants may have completed this activity if they have attended other property planning workshops. Participants will also describe their ecological visions.

Session Three involves field work activities. These involve both biodiversity assessments of native vegetation, water bodies and other habitat features as well as baseline biodiversity surveying.

The assessments are based on recognising that natural, modified and artificial systems can all contain native biodiversity values. The assessment survey forms and ratings tables are to assist in identifying the opportunities for rehabilitation and restoration of key areas of the property. These activities are the focus of Module Two but will need to be flagged in Module One.

Assessments and surveys can be conducted in whatever sequence is appropriate to sites available. Activities need to be easily replicable so that participants have the confidence to conduct similar assessments on their own properties. Assessments can be done of native vegetation areas, a modified area eg orchard or cultivation paddock, a revegetated site, a farm dam or a natural or artificial wetland.

An aerial map of the site surveyed needs to be provided so that participants can have some practice in mapping the results of assessments. As this is likely to be done in the field, it needs to be an easily understood map.

Biodiversity baseline surveys can be undertaken in a range of different ways. With a large group it would be best to form into smaller groups and have experts to provide support. As well as demonstrating techniques, the session is an opportunity to extend skills in species identification using fauna and flora specialists.

Homework should not be omitted. It is most important that participants are given appropriate directions and references for following up surveys and assessments on their own properties. These surveys as well as the development of a property vision are essential prerequisites for participation in Module Two. It is important to allow enough time between the two workshop days for participants to be able to undertake tasks that form the basis of activities in Module Two

MODULE ONE WORKSHOP PROGRAM – BIODIVERSITY ASSESSMENT AND SURVEY

Time & duration	Content	Participant's resources	Facilitator's resources	References
SESSION 1	*Training room*			
Part 1 9.00 am-9.30 am (30 minutes)	• Introduction • Outline of learning objectives and workshop program • Participants introduce themselves and outline their personal expectations of the outcomes of the workshop		• Whiteboard or butcher's paper	• See "Activities" section of Biodiversity in Property Management Planning. Living Systems Resource Kit. NRE, Vic. (2002)
Part 2 9.30 am - 10.30 am (1 hour)	• Introduction to Biodiversity and key terms eg biodiversity, species, habitat, ecology, ecosystem • Discussion - Biodiversity on farms - natural and modified ecosystems. What is native vegetation? Why retain native vegetation? What are the benefits of biodiversity? What are the threats to biodiversity? • Introduction to visioning exercise, to be undertaken by participants next session		• OHTs – various (including those in Facilitator's Biodiversity Resource Kit) • Local case studies	• Background to concepts and biodiversity benefits in Additional Notes • Facilitator's Biodiversity Resource Kit has other activities in Section 4: Facilitation Guide eg Ecosystems Services Tender, Risk Management exercise • Nature Conservation of Farms • Biodiversity in Property Management Planning - Living Systems Resource Kit. NRE, Vic. (2002) • Biodiversity Conservation Management Notes - various
10.30 am - 10.50 am (20 minutes)	**MORNING TEA**			
SESSION 2	*Training room*			
10.50 am-12.00 pm (1 hour 10 mins)	• Brief introduction to the planning process • Participants write ecological vision for property • Overlay mapping exercise	• Sheet 1 • Clear plastic (acetate) overlays • Aerial photo or topographic map of own property • Coloured pens	• OHT: Planning process • As an alternative to participants using own property map, supply copies of a map of property or reserve to be assessed in Session 3	• Physical Property Planning (NSW Ag.) • FFF Workshop 2 • Save the Bush Toolkit, Kit 9 "Farm planning for bushland and wildlife"
12.00 pm - 12.45 pm (45 minutes)	**LUNCH**	Allow time to get to field site		

MODULE ONE WORKSHOP PROGRAM – BIODIVERSITY ASSESSMENT AND SURVEY

Time & duration	Content	Participant's resources	Facilitator's resources	References
SESSION 3	*In the field*			
Part 1 12.45 pm - 2.30 pm (1 hour 45 minutes)	• Assessment of native vegetation area or modified farm site and/or assessment of water bodies using assessment sheets and evaluation tables. Select sites for assessment that can then be used for one or more transects for biodiversity survey. • Link assessment results to map of site or indicate how this is to be done	• Clipboards, pens, recording sheets; assessment sheets and evaluation tables • Map including physical features of property or reserve where assessment is conducted • Additional overlays; 4 colour marker pens • Sheets 2-5		• Facilitator's Biodiversity Resource Kit Section 4.3 • Nature Conservation on Farms • FFF Workshop 4 & Appendix 1 • Save the Bush Toolkit, Kits 1, 3 & 5. • Biodiversity Conservation Management Notes eg Photographic monitoring
Part 2 2.30 pm - 4.00 pm (1 hour 45 minutes)	• Biodiversity baseline survey of plants/birds/reptiles. A survey in a native vegetation area and a modified or rehabilitated area would be ideal for this activity, if feasible. • Discuss setting performance indicators and ongoing monitoring and evaluation	• Clipboards, pens, tape measure • Sheets 6-7	• Resources required will depend on what is being surveyed. (See Additional Notes – Tips for biodiversity surveying)	• Community Biodiversity Survey Manual • Flora and fauna field guides; species lists; Local experts - "Biodiversity mentors" • Biodiversity Conservation Management Notes eg Threatened Species Conservation Act; Watching Wildlife • Save the Bush Toolkits 7 and 8
HOMEWORK	• Complete evaluation form for workshop • Complete surveys and assessment of own property and overlay assessments on map • Select Biodiversity performance indicators and mark on map	• Sheets 1-7 will provide participants with a set of resources for use in assessing their own properties		

3. MODULE TWO: MANAGEMENT PLANNING

Module Two builds on the information that participants have gained about the biodiversity values of their property and guides participants in developing their own management planning strategies. Therefore it is essential that participants have completed the following activities and brought the following resources with them to be used while undertaking Module Two.

1. Ecological vision for property;
2. An aerial map of their property with the physical features and natural assets mapped on a first overlay;
3. If possible, have undertaken assessments of native vegetation and water bodies with condition of sites assessed marked on a second overlay map;
4. If possible, have undertaken biodiversity baseline survey in at least one area and, if possible, have set up at least one photopoint and/or selected performance indicators for long term monitoring.

Session One of the module restates the planning steps, asks participants to review their visions for their properties and takes the group through the process of doing a SWOTA analysis. The first activity suggested is a values identification activity which can be used as an introductory warm-up or icebreaker to the workshop. The *Facilitator's Biodiversity Resource Kit* also outlines a more structured activity, "Invest in your values", which may be appropriate for some groups. The Additional Notes have background information which supports the facilitation of this activity. (See Social and Cultural Benefits in Section 4.1.2 and OHT Values Interpretation).

Once participants have clarified and reviewed their ecological visions the SWOTA analysis can be introduced. This can be done most effectively by using a case study, local if possible, or by preparing a hypothetical example. A map, showing the property's physical assets with areas coloured to reflect native vegetation and water bodies or other assessments is useful. Biodiversity survey results or lists of wildlife sightings can be included. Facilitators can also highlight the table listing threatening processes. (See OHT). Participants should be divided into small groups and asked to do a SWOTA (Strengths/Weaknesses/Opportunities/Threats /Actions) analysis on the case study or hypothetical property. Once the different groups' responses are compared and discussed and an appropriate SWOTA analysis modelled, participants can then attempt to do a SWOTA for their own properties. It is important for the following sessions that all participants do

complete their own SWOTA, even if it is a very general set of issues. Note the fifth component – A for "Action" which has been included as part of this analysis technique. The "Actions" are the management actions to be put into plans to address opportunities and threats. It is important to include this final step so that the identified threats do not become too daunting to act upon. Opportunities and threats should be seen as a balanced way of informing planned management actions.

Session Two begins with an overview of the actions and strategies that property owners can undertake to conserve biodiversity. Again the use of case studies and appropriate visuals will add interest and colour to this session. You may wish not to brainstorm or discuss all the specific management actions at this stage, but draw on these details later, when the group is completing Management Planning Sheets (Sheet 10).

A risk management approach to biodiversity conservation is provided with a number of suggested discussion questions, if facilitators wish to pursue this approach.

The goal setting activity should be started in this session. Participants will be able to develop their goals further in the next session.

Session Three takes participants several steps further along in the biodiversity planning process. The activities require participants to review their SWOTA analysis, to identify several key issues and to also review their goals to ensure that they have developed goals to match the key issues they have now identified. These steps can be completed by participants individually or in pairs. Facilitators will need to provide multiple copies of Management Planning Sheet 10 and have an OHT version of this sheet if possible.

The aim of this session is to give participants practice in developing actions and strategies for one or more management issues. However again this can be done as a group exercise, modelling the process. When participants have identified significant issues, and if possible linked them to goals, facilitators should discuss the example in the Model Management Planning Sheet or model an issue relevant to the group. Activities 6.1 and 6.2 can be done as a group exercise selecting management issues common to participants, or as individual activities.

Use this session to give participants experience in the use of the planning tools, described in the worksheets and notes. It is not expected that participants will develop a plan for the management of their properties' biodiversity conservation by the end of the workshop, but rather that they will have the means to develop these biodiversity management plans at their own pace.

MODULE TWO WORKSHOP PROGRAM – MANAGEMENT PLANNING

Time & duration	Content	Participant's resources	Facilitator's resources	References
SESSION 1	*Training room*			
9 am-10.45 am (1 hr 45 minutes)	• Introduction • Outline of learning objectives and workshop program. Introductory activities, if new participants • Review of the planning process • Values identification exercise • SWOTA analysis developed as a group exercise and then completed by participants for their own property	• Sheet 1 • Map of property's physical assets • Property assessment and survey sheets and results • Sheet 8	• Whiteboard or butcher's paper • OHT Planning process • OHT Managing threatening processes • Local case study or hypothetical property map	• See suggested icebreakers and activities in Biodiversity in Property Management Planning - Living Systems Resource Kit. NRE, Vic. (2002) • Facilitator's Biodiversity Resource Kit (Section 4.1) • Additional Notes
10.45 am - 11.05 am (20 minutes)	**MORNING TEA**			
SESSION 2	Training room			
11.05 am-12.45 pm (1 hr 40 minutes)	• Brainstorming and presentation of management practices for biodiversity conservation on farms. • Discussion and case studies Guest speakers if appropriate • Setting short term and long term goals. Participants need to complete list of goals	• Sheet 9	• OHTs - various • Visuals including slides of local examples • Guest speakers	• Biodiversity in Property Management Planning - Living Systems Resource Kit. NRE, Vic. (2002) • Facilitator's Biodiversity Resource Kit • Managing wetlands on farms (NSW Ag.) • Nature conservation on farms (NSW Ag.) • Save the Bush Toolkit, Kits 2, 4 and 6 • FFF Workshop 4 & Appendix 1 • Biodiversity Conservation Management Notes –various
12.45 pm-1.45 pm (1 hour)	**LUNCH**			

MODULE TWO WORKSHOP PROGRAM – MANAGEMENT PLANNING

Time & duration	Content	Participant's resources	Facilitator's resources	References
SESSION 3	*Training room*			
1.45pm – 4.00 pm (2 hours) Allow for a 15 minute afternoon tea break when appropriate.	• Review of participants' vision, SWOTA and goals - individually, in pairs or small groups • Participants identify significant management issues • Completion of Management Planning Sheet(s) as group or individual activity	• Sheet 9 • Sheet 10 - multiple copies	• OHTs –various • OHT Sheet 10 Management Planning Sheet	• Save the Bush Toolkit, Kits 2, 4 & 6 • FFF Workshop 4 & Appendix 1 • Biodiversity Conservation Management Notes –various
HOMEWORK	• Complete evaluation form for workshop • Complete management planning sheets and summary sheets • Monitor and evaluate	• Sheet 11		

E.Higginson/NPWS

Homework will involve participants completing all the planning sheets for themselves, including Management Planning Summary (Sheet 11), which needs to be completed by participants outside the workshop. Participants should also be reminded of the need to monitor and evaluate their properties' ecological condition and build this into their plans.

"Use this session to give participants experience in the use of the planning tools."

4. ADDITIONAL NOTES

4.1 BACKGROUND ON BIODIVERSITY

The information below is provided as background briefing material covering both Modules One and Two. It is summarised from *Facilitator's Biodiversity Resource Kit*, NSW National Parks and Wildlife Service, Farming for the Future Project, (2001) and other relevant sources. This information is in addition to the content material provided in the Participant Workshop Notes in both Module One and Module Two.

4.1.1. BIODIVERSITY: WHAT IS IT?

Biodiversity is an abbreviation of the term biological diversity, which has been defined as: *The variety of life forms: the different plants, animals and microorganisms, the genes they contain, and the ecosystems they form. It is usually considered at three levels: genetic diversity, species diversity and ecosystem diversity.* (National Strategy for Conservation of Australia's Biological Diversity, 1996).

Genetic diversity

Genes are inherited characteristics, which are packaged in different ways with each new generation. Genetic diversity is the variety of genetic material on earth. There is genetic diversity within species, and across all species. Among all magpies, for example, no two are exactly the same, but each has a different combination of genes. Diversity in this sense ensures that some individuals are better at adapting to certain types of environment. Without genetic diversity a species cannot evolve, and cannot survive changes in its environment.

Species diversity

The next element is species diversity, which refers to the variety of species on earth. This is the most common way people think about biodiversity. A species is a group of organisms, which shares a combination of genetic variations that make its members different to all other species. Members of a species can breed only with other members of the *same* species; they cannot breed with members of *other* species. Biodiversity can be measured by counting the number of species in an area; it is described as "species rich" if it contains many different species.

It is not known exactly how many species exist in the world. There are vast numbers of species still being discovered. Even big organisms like mammals and trees are still revealing new species to science. Only a proportionately small number of the invertebrates has even been recorded. The number of species on earth is widely estimated at 10-100 million.

One of the consequences of biodiversity loss is the decline of plant and animal species. This decline leads to species becoming endangered, vulnerable or extinct, otherwise known as "threatened species". The diversity of life cannot be replaced. Once a species is lost from the system it is almost impossible to bring it back. The loss of any species will irrevocably change the character of an ecological community. In many cases it is only after a species becomes extinct that its significance in the ecosystem becomes clear and the full impact of extinction is realised eg. the loss of a pollinator can cause one or more tree species to become extinct.

An important component of biodiversity conservation is the protection and recovery of threatened species, populations and ecological communities.

Ecosystem diversity

Ecosystem diversity refers to the variety of natural habitat types and ecological processes. Plant and animal species interact with each other in their physical environment to form ecosystems. Australia has a broad range of ecosystems ranging from arid deserts to tropical rainforest. Ecosystems are the "web of life". They operate a cycle of energy: energy from the sun is harnessed by plants together with carbon dioxide and water and converted into nutrients - starch and sugar. These nutrients and energy are distributed through all organisms: herbivores, carnivores, parasites, and decomposers through the food web.

To illustrate the concept of species interaction and give an idea of how complex these interactions can be, the example of a single bark beetle, five millimetres long, was found to be the host to 34 mites (3 species), 883 roundworms (4 species), 100 fungal spores (3 species) and 10,000 yeast or bacteria (7 species).

The relationships between organisms are crucial to sustaining a system. The ways different species use the water, gases, and minerals create the environment they depend on. Different systems use the different elements in different ways. Nitrogen, for example, is distributed differently in different ecosystems. In alpine areas most of the nitrogen is fixed in the soil; the plants are small, the growing season is short, nitrogen demands are low. In rainforests vigorous growth has removed most of the nitrogen from the soil - it is stored in the vegetation. Clear felling a rainforest removes most of the nitrogen from the system. As nitrogen is essential for plant growth, lack of it retards regrowth of the forest.

Australian biodiversity

Australia's biodiversity is a consequence of its unique geological history. The continent has been isolated for forty million years. It has vegetation from Gondwana times; a period when Australia was a part of a larger landmass, which included what is now South America, South Africa, Antarctica and India.

The two major features of Australia's biodiversity are:

- It is "mega-diverse" which means that it has a huge range of species which can be very concentrated in some ecosystems such as rainforests.
- It has a high rate of "endemism" which means that many of Australia's native plants (flora) and animals (fauna) are unique to this continent and found nowhere else in the world.

Australia is recognised as one of twelve "megadiverse" countries, which between them contain 60-70% of the world's known species.

"Australia's biodiversity is a consequence of its unique geological history."

4.1.2 BIODIVERSITY: AN IMPORTANT ASSET

There are environmental, economic, social and cultural benefits of biodiversity. We are all dependent for our sustenance, health, well-being and enjoyment of life on fundamental biological systems and processes. The enormous diversity of life in itself is of crucial value, giving greater resilience to ecosystems and organisms.

Ecosystem services

One of the greatest benefits of biodiversity is the critical role that biodiversity plays in delivering ecosystem services which contribute to healthy agricultural systems - to sustainable clean and green production. Plants, animals and microorganisms all contribute to maintaining healthy functioning ecosystems. Some of these ecosystem services include:

- Protection of water resources to ensure water quality;
- Soils formation, structure and fertility as well as protection of soils;
- Nutrient storage and cycling;
- Pollution breakdown and absorption;
- Ecosystem relationships eg the relationship of pollinating insects like wasps and bees with plants;
- Recovery from severe environmental events, eg drought, flood, fire.

There are many examples of the economic benefits of biodiversity in agricultural production. Pollination of crops by insects and birds has been estimated to be worth up to $1.2 billion per year in Australia. We are fortunate that native insects from nearby native vegetation perform much of this unpaid work. Soil fungi associated with plant roots can effectively increase the surface area of roots by up to 200% providing a huge boost to crop/pasture productivity. Soil organisms also contribute to soil formation, delivery of water and nutrients, maintenance of soil structure and porosity. Tables 1-5 summarise the benefits of biodiversity for productive properties.

Biological Resources

Humanity derives all of its food and many medicines and industrial products, such as wood products, from the wild and domesticated components of biological diversity. About 50 per cent of species in Australia are known but only a quarter are formally described. As knowledge improves, new bioresources to increase human welfare will be discovered and developed. There is a clear relationship between the conservation of biological diversity and the discovery of new biological resources eg antibiotics from soil fungi streptomycin, solasodine used in the production of oral contraceptives and cortisone from Kangaroo Apple (*Solanum aviculare*).

Social and Cultural Benefits

There are recreational and educational benefits in biological conservation as well as the economic benefits of eco-tourism. For broadacre landholders the aesthetic value and landscape amenity of the natural bush retained on their properties has been shown to be important. A Victorian study exploring the core values of broadacre landholders showed that landholder's top four values were:

- Wellbeing (*being healthy and satisfaction with lifestyle*)
- Future environmental stability (*having a sustainable farm and a sustainable landscape and enjoying the landscape*)
- Relationships (*having close relationships with family and friends and providing for your children*)
- Economic wealth (*having a profitable business, generating new markets and managing debt*)

The survey also asked landholders why they have retained remnant native vegetation on their properties. Interestingly the results indicate that retention is closely linked to the indirect benefits of retaining native vegetation such as its intrinsic beauty and its contribution to the enjoyment of the landscape. The direct benefits of stock shelter, timber production were also identified as important rationale.

The perception of farm sustainability /profitability, personal health, pursuing excellence and sense of pride were all closely associated with the presence of native flora and fauna on the property.

Source: *Biodiversity in Property Management Planning. Living Systems Resource Kit*. Victorian Natural Resources and Environment, 2002. See www.nre.vic.gov.au.

Aboriginal people, especially those who have retained a connection with the land possess a great deal of valuable indigenous ecological knowledge such as species distributions, animal behaviour, the uses of a wide range of plant and animal species, sustainable harvesting and the preparation of native food and medicine, the seasonal availability of resources, the effects of fire on both plant and animal species and historical perspectives on environmental change. While biodiversity is a western term, because it encompasses species and ecosystems and is strongly related to the concept of land and country to which Aboriginal people are so closely affiliated, it is accurate to say that Australian Aboriginal people highly value biodiversity.

Biodiversity conservation benefits for farmers

The following tables from the *Facilitator's Biodiversity Resource Kit*, 2001, are comprehensive summaries of biodiversity benefits for productive farming enterprises. These could be photocopied as handouts for the participants.

L. Brodie/NPWS

"About 50 per cent of species in Australia are known but only a quarter are formally described."

TABLE 1. SUMMARY OF ECOSYSTEM SERVICES WHICH BENEFIT AGRICULTURAL PRODUCTION

Native bush patches	Scattered remnant trees	Native Grasslands	Wetlands/Water courses
• stock shelter/ off-shears, lambing etc • emergency stock fodder • habitat for native fauna which control pest species • soil erosion control • soil formation • water table management • nutrient cycling • microclimate control • riparian vegetation/water quality • opportunity cost of revegetation • alternative enterprise, eg. seed, honey, sustainable firewood, ecotourism • recreation • aesthetic value • property value • product marketability	• watertable management • stock shade and some shelter • emergency stock fodder • microclimatic control • habitat for native fauna which control pest species • erosion control particularly along drainage lines • local seed source for natural regeneration or propagation for use in other areas on the property • landscape amenity and aesthetic value • opportunity cost of revegetation • habitat for crop pollinating fauna such as insects and birds • indicators of species indigenous to the area/region	• stock grazing value • drought "proofing", various seasonal options • soil structure management • nutrient cycling • fire retardant sp. such as Themeda in summer • water table management by deep rooted native perennials • weed species management • riparian vegetation /water quality management • alternative enterprise • commercial native seed harvesting	• "green pick" in summer • habitat for pest species - controlling native fauna • ability to control total grazing pressure • improved stock performance • fire management • catchment-scale nutrient control, flood mitigation • opportunity cropping • alternative enterprises such as aquaculture • nutrient cycling • microclimatic control • opportunity cost of revegetation • aesthetic and recreation value • property value • domestic water supply • management of water quality which impacts on chemical effectiveness

TABLE 2. SUMMARY OF BENEFITS OF BIODIVERSITY CONSERVATION

Agroforestry (pref. native sp.)	Shelterbelts	Soils	Human infrastructure
• alternative enterprise • watertable management • habitat value for pest controlling native fauna • sustainable firewood production • alley farming opportunity • niche marketing, value adding	• Primary stock shelter • Maximisation of crop/ pasture production • animal welfare • habitat value for pest controlling native fauna • sustainable firewood production • watertable management • stock movement management	• fundamental to agricultural practice • habitat for microflora • effective water storage • nutrient supply • structural support for plants • enterprise opportunity • integrated pest species	• domestic gardens • agricultural sheds and other structures • water troughs • fences for bird perching • farm equipment may provide shelter/habitat for pest controlling native species • access tracks

TABLE 3. SPECIFIC BENEFITS OF REMNANT VEGETATION ON LIVESTOCK PRODUCTION

Results	Region/context	Reference
Over a 5-year trial, a 31% wool production increase and 6 kg (21%) more liveweight was found in sheltered areas compared with sheep without shelter. This equated to an increase of $4 per head if sold in August 1984. The plots sheltered by barriers had 18% more pasture.	Armidale, NSW rainfall 860 mm	Lynch & Donnelly (1980), Bird et al. (1984), Dengate (1983), Richmond (1992)
From 10 to 16% more lambs present at marking owing to heat load reduction on ewes at joining and lambing, as well as a faster growth rate and more wool from lambs over their first 16 months of life.	Northern Queensland	Wakefield (1989)
Availability of shelter resulted in a 50% reduction in lambing losses (average losses without shelter were 36% for twins and 16% for single births). When shelter was provided, the figures dropped to 18% for twins and 8% for single lambs.	South-west Victoria, eastern highlands.	Bird (1981), Dengate (1983)
Lambing losses decreased from 20% to 10% of the lambs born alive in sheltered areas, (with wind speed halved by adequate windbreaks), resulting in a 5% increase in the percentage of lambs at the end of lambing.	Kangaroo Island	TBA
If the lifetime of the shelter (and fencing) is taken to be 44-60 years, over 60 years total wool production will increase by 29% and $42/hectare of sheltered pasture, and total dairy production will increase by 30% (20% improved pasture growth, 10% improved milk production), and $150/ha of sheltered pasture.	Victoria	Fitzpatrick (1994)
Winter lamb mortality from birth to 48 hours was greater in an exposed group of single lambs (14%), than a sheltered group (4%). Likewise, mortality rates of twins were 9% in shelter and 28% when exposed.	Western Victoria	Squires (1983)
A 27% increase in survival of single lambs was observed in sheltered areas, but no advantage was evident to twins during periods of rain with temperatures <5 degrees C.	Southern Australia	Alexander et al. (1980) cited in Bird et al. (1984).
Up to 17% increase in dairy milk production was estimated for sheltered areas.	Not specified	Blore (1994)
On a day of 27 degrees C, unsheltered cows will have 26% less dairy milk production than unshaded stock.	Australia	Fitzpatrick (1994)

Source: Miles, C., Lockwood, M., Walpole, S. and Buckley, E., (1998) Assessment of the On-Farm Economic Values of Remnant Native Vegetation, Johnstone Centre Report No. 107, Charles Sturt University, page 20

TABLE 4. SPECIFIC BENEFITS OF REMNANT VEGETATION ON CROPS

Results	Region/context	Reference
An increase in wheat and crop yields in sheltered zones estimated between 22% and 47%.	Rutherglen, Victoria	Bird *et al.* (1993)
Crop yields from shelterbelts increased by 25% - although trees rob the crop of moisture and nutrients for a distance equal to about 1-2 times their own height, they shelter a much larger area, extending downwind for at least 15-20 times their own height.	Various study areas	Carritt (1999)
An increase in lupin yield by 19-22% was measured when the area of shelterbelts was included in the net yield/ha, and an increase of 27% on the lupin crop area between the shelterbelts.	Gibson, Southwest Western Australia	Richmond (1992)
Increased yields of 25%-45% were observed in sheltered crops of wheat, oats and lupins compared with unsheltered crops, and yield increases of 20%-100% in horticultural crops.	Not specified	Fitzpatrick (1984)
An increased net cereal yield of 15% per annum was attributed to sheltering effects of shelterbelts.	USA cereal growing area	Adamson (1988)

Source: Miles, C., Lockwood, M., Walpole, S. and Buckley, E., (1998) Assessment of the On-Farm Economic Values of Remnant Native Vegetation, Johnstone Centre Report No. 107, Charles Sturt University, page 20

TABLE 5. SPECIFIC BENEFITS OF REMNANT VEGETATION ON PASTURE GROWTH

Results	Region/context	Reference
A 20-30% higher yield was obtained in protected than in unprotected areas of a farm, with annual benefits of $38 to $66 per hectare.	Mainland Australia	Fitzpatrick (1994)
A 20% increase in average annual pasture growth was estimated for protected areas of a farm.	Australia and overseas	Radcliffe (1983)
Gross value of pasture output is at its highest level when the proportion of tree area is at 34%. Note that this figure relates to natural remnants of bushland rather than shelterbelts or windbreaks.	Gunnedah, north-west NSW	Walpole (1998)

Source: Miles, C., Lockwood, M., Walpole, S. and Buckley, E., (1998) Assessment of the On-Farm Economic Values of Remnant Native Vegetation, Johnstone Centre Report No. 107, Charles Sturt University, page 20

4.1.3 BIODIVERSITY: HOW TO PROTECT AND CONSERVE IT

The first step towards the conservation of biodiversity is to understand what contributes to biodiversity and the processes that threaten it; these encompass a broad range of human activities and are not limited to a particular industrial/production sector of the community.

On farms areas of native vegetation, significant landforms, modified and artificial systems, integrated into agricultural production can all contribute to biodiversity.

TABLE 6. MANAGING AGRICULTURAL PRODUCTION AND BIODIVERSITY

Type of Impact	Management Solutions
Inappropriate stock grazing	• Alternative grazing strategies such as rotational grazing • Fencing to control stock movement and access in sensitive areas • Grazing native grasslands on seasonal patterns
Inappropriate clearing of native vegetation	• Plan to retain areas of remnant native vegetation • Revegetation to link remnant vegetation and create wildlife corridors • Improve existing pasture • Enhance grazing management to maximise production on existing pastures
Introduction of exotic weed and feral animal species	• Alternative methods of pest control • Integrated pest control • Weed management • Feral animal management • Use of local native species
Excessive numbers of specific wildlife species	• Bore capping • Participate in the development of regional wildlife management plans
Pollution and land contamination	• Alternative waste disposal of unused agricultural chemicals
Salinity	• Modified irrigation practices • Identifying and replanting recharge areas • Protecting discharge areas and salt scalds from further degradation • Expand native vegetation

Biodiversity loss is difficult to reverse. Working to protect, conserve and prevent biodiversity loss by minimising the risk of threatening processes such as those listed above can make an important contribution. Biodiversity conservation requires the adoption of management practices, which sustain the diversity of natural ecosystems.

Some of the basic things that can be done to conserve biodiversity on farms include:

1. Retain and protect by fencing all natural vegetation, whether areas of remnant, native grassland or isolated paddock trees;
2. Protect all watercourses and wetlands;
3. Leave adequate ground debris - logs, branches, rocks and leaf litter for shelter and food for plants and animals, if it is safe to do so;
4. Control exotic or native pests with ecological sensitivity and in cooperation with neighbours and government agencies;
5. Control weeds with ecological sensitivity;
6. Revegetate strategically using local native species to restore and rehabilitate areas;
7. Control soil erosion and maintain soil health and
8. Manage fire for both protection of built assets, as well as considering the protection of biodiversity from inappropriate fire regimes.

There is more detail regarding these strategies in the Participant Notes for Module Two.

Revegetation to buffer riparian remnant *R.Davies/Greening Australia*

"Biodiversity loss is difficult to reverse."

4.2 TIPS FOR BASELINE BIODIVERSITY SURVEYS

The information below comprises some suggestions regarding baseline surveys. It is summarised from National Parks Association of NSW and NSW National Parks and Wildlife Service, (2001) *Community Biodiversity Survey Manual*. You should consult this reference for further details before conducting a baseline survey in a workshop for the first time. There is also a useful list of reference books relevant to biodiversity surveys in the *"General Reference List"* and *"General References – update"* Notes in Section Seven of this Kit.

4.2.1 SETTING UP A TRANSECT

One of the most common methods of surveying, applicable for most types of surveys, is to use a transect. The transect method for a baseline survey is based on setting up a single line that can be 200 metres, 300 metres, 400 metres or 500 metres long. The transect should be located so that the area covered is as uniform as possible. Try to consider, in order of importance:

- the vegetation - for example, ensure that the transect is not half in woodland and half in grassland; and
- the physical environment - for example, try for a consistent slope and drainage.

A 500 metre transect has been chosen to use as an example of how to lay out a transect to search for plants, birds or signs of animals such as insects, reptiles, frogs and mammals. Use flagging tape to mark out the start and finish points and then five points, 100 metres apart, are marked out along the transect. Point one is located 50 metres from the beginning of the transect and all other points are 100 metres apart (see Figure 4.1 below).

- Find your transect starting point and hammer the first stake into the ground and tie flagging tape to the top.
- Using the compass to keep a straight line, measure out 50 metres and place the second stake and tie flagging tape to the top.
- Keeping to the straight line, measure out 100 metres and place the third stake with a piece of flagging tape attached. Repeat three times.
- Measure out another 50 metres and place the final transect stake, with flagging tape attached.
- Each sample point along the transect should be marked with flagging tape and assigned an identity number.

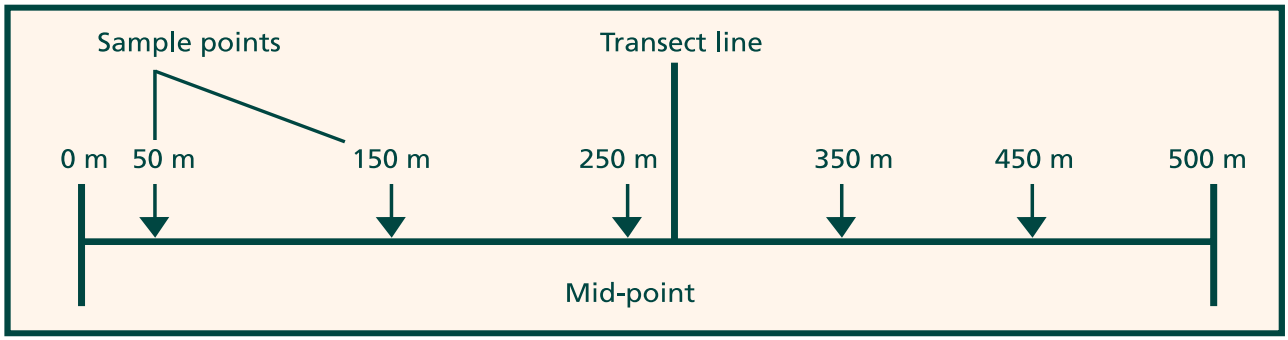


Figure 4.1 Example of 500 metre transect

- The position of each sample point on the transect (in metres) and its identity number should be written onto the flagging tape. This tape must be removed when the survey is finished as it may be confusing for future surveys. On a topographic map, record where the transects are located and keep this as a permanent record.
- The next step is to mark out areas that surround each sample point as squares 50 metres x 50 metres (sample areas) as shown in Figure 4.2 below.
- Then spend a few minutes mentally dividing the first square up into equal portions so that you can systematically search the area for reptiles and frogs.
- How long it will take you to survey each square depends on whether you allocate a part of each square to a person in the team or not. It should take about four people 10 to 15 minutes to do a quarter of the square each.

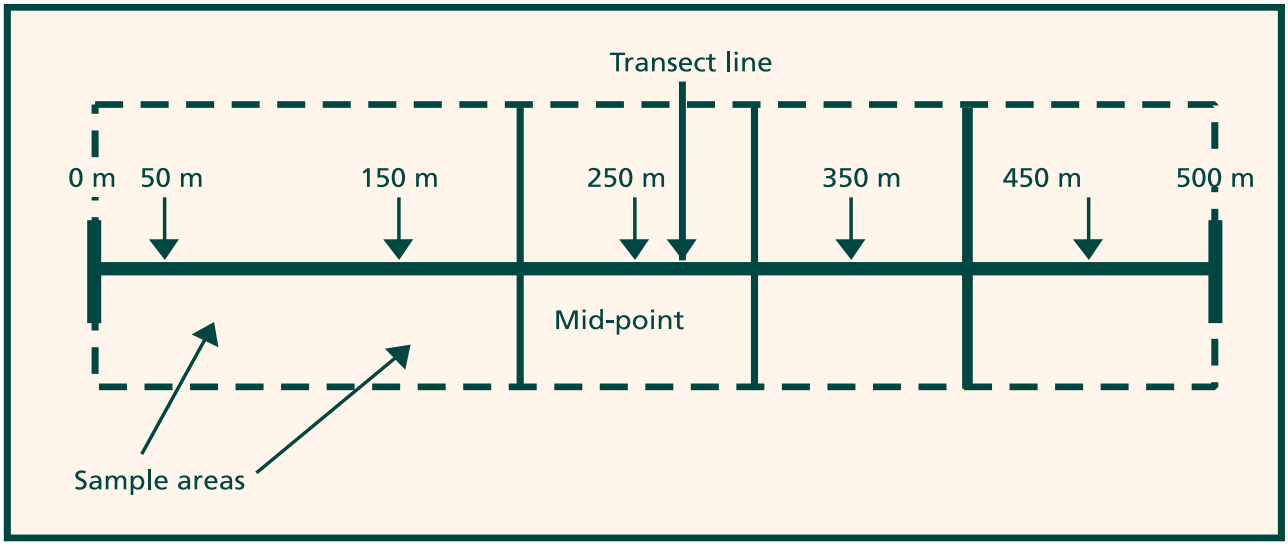


Figure 4.2 Example of how to mark out sample areas

4.2.2 MAMMAL SURVEYS

Sign search

There are many mammals that leave signs of their presence. These include scats (that is, droppings), tracks, scratches on trees, diggings, shelters and bones. Sign search can be applied in all habitat types.

Look for tracks or footprints in areas of soft soil or mud. Good places to look are around dams, puddles, or along the sides of dirt roads and vehicle tracks. Tracks are best seen in slanting light, so searching in likely spots in the early morning or late afternoon is ideal. Look for scratches on trees caused by arboreal marsupials such as gliders, possums and koalas. Any skulls or other bones may be collected and the species identified from a field guide or by referring the material to experts.

Scat collection

Scats or animal droppings are an interesting and a very efficient way to survey for mammals. The identity of the species can usually be determined from the size and shape of the scat. Several useful field guides have been published to aid you in this. Not only can you identify mammals from their scats but also sometimes what they had for dinner. This is particularly the case with carnivores or meat eaters, such as Owls, though it can also be done for herbivores, plant eaters. However this is much more difficult because there are far more plant species to be accounted for and very highly skilled people are required to perform the identifications of microscopic plant material.

The situation is much better for predators and very useful information can be gathered on other species of animals present in an area by examining the contents of predator scats, looking for things such as hair, feather and bone fragments. This still requires expert assistance, but the range of possible prey species is much narrower and sufficient reference material is available to ensure that accurate identifications are usually possible. Scat collection can be attempted in all habitats but may be difficult to do in wetlands. It is fun detective work and there are just a few things to be aware of:

- For health and safety, use disposable gloves, or a small plastic bag worn like a mitt, to pick up the scat and place it in a paper envelope. Do not handle scats with your bare hands. Seal the envelope. If it is not a press-seal envelope, do not lick it! Use a moistened sponge, or handkerchief.
- Be careful to accurately record all the necessary information after scats are collected, so that you relate the

identifications provided by experts to your field records. If you are unsure of how to prepare scats for submission to an expert, contact them and discuss their requirements.

4.2.3 BIRD SURVEYS

Point count method

A basic method involves setting up a single line at each site called a transect. Birds can be identified either visually, or by their calls. This method involves identifying all the birds you see or hear while standing at a series of points along a transect. It is always good to identify favourite places to watch for birds. Then throughout the year you can regularly visit this site and observe the seasonal changes and the changes over the years, in response to differing conditions.

A systematic search (over a fixed area and/or for a fixed time, say 10-20 minutes at each point) has the added advantage of providing an index of the abundance of individuals and species, which can be later compared with other sites where the same systematic search method was used. The reliability of the abundance index can be reduced by either overestimates or underestimates of bird numbers. To reduce overestimates, particularly when several team members are observing, try to ensure that each individual bird is recorded only once. Less experienced bird watchers may need to refer to books to aid identification, which will reduce the time spent watching and may result in underestimates of abundance. Hence, ensure that a least one member of the team is watching at all times.

Bird survey teams should be small in size with two to four members in each team with one team member nominated as the scribe. All should speak and move quietly and avoid sudden movements. Bird counts are best conducted at the start of first light which is before sunrise. This is the time when birds vocalise most, - the dawn chorus. It is also a time of maximum bird movement as birds move through the bush to begin feeding.

4.2.4 REPTILE AND FROG SURVEYS

An intensive daytime search of habitat will reveal reptiles and frogs sheltering under logs, leaf litter, rocks, loose bark, trees and bushes, around the base of in-stream vegetation, and in rocky crevices. Human rubbish such as corrugated iron sheeting and log piles often provide shelter for larger species. Animals can be captured by hand for closer identification, a skill that requires quick wits and quick reflexes. Some species are distinctive enough to be identified without handling the animal, and commonsense would suggest it is wise to

avoid handling large goannas and most snake species. Observation is more effective relatively early in the day when reptiles are not too active.

Systematic frog call recognition

The males of most frog species call to advertise their location to potential rivals and mates during the breeding season. The species of the caller can be identified from the call. By recording those calls, you make a permanent record which can be checked by others or compared at leisure to reference tapes of frog calls made by experts. Bear in mind that many species may congregate at a single water body and many individuals of one species may drown out the calls of a few individuals of another species.

You can survey for frogs at points along the transect, for example, the centre points of each quadrat or in significant patches of habitat for frogs, away from the sample area. You can base your work on the spot call recognition during a fixed 30 minute listening time, or make a recording for 30 minutes which will be analysed later to identify calling frog species. You could use both forms of information gathering in one session at a site.

The species you detect may depend on the time you record. The best opportunities for frogs are when it rains. Some species are more diurnal, calling most at dawn and dusk or during the day after rain, while others call more at night. Hence, to detect a good range of species present, it is best to make more than one recording at any one location, one at dusk and one a few hours later. Remember also that different species will breed in response to different environmental conditions, so that several visits to a single location over spring summer and autumn may enable you to detect a wider range of species.

4.2.5 INVERTEBRATE SURVEYS

There are very few places where invertebrates cannot be found. Look in the air, on plants, under logs and rocks in leaf litter, in soil, on dead animals and on other invertebrates themselves. They are most numerous in the warmer months but can also be found in the depths of winter, although you just might need to search a little harder. When surveying you should search as many different habitats within your survey site to find as many macroinvertebrates as possible.

Simply searching an area thoroughly (giving attention to all potential hiding places or types of microhabitat) is an effective method for revealing the diversity and abundance of invertebrate species within an area. A systematic search is a search of a fixed area

TABLE 7: MACROINVERTEBRATES THAT WILL BE DETECTED BY THE BASELINE METHODS

Method	Invertebrate types that will be detected	Some examples
Opportunistic	Many, but mostly large or colourful species and parasites of humans	Butterflies, ticks, leeches
Systematic search	Wide range if all habitat types are searched, including some soil dwellers. Will not sample many flying insects, tree canopy species, or boring species very well	Snails, slugs, oecophoridans, earthworms, leeches, landhoppers, woodlice, slaters, spiders, scorpions, harvestmen, mites, ticks, millipedes, centipedes, springtails, cockroaches, termites, mantids, earwigs, grasshoppers, stick insects, leaf insects, beetles, ants, bugs
Pitfall trapping	Ground surface dwellers, particularly more highly mobile species and life stages	Adult carabid beetles, grasshoppers, wolf spiders (Lyosidae), scorpions, ants, centipedes and millipedes
Light trap	Night-flying insects	Beetles and moths

with a fixed level of search effort, and ensures that the results can be compared between sites and between surveys conducted at different times where the same area and effort levels were used. This method is suitable for all habitats.

Pitfall traps

Pitfall trapping is an effective means of sampling the ground-active invertebrates of an area. A pitfall trap is simply a container sunk into the ground so that the top of the container is level with the ground surface. Ground-active animals fall into the trap while moving about, and generally cannot escape, but this will depend on the depth of the trap, the slipperiness of its sides, and the ability of the species to climb or fly away.

Small barriers, "drift fences" are often set up around the trap to direct any passing animals towards the trap. Pitfall traps for invertebrates can be either "dry" or "wet". "Wet" pitfall traps contain a fluid which kills and preserves the animals which fall into the trap. The method outlined in the *Community Biodiversity Survey Manual* is for dry pitfall traps which capture animals alive.

Light Traps

Light traps are a good way of live-trapping invertebrates that are attracted to lights at night. Most will be insects such as moths and beetles, but lacewings, bees, wasps, spiders and flies may also be attracted. The trap consists of

a vertical sheet held taut between two poles, and illuminated by an ultra violet (UV) light. Invertebrates fly or crawl towards the light, and may be picked off the vertical sheet or another sheet spread out under the trap.

It is important whether using pitfalls traps or light traps, or any other trapping device, to have respect for living things. For example do not leave pitfall traps out for long periods without checking and releasing animals not needed.

4.2.6 PLANT SURVEYS

To identify a plant properly you will need to take the relevant identification books into the field or bring part of the plant to the identification books. It will be very difficult in most cases to identify the plant from memory or a photograph. In most instances it is necessary to examine the parts of the flower, fruit and leaves in detail.

To conserve the biodiversity of species, collection of all plants should be undertaken with care. Note that you may need a licence to pick or collect native plants.

Method of collection

Collect several pieces of the plant that you wish to identify, you should try to include at least:

- leaves;
- flowers; and
- fruits.

It is best to collect larger pieces of plant with these different parts attached to a stem.

Store them in a plastic bag with a label that lists:

- the survey site where they were collected;
- date of collection;
- what the whole plant looked like (for example, a tree, shrub, vine or herb);
- the height of the plant; and
- flower colour, as this will fade if it is stored for longer than a day.

Keep the plastic bag cool and work on identifying them as soon as possible. If you are not able to work on the plants until later, you can store them in the refrigerator for a day or two. Longer storage will require pressing and drying the plants.

Equipment needed:

- **Magnifying glass**

  If you are going to buy one a 10X magnification hand lens is recommended.

  This can be purchased from most optical suppliers.
- **Scissors or secateurs**
- **A "how to…" text. Recommended is "How to identify Plants" by G. Harden and J. Williams.**
- **Field Guide covering plants growing in your area**

4.3 SWOTA ANALYSIS

SWOTA Analysis:

Strengths, Weaknesses, Opportunities, Threats, Actions.

SWOTA analysis is an effective method of identifying strengths and weaknesses, which then provide the basis for examining opportunities and threats that landholders may face. Often carrying out an analysis using the SWOTA framework will be enough to reveal changes which can be usefully made.

Below are some questions to be considered when carrying out a SWOTA Analysis. These should be considered both from a personal point of view and from the point of view of others eg neighbours or others working in the same field. It is important to assess realistically.

Strengths:

What are your advantages?

What do you do well?

Weaknesses:

What could be improved?

What is done badly?

What should be avoided?

Opportunities:

Where are the good chances facing you?

What are the interesting trends?

What are the possible changes in technology and markets on both a broad and narrow scale?

What are the possible changes in context eg government policy, funding?

What are the possible changes in social patterns, population profiles, lifestyle changes, etc?

What opportunities could be provided by local events?

Threats:

What obstacles do you face?

What are your neighbours doing?

Is changing technology threatening your position?

Do you have cash-flow problems?

Actions:

Given these SWOTAs, what management actions need to be taken to:

Build on strengths

Minimise weaknesses

Capture opportunities

Address threats.

FACILITATOR RESOURCES

2. FACILITATOR RESOURCES

OVERHEAD TRANSPARENCIES

- Benefits of biodiversity conservation
- Managing threatening processes
- Planning Context
- Planning Cycle
- Strategies to conserve biodiversity
- Values interpretation
- Conserving biodiversity of farms
- Biodiversity property plan overlays
- Your biodiversity property plan
- Bio-overheads 1-10 (See the Facilitator's Biodiversity Resource Kit NPWS 2001)
- The Planning Steps,

Evaluation form

BENEFITS OF BIODIVERSITY CONSERVATION

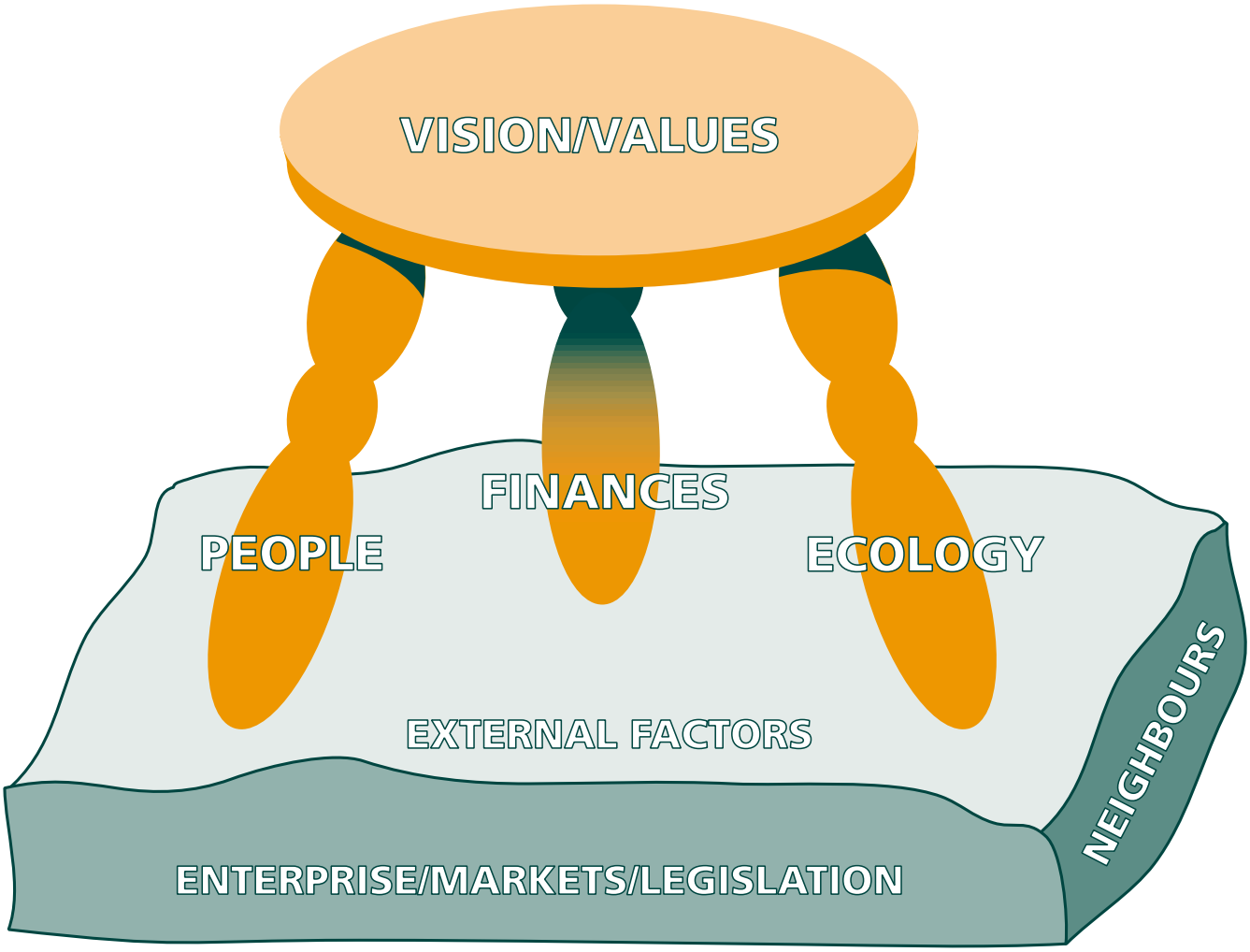
Protecting and conserving biodiversity in native bushland and other habitat areas can have the following benefits:

- habitat for native fauna which control pest species and provide crop pollination
- erosion control
- water table management
- stock shade and shelter
- nutrient cycling
- microclimate control
- riparian vegetation/water quality management
- alternative enterprises
- landscape amenity
- drought proofing

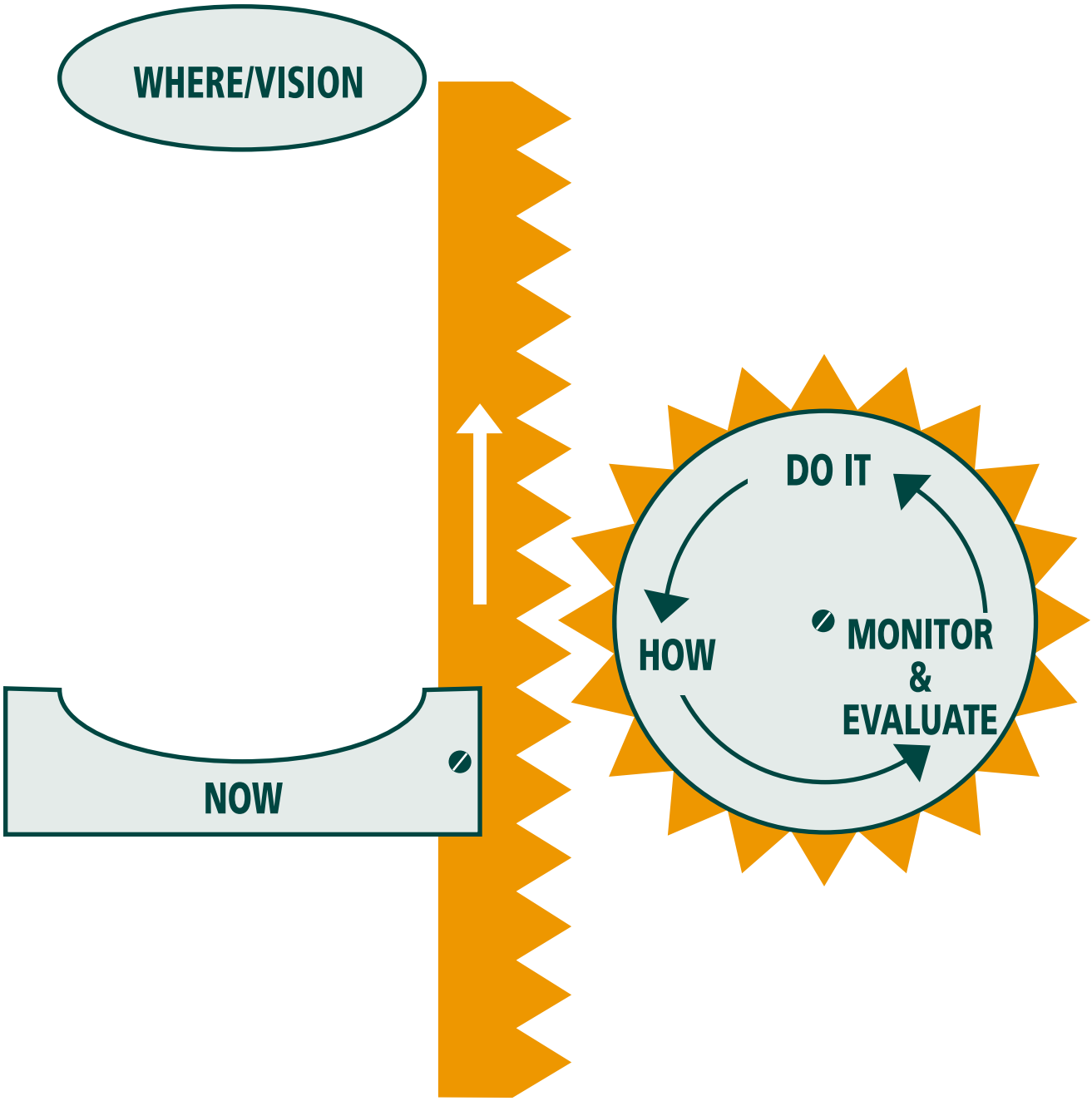
MANAGING THREATENING PROCESSES

Threat	Management Solutions
Stock grazing	• Change grazing strategies • Fence to control stock movement and grazing
Clearing of native vegetation	• Improve existing pasture • Retain remnant vegetation • Revegetate to link remnants and create wildlife corridors • Enhance grazing management
Exotic weed and feral animal species	• Change pest control methods • Manage weeds and feral animals • Use local native species
Excessive native wildlife species	• Bore capping • Develop regional wildlife management plans
Pollution and land contamination	• Reduce use of artificial fertilisers and pesticides • Change waste disposal for unused agricultural chemicals
Salinity	• Modify irrigation practices • Identify and replant recharge areas • Protect discharge areas and salt scalds from further degradation • Expand native vegetation

THE PLANNING CONTEXT



THE PLANNING CYCLE



VALUES INTERPRETATION

Core Business Value	Value
ECONOMIC	• Generating new markets
	• Having a profitable business
	• Managing debt
RESPECT	• Being respected by friends
	• Being regarding as one of the best farmers
	• Being proud of our property
EFFICIENCY	• Pursuing excellence
	• Managing the property efficiently
	• Having a viable farm
ECOLOGICAL AWARENESS	• Retaining native bushland
	• Enjoying the landscape
	• Thinking of the farm as part of the catchment
COMMUNITY INVOLVEMENT	• Being active in community groups
	• Helping others
	• Taking initiative in the local community
POWER	• Making my own decisions
	• Having control over future directions
	• Being a leader
RELATIONSHIPS	• Having close relationships with family and friends
	• Providing for your children
	• Working as part of a team
WELL BEING	• Having low work stress
	• Being healthy
	• Satisfaction with lifestyle
RISK	• Experimenting with new techniques
	• Gaining new knowledge
	• Willing to make changes

Source: Facilitator's Biodiversity Resource Kit, (2001), NSW National Parks and Wildlife Service.

STRATEGIES TO CONSERVE BIODIVERSITY

1. Retain and protect all natural vegetation by fencing
2. Protect all watercourses and wetlands
3. Leave adequate ground debris
   - logs, rocks, leaf litter etc for habitat
4. Control pests
5. Control weeds
6. Revegetate strategically with local native species
7. Control soil erosion and maintain soil health
8. Manage fire

CONSERVING BIODIVERSITY ON FARMS

RETAIN

- all remnant vegetation
- paddock trees
- wetlands, water bodies
- representative samples of all native biodiversity
- natural landscape features, eg rocks

PROTECT

through

- fencing
- fire management
- erosion and salinity control

for natural regeneration

RESTORE

- revegetate to
  - improve diversity of remnants
  - expand & link remnants
  - enhance wetlands
  - create shelterbelts

Monitor and evaluate

Monitor and evaluate

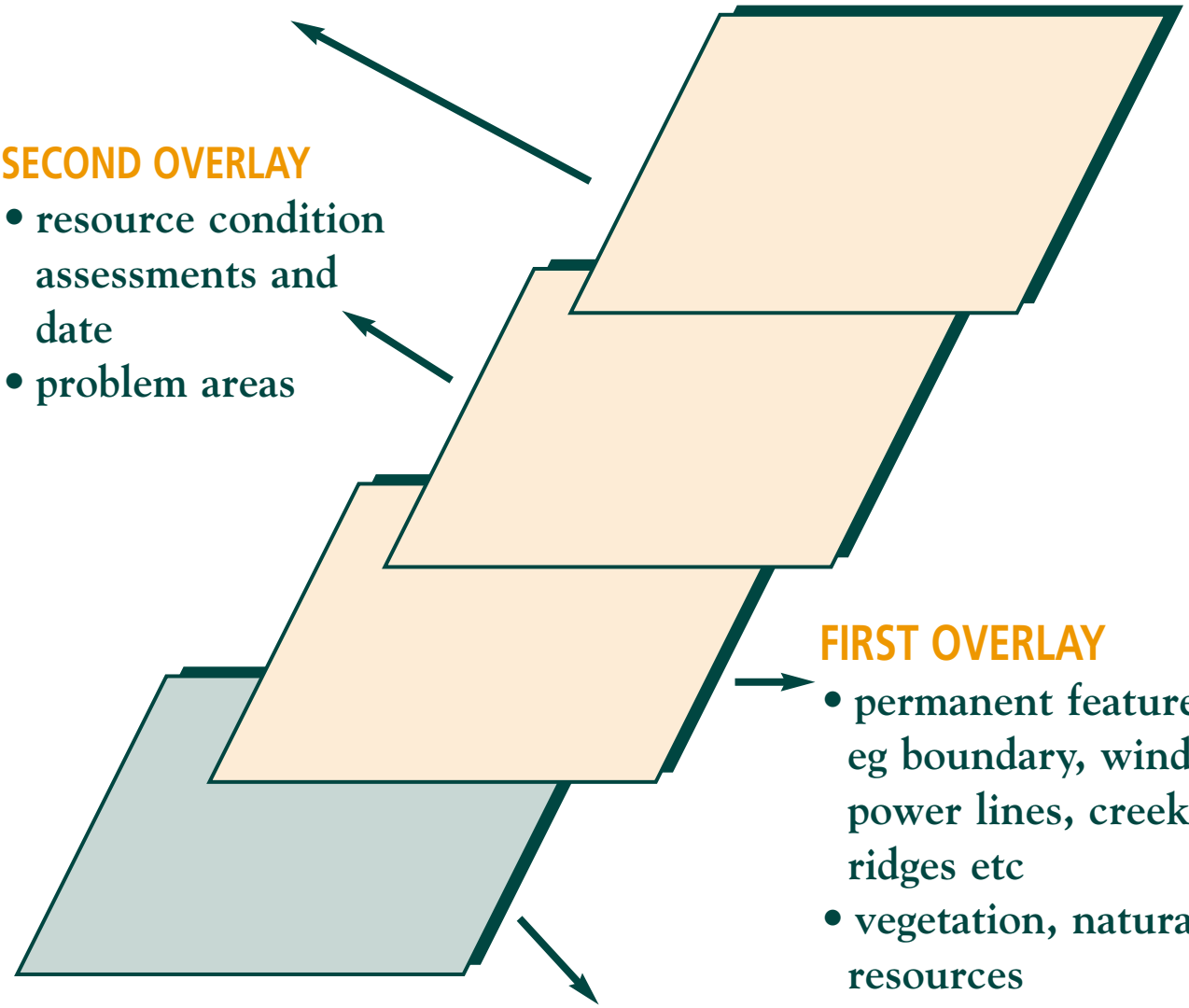
CONTROL

- pests
- weeds

YOUR BIODIVERSITY PROPERTY PLAN

THIRD OVERLAY
- management plans

SECOND OVERLAY
- resource condition assessments and date
- problem areas



FIRST OVERLAY
- permanent features eg boundary, winds, power lines, creeks, ridges etc
- vegetation, natural resources
- performance indicator sites

AERIAL PHOTO
- property name
- north point
- scale

THE PLANNING STEPS

Where	**Set your vision** What do you want the wildlife and natural vegetation on your property to be like?	Module 1/3 Module2/2	Sheet 1
Now	**Map your property's features**	Module 1/4	Aerial photo and map
	i. Assess the current condition of your natural resources How good is your bushland? Is your dam good wildlife habitat? What native species do you have? **ii. Map the results on your map**	Module 1/5, 6 & 7	Sheets 2, 3, 4, 5, 6, 7
	SWOTA review Identify strengths, weaknesses, opportunities, threats (constraints) and management actions.	Module 2/2	Sheet 8
How	**Set your goals**	Module 2/4	Sheet 9
	Summarise key issues What are the essential things that you need to do, and that are in your capacity to do, to achieve your vision?	Module 2/5	Sheet 8
	Develop management strategies and actions What do you need to do to achieve your goals?	Module 2/6	Sheets 10 & 11
Do it	**Implement actions** Start to carry out tasks to achieve your plan.		
Monitor & evaluate	**Review/check performance indicators** Review your actions, are they going according to plan? Adjust/adopt your plan if necessary.	Module 1/7 Module 2/7	

EVALUATION

Thank you for attending the Planning for Biodiversity Management Workshop. We would appreciate it if you could spend a little time answering the below questions, so that we can ensure that the course is relevant and supports your needs. Your feedback also helps us to make appropriate adjustments to the course content and delivery.

1. **Please indicate the usefulness of the following:** (1 indicates least useful and 3 most useful)

Module 1/Module2	Circle as appropriate		
Relevance of Support Materials	1	2	3
Activities used in the classroom	1	2	3
Field based practical sessions	1	2	3

2. **Were the outcomes of the day clearly stated at the beginning of the sessions?** Yes / No

3. **Did you understand what was expected of you throughout each day?** Yes / No

4. **Did you find the length of time for the training sessions appropriate?**

   Too long Just right Not enough

5. **Were you able to relate the activities to the management of your property and will you be able to transfer your learning to your activities on your land?** Yes / No

6. **Did you feel involved in the training?** Yes / No

7. **Did you find the trainer/s**

   Knowledgeable? Yes / No

   Approachable? Yes / No

   Good at listening? Yes / No

8. **Did the trainer/s display good verbal communication skills? (ie speaking, explaining concepts)** Yes / No

9. **Did you feel by the end of the training course you had accomplished the outcomes that were stated at the beginning of each session?** Yes / No

10. **Please give any additional comments you would like to share about your training in the space below:**

BIODIVERSITY ASSESSMENT AND SURVEY

3

3. MODULE ONE: BIODIVERSITY ASSESSMENT AND SURVEY

PARTICIPANT NOTES

1. Introduction and learning outcomes
2. Biodiversity: an important asset
3. Planning the biodiversity management of your property
4. Mapping your property's native vegetation and water body areas
5. Assessing your property's current ecological condition
6. Surveying your property's biodiversity
7. Setting biodiversity performance indicators

1. INTRODUCTION

This is Module one in the two module series *Planning for Biodiversity Management*. These two modules will help you and your family to plan how to manage and conserve the biodiversity that occurs on your property and how this links with other decisions you need to make in managing your property as a whole.

The primary aim of Module One is to provide you and your family with an increased awareness and understanding of biodiversity conservation on your own property. This module enables you to collect the information you need to assess the current health of your property's biodiversity.

These practical skills in biodiversity assessment and understanding will assist you in your ongoing development of property management plans for your whole property. This recognises the importance and contribution of biodiversity conservation to environmentally, economically and socially sustainable land management.

LEARNING OUTCOMES

On completion of this workshop you will be able to:

- Recognise how your property's health and productivity is supported through biodiversity management and conservation;
- Understand the meaning of terms such as biodiversity, genetic diversity, species diversity, ecosystem diversity, sustainability, ecosystem, ecological community, and threatened, vulnerable and endangered species;
- Have an appreciation of the economic, social and environmental values of conserving biodiversity and have a greater understanding of the range of threatening processes to biodiversity;
- Identify, describe and assess native vegetation and modified, artificial environmental systems with regard to biodiversity values;
- Assess water bodies, such as creeks, dams and wetlands for their health and wildlife habitat value; and
- Conduct a baseline biodiversity survey.

"This module enables you to collect the information you need to assess the current health of your property's biodiversity."

2. BIODIVERSITY: AN IMPORTANT ASSET

Biodiversity is the variety of all life forms on Earth, including plants, animals and micro-organisms. It includes the genes of all species, the communities they form and ecosystems of which they are a part.

Biodiversity can be considered on three different levels: genetic, species and ecosystem diversity. In surveys or assessments of an area, a measure of biodiversity can be made by identifying the number of species in that area.

A species is a group of organisms, which shares a combination of genetic variations that make its members different to all other species. Members of a species can breed only with other members of the same species; they cannot breed with members of other species.

The number of species on earth is widely estimated at 10-100 million. In Australia there is a distinctive and diverse range of native plants and animals. Australia's history as an isolated landmass has resulted in a high level of species richness and uniqueness compared to many other parts of the world; for example there are an estimated 25,000 plant species alone, not to mention the vast numbers of invertebrates. There are more ant species on Black Mountain, overlooking Canberra, than there are in the whole of Britain. (Tim Flannery, *The Future Eaters*, Reed, 1994, p.75).

Australia is one of only twelve mega-diverse countries and its native biodiversity is of global significance. In these workshops the term biodiversity will be used to refer to the native Australian ecosystems and their components - the plants, animals and microorganisms. On farm properties this is the original vegetation or bushland - the remaining vegetation of trees, shrubs and grasses and all the native organisms - the animals, birds, insects, fungi, bacteria etc which use the bush and soil for habitat or in some way are a part of this natural system. The term habitat means the place - the living space - where a plant or animal lives. Habitat is shelter and food; it is made up of different components and consists of different things for different species. To ensure a variety of life we must ensure a variety of habitat.

Much of Australia's precious biodiversity exists on privately owned properties in agricultural landscapes.

DISCUSSION QUESTION 2.1

Think about your own property. How many species might it contain? Which areas of your property might provide the best habitat or have the highest biodiversity values? How do the modified areas on your property also provide habitat?

Since 1788 the natural environment of Australia has been significantly modified. More than 70% of native vegetation in NSW has been removed or substantially changed by human activity. In NSW over 80 native plant and animal species are presumed extinct with another 600 species considered either endangered or vulnerable. Forty percent of the mammal species that are extinct or endangered were common 200 years ago. The growing list of species threatened with extinction is an indicator of the loss of biodiversity.

DISCUSSION QUESTION 2.2

Think about the native birds or animals you remember from your childhood. What changes have occurred? What native birds or animals seem to have adapted to the agricultural or other changes you have made to your property?

Healthy bushland and waterways are now quite scarce in much of the agricultural areas of NSW. Many of the existing patches of bush on farms are small and often in decline due to impacts such as clearing, grazing, changes to fire regimes, pest and weed competition, increased nutrient input from fertilizers and animal manure and changes in ground water levels affecting salinity.

Wildlife species move across the landscape seeking food and shelter. Private lands cover a large part of the NSW landscape and provide valuable habitat for a diverse range of native plant and animal species and ecosystems. The remaining vegetation on private land tenure provides linkages and corridors of wildlife habitats to protect and support the sustainable conservation and management of our native biodiversity, including many endangered species and ecosystems.

THE IMPORTANCE OF BIODIVERSITY CONSERVATION

Biodiversity is vital in supporting all life on Earth. It affects us all and is a fundamental part of our lives and agricultural production. Biodiversity provides what are termed "ecosystem services", which is the provision of clean air and water and fertile soils. Biodiversity provides all of our food and the raw materials for clothing and many industrial products and medicines. It provides opportunities for recreation, tourism, scientific research and education and is a source of cultural identity for many Australians.

Biodiversity, the plant and animal species that interact with each other in their physical environment, is essential to the rural, agricultural landscape and agricultural land management systems as it provides the "nuts and bolts" of a healthy ecosystem.

An "Ecosystem" is the organisms in a community and the associated non-living factors with which they interact.

Generally, the more complex or diverse an ecosystem, the less likely it is that a disturbance will cause an individual species to die out, and the system remains stable. So, in natural ecosystems, there is a relationship between diversity and stability. The more variety in a system, the more robust the system and the better it can survive a disturbance or a major environmental event such as drought, flood or fire.

Farms, although managed for production of food and/or fibre, have natural ecosystems (remnant vegetation), and modified and artificial systems integrated with agricultural production systems, which all support and sustain native biodiversity. The natural ecosystems can provide the robustness and be an important component in managing risk.

DISCUSSION QUESTION 2.3

What are some of the impacts of your enterprises upon biodiversity?

Farming systems modify the natural ecosystem to achieve a specific result. For example clearing of native vegetation and pasture improvement create an environment suited to increased grazing by stock. Because parts of a farm ecosystem relate to each other in a complex system, all actions produce an effect, sometimes unintended.

UNDERSTANDING YOUR PROPERTY'S ECOLOGY

Ecology is the study of the relationship between living organisms and the environment or the study of ecosystems.

Ecosystems are the "web of life", made up of a diverse range of plant and animal species that interact with each other in their physical environment. Since humans are a part of or have an influence on the ecosystem, it is important for us to remember that any damage to the environment has a potential impact upon us.

Your property can also be described as an ecosystem because each part interacts with at least one other to contribute to the overall functioning. A change in one part will affect many other parts of the whole ecosystem.

Figure 2.1 Straw-necked Ibis *RAOU 1984*

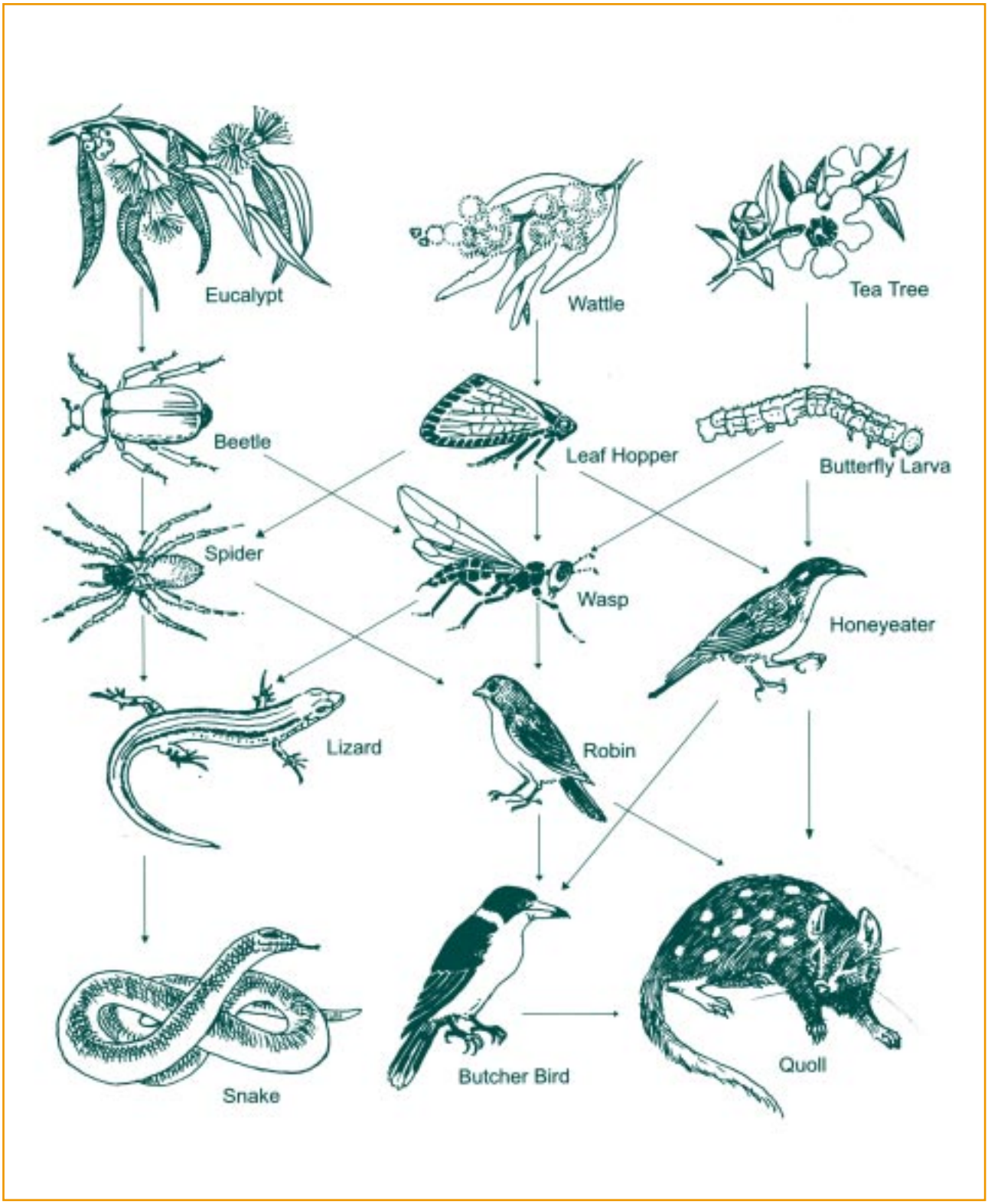


Figure 2.2. A food web develops in the ecosystem and humans are often a part of the system *J.Miller*

DISCUSSION QUESTION 2.4

What are the different components of your property's ecosystem? How healthy is it? How would it respond to a major disturbance or extreme environmental event?

Parts of your property's ecosystem may include: stock, crops, pastures, trees, native bush, soil, creeks, dams, gullies, soil organisms and a variety of other native plants and animals. We now realise that there are many benefits to integrating the natural ecosystems with agricultural and grazing practices and the farm ecosystem.

THE BENEFITS OF HAVING NATIVE PLANTS AND ANIMALS ON YOUR PROPERTY

It is hard to put a value on the quality of life that the Australian landscape, the characteristic trees, animals and birds, provide for those who live on the land. However a considerable amount of scientific research has been done in recent years to show the economic value landholders derive from retaining native vegetation and having native plants and animals on productive properties.

DISCUSSION QUESTION 2.5

Brainstorm the benefits that come from having native plants and animals on a farm. Consider the value of the bush around this farm dam.

Can you assess the risks to your farm production and farm management of biodiversity loss and loss of its associated ecosystem services?

Figure 2.3 Landholders can benefit from retaining native vegetation on their properties *S.McMahon/NPWS*

Some of the main benefits to consider are listed below.

1. The ability of many of our native wildlife species to control pests. For example:

- Honeyeaters can consume 24-36 kg of insects per hectare per year from woodland areas. Honeyeaters require a well developed native vegetation understorey for nesting and a variety of nectar producing plants.
- A flock of 100 Straw-necked Ibis will eat over 25,000 pasture insect pests in one day. Vegetation near water will provide safe night time roosts for Ibis.
- One insectivorous bat can consume up to 600 small flying insects in an hour. Bats are known to eat army worms, moths and mosquitoes and need safe places to camp during the day, such as hollow bearing trees, caves and sheds.
- One sugar glider consumes the equivalent of well over 4,000 Christmas beetles or 23,000 Autumn gum moths per year. Sugar gliders need a diverse native vegetation understorey and hollow bearing trees for survival.

Figure 2.4 Sugar Glider *NPWS*

- Native wasps may parasitise over 90% of eggs in some locust egg beds. Native wasps also need a diverse native vegetation understorey to survive.

Consider the savings in pest control if you had all of these farm workers on the payroll!

TABLE 2.1 SUMMARY OF SOME ADVANTAGES OF ENCOURAGING WILDLIFE TO CONTROL PESTS *(NSW Agriculture 1996)*

Pest Type	May be controlled by
Insect pest species of pasture and trees	Echidnas, sugar gliders, bats, parasitic wasps, magpies and other birds
Mice, rats, hares, rabbits	Predatory birds such as owls, hawks and eagles
Carrion that may spread disease or blowflies	Crows, ravens, goannas and some lizards
Mistletoe	Possums and some butterflies
Insects, rats and mice	Lizards, snakes, frogs and spiders
Insect pests of trees (eg. scarabs that contribute to dieback)	Parasitic wasps

2. Shelter and shade provided by native vegetation, especially in times of poor or extreme weather:

- Significantly reduces the need for supplementary feeding of stock. Wethers, in shelter provided by vegetation, require around one third the amount of supplementary feed to maintain liveweight as unsheltered wethers.
- Dramatically reduces stock losses off shears or following lambing.
- Reduces heat and cold stress in stock, resulting in increased milk production, increased liveweight gain, increased wool growth, increased fertility and increased birth weights.
- As shelterbelts, reduce the microclimatic impacts of wind, increasing downwind yields of crops and pastures by an average of approximately 20 per cent.

3. The pollination of crops by insects and birds:

- Was last estimated (1990) to be worth between $600 million and $41.2 billion per year in Australia. Native insect pollinators will travel from nearby areas of native vegetation and wetlands.

4. Soil fungi associated with plant root mycorrhiza:

- Can effectively increase the surface area of roots by up to 2000 times, providing a huge boost to plant productivity.

5. Clean water from areas managed as wildlife habitat as well as stock water supply can affect stock production:

- An overseas trial showed that over the course of 71 days, 18-month old steers drinking clean, fresh water gained 23 per cent more weight than steers drinking dirty water from poorly managed dams.

6. Wetlands are places of intense biological activity which provide many benefits:

- They filter and break down nutrients in farm runoff, reducing the risk of blue-green algal blooms and improving catchment water quality;
- They provide green fodder in summer, while being retained as a valuable wildlife habitat, encouraging native water birds and other wildlife onto the property that feed on insect pests;
- They are also important for recreational activities eg: fishing, hunting, canoeing and camping; and

- Dry wetlands reduce the damage caused by floods by absorbing large volumes of water which would otherwise be confined to the main river channel.

MANAGING FOR BIODIVERSITY

We all benefit from the conservation of biodiversity and the products and services it provides and we hope will continue to provide for future generations. It is also a major challenge due to population growth, settlement patterns and our consumption of resources, which are all exerting major stresses on our natural environments.

Damage to the environment and biodiversity loss is difficult to reverse. By understanding the things that threaten biodiversity we can work to protect, conserve and minimise further loss of our natural resources. These threats come from a broad range of human activities and are not just limited to one particular sector of the community.

However on farming lands activities such as clearing, inappropriate grazing, inappropriate water extraction, pests, weeds, pollution, contamination, soil loss and salinity all contribute to the threats to biodiversity.

Biodiversity conservation requires the adoption of management practices, which sustain the diversity of natural ecosystems. You also need to have an awareness of how your modified and artificial systems integrated in agricultural production can contribute to biodiversity. Your property planning and management objectives need to include biodiversity conservation as part of achieving productive and sustainable farming systems.

Some of the basic things that can be done to conserve biodiversity on farms include:

1. Retain and protect by fencing all natural vegetation, whether areas of remnant, native grassland or isolated paddock trees;
2. Protect all watercourses and wetlands;
3. Leave adequate ground debris - logs, branches, rocks and leaf litter for shelter and food for plants and animals, if it is safe to do so;

> "Damage to the environment and biodiversity loss is difficult to reverse."

4. Control exotic or native pests with ecological sensitivity;
5. Control weeds with ecological sensitivity;
6. Revegetate strategically using local native species to restore and rehabilitate areas;
7. Control soil erosion and maintain soil health and
8. Manage fire for both protection of built assets, as well as considering the protection of biodiversity from inappropriate fire regimes.

Biodiversity is linked to achieving ecological sustainability and is a pillar of sustainable land management.

Ecologically Sustainable Development (ESD) is development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations of all species.

(Learning for Sustainability, NSW Environmental Education Plan 2002-5)

Your efforts to adopt sustainable property management practices will significantly contribute to your property's ecological health, productivity and future viability, ensuring that your property is a valuable asset either for resale or transfer to your family's next generation. You will also contribute to health of your entire catchment or sub-catchment.

Managing for biodiversity and property planning to make sure you look after all the resources of your property is the focus of the second biodiversity planning workshop, Module Two.

Fire in grassland *Higginson/NPWS*

3. PLANNING THE BIODIVERSITY MANAGEMENT OF YOUR PROPERTY

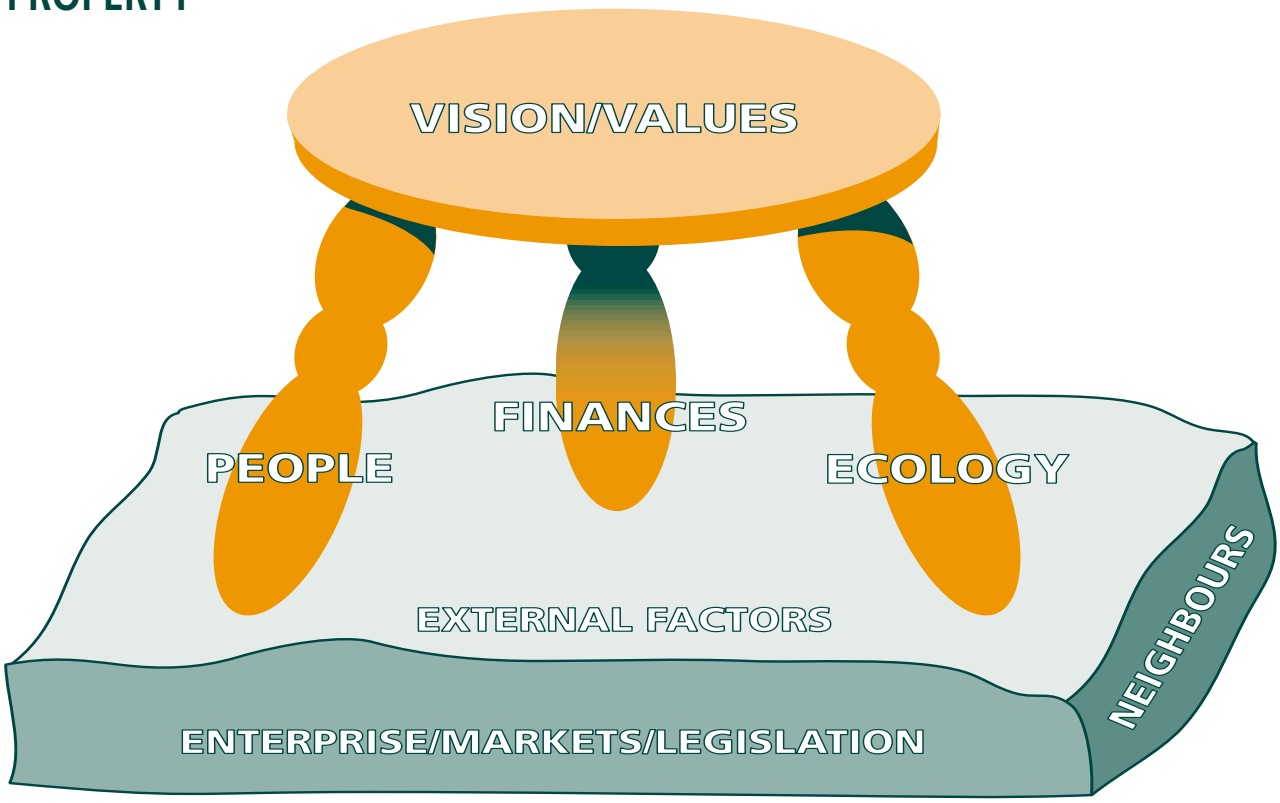


Figure 3.1 The planning context

This stool diagram shows the key aspects that need to be considered when undertaking the planning process for your property's management. Your property rests on the three "legs" of people (human resources), the finances (financial resources) and the ecology (natural resources). The stool is placed on a platform of external factors and considerations that you must be aware of and take into account and which change over time. These include legislation, council planning regulations, neighbour's values and attitudes, climatic factors and market factors. If too much emphasis is placed on any one of the three legs or the platform shifts or changes, the stool, ie your property's management, becomes unbalanced and falls over. The two workshops in *Planning for Biodiversity Management* are focussed on the Ecology "leg".

In order to manage your property, including biodiversity considerations, it is helpful to undertake long term planning. This process includes looking to the future to identify a vision as to where you wish your property to

be, in the long term. The next step is to identify what the situation is now and then to identify how to work toward achieving your vision through doing tasks and actions. Acknowledging that things change, a plan should not be a static document but one that can be adapted and changed as circumstances change and tasks are achieved. Monitoring and evaluating the actions that have been identified in the plan over a time period means that the plan remains valid, current and a working document for ongoing use and guidance. In this Module we will consider the *where* and the *now*. In Module Two the *how*, *do it* and *monitor* and *evaluate* steps of the planning process will be outlined.

"WHERE" - YOUR PLANNING VISION

An essential part of the planning process is to think about *where* you would like to be, with regard to your property's ecological condition, at some time in the near future. This vision of what you would like your property to look like in the future will guide you and your family's planning decisions.

"NOW"- YOUR ECOLOGICAL STOCKTAKE

Now means an assessment of your property's current health. This is carried out through a range of stocktakes, surveys and assessments. The first step will involve mapping of your resources, followed by an assessment of their condition. There are then a range of surveys that you can undertake to get a snapshot of your property's biodiversity as well as the means to systematically monitor its ongoing state.

ACTIVITY 3.1 DETERMINING YOUR VISION FOR YOUR PROPERTY'S ECOLOGICAL CONDITION

In developing a vision for your property's ecology ask yourself how you would ideally like to see your property in the future - say ten years from now. Think of a place or places on your property that make you feel good. What is there? What are the things you most value about the natural resources of your property?

Consider the following checklist:

- Areas of remnant native vegetation
- Wildlife dams
- Vegetated laneways
- Shelterbelts
- Revegetated areas
- Native pastures

Now create the image of your property's ecological vision in your mind, complete with all the detail you can manage.

Use Sheet 1. Write your ideas about your vision.

4. MAPPING YOUR PROPERTY'S NATIVE VEGETATION AND WATER BODY AREAS

The first step in surveying the biodiversity component of your property's natural resources is to complete a map of the features of your property. This involves using an existing map or an aerial photo and marking on clear plastic overlays information such as the land uses on the property and the types of vegetation and habitats. This valuable information gathering process can be a starting point for assessing biodiversity on your property. The map and overlays become a management tool, assisting

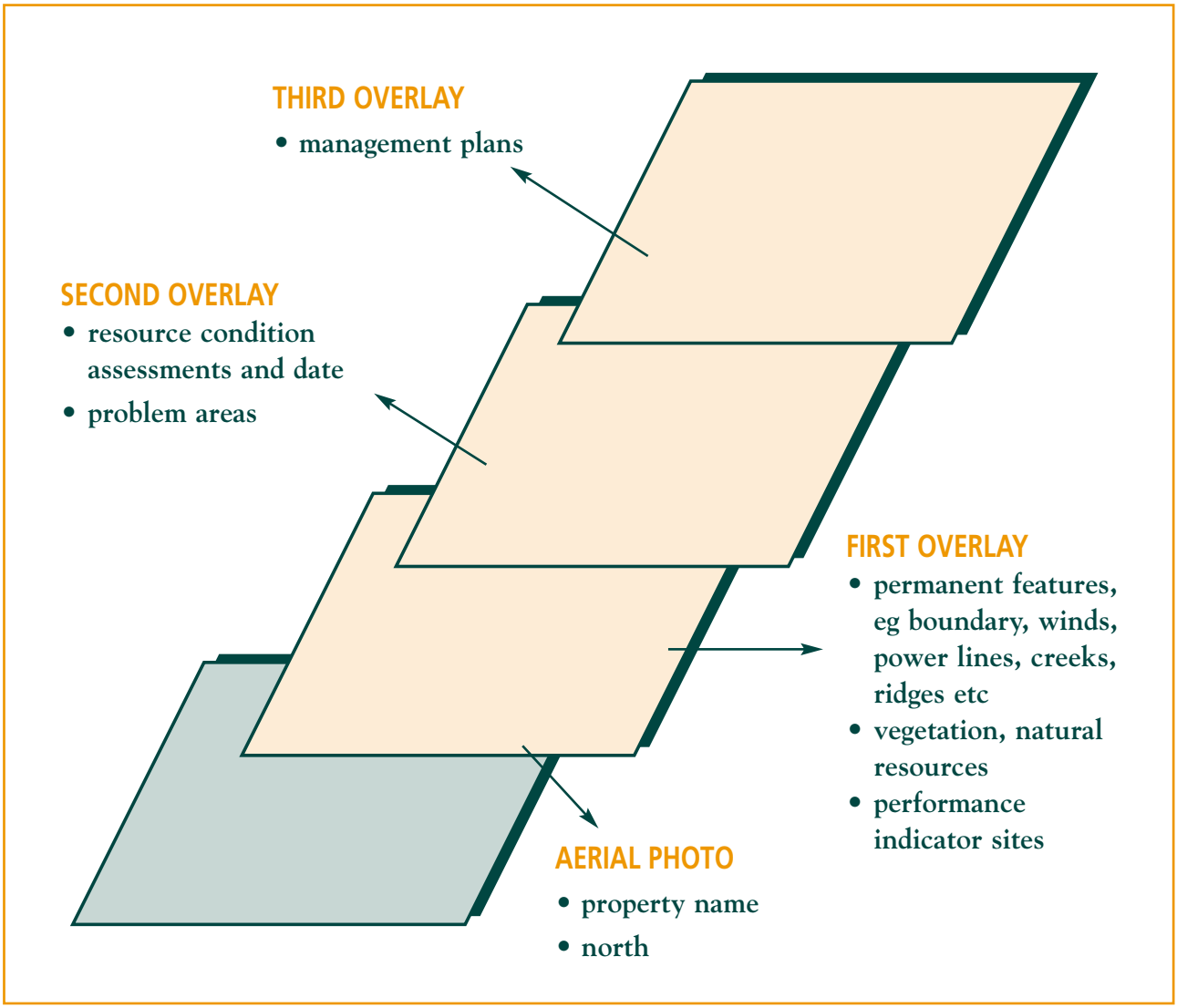


Figure 4.1 Overlays for your Biodiversity Property Plan *S.McMahon/NPWS*

you and your family in planning and monitoring the management of your property's ecological resources.

ACTIVITY 4.1 COMPLETING A MAP OF THE FEATURES OF YOUR PROPERTY

Step One: Mapping features

Mark on the first of your clear plastic overlays for your map (topographic map or aerial photo) the following items. Use a black pen for features and boundaries. Use blue pens for creeks, dams and wetlands.

- **Location of houses, buildings**
- **Native vegetation areas** (eg patches of native bush, grassland, corridors.) Mark these by drawing a line around the vegetation patch in question. Identify each patch of vegetation with a number or name or the vegetation type, if known. Patches can be labelled R1, R2 for remnant 1 etc.
- **Scattered paddock trees**

  Mark individual trees "ST"

  If there are a large number of scattered trees in a paddock (eg. more than 20 in a 50 acre or 20 hectare paddock) add "ST" next to the paddock's name (or number).
- **Creeks / rivers**
- **Dams and wetlands "D" or "W"**
- **Wildlife sightings**

  Mark any sightings of useful, common or important usual native animals, eg. sugar gliders, ibis or bats. Note sightings in modified as well as natural areas of your property.
- **Features** such as rare plant species, geological formations, cultural heritage.
- **Other landuses**
- **Zones**

  Mark the areas of common landuse/features that will be managed as one area with common strategies and actions.

"Mark any sightings of useful, common or important usual native animals, eg. sugar gliders, ibis or bats."

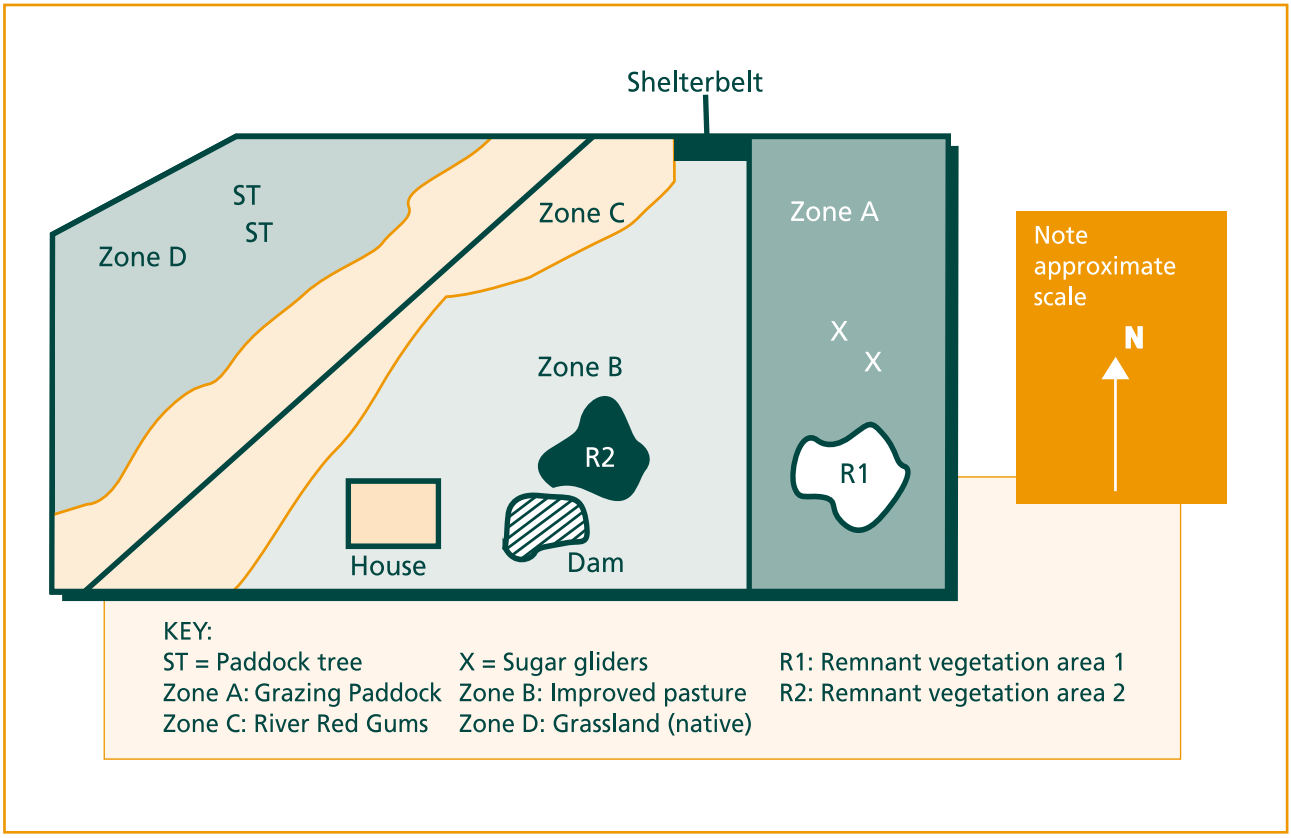


Figure 4.2 A map such as this can be used to show information about the ecology of your property

Step Two: Evaluating mapping outcome

Look at the map of your property's features. What percentage of your property consists of original vegetation? How big are the patches of remnant vegetation? What shape are they? How does your current property condition differ from the ecological vision you have just formulated? Compare your map with others in the group and consider the biodiversity implications of each property map.

For further information on preparing a physical property plan contact your local office of NSW Agriculture, Department of Land and Water Conservation, NSW National Parks and Wildlife Service, or your nearest TAFE College. You can also find useful information on how to prepare these plans in the Farming for the Future/NSW Agriculture 1999 publication "Physical Property Planning" available through NSW Agriculture, Phone: 1800 025 520.

5. ASSESSING YOUR PROPERTY'S CURRENT ECOLOGICAL CONDITION

The next step towards planning for the management of your property's biodiversity is to describe and assess the property's ecological health. This gives you information about its condition with regard to its value as healthy ecosystems and wildlife habitats as well as a productive agricultural system.

In this section we describe the rapid assessments you can do of areas of your property using a question sheet and evaluation table. You may also want to explore the biodiversity values of some of these same areas in more depth by surveying for different species of plants, animals or birds. The guidelines for these surveys are in the notes in the next section of this module.

There is also a sheet to help you identify possible habitat areas on your property that are not areas of native vegetation but may nevertheless be relevant for biodiversity conservation.

Rapid assessments of selected areas of native vegetation (eg large patches of remnant forest or woodland, native grassland, discernible clumps of trees in a paddock or even isolated paddock trees), modified areas (eg crops and introduced pastures) and water bodies (particular sections of creeks or rivers or entire dams and wetlands) can be made using a series of two or more assessment sheets. The first step is to select some key sites that represent typical aspects of your property and should tie into the zones that you have selected. Each site can be recorded on Sheet 2 and can include a photo of the site from an identified photopoint. This photopoint can then be used in the future to record changes at the site over time. These should include areas of typical vegetation types, water bodies and perhaps other areas that provide good habitat for native species, eg along the side of a paddock or roadside. The next step is to assess the condition of each of these sites and Sheets 2-5 can be used for these assessments. You should keep a clear master copy of these sheets and use it to make multiple copies for current and future use.

PURPOSE OF ASSESSMENTS

These assessments will help you to:

- Identify which areas are healthier;
- Identify which areas should be given higher priority for management actions;
- Identify management practices that will help to retain and protect these areas and restore and rehabilitate them;

- Identify which areas can be restored; and
- Monitor the impacts of implemented management practices on these areas by establishing a benchmark for future reference and repeating the assessment at regular intervals.

WHAT AREAS TO ASSESS

When planning which parts of the property to conduct assessments, it is suggested that you carry out an assessment in each of the different environments or habitat types in each quarter of the property. For example select areas along your creek bank, in bushland, grassland, cropping areas with occasional trees and wetland (swamp) areas. You can also select features such as rocky areas. By selecting a few sites to assess in each habitat type you will get a good idea of the overall habitat health on your property. These can be marked on a separate plastic overlay of your property plan.

Conducting assessments in different habitat types in each quarter of your property will provide a more accurate overall assessment for the whole property, and _highlight_ areas requiring greater attention.

WHEN TO CONDUCT ASSESSMENTS

Assessments can be conducted at any time of the year but you will find them easier to carry out when plants are flowering and animals are more active, ie late winter through to late spring. Some animals seasonally migrate or hibernate and are therefore only present at certain times of the year. Therefore, to get a good picture of the site's condition, you could, in the first year, conduct a number of assessments throughout the year.

Repeating your assessments on a yearly basis, at similar times and in a similar way, gives you the opportunity to observe the cycles and observe things coming back. Your observations can guide you to make changes, and monitoring the response to the changes feeds into your ongoing management. The more you do, the more information you will collect and the more you will learn about the property's health and changes from year to year.

ACTIVITY 5.1 ASSESSMENT OF NATIVE VEGETATION SITES

Sheets 2 and 3 apply to the description and assessment of areas of bushland and native grassland and the condition of scattered paddock trees. Table 3.2 in Module Two summarises the management actions that are recommended according to the identified condition ratings.

Step One: Site selection

Select areas of native vegetation on all four quarters of your property that you wish to assess to give you a representative picture of the health of vegetated habitat on your property. You need to eventually assess all patches of remnant vegetation so that you can properly manage all the natural resources of your property. Refer to the map of your property's features. You will need to complete a separate set of assessment forms for each site.

Step Two: Completion of site description form - Sheet 2.

i) Identify native vegetation type

- To identify your broad vegetation type you need to note the physical features of the vegetation community, such as the height of the vegetation and the spacing between the tallest plants. Descriptions you may use include "open forest", "woodland", "shrubland" and "grassland". Look at the matrix in Table 5.1 and describe the type of

TABLE 5.1 VEGETATION TYPES.

Vegetation Type	Description
Rainforests Closed forests	Trees > 2 m tall, single stemmed, canopies touching or separated by less than tree height
Open Forests Woodlands	Trees > 2 m tall, single stemmed, canopies separated by less than 20 x tree height
Shrublands Mallee Shrublands	Top vegetation layer often multi-stemmed, < 8m tall
Heathlands	Top vegetation layer < 2 m tall, most plants have small leaves
Dry Grasslands Sedgelands	Top vegetation layer usually < 1 m tall, most plants grass/reed-like shape; not subject to regular waterlogging
Wetlands	Ground subject to regular waterlogging
Moss gardens Lichens Liverworts Seaweed mats	Top vegetation layer usually < 0.2 m tall

(From Community Biodiversity Survey Manual - NPA/NPWS 2001)

the vegetation that is present at this site eg. Open Forest.

- Now examine the species of plants present. Usually the plants, trees, shrubs or grasses, which are dominant in the vegetation are the most important in the description. Sometimes, there may be two or three species that are equally dominant. Consider which species are the main ones on the site. Often, only one species will be dominant eg. Spotted Gum (*Corymbia maculata*). See field guides and Biodiversity Conservation Management Notes for help in species identification.

  NOTE: Vegetation types are named by using both the general description and the species.

- Decide on the best description for your vegetation, eg the above examples would be combined to describe the vegetation as "Spotted Gum Open Forest". A grassland dominated by Kangaroo Grass (*Themeda* spp.) would be described as a "Themeda Grassland".

- Write the description on the site description form (under "vegetation description").

ii) Select photopoints and take photo(s).

Select fixed points in or near the assessment site from where you can take regular photos to monitor changes in vegetation or identify things of interest. For sites involving larger patches of native vegetation, you may wish to establish two photopoints, one at the centre and one at the boundary, or where the vegetation changes. You need to complete a separate site description sheet for each photopoint. For more information on setting up photopoints see Biodiversity Conservation Management Note: Photographic Monitoring.

iii) Complete all other details on Site description form, Sheet 2

Attach the photos to the site description form and write the description for the photopoint. Date the assessment sheet according to the date you take the photo(s). For each site complete the site description details of land use history etc.

Step Three: Completion of Condition assessment – native vegetation.

i) Complete Sheet 3: Condition Assessment – native vegetation.

Answer "yes" or "no" to each of the questions asked about the condition of the vegetation. You will notice that some questions will be relevant to the particular site and some will not. Don't worry! Just answer the questions that are relevant to the site you are observing. You may put N/A for questions that are not applicable to your site.

ii) Total the number of "yes" responses

Step Four: Determination of Condition Rating

Now refer to Vegetation Condition Rating Table at the bottom of the sheet and determine the condition rating of your site. The site's condition rating will indicate the management requirements necessary to retain and enhance this area of vegetation for its production and habitat values.

These assessment results can be used as a benchmark for future assessments which forms part of an ongoing monitoring program for your property. Try to repeat this assessment for each site once every 12 months. Repeated assessment allows you to monitor the ongoing health of the sites and to gauge the success of the management practices you adopt.

The questions in Sheet 3, *Condition Assessment - Native Vegetation*, provide an indication of the sort of features or conditions necessary to constitute a healthy patch of native vegetation. Brief explanations of the reasons behind these questions appear in italics under most questions.

ACTIVITY 5.2 ASSESSMENT OF WATER BODIES.

Identify sites along particular sections of creeks or rivers or entire dams and wetlands, either natural or artificial. You need description and assessment sheets for every site, so ensure that you have plenty of copies of these sheets to enable repeated assessments of sites. Refer to the Water Bodies Condition Rating Table at the bottom of Sheet 4 to interpret the assessment, establish the condition of each site and identify management recommendations to retain and enhance identified sites as a property water supply and habitat area.

Using Sheets 2 and 4 complete the relevant Steps 1-4, following the same procedures used in the native vegetation assessment site.

ACTIVITY 5.3 IDENTIFICATION OF OTHER HABITAT FEATURES ON YOUR PROPERTY

Parts of your property which are not water bodies or remnant vegetation can also have biodiversity value. It is important to identify these areas so that you can include them in your management actions, for example in cultivation areas where you may have identified endangered native wildlife. There are many different places on a property which support native biodiversity, but this will vary

from place to place. It is up to you and your family to be aware and monitor these sites. Based on your observations, you may wish to complete a site description form (Sheet 2) for a selected area that you chose to follow up and monitor.

Use Sheets 2 and 5 to identify other habitat areas on your property and to assess their condition as habitat. Complete the relevant Steps 1-4, following the same procedures used in the native vegetation assessment site.

ACTIVITY 5.4 LINKING YOUR ASSESSMENTS TO YOUR MAP

The information from your assessments can be marked onto your map of your property's features. (Activity 4.1). This will provide you with a better picture of the condition of the resources you are managing.

Note: Ensure that you create a map legend on your property plan/map that lists features mapped and the relevant symbol and/or colour. Also indicate a north point.

Step One: Name the vegetation types

The native vegetation areas have been marked on the first overlay of your map (see Figure 4.2). On this first overlay, write the name of each vegetation type as determined during the description and assessments.

Step Two: Record condition of native vegetation areas

i) On a second clear plastic overlay record information about the identified vegetation remnant. Write on the overlay the date of the assessments.

ii) On this new overlay, record the assessment rating onto each patch of vegetation by either shading the patch or underlining the patch name with the relevant colour ie green, blue, yellow or red, established following the site assessment and condition rating process.

Step Three: Record condition of scattered paddock trees

i) On the second overlay, using the coloured pens, give individual trees the assessment rating determined eg. green, blue, yellow or red.

ii) Where there are a large number of scattered trees which are marked as "ST" next to the name of the paddock, underline the "ST" with the relevant colour.

"There are many different places on a property which support native biodiversity."

Step Four: Record condition of creeks, rivers, dams and wetlands

i) On the second overlay, mark sections of your creeks and rivers using the pen colour that is relevant to the determined assessment rating for that section of creek or river.

ii) On the same overlay, draw a coloured line around the boundary of assessed water bodies, using the colour that corresponds to the assessment rating.

Step Five: Mark other identified habitat areas

In a different coloured pen, mark the other habitat areas you have identified from Sheet 5. For example use a purple pen to shade or circle these areas. You may have already marked significant features and wildlife sightings on your base map. These can also be marked in purple. If you considered some areas more valuable than others, use a darker shading for the more important and a lighter tone for less significant.

Figure 5.1 Name the vegetation type and record the condition of native vegetation *NPWS*

6. SURVEYING YOUR PROPERTY'S BIODIVERSITY

What is the native wildlife on your property? What are the native plants, birds and animals that can be found there at different times and in different habitats?

WHY SURVEY?

There are a range of surveys that you can undertake to get a snapshot of your property's biodiversity. Regular surveys will give you the means to systematically monitor your property's ongoing state. With the information you get you will be able to measure, over time, how well you are sustaining the ecological values which themselves sustain your property enterprises.

WHAT TO SURVEY

A biodiversity survey is an inventory of the plant and/or animal life of an area including their habitats. To get an indication of biodiversity you can survey plants, birds, invertebrates (insects), mammals, frogs and reptiles, as well as describe their habitats. You can survey all of these at one time, but you may choose to survey for only one or two things as a starting point, such as plants and birds, and progressively fill in the picture.

- Birds are often used as an "indicator species", that is their presence can indicate the health of the whole ecosystem; and they are relatively visible and easy to identify.
- The presence of frogs, their diversity and abundance, can be an indicator of suitable water habitats, and frogs, as consumers of insects also make a contribution to the overall health of your property's ecology. Frogs are sensitive to a range of chemicals used on most farms, particularly those which end up in water bodies.

A specific methodology is used for surveying plants and each different animal group, although all the survey methods suggested here are based only on observation - or sometimes, in the case of frogs or birds by identification through hearing and recognising calls. The choice of what to survey is likely to depend on where your strengths in identification lie. Whatever the case, a set of good reference books on local native plants and animals are invaluable for identification, and should be an essential part of your farm biodiversity "toolkit". Local scientific experts can also provide further assistance or advice. See Sheet 12 for a suggested list and complete the contact details.

WHERE TO SURVEY

Ideally you should survey each different environment or habitat type on your property, eg your creek bank, bushland, pasture, grassland or wetland. You will find different plants and animals according to soil type, topography and climate- all factors which help create the particular ecological niches of your property.

You can also survey modified parts of your property, that you may have identified as habitat, areas such as cultivation paddocks, farm yards, woodlots or gardens. By selecting a few sites to survey in each habitat type you will get a good idea of the range of animals and plants that use the different habitat types on your property. The survey transect (see Figure 6.1) should be located so that the area covered is as uniform as possible i.e of similar habitat or vegetation type (grassland, woodland, wetland etc) and physical environment (slope, aspect and soil type).

WHEN TO SURVEY

Surveys can be conducted at any time of the year but it is easier to identify plants when they are flowering (eg late winter and early spring for many shrubs, summer for native grasses) and certain animals are more likely to be seen at particular times of the day or night. For example reptiles will be more active during the day in warmer months. Some animals seasonally migrate or hibernate and are therefore only present at certain times of the year. So to get a good picture of what is there, you should conduct a number of surveys throughout the year.

It is up to you how often you repeat your survey, but as a general guide, repeating your surveys on a yearly basis, and also observing and monitoring at key times, will give you a chance to note changes over time. The more you do, the more information you will collect

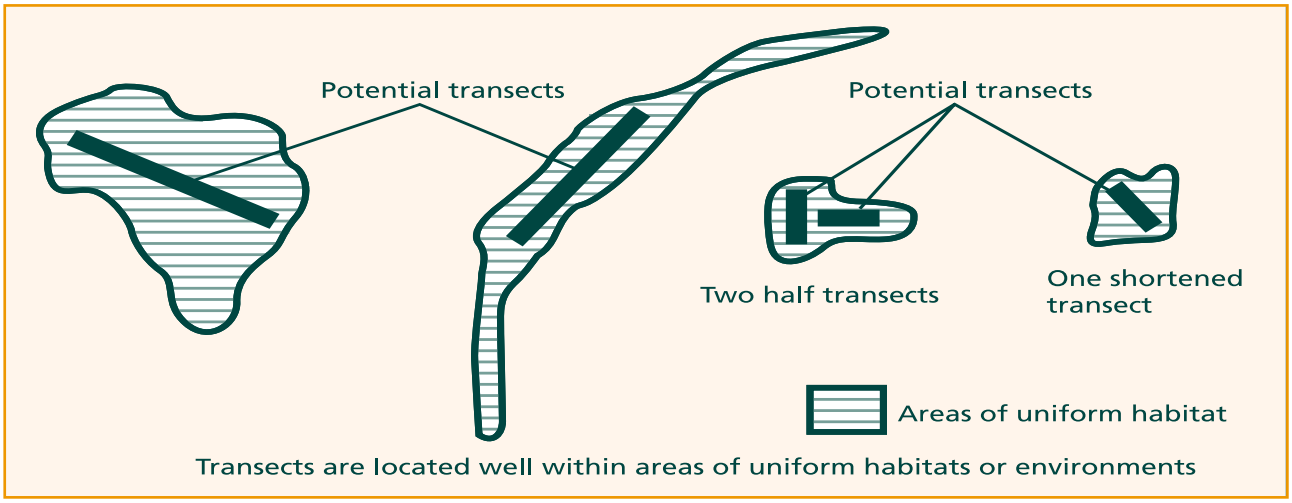


Figure 6.1 Possible transect locations which allow for consistent conditions NPA/NPWS

and the more you will learn about the property's biodiversity and the seasonal changes throughout a year.

HOW TO SURVEY

The important thing is to establish a biodiversity survey method that works for you. For some people this will be as easy as keeping a species list of native plants for your property and recording opportunistic wildlife sightings. Sheet 7 provides a sample proforma for this.

If you want to maintain a regular monitoring program based on the baseline survey techniques outlined below you need to ensure that you establish a survey methodology - a time frame, location, setting etc which you can sustain comfortably over the longer term. To reliably monitor change to reflect your changing management strategies, you need to be as systematic and consistent as possible in your survey methods.

A baseline survey is a recommended method to systematically record plants, birds or animals in particular patch on your property. It is simple and inexpensive to conduct, and does not require any prior survey experience, scientific training or special equipment, apart from identification field guides. The baseline survey methods outlined in this module and listed in Table 6.1 are explained in detail in the NSW National Parks Association /National Parks and Wildlife Service 2001 publication *Community Biodiversity Survey Manual* (Second Edition).

TABLE 6.1 SURVEY METHOD SELECTION

What you intend to survey	Which methods are suitable
Mammals	• Scat Collection • Sign search • Sand trapping • Opportunistic sightings
Birds	• Point count • Opportunistic sightings
Reptiles	• Day search • Opportunistic sightings
Frogs	• Search and frog call recognition • Opportunistic sightings
Invertebrates	• Pitfall traps • Light traps • Systematic search • Opportunistic sightings
Plants	• Identification survey

ACTIVITY 6.1 SURVEYING YOUR PROPERTY'S BIODIVERSITY

Exercise One

Record the biodiversity history of your property

i) Interview people (family, previous property managers) and/or consult written records which can give you information about your property's past biodiversity. Record the information you collect on Sheet 7 (Wildlife Record Sheet). You may wish to set up separate sheets for birds, reptiles, frogs, plants etc or even different paddocks or remnant patches if appropriate to your property.

ii) Contact your nearest NSW National Parks and Wildlife Service office for more details or consult databases such as the Atlas of NSW Wildlife on the NPWS website at www.nationalparks.nsw.gov.au to find out about your locally occurring species.

iii) Ensure that you have a recording sheet to note down opportunistic wildlife sightings on your property from now on.

Prepare lists of native species which:

- **occur in one habitat type only;**
- **occur across a range of habitats;**
- **are known to breed on your property;**
- **are occasional visitors just passing through;**
- **are endangered or vulnerable in NSW or Australia wide.**

Exercise Two

Conduct a baseline biodiversity survey

An introductory survey method is the baseline survey which will give you an indication of the species present in a selected patch.

This method involves setting up a single line called a transect, which can be 200-500 metres in length. At the mid-point of this transect, a 20 metre by 20 metre square called a quadrat, is marked out and used to survey plants and insects. Along the transect there are sample points set up 100 metres apart where birds, mammals and reptiles are surveyed for given periods of time.

i) Select the area/s to be surveyed and decide on what you will survey for.

ii) Refer to Table 6.1 to decide the relevant survey method for your site.

iii) Make sure you have notebook, pen, field guide.

iv) Complete the background details on the recording sheet - Sheet 6.

v) Select your survey transect site. Your transect should be a single line from 200 to 500 metres long. Remember, the transect should be located so that the area covered is as uniform as possible.

vi) Mark up your transect accordingly to your survey type.

vii) Carry out the relevant surveys and record the results

viii) Repeat this survey along the same transect at times that will give you the best results and that fit in with your property management schedules.

Animal care issues

- **Avoid damaging the habitat that you are searching. Replace any disturbed rocks, logs, bark or leaf litter as best you can.**
- **Do not handle or touch any animals unless there is someone present who has both a licence from NPWS and animal ethics approval.**

For example, repeating your surveys once every 12 months, sometime between late winter and late spring (when wildlife are most active) will give you a chance to monitor changes over time. The more you do, the more information you will collect and the more you will learn about the property's biodiversity and the seasonal changes throughout a year.

Even if you repeat at intervals greater than 12 months for 3-5 years, your information will show change. Regular updates will be able to show you whether changes are temporary or show a long term trend.

Figure 6.2 Always wear gloves when handling scats *L.Brodie/NPWS*

Common Scats:

Fox *V.Bear*

Swamp Wallaby *V.Bear*

Long-nosed Bandicoot *V.Bear*

Figure 6.3 Common Scats.

Note: Drawings are not to scale. For more detailed information on identification of scats please refer to Triggs, Barbara, 1996, Tracks, Scats and other Traces, *Oxford University Press, Melbourne*

WHAT TO DO WITH YOUR SURVEY RESULTS?

The information you have gathered about the native plants and animals living on your property can inform your future management practices to increase both agricultural production and biodiversity conservation. Compare your survey results with historical records to discover which species are no longer there.

For example, the recent absence of a bird species may have led to an increase of insect pests feeding on pasture or crops. To improve agricultural production it may be beneficial to consider why the bird species is no longer living on your farm and what actions can be taken to encourage its return to the area. It is possible that a particular understorey shrub, which the bird species relied upon for shelter and/or food has since been cleared for grazing. In this case, restoring the understorey of your remnant native bushland may result in the return of the bird species to continue its valuable role in natural pest control on your property.

WHAT TO DO IF YOU FIND A THREATENED SPECIES ON YOUR PROPERTY

It is quite possible that you may find a species listed as threatened on your property.

(See Biodiversity Conservation Management Note, The Threatened Species Conservation Act: An Overview for more details). The first thing to recognise if you identify a threatened species on your property, is that something good is happening in the management of that land to enable such species to continue to exist. Congratulations for successfully ensuring the ongoing survival of the species on your land to date. You should look at your current management practices and continue using them. If you are considering changes it is important to look at the risks to threatened species. The NPWS prepares Recovery Plans for threatened species which outline management actions for conserving these species. You may be able to get involved in the development of these plans and help in their implementation.

You can report your finding to the NSW National Parks and Wildlife Service via the Atlas of NSW Wildlife Database. This will increase the knowledge of species across the state and will lead to a better understanding of the species, which will assist in its recovery. The NPWS does not aim to take over management of lands where threatened species are found, and any routine agricultural activities are able to continue. There may be financial support available to help you.

The NPWS can help with technical advice on how to ensure the continued survival of the species which may involve taking some basic steps in conservation such as:

- Retain natural revegetation, in particular, established mature trees with hollows.
- Leave adequate ground debris such as fallen logs and branches, leaf litter and rock in place. These provide vital shelter and food sources for many native plants and animals.
- Co-operate with neighbours and government agencies in control of pest animals such as foxes, dogs, cats and rabbits.
- Utilise local, native species for plantings.
- Minimise the use of pesticides and herbicides.

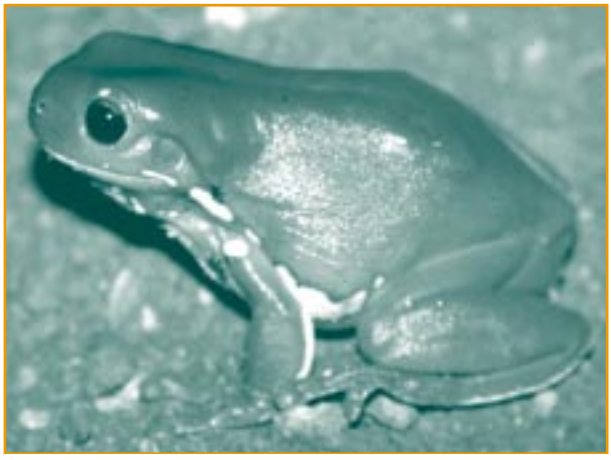


Figure 6.4 Blue Mountains Tree Frog *NPWS*

Module Two will provide further information on planning the management of your property's ecological resources.

7. SETTING BIODIVERSITY PERFORMANCE INDICATORS

As discussed above, many ecological resource issues have to be measured over a long period of time for any indicators of change to be detected.

It is a good idea to select one or a number of performance indicator sites on which to do regular tests. The chosen sites should be either representative of a large portion of your property (same soil type, land capability and vegetation), be a site given high management priority following your resource assessments, (described in Section 5 in this module), or have an obvious or suspected land degradation problem.

Identifying performance indicator sites

Locate and label your performance indicator sites onto your map (first overlay) using the symbols PI 1, PI 2, PI 3, PI 4 etc.

> "It is a good idea to select one or a number of performance indicator sites on which to do regular tests."

Determining indicators of change (performance indicators)

Determine indicators of change that you can use to monitor physical changes on your farm. The list below provides examples of indicators. Obviously, your vegetation and water bodies assessments will be on this list.

- Records of sightings of birds species. These will show trends in the ecological health of your farm - an increase in the number and diversity of species signals better environmental conditions.
- Assessments carried out in Section 5.
- The variety and number of frogs as an indicator of environmental quality (healthy populations show that a stream or wetland system is in reasonable condition).
- Water quality - water "bugs" survey, using "Water Bug Detective Guide" or measuring salinity levels.
- Changes of vegetation eg an increase in understorey shrubs, by comparison of photos taken at your photopoint sites.

MANAGEMENT PLANNING

4

4. MODULE TWO: MANAGEMENT PLANNING

PARTICIPANT NOTES

1. Introduction and learning outcomes
2. Reviewing your ecological resources and completing a SWOTA analysis
3. Management practices for conserving biodiversity on your property
4. Setting your ecological goals
5. Identifying biodiversity management issues for your property
6 Developing management strategies and actions
7. Monitoring your property's ecological management
8. Costing out your ecological management projects

1. INTRODUCTION

This is Module two in the two module series *Planing for Biodiversity Management*. Prior to doing this module you should have completed Module One and undertaken biodiversity surveys and assessments for your property. You will also have developed your vision for your property's ecological health.

In Module Two you will start to work towards your vision and build on your knowledge of the biodiversity components of your property. You will begin to develop a plan to implement management strategies and monitoring procedures that will retain and/or enhance these biodiversity resources.

LEARNING OUTCOMES

On completion of this workshop you will be able to:

- Set short and long term goals for the management of your property's ecological resources;
- Develop strategies to manage remnant native vegetation, water bodies and other areas on your property in order to maintain and enhance their value as wildlife habitat; and
- Understand the requirements for preparing a property management plan that encourages biodiversity and enhances your property's productive capacity.

2. REVIEWING YOUR ECOLOGICAL RESOURCES AND COMPLETING A SWOTA ANALYSIS

You should recall from Module One, the stool diagram, below, which shows the planning context for your property's ecological management. Your property rests on three "legs": human resources, financial resources and the ecology or the natural resources. All three "legs" need to be in balance. For example, planning decisions about the management of your property's ecology, which you will make today, need to take into consideration the impacts on and resource requirements for your finances and your family. Also the "stool" sits on a platform of external influences such as legislation, planning controls, neighbours values and actions and market forces.

In Module One you developed the *where* part of the planning process - your vision of where you would like your property to be at some time in the near future. Make sure you have a copy of your ecological vision with you. You also conducted ecological stocktakes and assessment of the *now* condition of your property. Make sure you have the map of your property's features which shows the results of your native vegetation, modified areas and water bodies assessments. You may also want to refer to your biodiversity baseline surveys.

4. MODULE TWO: MANAGEMENT PLANNING

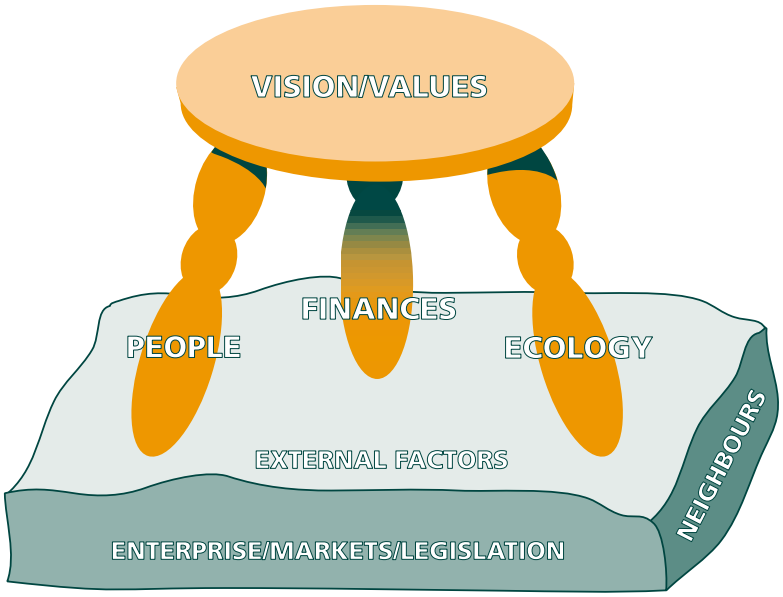


Figure 2.1 The Planning Context

Balancing the property's ecological needs with your enterprise mix as well as your other natural, financial and human resource issues is best achieved by preparing a property management plan.

Contact your local TAFE or NSW Agricultural office for information on your nearest property management planning course.

In this Module we will now consider *how* you will fulfil your vision. You will determine goals and strategies, enabling you to *do it* and implement the necessary actions. An important part of the planning process is to regularly check to see how the planned actions are progressing ie *monitor*, as well as to see if any changes are required ie *evaluate* to ensure your vision is achieved.

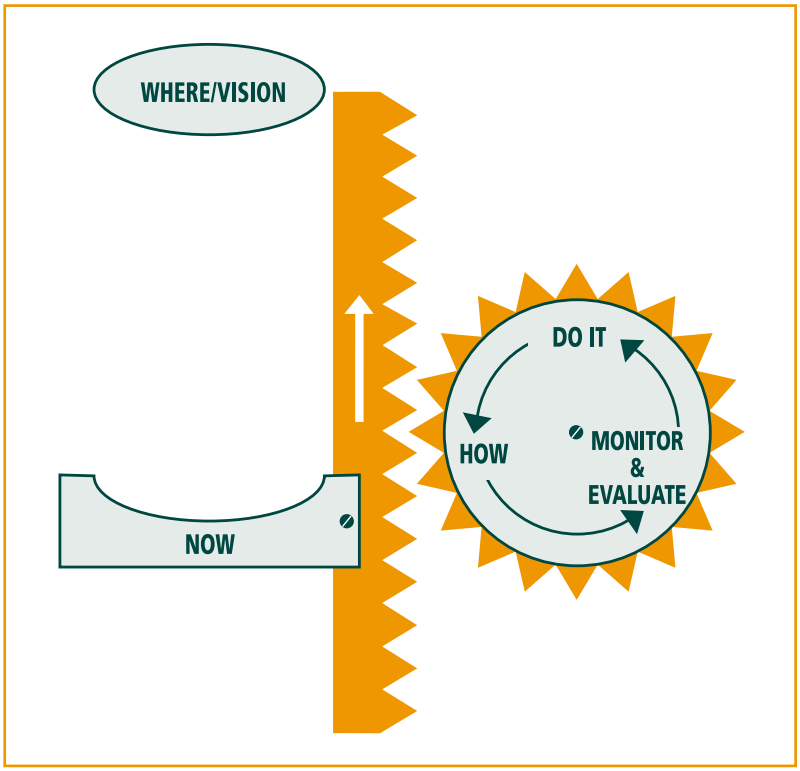


Figure 2.2 The Planning Cycle

Central to this process are your values. Your values are simply the things you consider important or the principles you use to guide your decisions.

ACTIVITY 2.1 IDENTIFYING YOUR VALUES

Examine the list of values below. Ask yourself these questions: *Is that value important/not important to me? How have I thought about it in the past? Have my values changed over time?*

Step One:

Tick those values that you hold firmly. You may add additional values. Put an asterisk next to the three that you consider have the highest priority.

Step Two:

Think about which of your values can be linked to biodiversity conservation? Do you think your current management decisions reflect your values? Why? Why not?

✓	Value	✓	Value
	Having control over future directions		Managing the property efficiently
	Willing to make changes		Working as part of a team
	Managing debt		Providing for your children
	Gaining new knowledge		Experimenting with new techniques
	Retaining native bushland		Having satisfaction with lifestyle
	Making my own decisions		Being proud of our property
	Having low work stress		Being a leader
	Taking initiative in the local community		Helping others
	Pursuing excellence		Being healthy
	Being active in community groups		Having a healthy property
	Being respected by friends and associates		Having a viable farm
	Enjoying the landscape		Having a profitable business
	Thinking of the property as part of the catchment		Having a close relationship with family and friends
	Being regarded as a good land manager		

ACTIVITY 2.2 REVIEWING YOUR ECOLOGICAL VISION FOR YOUR PROPERTY

The first part of the planning process is to know where you want to be - your vision. We will now review the ecological vision you wrote for your property in Module One.

Step One:

Create in your mind your ecological vision for your property, complete with all the detail you can manage. Consider the values you have identified and how they are reflected in your vision.

Step Two:

Now, without looking at the vision you wrote in Module One, write your ideas again on Sheet 1.

Step Three:

Compare what you have written today with your previous vision. Edit your original vision document if you think it requires it.

"Consider the values you have identified and how they are reflected in your vision."

Figure 2.3 Reassess your vision for your property B.Thompson

ACTIVITY 2.3 REVIEWING YOUR ECOLOGICAL RESOURCES THROUGH A SWOTA ANALYSIS

The next part of the planning process is to assess your current situation. This includes analysing the assessments and surveys you have done of your property's ecological resources.

A useful way to summarise all this information about your property's ecological resources or native biodiversity, and what management actions you need to take, is through a SWOTA analysis.

A SWOTA analysis includes:

S - Strengths to capitalise on

W- Weaknesses that need attention

O - Opportunities that are available

T - Threats that may have adverse effects

A - Actions that need to be taken

Carrying out an analysis using this framework can often reveal quite simple changes that you can usefully make.

Step One:

First consider your strengths and the strengths of your property. Look at your property map which should be shaded according to the colour coding given in the condition assessment forms. Where are your green areas? Consider the assessments that you completed for your property and your "Yes" responses. Consider your surveys. Where are your biodiversity "hot spots"? Are you conserving any threatened species on your property?

These will be your "strengths". Your strengths will indicate your management priorities.

Now think about areas that could be improved – your weaknesses. Look at the yellow or red shaded areas. Look at your assessments sheets and take note of where you have written "No".

These issues will indicate weaknesses or threats to your property's biodiversity. "Weaknesses" can be linked to "Opportunities". For example your remnant vegetation may be very scattered and only in small patches. The opportunity will be to link these patches together by restoration and/or revegetation. Your "Opportunities" are also the good chances you can take to enhance you ecological resources.

Think about the obstacles to your just revised vision. What are the things that are currently holding back your achievement of this vision for your property? Look at your site description and assessment sheets for mention of pests and weeds. These and other issues, such as salinity or erosion, present threats to your natural resources. Threats may also be linked to opportunities.

Now note down some of the key actions you will need to take to address the issues you have identified.

Step Two:

Use Sheet 8. Complete your SWOTA analysis, keeping in mind your vision for your property

> "Your strengths will indicate your management priorities."

3. MANAGEMENT PRACTICES FOR CONSERVING BIODIVERSITY ON YOUR PROPERTY

There are many management practices that will enhance your property's ecological health and biodiversity while making the farm more robust against impacts such as climatic variation and insect attack. These measures in turn contribute to the reduction of production costs and improve your property's agricultural viability.

Figure 3.1 Native grasslands are important for biodiversity *L.Brodie/NPWS*

DISCUSSION QUESTION 3.1

Brainstorm the management strategies you think will assist in building on your property's strengths and opportunities and overcoming your own property's threats and weaknesses, remembering discussions in the Module One workshop.

RETAIN

A key element of biodiversity conservation is retaining remnant native vegetation. The highest priority for biodiversity management in rural environments is to identify, protect and manage the existing remnants of natural vegetation, wetlands and representative samples of all native biodiversity.

RESTORE AND PROTECT

Although the remnants may have experienced varying degrees of disturbance, protection and restoration of remnant vegetation is far more cost effective and offers greater potential for biodiversity conservation than attempting to develop new habitats by revegetation.

Often simply fencing off remnants, dams, creeks and wetlands will be a significant step towards increasing the biodiversity component of your property, allowing for natural regeneration. Larger patches are also more valuable for habitat and easier to manage than small patches, and isolated patches less valuable than linked ones.

REVEGETATE AND REHABILITATE

However in many situations the protection and restoration of remnant native vegetation will not be enough to substantially enhance your property's biodiversity. Where existing remnant vegetation is limited and/or degraded and isolated the re-establishment of native vegetation or revegetation is also necessary.

There may also be many other parts of your property, which no matter how modified or artificial, are still important habitat for certain species and have biodiversity value and need to be managed. Buildings can host swallows, bats and many other creatures; farm gardens are often biodiversity havens and cultivation paddocks can also be suitable habitat for grassland species which have adapted to the modified conditions, such as Stubble Quail in wheat paddocks or Bush Stone Curlews in rice fields. It is important to be aware of the importance of managing these parts of your property as well as the native vegetation areas.

Figure 3.2 Fence off revegetation areas *N.Layne/CVA*

Rehabilitation may also be required to manage key threatening processes across your property as a whole. These threats may involve weeds and animal pest problems, (both introduced or native) and issues of pollution, land contamination and salinity.

This section will discuss many generic ecological planning and management practices that will enhance your property's biodiversity and environmental health.

For specific information and advice on local and regional management practices, appropriate species and biodiversity issues you should contact your local NSW National Parks and Wildlife Service officers, Dept. Land and Water Conservation, Greening Australia staff, Landcare, or local Field Naturalist Club representatives. Refer to Sheet 12.

"Retaining vegetation should remain your highest priority in planning for biodiversity."

(I) NATIVE VEGETATION PLANNING AND MANAGEMENT

Retaining vegetation should remain your highest priority in planning for biodiversity. There are a range of management issues to consider when planning to protect and improve your remnant patches so that they provide improved habitat for plants, birds and animals.

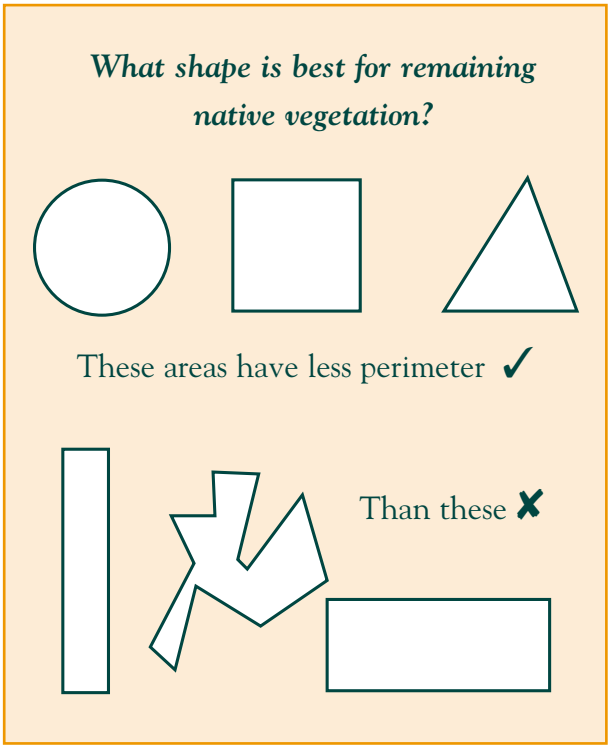


Figure 3.3 Remnant shapes. Minimise the perimeter of remaining vegetation to reduce "edge effects" or disturbances

TABLE 3.1 NATIVE VEGETATION PLANNING AND MANAGEMENT

Planning considerations	Management considerations
• Retain existing clumps of remnant vegetation, paddock trees and native pastures. • Retain, where possible, fallen and standing dead trees, fallen timber, rocks, logs and stumps as native wildlife habitat. • Minimise the perimeter of remnants to reduce "edge effects" or disturbances, such as changes in levels of weeds, predators, noise, humidity, sunlight, wind, temperature and nutrients. (See Figure 3.3).	• Fence off potential habitat areas, ie your remnant vegetation areas including grasslands, farm dams, creeks and wetlands, to control stock access and to allow natural regeneration. • Fence off areas next to and downwind of mature trees (equivalent to twice the diameter of the tree's crown) to allow for natural regeneration and increase the size and value of these areas for shelter and habitat. • Exclude stock from these areas during flowering and seeding periods to allow natural regeneration. Exclude stock from wetlands during wet periods and bird breeding seasons. • Plant missing understorey shrubs and grasses, using local indigenous species. • Control weeds prior to native species seed fall and maintain good native ground cover with minimal disturbance. • Control pests like rabbits, foxes, feral cats. • Stabilise any areas of soil erosion.
• Alter paddock sizes to reduce paddock grazing times and pressures on a particular area, allowing paddock trees to regenerate naturally.	• If grazing native grasslands, graze intermittently in short spells of high grazing pressure. Contact NPWS for information on ideal timing of grazing to reduce impacts.

TABLE 3.2 NATIVE VEGETATION MANAGEMENT GUIDELINES

Condition	Fencing	Revegetation/dead timber/habitat	Weeds	Pest animals	Fire	Erosion
Healthy (Green)	• Fence off to control stocking rates and inappropriate use, and encourage natural regeneration (permanent fencing preferred)	• Allow natural regeneration of all locally native species including shrubs and grasses • Link remnants using shelterbelts or woodlots • Retain standing dead timber, rocks, logs and stumps as habitat • Identify the plant species	• Identify and control weeds • Use ecologically sensitive control methods	• Remove all non-native animals (rabbits and foxes can be controlled using 1080 poison - minimises harm to most native animals)	• Use fire for ecological purposes only (seek advice)	• Stabilise erosion without using earth works • Maintain good native ground cover
Good (Blue)	• Fence off to control stocking rates and inappropriate use, and encourage natural regeneration (temporary fencing may be an option)	• Allow natural regeneration of all locally native species including shrubs and grasses • Where necessary, establish native trees, shrubs and grasses to supplement natural regeneration • Link remnants using shelterbelts or woodlots • Retain standing dead timber, rocks, logs and stumps as habitat • Identify the plant species	• Identify and control weeds • Use ecologically sensitive control methods	• Exclude rabbits; remove foxes, cats and goats (rabbits and foxes can be controlled using 1080 poison	• Use fire to reduce fuel loads and to trigger regeneration	• Stabilise erosion but minimise earth works • Maintain good native ground cover
Fair (Yellow)	• Fence off to control stocking rates and encourage natural regeneration (temporary fencing may be an option)	• Allow natural regeneration of all locally native species including shrubs and grasses. • Establish trees to supplement aging trees; establish missing shrubs; use tree guards • Link remnants using shelterbelts • Retain standing dead timber, rocks, logs and stumps as habitat	• Control noxious and invasive weeds	• Exclude rabbits; manage others	• Use fire if needed to reduce fire hazard	• Stabilise erosion using earthworks and/or native grasses
Poor (Red)	• Desirable to control stocking rate • Off-set fencing of aging groups of paddock trees encourages regeneration	• Establish trees and shrubs; use tree guards • Retain standing dead timber, rocks, logs and stumps as habitat • Identify the plant species	• Control noxious and invasive weeds	• Exclude rabbits; manage others	• Use fire if needed to reduce fire hazard	• Stabilise erosion using earthworks and/or native grasses

Fire as a management tool

Fire is an important ecological management tool. It can be used to advantage in maintaining remnants or can be a destructive force if poorly managed.

Develop a fire management plan for protecting your built assets and your natural resources. This plan should integrate with your overall property fire management plan. Contact NPWS for information on fire ecology for particular habitats.

How much remnant vegetation is required?

Research has shown that 5-10 per cent vegetation cover in flat country provides economic and environmental benefits to your property. Consider this as a minimum amount for your best country and 50-100 per cent cover in your least productive areas. Birds Australia have stated that local native vegetation should cover at least 30% of the total farm area to ensure sustainability and maintain native bird populations. (Barrett, 2000).

(II) REVEGETATION: WHAT, WHY, WHERE?

Revegetation means planting trees, shrubs, sedges and rushes for creeks, dams and wetlands or native pasture grasses to rehabilitate areas and increase habitat. In all cases, by selecting plants which are native to your local area you will be improving the biodiversity of your property and also ensuring a higher success rate of establishment, as plants will be adapted for the local soil type, topography and climatic conditions.

Why revegetate?

Apart from the many benefits to the productive capacity of your farm, as discussed in Module One, revegetation strategies are often required to improve the biodiversity of your property.

TABLE 3.3 MINIMUM RECOMMENDED VEGETATION COVER

Suggested targets for minimum long-term tree/natural vegetation cover
(This table has been produced for the Northern Tablelands of NSW)

Landuse	Land capability classes	Tree cover
cropping enterprises	I	5 %
cropping & livestock	I, II, III	10 %
livestock enterprises	IV, V	15 %
light grazing, semi-"improved"	VI	50 %
light grazing, "unimproved"	VII	100 %

Source: C. Nodolny/UNE

1. Existing remnants may be too small to maintain wildlife populations of sufficient size to be self-sustaining in the long term. Revegetation, with plants native to your local area, can be used to enlarge individual remnants and increase the total amount of habitat in the landscape.

2. Not all types of vegetation (eg understorey plants) are adequately represented in the system of the remaining vegetation present. Revegetation offers the potential to replace these missing elements. This will improve the structure of the remaining vegetation to provide better wildlife habitat opportunities.

3. Revegetation for biodiversity value can also be combined with productive outcomes. For example firewood woodlots of suitable trees, such as wattles and casuarinas, will copice when cut and produce multiple trunks while at the same time they provide wildlife habitat.

Where to revegetate?

Some of the general principles are outlined below but each property will be different and it is important to take some time to study your physical property plan and plan carefully. Simply planting along existing fencelines, which may change or not reflect topography or other landscape features, may not be suitable. You need to plan revegetation where it is most suited in the long term. Some guidelines include:

1. Link patches of remaining vegetation, dams and wetlands using shelterbelts or woodlots.

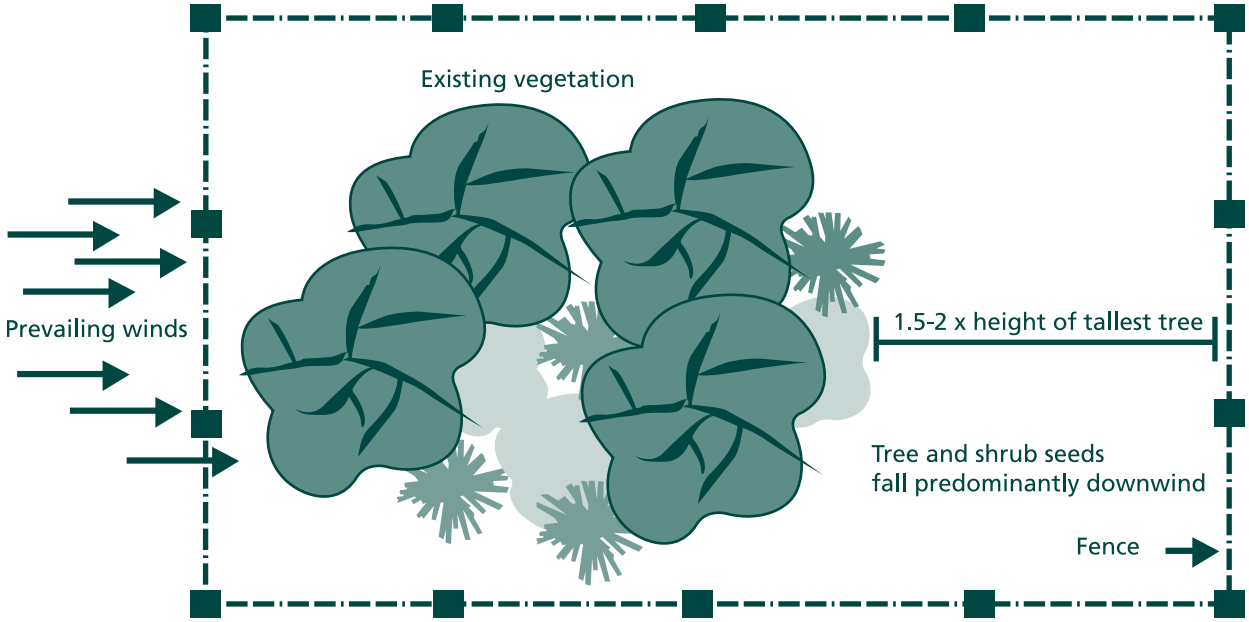


Figure 3.4 Plan view of a patch of remnant trees with offset fencing downwind to maximise regeneration potential *NPWS*

2. Revegetate along creeks and gullies or as shelterbelts across damaging hot and cold winds and along contours.

3. Establish native shrubs, trees and grasses upslope of dams and wetlands to act as a sediment and nutrient buffer, as well as a wildlife area.

4. Consider planting on upper slopes and ridgelines to:

   - gain maximum wind protection,
   - minimise the risk of exposed stock camps.

5. Consider planting on lower slopes to:

   - provide shelter to crops and pastures
   - provide diverse fodder and movement corridors for native wildlife.

Be aware revegetation areas and wetlands often harbour pests like foxes, which will prey on native wildlife. Seek advice about effective fox control methods from NPWS and see the Red Fox Threat Abatement Plan on the NPWS web site www.nationalparks.nsw.gov.au.

GUIDELINES FOR DESIGN OF SHELTERBELTS.

Design shelterbelts so that they:

- are approximately 20 times the height of the trees in the belt from the next shelterbelt;
- are wider than the height of trees in the belt;
- are longer than 20 times the height of trees in the belt;
- consist of at least three rows of trees/shrubs;
- consist of native trees and shrubs;
- are not directly up and down hills to prevent erosion from channelled water;
- take particular account of porosity which is a key factor in shelter effectiveness, eg have a porosity of approximately 50 % from the ground to the top of the canopy, so that you can see patches of light through the foliage.

Consider enlarging a three row shelterbelt to a ten row woodlot, increasing the shade, shelter and timber resource with very little extra fencing needed.

(III) PLANNING AND MANAGEMENT FOR CREEKS, RIVERS, DAMS AND WETLANDS

The water bodies on your property - your rivers, creeks, wetlands and dams are valuable for wildlife habitat and offer wonderful opportunities for increasing your property's ecological health in a relatively short period of time. Revegetation in these areas will not only increase the biodiversity component of your property but also help in other ways, such as improving water quality by filtering sediments and runoff from other areas, stabilising creek banks and improving fish habitat. These areas are also important aesthetically and can influence property values.

Figure 3.5 Standing dead trees provide valuable habitat *NPWS*

Figure 3.6 Provide a gravelled stock ramp into fenced off dams *L.Brodie/NPWS*

TABLE 3.4 WATER BODIES PLANNING AND MANAGEMENT

Planning considerations	Management considerations
• Retain native vegetation areas near water bodies, such as creeks, dams and wetlands, to greatly enhance the area's habitat value.	• Standing dead trees near or within dams provide safe water bird roosts. Logs, rocks and litter within and around the dam provide shelter for fish and frogs.
Creeks • Fence rivers, and creeks for possible buffer zones, wildlife corridors and erosion control areas and increase the areas of vegetation. • Have a range of microhabitats in farm streams, eg. deep pools, rocky riffles, submerged logs and snags. • Prevent chemicals, fertilisers and irrigation tailwater running off into streams or wetlands.	• Incorporate wider patches of vegetation in the streamside corridor eg. at bends in the creek. • Retain logs and rocks for shelter for frogs. • Ensure foliage from trees and shrubs overhang creek water, providing shade for fish and turtle habitat.
Dams • When constructing dams be aware of the ways in which you can make your dam more wildlife-friendly.	• Increase slightly the height of the dam overflow which might flood shallow areas, increasing the wildlife value of the dam. • Provide an earthen or floating island within farm dams as safe waterbird habitat. • Provide a gravelled stock ramp into the deep section of a fenced off farm dam, or pipe water to stock troughs located outside the fenced off dam area. • Walking/compressing clean straw into the edge of a new dam will supply aquatic organisms with a source of food and kick start the new food web, while reducing erosion. • Natural fluctuations in dam water levels are desirable for wildlife, but should be taken into account when considering the amount of shallow water available in summer and to ensure the dam doesn't dry out.
Wetlands • Consider fencing the wetland's catchment to manage separately to reduce input of sediment, nutrients and pollutants. • Create a buffer zone of vegetation around the wetland to help absorb the impacts of on-farm activities. • Consider diverting irrigation tailwater (which may contain pesticides) to holding dams - not wetlands.	• Retain dead trees for waterbird roosts. • Use fire carefully. Do not burn during wildlife breeding seasons. Retain areas of lignum as nesting habitat.

(IV) RISK MANAGEMENT PLANNING FOR BIODIVERSITY LOSS

Risk assessment within any farm business includes the physical production risk of biodiversity loss and its associated ecosystem services, as discussed in Module One. By reviewing the ecosystem services that biodiversity affords your property you can identify the risks of losing these services and develop management strategies to offset these risks.

Figure 3.7 Feral cats or other pest animals may be a problem in your area. S.McMahon/NPWS

DISCUSSION QUESTION 3.2

What are the risks for your property associated with the loss of biodiversity and associated ecosystem services?

What management strategies can offset these risks?

How do these strategies compare with those already discussed in this section?

4. SETTING YOUR ECOLOGICAL GOALS

Your ecological goals will break down your vision for your property into manageable detail, helping you to set a well marked path to go about implementing your ideas. Once goals have been set, then strategies can be put in place to achieve these goals. In order to be meaningful, your goals need to be *SMART*.

S - Specific

M - Measurable

A - Agreed / Achievable

R - Realistic

T - Time constrained

Here are some examples of ecological goals. Can you identify the SMART elements of these goals?

"We will establish a 30 metre wide native shelterbelt corridor along the western boundary of our two bottom paddocks by June 2005."

"We will fence off and revegetate the house dam, using native trees and shrubs, by October 2005."

"We will link the red box and stringybark vegetation patches with a 20 metre wide native shelterbelt by October 2006."

ACTIVITY 4.1 WRITING YOUR KEY ECOLOGICAL GOALS

Look at your updated vision and your SWOTA analysis. Consider the key goals required in order to achieve this vision. What are the goals or milestones that must be achieved in terms of conserving your property's ecological resources? Will these goals help to build on your property's strengths and overcome its weaknesses thus allowing you to achieve your vision?

Use Sheet 9. Write your short and long term goals.

Record as much detail as you can about what you want to achieve, ensuring that your goals are SMART. You will have a chance to refine these goals later today.

"In order to be meaningful, your goals need to be SMART."

5. IDENTIFYING THE BIODIVERSITY MANAGEMENT ISSUES FOR YOUR PROPERTY

You have now reached a point in the planning process where you have determined where you would like to be, with regard to your property's ecological condition, at some time in the near future. Your family's vision has provided a focus of what you would like your property to look like in the future.

S. Ash/NPWS

TABLE 3.5: THE PLANNING STEPS

Where	**Set your vision** What do you want the wildlife and natural vegetation on your property to be like?	Module 1/ 3 Module2/2	Sheet 1
Now	**Map your property's features**	Module 1/4	Aerial photo and map
	i. Assess the current condition of your natural resources How good is your bushland? Is your dam good wildlife habitat? What native species do you have? **ii. Map the results on your map**	Module 1/ 5, 6 & 7	Sheets 2, 3 4, 5, 6, 7
	SWOTA review Identify strengths, weaknesses, opportunities, threats (constraints) and management actions.	Module 2/ 2	Sheet 8
How	**Set your goals**	Module 2/ 4	Sheet 9
	Summarise key issues What are the essential things that you need to do, and that are in your capacity to do, to achieve your vision?	Module 2/5	Sheet 8
	Develop management strategies and actions What do you need to do to achieve your goals	Module 2/6	Sheets 10 & 11
Do it	**Implement actions** Start to carry out tasks to achieve your plan		
Monitor & evaluate	**Review/check performance indicators** Review your actions, are they going according to plan? Adjust/adopt your plan if necesary	Module 1/7 Module 2/ 7	

You and your family have also undertaken surveying and assessing of your property's biodiversity and current ecological condition. You have considered your property's ecological strengths and weaknesses and made a start in developing your key ecological goals.

It is now time to begin to develop management strategies to retain and enhance your property's ecological condition and biodiversity values. The steps in planning process are shown in Table 3.5

ACTIVITY 5.1 IDENTIFYING SIGNIFICANT MANAGEMENT ISSUES

The planning steps you have so far taken will all help you to identify your most significant management issues. We will now look at ways to summarise the issues you have identified and then to link them to management strategies and actions.

Look at the map of your property's physical features and your SWOTA analysis on your ecological resources. Consider your strengths - your stand out healthy areas. Can the biodiversity in these areas be enhanced through management practices? Consider the areas on your property that stand out as degraded or ecologically unhealthy. Where should you concentrate your management efforts?

Step One:

Keeping all your previous planning steps in mind, review each of your property's strengths, weaknesses, opportunities and threats. Which are the most significant of each of these issues?

Consider:

- Which strength or opportunity will more likely, with enhancement, help you achieve your vision?
- Which weaknesses or threats will most hinder you in achieving your vision?

Use the SWOTA Sheet 8. Use the Summary sheet to record the most significant positive and negative issues.

Record at least two key strengths /opportunities and two weaknesses/threats.

Figure 5.2 Putting together a management strategy will help you achieve your vision for your property *D.Brouwer*

Step Two:

To help you prioritise these issues, look at each significant issue and consider the following questions. Place a tick alongside the issue in the relevant column under the heading ***Concern, Influence*** or ***Control.***

Is this issue totally within your power to change? Can you ***control*** *its effects on your situation?*

Is this issue in your power to do something about, to ***influence*** *its effects on your situation?*

Is this issue outside your power to do anything about? Can it only ***concern*** *you?*

Step Three:

Having ordered these issues into your realms of control, influence and concern, we will now consider key goals and management strategies for those significant issues you can ***control*** and ***influence***. This will ensure that your limited management resources are being most effectively utilised.

Use the Management Planning Sheet 10. Rewrite each significant issue that you can "control" or "influence" onto a separate copy of this sheet.

"Look at each significant issue."

ACTIVITY 5.2 REVIEWING AND DEVELOPING YOUR KEY GOALS

The goals you developed previously now need to be linked with the issues you have identified on the Management Planning Sheets.

Step One:

Look at the key ecological goals you have already written. With both your property vision and your summary of key issues (Sheets 1 & 8) review each of your goals, ensuring they are still appropriate and targeted to your key issues.

Write each of your key goals onto your Management Planning Sheets next to the issue that is relevant to that goal.

Step Two:

Do you have some significant issues without associated goals developed?

Look at each significant issue recorded on your Management Planning Sheets. Write some *SMART* goals to address each issue (you may have more than one goal per issue) onto the relevant Management Planning Sheet.

You have now completed the first important steps in the planning process. Keeping in mind the management strategies discussed earlier, you will now develop strategies and actions relevant to the needs of your own property.

6. DEVELOPING MANAGEMENT STRATEGIES AND ACTIONS

Having identified your significant issues and having clearly defined your key goals, you will now be able to choose the best strategies and associated actions to help you towards achieving your property's ecological vision.

What is a strategy?
Strategies are projects or programs. They describe a broad direction that must be followed for a key goal to become a reality.

What is an action?
Actions are specific tasks or steps that must be undertaken for a strategy to be implemented.

ACTIVITY 6.1 IDENTIFYING STRATEGIES TO HELP CONSERVE BIODIVERSITY ON YOUR PROPERTY

Step One:

Look at the assessments and surveys you did in Module One. Look at the explanations which correspond to your "No" answers. In point form, turn these explanations into strategies or management activities.

Step Two:

Look at Table 3.2 Which management strategies correspond to particular patches of bushland on your property? Are there some strategies in this table that you hadn't noted down before?

Look at the general or water body assessments you did in Module One. Again your "No" responses will indicate areas for your management attention. Highlight these and note down quickly some management strategies for the other non-remnant vegetation habitat areas of your property which will help in improving their ecological condition.

ACTIVITY 6.2 COMPLETING MANAGEMENT PLANNING SHEETS FOR YOUR KEY ISSUES

Step One:

Look at the model management planning sheet (Table 3.6) which has been completed for a significant issue, in this case an identified "weakness". It outlines an example of a significant issue and its associated goal, strategies and actions.

Step Two:

Using your significant issues and key goals as a guide and referring to your notes from Activity 2.3 and Activity 6.1, write your management strategies and associated actions onto your Management Planning Sheets.

Try to think past the obvious. Get your ideas down first, you can judge them later. A lot of good ideas are lost by being judged prematurely.

Step Three:

Complete Sheet 11 - the Management Planning Summary Sheet to help you prioritise your actions.

TABLE 3.6 MODEL MANAGEMENT PLANNING SHEET

An example of significant issue ("weakness") and its related goal, strategies and actions.

Key issue	Key goal	
Highly exposed bottom paddocks	We will establish a 30 metre wide native shelterbelt corridor along the western boundary of our two bottom paddocks by October 2003	
Strategies		
A Research most appropriate native vegetation establishment technique and species for site		
B Develop timetable for shelterbelt establishment and weed management		
C Protect shelterbelt area from stock pressure		
D Establish shelterbelt		
Action plan		
Action	**Completion Date**	**Person responsible**
A 1 Speak to local Greening Australia rep	March 2002	Sarah
A 2 Look in local library for relevant books	February 2002	Sarah
B 1 Speak to local Greening Australia rep	March 2002	Sarah
B 2 Write shelterbelt establishment timetable	March 2002	Sarah
C1 Select site for shelterbelt	January 2002	Harry and Sarah
C 2 Measure site lengths and area on aerial photo	February 2002	Harry
C 3 Purchase fencing materials and build fence	May 2002	Harry
D 1 Strip spray shelterbelt lines	Sept 2002	Harry
D 2 Respray shelternbelt lines	April/May 2003	Harry
D 3 Final spray of shelterbelt lines	Sept 2003	Harry
D 4 Treat area for red legged earth mite	Sept 2003	Harry
D 5 Direct seed tree and shrub species	Sept 2003	Harry and Sarah
D 6 Check for weeds, shielded herbicide spray, check for earth mite and grasshoppers	Dec 2003	Harry

7. MONITORING YOUR PROPERTY'S ECOLOGICAL MANAGEMENT

Figure 7.1 Monitoring tree growth *L.Brodie/NPWS*

An important part of planning and implementing your property ecological management practices is to regularly check to see how the planned actions are progressing (ie. *monitor*). Are they actually improving the health of the areas in question?

Once you have monitored these practices you can see if any changes to the strategies and actions are required (ie. *evaluate*) to ensure your vision is achieved.

Annual monitoring should be conducted in late winter through to late spring. At this time the biological systems are operating at their optimal level. Conduct your annual monitoring at the same time of each year.

Try to do your monitoring at the same time of the day, preferably early in the morning when the greatest number of species can be found.

Review the monitoring methods outlined in Module One (Section7) and choose your preferred **Performance indicators.**

> "Try to do your monitoring at the same time of the day."

8. COSTING OUT YOUR ECOLOGICAL MANAGEMENT PROJECTS

You should check your plans to make sure the proposed changes are within your financial capacity to implement.

Good management involves planning *E.Brown/Hornsby Council*

There are a number of different budgeting techniques you could use to test your plans.

> "There are a number of different budgeting techniques you could use to test your plans."

For example:

- A partial budget
  - which assesses the impact of a change involving some form of capital investment.
- A cashflow development budget
  - which assesses the cashflow and finance implications of a plan over a long period of time.
- A cashflow budget
  - which assesses the cashflow and finance implications of a plan over a short period – usually a year.

Consult with your accountant or financial adviser to discuss the financial implications of your proposed management plans.

PARTICIPANT WORKSHEETS

5. PARTICIPANT WORKSHEETS

SHEET 1: ECOLOGICAL VISION FOR PROPERTY

PROPERTY NAME: _____ **DATE:** _____

A list of the things I would like to see on my property.

ELEMENTS OF MY PROPERTY'S ECOLOGICAL VISION

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

SHEET 2: DESCRIPTION OF ASSESSMENT SITE

For all sites including native bushland, grassland, paddocks containing scattered shade trees, water bodies, creeks and rivers or other areas in modified or artificial systems.

SITE DESCRIPTION

Site or paddock number or name: Date:

Photopoint No:

Photo:

History of land/water use:

SHEET 2: DESCRIPTION OF ASSESSMENT SITE (CONT.)

Current use and management practices:
Stock record since last assessment:
Fires since last assessment:
Vegetation description:
Native birds, animals and/or fish seen in the area:
Pest and/or weed problems:
Other comments:

SHEET 3: CONDITION ASSESSMENT - NATIVE VEGETATION

For native bushland and grassland sites and paddocks containing scattered shade trees.

Site or paddock number or name:	**Monitoring date:**
Assessment questions	**AnswerYes, No or N/A**
1. Is the area fenced to manage stock access and grazing? *Healthy bush should be rested for long periods to allow regeneration. To achieve this, it should be fenced off.*	
2. Is there regeneration of native trees and shrubs, or if in grassland, regular germination of native herbs eg perennials such as lilies or orchids and annuals such as daisies? *Regeneration of trees and shrubs is necessary for the bush to maintain health, diversity and a range of habitats. An understorey of shrubs encourages small insect eating birds and other native animals.*	
3. Is there a diverse range of tree and shrub species present, eg more than 20 (coast), 15 (tablelands), 10 (western slopes and plains)? (Note: healthy river red gum forest may have only one tree and 5-10 shrub species present). *Diversity encourages a range of native animals and helps the bush withstand attacks of insects and other adverse conditions.*	
4. If grassland, is there a diverse range of grasses and broad leaf herbs present?	
5. Is there adequate ground cover, eg leaves, bark and twigs, or litter (dead grasses)? *Ground cover indicates whether the area is being disturbed by stock and is a measure of tree canopy density and the domination of exotic grasses and weeds.*	
6. Are mosses or lichens on rocks, fallen branches and the ground surface, or are these species, along with liverworts, forming a crust on bare soil?	
7. Are weeds uncommon, sparsely scattered, absent, or mainly around edges of the area? *The understorey may have exotic weeds present. Too many are undesirable and you may need a management plan for their control.Weeds compete with native plants for light, space, water and nutrients.*	
8. Is there a very low incidence of pest animals, eg foxes and rabbits? *Remnant bush can be a refuge for pest animals as well as natives. The feral animals should be controlled.*	
9. Is the patch shape a block or part of a corridor more than 30 metres wide rather than a thin strip? *Blocks of native vegetation have less edge area than strips, so they are less influenced by changes in levels of weeds, predators, noise and climatic effects.*	
10. Is the area greater than 1 ha (coast), 5 ha (tablelands), 10 ha (western slopes), 20 ha (plains), 50 ha (Western Division)?	
11. Is the remnant linked to other remnants by corridors, eg. roadside vegetation, or scattered trees no more than 50 m apart ? *Corridors provide shelter and pathways for native organisms (other than birds) to move over the landscape for feeding, breeding, roosting and expanding territory.*	
12. Is there a mix of tree ages present, ie saplings through to old growth with hollows? *A range of ages and conditions means the bush is regenerating itself and each stage of growth is suitable habitat for native organisms.*	

SHEET 3: CONDITION ASSESSMENT - NATIVE VEGETATION (CONT)

13. If trees are present is an understorey also present? *An understorey of shrubs encourages small insect eating birds and other native animals.*	
14. Is the understorey mostly comprised of native shrubs and / or grasses and broad leaf herbs?	
15. Are there standing trees (alive or dead) with hollows, present in the remnant or paddock? *Dead trees with hollows are essential for roosting and nesting of a large range of native birds such as parrots and of bats.*	
16. Are the trees mainly healthy, with little or no dieback? *Dieback is apparent if there are bare twigs at the outer part of the tree canopy. It is usually a sign of severe insect attack.*	
17. Are there less than 20 % of trees affected by mistletoe? *Mistletoe is a parasite that invades trees and causes them to lose vigour. Where many trees in an area are affected it is likely to indicate that the area of vegetation is under severe stress.*	
18. Are there logs and fallen timber on the ground? *Logs and dead material are essential habitat for smaller native organisms. But they can also be a harbour for pest animals.*	
19. If scattered paddock trees are unfenced, are stock camps absent? *Bare ground, bare tree roots or the movement of soil all can indicate erosion which needs to be managed and controlled.*	
20. If scattered paddock trees are unfenced, is evidence of stock ringbarking or rubbing absent?	
21. Is the area free of herbicide, insecticide or fertiliser overspray from adjoining areas? *Herbicides and insecticides can kill native plants and small organisms. Fertiliser encourages exotic species by raising nutrient levels.*	
22. Is the area free from the threat of salinity and / or high water tables?	
Total number of "yes" answers	

CONDITION RATING - NATIVE VEGETATION

Number of "yes" answers			Vegetation condition rating	Mapping colour	Need for management attention
Remnant bushland	**Remnant grassland**	**Scattered paddock trees**			
14 +	9 +	12 +	Healthy	Green	Maintain current management
9 - 13	6 - 8	8 - 11	Good	Blue	Needs some management attention
5 - 8	3 - 5	5 - 7	Fair	Yellow	Needs a significant level of management attention
0 - 4	0 - 2	0 - 4	Poor	Red	Urgent management necessary if you wish to retain area as stock shelter

SHEET 4: CONDITION ASSESSMENT - WATER BODIES

For creeks, rivers, farm dams and natural or artificial wetlands.

Site number or name:	**Monitoring date:**
Assessment questions	**Answer Yes, No or N/A**
1. Is all or part of the site fenced to control stock assess?	
2. Is there a diverse range of native tree and shrub species present upslope of the dam or wetland, or along the creek?	
3. Are there any standing trees (dead or alive), with hollows near to, or within the dam or wetland, or along the creek?	
4. Is the site linked to remnant vegetation by corridors, eg. roadside or scattered trees no more than 50m apart?	
5. Is the site free of herbicide, insecticide or fertiliser overspray or run off?	
6. Are weeds uncommon, sparsely scattered or absent from the site?	
7. Is there an earthen or floating island within the dam?	
8. Does the dam have an irregular margin?	
9. Does 50% of the dam edge have a gentle slope?	
10. Is 50% of the dam less than 800mm deep when the dam's full?	
11. Are there any native fish species present in the dam or creek?	
12. Are introduced fish species (eg. carp) absent from the dam or creek?	
13. Are there hollow logs, rocks and litter around the dam or along the creek?	
14. Is more than 50% of the creek corridor vegetated with native species?	
15. Are the creek banks stabilised by vegetation?	
16. Are there wider patches of native vegetation along the creek corridor eg 20-30m wide?	
17. Is the area immediately adjacent to the creek free from cultivation?	
18. Are aquatic insects present under small to medium rocks or logs within the creek?	
19. Is the creek's water free from regular algal blooms?	

SHEET 4: CONDITION ASSESSMENT - WATER BODIES (CONT.)

Site number or name:	Monitoring date:
Assessment questions	**Answer Yes, No or N/A**
20. Does foliage of trees or shrubs hang over the creek, dam or wetland?	
21. Is there any regeneration of reeds and rushes upslope of the dam or wetland?	
22. Is there a buffer zone of ungrazed vegetation around the wetland?	
23. Is the area free of irrigation tailwater or polluted stormwater?	
24. Is the area free of fire during bird breeding seasons?	
25. Are patches of vegetation left unburnt as wildlife breeding habitat?	
26. If the area has original vegetation, has the water regime remained largely unmodified?	
27. Does the water level fluctuate regularly (seasonally)?	
Totals number of "yes" answers	

CONDITION RATING - WATER BODIES

Number of "yes" answers			Vegetation condition rating	Mapping colour	Need for management attention
Dam	**Creek**	**Wetland**			
11 +	13 +	10 +	Healthy	Green	Maintain current management
7 - 10	9 - 12	7 - 9	Good	Blue	Needs some management attention
4 - 6	5 - 8	4 - 6	Fair	Yellow	Needs a significant level of management attention
0 - 3	0 - 4	0 - 3	Poor	Red	Urgent management required to improve the resource condition

SHEET 5: CONDITION ASSESSMENT - OTHER WILDLIFE HABITAT FEATURES

		Answer these questions to identify condition of habitat features. Is this habitat feature... (Answer Yes, No, or N/A.)					
Answer these questions to identify habitat features **On your property.....**	**Answer Yes, No or N/A. List, if more than one example.**	Free from pesticides or similar contamination?	Fenced from stock access?	Relatively undisturbed by cultivation or other activity?	Linked or near to native vegetation remnants, paddock trees or water bodies?	Relatively free of pest animals?	Providing a diversity of habitat niches?
1. Are there areas of rock outcropping or rock formations?							
2. Is there a garden and/or constructed water features?							
3. Are there "wild" vegetated areas (non natives/weeds) that may be used by native wildlife?							
4. Are there cultivation paddocks that may be used by native wildlife?							
5. Are there woodlots, plantations (of native or exotic species) or orchards that may be used by native wildlife?							
6. Are there built structures that may be used by native wildlife eg woolshed, hayshed?							
7. Are there other non-natural structures or formations which may shelter or provide wildlife habitat eg rubble piles, abandoned machinery?							
Totals number of "yes" answers (include every square) =							

The more "Yes" or partial yes responses you have made, the greater the likely biodiversity potential of your property, although this will vary from place to place. However if you have many "No" responses you should consider some of the management actions you could take to increase the biodiversity potential of these other parts of your property.

SHEET 6: BASELINE SURVEY _____

PROPERTY NAME: _____ **DATE:** _____

Survey location: _____

Date:_____ **Start time:** _____ **Finish time:** _____

Site description (History of land use, fire history, pests, vegetation type, current management)

_____

_____

SPECIES NAME	NO. OF SPECIES	FIELD NOTES

SHEET 7: WILDLIFE RECORD SHEET

PROPERTY NAME: _____ **DATE:** _____

Record from 2____to 2_____

Date & Observer	Common Name	Habitat Type	Paddock/site -Current use & management	Comments Eg How many? Male/female/juv. Distinctive features/ colors? Activities?

SHEET 8: SWOTA ANALYSIS

PROPERTY NAME: _____ **DATE:** _____

A list of the strengths, weaknesses, opportunities and threats of my property's ecological resources (ie its native biodiversity resources) in terms of my vision.

STRENGTHS to capitalise on	**WEAKNESSES** that need attention
OPPORTUNITIES that are available	**THREATS** that may have adverse affects

ACTIONS to be taken

SHEET 8: SWOTA SUMMARY SHEET (CONT.)

The most significant positive and negative biodiversity management issues regarding my property and whether I control or influence them, or if they are issues of concern outside my influence or control.

	Control	Influence	Concern
Strengths / Opportunities			
Weaknesses / Threats			

SHEET 9: PROPERTY'S ECOLOGICAL GOALS

PROPERTY NAME: _____ **DATE:** _____

These goals are Specific, Measurable, Agreed/Achievable, Realistic & Time constrained.

SHORT TERM GOALS (in the next few years)

LONG TERM GOALS (in 10 years or more)

SHEET 10: MANAGEMENT PLANNING SHEET NO. _____

PROPERTY NAME: _____ **DATE:** _____

Key issue	Key goal

Strategies

Action plan		
Action	Date to be finished by	Person responsible

SHEET 11: MANAGEMENT PLANNING SUMMARY

PROPERTY NAME: _____ **DATE:** _____

These are my top ten priority actions for 2_____ until 2_____

Priority	Action	Function	Materials required	Cost $
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

SHEET 12: REFERENCE LIST OF SUPPORT ORGANISATIONS

A list of contact details of sources of specialists and scientific experts to assist in biodiversity surveying and vegetation management actions.

Organisation	Address or local contact number
● NSW National Parks and Wildlife Service	
● Greening Australia (NSW)	
● Royal Botanic Gardens	
● Australian Museum	
● National Parks Association	
● State Forests of NSW	
● Local Councils	
● Catchment Management Boards	
● Nature Resource Management	
● TAFE or University	
● Local experts	
● Local clubs - Field naturalists etc	
● Birds Australia Inc	
● Frog and Tadpole Society (FATS)	www.fats.org.au
● Herpetologist and mammal groups	
● Department of Land and Water Conservation	

GLOSSARY & REFERENCES

6

6. GLOSSARY & REFERENCES

Biodiversity	Biodiversity is the variety of all life forms, that is, the plants, animals and micro-organisms. It includes the genes of all species, the communities they form and the ecosystems of which they are a part.
Genetic diversity	Genes are inherited characteristics, which are packaged in different ways with each new generation. Genetic diversity is the variety of genetic material on earth. There is genetic diversity within species, and between all species. Among all Magpies, for example, no two are exactly the same, but each has a different combination of genes. Diversity in this sense ensures that some individuals are better at adapting to certain types of environment. These are the successful ones, which pass on the genes, to ensure success of their offspring. Without genetic diversity a species cannot evolve, and cannot survive changes in its environment.
Species diversity	The variety of species on the planet. A species is a group of organisms, which shares a combination of genetic variations that make its members different to all other species. Members of a species can breed only with other members of the same species; they cannot breed with members of other species. Biodiversity can be measured by counting the number of species in an area; it is described as 'species rich' if it contains many different species.
	The number of species on earth is widely estimated at 10-100 million. One of the consequences of biodiversity loss is the decline of plant and animal species. This decline leads to species becoming endangered, vulnerable or extinct, otherwise known as "threatened species".
Ecosystem diversity	Plant and animal species interact with each other in their physical environment to form ecosystems. The many different kinds of environments, including the many different species adapted to live in them, form ecosystem diversity. An ecosystem is the plants, animals, fungi, and microorganisms, and their non-living environment interacting together as a functioning unit.
Carnivore	A flesh eating animal.
Colonisers	The first organisms to establish in a new environment.

6. GLOSSARY OF TERMS

Corridors	Or habitat corridors. Strips of vegetation of varying width between reserves or other patches of remnant vegetation that allow migration, colonisation and interbreeding of wildlife.
Decomposer	Organism that obtains energy from the breakdown of dead organic matter to more simple substances; mostly refers to bacteria and fungi.
Diversity	Abundance in the number of species in a given location.
Ecology	Study of the relationship of living organisms with their surroundings.
Ecological sustainability	Meeting the needs of the present and future generations with little damage to the environment or loss of biodiversity.
Ecosystem	The organisms in a community and the associated non-living factors with which they interact.
Energy	Capacity to do work.
Energy cycle	The interaction of plants, animals and soil, started with energy from the sun.
Food chain	Movement of energy and nutrients from one feeding group of organisms to another in a series that begins with plants and ends with carnivores and decomposers.
Food web	The food relationships between species within a community. A diagram of who eats whom.
Habitat	A place where a plant or animal lives.
Herbivore	Organism that feeds on plant tissue.
Remnant vegetation	These are the fragments of the pre-European landscape of forest, woodland, grassland or wetland vegetation. Remnant vegetation includes single paddock trees, bushland patches, native forests and native grasslands.
Species	A group of organisms that interbreed in nature; a taxonomic grouping.
Wetland	A seasonal or permanent body of water or a waterlogged area forming a habitat for aquatic plants and animals, notably birdlife and fish.

REFERENCES AND FURTHER READING

National Parks and Wildlife Service, 2001, *Facilitator's Biodiversity Resource Kit*.

National Parks Association of NSW and NSW National Parks and Wildlife Service, 2001. *Community Biodiversity Survey Manual*.
A useful resource for full details about biodiversity survey techniques.

The Atlas of NSW Wildllife is the main database of native plants and animals for New South Wales. This database is managed by National Parks and Wildlife and the information is available to you via the NPWS web site. www.nationalparks.nsw.gov.au

NSW Agriculture, 1999. *Physical Property Planning*, Farming for the Future.
A 146 page manual with detailed, step by step instructions for preparing a physical property plan, using an aerial photo of your property.

NSW Agriculture, Department of Land and Water Conservation, National Parks and Wildlife Service, Farming for the Future 1999. *Property Management Planning Workshop Series 2nd Edition*.
This set of eight workshops explains the entire property management planning process.

NSW Agriculture 1996. *Nature conservation on farms*. Home study program.
This easy-to-follow 118 page book is designed as a home study module and provides detailed information on the value, assessment and management of nature conservation on your property.

Greening Australia (2001) *Tracking and improving vegetation projects*. A National Training Package.
This is a training package which provides monitoring and evaluation guidelines, mostly aimed at community bushcare groups.

Greening Australia, Queensland 2000. *Monitoring Farm Flora and Fauna*.

Goldney D. and Wakefield S., 1997, *Save The Bush Toolkit*. Charles Sturt University and Orange Agricultural College, University of Sydney.
This is a self-guiding package of nine "Kits" which takes the landholder through step by step assessments of the natural features and vegetation on farms with a matching kit giving management suggestions. It also has sections on wildlife surveying and farm planning. This resource was developed for the Central West region but is useful for most rural production areas in NSW.

REFERENCES AND FURTHER READING

Barrett, G. 2000. *Birds On Farms: Ecological management for agricultural sustainability*. Supplement to Wingspan 10:4, December 2000, Birds Australia, Hawthorn.
A set of ten recommendations.

Blakers M., Davies S.J.J.F., Reilly P.N., 1984 *The Atlas of Australian Birds*, Royal Australasian Ornithologists Union.

Victorian Natural Resources and Environment, 2002, *Biodiversity in Property Management Planning - Living Systems Resource Kit*.

Platt, Stephen, J. 2002. *How to plan wildlife landscapes: a guide for community organisations*. Department of Natural Resources in Victoria. See www.nre.vic.gov.au (Select Conservation and Environment theme, then Living Systems.)

A complete management information resource for property planning for biodiversity.

NSW Agriculture, 1995. *Managing Wetlands on Farms*, Home Study program.

Department of Land and Water Conservation, 1998. *Rural Production and Native Vegetation Conservation*.

An information package for Landholders consisting of Veg Notes and other information sheets.

See also the Biodiversity Conservation Management Notes in Section Seven.