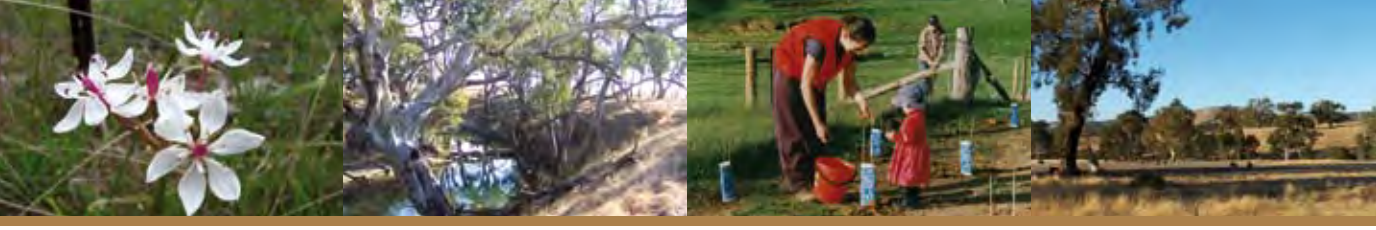
caring *for country*




A Guide for Sustainable Land Management in Central Victoria

Upper Loddon, Upper Campaspe and Upper Maribyrnong River catchments



caring *for country*

A Guide for Sustainable Land Management in Central Victoria

Upper Loddon, Upper Campaspe and Upper Maribyrnong River catchments

NORTH CENTRAL
Catchment Management Authority

Cover Image: View from the Calder to Big Hill, Bendigo

First published 2006

North Central Catchment Management Authority
P.O. Box 18
Huntly, Victoria 3551
Phone 03 5448 7124
Fax 03 5448 7148
Email info@nccma.vic.govau
www.nccma.vic.gov.au

Caring for Country: A Guide for Sustainable Land Management in Central Victoria

ISBN: 0 9756011 4 8

This document is also available on **www.nccma.vic.gov.au**

Acknowledgements

In using the title *Caring for Country* we acknowledge the significance of this term for indigenous people, the custodians for many centuries of the land we share. We now all share the responsibility to act as custodians of the land that supports us and all living things.

The North Central Catchment Management Authority wishes to acknowledge the Victorian and Australian governments for funding provided through the National Action Plan for Salinity and Water Quality.

Design: Snap Printing Bendigo
Copy editing and proofreading: Peter McRostie, Andrew McKenna, Genevieve Barlow, Neil Conning, Malory Weston.
Illustrations: © Anne Forko
Index: Max McMaster

action

Coliban WATER

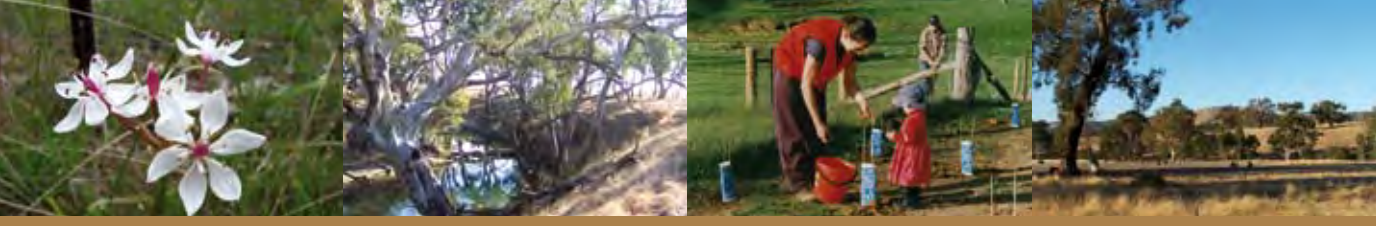
EPA VICTORIA

WATER

LANDCARE AUSTRALIA

Parks VICTORIA

NORTH CENTRAL
Catchment Management Authority



Caring for Country is designed as a resource for managing small rural properties in the Upper Loddon, Upper Campaspe and Upper Maribyrnong catchments. It will help landholders manage their land appropriately to support conservation efforts and improve biodiversity in Central Victoria.

The publication of this guide has been made possible by the close collaboration of several natural resource management agencies, and we commend the partnership approach in land management. The agencies are dedicated to helping local communities and individuals improve their land management practices.

Caring for Country is a practical application of the natural resource planning objectives outlined in documents such as Victoria's *Biodiversity Strategy*, the *North Central Regional Catchment Strategy, Native Vegetation Plan* and *River Health Strategy*. These documents are supported by local government planning schemes, corporate plans and annual works plans.

We are delighted to endorse this document as a planning tool for small rural landholders and look forward to working with the community to continue improving our land management practices. As a landholder, you can make a difference.

Ian MacBean
Chair
North Central CMA

NORTH CENTRAL
Catchment Management Authority

David Jones
Mayor
City of Greater Bendigo

CITY OF GREATER BENDIGO

Gavin Holt
Mayor
Loddon Shire Council

LODDON

David Gittus
Mayor
Mount Alexander Shire Council

MOUNT ALEXANDER

Judy Lawler
Mayor
Campaspe Shire Council

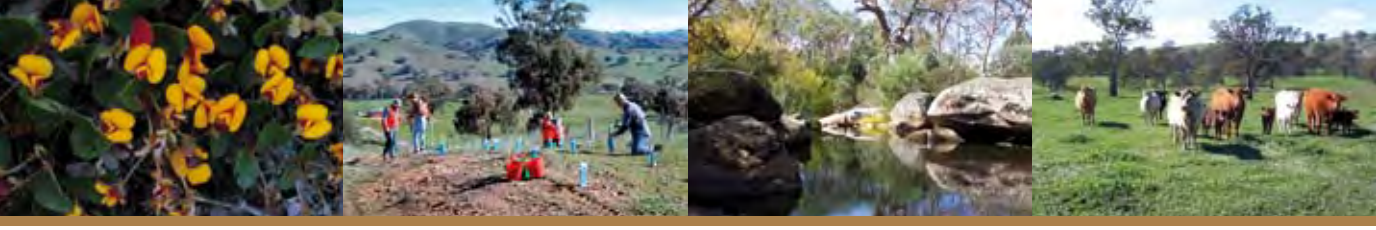
CAMPASPE

Geoff Neil
Mayor
Macedon Ranges Shire Council

Macedon Ranges
SHIRE COUNCIL

Heather Mutier
Mayor
Hepburn Shire Council

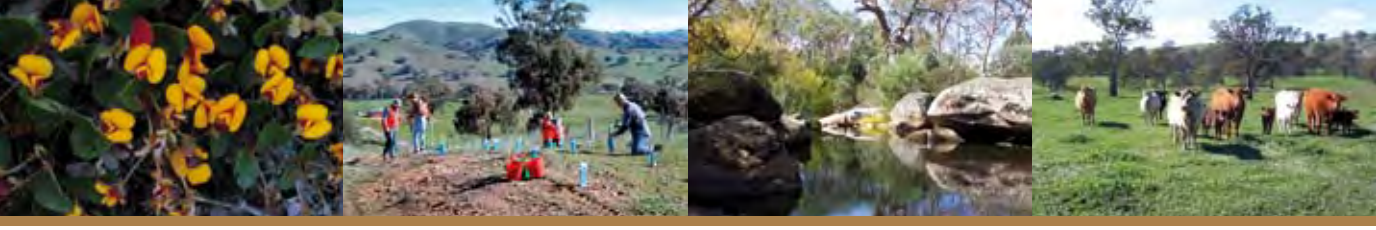
Hepburn



This guide covers the area surrounding the upper Loddon and Campaspe rivers and the headwaters of the Maribyrnong River (see map above). The Loddon and Campaspe rivers meander through Central Victoria into the mighty Murray River. The southern area of Macedon Ranges Shire features the Jackson and Deep creeks, which feed into the Maribyrnong River before it enters metropolitan Melbourne and Port Phillip Bay. Towns in the area include Gisborne, Woodend, Romsey, Wedderburn, Castlemaine, Maryborough, Daylesford, Kyneton and Elmore, and the regional city of Bendigo.




contents



recognition of traditional owners

Country… is a nourishing terrain. Country is a place that gives and receives life. Not just imagined or represented, it is lived in and lived with… Country is multi-dimensional – it consists of people, animals, plants, Dreamings, underground, earth, soils, minerals and waters, surface water, and air…

Country in Aboriginal English is not only a common noun but also a proper noun. People talk about country in the same way that they would talk about a person: they speak to country, sing to country, visit country, worry about country, and long for country. People say that country knows, hears, smells, takes notice, takes care, is sorry or happy…

From Strategy for Aboriginal Managed Lands in Victoria, December 2003.

Bush Tucker (detail), by Dja Dja Wurrung artist Ricky Nelson.

We acknowledge, with great appreciation, the traditional custodians of this country, the Dja Dja Wurrung and the Wurundjeri.

We recognise and respect the knowledge that Indigenous people have in managing land and in conserving biodiversity. We see Indigenous Australians as major partners in managing our environment and cultural heritage. Caring for country is important to Indigenous Australians who have been looking after their lands for many thousands of years. Their knowledge of the land is central to their culture and spiritual beliefs.

Aboriginal people have a history dating back at least 40,000 years in what is now known as Victoria. The tribes that lived in and around Central Victoria include the Dja Dja Wurrung in Central Victoria and the Wurundjeri around Mount Macedon. There were around 16 to 24 Dja Dja Wurrung clans, and through intermarriage, many variations of the language developed. Early settlers were confounded by this, and simply called it 'Dja Dja'.

Aboriginal people have traditionally seen the land and their culture as one, so looking after their country – its plants, animals and waters – has been synonymous with looking after their culture.

As non-Indigenous people 'manage' their land, Indigenous people regard themselves as 'negotiating with country', interpreting and responding to signals that were coming from the land. Whereas non-Indigenous people say they are 'managing their land', Indigenous people's phrase is 'caring for country'.

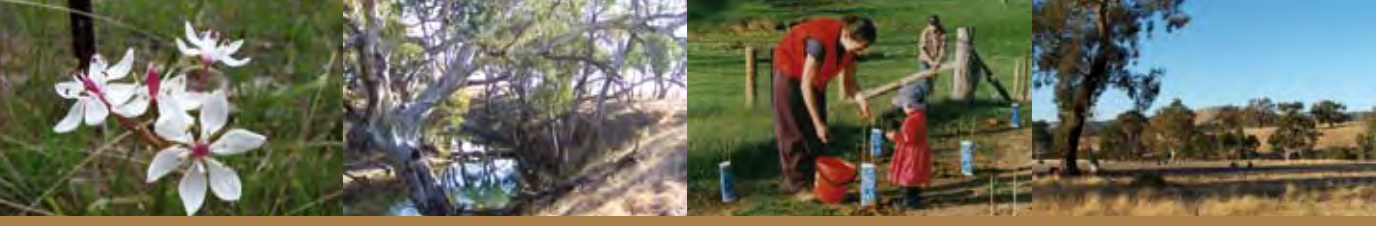
One hundred and fifty years of agriculture have brought untold benefits to Central Victoria, but they have also wrought erosion and salinity, damaged rivers, wiped out native species and brought many more to the brink of extinction. As we embark on the twenty-first century, we increasingly understand that we have much to learn from Indigenous land management practices.

Government agencies have taken to controlled burning as a means of reducing fuel loads in forests, killing weeds and regenerating native species. Farmers are discovering the benefits of native pastures, which have evolved with this landscape for millennia. Non-Indigenous people are even discovering the richness of bush tucker, and finding that in many places, it's best to grow indigenous plants. In some places, introduced European farming practices may not work at all.

Just as we can learn about land from Indigenous people, we have a responsibility to care for the physical and cultural heritage they have left us. Throughout Central Victoria there are signs of previous occupation, whether they be middens, earth mounds, scar trees or other cultural artifacts. As landholders we have a responsibility to care for these sites, to protect them and to learn from them.

We have arrived at the day when caring for our culture is the same as caring for our land, as we realise that having healthy land, streams and air is fundamental to our survival and the continuance of our own culture.

As a landholder, this guide will help you care for country.



introduction

Congratulations! If you have this book in your hand it's likely you have a commercial title to land in Central Victoria. You are now a land manager. Hopefully this will bring you a lot of pleasure, but it also brings responsibilities.

Caring for Country will help you meet those responsibilities. It will help you look after the land in a way that protects the environment and offers economic, social and wider environmental benefits for you and those who live around you and further afield.

What you do on your land can have a profound impact on others many kilometres away. If every property owner damages water quality, that damage accumulates down the catchment, through the river system and into water storages, affecting water supplies for the wider community. As a land manager, it is your responsibility to ensure this does not happen.

This guide is not a farming guide. It does not offer advice on animal husbandry or how to build fences, but it does explain how to manage and recycle your waste and water, how to reduce your fire risk, control weeds and vermin, and conserve and improve areas of native vegetation, which is habitat for native animals and plants. Caring for Country is conservation, sustainable and community-minded.

We recommend you use it as a starting point only, and encourage you to seek more information. Where possible, we have provided websites and contacts for agencies that will be able to offer more detail.

There is no simple formula for successfully managing land, but learning the basics will have benefits for you and the whole community. It is much easier, and cheaper, to prevent land and water degradation than to repair it.

Enjoy your land. If you care for it, it will bring you and many others great rewards.

How To Use This Guide

Chapters are colour coded under three main themes. The blue chapters are about water, green chapters are about preserving biodiversity and gold chapters concern topics relating to property management.

- Water
- Biodiversity
- Property Management

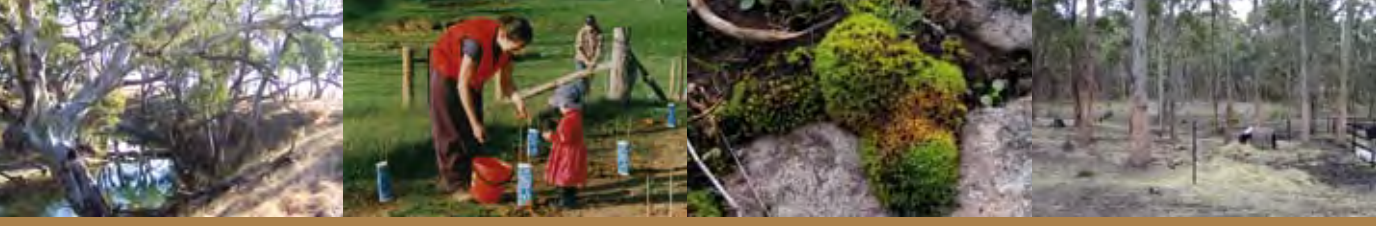
part one

rural living

People often overlook or underestimate the cost and effort involved in maintaining their property. Even a bush block needs management to keep it clear of weeds and feral animals, and to prevent or treat erosion or salinity.

If you've never owned a rural block before, you may want to get a whole farm plan completed, which will help you make smart decisions for your block. If you're building, you'd be prudent to investigate water-wise and energy-smart building techniques, which can reduce your energy consumption and reduce the need for running expensive air-conditioners and heating systems.

If you're new to the area, consider joining a Landcare group or fire brigade, which is a great way to meet new people and contribute to your local community.



chapter 1
your block

Before you buy

Central Victoria offers a quality of life that many people find hard to resist. But it is important to understand life in a rural area before buying a property and living on it. Although it may look peaceful, it can be a busy, noisy, and smelly place at certain times and in some areas.

Is the land suited to what you want to do? The land's capability will determine what it can sustain, regardless of what you want to use it for. The climate in Central Victoria is extreme. Sometimes a place that looks lush and green in winter can be harsh and dry in high summer. Before making too many grand plans, see the property in the extreme of summer and winter. If this is not possible, talk to local people about the highs and lows of the weather, or check average temperature and rainfall figures with the Bureau of Meteorology.

Is the soil suitable? For example, are you planning to grow grapes, or do you want to run a few horses or sheep? It's no good buying a bush block on infertile soils if you need pasture. This will lead to a loss of native vegetation, the establishment of weeds and the expense of hand-feeding.

Are there signs of salinity? Is Spiny Rush growing in any of the low-lying areas or is there bare ground in the middle of a paddock where pasture and grass doesn't seem to grow? If so, you can test the dams, waterways or soil for salinity to understand the extent of the problem. Refer to the salinity section of this guide for further information and organisations from where you can get support and advice.

What existing activities are in your neighborhood? Orchards, for example, often use noisy air guns to protect their fruit. If you are buying in a rural zone, be prepared for rural activities that may include noisy machinery and livestock.

What about the fences? Are they in good nick? How will you work out sharing the costs of replacing them?

Do you plan to eventually live on your block? How much work will it take to achieve that? Does it matter if the kids lose interest as they get older? If your children are young there may be many weekends when sport and other commitments keep them from going to the country block.

What's the road access like? Have you considered access in winter, or dry, dusty, bumpy roads? Councils can't be expected to bitumen every road, or maintain gravel roads to be pothole or corrugation-free at all times.

Do you expect council services such as waste disposal? If so, check to see if this is available before you buy.

You need to decide what activities you want on your land.

Legal responsibilities and planning controls

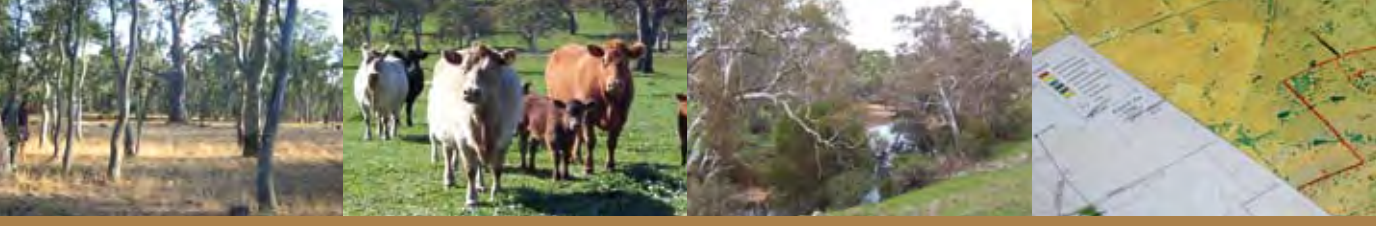
You need to be aware that there are regional and council environment and catchment plans, and land management guidelines. These may limit what you can do with your land. Some plans are advisory and others place legal restrictions on landholders to protect the environment and certain agricultural activities.

Some of the things regulated by these plans in Central Victoria include subdivision, vegetation clearing, and control of weeds and feral animals. You may also need a permit to carry out some types of activities on your land, such as obtaining water, keeping certain animals, using farm chemicals and lighting fires.

As a rule of thumb contact your local council if you are unsure. Ignorance is no excuse.

How your land is zoned may affect what you can do on it. Check with the council or view the planning scheme on-line (**www.dse.vic.gov.au/planningschemes**) first. Also check for planning overlays and ask what they mean for your property. If you're planning to build, check on planning permit requirements.

If your block is in a proclaimed catchment, contact your local urban or rural water authority to discuss development constraints they are aware of before applying for a permit. Consider requesting a Land Capability Assessment before you buy, or make the sale conditional on a permit being available. Your local Environmental Health Officer at Council can help and provide you with these assessments. Each shire and the City of Greater Bendigo have local laws that may affect your plans.



Before you buy checklist:

- check with your local council regarding planning controls or any other constraints to development
- do your research about the industries and land uses surrounding your intended property
- have realistic expectations of life in a rural industry area
- be prepared to spend time and money on your land management responsibilities, especially on weeds and pests
- get information, advice and assistance from the Department of Primary Industries, the local council and other government and non-government sources to ensure you make an informed choice about living in rural Victoria
- check whether you can build a house on your land
- check the location of water, gas and electricity services and their proximity to your preferred building site
- check access to the local road

Just bought a rural block?

House design

Photo: Geoff Park

Planning is a crucial part of buying your block.

If you are building on a rural block you have the opportunity to create an energy-efficient house. A 'sustainable house' is designed to be efficient in water and energy resources, and minimises waste. The bonus is that your house is cost-efficient over time, comfortable, cheap to maintain, and complements our unique environment. Your home can be up to 5°C warmer in winter and up to 10°C cooler in summer, making it brighter and more comfortable to live in throughout the year.

It is very simple to include the basic concepts of sustainable design into your new house or to apply them to an existing dwelling. There is plenty of information available to assist you with designing an energy-efficient house.

Visit Sustainable Energy Authority Victoria www.seav.sustainability.vic.gov.au

The main principles of energy-smart design include:

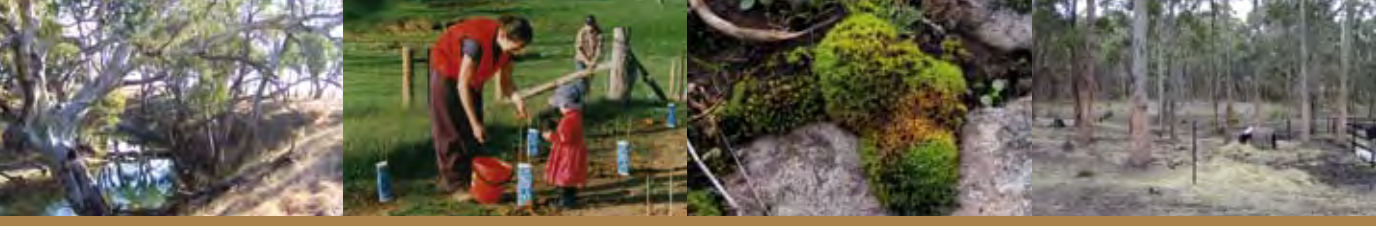
- daytime living areas with large north-facing windows to receive unobstructed winter sun
- internal planning to create zones that reduce the amount of energy required for heating and cooling
- windows appropriately orientated and sized with protection from winter heat loss and summer heat gain
- adequate thermal mass (heavy building materials) to stabilise indoor temperatures
- adequate insulation in walls, ceilings and floors
- good draught-proofing
- cross-ventilation for summer cooling
- an efficient hot water system and fittings
- efficient lighting and appliances
- landscape design that helps modify the microclimate for more comfortable conditions inside

Controls on vegetation clearing are designed to curb the loss of native vegetation.

Planning your farm

After you have bought your property, it is advisable to develop a plan for it that takes all of its features into account. Such plans are sometimes referred to as 'whole farm plans'.

Whole farm planning helps you establish and run your property by identifying sustainable land management practices for small-scale and alternative farming. The aim of whole farm planning is to produce farm layout and land management strategies that will minimise land degradation and optimise efficient



layout and management of your property.

The process will require landholders to stocktake their property's assets – the soil, water, remnant vegetation, wildlife, pastures, soils, topography and fences, and plan how to manage the property sustainably into the future. The plan will also identify the risks to the property's assets.

Some of the considerations when developing your plan should include:

Fire prevention

The property plan must consider preventative design principles, emergency access locations, and water supplies in the event of a fire.

See Chapter 9 Preparing for Fire for further information.

Vegetation

Exclude stock from areas of native vegetation, buffer roadside vegetation and concentrate pest plant and animal works in these areas. With careful management, natural regeneration should begin to occur. If the range of species is limited reintroduce select indigenous species.

See Chapter 6 More than Just Trees for more information.

Streams and creeks

Are there signs of erosion or unstable stream banks? Use fences to manage stock near waterways, and create off-stream water points for stock.

See Chapter 4 Looking After Your Waterway for further information.

Dams

Do you really need a dam? What are the alternatives?

See Chapter 3 Water is Gold! for more information.

Livestock

What sort of animals do you plan to keep on your farm, and how many do you want? Will your block support hundreds of sheep or a few horses? Do you intend to raise animals intensively in sheds, and if so how will you manage the waste?

Horses

Horses create problems that need to be closely managed so the land is not damaged and there is no ripple effect on nearby land and waterways.

Your intention with any land grazed by horses should always be to care for the soil, to encourage pastures to grow and remain viable, and to discourage weeds.

Horses are herd animals, and if you keep one by itself it can fret, get bored, and suffer from 'walk the fence' syndrome, which causes soil compaction and erosion. Horses kept by themselves are also more likely to panic during storms and run into fences, and to strip bark from trees.

Areas near gates, feed containers and shelter can become bare, compacted, and boggy in wet weather. It is far easier to prevent a paddock from becoming 'horse-sick' than to try to repair the damage afterwards.

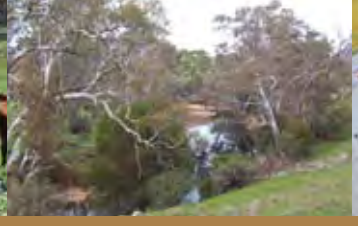
Because horses are selective grazers, undergrazing can change the composition of the pasture, as the more palatable species are grazed while the less palatable species become tall and rank. Conversely, if pastures are overgrazed they become bare and susceptible to infestation with weeds such as Cape Weed.

You may decide to use rotational grazing, using several smaller paddocks rather than one large one. By shifting horses around you give one paddock the opportunity to recover while the horses graze elsewhere. The optimum seems to be to let them graze pastures down to about five centimetres, then let the pasture recover to 15 centimetres before the horses graze again. To maintain good production you can also graze rotationally with other livestock. Sheep and cattle eat a much greater range of plants than horses do, and will graze areas horses have avoided.

Because horses will not graze near their manure, you will need to pick it up regularly. Removing it will reduce blowflies, and you can help break the worm cycle. It also makes good fertiliser for your vegetables and fruit trees.

Many people move to small blocks to keep a horse or two for their children.






In brief, whole farm plans set short- and long-term objectives and then work out environmentally friendly ways to achieve them. A good whole farm plan will take the following matters into account:

- how to maintain and improve the land, soil and water
- available finance
- how to do the work with the available labour
- fencing costs
- weed and pest animal control
- how to protect and enhance existing vegetation
- how to conserve wildlife
- production capability
- appropriate work safety procedures

This list is not exhaustive, and is a guide only. Check with your local Landcare group or Department of Primary Industries about workshops or courses for developing whole farm plans.

Resources:

Do a search for 'small farms' on the DPI website at **www.dpi.vic.gov.au**

Sustainable Energy Authority Victoria
www.seav.sustainability.vic.gov.au

Certified whole farm plans

Some councils recognise the importance of sustainable land management, and subsequently provide rate rebates for properties managed under certified whole farm plans. Check with your local council for details.

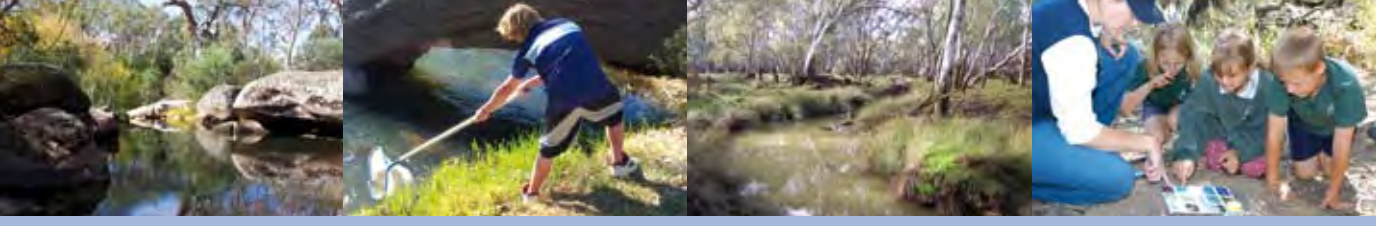
A good, whole-farm plan will protect local waterways and the long-term viability of your block.

part two

water

You need water to make your land workable. You may have a dam, a creek, a river or spring, or you may have to catch your water in tanks. If you're close enough to town you might even be on town water, but however you get it, you need to be water-wise.

We're short of water in Central Victoria, so we should treat it with respect. Save it, recycle it, don't dump your waste or rubbish in it, and make sure it leaves your property in as good or better shape than when it arrived.



chapter 2
our catchment

What is a catchment?

A catchment is land bounded by natural features such as hills or mountains, from which all run-off water flows to a low point such as a creek, river, wetland or ocean, or underground into the groundwater system. It's like water in a bathtub flowing to the plughole, or water that falls on a roof flowing to a downpipe.

Catchments consist of trees, shrubs, birds, insects, animals, people, rivers, creeks, lakes, dams, wetlands, groundwater, stormwater, wastewater, reservoirs, towns and farms. We all live in a catchment and are responsible for its health.

The health of a catchment depends on how those who live there manage it. How we manage our stock, land and gardens, design our houses, dispose of our waste, collect our firewood, treat our waterways, and care for our trees and other vegetation affects our catchment.

Water quality is a key measure of a catchment's health. Humans can pollute streams, and pollution can increase salinity, reduce oxygen and change pH and water temperature. Small property owners need to be aware of their impact and the consequences for others in the catchment.

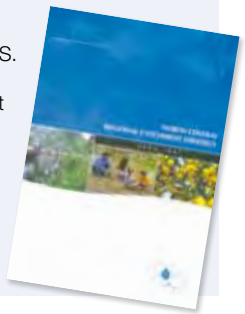
Regional Catchment Strategy

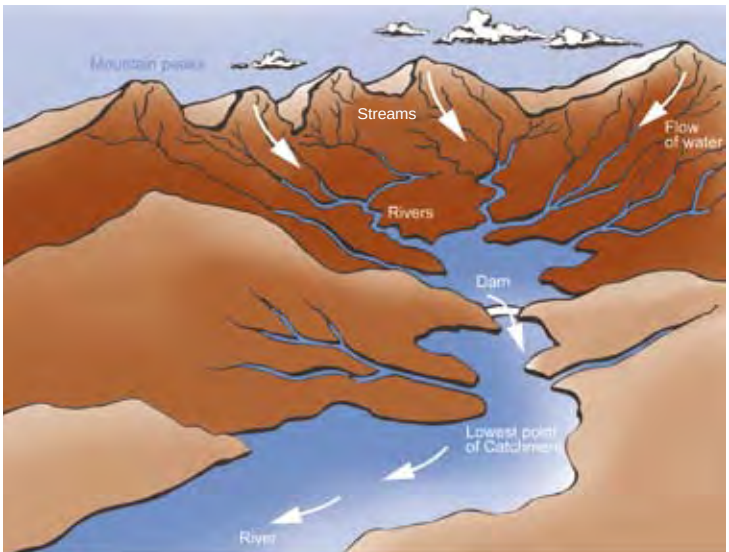
Central Victoria is rich in natural assets of regional, national and international significance. It also faces some of the most complex environmental problems in Victoria.

The North Central Regional Catchment Strategy 2003–07 (RCS) is a framework providing a vision for the future landscape of the region and the direction for managing its natural resources. It proposes the important works to achieve a healthy and sustainable environment for current and future generations in accordance with the resources available.

The vision of the Regional Catchment Strategy is: 'A well informed, resourced and actively committed community protecting and improving the natural resources for the environmental, social and economic benefit of our region.'

The Maribyrnong Catchment, which covers half of the Macedon Ranges Shire, is part of the Port Phillip and Western Port Catchment Management Authority (PPWPCMA) region, which has a separate RCS. Catchment management services are provided by Melbourne Water and the PPWPCMA.





Everyone lives in a catchment.

Proclaimed water supply catchments

Some natural catchments are also known as proclaimed water supply catchments. These areas provide a basin to catch and store water for domestic, agricultural and commercial use.

The Lake Eppalock Catchment supplies domestic water to almost 100,000 people (2005) in 23 towns, including Heathcote, Kyneton, Trentham and Woodend, and major urban areas outside the catchment such as Bendigo, Castlemaine and their surrounds. Up to 27,400 megalitres a year of Lake Eppalock water is also used by irrigators in the Rochester–Campaspe and Pyramid–Boort irrigation areas. Proclaimed water catchments in the Maribyrnong Catchment area include Lake Merrimu Catchment and Rosslynne Reservoir Catchment.

Every household, farm and business in this area relies on this water, where

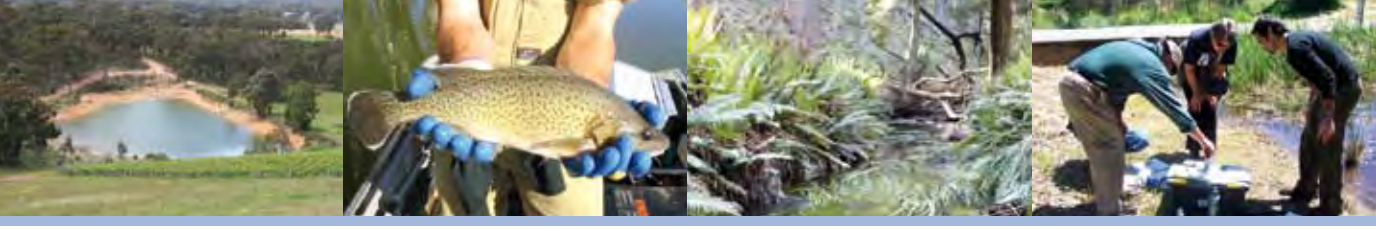


Photo: Angela Gladman

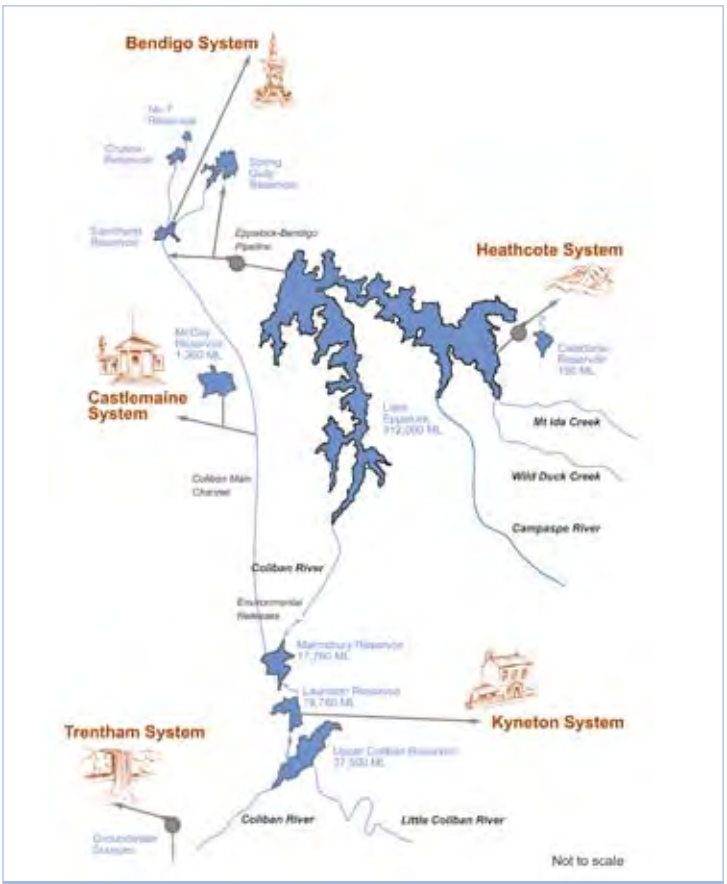
Lake Eppalock supplies irrigation water and town water for drinking.

quality and quantity available is influenced by surrounding land use, land management activities, droughts and erratic seasonal rainfall and urban and rural development.

Coliban Water manages three major water storages on the Coliban River (the Upper Coliban, Lauriston and Malmsbury reservoirs), often referred to as the Coliban Supply System. Goulburn–Murray Water manages three storages on the Loddon River (Tullaroop, Cairn Curran and Laanecoorie reservoirs) and one storage, Lake Eppalock, on the Campaspe River. These storages provide water for domestic, commercial, environmental and agricultural use.

Lake Eppalock supplements the potable water supplies in the Coliban Supply System, as well as providing a large amount of water for irrigation. The Coliban Supply System supplies water to towns in both the Campaspe and Loddon catchments, including Bendigo, Castlemaine and Kyneton, as well as many smaller towns including Raywood, Sebastian, Harcourt, Maldon, Chewton, Tylden, Newstead, Fryerstown, Elphinstone, Taradale, Malmsbury and Guildford.

Western Water manages water storages and water treatment plants in the Maribyrnong River Catchment.



Central Victoria's reservoir system.

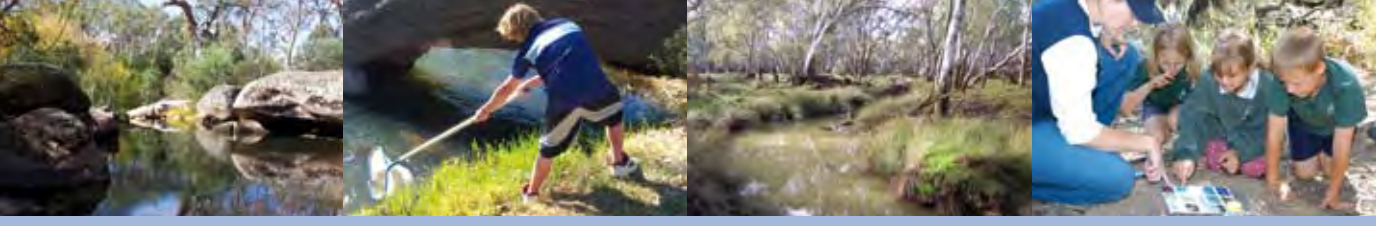
River Health Strategy

The North Central River Health Strategy (RHS) is a planning document that provides the direction for the North Central CMA's management of waterways. Its intention is to develop the most important actions for river health activities across the region.

A key objective of the RHS is to involve the community in planning and implementing river health projects. Landholders are vital to the success of such projects, as most works are on privately owned land or affect areas that require the cooperation of private landholders. Effective natural resource management involves creating and sustaining partnerships between various levels of government, communities and community groups, Indigenous communities and private landholders.

Safe, clean water

Inappropriate land use and development can undermine the safety and reliability of water supplies in our catchments. Water authorities, local governments and



local communities must preserve the quality of our water to safeguard public health, protect our water supply, reduce water tariffs, and ensure a secure and reliable long-term supply of drinking water.

Inappropriate development and land use in catchments could ruin water supplies, so planning authorities look closely at catchment planning and management. Consequently, development proposals in proclaimed water supply catchments are now receiving more scrutiny than ever. Catchment protection and water quality have become some of the most significant issues confronting rural land use planning in Victoria. Authorities have to consider and guard against the cumulative impact of individually insignificant developments and activities. The Lake Eppalock Catchment is one of these special catchments under increasing pressure from further subdivision and development.

Living in a water supply catchment – main risks

Photo: Angela Gladman

We can all play a role in protecting our waterways.

- Nutrients and wastewater from intensive animal industries including dairies and piggeries, forestry and urban stormwater.
- Nutrients and chemical leaching from intensive agriculture, such as potato farming.
- Unsustainable land management practices in rural areas (i.e. activities leading to long-term decline in soil, water, vegetation and community values – refer to specific chapters for details on these).
- On-site wastewater treatment and disposal that cannot be contained on-site and may flow off-site via run-off and contaminate waterways and groundwater.
- Old wastewater treatment systems that no longer effectively treat and dispose of wastewater.
- Towns and settlements close to waterways where higher building densities lead to a greater risk of polluted surface run-off.
- Agricultural run-off (chemical, dirty water, nutrients and sedimentation) in areas without enough distance to buffer waterways and vegetation.
- Uncontrolled stock access to waterways and reservoirs leading to water contaminated by pathogens, nutrients and sediments.
- Chemical spills and surface water run-off from roads located near rivers, streams and reservoirs.
- Poor river health contributing sediment and nutrients into waterways.
- Specific points on a waterway or on land where the soil or water is being polluted or has the potential to be contaminated, e.g. stock watering point, water reclamation plant discharge point, school or scout camps, businesses next to a waterway, etc.

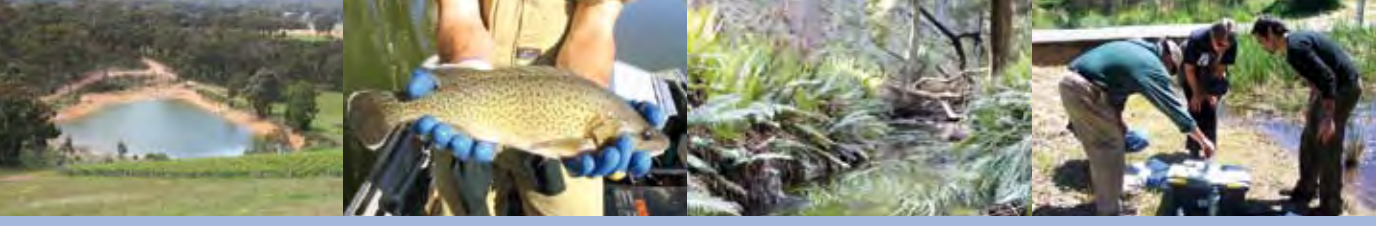
Photo: Brad Drust

Rivers play a vital role in our daily lives and protecting them is essential to our own wellbeing.

Resources:

Go to the North Central Catchment Management Authority website to find out more about the Regional Catchment Strategy:
www.nccma.vic.gov.au

For more on the Coliban system, go to Coliban Water's website:
www.coliban.com.au



chapter 3

water is gold!

Ensuring healthy waterways is a crucial part of owning a small property, and run-off has to be managed so it does not affect water quality. Polluted water such as septic effluent and contaminated surface run-off must be kept clear of your dams, as well as rivers, streams and drainage lines crossing your property. Small property owners should aim for water draining from their property to be as clean as when it arrived.

Ways to keep your catchment healthy

Good planning and managing run-off by planting trees, shrubs and grasses as buffers helps stop nutrients, pathogens, chemicals and sediments from entering waterways and water storages.

Here are some ways you can reduce your impact on catchment health:

- Use chemicals efficiently and carefully, or seek alternative methods where possible
- Control weeds and pests
- Retain and plant native vegetation to prevent erosion
- Protect stream bank vegetation so it provides a filter against pollution
- Manage on-site wastewater treatment systems (septics) properly
- Develop improved wastewater and stormwater treatment systems
- Manage your land to prevent or minimise the impact of large-scale bushfires
- Report accidental spills near waterways (see Chapter 15 Waste and What to Do with It)
- Get involved with catchment protection, Landcare, Waterwatch, Saltwatch or other local community groups

Many school children have participated in Waterwatch activities in Victoria.

North Central Waterwatch is a water quality education and monitoring program that aims to increase community understanding, participation and ownership of local water quality issues. Waterwatch groups regularly check on water quality and work in partnership with water authorities, local government, landholders and businesses to improve environmental conditions.

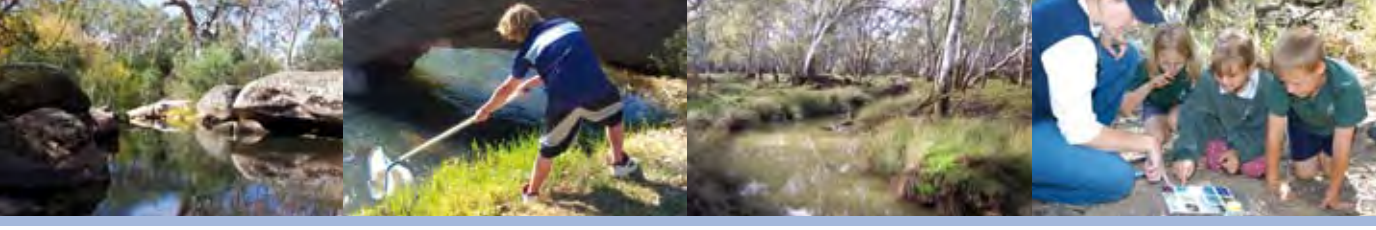
Thanks to government grants and local sponsorship, North Central Waterwatch can provide free water testing equipment, training and technical expertise to any group or individual interested in monitoring water quality.

North Central Waterwatch has developed the River Detectives Program to get schools involved in monitoring local waterways. The program offers schools the chance to learn about river health through a range of activities, including monitoring various water quality indicators such as pH, conductivity (salinity), temperature, turbidity, and phosphorus and macro-invertebrate surveys.

Data collected by Waterwatch groups is kept in a regional database, with specific reports available on request.

If you wish to participate in the North Central Waterwatch program or want any further information, please contact the North Central Catchment Management Authority and ask for the Regional Waterwatch Coordinator.

North Central Waterwatch volunteers regularly test local water quality.



Accidental spillages in waterways

If you spill something into a waterway, you must take responsibility for dealing with it. Do what you can to contain the spill without flushing or diluting it, as that can spread the contamination. Contact the Environment Protection Authority (EPA Victoria) once you have done what you can to contain the spill. While EPA Victoria does not have the necessary equipment to conduct a clean-up, it can provide advice on what you may need to do to rectify the problem. This may include directing you to a private contractor with expertise in cleaning up spills.

If you live in a proclaimed catchment area, such as the Lake Eppalock Catchment, and you become aware of a significant chemical or fuel spill, you need to contact your local water authority as well as the EPA. Immediate measures might need to be put in place to protect potable supply reservoirs and treatment plants from the polluted water flowing downriver.

Recycling water

Water is precious. Reduce the amount you use and, before you buy them, think about where your detergents and cleaning agents will end up. Try natural and safe alternatives. The less water you use the more there is for our rivers and streams, which helps keep them healthy.

In Central Victoria in recent years, water supplies have been particularly low in the Campaspe Catchment, which provides water to the growing city of Bendigo.

Grey water

Sometimes referred to as sullage. Consists of all non-toilet wastewater. It includes wastewater from showers, baths, spas, hand basins, washing machines, laundry troughs and kitchen sinks.

Black water

Wastewater contaminated by faeces and urine from toilets and urinals.

(EPA's Information Bulletin, *Domestic Wastewater Management Series, Reuse Options for Household Wastewater*, Publication 812)

Many people in Central Victoria are recycling grey water. This is a viable option during times of drought and water restrictions, and a number of products are now on the market that let you access grey water from domestic plumbing. These products are designed for the immediate use of grey water.

As its use can carry health and environmental risks, grey water should be used only when following basic safety guidelines. The EPA supports water conservation methods and believes that grey water can be used effectively and safely in domestic situations by following several simple tips:

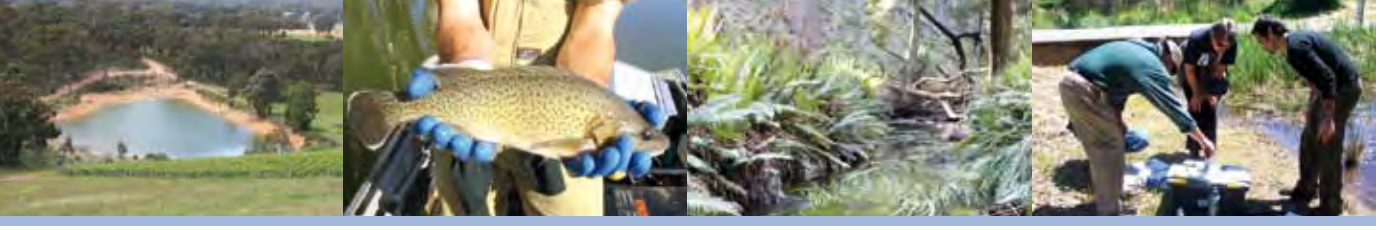
Do:

- ✔ Use wastewater only from baths, showers, hand basins and washing machines (preferably the final rinse water)

Some new houses are being fitted with greywater recycling systems.

- ✔ Only use grey water on the garden, and rotate which areas you water
- ✔ Only apply enough water that the soil can absorb
- ✔ Wash your hands following watering with grey water
- ✔ Stop using grey water when it rains or the ground is wet
- ✔ Stop using grey water if it smells or plants do not appear to be healthy

Recycled water is increasingly used in irrigation.



Don't:

- ✘ Use grey water on vegetable gardens if the crop is to be eaten raw
- ✘ Use grey water that has faecal contamination, for example wastewater used to launder nappies
- ✘ Use kitchen wastewater (including from dishwashers) due to the high concentration of food wastes and chemicals that are not readily broken down by soil organisms
- ✘ Store grey water for more than 24 hours
- ✘ Let children or pets drink or play with grey water
- ✘ Allow grey water to flow from your property or enter stormwater systems

If you wish to put in a permanent system for grey water use, further information can be obtained from EPA's Information Bulletin, *Domestic Wastewater Management Series, Reuse Options for Household Wastewater*, Publication 812.

You may only recycle water from on-site wastewater treatment plants such as septic tanks or package treatment plants if you have the necessary council permits and an agreed on-site treatment plant management program.

For further information see Chapter 15 Waste and What to Do with It, or contact the Environmental Health Officer at your local council.

Tips for saving water

The average daily water use in a typical Central Victorian home, in the Coliban Water region of supply under summer water restrictions, is 591 litres. Outside of restrictions the figure is approximately 1000 litres. There is, of course, great variation within these figures, with some homes using as little as 300 litres a day and others using much more. Coliban Water estimates approximately half the water is used on the garden.

As a growing community, we need to continually work together to conserve water to ensure we have enough to get through even the driest summers. But as our population grows, we are placing an excessive demand on our waterways and water supply systems, and the answer doesn't lie in building more dams.

A far easier and cheaper solution is for all of us to become responsible users of water. That's not only better for the environment, but better for your pocket too, because we all pay for the water we use.

Here are some practical suggestions to get you started as a wise water user. The positive effect on our water reserves could be dramatic, and the bonus is that if you follow these tips, you'll lower your water bills.

In the garden:

- Keep lawn areas to a minimum. Does the lawn need to be green all year? Do you need so much lawn?
- Water in the cool of the evening or morning
- Water your garden less often but more thoroughly
- Use water-wise plants (indigenous plants), which require less watering and still provide beautiful flowers, colours and shape to your garden. See more information in More than just Trees
- Mulch and compost

AAA showerheads can save vast amounts of water.

In the house:

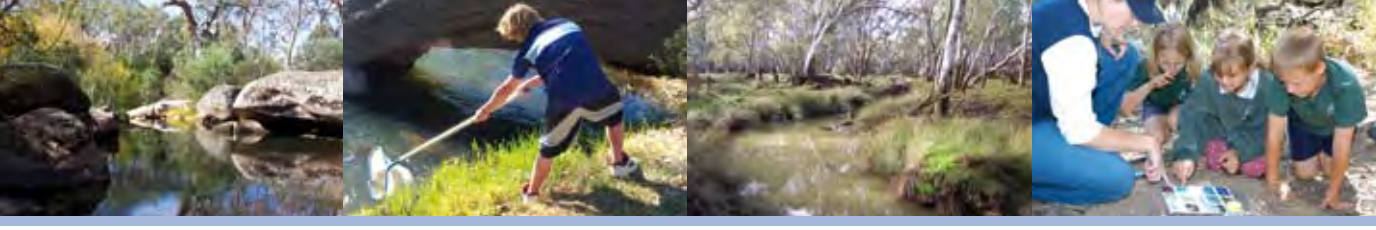
- Install water-saving devices. For example AAA rated shower heads, grey water systems and dual flush toilets
- Fix taps that leak. A small drip from a worn washer can waste over 200 litres of water a day
- Avoid using running water where possible. Use a cup for rinsing after brushing your teeth or half fill the sink for rinsing your dishes or fruit and vegetables

Rainwater tanks

Rainwater tanks have enjoyed a resurgence in recent years.

Rainwater can readily be harvested in rainwater tanks, which are an excellent means of harvesting water on isolated properties, in small communities and in rural areas. They can save you money on water bills, conserve water and be used as a storage for year-round fire fighting (in some areas the dam will be empty when you most need it).

Using rainwater can save large amounts of water. The easiest way is to use it in the garden, which accounts for 35 to 50 per cent of domestic water use. Using rainwater in the garden requires a relatively



simple system, and is encouraged by many water authorities.

Further savings can be made when rainwater is used for toilet flushing (about 20 per cent of domestic water use), as well as in the laundry, kitchen and bathroom. It can also be used in pools, and for washing cars. In many situations in rural areas rainwater is used for all domestic uses as there is no access to the mains supply.

Rainwater can be used for drinking, washing, bathing, washing clothes and gardening. Provided the rainwater is from a well-maintained system, is clear and has little taste or smell, it should be safe to drink.

Harvesting rainwater simply involves collecting rain from surfaces where it falls and storing it for later use. Normally water is collected from the roofs of buildings and stored in rainwater tanks.

There are many different design possibilities for a rainwater system. The key features include:

Water pressure – are you going to use a pump or a header tank to provide pressure?

Water quality – first flush systems, leaf guards and filters

Size of tank – will depend on roof capacity, local rainfall, the level of capacity needed

Dams

Dams modify the volume, speed and frequency of stream flow. Taking too much water from streams for dams can mean the flow diminishes and destructive levels of nutrients build up in the streams. In a proclaimed catchment, you may be harvesting water that is already relied on as part of the domestic supply system. Think about this when you plan to build a dam and consider alternative and more effective ways of storing water.

First, check the zoning of your property. This may determine whether you can build a dam. You will need planning approval from your local council to build a new dam or to extend an existing one. If your proposed or existing dam is on a waterway, you may also need a permit from your rural water authority. See Chapter 16 Key Contacts for contact details.

Building a dam is a major engineering feat and you need to consider safety. Dams that have a wall five metres high or greater or hold 50 megalitres or more are classified as potentially hazardous. Consider the safety of downstream neighbours in the event of the dam collapsing. Installing a dam of this size would require further discussion with your rural water authority.

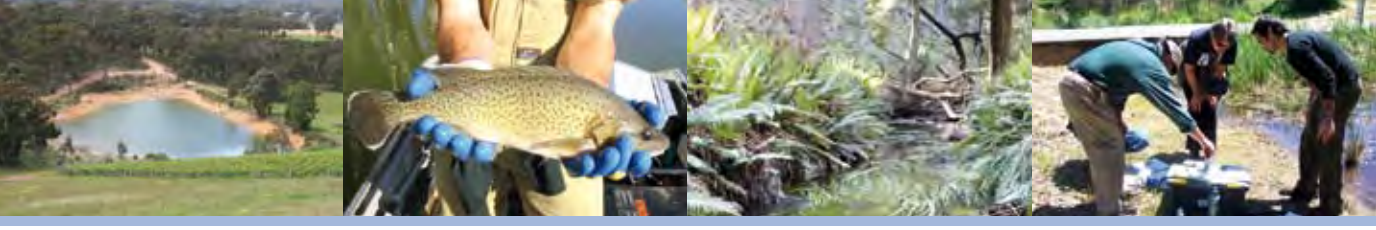
Check dams regularly. Leaking dams waste water and can contribute to erosion. To keep a dam healthy, prevent stock from getting to the water. When stock drink directly from a dam they cause erosion, foul the water and risk drowning. You can exclude stock by building a fence around the dam and gravity feed the water to a stock dam or trough below. You may need to get to the dam in a hurry to get water for fire fighting. Design your fence accordingly.

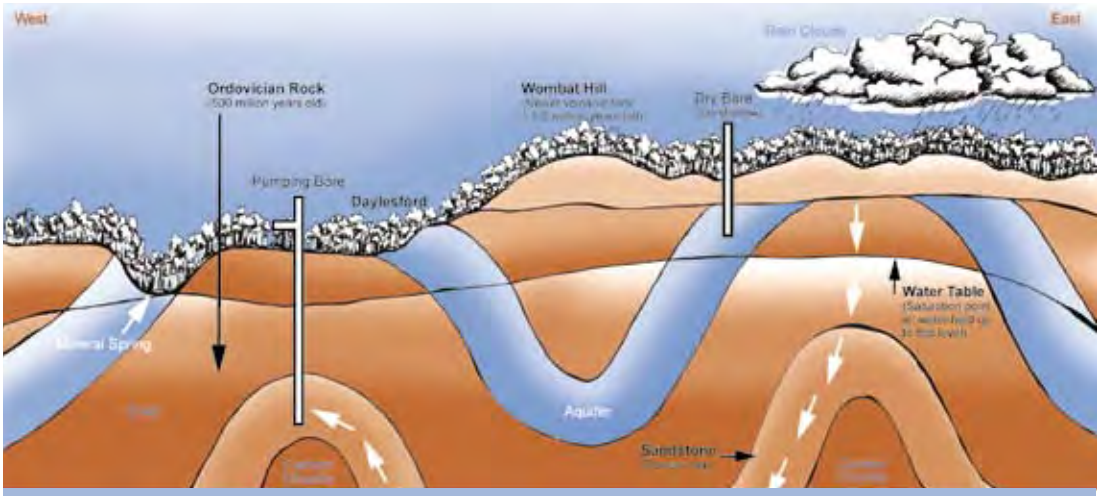
Fencing will help natural regeneration of native vegetation around the dam. Supplement this with more plants. Planting against the prevailing winds can help prevent evaporation. Native trees, shrubs and groundcovers typically found in local wetlands are suitable. Planted densely, they will also provide habitat for birds and wildlife. A log, dead tree or an island in the dam are excellent roost sites, and islands provide security from predators such as foxes.

Making your dam wildlife-friendly can also reduce losses from evaporation, improve water quality, provide shade and shelter for stock and humans,

Photo: Peter McRostie

Dams are a great addition to rural blocks, but there are many considerations before you build a new one.





How mineral springs are formed.

assist with natural pest control in pastures and greatly improve the dam's appearance.

Be careful not to plant trees below the main dam wall as their roots can cause tunnelling and leakage.

Bores and underground water

Groundwater is used by one in 10 Victorians. The groundwater can be from private bores, springs or public water supplies, and in Victoria there are more than 74,000 bores extracting more than a quarter of a million megalitres of water each year.

You need a licence from your rural water authority to extract groundwater for irrigation purposes, except if the water is for domestic or stock use. Domestic or stock use includes household purposes; watering of animals kept as pets; watering of cattle or other stock; or irrigation of a kitchen garden, but does not include use for dairies, piggeries, feedlots, poultry or any other intensive or commercial use.

If you intend to bore for water, first contact your local council and your rural water authority. The zone or overlay controls on your land, or activities associated with installing the bore (i.e. clearing of native vegetation), may require a planning permit.

Mineral springs

Mineral springs are abundant in the southern part of this region, especially around Daylesford. The springs in this area are fed by rain falling onto recharge areas along the crest of the Great Dividing Range. Water percolates down into a deep groundwater system where it reacts with the underground rock. Minerals from the rock dissolve into the water. The mineralised waters then travel 2–45 km from the crest of the Great Dividing Range before emerging as mineral springs at the surface.

Threats to mineral springs

There are two main threats to mineral springs. The first is contamination and reduced quality, and the second is reduced flows.

In the past, septic tank effluent and fertilisers have contaminated springs. Because of this, some septic tank systems are being removed from mineral springs catchment areas and homes are being connected to reticulated sewerage systems.

Today, the main contamination risks are from agricultural chemicals and salty groundwater from cleared agricultural land. In urban areas, chemicals, pesticides and fuel are the main contamination risks.

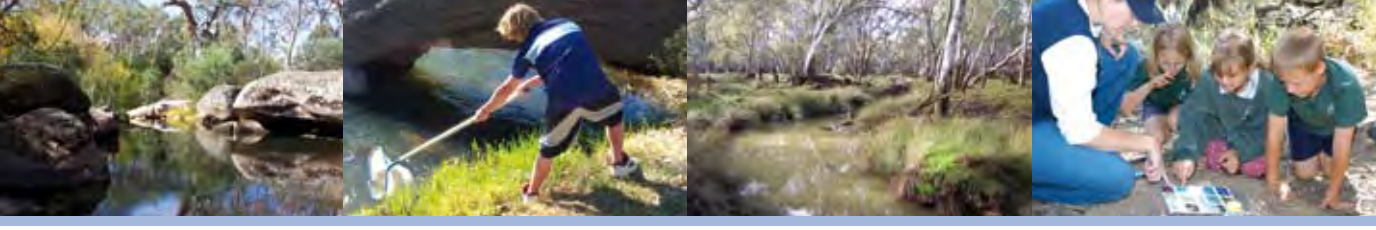
Resources:

North Central Waterwatch:
www.vic.waterwatch.org.au

EPA's Information Bulletin, *Domestic Wastewater Management Series, Reuse Options for Household Wastewater*, Publication 812

Coliban Water:
www.coliban.com.au

Waterwatch Australia:
www.waterwatch.org.au



chapter 4

looking after your waterway

Although rivers, creeks and wetlands are only a small portion of our landscape, their importance to the economy, ecology and social fabric of Central Victoria is considerable.

Until fairly recently, waterways were regarded as a resource to be exploited. They were often seen as convenient channels or drains to supply water or to transport wastes. But with great improvements in our knowledge of the complex nature of river systems and a greater awareness of the vital role they play in our daily lives, we now have a much greater appreciation of their social, economic and environmental values.

Our waterways are important to the community because they:

- provide drinking water
- provide water for irrigation and industry
- are a focal point for recreation and tourism
- support a multitude of life and have a unique environment
- have strong cultural and historical associations

Waterways must be protected and improved for future generations, because healthy rivers, which reflect the health of the catchment, sustain communities and agriculture in this region. Rivers have a special significance ecologically, economically, socially and culturally in Australia. Competing interests such as development, agriculture and conservation are vying for finite water resources, yet the evidence is abundant that many rivers are in poor condition, and their condition continues to deteriorate.

This chapter explains how to look after rivers and waterways that flow through privately owned land.

The state of our rivers

The three main rivers in the Upper Loddon and Campaspe catchments are the Loddon, Campaspe and Coliban. The Loddon and Campaspe catchments lie in the Murray–Darling Basin and have a direct influence on the health of the Murray River.

The southern part of the Macedon Ranges Shire is part of the Upper Maribyrnong Catchment. The tributaries of Deep Creek and Jacksons Creek feed into the Maribyrnong then into Yarra River at Yarraville, near the West Gate Bridge, and then into Port Phillip Bay.

The Maribyrnong River arises from two main branches, Deep Creek and Jacksons Creek. These creeks join near Bulla to become the Maribyrnong River. Jacksons Creek originates in the Wombat Forest and supplies domestic and irrigation water to the region through Rosslynne Reservoir. Deep Creek arises near Newham, and has no large reservoirs along its length, so it has nearly natural environmental flows.

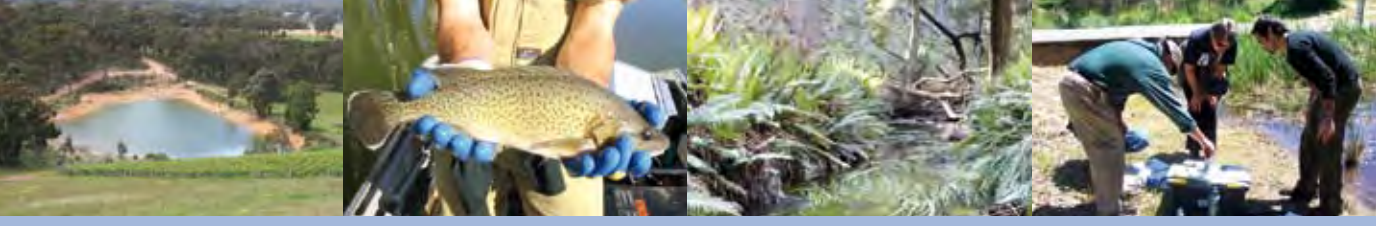
Recent assessments for the Maribyrnong Catchment rate the waterways as 1 per cent in excellent condition, 13 per cent in good condition, 40 per cent moderate and 46 per cent poor to very poor. Increasingly Landcare groups, individuals and Melbourne Water have been working to improve waterways in the catchment by fencing waterways, protecting native vegetation, and undertaking weed control and revegetation. Future investments by Melbourne Water will ensure significant improvements to waterways in the Maribyrnong Catchment.

The Loddon River is the main watercourse of the Loddon Catchment. It flows north from near Daylesford on the Great Dividing Range to the Murray River near Swan Hill. Major tributaries of the Loddon River are Tullaroop Creek and Bet Bet Creek in the south-west of the catchment, and Bullock Creek and Bendigo Creek in the east. The Murray River and a branch of Gunbower Creek and Pyramid Creek flow across the northern floodplain. Several wetlands are important in the Loddon Catchment, including the internationally recognised, Ramsar-listed Kerang Lakes and Gunbower Forest in the north.

Since European settlement, the effects of the gold rush, irrigated agriculture and river regulation, urban development and land clearance have fundamentally changed the

Photo: Sandra Volk

Waterways on your property bring special responsibilities, not only for your own sake but for others who live in the region.



nature of many of the waterways in the catchment. Results of a 2004 survey by DSE reveal that no streams sampled in the Loddon Catchment are in good condition, 40 per cent are in moderate condition and 35 per cent are in a poor to very poor condition.

The major waterway of the Campaspe Catchment is the Campaspe River, which flows from the Great Dividing Range near Woodend to the Murray River at Echuca. The Campaspe's major tributary is the Coliban River. Other significant tributaries include the Axe, McIvor, Mount Pleasant, Wild Duck and Pipers creeks.

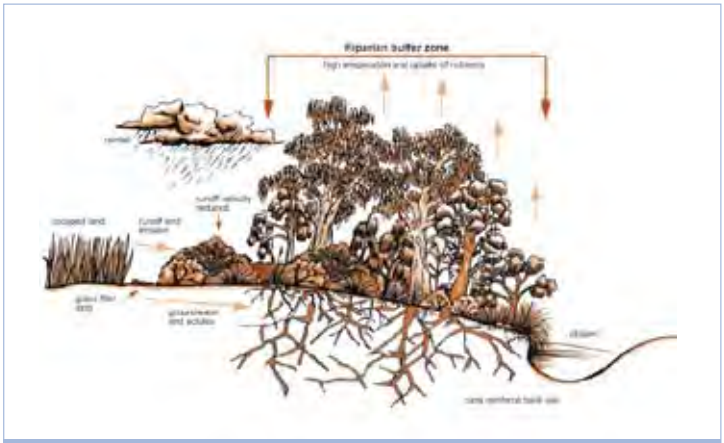
The effects of the gold rush, building reservoirs and water supply systems, native vegetation clearing, farming practices and urban development are clearly reflected in the current condition of the waterways. A 2004 DSE survey showed that 65 per cent of the streams in the Campaspe Catchment are in moderate condition and 29 per cent are in a poor to very poor condition.

What is a riparian zone?

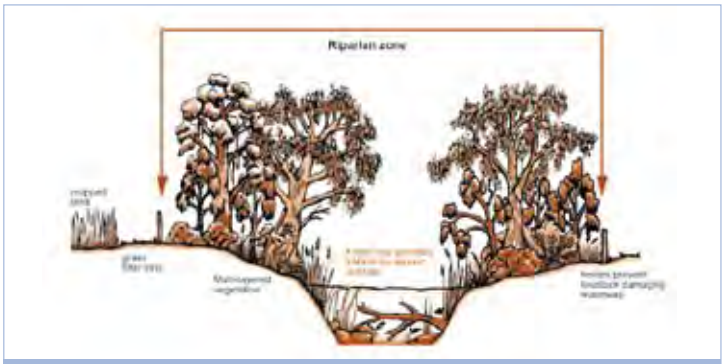
Riparian land is any land that adjoins or directly influences a body of water. It includes:

- the land immediately alongside small creeks and rivers, including the river bank
- gullies and dips that sometimes run with water
- areas around lakes
- wetlands and river floodplains that interact with the river during floods

It is important not to think of riparian land as just a narrow strip along each river bank. Depending on the nature of the land (floodplain, gorge or valley) and the adjacent land use (national park, farming, forestry, urban housing), the width of riparian land that needs special management will range from very narrow to a wide, densely vegetated corridor.



How a riparian buffer and grass filter strip combine to trap sediments, nutrients and other contaminants.

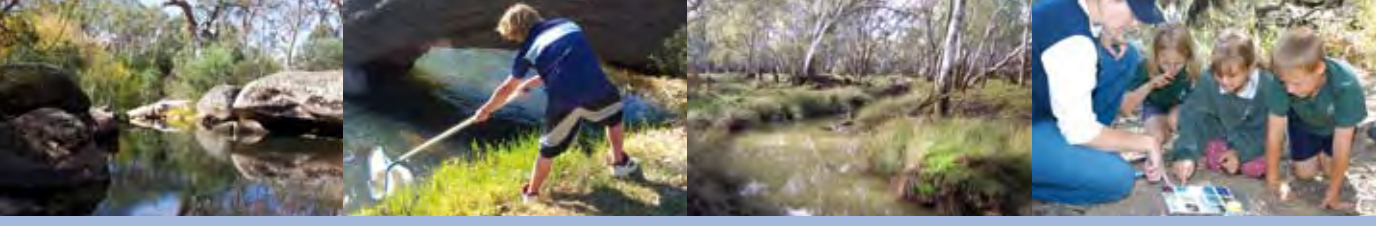


Cross section of a river.

Benefits of revegetating watercourses

In areas where the riparian vegetation is patchy or absent, revegetation is an essential first step. Revegetating waterways with indigenous plants has many benefits, such as:

- Stabilising banks and controlling bank erosion
- Providing habitat for a diverse range of indigenous predatory wildlife, including bats and gliders, and predatory insects and parasites, which help control crop and pasture-feeding pests
- Providing shade and shelter for livestock
- Providing shelter from damaging winds for pastures and crops
- Improving appearance of farm land, adding to land and landscape values
- Providing habitat and food sources for aquatic and land animals
- Maintaining water quality by providing a buffer strip that acts as a filter for nutrients and sediments



In some situations, fences will encourage natural regeneration by controlling the timing, duration and intensity of stock grazing. But if the site is isolated from natural seed sources, replanting may be necessary. Local, native riparian plants should be your first choice, as replanting with introduced species will not recreate the habitat needed to support the full range of native wildlife in and along the waterway.

Riparian revegetation in action.

Managing stock

A key to keeping waterways healthy is to fence them off to livestock. Uncontrolled access by sheep and cattle to riparian land can erode banks, destroy productive land, ruin important wildlife habitats and water quality, and damage in-stream ecosystems. Animal dung and urine can also ruin water quality for downstream users.

Domestic stock, especially cattle, enjoy riparian areas and, if not managed carefully, will spend much of their time along stream banks and in the water. This results in over-grazing, which erodes stream beds and bank soils, and encourages weeds. Stock create tracks that erode during heavy rain, washing sediment and nutrients into the stream.

It is often not necessary to permanently exclude animals from riparian lands, but it is important to control their movement and to manage grazing pressure. This takes a bit of planning and effort, but many landholders are discovering it pays off significantly in increased production, improved water quality, stable stream banks and healthy riparian vegetation. Funding may be available to landowners for fencing and to provide off-stream watering infrastructure. Contact the North Central CMA for further information.

Snags are good

As the trees beside a stream or river age, die and decay, large branches and sometimes even whole trunks can fall onto the stream bank or into the river. Before European settlement, most rivers had lots of this woody material, usually known as large woody debris (or 'snags') along their banks and in their channels. To the early settlers, snags were often a nuisance. It was generally incorrectly thought that snags blocked the channel and caused additional flooding at times of peak flow. As a result, especially in southern Australia, millions of snags were removed from streams and usually piled on the bank and burned.

Uncontrolled access by stock to waterways causes untold damage at the site and further downstream.

Today we understand how much snags contribute to healthy waterways.

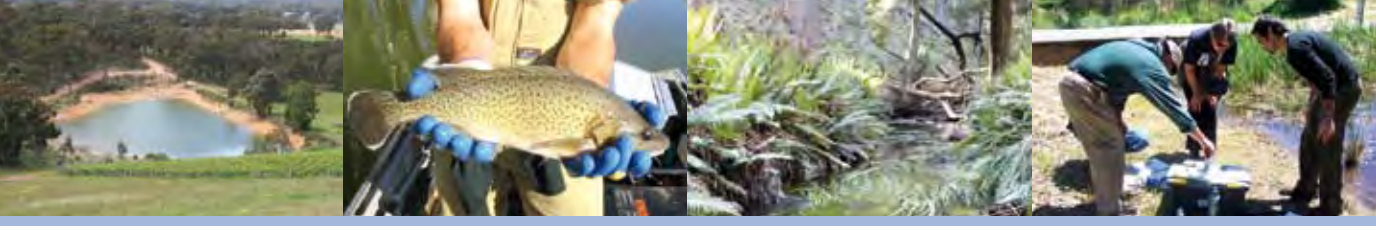
Snags provide habitat for animals and fish and help stem flows. Woody debris plays an important role in maintaining a diverse aquatic habitat by helping to scour out pools in the stream bed, creating variable flows and providing a diversity of habitat for aquatic life. Murray Cod, Trout Cod and River Blackfish all rely on snags for their survival.

Woody debris also provides habitat and food for the algae, bacteria and bugs that form the basis of aquatic food webs. Birds and snakes use large woody debris above the water surface for resting and as vantage points for hunting.

Everyone has a responsibility to ensure that our waterways are protected and improved for the health of our environment and communities at a local and regional scale.

For more information on river restoration visit:

River Landscapes: Restoring rivers and riparian lands all over Australia
www.rivers.gov.au



Wetlands

A wetland is a swamp, billabong, lake, saltmarsh, bog, soak, mudflat or mangrove. Wetlands are areas that have acquired special characteristics from being wet on a regular or semi-regular basis. The term also applies to depressions in the landscape of more arid regions that only occasionally hold water but teem with life and become environmental focal points when they do.

Considered essential components of our landscape, wetlands provide a link between our waterways and the surrounding land. They maintain water quality, reduce the impact of flooding, and provide habitat, feeding and breeding areas for many significant plants and animals. Of significant environmental value, wetlands support a range of distinctive flora and fauna communities consisting of common and many threatened or endangered species.

Unfortunately, there has been an overall decrease in wetland area and quality since European settlement, largely because of the development of urban and agricultural areas, the diversion of watercourses to drainage lines and alteration to water quality and flow patterns through regulated dams, weirs and levee banks.

Photo: Brad Drust

Wetlands play a vital role linking rivers to the surrounding land.

Despite a growing recognition of their many values and functions, wetlands remain one of our most endangered environments. In Australia many wetlands are transient, remaining dry for part or all of the year and filling only during wet seasons after rain. Consequently, recognition of less well-known wetlands is a difficult process, especially in dry years.

Not only the health of wetlands but also their existence is sometimes placed in jeopardy. Changes to their flow can significantly alter them, bringing about disruptions in natural productivity cycles, creating changes in vegetation, and affecting the normal exchange of nutrients and organic matter between rivers and floodplains – an exchange needed to keep wetlands healthy.

Changes in land use and land management practices such as grazing livestock and cropping have reduced the quality of water available to wetlands. Salt levels have risen because of these practices, which can have a drastic effect on the health of wetlands.

Wetlands are also important socially and economically. A unique part of our landscape, they are popular for tourism and recreation, and can be significant cultural heritage sites. They are often valuable resources for agriculture, timber harvesting, fishing, education and research.

Resources:

River Landscapes:
www.rivers.gov.au

Australian Wetlands Database:
www.deh.gov.au/water/wetlands/database/index.html

Department of Environment and Heritage website:
www.deh.gov.au/water/wetlands

pathfinder

biodiversity

The land supports a multitude of living things – plants, animals, insects, soil and water organisms and microbes. This life is known collectively as biodiversity. In the early days of settlement native vegetation and animals were often seen as an impediment to agricultural development, but it is now widely recognised that native and indigenous plants not only benefit agriculture, but they are essential for it to continue. Many native animals and birds, too, play an important role in keeping insect numbers down.

A host of reasons – including legal obligations – now mean that you have to protect, and, where possible, improve the biodiversity on your block. Doing so makes not only good environmental sense, but it's good economic sense as well. Most successful farmers have long ago realised the benefits of tree planting and encouraging the wildlife to come back.

chapter 5

what is biodiversity?

Internationally and nationally, the term biodiversity – or biological diversity – is used to describe the variety of all life forms. Biodiversity is considered at three levels: the different plants, animals and microorganisms (species diversity), the genes they contain (genetic diversity), and the ecosystems of which they form a part (ecosystem diversity).

Biodiversity is constantly changing; it is increased by genetic change and evolutionary processes and reduced by habitat degradation, population decline and extinction. It emphasises the interrelatedness of the biological world, and covers terrestrial, marine and other aquatic environments.

From a human perspective, the conservation of biodiversity provides significant cultural, economic, educational, environmental, scientific and social benefits. In this time of looming global warming, an environment rich in biodiversity offers the best chance for adapting to change.

Biodiversity comes in all forms

Photo: Ash Beechey

Sundews

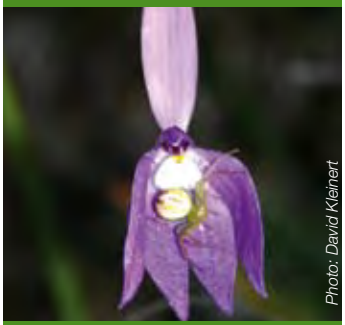


Photo: David Kleinert

A spider makes its home in a flower.

Why plants and animals are so important

Protecting creatures of all sizes – down to the tiniest microorganism – and their habitats, helps reverse the effects of human activities that threaten life and life-support systems and agricultural productivity. Animals and plants help rebuild soil, clean water and air, store and cycle nutrients, provide climate stability and help repair damaged ecosystems. These activities are called 'ecosystem services'.

Australians are just beginning to see the value of biodiversity and ecosystem services. Ecosystem services provide food, medicine, wood, timber, ornamental plants and fish supplies as well as recreation and education opportunities, nature's beauty and a rich cultural landscape. They also boost land values.

The ecosystem services that nature provides:

- boost productivity by maintaining the foundations of a healthy and sustainable environment – healthy soils, clean air, clean water
- ease potentially devastating and costly environmental problems, including salinity and erosion
- purify air and water
- lessen the effects of flood and drought
- detoxify waste and aid decomposition
- generate and renew soil and soil fertility
- pollinate crops and native vegetation
- help control agricultural pests
- disperse seeds and nutrients
- protect us from ultraviolet rays
- regulate climate
- moderate temperature extremes and the forces of wind and waves.

Photo: [illegible] Higgins

Kookaburra

Photo: Lachlan Milne

Lobelia gibbosa

Photo: David Kleinert

Native bees and hoverflies provide ecosystem services.

Source: **www.deh.gov.au/biodiversity/toolbox/localgov.html**

For more information about biodiversity, visit the DSE website at **www.dse.vic.gov.au** and search for biodiversity; or the Environment Australia website at **www.ea.gov.au** and select the biodiversity theme.




Biodiversity of Central Victoria

Much of Australia's biodiversity is distinctive because of the continent's isolation for millions of years. The variety of life in Central Victoria is no exception. Evolutionary time and variations in climate, soil type and topography have produced an abundance of plant and animal species and habitats. About 1,908 native plant species and 428 native animal species are found here, along with 59 vegetation groups called Ecological Vegetation Classes (see 'Vegetation types' in the next chapter).

Bioregions

Remnant (native) vegetation is found throughout Central Victoria. It occurs in the Riverina Plains to the north, through the Box-Ironbark ecosystem of the goldfields, down to the moist forests around the Macedon Ranges, and across to the volcanic plains in the south-west. These areas are called bioregions. They reflect soil type, climate and topography, and consequently contain plants and animals that are often endemic to those areas. Bioregions are a sensible basis for conservation planning.

The North Central Catchment Management Authority in partnership with DSE has developed a North Central Native Vegetation Plan and several Biodiversity Action Plans.

The Native Vegetation Plan aims to protect and enhance the native vegetation communities of the North Central Region and follows the principles of Victoria's Biodiversity Strategy. The plan provides information on the status of vegetation communities and identifies priorities for targeting vegetation and species. The plan is also a framework for involving and supporting community groups in activities to achieve the aims.

Biodiversity action plans have been developed for the Riverina and Goldfields Bioregions. Biodiversity action planning is a structured approach to identifying priorities and mapping significant areas for native biodiversity conservation at the landscape and bioregional scales.

Refer to DSE website (**www.dse.vic.gov.au**) and search for Biodiversity Mapping to view information about your area, including bioregion, type of vegetation (EVCs) and important local areas.

Resources:

Local Government and Biodiversity: **www.deh.gov.au/biodiversity/toolbox/localgov.html**

Australian Museum Online site on Biodiversity: **www.amonline.net.au/biodiversity/**

North Central Catchment Management Authority: **www.nccma.vic.gov.au**

Bioregions of the Upper Loddon Campaspe Management Area

chapter 6

more than just trees

Native vegetation is more than just trees. It includes other plants that occur naturally, such as shrubs, grasses, groundcovers and herbs. Strictly speaking, mosses, fungi and lichens are also native vegetation, and they are often overlooked. Collectively, these plants form part of the biodiversity of an area and provide habitat for native animals as well as each other.

Nodding greenhood orchids

The benefits of looking after native vegetation

Native vegetation forms a vital part of any small property, and, on a broader scale, the catchment and its biodiversity.

Just as management of weeds, soil health and water quality is an integral part of being a responsible landholder, so too is looking after remnant vegetation. Remnant vegetation provides a number of functions, or 'ecosystem services'. These services can include habitat for native plants and animals; erosion control; reduction of greenhouse gases; natural pest control; maintenance of the land's productivity; protection of good water quality; provision of shade and shelter for farm animals; and aesthetics.

A diverse understorey with herbs, grasses and shrubs.

Vegetation types

In their natural setting, plants occur in association with each other. These different types (or groups) of vegetation associations are sometimes referred to as Ecological Vegetation Classes (EVCs). There are about 59 EVCs in Central Victoria.

Vegetation structure

The basic structure of native vegetation can include a combination of an overstorey, mid-storey, understorey and herb layer – it all depends upon the vegetation type. The layers beneath the overstorey are considered essential in nutrient cycling, to provide a more immediate supply of nutrients to the soil than can eucalypt leaves.

The influences of structure on habitat

The different layers of vegetation provide different types of habitat, and many native animals have adapted to use one or more specific layers. As a result, a number of animal species can occur in the one place without necessarily affecting each other. Similarly, vegetation structure provides habitat for various plants.

Different layers can also be used for different reasons by one species. For example, the threatened Grey-crowned Babbler is a bird that requires shrubby, thick growth of a certain height in which to make nests. But it also forages for insects on the bark of older trees, as well as on the open ground. Therefore, if one of these structural components is

Healthy woodland

Creekline grassy woodland

Damp forest woodland

Photo: Tadao Shimba, courtesy Birds Australia

Grey-crowned Babbler

missing – e.g. no tall shrubs or bushy eucalypt growth, no old trees, or the ground layer is too thick – you won't find Grey-crowned Babblers.

Vegetation structure also relates to the age of the remnant vegetation. As plants age, particularly trees, they get bigger and tend to dominate the resources immediately around them. They command more of the light, soil nutrients and moisture, and subsequently create space around them. A patch of younger-aged vegetation tends to be more closely spaced, whereas mature vegetation with larger trees tends to have a more open structure.

In theory, a diversity of structure across the landscape will provide a diversity of habitat for different animal and plant species. In reality, however, the landscape is greatly altered and simplified. Historical and continuing disturbance of native vegetation has left us with very few old-growth trees, let alone anything in a pristine or 'natural' condition. Time – well beyond our lifetimes – can address this loss of old growth; but introduced plants and animals have altered habitats forever.

Photo: Geoff Park

Typical vegetation of the Central Victorian goldfields.

An old tree with younger vegetation growing nearby.

What are the threats to remnant vegetation?

Native vegetation in Central Victoria faces severe threats to its survival. Some of these are unforeseen consequences of historical over-clearance (e.g. salinity), some are new and unprecedented (e.g. global warming), but most are the same human activities that brought about the massive alterations to the landscape in the nineteenth and twentieth centuries.

Threats include:

- Clearing
- Overgrazing (by domestic, introduced or native animals)
- Weeds
- Fragmentation and 'edge' effects
- Loss of hollow-bearing trees and lack of replacements
- Inappropriate fire regimes
- Loss of or alteration to stream flows or wetland habitats
- Introduction of pathogens and disease
- Inappropriate road management

For further discussion of fire, see Chapter 9 Preparing for Fire, and Chapter 12 Pest Plants and Animals.

The remaining habitat in an altered landscape

Since Europeans arrived, the total area and pattern of vegetation and habitat in the landscape has changed. Only about 21 per cent of remnant vegetation remains in Central Victoria, predominantly on higher, less fertile ground. It is now highly fragmented and degraded by various human influences.

The Mooloort Plains have been largely cleared of their original vegetation cover.

Some common animal and plant species are 'generalists', and can cope with, or are even advantaged by, varying conditions including a fragmented or disturbed environment – for example, magpies and many species of wattle. But many species are more specialised in their habitat requirements, and are adversely affected by the amount of clearing, fragmentation and alteration of habitat.

The total area or cover of remnant vegetation is critical. Although the amount of native vegetation required for long-term survival varies for different species, a recent study found that in a landscape of 100 square kilometres 30–35 per cent cover was necessary to maintain sustainable populations of most woodland bird species. Below this, species may be present even though their populations are in decline.

Fragmentation itself can be a barrier for some species. Open areas can inhibit movement of less mobile animal species or those that need cover at all times. This means that isolated populations can become in-bred in the long term, or become locally extinct after a catastrophic incident such as wildfire or severe drought. These same effects can also apply to some plants.

Fragmentation of the vegetation is apparent from the top of Hanging Rock.

The quality of remaining remnant vegetation is important. For instance, some species prefer woodland vegetation that grows on lower, more fertile and moist soils – most of which has been (and continues to be) preferentially cleared for agriculture. These species are now restricted to patches and linear reserves that are degraded by grazing, roadworks, weeds, fire and the stresses of being 'edge' habitat. Species such as the Powerful Owl can tolerate a drier environment but need a mature, hollow-rich habitat. Because of historical timber harvesting, little of this habitat remains in Central Victoria. Other species are dependant upon a shrubby layer as protective cover or for nesting, but inappropriate fire regimes and grazing removes and fragments this habitat.

The size of the individual remnant can influence which species are present. Animals such as the Crested Bellbird and Brush-tailed Phascogale tend to occur in larger blocks of remnant vegetation.

Threatened native animal species

Given the impacts of European settlement, it should be no surprise that many native animal species are now in decline in Australia. Since European settlement, 10 species (all mammals) have become extinct in Victoria.

Nearly 86 native species found in Central Victoria have depleted or unknown populations and are consequently officially listed as threatened. Some of these animals are on the verge of extinction.

The better-known threatened species are:

- Regent Honeyeater
- Barking Owl
- Bush Stone-curlew
- Grey-crowned Babbler
- Swift Parrot
- Malleefowl
- Pink-tailed Worm Lizard
- Growling Grass Frog
- Brush-tailed Phascogale (or Tuan)
- Brolga
- Lace Monitor (or Tree Goanna)
- Bearded Dragon
- Powerful Owl
- Eltham Copper Butterfly

Swift Parrot

Growling Grass Frog

Brolga





Photo: Adrian Wait

Lace Monitor


Photo: David Kleinert

Bearded Dragon


Photo: Jacob Shimba

Powerful Owl


Photo: Peter Johnson

Pink-tailed Worm Lizard

Some of these endangered animals could be mistaken for more common species. For example, the harmless and unobtrusive Pink-tailed Worm Lizard is often killed by landowners mistaking it for a baby Brown Snake (an offence, either way). This legless lizard is one of a number of species found in Central Victoria. The Pink-tailed Worm Lizard spends most of its life underground feeding on ants, termites and their larvae. So depending upon your point of view, some might consider this animal to be a natural 'pest' control.

To the unaware, the Swift Parrot could be mistaken for some sort of lorikeet or grass parrot. But this incredible species migrates in the hundreds to the mainland every year from Tasmania to feed on nectar and lerp (the little sugary covers of sap-sucking insects on eucalypt leaves). Swift Parrot numbers are in decline, and you would be privileged to have them visit your property.

The Brush-tailed Phascogale is often unknown to landowners until their cat brings one in dead or mutilated, or when they find one drowned in a water tank. They sometimes take up residence in sheds or the roofs of houses, and their droppings might be mistaken for a rodent's. These small nocturnal mammals spend time foraging on the ground and in trees. They are part of a group of mammals in which the adult males die after mating. Subsequently, any loss in number because of cats or road accidents is a contributing threat to local populations.

If you think that you might have seen one of these threatened animals, or want to know more about their identification or habitat requirements, contact the DSE Customer Service Centre on 136 186; your local DSE/DPI or Parks Victoria office. To view lists of threatened flora or fauna; visit the DSE website on **www.dse.vic.gov.au** and search for 'advisory list threatened flora' (or fauna).

All native animals are protected by law under the *Wildlife Act 1975* (unless exempted under licence or other government orders). Some of these species are further protected under legislation such as the *Flora and Fauna Guarantee (FFG) Act 1988* or the Federal Government's *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. For information about your obligations regarding the Victorian Acts, your first point of contact should be the Wildlife Officer based in Bendigo on 03 5430 4444.


Photo: Julie Fleck

Brush-tailed Phascogale (Tuan)

Eltham Copper Butterfly

For information about the EPBC Act 1999, contact the Department of the Environment and Heritage on 02 6274 1111, or visit the website on **www.deh.gov.au** and select the threatened species heading.

Your property may be covered by an overlay to protect vegetation or a threatened species. Contact your local government planning office to find out.

Killing or interfering with native wildlife – including snakes – is an offence. Snakes are protected in Victoria under the *Wildlife Act 1975*. Ironically, most cases of snakebite occur when people are trying to catch or kill snakes.

Contact DSE Customer Service Centre on 136 186 to get details of nearest licensed snake catchers. Usually they charge a fee for service. There is also a DPI Information Note regarding 'problems caused by snakes', which suggests solutions to snake problems around your home. Visit the DPI website on **www.dpi.vic.gov.au/notes/** and search for 'snakes'.

Threatened native plant species

About 180 threatened plant species occur in Central Victoria. Fifty-four of these are of national significance.

The patterns of clearing for agriculture, settlement and activities such as alluvial gold mining have selectively affected the low-lying and more fertile areas in the landscape. Consequently, many of the threatened plants are associated with grasslands, woodlands, river and creek flats and wetlands. Other species have been adversely affected by the processes of settlement, and cannot cope with weeds, grazing, or other changes in their environment.

Threatened Plants

Common Fringe Lily

Anchor Plant

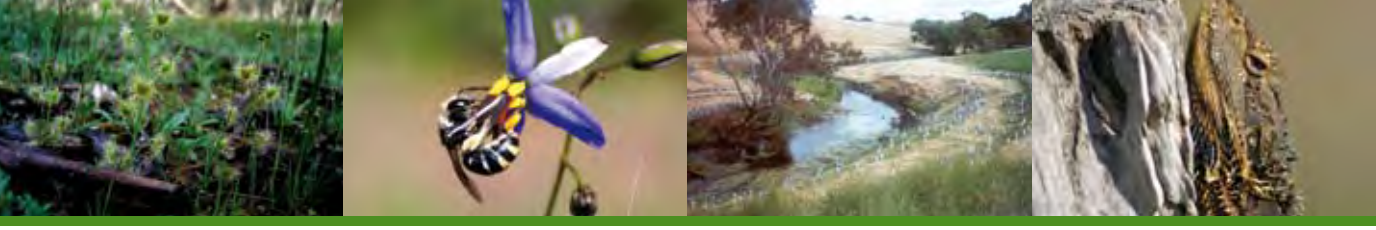
Clover Glycine

Dianella amoena flower

Large old trees are a familiar part of our countryside.

Large old trees (paddock trees) – precious and in decline

Large old paddock trees can provide shade for stock and help to maintain watertables and prevent salinity. They also provide significant habitat for native animals, including hollow-dependent species. These trees are often stressed from exposure to extreme weather, ringbarking at their base from stock rubbing and chewing the bark, and high levels of nutrients from stock manure and urine. Large old paddock trees have a limited life remaining and there are usually no replacement trees. What will our landscape look like without these trees?



It is vital to keep large old trees. They are an irreplaceable feature of the landscape and invaluable habitat for wildlife. The habitat value of a tree is considered to be proportional to its age – the older the tree, the more nectar it produces – and the rough bark provides lots of places for insects to hide and other animals to forage. As trees reach the age of 100 or more, they begin to form hollows. With further ageing, a variety of hollows is formed and the tree becomes a multi-storey housing complex for many different animals. Conservation of less mature trees is also extremely important, as these will be the next generation of large old trees.

Photo: Geoff Park

Tree hollows are essential for many native animals, and this old tree stump is home to a group of Eastern Rosellas.

If you are going to revegetate some of your property, consider fencing off areas that include large old trees. This will enable natural regeneration to occur with a greater chance of survival, is much easier and cheaper than planting tube stock, and helps protect precious habitat.

What to do with dead and fallen trees

Old dead trees and fallen timber (sometimes referred to as 'woody debris') provide great habitat for birds and other animals. Where possible, leave them. Don't burn them.

Many animals use old dead trees. For example, the threatened Brush-tailed Phascogale prefers to look for food on dead standing trees. Because old dead trees are often hollow, many animals continue to use them as homes. Birds also look for these trees for perches – either for basking in the sun, resting, announcing their presence, or to spot prey.

The importance of fallen timber is also often overlooked. Try a little test – carefully look under some fallen timber and see how many different insects there are. You might even see a frog or gecko. (Remember to carefully replace the timber to maintain the habitat.) If you're patient and watch carefully from a distance, you will notice that birds (and small mammals) also use fallen timber as part of their habitat. Fallen timber is used in many different ways – it can be used for shelter, breeding and basking sites; and provides areas for larger animals to forage for insects. The wood itself provides food for insects and various fungi and bacteria. Fallen timber is an essential part of nutrient cycling and the food web.

Photo: Adrian Martins

Don't burn old hollow trees on your property.

Photo: Terri Williams

Fallen and dead timber creates habitat.

Landowners need to balance fire hazard reduction with maintaining habitat for fauna. Before you 'clean up' and burn your fallen timber, consider its value as habitat. Can you relocate it to another area further from your house?

See Chapter 8 Firewood for Heating your Home for information about where to source your firewood.

Protecting roadsides

It is a pleasure to drive through Central Victoria with its many tree-lined roads and magnificent panoramic views. Our roadsides are one of our greatest natural resources and, in many places, contain the finest examples of vegetation that previously existed across the landscape.

Road reserves were initially established to provide legal access and a route from one place to another. Their role has since evolved and, besides being recognised for their conservation values, they are now also service corridors for gas, electricity, drainage, sewage and telecommunication lines. Some roadsides play an important role in

Roadsides are highly valued for helping conserve flora and fauna.

minimising the risk and impact of fires. As a consequence, however, roadside vegetation is increasingly under threat.

Roadsides provide habitat, allow animals to move around the landscape and connect patches of bush, especially if most of the native vegetation on adjacent private land has been cleared.

Many threatened animal and plant species, such as the Brush-tailed Phascogale and the Red Swainson-Pea, make use of the roadside network throughout Central Victoria. Some roadsides are declared significant native vegetation areas, and are often marked with signs. These roadsides usually contain good examples of native vegetation and habitat, and could contain threatened plants or animals.

Councils are responsible for most road reserves in their municipality and must make decisions, in consultation with other authorities, on appropriate roadside management. VicRoads is responsible for the highways and main arterial roads.

If you intend to undertake weed treatment work or other activities along the roadside next to your property, first get in touch with your local council. Similarly, if you intend moving stock along roadsides, contact your local council.

Ways to maintain and improve biodiversity

Collectively, landowners are a powerful force in determining the future of biodiversity in the landscape. Individually, each landowner has the opportunity to contribute in some way.

In order to maximise the benefits and minimise the impacts of any actions you undertake, you should first familiarise yourself with the basic characteristics of your land.

Note things such as patches of remnant vegetation, large old paddock trees, dead trees, fallen timber, wildlife, creeks or other water features such as drainage lines or depressions, adjacent vegetation including roadsides and the presence of forested public or private land in the neighborhood.

If you suspect that you have a threatened species on or near your property, please contact your local DSE office for confirmation and advice. Conservation of the species might only involve continuing what you are already doing, but ill-considered alterations might tip the balance out of that species' favour.

You can contribute to maintaining and improving biodiversity by:

- protecting and improving existing vegetation and habitat, including large old paddock trees
- expanding existing remnants by revegetating, including alongside roads or other vegetated land (public or private. Check with local authorities first.)
- linking remnants by establishing wide corridors or large patches of native vegetation, to create corridors or 'stepping stones' in the landscape for species to live in and move through
- replacing vegetation in critical areas such as along creeks, drainage lines and depressions
- reinstating wetlands by allowing water to drain into them
- leaving fallen timber, large dead standing trees and rocky outcrops for habitat
- controlling pets (particularly cats), weeds, and pest animals
- managing domestic stock to protect remnants and waterways.

Gaining an intimate knowledge of your land takes time – time over the seasons, time comparing 'good' and 'bad' years and how your land responds, and even time as you become more aware and educated. Once you begin, the discoveries uncover more and more complexity, and the journey can take you as far and long as your curiosity lasts.

Resources:

Department of Sustainability and Environment: **www.dse.vic.gov.au**

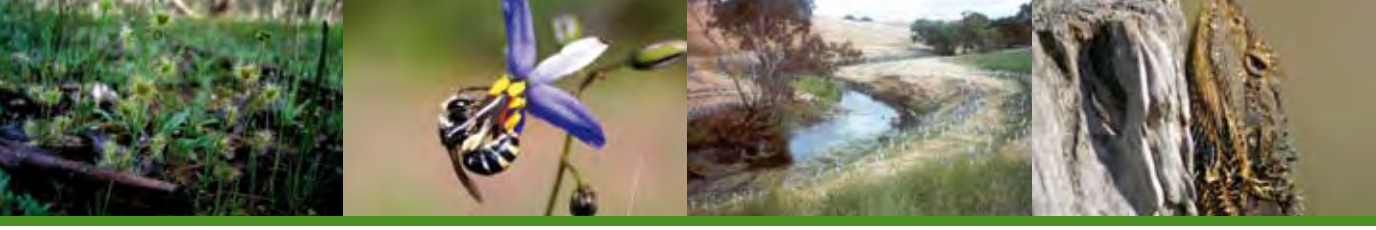
Department of Environment and Heritage: **www.deh.gov.au**

Biodiversity and EVC Mapping) Interactive Maps - Biodiversity Interactive Map. Also search for 'advisory list threatened flora' or 'fauna'. **www.dpi.vic.gov.au/notes/**

Threatened Species Network: **wwf.org.au/ourwork/species/tsn/**

Department of Primary Industries: **www.dpi.vic.gov.au/notes/**

Roadside conservation at www.nccma.vic.gov.au/Ourresponsibilities.asp



chapter 7
vegetation management

Farmers and land managers are increasingly seeing the benefits of using indigenous plants for revegetation and improving habitat, and through trial and error have learned where and how to revegetate and how to protect what is left.

Why should I use indigenous plants?

Indigenous plants have adapted over thousands of years to the conditions in your locality. They cope better with the weather, soils and native predators and do better than non-indigenous species. Generally, they also require less water than non-indigenous plants. Non-indigenous plants can 'go wild' and become weeds, e.g. pines, sycamores and gazanias.

Indigenous plants have evolved as part of the entire ecosystem of an area. Local birds, mammals, reptiles, amphibians and insects have adapted to them, and plants and animals are often reliant upon each other for survival. Planting an appropriate mix of indigenous overstorey, understorey and groundcover species provides habitat for native animals. This will lead to a more biologically diverse property.

Where and how should I manage and restore vegetation on my property?

There are a few basic principles to follow:

- Protect remnant vegetation
- Enhance remnant vegetation
- Build on remnants
- Create landscape links

Protect remnant vegetation

Remnant native vegetation is very valuable, partly because it is so difficult to re-create, and should be the initial focus of protection and management. Compared to starting from scratch, remnant vegetation (even in poor condition) is often more stable, less weedy and often more species-rich than can ever be created.

Protection measures might include fencing, eliminating rabbits from the site, and weed control. Carefully controlled grazing, and/or even the use of fire, might be an option to manage very grassy sites to maintain an open structure and diversity.

After protection, wait and observe. Often plants – perhaps even different species – will regenerate. You can then decide whether further assistance is needed. Keep in mind that bulbous/tuberous plants might only appear seasonally (especially in spring).

Protecting remnant vegetation is an important part of managing your property.

Enhance remnant vegetation

Remnant vegetation has often been degraded by grazing (rabbits, domestic stock or even kangaroos and wallabies), weed invasion, inappropriate fire regimes, or physical disturbance such as historical gold mining. Reintroduction of missing shrubs or ground layer species can greatly improve the remnant. Enhancement might also include allowing natural regeneration to occur (fencing and eliminating rabbits usually enables this).

It is important to identify the type of vegetation before you start introducing new species. Different vegetation types will have different layers and species. For example, you might have Box-Ironbark vegetation that has lost shrub and groundcover layers. A grassland remnant (which should not be planted with trees) might require a more diverse grass or small shrub layer (depending upon the grassland type).

You can find out which vegetation type (based on Ecological Vegetation Class) occurs on your property by visiting the DSE website and selecting the Biodiversity Interactive Map: **www.dse.vic.gov.au**

Many organisations are willing to provide advice and support for managing and enhancing native vegetation. A great way to start is to join your local Landcare group – you will quickly learn about the importance of the remaining vegetation in your area, how to build or repair a fence, methods of pest plant and animal control, and so on. Contact the NCCMA to find out about your local Landcare group.

Build on remnants

Expanding from your remnant vegetation is the most efficient way to add habitat value and encourage natural regeneration. Expansion could include fencing off and revegetating a linear area next to roadside vegetation or other vegetated land, revegetating

corners of your land to consolidate roadside vegetation, revegetating out from remnants along drainage lines, down from hill-top vegetation, or around paddock remnants to create a larger single patch. Streamside and drainage line vegetation is especially important habitat.

Create landscape linkages

Think about how you can contribute to linking up remnants through the landscape and enabling species to move around.

Links don't necessarily have to be physical connections to be useful. Depending upon the species – both plant and animal – a gap can be 50 metres, 500 metres, or more! For example, mobile animals such as some birds, bats and kangaroos can use creek lines, roadside vegetation and other remnants as 'stepping stones' to sustain and guide them through the landscape. Although mobile species such as birds and bats can cope with gaps between good habitat, less mobile or cover-dependent species need continuous pathways of suitable habitat.

Ideally, aim to link patches of remnant vegetation to maximise

Revegetating along fencelines is a good way to link remnant vegetation.

Aim to link patches of remnant vegetation to maximise the benefits of revegetating.

the effect. If you can't physically fill a gap between patches of remnant vegetation, don't worry. Any kind of gap-filling at the landscape scale is better than none. If possible, target areas on your property that contain streams, drainage lines, depressions or wetlands. These areas once supported relatively high-value habitats for native animals. If you can link a remnant higher in the landscape down to your lower, revegetated areas, then you are providing an interface between terrestrial and aquatic habitat, and creating diversity.

Think about linking areas of different habitat such as hillsides and gullies.

Other landscape priorities for revegetation

Salinity control

If they are cleared, hills in much of Central Victoria allow rainfall to percolate into the groundwater, causing saline discharge further down the slope on adjoining flat land. This is especially common in sedimentary and metamorphic country – see Chapter 10 Looking After Your Soil.

Revegetating hill country may help reduce salinity in the long term. Hill country is suited to direct sowing – see the Information Notes on the DSE website and seek further advice.

Waterway protection

Native vegetation also acts as a protective mantle in and around waterways. It maintains good water quality, prevents erosion and provides very rich wildlife habitat. Direct seeding can be difficult where flooding occurs, but natural regeneration is often prolific following floods if parent plants are present.

Methods of revegetation

There are three different approaches you can take to revegetating your property: natural regeneration, direct sowing or planting. Of course you can combine these in any way you like, depending on your own situation and what is appropriate. There is no one best way to go about revegetation.

The species of plants most likely to grow well, provide the most benefit to the environment and regenerate naturally, will be those indigenous to the area. At some sites however, some of the local species may no longer be able to survive because of altered conditions such as salting or waterlogging. In these extreme cases, careful selection of non-indigenous species may be required.

Visit the DPI website and search under 'Information Notes' for more detail.

Natural regeneration

Wherever you have native remnant vegetation on or next to your property there is an opportunity for natural regeneration. This is often the cheapest and most efficient way to increase the numbers of native plants. In some cases all that is required is the removal or reduction of grazing





Photo: Adrian Martins


Photo: Adrian Martins

Revegetating along waterways is vitally important.

(by rabbits, stock or even kangaroos and wallabies). More often than not – especially in farm land – continuing weed management will be required.

For further information contact your local native plant nursery. (See Chapter 16 Key Contacts, for list of nurseries.) For information regarding revegetation, visit the North Central CMA website on: **www.nccma.vic.gov.au/revegetation** or the DPI website and search under 'Information Notes', then select 'Land for Wildlife'.

Direct sowing

Instead of sowing seeds into containers, the seeds can be sown directly into the soil, just like growing a bed of carrots! Direct seeding is very cheap compared to planting, but may require more planning and preparation.

Planting

Getting a seedling, digging a hole and placing the plant in the soil is a simple concept that people find rewarding. There is immediate concrete evidence and recognition that a tree has been 'planted'. Tree planting will probably continue to be a popular method for centuries to come in spite of challenges from cheaper methods. Some new developments in providing tree seedlings at very low cost, mechanising planting, and better weed control methods, are keeping tree planting cost-competitive with other methods.

You can buy seedlings in containers or less commonly as bare-rooted stock from nurseries, but it is easy to grow your own seedlings in containers. Sometimes you can grow your own seedlings in the ground and transplant them.

Tube stock

Plants bought in tubes are called tube stock. Tube stock is still the most common source of plants for rural revegetation projects. Recently, a lower cost container-grown alternative to tube stock has arrived on the rural revegetation scene. 'Plug array' or 'cell tray' methods consolidate a large number of individual, small 'tubes' into one tray. These trays allow cheaper production of seedlings and, depending on the design, may allow for healthier root systems in the plants. Both types of containers can be used for growing seedlings at home.


Photo: Adrian Martins

Natural regeneration is often the cheapest and best way to increase native plants on your property.


Photo: Adrian Martins

Tube stock is the most common source of plants for revegetation projects.

Native gardens around your house

Your garden has an impact on the environment. Whether this is good or bad depends largely on the kinds of plants grown.

You can have a good impact by growing plants that are not invasive and need minimal or no watering or fertilising. Indigenous plants fit the bill perfectly. Talk to an indigenous nursery operator about what plants might be suitable for your needs.

Detrimental impacts arise from watering, fertilising and weed invasion. To water a garden means depriving streams of their natural flows, and run-off pollutes and allows weeds to invade. Fertiliser application often means plant nutrients escape from your garden in run-off and leach, poisoning adjoining bushland plants and allowing weeds to invade. Many commonly grown garden plants are serious weeds now threatening the survival of bushland (see Chapter 12 Pest Plants and Animals). Common examples in Central Victoria are gazanias, Ivy, Cotoneaster, ash trees, Ghost Maple (Acer negundo), Pampas Grass, Ixia and Freesia. Most popular lawn grasses are virulent environmental weeds in Victoria. In Central Victoria, Bent Grass, Couch, Kikuyu, Kentucky Blue Grass and English Couch are all very invasive.

Every good garden should have at least some indigenous plants – one tree or large shrub can make all the difference to wildlife survival.

Photo: Adrian Martins

Gazanias are a good example of a garden plant that is becoming invasive in Central Victoria.

Water

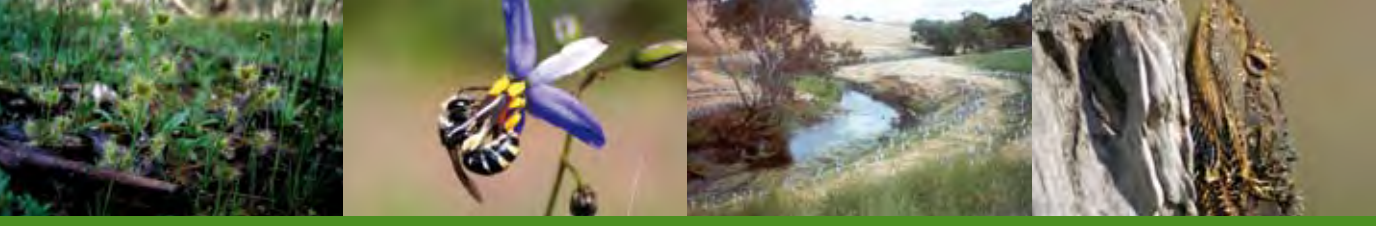
The first thing to consider when planning your garden is the availability of water. There is a large range of drought-tolerant native plants to choose from. Ask about these at your local native nursery (see Chapter 16 Key Contacts for local nurseries). Be sure to ask for local native species (indigenous), as they will have a better chance of long-term survival.

Mulching also helps to preserve moisture. An unmulched moist garden will lose the same amount of water through evapo-transpiration (loss of water from plants and surrounding soils) as a similar sized dam. Mulch also keeps soils cooler in summer and helps to prevent weeds. The best time to apply organic mulch is mid to late spring after the soil has started to warm up. 'Eucy mulch' or old sawdust are commonly used. Other more permanent mulches can be in the form of gravel or rocks (obtained from your building site or other ethical sources). Even scattered fallen timber can retain small pockets of moisture.

Native grasses are available for lawns. Weeping Grass, Windmill Grass, Kneed Wallaby Grass, Mat Grass,

Photo: Ian Hughes

Stones can be used as an effective garden mulch.



Redleg Grass, Kangaroo Grass and Brown's Love Grass are all suitable.

The watering rules for an indigenous garden are just the same as for other gardens. Watering in the cooler part of the day is better. Watering plants in the middle of the day can burn the leaves, plus most of the water will evaporate. Slow watering is best as it allows the water to infiltrate around the root zone; whereas fast watering wastes a lot of water as it drains across the soil surface. Generally you should soak your soil slowly and thoroughly and don't water it again until it is dry.

Equally important as water availability is the consideration of your soil type. Once again, the plants that occur naturally in your area will do best. The importation of soil from elsewhere is not advisable, as these soils often contain weed seed, or enable weeds to establish easily because of higher fertility levels.

Management agreements

Trust for Nature covenants

Landholders who would like to protect their patch of bush forever can do so with a conservation covenant. A conservation covenant is a voluntary agreement negotiated between the landholder and Trust for Nature, which is then registered on the Title. You can contact Trust for Nature to arrange a visit and assessment of your property.

Land for Wildlife

Land for Wildlife is a voluntary scheme that encourages and assists private landholders to provide wildlife habitat on their property, even though it may be managed primarily for other purposes.

There are more than 5,900 Victorian *Land for Wildlife* properties involving over 14,800 dedicated people. They are making a real contribution to native biodiversity conservation by managing over 560,000 hectares of their combined properties, of which 160,000 hectares are managed as wildlife habitat. This includes a wide range of ecosystems found on private land including forests, woodlands, heaths, grasslands and freshwater environments.

For further information contact your regional Land for Wildlife Extension Officer on 13 18 16 or **www.dse.vic.gov.au** via 'plants and animals' and 'native plants and animals'.

Native Vegetation Retention (NVR) controls

Recognising the importance of native vegetation, the Victorian Government has regulations controlling its removal. All landowners must check with their local council before attempting to cut down, trim, clear or otherwise remove native vegetation. This includes herbs, grasses and other ground flora – not just trees.

Throughout Victoria, a planning permit is required to remove, destroy or lop native vegetation on any land in a holding of 0.4 hectares or greater in size, or on any road reserve. A number of exemptions do apply unless there is a planning scheme overlay that deems the vegetation or habitat significant.

The first step taken in assessing a clearing application will be to try to avoid removing or damaging the vegetation in the first place. If clearing can't be avoided, then it will be kept to a minimum and the vegetation lost will have to be compensated for – which is called 'offsets'. Offsets are substantial, as the goal is 'net gain', i.e. more vegetation (in extent and quality) than was cleared needs to be offset.

Photo: Darren Bain

Land owners must check with their local council before removing native vegetation.

Reporting breaches of native vegetation removal

If you suspect that native vegetation is being cleared illegally (i.e. without a permit), contact your local council.

Resources:

DSE website. Select the Biodiversity Interactive Map: **www.dse.vic.gov.au**

Many local councils have compiled lists of indigenous plants suitable for use in gardens. In some cases, such as the City of Greater Bendigo, booklets have been published. Ask your council if they have any information.

DPI website and search under 'Information Notes': **www.dpi.vic.gov.au**

Trust for nature **www.tfn.org.au**

North Central CMA website: **www.nccma.vic.gov.au/revegetation**

Land for Wildlife Extension Officer, tel 13 18 16 or **www.dse.vic.gov.au**

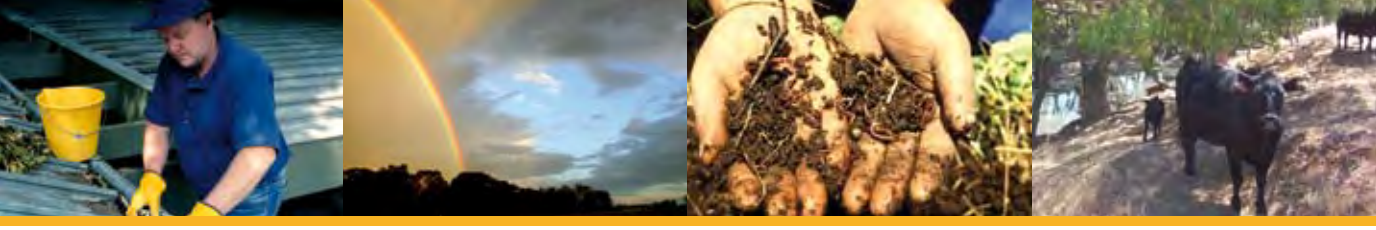
part four

property management

There is more to owning a block than sitting back and watching the grass grow. You will want to care for your soil, repair erosion and stop any more from occurring, make your pastures productive, control weeds and pest animals, and get rid of your waste without upsetting local waterways or your neighbours.

You may be privileged to have Indigenous cultural sites on your land, or mining or other relics from the early days of white settlement. What should you do with these and how should you safeguard them? And what can you learn from them?

You will want to heat your home in winter, stay cool in summer, and be prepared for the inevitable summer bushfires.



chapter 8

firewood for heating your home

Many households in Central Victoria rely on wood to heat their homes, since natural gas is not readily available. An average house with reasonable insulation and an efficient wood heater uses about 6–10 tonnes of firewood per year for heating (an uninsulated house can use 20 tonnes).

Most small property owners can grow firewood to meet or supplement their needs and provide habitat for native animals at the same time. Some wood types are better than others for burning; there are techniques for burning wood effectively; and you can minimise your impact on biodiversity when you collect firewood.

Native animals and plants (biodiversity)

To some eyes, that dead hollow branch lying on the ground is untidy, and cutting it to fireplace-sized pieces is a good way to get rid of it. But a lot of native animals, from invertebrates to small furry mammals, require fallen timber for feeding, shelter and refuge. This also applies to standing dead trees or large old trees as well.

A result of post-European settlement vegetation clearing is that there is a shortage of hollow-bearing trees in Central Victoria. Most native trees require at least 100 years to produce suitable hollows for birds and mammals to use as habitat. The remaining hollows in standing or fallen trees are very scarce and valuable.

Photo: Adrian Martins

Many native animals require fallen timber for feeding, shelter and refuge.

Collecting firewood to limit impacts on biodiversity

Be selective when taking wood from your property. If you are collecting firewood **leave hollow logs alone**, whether they are standing or lying. Although they may burn well, they are the dwindling homes to some of Australia's most beloved animals. So try to take small diameter solid pieces of wood instead of large diameter hollows.

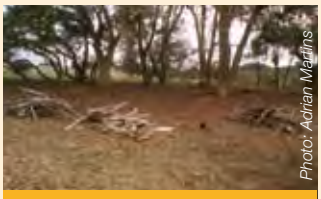


Photo: Adrian Martins

Even wood on the ground can be vital animal habitat.

Do not collect from endangered woodland communities. A list of nationally endangered communities can be found on the DSE website (**www.dse.vic.gov.au**). These communities are declining and are protected by State and Federal legislation, so penalties apply to firewood collecting.

When you take firewood, leave some behind and move on. If there is very little around, leave it and search elsewhere. It is often the cumulative impact of lots of people taking a little firewood that causes depletion.

Buying responsibly

Encourage your wood seller to stock plantation wood or the less threatened species of hardwood such as Stringybark. If there is enough consumer demand for alternative products, then merchants will progressively turn away from the threatened woodland species.

Photo: Lachlan Milne

Dead trees are ideal homes for native animals.

Collecting firewood

Collecting and burning firewood is one of humanity's oldest activities so it is no wonder that the pleasures of burning firewood are ingrained in our culture. Collecting firewood on your property has the same impact on the natural environment as collecting from public land, so wherever possible use old fence posts and building materials or try to source recycled materials from local industries.

In the future there will be a supply of plantation firewood on the market, so be sure to keep looking for sustainable wood suppliers.

In the Box-Ironbark Domestic Firewood collection areas you have access to collecting green fallen timber in designated areas. If you live within 25km of Bendigo, Heathcote, Castlemaine, St Arnaud, Maryborough, Avoca or Dunolly contact your local DSE office for specific information.

Outside the Box-Ironbark Domestic Firewood collection areas you can check with your local firewood merchant or your council about potential council supplies.

Collecting firewood from public land (which includes roadside and stream frontages) without a licence is illegal and heavy fines apply. Check with

your local council or the Department of Sustainability and Environment, phone 136 186, or visit the DSE website **www.dse.vic.gov.au** for further information.

Which wood is best?

Avoid buying wood sourced from valuable remnant stands of native forest. Box (Grey, Red, Yellow and White), Ironbark and Red Gum firewood currently is most often sourced from these forests. Some is currently being grown in plantations and will become available within the next few years. These species make great firewood, but they are considered 'vulnerable' at present, and are better left to provide habitat. Look for a firewood supplier who sources wood exclusively from plantations or coppiced woodlots.

Dry, seasoned firewood is the best for your wood heater.

If you buy wood to use immediately, always buy dry, seasoned, untreated wood. Unseasoned wood can have up to 50 per cent moisture content. This wood is hard to ignite, slow to burn, and produces more smoke and less heat. You can save money by buying unseasoned firewood in the early spring and storing it undercover until the following winter. Store wood so it is kept dry. It is best to stack wood in a criss-cross pattern for about eight to 12 months before using.

Are wood heaters the solution?

Save money and insulate your home first. Uninsulated ceilings, walls and floors can account for 70 per cent of total heat loss from a home.

If you have the opportunity and are building or renovating your home, investigate sustainable alternatives. By using simple design techniques to capture the heat of the sun in winter and protecting from the heat in summer, you can reduce or even eliminate your heating and cooling costs. House orientation, and even the plants you put around the house, can play an important part in making it energy-efficient.

Tips for buying a wood heater

Think about the area you want to heat, how long you want to heat that area, where you will source the wood and its cost.

Open fires are up to five times more polluting than wood heaters that meet the Australian Standard (AS/NZS 4013:1999). All wood heaters made and sold in Victoria must meet this standard. Check that the wood heater you are buying has a compliance plate to confirm it complies with the standard.

If possible, consider replacing your open fire with a wood heater that meets the standard or an alternative form of heating that is energy efficient.

Ensure your wood heater is installed by a licensed plumber.

Wood heater maintenance

Wood heaters need to be maintained and serviced to keep them burning efficiently and cleanly. Check your heater and flue before winter. Look for cracks or changes to the surface. If necessary, have it checked by a qualified service person, and have your flue or chimney professionally cleaned at least once a year.

Don't burn:

- unseasoned wood
- household rubbish
- garden clippings
- painted or treated timber
- wet or damp wood
- particle board
- plastic

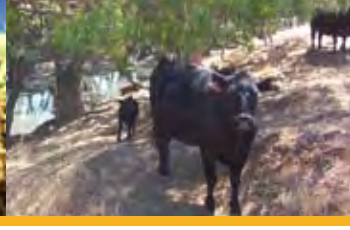
Cutting pollution

Smoke from domestic wood heaters and open fires is the main source of air pollution in Victoria in autumn and winter. When wood is burned, particles and other chemicals are released into the atmosphere, which affect air quality and can affect our health and quality of life.

Wood smoke can exacerbate respiratory and cardiovascular illnesses such as asthma and can affect people's ability to enjoy their homes and the outdoors.

- Prevent or minimise air pollution problems associated with wood heating by doing the following:
- Burn dry, seasoned, untreated wood.
- Get a hot fire going quickly with plenty of paper and small kindling.
- Keep the air controls set high enough to keep your fire burning brightly.
- Never leave your wood heater to smoulder overnight. Doing this starves the fire of oxygen, producing more smoke and air pollution.
- Never overload your wood heater by placing too much wood in the fire.
- Check your chimney or flue for smoke at least once every evening.
- Consider your neighbours' well-being.
- Ensure your chimney or flue is higher than your neighbour's roofline. This will prevent smoke from your fire entering your neighbour's home.



Growing your own firewood

Trees are a natural part of our environment and if you have space (and it does not have to be much) consider growing your own firewood. Not only will you attract more birds to your property, a firewood lot will improve the property's appeal and you will save money. If you have an area of five square metres you can start with your first firewood tree. Two hectares should supply you with all the firewood you need forever! To get the best result – plan and design what you grow with advice from experienced tree growers or the DPI (www.dpi.vic.gov.au/privateforestry).

Often 'firewood blocks' can be incorporated into the property to provide shelter, wildlife habitat or landscape. Preparation is the key to good, early growth and survival. Deep ripping to a depth of at least 50 centimetres will help trees get established, and it should be done in autumn before the ground becomes too wet to work. Clear weeds before planting. Planting is best done in autumn, but if the area is severely waterlogged or frost-prone during winter, planting should be carried out in spring.

Space rows 3.5–5 metres apart to allow tractor access for slashing and extraction. In the rows, spacing between trees should be 2.5–4 metres. Thin out the 10–15-year-old plantation to provide some fuel and allow the remaining trees to grow faster. Tree guards may be necessary early in exposed areas if rabbits or hares are a problem. If possible, the fence surrounding the planted area should be stock-proof. Check with your specialist nursery for suitable species.

Commercial tree growing

Many farmers are diversifying their farms by growing tree plantations for pulpwood, sawlogs, farm forestry and agro-forestry. If you are interested in growing trees commercially for a profit, you will need to carefully select species and take their provenance and even the individual parent tree into account to get the maximum growth.

With pulpwood and some sawlog plantations, farmers are realising economies of scale with lots that are up to hundreds of hectares in size, but smaller plantations – areas of more than 10 hectares – can be economic if they are managed for timber while providing shelter for agricultural land. You may even be interested in growing specialty hardwoods for sawn timber and veneers. Check with DPI for the species and the optimum size for a plantation that is right for your block.

You should also check that the zoning of your land does not prohibit timber allotments, and you may have to lodge a plan with council so your operation falls under the Code of Practice for Timber Harvesting and won't be affected by controls for removing native vegetation.

City of Greater Bendigo's firewood plantations

The City of Greater Bendigo has developed two commercial timber plantations at Huntly and Knowsley in Central Victoria. The two plantations comprise an area of approximately 220 hectares and were developed with the assistance of DPI.

A variety of native species has been planted, particularly Red Ironbark and Sugar Gum, which will be managed for high-value timber products.

Future thinning operations will generate significant firewood supplies for the local community and the plantations will have many environmental benefits, including improved biodiversity, improved water quality and salinity mitigation. Both plantations have been established in low-rainfall areas and neither is irrigated. They provide excellent examples of the potential of low-rainfall forestry in Central Victoria.

Firewood blocks can be incorporated into your property to provide shelter, wildlife habitat or landscape improvement.

Resources:

Department of Primary Industries Private Forestry:
www.dpi.vic.gov.au/privateforestry

Your Home, Design for Lifestyle and the Future:
www.greenhouse.gov.au/yourhome

Firewood:
www.deh.gov.au/firewood/




chapter 9

preparing for fire

If you live in the bush, especially around Central Victoria where it gets hot and dry, you have to plan for fire.

Develop a fire plan

Every rural property needs a bushfire survival plan. This starts with choosing fire-resistant materials for buildings on your block, siting the house to maximise safety, and managing vegetation to reduce your fire risk. Planning for fire includes managing potential fuels around your home during the fire season and making sure your house and sheds are clear of potential fuel sources such as leaves in guttering and firewood stacks. Check that water supplies are adequate and easy to get to, and that each member of the household knows how to operate pumps, knapsacks and hose reels. Make driveways, swimming pools, tennis courts and open areas part of the fuel management plan. Your intention is to ensure that no direct flames or excessive levels of radiant heat can contact your buildings. Make sure overhead power lines are clear of vegetation and plan where to move stock on high fire danger days.

Developing a bushfire survival plan is a crucial job, and it's best to make the plan before the start of the summer bushfire season.

When you are making a decision about what you will do if there is a bushfire in your area, the first and most important thing to decide is whether you intend to stay with your home. Under Victorian law **it is the right of all residents to decide for themselves** whether they will stay and defend their property. If you do leave, however, police and emergency service personnel can stop you from returning.

Constructing new buildings

Before designing a new home, discuss fire-safe design and construction techniques with your architect or builder. Your local council can also advise on building in bushfire-prone areas. In Victoria, the CFA publishes *Building in a Wildfire Management Overlay Applicant's Kit* in hard copy and on the web. The Building Code of Australia specifies performance standards for houses built in bushfire-prone areas. There is also an Australian Standard, *AS 3959-1999 Construction of Buildings in Bushfire-prone Areas*, which provides detailed information about housing construction matched to the category of bushfire.

Photo: Courtesy CFA

Developing a fire plan is important in all rural areas.

Remember:

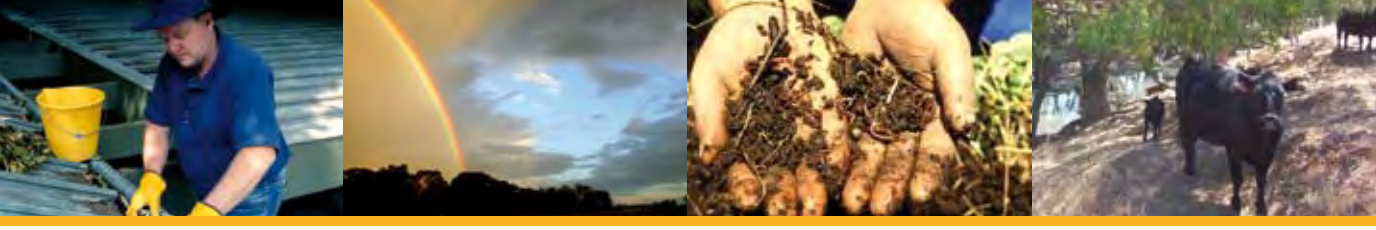
- Flat sites are safer than sloping sites and the steeper the slope, the greater the danger. Fire can rush uphill.
- Buildings at the foot of slopes are safer than those at the top.
- Simple house designs are best. Minimise hard-to-reach areas where debris can accumulate.
- Concrete on-ground slabs are preferable to piers, where sparks can ignite material under the house.
- Ground-level drains can act as firebreaks.

Protecting established buildings

- Keep gutters free of leaves.
- Fix metal spark-proof screens to external vents.
- Eliminate gaps in external eaves where burning embers might enter.
- Consider installing a roof sprinkler system, preferably using a water source from a reticulated supply (like a diesel-powered pump drawing from a rainwater tank or swimming pool).
- Consider installing non-combustible shutters. Fully closed, they can prevent windows breaking from flying debris and radiant heat.

Fire-retardant plants

Don't use plants near your house that have a high content of volatile oil or resin in their trunks, branches or leaves. They can burn fiercely, and include conifers, melaleucas, bottlebrushes, tea-trees, boronias, mint bushes and eucalypts.



Think about replacing conventional grass lawns around buildings with succulent groundcovers.

Plants with a high moisture content, fruit trees and plants with a high salt content, such as saltbushes, may slow a fire, but **all** plants can burn in high-intensity fires (the fires that put you or your home at most risk). It is unwise to rely on plants being fire-retardant.

Reduce fire risk/ hazards

Photo: Courtesy CFA

You should clean gutters regularly.

One of the most effective means of reducing your fire risk is maintaining a zone around the house where accumulated fuel is eliminated or reduced.

- Keep grass cut low and remove ground litter immediately around the house
- Eliminate plants growing next to walls, under windows or overhanging roofs
- Store flammable material away from the house
- Visit the CFA website for extra information and ideas, or contact them direct for more detailed advice. You can also call the Victorian Bushfire Information Line

Fuel reduction burning

The Department of Sustainability and Environment, Parks Victoria and the CFA carry out fuel reduction burning, using low-intensity fire under controlled conditions to reduce the amount of ground-level fuel in forests, woodlands and grasslands. This method is usually restricted to public lands, where it may also be used to protect vulnerable native animal colonies and to stimulate the growth of certain plant species. In rural areas, landholders may also carry out hazard reduction burning with council and CFA approval.

Fire services and individuals in Victoria are obliged to notify nearby property owners if hazard reduction burning is to be carried out.

Hazard reduction burning is often controversial, as it may produce a conflict between the needs of humans and the protection of the environment. For example, frequent, low-intensity burns reduce the danger to life and property during the bushfire danger period. They can also change the composition of the native vegetation. Plants relying solely on seed reproduction may be eliminated, because the interval between fires may be too short to allow the plants to mature, flower and set viable seed.

Your legal obligations

Property owners are responsible for keeping fuel on their properties below dangerous levels. *The Country Fire Authority Act 1958* allows Municipal Fire Prevention Officers to inspect properties and requires owners to carry out hazard reduction. If necessary, your local council may carry out the necessary work and recover costs from the owner or occupier.

Fire Danger Period

In Victoria, fire restrictions are imposed depending on seasonal conditions, and they vary from year to year. You should watch your local papers and listen to local radio for announcements of fire restrictions.

Details of restrictions in country Victoria during the Fire Danger Period can also be found on the CFA website. If your property is within 1.5 km of state forests, national parks or protected public lands, it may be within a Fire Protected Area. In that case you should also look up the Department of Sustainability and Environment's website to check their Prohibited Period.

You should also refer to the CFA's brochure *Can I or Can't I?*, which outlines what is allowed and what is not during the Fire Danger Period.

Forests, national parks and protected public lands in Victoria are subject to a Prohibited Period, where year-round fire restrictions are in force. Details of these restrictions can be accessed at DSE's website, or you can ring the relevant local DSE or Parks Victoria office.

The Victorian Bushfire Information Line can also give you information if you intend to spend time in forests, national parks and protected public lands.

Backyard burning

Backyard burning is not recommended. Check with your local council for specific controls and local by-laws you must follow.

What to do when fire approaches

Individuals can do many things to minimise the risk of damage to property and personal injury. The




most important thing to do is protect yourself from radiant heat and smoke.

- Wear loose fitting overalls or long-sleeved shirt and pants made from natural fabrics, not synthetics, which may melt and cause injury. Underwear and socks should also be of natural fibres.
- Wear strong shoes or boots.
- If available, wear safety goggles, gloves, a hat and smoke mask (or a large, wet handkerchief over mouth and nose).

Fire approaching your home

- Keep informed via radio reports.
- Keep your phone line free.
- Hose down the house walls, roof and garden (use sprinkler system if available).
- Do not rely on mains water supply for sprinklers or home defence.
- Block downpipes and fill gutters with water.
- Fill baths, sinks, buckets and other containers with water (for dousing fires that might be caused by embers entering the house).
- Place wet towels and blankets against gaps in doors and windows.
- Close curtains and shutters, but do not take shelter in any part of your home where you can't see the fire's progress.
- After the main fire passes, put out spot fires (any small fires in the garden or on structures).
- If the house catches fire, stay low under smoke and go outside onto burnt ground as soon as the main fire front has passed. Keep away from radiant heat and do not return to the house.

In a motor vehicle

Cars are suitable only as a shelter of last resort, in areas clear of fuel and out of direct contact with flames.

Photo: Peter McRostie

Grassland fires can move very quickly.

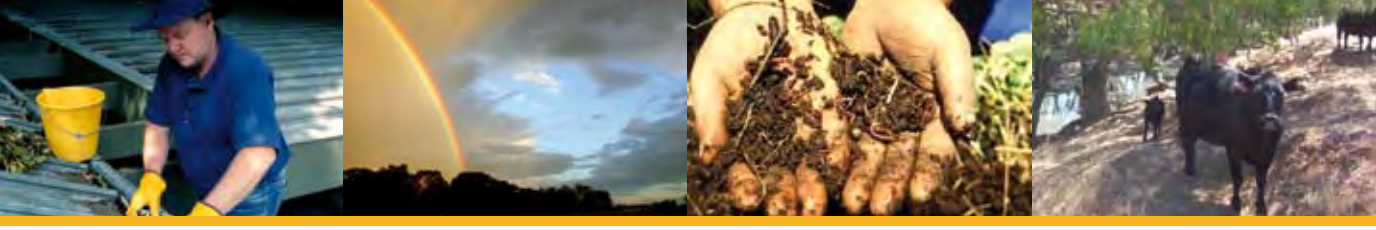
- Find a clear area with at least 10 metres of space above.
- Rake litter from under and around the car (if time and safety permit).
- Keep engine running and air-conditioner on recirculate, with the vents closed. This helps keep the interior of the car cool and inhibits the entry of smoke.
- Leave lights on.
- Put on protective clothing.
- If possible, put a dry woollen blanket over seats and over the occupants who should lie on the seats or the floor.
- Hang towels on insides of windows (which may shatter in the heat).
- Stay in the car until the fire has passed. Do not leave the car until you feel a reduction in heat.
- The petrol tank is unlikely to explode.

On foot

- Don't go bushwalking on days of fire danger. If in doubt, check with DSE, Parks Victoria, or the Victorian Bushfire Information Line 1800 240 667.
- Cover up as much as possible.
- Try to remain calm – don't run in a panic, as that will waste energy.
- Move downhill (fires travel most rapidly up slopes).
- Look for safe area such as previously burnt vegetation, dams, pools (not elevated tanks as the water temperature can reach dangerous levels).
- If flames are more than a metre high, don't try to go through them to a safe area.
- If you are trapped, lie as flat as possible behind whatever shelter is available in the most vegetation-free area that you can find and cover yourself with a blanket or soil.

Join the fire brigade

Joining a volunteer fire brigade does not necessarily mean a big commitment of time. Brigades have a range of jobs available, including support, administration and communications, as well as front-line firefighting. To find out more about becoming a volunteer, contact the Country Fire Authority or see the CFA website **www.cfa.vic.gov.au**. You will then be put in touch with the brigade captain for the brigade closest to your home.



The effects of fire

Most local plants can recover provided the average interval between fires and the fire intensities matches the needs of the plants, which have evolved with fire over thousands of years. Many Australian plants depend on fire to reproduce. Most animals have also developed ways of sheltering or avoiding fires, although many individual animals perish or are injured in large bushfires.

Humans can influence the effect of fire on bushland by either burning too often or by reducing or eliminating fire from plant communities that depend upon it. Both actions will change the composition of the plant communities in the bush, may make some plants locally extinct and, as a result, may affect the well-being of other living things. A well-considered property management plan can integrate residential bushfire safety with environmental protection.

Resources:

Victorian Bushfire Information Line 1800 240 667

CFA website: **www.cfa.vic.gov.au**

DSE website: **www.dse.vic.gov.au**

Recommended reading

Can I or Can't I?, CFA

Living in the Bush, A Bushfire Survival Plan Workbook, CFA. Order it from the CFA website **www.cfa.vic.gov.au**, by calling the Victorian Bushfire Information Line on 1800 240 667, or the CFA Regional Office in your area.

The Australian Bushfire Safety Guide: The Essential Guide for Every Home, John Shauble, HarperCollins Publishers, Sydney, 2004.

Essential Bushfire Safety Tips, Joan Webster, Random House Australia, 2001.

Photo: Courtesy CFA

People living near bushland have a right to protect their properties and an obligation to protect their environment.




chapter 10

looking after your soil

Soil is fundamental to maintaining life on the land. Australian soils are among the poorest in the world. They generally contain little organic matter and erode and degrade easily, because we misunderstood what our land is capable of. You need to look after your soil as we can't afford to lose any more.

In Central Victoria we have lost millions of tonnes of topsoil since settlement.

The nature of soil

If you own a small property, your soil is a most valuable asset. It is made up of mineral particles, organic material, water, air and living organisms. Soil is alive. It is formed as rocks break down and organic material decays. This is a very slow process, as one centimetre of topsoil can take several hundred years to form.

Soil organisms

Soil organisms help keep the soil healthy and fertile. These organisms range from tiny bacteria, protozoa and fungi to larger soil animals like centipedes, earthworms, spiders, earwigs, springtails and termites. Each soil organism plays an important role in cycling carbon, nitrogen, sulphur and phosphorous through the soil and in maintaining good soil structure. One hectare of good quality soil could contain around 1,000 kilograms of earthworms, 100 kilograms of other soil animals and millions of fungi, bacteria and protozoa.

Soil is teeming with life.

Soil acidity/alkalinity

The acidity or alkalinity of soil is measured by the pH scale. Less than 7 is acidic, greater than 7 is alkaline. Seven is neutral. Most crop plants prefer a pH close to neutral. In Central Victoria, the higher the annual rainfall, the more likely the topsoil and subsoil will be naturally acidic. Most sedimentary and granite soils especially are naturally acidic. Soil that is too acidic can be treated with lime; too alkaline with sulphur. You can check if you need to treat your soil by carrying out tests with a simple pH kit available from most nurseries and garden shops. Keep in mind, though, that native vegetation is perfectly adapted to the natural pH of the soil in which it grows.

Contact the Catchment and Agricultural Services staff at Department of Primary Industries offices throughout Central Victoria for further advice on pH problems.

Soil structure

Maintaining (or improving) soil structure is a crucial part of good land management, as plants need air and water near their roots to grow well. A well-structured soil will easily absorb water, and excess water will drain away to be replaced with air. A soil with poor structure will shed water, increasing erosion. It will not store as much moisture in dry conditions but can be waterlogged in winter as it does not allow aeration.

Many soil types have naturally poor structure. Good land management practices can improve them but poor practices can easily degrade or destroy them.

To maintain and improve soil structure:

- Keep soil covered by vegetation all year round – bare soil is always at risk. Perennial plants are better than annuals.
- Maintaining a continuing supply of organic matter is essential. You can do this for free if you just let the natural vegetation drop leafy material onto the surface and leave it there to decompose. In agricultural situations where all native vegetation has been lost, adding mulch or other material can help, but beware of introducing weed seeds in materials like straw or manure.

Soil structure, the living things in the soil and the processes that keep soil in good health can be damaged unless you manage the land well.

Threats to your soil

Soil disturbance

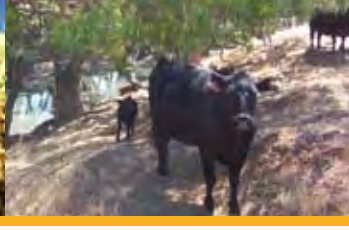
Anything that removes vegetation cover or exposes soil to the open air puts your soil at risk. Ploughing that turns soil over, thus burying the topsoil, is particularly harmful. But aerating the soil with specialised chisel ploughs that minimise topsoil disturbance can improve the soil's structure.

Compaction and pugging

Constant trampling by livestock and tyre track damage from machinery and off-road vehicles can severely degrade soil structure. When hard-hoofed animals like horses are fed and watered in a confined area, they exert huge pressures on the soil. Horses and cattle are very social animals and will often congregate in one area. Their hooves can make deep holes or 'pugs' in wet soils. Some soil types, especially clays, can form dense, compacted layers up to several metres below the surface.

Soil pugging



Erosion

Although erosion can occur naturally, it is accelerated by native vegetation clearing, grazing, cropping, road and house construction and by altering natural drainage lines.

Erosion occurs when soil particles are moved by wind and water. Any force that can break soil aggregates into smaller particles can lead to soil erosion. Such forces include the impact of raindrops on bare soils, cultivation and animal trampling.

The parts of soil that promote plant growth are mostly in the topsoil. When topsoil erodes, plant growth on the remaining soils declines. When vegetation is lost, the soil surface is exposed, and erosion increases, creating a vicious cycle. Don't let it start on your property.

Eroded soil is called sediment. Sediment degrades the quality of water and may carry polluting chemicals. Soil erosion causes damage in three places:

- It damages the land where the soil is removed
- It degrades the water that transports the soil
- It damages the site where it is deposited

Types of erosion

Tunnel erosion is the washing away of subsurface soil while the surface soil is mainly intact. Tunnels start to form when water moves into cracks in the soil, root holes and rabbit burrows, and when the surface soil is saturated.

Tunnel erosion produces long cavities beneath the soil surface. The cavities enlarge until the surface soil is no longer supported, and then it collapses. If the process continues, the soil surface collapses further and forms open gullies that continue to grow.

Rill erosion is the formation of numerous small channels by concentrated run-off. Rills can often be seen on road batters and after earthworks. Rilling increases with the length of slope and steepness. Severe rill erosion can lead to the formation of gullies.

Gully erosion occurs when running water washes away soil, forming large channels. Relatively small changes in land management, such as increased discharge to a minor drainage line, can start gully erosion. Much more effort is required to treat gully erosion once it is underway, than to maintain a stable system and prevent gullies from forming in the first place. You may need to change the flow of water over the land, exclude grazing animals, fence off and replant. If large gullies form, earthworks are often required.

Typical gully erosion

Sheet erosion is the removal of topsoil by rainfall run-off. It occurs where there is no protective plant cover. The loss of topsoil and soil nutrients affects plant growth.

Sheet erosion

Stream bank erosion is caused by changes in water flow and the loss of streamside (riparian) plants and trees. Riparian vegetation stabilises stream banks. Where erosion is severe and the bank collapses, the water flow could change, leading to more erosion. Fencing off and replanting riparian areas is the key to controlling stream bank erosion.

Stream bank erosion

Wind erosion occurs when particles of soil are moved by the wind. Heavier particles roll along the ground, lighter particles bounce, or are blown up into the air in dust clouds.

During the dramatic dust storms of 1983 tonnes of priceless Victorian topsoil was blown to Melbourne. An average of nine kilograms of topsoil was dropped on each suburban block.

Induced soil acidity

Agricultural practices are turning large areas of farm land even more acidic. This induced acidity is caused by:

- Not enough deep-rooted trees in the landscape
- Removing plant and animal products (e.g. hay, grain, milk, grapes, fruit)
- Applying nitrogen-based fertilisers, e.g. ammonium or nitrate salts or animal manures
- Using shallow-rooted, annual pastures (e.g. clover, rye grasses)




You can help reduce soil acidity by:

- Maintaining groundcover, promoting natural regeneration and replanting bare areas
- Fencing along the natural contours of the land
- Protecting steep sites, streams and waterways
- Taking care when earthmoving and road building (dial before you dig)
- Keeping stock off wet soils and away from drainage areas
- Not overgrazing or using heavy machinery on wet soils

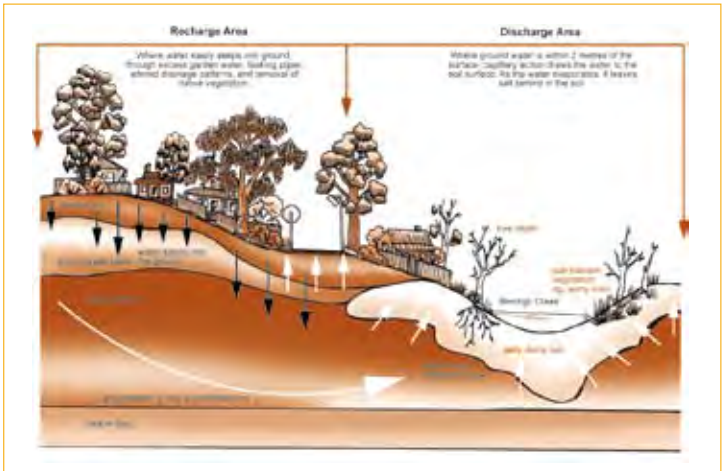
Salinity

What is salinity?

Salt occurs naturally in many Australian landscapes. Before European settlement, the native vegetation used up most of the rainfall, concentrating salt deep underground and maintaining a stable groundwater level. Little water drained below the root zone.

Salinity can severely damage the productive capacity of your land.

Since then, the loss of native vegetation and its replacement with shallow-rooted, often annual plants, has allowed more rain to pass through the root zone. Where this happens, the stored salts are 'mobilised' into the groundwater and the watertable rises, bringing dissolved salts up with it. When the watertable is within one to two metres of the surface, the water and salts are drawn to the surface, causing the root zone to become very saline, eventually killing all vegetation.



Salt city: salinity affects townspeople as well as agricultural areas.

Salt also causes problems in urban areas by eating away at building foundations and roads.

Salinity is a catchment-wide problem that does not stop at property boundaries. Some farmers and other landholders may be adding to the problem in a catchment but not be aware they are doing so because the salt does not emerge for years. When it does, it usually appears elsewhere in the catchment, while the farm itself may not be directly affected by salinity. If no one does anything, the land degrades and the costs are handed on to another generation.

Telltale signs

Salinity may be evident to the naked eye where it is extreme. It can result in bare patches of ground and a white covering of salt crystals may be visible. However, the early stages of developing soil salinity may be invisible. It is wise to check for salinity before building or beginning a farming enterprise. You can do this by having your soil tested. If you can recognise plants easily, the vegetation present can provide clues.

Salt tolerant plants are listed on the Victorian Resources Online website at www.dpi.vic.gov.au/vro. Check the salinity indicator plants under Highlights. Your local indigenous nursery should be able to advise you on what species are salt-tolerant.

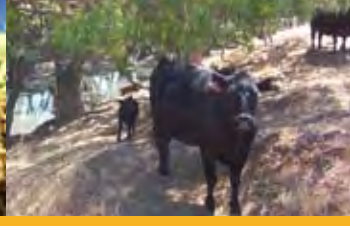
What to do about salinity

Salinity control involves all landholders in a catchment.

- Join your local Landcare group, or consider forming a new one in your community. Cooperate with your neighbours to tackle the problem with a total catchment management approach. Find out where your main recharge areas are (often at the top of the catchment) and start remedial action there, working down.

One of the best ways to combat salinity is to plant trees.



- Protect and improve native vegetation.
- Plant hilltops and where the ground begins to flatten out from the steeper slopes of hills. This is called break-of-slope planting.
- Plant recharge areas with deep-rooted vegetation.
- Plant discharge areas with salt-tolerant species.

Soil tests

Soil tests are a vital tool for revealing the condition of soil and whether your land might be productive. You can use soil tests to find out if your soil is salty or acidic; whether it contains arsenic; or if it lacks certain minerals. You must know what you are looking for when you have a soil test done. It's wise to discuss with your soil testing company exactly what you want to find out before testing begins.

Soil testing companies are listed in the yellow pages of your local phone book, but check with other landowners or Catchment and Agricultural Services staff at the Department of Primary Industries for reputable companies.

What type of soil do I have?

In Central Victoria, five main types of landscape have produced different soils.

Sedimentary soils

Sedimentary soil

Our sedimentary rocks formed as ancient landscapes eroded and washed into the sea. Around 500 million years ago beds of mud, sand and gravel built up to 14 km deep. Later, the layers were pushed up and folded, forming mountains. The eroded remains of these now form much of the hill country of Central Victoria. The soils produced from sedimentary rock tend to be very infertile and poorly structured. They are often pale coloured grey-yellow 'duplex' (two contrasting layers) soils, where the grey topsoil lies over a yellow subsoil sitting on the bedrock. These soils are extremely vulnerable to erosion, and erosion gullies are common in sedimentary soil landscapes. Some areas are also prone to tunnel erosion.

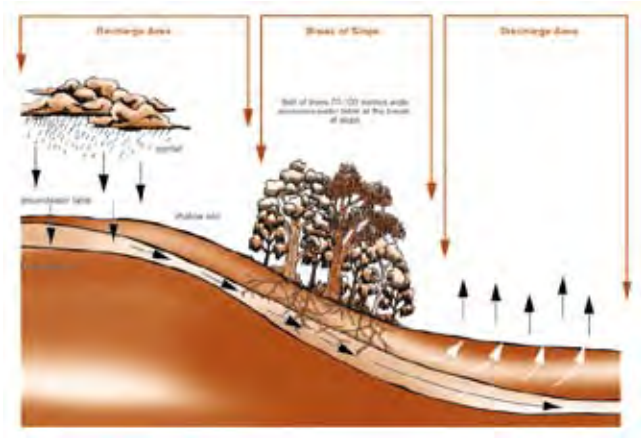
Metamorphic soils

When granite and sedimentary country meet, the sediments get squeezed and baked into a much harder form (just like kiln-fired pottery). These rocks resist erosion and usually form higher, steeper hills than the surrounding sedimentary country. Soil formed from metamorphic sediments is usually of better quality and more resistant to erosion than sedimentary soil. It is very shallow, however, and metamorphic country cleared of native vegetation is infamous for causing bad salinity problems down the slope.

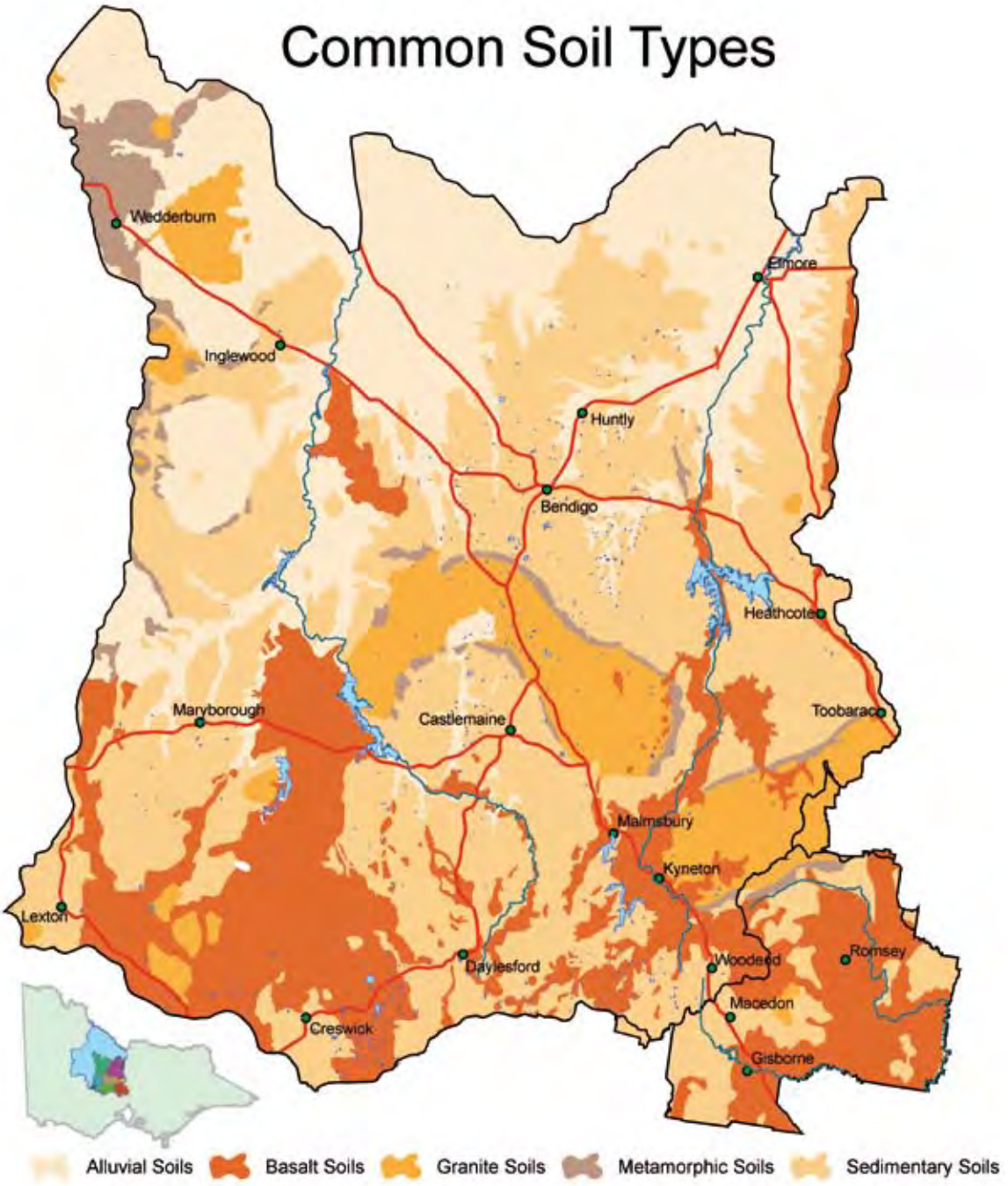
Metamorphic soil

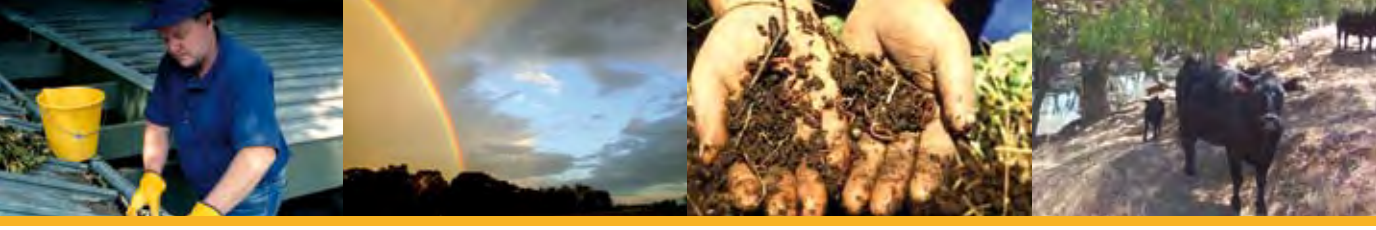
Granite soils

Granite rock forms as hot molten rock (magma) wells up several kilometres underground. The magma cools very slowly and large crystals form. Millions of years of erosion strip off the covering earth and expose often spectacular granite landscapes, such as Mount Alexander.



Water will rise to the surface and bring dissolved salts with it if it is not used by plants.


Common Soil Types
Wedderburn
Inglewood
Elmore
Huntly
Bendigo
Heathcote
Maryborough
Castlemaine
Toobarac
Malmsbury
Kyneton
Lexton
Daylesford
Woodend
Romsey
Macedon
Creswick
Gisborne
Alluvial Soils
Basalt Soils
Granite Soils
Metamorphic Soils
Sedimentary Soils



Granite soils are infertile and have a poor structure. Most are pale grey to yellow, though brown sandy loams can develop in well-drained areas. These soils dry out rapidly and are very susceptible to erosion. Sometimes natural 'hardpans' of compacted subsoil develop, which prevent water draining and make granite soils notoriously waterlogged and sloppy in winter.

Granite soil

Basalt soil

Basalt soils

Basalt landscapes developed between 10,000,000 and 10,000 years ago from volcanoes that flooded the ancient sedimentary landscapes with molten lava or produced volcanic ash 'cones' (the classic volcano shape). These rocks contain many elements that produce good soils. Basalt soils are fertile and resilient and, as a result, most basalt country is intensively used for agriculture. The best soils tend to be red-brown, but waterlogged areas may be grey.

Salinity and erosion are generally not significant problems, but these soils may be greatly exposed to weed invasion. Heavy, cracking clays may form in flat areas, and can be prone to waterlogging, which can suppress plant growth over winter.

Alluvial soils

Alluvial soils are formed on floodplains and are derived from combinations of soils washed down from the surrounding landscape. Alluvial soils are of moderate fertility but may have poor structure and can erode. Because alluvial country is low-lying it is vulnerable to rising saline watertables.

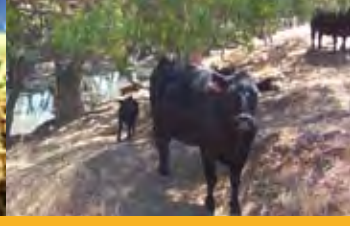
Alluvial soil




Common soil types – based on underlying geology

Common questions	Sedimentary soils	Metamorphic soils	Basalt soils	Granite soils	Alluvial soils (found on floodplains)
Natural fertility level	Extremely low	Low–moderate	High	Moderate	Moderate
Common problems	Erosion, salinity, compaction, infertility, poor structure, acidity	Weeds	Weeds	Erosion, acidity, waterlogging, weeds	Erosion, poor structure, waterlogging, weeds.
Erosion prone?	Yes (tunnel erosion)	Bare sheep camps on high hills can be wind eroded.	No	Very	Yes (waterways need to be protected from compaction and disturbance).
Prone to salinity?	Yes – in flatter areas adjacent to hill (break of slope areas), in drainage lines	Not usually, but without native vegetation, can cause severe downstream salinity problems.	Not usually	Granite country in high rainfall areas is not associated with salinity.	Yes – especially on wide plains where watertables are close to the surface or on the base of drainage lines.
Prone to compaction?	Yes – a serious problem	Less of a problem	Less of a problem	Less of a problem	Yes – can be a serious problem. Requires careful pasture management and low stocking rates.
Native vegetation	Because of the low land capability of this soil type, native vegetation is likely to be present. These low-fertility soils often have the highest biodiversity.	Often retains native vegetation because of steep terrain.	Basalt soils are most often cultivated, therefore the native vegetation associated with these soils is often endangered (e.g. plains grassy woodland). Often rocky paddocks have not been cultivated and may retain significant native vegetation that should be retained. The rocks provide habitat and the mosses and lichens are often of ecological significance. Rocky escarpments on river banks provide significant habitat.	Extensive grazing and subsequent weed invasion have caused the loss of most native groundcovers. Often stands of trees are the main native vegetation in this landscape. Any native vegetation understorey on granite soils is highly significant and requires careful management. Boulders provide a distinctive landscape and habitat structure.	Alluvial soils have mostly been cultivated or drained for agricultural uses, but banks of creeks and drainage lines where ploughs have not been able to reach often retain significant native vegetation and habitat. These areas can be fenced to form buffers to waterways.



Common questions	Sedimentary soils	Metamorphic soils	Basalt soils	Granite soils	Alluvial soils (found on floodplains)
Prone to weeds?	• Natural low fertility often restricts weed growth. • Generally associated with a range of woody weeds, cactus and grassy weeds. Other weeds can establish with over-grazing or cultivation. • Often intact native vegetation has few weeds – native vegetation can be used to help prevent weed spread.	• Very prone to weed invasion if disturbed, e.g. by livestock grazing.	• Thistles and Patersons Curse favour basalt soils. Think twice before disturbing or cultivating basalt soils as a crop of thistles will usually result. • In the Maribyrnong Catchment, weeds may include Artichoke Thistle, Chilean Needle Grass or Serrated Tussock – so watch out.	• Granite country is extremely vulnerable to weed invasion. Steep hill country is very expensive to treat, so better to prevent.	• Generally associated with a range of woody weeds, cactus and grassy weeds. Other weeds can establish with over-grazing or cultivation. • Often, intact native vegetation has few weeds – native vegetation can be used to help prevent weed spread.
Management comments	• Generally this soil is suited to light, broadacre grazing, with a strong focus on revegetating waterways and steep slopes and protecting remnant native vegetation. • Identify any native pastures and manage these to enhance native grasses, as they are cheap to maintain and protect the soil. • Native grasslands should be allowed to go to seed or periodically burned. • Not appropriate for heavy grazing or stocking. • Livestock should be excluded from any bushland area most of the year.	• Retain as much perennial vegetation as possible. • Highly porous soil which will suit drought tolerant plants. • Vulnerable to wind erosion… retain indigenous vegetative cover.	• Soils generally suited to most agricultural uses. Main limitations include rainfall and aspect. • Soils can vary significantly – look out for heavy clay soils, waterlogged soils or cracking soils (usually clay soils).	• Generally poor soils suited to light broadacre grazing or some horticulture (e.g. vine growing). A strong focus should be on revegetating steep hills and waterways to help protect viable grazing areas. • Viability of any land use should be carefully researched.	• Alluvial flats are often cropped or used for horticulture if irrigation is available. • Try to establish buffers for native vegetation along waterways.




Common questions	Sedimentary soils	Metamorphic soils	Basalt soils	Granite soils	Alluvial soils (found on floodplains)
General comments	In all areas, fence the land to protect waterways and native vegetation. Establish windbreaks along drainage lines, ridges and in clumps, rather than along boundaries. (Note: a planning permit is required to clear native vegetation, including trees, grass, herbs and shrubs.) Bent Grass *(Agrostis capillaris)* often dominates the pastures in the region. This grass is so dominant it is beyond being treated as a weed. It can make pastures green and lush, but it has little feed value and is a sign of low fertility. Consider focusing on investing in good pasture on arable land where soil fertility and desirable pasture species can be maintained. Often soil disturbance brings in weeds – think about what it might cost before using earth moving equipment or cultivators to 'clean up the mess'.				

Mine tailings

Many towns and houses in Central Victoria have been built in areas that were once mined for gold. After gold was extracted, large piles of crushed rock called mine tailings (also called battery sand or tailings sand) were left behind. These often look like fine clay or sand. Many contain high levels of arsenic and around Central Victoria they have mistakenly been used for landscaping, meaning they have been spread over large areas of land, including land now used for housing. Arsenic in mine tailings may be harmful to health. The risk to health depends on a number of factors including:

- The level of arsenic in the mine tailings
- The amount of soil and dust swallowed
- The length of time people are exposed

Relics and waste from the gold mining era are still found in Central Victoria.

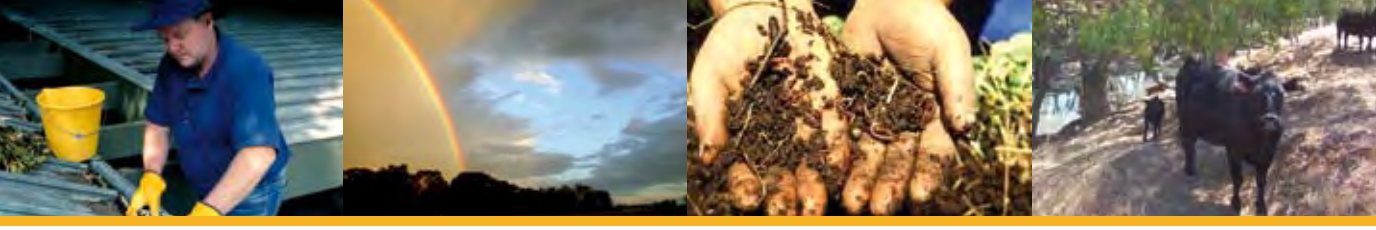
Resources:

Salt-tolerant plants are listed at Victorian Resources Online: **www.dpi.vic.gov.au/vro**

Victorian Land and soil Survey Directory: **www.dpi.vic.gov.au/dpi/vro/soilsurv.nsf/HTML/Index?Open**

For further information about living in an area with mine tailings, contact the Department of Human Services on 1300 650 172.

If you want to move or dispose of mine tailings, contact EPA Victoria on 03 9695 2722 or 1800 444 004.



chapter 11

managing pastures

Most small property-owners dream of running a few animals for fun or profit. Managing pastures becomes vital for supplying good feed and looking after the soil.

Kangaroo Grass

Types of pasture plants

Good pastures are a blend of different plant species, so that fresh, green feed is available for as long as possible during the year. Pastures consist of annual and perennial plants.

Annual plants grow only from seed. They germinate quickly and strongly, grow to maturity, flower, set seed and die within 12 months. Some early maturing annuals take only a few months to complete the cycle while others take the full year. The life cycle of the plant is linked to the length of the growing season where it is found.

Perennial plants live for two years or more. Some grow from vegetative parts as well as from seed. They do not grow as quickly or strongly as annuals and take longer to establish. Once mature, they continue to flower annually until they die. Perennial plants generally require good rainfall to establish strong, deep root systems and are better at out-competing weeds and withstanding the soil pugging and compaction problems caused by hard-hoofed animals such as horses, sheep and cattle.

Tussocky perennial grasses with upright growth habits provide hardy groundcover but have a lower nutritional value than low-growing clovers.

Pasture has to be managed to maintain its health.

Perennial pastures have a number of advantages over annuals:

- They are deep-rooted and help control salinity as they use more water
- They help control erosion by reducing run-off
- They grow for a longer period than annual pastures
- They help with weed control by out-competing some weed species
- They are active in summer and respond quickly to rain

Good pasture blends can be difficult to achieve, as the more dominant pasture species will out-compete the less dominant species.

Native pastures

Native pastures consist of a variety of perennial grasses including Weeping Grass, Kangaroo Grass and Wallaby Grass. Native grasses are very hardy and persistent and can even survive on soils with low fertility.




Since European settlement, 99 per cent of Victoria's native grasslands have been lost. Native grasslands are now severely threatened, and protection of even small patches of remaining grasses is essential.

Every effort should be made to encourage the persistence of native pastures. They will not withstand heavy grazing as do introduced pastures but, if managed properly, they can provide groundcover for up to 80 per cent of the year.

Many native grasses are perennial so they also help control salinity and erosion. Research on grazing of native pastures is still underway but early recommendations suggest native grasses should not be grazed in spring, to allow plants to set seed, or after autumn rains, to allow seeds to germinate and establish.

Common native pasture grasses include:

- Kangaroo Grass (*Themeda triandra*)
- Wallaby Grass (*Danthonia spp.*)
- Weeping Grass (*Microlaena stipoides*)
- Tussock Poa (*Poa spp.*)
- Spear Grass (*Stipa spp.*)

Pasture weeds

A pasture weed is any plant that is toxic to grazing animals, unpalatable or unproductive. Pasture weeds compete with pasture plants for light, moisture and nutrients. Inspect paddocks closely throughout the year to identify pasture weeds. Weeds occupy a lot of space when they are green and can make a paddock look healthy and lush. When they dry off over summer and set seed, bare patches become evident and the true state of the paddock is revealed. Many pasture weeds were once valued plants of home gardens. Soursob (*Oxalis pes-caprae*) and Spanish Heath (*Erica lusitanica*) are examples of garden escapees.

Also, pasture plants like Kikuyu Grass (*Pennisetum clandestinum*) and Phalaris (*Phalaris spp.*) are considered serious weeds in remnant vegetation and along roadsides when they escape from pastures. Buffers along boundary fences near roadsides and near remnant vegetation should be kept clean of pasture weeds. Land managers must work to keep weeds out of their pasture paddocks, and to keep the introduced pasture species in the paddock, as they can cause weed problems elsewhere. This is not an issue when the main grazing species are native pastures.

Controlling pasture weeds requires constant monitoring, grazing, slashing and mowing and, as a last resort, herbicides. See Chapter 12 Pest Plants and Animals, for further information on weed control.

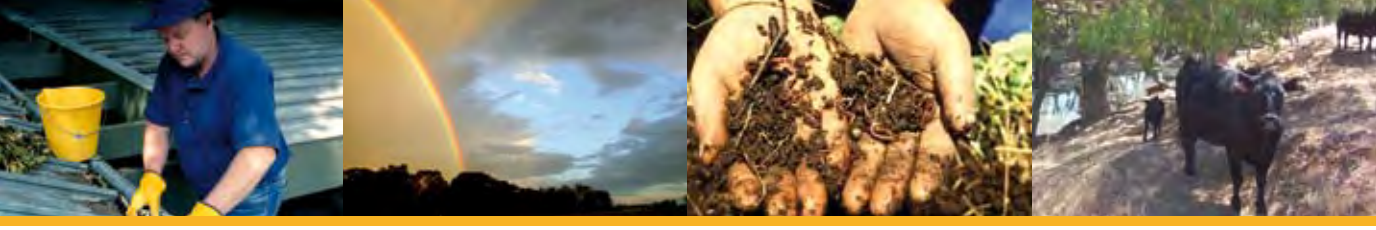
Artichoke Thistle is a common invader of pastures and grasslands.

Rotational grazing with sheep or cattle

Grazing horses on rotation with other livestock like sheep and cattle can be an effective way to maintain good production from pastures. Sheep and cattle eat a much greater range of pastures than horses and will graze areas horses have avoided. Sheep will eat most weeds found in horse paddocks.

In a cattle and horse rotation, it is best to graze cattle first as they will eat the longer grass, while horses prefer shorter grass. Even when horses are grazed first, cattle are good at cleaning up the areas of long grass that have been left. Cattle and horses will not graze near their own dung but they will graze near each other's dung.

Alternating cattle or sheep with horses also helps to control parasitic worms in the pasture. Most worms that live in horses cannot survive in cattle or sheep. Small property-owners not wanting to buy sheep or cattle could consider leasing, or joint ownership of stock, which can be moved between neighbouring properties.



Mowing or slashing and mulching

Mowing or slashing during rapid spring growth can help keep pastures short and available for grazing. It also prevents weeds from establishing and improves the soil by providing habitat for soil organisms. Some broad-leafed weeds, such as Cape Weed, will not be controlled by mowing as they grow outward rather than upward. Mulching can help smother weeds and hinder their growth.

Manure removal

Regularly removing manure in small paddocks will increase the amount of pasture available and discourage patchy grazing and weed invasion. If this manure is composted and respread over the paddock, it will act as a natural fertiliser and encourage pasture growth.

In larger paddocks you can spread rather than remove the manure, which again promotes soil health and encourages pasture growth.

Tips for managing pastures

- Healthy pastures rely on healthy soil
- Pasture management requires regular monitoring and recording
- Aim for a mix of annual and perennial plants
- Encourage native pastures
- Monitor and control pasture weeds
- When running horses, practise the 5–15 centimetre method of rotational grazing and remove manure regularly
- Mowing and slashing may also be useful

Resources:

Weeds Australia weed identification: **www.weeds.org.au/vicmap.htm**

DSE website: **www.dse.vic.gov.au/** (go to Plants and Animals/ The Weeds and Pests on Public Land (Including National Parks) Initiative

The Australian Society of Agronomy: **www.regional.org.au/au/asa/1998/3/index.htm**

For the best results for your pasture, horses need to be shifted regularly into fresh paddocks.




chapter 12
pest plants and animals

Landowners can do a lot to protect native animals and plants by controlling the things that kill or out-compete them. You have legal responsibilities to identify invasive plants or animals and to manage them to minimise their impact.

Weeds

A weed may be defined as a plant growing in the wrong place or an aggressive plant that thrives when natural environments are disturbed or inappropriately managed. Weeds can invade bushland or waterways and out-compete indigenous species. This reduces or sometimes destroys the habitat available for native plants and animals.

Weeds are often introduced to an area through human ignorance or carelessness. For example, many weeds of waterways are the result of discarded aquarium water. Once established in the wild, these weeds are almost impossible to eliminate and are readily spread by water or animals.

There are environmental and agricultural weeds, and some in both categories are declared noxious.

Environmental weeds

Environmental weeds are plant species that invade and choke out native plant communities. They compete with native vegetation for resources like moisture, nutrients and light, and reduce or destroy habitat for native animals. They often take over when vegetation is disturbed or inappropriately managed. Landholders can help by controlling these weeds on their land and preventing their spread to other areas.

Environmental weeds can be introduced from other countries or be native to Australia. Cootamundra Wattle (*Acacia baileyana*) is an example of an Australian plant that is an environmental weed in Central Victoria. Landholders should make every effort to control weeds on their land and to prevent their spread to other areas. Most environmental weeds were originally introduced for ornamental purposes (gardening). They are sometimes called 'garden thugs'. You can help the environment by making sure you don't use invasive plants in your garden. Ask your council or local native nursery if they have a list of environmental weeds or garden thugs for your area.

Declared noxious weeds

Declared noxious weeds are introduced plants that have been declared 'noxious weeds' under the *Catchment and Land Protection Act 1994*. They may affect the productivity of agriculture, invade native vegetation, or both. Noxious weeds are classed as State Prohibited, Regionally Prohibited or Regionally Controlled or Restricted. The category determines which land manager is responsible for eradicating or controlling these weeds and controlling their growth and spread to other areas (see Table 1 overleaf).

State Prohibited Weeds

State Prohibited Weeds are the responsibility of the State Government. They either don't yet occur in Victoria but pose a significant threat if they invade or, if present, do pose a serious threat and it is reasonable to expect that they can be eradicated from the State. Control of these weeds is the responsibility of DSE throughout the State.

Regionally Prohibited Weeds

Regionally Prohibited Weeds are not widely distributed but are capable of spreading further. It is reasonable to expect that they can be controlled or eradicated in the region. Land owners and managers are responsible for control of these weeds on their land.

Regionally Controlled Weeds

Regionally Controlled Weeds in the region are usually widespread and continued control measures are required to prevent further spread to unaffected land. Landowners are responsible for preventing the spread of Regionally Controlled Weeds on their properties and adjoining roadsides not managed by VicRoads.

Restricted Weeds

Restricted Weeds include weeds that if sold or traded, would create a risk of spreading more widely in Victoria and other states.

A list of all the State Prohibited, Regionally Prohibited, Regionally Controlled and Restricted Weeds can be found at **www.dpi.vic.gov.au/vro**.

Legal obligations concerning weeds

The *Catchment and Land Protection Act 1994* (*CaLP Act*) lists the declared noxious weeds in Victoria and provides information relating to weed control. Under the *CaLP Act* landowners are responsible for eradicating Regionally Prohibited Weeds only on their own properties. Those who fail to eradicate Regionally Prohibited Weeds may be prosecuted. A Land Management Notice may be served on a landowner who fails to comply with the *Catchment and Land Protection Act 1994* and, if works are not carried out, they may be liable to prosecution, with fines of up to $24,000 imposed and/or DPI may enter the property and carry out the works at the owner's expense.

It is also the responsibility of landholders to control Regionally Controlled Weeds on their properties and some adjoining roadsides. Failure to do so leaves the owner liable to prosecution. A notice may be served on a landowner and if works are not carried out DPI may enter the property and carry out the works at the owner's expense.

Regional Priority Weeds for Central Victoria

Further to the listed weed species under the CaLP Act 1994, the North Central CMA has prioritised weeds for Central Victoria. Not all priority weeds for the North Central region are declared noxious weeds but they are considered an environmental or agricultural threat.



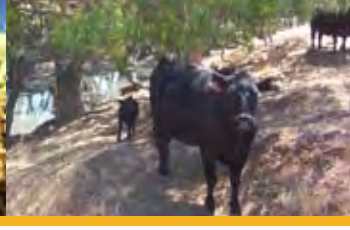



Table: Noxious weed classes and responsible land manager

Status (Level of control)	Land type	Responsibility
State Prohibited (Eradication)	All land including private	DSE/DPI
Regionally Prohibited (Eradication)	Private land	Landowner or lessee
	Declared Roads (highways)	VicRoads
	Declared Roads (main roads)	VicRoads or local government where delegated
	Undeclared Roads (local roads)	DSE
	Unlicensed Unused Road Reserves	DSE
	Licensed Unused Road Reserves	Lessee
Regionally Controlled (Prevent growth and spread)	Private land	Landowner or lessee
	Declared Roads 1 (Highways)	VicRoads
	Declared Roads (main roads)	VicRoads or local government where delegated
	Undeclared Roads (local roads)	Adjacent landowner or lessee
	Unlicensed Unused Road Reserves	DSE
	Licensed Unused Road Reserves	Lessee
Restricted Weeds	All land including private	Land manager

Table 1: Priority Weeds for Central Victoria as identified in the North Central Region Weed Action Plan 2001–2005

Priority Weeds for Central Victoria	Common Name	Botanical Name
New and Emerging Weeds	Arrowhead	*Sagittaria graminea*
	Chilean Needle Grass	*Nassella neesiana*
	Serrated Tussock	*Nassella trichotoma*
Regional Priority Weeds	Bridal Creeper	*Asparagus asparagoides*
	Hardheads/Russian Knapweed	*Acroptilon repens*
	Prairie Ground Cherry	*Physalis viscosa*
	Silver-leaf Nightshade	*Solanum elaeagnifolium*




Priority Weeds for Central Victoria	Common Name	Botanical Name
Local Priority Weeds	Blackberry	*Rubus fruticosus agg.*
	Boxthorn	*Lycium ferocissimum*
	Cape Broom	*Genista monspessulana*
	Cape Tulip (two-leaf)	*Homeria miniata*
	Cape Tulip (one-leaf)	*Homeria flaccida*
	Furze/Gorse	*Ulex europaeus*
	Horehound	*Marrubium vulgare*
	Paterson's Curse	*Echium plantagineum*
	Spiny Burr Grass/Gentle Annie	*Cenchrus longispinus*
	Spiny Rush	*Juncus acutus*
	St John's Wort	*Hypericum perforatum*
	Wheel Cactus	*Opuntia robusta*
	Wild Garlic	*Allium vineale*

How weeds germinate and grow

Effective weed control depends on knowing your weed before deciding on a control method. There are three main life cycle types: annual, biennial and perennial.

Annual weeds grow to maturity, set seed and die within one year. Their roots are usually shallow. They rely heavily on annual seed production for their survival. Cape Weed (*Arctotheca calendula*) and Bathurst Burr (*Xanthium spinosum*) are examples of annual weeds.

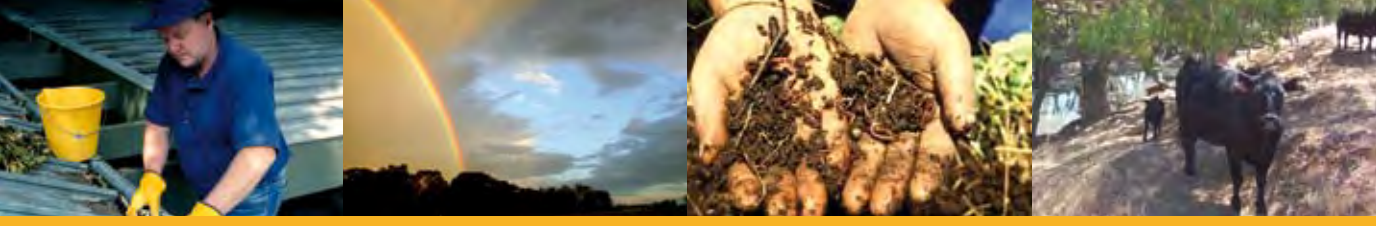
Biennial weeds live for two years. They germinate and grow to a small plant in the first year then flower and set seed and die in the second year. Twiggy Mullein (*Verbascum virgatum*) is an example of a biennial weed, as are some thistles.

Perennial weeds live for many years. Some perennial plants may propagate without producing seeds, e.g. Soursob (*Oxalis pes-caprae*). Blackberry (*Rubus fruticosus agg.*) and Cat's Ear (*Hypochoeris radicata*) are examples of perennial weeds. Invasive shrubs and trees are perennial but are often referred to as woody weeds.


Paterson's Curse


Bridal Creeper


Wheel Cactus



Control techniques

There are various means of controlling weeds, ranging from hand weeding to improved management and chemical treatment. On many small properties the most effective way to control larger weeds might be to hand weed them, but over larger areas changing your management of grazing, altering the soil properties or using herbicides might be more appropriate. Seek advice from your local Landcare group, DPI, herbicide retailer and local weed contractor before you start weeding.

Integrated weed control

Controlling weeds usually needs a combination of techniques, and almost never succeeds with only one treatment. A planned approach is required to identify the characteristics and weaknesses of a weed and match the problem with a range of control methods. This approach is called integrated weed control.

What is Integrated Weed Control?

Controlling a large gorse problem: In the first year manually 'cut and paint' large isolated bushes. Cut and paint is just that: cut the large bush down and paint the stump – particularly the green growing layer under the bark – with herbicide. Engage a contractor to 'groom' (cut and mulch) large clumps, and spray small isolated bushes with selective herbicide.

In the second year, spray the groomed areas and any regrowth gorse from last year's spraying or cut and paint work. In year three burn all the treated areas to germinate the seed bed and following the burn, spray all the seedlings with a selective herbicide. In the fourth year spot spray any regrowth. If the area is a steep slope or waterway, fence and revegetate to provide shade and competition. Continue to spot spray any regrowth gorse as it appears, and never allow any gorse to set seed.

This example of integrated weed control uses five control methods to address one weed species: cut and paint, grooming, chemical control, competition and fire. Any investment in weed control must be matched with follow-up works, or the original investment may be wasted. In many situations weeds cannot be eradicated and can only be kept at low levels. This requires weed control to be part of an annual maintenance program.

Integrated weed control uses a variety of methods in combination to combat weeds.

Steps for integrated weed control

- Identify the weed. Your local library is likely to have a range of weed identification books. If you can't identify the weed, collect a sample and take it to your local DPI office, rural store or even the National Herbarium. Identification is easier if the plant has a flower, seed head or fruiting body. If sampling grasses, dig up the whole plant, roots and all. Plants should be sealed in a plastic bag with some wet paper to prevent them drying out, or pressed between sheets of absorbent paper.
- Determine what category the weed is in, and if there are any legal requirements for treatment. For information on any type of weeds contact your local DPI office or visit **www.dpi.vic.gov.au.**
- Establish whether the weed is a problem on neighbouring properties and if possible develop a joint strategy for eradicating it.
- Apply initial control program.
- Monitor the re-establishment of the weed.
- Apply follow-up action.
- Continue monitoring for reinfestation.

Hand pulling

On small properties the best way to control larger weeds might be to pull them out manually. Do this in small areas where weeds are scattered and before the plants set seed. Dispose of the weeds carefully, either by burning or composting to prevent them spreading elsewhere.

Mowing and slashing

Regular use of a brushcutter, whippersnipper or mower can help keep weeds under control. Timing is important. Annual weeds should be cut before they drop seed. Cutting the weeds close to the ground does more damage to the weeds than cutting them high. Mow or slash perennial weeds several times over the growing season to limit growth and prevent fruits or seeds from developing.

Grooming to remove gorse.




Mulching

Mulching keeps out the light, which can prevent weed germination and growth. It can also preserve soil moisture and improve the organic matter in the soil. Use commercial mulch, wood chips, newspaper and plastic. Check that the commercial mulch you buy is free of weed seeds. Don't mulch where there are indigenous ground storey plants, as it smothers them and prevents germination.

Grazing

Well-planned rotational grazing regimes can help control pasture weeds. Follow up with other control methods to ensure that weeds not eaten by stock do not gain an advantage and crowd out the preferred plants.

Burning

Burning is a complex weed control method that should be used only by those with experience. When used carefully, fire can destroy mature weeds, exhaust weed seedbanks and stimulate the growth of indigenous native species. Fire can be used to open up larger areas infested with woody weeds or to spot-burn smaller invasive weeds with a hand-held flame-thrower.

A fire's impact must be closely considered. Burning can hasten erosion by removing groundcover, and not all indigenous species are adapted to survive fire. Burning will stimulate germination of weeds and indigenous plants, so follow up weed control will be necessary. Fire always poses some risks. Check to see if permits are necessary. (See Chapter 9 Preparing for Fire.)

Gorse spider mites are having some success in biologically controlling gorse.

When gorse becomes well established it is difficult to eradicate.

Altering soil properties

The chemical and physical properties of soil will determine which plants will grow in a given area. For example:

Soil acidity – Adjusting pH can affect the range of plants that can grow in the soil. pH can be increased with lime and decreased with sulphur.

Drainage – Improving drainage can eliminate plants that prefer waterlogging, e.g. dock. On the other hand, inundating an area (e.g. reinstating a wetland) can drown many weeds.

Fertility – Adjusting the amount of soil minerals, especially phosphorus (P) and nitrogen (N), and also trace elements like molybdenum, can lead to healthier plant growth.

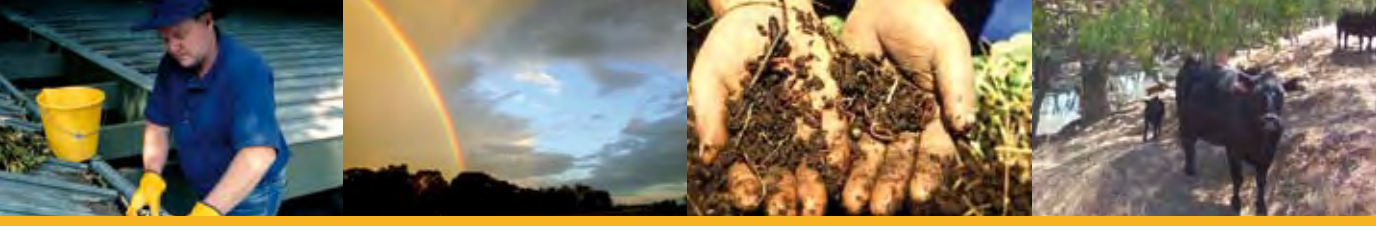
Raising soil fertility usually increases the number of weeds that can grow and their rate of growth. Indigenous plants are well adapted to the naturally infertile soils of our region and will usually compete better with weeds if the soil is left unfertilised. However, in agricultural situations, higher fertility can help exotic pasture or crops to compete with weeds.

Prevention and plant competition

Weeds are always more of a problem in areas that have been disturbed by grazing or earthworks, or are subject to soil erosion. Keep the soil in good condition. This means desired plants can compete with weeds and help to control them.

Prevent future weed problems by planting indigenous native plants grown from locally collected seed. Plants native to other parts of Australia can become weedy when introduced to another area, so when you buy a plant with the term native on the label you could still be buying a weed.

Indigenous plants grown from local seeds are best suited to local



conditions, and growing them on your property will greatly help the environment. Consult your council, specialist native nursery or Catchment Management Authority for a list of plants indigenous to your area.

Chemicals

Chemicals designed to control weeds are called herbicides, and their use is of great community concern. Spray drift, the persistence of herbicides in the soil, damage to non-target species and the health risks involved in handling and storing herbicides are some of the problems associated with their use.

When they are used selectively by an experienced operator or local contractor, herbicides can be highly effective. Herbicides can be specific, meaning they target a particular type of plant, or non-specific, meaning they have the potential to kill any type of plant. Herbicide manufacturers are required by law to provide application rates and methods, and safety information on product labels.

Each particular chemical has its own mode of action and associated safety procedures. Instructions are clearly spelt out on the label. They should explain the chemical's withholding period, the time it takes to break down, and its suitability for use in certain soil types or near water, horticultural crops and native vegetation. **Read these instructions very carefully**. For clarification on any points contact the chemical company, refer to the material safety data sheet or contact the retailer from which you bought the chemical.

It is important to choose the right herbicide and the right method of application. The most common methods of application are spraying (using a pump pack or spray can), wiping and dabbing using specialised applicators, and painting with a brush or sponge.

Use the smallest amount of herbicide at the lowest toxicity. Some chemical weed control can be legally handled only by the holder of an Agricultural Chemical Users Permit (ACUP) or someone under the direct supervision of an ACUP holder. Accurate written records of the use of these chemicals according to the regulations must be kept for at least two years. To qualify for an ACUP you must complete a Farm Chemical Users Course or a recognised equivalent. The ACUP is valid for 10 years.

The alternative to this is to employ an experienced weed control contractor. They will have the knowledge, qualifications, equipment and experience required for your area. A list of contractors is available from your local council. It is important that you check that your contractor has followed hygienic weed practices and is not accidentally introducing other weeds to your property from their vehicle or other equipment.

Further information on chemical controls and application forms for permits can be obtained from a DPI Regional Chemical Standards Officer. Up-to-date agricultural chemical label status and other information on registered chemical products can be obtained from the DPI Chemical Information Service. For further information please contact the DPI Customer Service Centre on 136 186.

Tips for effective weed control

- Plan ahead. It may take years to completely eradicate certain species. Set realistic, achievable goals.
- Correctly identify the weed and the indigenous species growing around it.
- Choose a safe and appropriate control method.
- Consider environmental impacts. Are there waterways nearby? What are the risks to native plants?
- Minimise disturbance at the site so the weeds don't spread further. This includes limiting vehicle access and checking tools, clothing and footwear.
- Time treatments to get maximum results.
- Remove weeds carefully to avoid reinfestation.
- Revegetate with or encourage regeneration of indigenous species.
- Record and evaluate all treatments. Modify if necessary.
- Work cooperatively with your neighbours.

Exotic aquatic plants

Exotic aquatic plants cause many problems in Central Victoria by impeding water flow in drains and irrigation channels, reducing water quality, decreasing biodiversity and impeding recreation. You should never throw out ornamental, aquarium and pond plants in or near waterways. Where possible use indigenous aquatic plants, such as Cumbungi or Water Ribbons, for ornamental purposes.

Parrots Feather is a common weed of waterways in Central Victoria.




Pest animals

Pest animals often out-compete and prey on native animals and have an enormous impact on the environment. They cause huge financial losses for farmers, degrade bushland and cost the community millions of dollars each year. Pest animals are a living reminder of the mistakes of history. Rabbits, foxes, deer and trout were brought to Australia by the white settlers for sport and food. Cats and goldfinches were pets that escaped and have established wild populations.

Rabbits

Under the *Catchment and Land Protection Act 1994*, landholders are required to control rabbits on their land and legal action can be taken if they fail to do so. Rabbits are the most serious of Australia's pest animals. They compete with native wildlife for food and shelter and have contributed to the extinction of numerous native species. They compete with livestock for food and damage native vegetation.

Rabbits graze selectively. They feed heavily on palatable grasses and herbs and avoid unpalatable weeds. This leads to the loss of native species and the spread of weeds.

Rabbits are prolific breeders and reproduce throughout most of the year. Under ideal conditions one pair of rabbits can increase to 180 rabbits in around 18 months. When the rabbits reach maturity they fan out from the family burrow, seeking new territory. Survival rates of young rabbits increase significantly when they have safe harbour.

Rabbit control methods

The key to effective rabbit control is planning and persistence. Tolerating even small numbers of rabbits is unacceptable – one rabbit is too many and you should take action.

Several of the following control methods used together will give the best results.

Destroying harbour

Rabbits do not need burrows or extensive warrens to survive, and in some cases can find harbour above ground in places such as abandoned cars and blackberry thickets. You should consider destroying harbour such as that as part of an integrated pest control program. Speak to your Catchment Management Officer at your local Department of Primary Industries, and always be aware of the possibility that there may be Indigenous cultural heritage sites on your land, that should be protected.

Rabbit-proof fencing

Well-constructed and maintained fences can keep rabbits out of your property for the long term. Working with adjoining neighbours to fence a larger area can also be worthwhile. Rabbit-proof fences require special construction. A section of wire mesh must be buried under the fence or angled across the ground in the direction of possible rabbit entry. Once an area has been securely fenced other control methods (poisoning, fumigation, and warren destruction) must be used to remove rabbits in the fenced area.

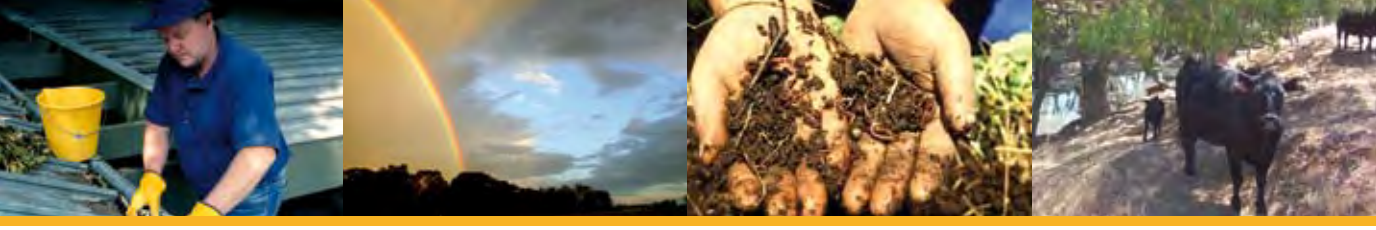
Fumigation and warren destruction

Fumigation involves placing a poisonous fumigant in warrens and burrows and blocking all exits. Running dogs over the area or creating loud noise will scare rabbits into their burrows before fumigation. Every hole or burrow must be treated and then securely blocked. Fumigation of warrens must be undertaken by contractors as the fumigant can be legally handled only by the holder of an Agricultural Chemical Users Permit. Destroying warrens after fumigation will prevent reinfestation. Warrens can be destroyed by digging them out with a shovel, mattock or pick. Backhoes are very useful but care must be taken to avoid excessive soil disturbance, which can cause erosion. Check the area regularly and close up any new burrows quickly.

Baiting

Oat baits laced with Pindone, an anti-coagulant poison, are effective to control large rabbit infestations, but there are some risks to native animals and pets. The safety and handling directions on the product

Infestations of rabbits can seriously damage the soil.



label must be strictly adhered to. An antidote is available from veterinarians if pets accidentally eat baits. A baiting program must be carefully planned and you will have to notify neighbours and put up warning signs. Baiting is a complex and potentially hazardous procedure and is best carried out by a group of landholders working together, or a registered pest control contractor.

Further information is available from your local DPI office.

Ferreting

Ferrets are useful for clearing a few remaining rabbits once numbers have been reduced by other methods. Ferreting is effective inside fenced areas or under buildings where access is difficult. Care must be taken to ensure that any native animals using rabbit burrows are not threatened or injured by ferrets.

Foxes

Fox dens can be found underneath houses, schools and factories and in bowling clubs, cemeteries, railways, golf clubs, creek banks, drains and rubbish heaps. Foxes prey heavily on rabbits but around a quarter of their diet is native wildlife. Ground-dwelling mammals are easy targets, as are birds, possums, lizards, beetles and other insects. Researchers have estimated that one fox can eat around 32 kilograms of native wildlife each year and can range over 20–30 kilometres a night.

Victoria has an estimated population of over one million foxes.

Photo: Laurie Martins

Some councils are applying cat curfews.

With an estimated one million foxes in Victoria the impact is staggering. Foxes carry a variety of canine diseases and would be a prime carrier of rabies if it were to enter Australia.

Fox control methods

Effective control should centre on making your property less attractive to foxes. Reducing rabbit numbers will affect foxes, but it will also force foxes to meet the rabbit shortfall with native species. For this reason it is critical to coordinate fox and rabbit control programs.

Further information on declared pest animal baiting is available by calling DPI customer information centre 1300 10 1080 or your local DPI office or Landcare group for further information.

Cats

Domestic cats

Cats are instinctive hunters and will kill wildlife even if they are well-fed. They rarely respect boundaries and will hunt in your neighbour's property as well as in yours. If allowed, they will also hunt in bushland with the risk that they will become feral.

The only way to reduce the impact of cats on wildlife is to not have a cat near bushland. If you can't do without a cat, adopt a cat curfew. Keep it enclosed – perhaps in a laundry or garage – from dusk until after sunrise. This will reduce its impact on wildlife and will also reduce the risk of injury to the cat on roads or in fights.

Confining cats permanently is also practical. Keep them in the house, where they will sleep most of the time or in special outdoor enclosures with or without a connection to the house. Cats kept indoors have an average life span of 12 years compared with three years for cats allowed to roam.

Some councils, such as the City of Greater Bendigo, apply cat curfews and impose fines for owners of cats caught out during curfew hours.

Feral cats

Feral cats kill wildlife, especially small mammals and birds. They are listed as a 'key threatening process' in the *Protection and Biodiversity Conservation Act 1999* (Federal legislation) and a *Threat Abatement Plan for Predation by Feral Cats* has been prepared. Feral cats are controlled by shooting, trapping, baiting and fencing off native wildlife reserves.




Dogs

Council regulations allow for up to three dogs to be kept in individual urban areas, but wildlife see dogs, even those on leads, as predators. To avoid unnecessary stress, it is best if dogs are not walked in bushland.

To avoid stress to humans, carry a scoop and plastic bag to remove anything your dog leaves behind. Do not allow dogs to roam freely when you are not at home. Most shires and the City of Greater Bendigo have local laws about controlling domestic animals: you can face severe fines if you don't abide by these regulations.

Other domestic animals

Less common pets such as domestic rabbits, guinea pigs, ferrets and aviary birds are not covered by specific council regulations. Your local council and the RSPCA may become involved if there are complaints of noise, smell, other nuisance or cruelty.

Keeping animals such as horses, pigs, sheep, goats and poultry is usually considered on a case-by-case basis and will depend on the zoning of the property. Council will not normally object to your keeping a sheep or goat as a 'lawnmower' provided adequate arrangements are made for the safety of the animal (e.g. to protect it from attack by dogs) and for secure fencing.

Pest birds

The introduced House Sparrow, Common Starling and Common (Indian) Myna are economic and environmental pests. These birds compete for food and habitat with native birds.

Pressure is put on native birds, many of which are declining, when starlings and mynas aggressively take over their hollows, destroying eggs and killing chicks in the process. It is almost impossible to stop them from occupying your property if you live where there are large populations of these species, but you can make your property more attractive to native birds and less inviting to introduced species by planting a variety of native plants – preferably indigenous – to the region you live in.

Birds affected include the larger parrots, cockatoos and owls.

Aquatic pests

Pest animals of the waterways are the result of careless disposal by aquarium owners or an ill-conceived, deliberate introduction for a specific purpose.

The goldfish (*Carassius auratus*) was probably introduced to Australia in the 1860s and widely distributed by acclimatisation societies in the 1870s. The continuing spread is believed to be assisted by anglers (using goldfish for live bait) and aquarists. Goldfish are found throughout the Loddon and Campaspe catchments and are part of the food web. They are members of the carp family.

The Eastern Gambusia (*Gambusia holbrooki*) is a good example of a well-intentioned action turning into an ecological disaster. Gambusia is native to the rivers draining the Gulf of Mexico, and has been distributed worldwide to control mosquitoes. It was introduced to Australia in the 1920s, but its introduction has proved to be disastrous because mosquito larvae form only a small part of its diet. The rest of its diet consists of native ants, flies, aquatic beetles, rotifers, crustaceans, molluscs and the eggs and fry of native fish species. Recent studies have also shown that gambusia have a preference for tadpoles over mosquito larvae, and scientists are worried that this is causing a serious decline in amphibian populations around the world.

Legal obligations

Landowners can face severe fines under the *CALP Act 1994* if they do not control declared pest animals on their land.

Tips for effective pest animal control

- Identify and monitor pest numbers
- Create coordinated pest animal management programs with neighbours or the local Landcare group
- Combine several proven control methods, including the destruction of habitat
- Strictly adhere to the safety and handling directions on poisons
- Record and evaluate all methods and modify if necessary
- Continue to monitor pest activity after control
- Be vigilant and persistent. Pest control is time-consuming and there are no quick-fix solutions
- Keep cats inside at night and control other potential pests
- Control your dogs

Resources:

Feral.org.au: **www.feral.org.au/**

www.dpi.vic.gov.au

CRC for Australian Weed Management: **www.weeds.crc.org.au**

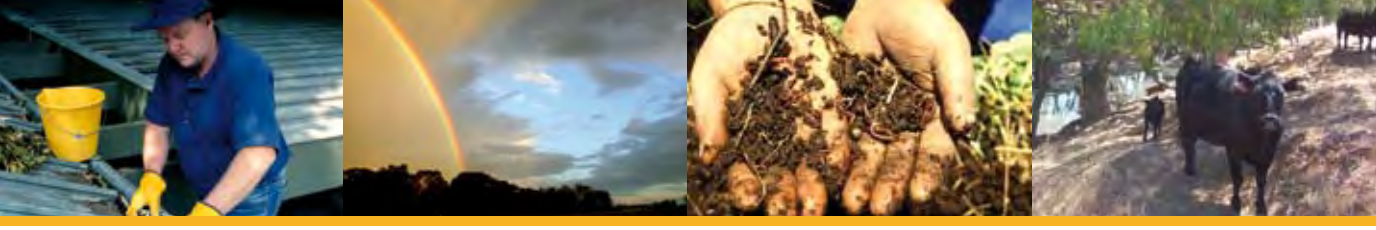
DSE website: **www.dse.vic.gov.au/** (go to Plants and Animals/ The Weeds and Pests on Public Land (Including National Parks) Initiative

Further Reading

Environmental Weeds: A Field Guide to SE Australia, Kate Blood, Bloomings Books, 2003.

Weeds of the North Central Region: A Field Guide for Identification, North Central CMA, 2003.

Central Victorian Weeds booklet, Macedon Ranges, Mount Alexander and Mitchell Shires.



chapter 13

being a good neighbour

We all like to get on well with our neighbours, but being a good neighbour involves so much more than being nice to each other. We have to respect those around us and respect their right to live in a healthy environment. That means controlling pest plants and animals, not polluting, not disrupting cross-property water flows, keeping noise down and ensuring that the quality of water flowing from your property is as good or better than it was when it arrived. You need to be a good neighbour, even when your neighbour is the State or Federal government.

Moving into rural areas

While at first your new rural home may seem quiet and picturesque, it could well change through the seasons, especially if you have moved into an area zoned rural. In these areas, farming is a legitimate activity. Noise, dust and smell may well be part of life. Sometimes slow, heavy vehicles and livestock may occupy the roads. Grapes are often harvested at night.

Your neighbours may want to let you know that you are responsible for pest and weed management. If they do, take the opportunity to try to learn something from them. If they've been farmers for some time, they may well have good advice. This might also present a good opportunity to learn about local groups such as Landcare, Waterwatch, Saltwatch and the local fire brigade. Joining these groups is your ticket to becoming part of the community.

Landowners must remember that it is their responsibility to control pest plants and animals on their properties and on some adjoining roadsides (see Chapter 12 Pest Plants and Animals). Failure to do so leaves them open to prosecution. A notice can be served on a landowner and if works are not carried out, DPI can enter their property and carry out the works at the landowner's expense.

Pets harassing, injuring, or killing neighbours' livestock is a major issue on farms where a neighbour's livelihood depends on the livestock. The Domestic (Feral and Nuisance) Animals Act 1994 provides the basis for councils and livestock owners to deal with this situation.

Noise, smoke and smell

Avoid causing pollution, especially when it affects your neighbours. Smoke and odour and noise pollution from recreational vehicles and motorbikes are the main culprits. Generators and pumps are also commonplace. These can become a serious environmental nuisance for neighbours, affecting not only their health but also their home comfort and quality of life. Think about this and try to adjust the use of noisy and smelly machinery to minimise its impact. But it is important to remember that if you move into an area zoned rural, farm neighbours may already run enterprises that by their nature are noisy. Orchards, for example, often operate scare guns. Mooing cows are an essential part of dairy farms.

Planting trees along boundaries can help buffer your home from these noises. When planning a noisy activity or one that produces smoke and smell, it's best to advise your neighbours beforehand. Be careful when you burn off, and don't light fires between October and March. You could be responsible for damage to neighbouring properties if the fire escapes. Always think about whether you really need to burn.

Fixing the fence

If you'd like to put up a new boundary fence, choose what sort, get a quote for materials and construction costs and then discuss this with your neighbour. If it's a standard fence, neighbours usually pay half each. If the farm fence is in good condition, your neighbour is not obliged to share the cost of putting up another just for the sake of building a better-looking fence.

Neighbours usually share the cost of boundary fencing.

Responsibilities concerning fences are set out in the *Fences Act 1968*. A copy of the Act is available online at **www.dms.dpc.vic.gov.au**. Fencing responsibilities are also explained at **www.legalonline.vic.gov.au**

Landowners are responsible for keeping their fences in good order. Make sure animals don't stray from your property on to a road. If they do and they cause an accident or damage your neighbour's property, you could be sued.

When your neighbour is the State or Federal government, i.e. when you live next to a State reserve, forest or national park, different rules apply to fence construction costs. Usually the private landowner has to pay all the fencing construction and maintenance costs. Refer to the web addresses listed above for further details.

Resolving disputes

It's best to seek a mutually agreeable solution with your neighbour when disputes arise. Legal action is expensive and time-consuming and




a court decision does not necessarily make either party any happier. Nor does it improve relationships. For example, if your neighbour's wood heater is creating pollution that is affecting the enjoyment of your property, try talking to your neighbour, explain the problem and offer appropriate suggestions for fixing it. If this does not resolve the problem, you may need to involve a third party. If the unresolvable problem involves a major industry, such as a factory or intensive animal industry, contact EPA Victoria. You can also seek advice from the environmental health officer at your local council. If the problem is non-industrial, contact your council.

If you have pursued all other attempts at resolving a dispute and your neighbour continues an illegal activity, ask an advisory officer from the council or a government agency to inspect the neighbouring property. Regulatory officers such as those from EPA Victoria have a responsibility to intervene where activities are illegal. They can order the activity to cease, impose fines and begin court action.

Another option for resolving disputes between neighbours is to contact the Rural Dispute Settlement Centre in the Department of Justice, phone 1800 658 528. It was set up especially to help rural residents and their neighbours resolve disputes over farming, land use planning and other land management issues. It provides a free mediation service.

A key guide to checking your rights as a neighbour is *The Rural Law Handbook*, available from the Victoria Law Foundation.

Going organic

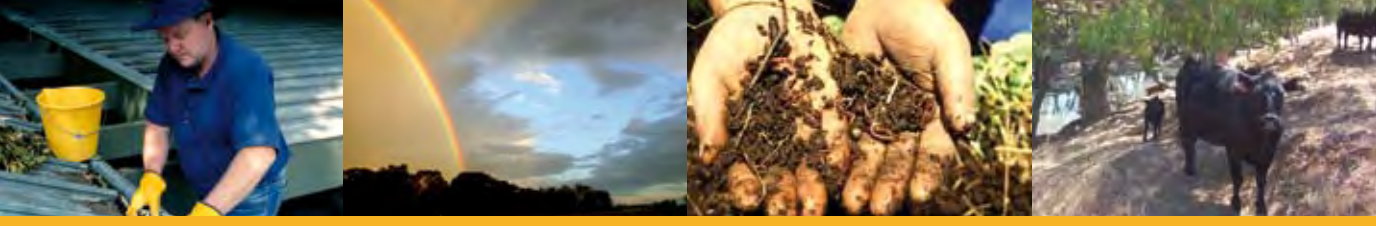
If you're planning to farm organically, let your neighbours know what this means. Try to work out an agreement on what they could do to reduce the effects of chemicals on your place or allow suitable buffer zones. Reward them for helping you out. You will also need to advise water authorities, councils and Crown land managers who use chemicals and herbicides for pest and weed control on roadsides and elsewhere.

Recreational vehicles and motorbikes

Recreational vehicles and motorbikes can be noisy. Consider your neighbours and try to keep well clear of their homes when on neighbouring properties. When used on public land, all motorbikes, trail bikes and 4WDs must be registered and their riders licensed. Riders must comply with park, reserve and forest regulations. They must drive on roads only open to the public. Vehicles must not be driven off formed roads or on walking tracks. When roads are closed either for safety reasons or to minimise erosion, they are off limits.

Besides noise trailbikes can cause erosion through bushland.

People who dump rubbish in bushland can be fined.



Vehicles and bikes registered for recreation are not permitted on public roads and tracks in parks and forests. For information about using bikes and 4WDs on public land, contact Parks Victoria on 13 19 63. For information on forests, land management, natural resources and agricultural matters, phone DSE on 13 61 86.

Landcare

One of the most important ways to help your community address environmental problems is by joining your local Landcare group. Landcare groups are voluntary groups that help tackle land degradation, weed problems and pest animals. They do this by banding together and organising planting and education days, and they work on private and public land. But if you need trees planted or weeds sprayed, it is best to call in professional contractors.

To contact your nearest Landcare group, check **http://northcentral.landcarevic.net.au/**.

LANDCARE AUSTRALIA

Living next door to a State park or national park

Living next door to a forest, park or woodland usually means the private landowner is liable for all fencing maintenance and construction costs between the two properties. If the government-owned land is leased then the lessee can share fencing costs. It is worth approaching a government agency, as sometimes it will agree to share the cost.

As a good neighbour, living next door to State forests, reserves and parks and national parks means keeping a check on pest plants and animals and reporting suspicious activity and incidents. Suspicious activity and incidents that could damage the environment or that are anti-social can be reported anonymously on the Bush Telegraph number which is 13 28 74 or 13 BUSH.

Incident reports on Parks Victoria land are sent to regional managers who ask local staff to investigate. Reports of incidents on other publicly owned land are sent to DSE to investigate.

Bush Telegraph

Bush Telegraph enables Victorians to report suspicious activity through a single, easy-to-remember number, 13 28 74 or 13 BUSH.

This is a simple, one-stop shop for Victorians to use when they witness behaviour that could damage our environment or is anti-social.

Everybody witnesses incidents from time to time such as people driving in inappropriate areas or removing plants from protected areas. Witnesses may like to report these to someone, but not necessarily the police. This service allows Victorians to register their concern (anonymously if they wish), which is then reported and forwarded to the appropriate authority.

Litter dumped in the bush can spread weeds and can be hazardous.

Resources:

Fencing responsibilities are explained at **www.legalonline.vic.gov.au**

EPA Victoria: **www.epa.vic.gov.au**

Biological Farmers of Australia: **www.bfa.com.au/**

Bush Telegraph: 13 28 74 or 13 BUSH.

Rural Law Online: **www.rurallaw.org.au/**

Further Reading

The Rural Law Handbook, Victoria Law Foundation **www.victorialaw.org.au/default.asp**




chapter 14
heritage

Old buildings, mullock heaps, middens and bones tell the story of this part of the country. We call this heritage. In Central Victoria, a rich trove of history and heritage survives from past eras. So when you see mounds, scarred trees, old buildings and mine sites, take note. Like a good storybook, they tell us much about what happened here and they need to be preserved. Not all heritage is evident. Some is culturally important, and it is important to look after it.

Aboriginal heritage

An early photograph of the original inhabitants of Victoria.

Aboriginal people have a history dating back at least 40,000 years in what is now known as Victoria. The tribes that lived in and around the Upper Loddon and Campaspe regions include the Dja Dja Wurrung in Central Victoria and the Wurundjeri around Mount Macedon.

Scar trees are still common throughout Central Victoria.

Map of language boundaries. Unlike present-day state borders, these boundaries were fluid and are approximate only.

Their physical traces (cultural heritage sites) include scarred trees, rock wells, stone quarries, axe grinding grooves, stone arrangements, oven mounds, burial sites, hearths (fireplaces) and artefact scatters. These sites link present day Aboriginal people to their past.

There are also places that Aboriginal people are connected to through their beliefs and cultural practices. Mount Franklin near Daylesford, for example, is important to the Dja Dja Wurrung people for its history as an 'Aboriginal Protectorate'.

The Mount William Stone Axe Quarry near Lancefield is significant to the Wurundjeri people because this was where greenstone, used for making stone axes, was quarried. A clan of the Wurundjeri cared for the quarry, ensuring that greenstone trades to other Aboriginal clans and nations

An Aboriginal rock well.



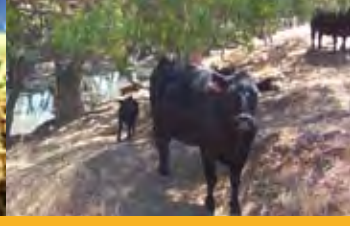




Photo: AAV


Photo: AAV


Photo: Peter McRostie

Mt William axe quarry was the most popular quarry because of the quality of its stone.

were carried out in accordance with customs and laws handed down from generation to generation.

There were eight known greenstone quarries in south-eastern Australia, but Mount William was the most desired for the quality of its stone. Stone from here was traded as far as the Adelaide Plains in South Australia, sometimes for possum skin cloaks made with 40 to 60 possum skins. One possum skin cloak would get two or three axe blanks. This indicates the importance of a greenstone axe to its Aboriginal owner: wooden implements (boomerangs, spears, clubs and digging sticks) used in hunting and gathering had to be made with stone tools.

If a clan had no naturally occurring stone in their area, they had to trade for it. When the stone was quarried, it was formed into blocks roughly the size of an axe head. Once traded, the new owner would then shape and sharpen the axe head using grooves made in an abrasive stone.

These grinding grooves and other places important to Aboriginal people are protected in Victoria by State and Federal laws including the *Archaeological and Aboriginal Relics Preservation Act 1972* (Victoria) and the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Commonwealth). Both Acts are administered by Aboriginal Affairs Victoria (AAV). Under these Acts it is an offence to damage, interfere with or endanger an Aboriginal site, place or object without obtaining prior written consent from the appropriate Aboriginal community.

Landholders are encouraged to report all Aboriginal heritage finds to Aboriginal Affairs Victoria.

Native Title

Freehold owners have exclusive possession of their land. Most houses in towns and on farms are on freehold land. Residential, commercial and certain other types of leases also confer exclusive possession. Australian law does not recognise Native Title over areas where people have exclusive possession of their land. Native Title isn't something to be afraid of.

Close up of a small grinding groove at Vaughan.




European heritage

European heritage is the physical remnants of history since settlement. It can range from old sheds to magnificent public buildings, from collections of buried remnants and gardens to entire towns and even suburban precincts, or places where significant events took place and archaeological sites are included.

These cultural heritage places can be on public land (parks, forests and reserves), agricultural land, residential or commercial land. Laws and regulations apply to protect these areas.

The Castlemaine Diggings National Heritage Park that surrounds Castlemaine, Chewton, Fryerstown, Vaughan, Campbell's Creek and Guildford, for example, is on the Commonwealth National Heritage List because it is considered a fine example of an 1850s gold rush site, and includes mining sites, miners' huts, Chinese market gardens and more. Plans are under way to apply special protection to this area. Bans are proposed, for example, on eucalyptus oil and timber harvesting, domestic stock grazing, hunting and the use and carrying of firearms in the park.

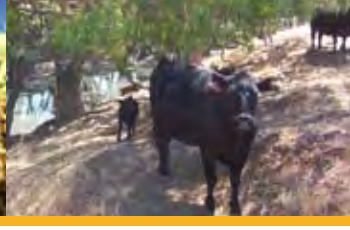
To find out more about the park, check the National Heritage List website at **www.deh.gov.au/heritage/national/index.html**

Central Victoria has one of the largest concentrations of listed cultural heritage places in Victoria. This extraordinary wealth of heritage places exists because during the mid-nineteenth century the region experienced one of the largest gold rushes in the world. Its gold played a major role in drawing overseas immigrants to the colony. It also raised great wealth from the ground, which flowed into Australian and overseas markets, changing the nation forever. As a result of this, population, wealth and manufacturing grew, transport improved and regional centres and

Relics from the days of gold mining litter the bush.

Many ruined buildings still stand from the gold era.



towns developed.

Landowners can check the following websites to see if a listed place occurs on your property.

- State significant – Victorian Heritage Register **www.heritage.vic.gov.au**
- Archaeological – Victorian Heritage Inventory **www.heritage.vic.gov.au**
- Local significant – Local Planning Schemes **www.dse.vic.gov.au/planningschemes/**
- Heritage places – The National Trust of Australia (Victoria) **www.nattrust.com.au**

You can also discuss the matter with local government heritage advisers or heritage advisory committees and with local community organisations such as historical societies and museums, and Heritage Victoria.

Local government heritage studies are another important source of information. They identify buildings, precincts and other places of aesthetic, architectural, historical, scientific and social importance within a municipality and can be found in local libraries or at the offices of the local council.

Landowners can find out, through the websites listed above, how to protect heritage places and objects. The Heritage Victoria website, for example includes:

- The Heritage Manual: gives practical and technical conservation tips and brochures advise landowners how to protect heritage places and objects
- Protecting Archaeological Sites in Victoria: explains archaeological sites in Victoria, why they are important and what to do if you find one
- Caring for Victoria's Heritage Places: explains how Victoria protects its historic buildings, gardens, shipwrecks, etc
- Protecting Historic Designed Landscapes: explains how Victoria cares for and protects historic designed landscapes, cemeteries, gardens and trees. Includes tips for researching the history of a garden and how to develop a plan to conserve it.

Resources:

Public funds are available to owners of heritage places for conservation plans and works. To find out more, check the Department of the Environment and Heritage: **www.deh.gov.au**

Heritage Victoria: **www.heritage.vic.gov.au**

National Heritage List: **www.deh.gov.au/heritage/national/index.html**

Victorian Heritage Inventory: **www.heritage.vic.gov.au**

Local Planning Schemes: **www.dse.vic.gov.au/planningschemes/**

National Trust of Australia (Victoria): **www.nattrust.com.au**

Parks Victoria **www.parkweb.vic.gov.au**

The Garfield waterwheel in its heyday.

The Garfield waterwheel today.

chapter 15

waste and what to do with it

An important part of living in the bush is managing waste. This includes domestic effluent such as grey water from bathrooms and laundries, sewage and domestic garbage, as well as chemical containers. This chapter explains how to manage and reduce waste.

Domestic garbage

Councils offer garbage collection services to urban and some non-urban areas. They may also offer special hard waste and green waste collection services, but avoiding, reducing and reusing waste are three important ways to reduce the waste load in a catchment. It's best to try to cut down on waste going to landfills. Most of them are nearly full and no one likes to have new ones sited near them.

Avoid, reuse and recycle

To cut down on waste:

- When shopping, choose brands with minimal packaging or packaging that can be recycled
- When shopping, use reusable bags instead of plastic bags
- Collect paper, cardboard, cans, milk containers, bottles and some plastics for recycling. Most regional waste disposal centres will accept them for recycling
- Create your own recycling centre by composting your kitchen and garden waste

To find your nearest recycling centres, go to **www.ecorecycle.sustainability.vic.gov.au**

and look under 'local governments', then 'council waste & recycling services'. This also lists landfill operating hours.

Composting

Composting is about piling up kitchen scraps and garden refuse into heaps, mixing it with the right amounts of air and water and microorganisms and allowing those organisms to break down the contents. When ready, it's great for enriching garden soil. There is lots of information available in books and online about how to compost.

Creating good compost:

- Turn it regularly
- Avoid adding diseased plants, meat, fat, oil or household cleaners
- Do not add too much salty water or ash from wood fires
- An ideal compost heap contains about 20 parts carbon to one part nitrogen by volume. Dry, brown and woody garden refuse is usually high in carbon, and soft, green garden waste and kitchen scraps are usually high in nitrogen

Composting is often the best way to deal with household scraps and garden refuse.

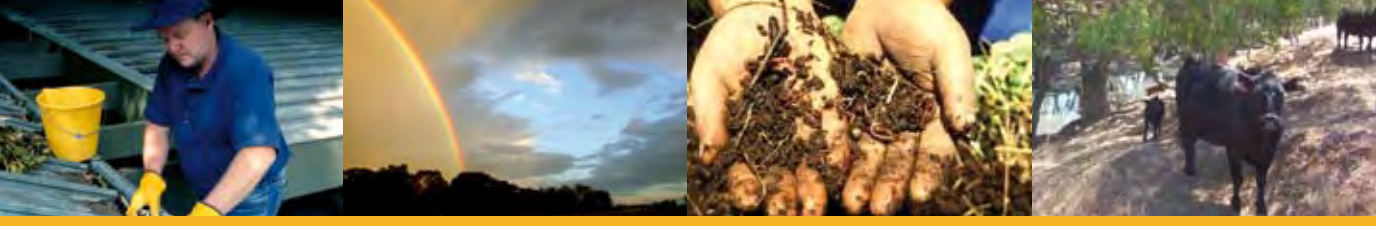
Photo: Courtesy City of Greater Bendigo

Councils offer waste removal services in towns, but not in most rural areas.

Septic tanks and alternatives

If you are planning a septic system or other toilet effluent treatment system for your property, contact your local council for a septic tank permit. Owners of properties with septic tanks and alternative treatment systems are responsible for managing and maintaining their systems in accordance with their permits. This could include monitoring the discharge quality from the system, and checking to ensure they operate efficiently and effectively. The owner must also:

- ensure the tank and disposal field are not disturbed or built over
- inspect the system at least annually
- desludge the tank at least every three years or as otherwise directed by the council



Landowners may need to review their household public liability insurance policy to ensure the septic tank is included.

If you want to install an alternative toilet effluent treatment system, it's best to discuss this with the environmental health officer from your local council first. They will advise you about their land management expectations.

Grey water

Grey water is the wastewater from kitchen sinks, washing machines, laundry tubs, hand basins, spas, showers and baths. It is usually mildly contaminated with organic materials and pathogens, bacteria and viruses, and cleaning products. Handled appropriately, this wastewater can be treated and used to water the garden. Plants will readily use the nutrients in the cleaning products and organisms in the soil will digest pathogens. Recycling grey water to use on your garden can be a good option during dry times, although it can involve health and environmental risks.

EPA Victoria supports water conservation methods and recognises that grey water can be used effectively and safely in domestic situations by following the simple tips in Chapter 3 Water is Gold! For further information read the EPA Victoria publication 812 *Reuse Options for Household Wastewater.* EPA Victoria also has available a Grey Water Reuse pamphlet that provides simple dos and don'ts for temporary grey water reuse. These publications are available at **www.epa.vic.gov.au** or by contacting EPA Victoria's Bendigo office.

Temporary grey water recycling

You can install simple recycling systems, such as pipes from your washing machine, direct to your garden if they are temporary, say, for three months over summer. EPA Victoria recognises that using grey water this way can be viable during droughts and water restrictions, as long as practical precautions are followed (see above). Products available from hardware shops, such as hoses and pipes that drain water from washing machines to gardens, are designed for immediate grey water use only.

Permanent grey water recycling

Recycling grey water year-round requires an approved grey water recycling system. Grey water recycling systems are available from specialist suppliers listed in the Yellow Pages of your local phone book under wastewater treatments. Before installing such a system, you will need a permit from your local council. It's wise to talk it over with the environmental health officer at your local council. Another good source of information is EPA Victoria's publication 812 *Reuse Options for Household Wastewater* (see above).

Most grey water recycling systems come with a service contract that requires the installer to submit regular reports to council on the condition of your treated waste.

Empty drums, petroleum products, chemicals and general waste

Empty drums can be recycled through the *drumMUSTER* program. This is a national program that collects and recycles *empty*, cleaned, non-returnable crop production and on-farm animal health chemical containers. Collection times and sites are listed at **www.drummuster.com.au** under collection calendar.

Chemclear is a program that collects unwanted rural and agricultural veterinary chemicals. These may be chemicals with an expired use-by date or chemicals that have been deregistered. To find out more, call 1800 008 182.

Waste oil collection contractors will collect waste oil, or you can deliver it to approved premises (contact your local council or EPA for details of premises).

Other household and general wastes should be disposed of at the local landfill or waste transfer station.

A poorly maintained property has flow-on effects far and wide.

It takes some effort to maintain your property but the results are felt throughout the whole of the catchment.




General waste management tips

- Avoid waste by buying only what you need for the job
- Most products and materials can be easily reused, returned or recycled
- Under no circumstances should you dispose of unwanted chemicals, waste oils or lubricants on your property
- The disposal of waste on farms, apart from green waste (i.e. compost and tree branches) and limited numbers of dead stock, is prohibited
- No waste, other than tree branches, should be burned on a farm. Waste such as tyres, hay band, silage wrap and domestic waste must not be burned
- You can dispose of or recycle waste that cannot be reused on farm at landfills and transfer stations
- Before you get rid of it, waste should be stored in a manner that will not contaminate water, land or risk the health of humans, stock or crops
- Chemical drums should be triple-rinsed and stored in a safe place before you return them for recycling or disposal
- Filling in low-lying areas around waterways or gullies with waste is prohibited
- Used concrete and clean bricks may be used for engineering works provided that the material is fit for purpose and is free from contamination. Acceptable works include construction of farm tracks and pads. Used concrete or bricks must not be used to stabilise natural waterways
- Livestock burning is permitted only when it is impractical to bury the carcasses or where burning is mandatory where certain exotic diseases are present

No one wants new landfill sites near their home.

- Tyres should not be used for erosion control purposes. Unless there is a legitimate on-farm use (for example, as tree guards or on silage stacks) they should be delivered to a location nominated by your council

EPA Victoria's publication *What Solid Wastes Can I Dispose Of On My Farm?* (publication 660) provides more detailed information on farm waste management.

Accepting fill material

Landowners may accept fill material from various sources. It must be naturally occurring (e.g. soil, sand, clay, silt, gravel and rock) and not contaminated or have been used for industrial purposes. Anything that cannot be reused or recycled must go to an EPA-licensed landfill. This includes building rubble, green waste, shredded tyres, butchers' waste and any prescribed waste such as asbestos, contaminated soil, mine tailings, filter cake, fly ash and sludge.

What to do if you accidentally spill something into a waterway

It is important to take responsibility when spills, especially chemical spills, occur. Do what you can to contain the problem (flushing and diluting is generally not the preferred action because it can spread the contamination), then contact EPA Victoria. The EPA does not have the necessary equipment to conduct a clean-up, but it can advise what to do to rectify the problem. This may include referral to a private contractor with expertise in cleaning up.

If you live in a proclaimed catchment area such as the Lake Eppalock Catchment and you become aware of a significant chemical or fuel spill, you also need to contact Coliban Water in addition to EPA Victoria. Immediate measures might need to be put in place to protect potable supply reservoirs and drinking water treatment plants from the mass of polluted water that subsequently flows down the river.

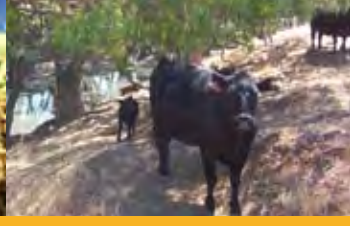
Resources:

EPA Victoria's publication *What Solid Wastes Can I Dispose Of On My Farm?* (publication 660) provides more detailed information on farm waste management.
Contact EPA Victoria
www.epa.vic.gov.au

Ecorecycle Victoria
www.ecorecycle.sustainability.vic.gov.au

drum Muster Program
www.drummuster.com.au/ or call 1800 008 182



chapter 16
key contacts

Local government

What is local government currently responsible for?

- Infrastructure and property services, including local roads, bridges, footpaths, drainage, waste collection and management
- Provision of recreation facilities, such as parks, sports fields and stadiums, golf courses, swimming pools, sport centres, halls, camping grounds and caravan parks
- Health services such as water and food inspection, immunisation services, toilet facilities, noise control, meat inspection and animal control
- Community services, such as child care, aged care and accommodation, community care and welfare services
- Building services, including inspections, licensing, certification and enforcement
- Planning and development approval
- Administration of facilities, such as airports and aerodromes, ports and marinas, cemeteries, parking facilities and street parking
- Cultural facilities and services, such as libraries, art galleries and museums

Map of shire boundaries

- **Campaspe Shire**
  Cnr Hare and
  Heygarth St Echuca 3564
  P.O. Box 35 Echuca 3564
  Phone 1300 666 535
  Outside Shire area 03 5481 2200
  Email shire@campaspe.vic.gov.au
  www.campaspe.vic.gov.au
- **Central Goldfields Shire**
  Neill St Maryborough 3465
  P.O. Box 194 Maryborough 3465
  Phone 03 5461 0610
  Email mail@cgoldshire.vic.gov.au
  www.centralgoldfields.com.au
- **City of Ballarat**
  The Phoenix Building, 25 Armstrong St South, Ballarat 3353
  P.O. Box 655 Ballarat 3353
  Phone 03 5320 5500
  Email ballcity@ballarat.vic.gov.au
  www.ballarat.vic.gov.au
- **City of Greater Bendigo**
  195–229 Lyttleton Tce Bendigo 3552
  P.O. Box 733 Bendigo 3552
  Call Centre Phone 03 5434 6000
  Email info@bendigo.vic.gov.au
  www.bendigo.vic.gov.au
- **Hepburn Shire**
  76 Vincent St Daylesford 3460
  P.O. Box 21 Daylesford 3460
  Phone 03 5348 2306
  Email shire@hepburn.vic.gov.au
  www.hepburnshire.vic.gov.au
- **Loddon Shire**
  41 High St Wedderburn 3518
  P.O. Box 21 Wedderburn 3518
  Phone 03 5494 1200
  Email loddon@loddon.vic.gov.au
  www.loddon.vic.gov.au
- **Macedon Ranges Shire**
  129 Mollison St Kyneton 3444
  P.O. Box 151 Kyneton 3444
  Phone 03 5422 0333
  Email mrsc@macedon-ranges.vic.gov.au
  www.macedon-ranges.vic.gov.au
- **Mitchell Shire**
  113 High St Broadford Vic 3658
  Phone 03 5734 6200
  Email mitchell@mitchellshire.vic.gov.au
  www.mitchellshire.vic.gov.au/
- **Mount Alexander Shire**
  25 Lyttleton St Castlemaine 3450
  P.O. Box 185 Castlemaine 3450
  Phone 03 5471 1700
  Email mtalex@mountalexander.vic.gov.au
  www.mountalexander.vic.gov.au
- **Pyrenees Shire**
  5 Lawrence St Beaufort 3373
  Phone 03 5349 2000
  Email pyrenees@pyrenees.vic.gov.au
  www.pyrenees.vic.gov.au




Loddon River at Glenlyon.

Regional natural resource management contacts and description of their roles

North Central Catchment Management Authority

Catchment Management Authorities (CMAs) were formed to create a whole-of-catchment approach to natural resource management in the State. Either directly or through its partnerships, the North Central CMA is responsible for projects relating to:

- waterway management
- water quality management
- floodplain and regional drainage management
- biodiversity management
- Landcare support and funding coordination
- regional responses to climate change
- salinity management

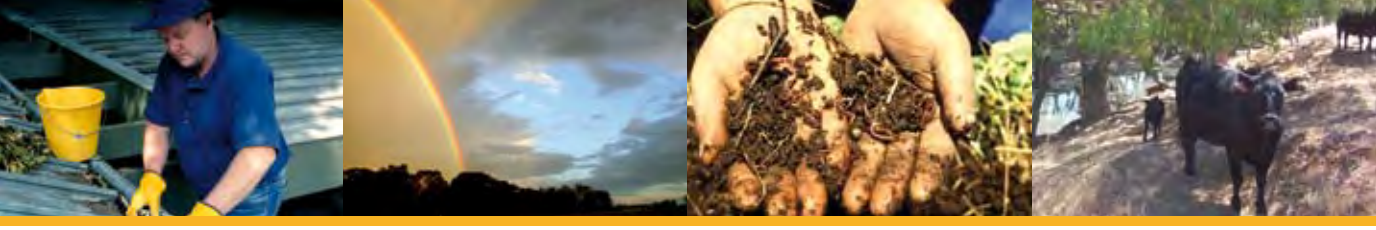
Waterways provide places to unwind and reflect.

- threatened species recovery
- pest plant and pest animal management
- soil health
- cultural heritage

Phone 03 5448 7124
Fax 03 5448 7148
www.nccma.vic.gov.au

Implementation Committees

The North Central Catchment Management Authority was established to give communities a strong role in managing natural resources. Community engagement and consultation is undertaken through the Implementation Committees.



These Committees play a vital role in effective land and water management in the region. They oversee the development and delivery of works programs and enable the community to provide input into these programs.

There are three Implementation Committees in the North Central region, representing the:

- Avoca/Avon–Richardson catchment area
- Loddon/Campaspe dryland area
- Loddon/Campaspe irrigation area

For information about your local Implementation Committee members, contact the North Central CMA on 03 5448 7124.

Landcare

Landcare is a community-based approach to addressing environmental problems and the long-term viability of agricultural production. It is about productivity, partnerships, participation and people.

Landcare was launched at Winjallock in the south-western part of Central Victoria. It has evolved to become the largest community-based movement for natural resource management in Victoria. There are 180 Landcare and other community groups focusing on natural resource management in Central Victoria.

Council-based Landcare Coordinators provide support to these Landcare groups, taking in the following areas:

Loddon Shire

Mount Alexander and Macedon Ranges shires

Bendigo and District

Hepburn and Central Goldfields shires

Land for Wildlife

Land for Wildlife (Victoria) is a State Government program supporting landholders or managers who provide habitat for native wildlife on their land.

www.dse.vic.gov.au (follow links to Land for Wildlife via Plants and Animals/Native Plants and Animals/ Land for Wildlife. In North Central Victoria call 03 5430 4368.)

Greening Australia Victoria

Greening Australia is a non-profit community-based organisation.

Photo: Peter McRostie

Sticky Everlasting Daisy

Greening Australia Victoria is working with farmers, community groups, land management agencies, schools and individuals to help protect and restore our local native vegetation. They receive funding from contracts with public and private agencies, corporate sponsorship, membership fees and product sales.

Phone 03 9450 5300
www.greeningaustralia.org.au/GA/VIC/

EPA Victoria

EPA Victoria works with government agencies, industry and people in the community to reduce and control air and water pollution, waste and noise. The *Environment Protection Act 1970* forms the legal basis for EPA work. This Act outlines how the EPA goes about protecting the environment and brings together the management of the whole environment: air, water and land together.

EPA North West Regional Office
1st floor 43 Williamson St
Bendigo 3550
Phone 03 5438 1000
Fax 03 5443 6555
www.epa.vic.gov.au

Aboriginal Affairs Victoria (AAV)

Aboriginal Affairs Victoria is the Victorian Government's central point of policy advice on cultural heritage and other Indigenous issues in Victoria, and is now a division of the Department for Victorian Communities. AAV works with Aboriginal communities, other Commonwealth and State Government agencies, local government and the private sector to promote consideration of Aboriginal cultural heritage in the context of relevant policy initiatives and programs, especially those relating to land management.

Level 9, 1 Spring St
Melbourne 3000
Phone 1300 366 356
Fax 03 9208 3292
Email aav.webpage@dvc.vic.gov.au
www1.dvc.vic.gov.au/aav/

Department of Primary Industries

The Department is committed to the sustainable development of primary industries for the benefit of all Victoria. The Department of Primary Industries is responsible for the areas of agriculture and food, fishing and aquaculture, minerals and petroleum, and science and research. The role of the Department is to deliver, efficiently and effectively, high-quality services and products that achieve the policy outcomes that government has established on behalf of the people of Victoria.

Customer Service Centre
Phone 136 186
www.dpi.vic.gov.au

Department of Sustainability and Environment

The Department provides advice and support to the Victorian Government and ministers. It aims to turn Victoria into the 'sustainable state'. The role of the Department is to deliver, efficiently and effectively, high-quality services and products that achieve the policy outcomes that government has established on behalf of the people of Victoria. Its responsibilities include, among others, catchment management, conservation, heritage and biodiversity.

Customer Service Centre
Phone 136 186
www.dse.vic.gov.au

Parks Victoria

Throughout the world, there is growing recognition of the vital contribution parks make to a healthy environment, to the health of individuals and to a healthy society. Victorians are very fortunate to have inherited a world-class network of parks and reserves, now accounting for more than 16 per cent of Victoria's land mass.

Parks Victoria is responsible for managing Victoria's outstanding parks and reserves system, as well as Melbourne's bays and waterways and a considerable part of our cultural heritage.

Our role is to protect the natural and cultural values of the parks and other assets, while providing a range of outdoor opportunities for all visitors.

Information Centre: 13 1963
www.parkweb.vic.gov.au

The Campaspe River at Barnadown

Photo: David Kleinert

Wedge-tailed Eagle

Urban Water Authorities

Coliban Water

Coliban Water provides 130,000 retail, urban and rural water customers with water and wastewater services, over an area of 16,500 square kilometres of central and northern Victoria. Coliban Water was established on 1 July 1992 under the *Water Act 1989*.

Phone 1300 363 200
www.coliban.com.au

Central Highlands Water

Central Highlands Water is a Victorian regional water authority, providing urban water and wastewater services to approximately 116,000 people throughout central and western Victoria. Based in Ballarat, Central Highlands Water provides services to more than 60 localities throughout the region, including Maryborough, Daylesford, Beaufort, Avoca and Clunes.

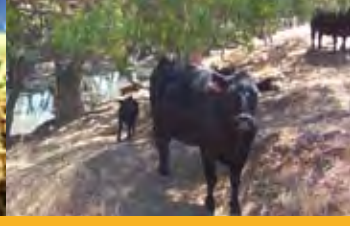
Head Office:
7 Learmonth Rd
Wendouree 3355
Phone 03 5320 3100
www.chw.net.au

Rural Water Authorities

Goulburn–Murray Water

Goulburn–Murray Water manages water storage, delivery and drainage systems, involving 70 per cent of Victoria's stored



water. Their region covers 68,000 square kilometres between the Great Divide, the Murray River and to the west downriver to Swan Hill and the Loddon River. Goulburn–Murray Water is Victoria's Constructing Authority for the Murray–Darling Basin Commission.

Head Office:
40 Casey St
P.O. Box 165 Tatura 3616
Phone 03 5833 5500
Fax 03 5833 5501
www.g-mwater.com.au/

Grampians Wimmera Mallee Water

Grampians Wimmera Mallee Water is a specialist rural and urban water supply and environmental service provider. They provide water supply services to approximately 52,000 urban customers living in 74 towns throughout the region, and environmental services to 24 of those towns. They provide domestic and stock water supplies to approximately 7,000 rural customers living in the region, and they provide community service obligations as required by Government.

Head Office:
11 McLachlan Street Horsham 3400
P.O. Box 481 Horsham 3402
Phone 1300 659 961
Fax 03 5381 9881
www.wmwater.org.au/index.html

Non-government organisations (NGOs)

Trust for Nature

Trust for Nature is a non-profit organisation that works to protect remnant bushland – forever! Sixty-five per cent of Victoria is privately owned. Ninety-five per cent of this land has been cleared for agricultural purposes and urban development. Only 5 per cent remains untouched and every year more and more of this remnant native bushland is disappearing. With it, the animals and plants that called it home are rapidly declining in numbers and species. Trust for Nature focuses on landscape-scale conservation using land purchase, conservation covenants and a revolving fund.

2/385 Little Lonsdale St
Melbourne 3000
Phone 03 9670 9933/ 1800 999 933
Fax 03 9670 9977
www.tfn.org.au

Conservation Volunteers Australia

Conservation Volunteers Australia is a non-profit, community-based organisation providing assistance to landholders and government organisations putting practical natural resource conservation projects into practice.

Greenhill Enterprise Centre
Cnr University Drive
and Enterprise Grove
Mt Helen 3350
Phone 03 5330 2600
Email
info@conservationvolunteers.com.au
www.conservationvolunteers.com.au/index.asp

Threatened Species Network

TSN's aim is to increase public awareness of, and involvement with, the protection and recovery of threatened Australian species and their habitats. TSN seeks to work cooperatively with government agencies, scientists, educators and community groups in conserving species and habitats. TSN supports communities to undertake species conservation through developing communication between interest groups, initiating and facilitating on-ground conservation projects, providing education and resources, and supplying funding through the TSN Community Grants.

TSN Coordinator
Level 3 60 Leicester St
Carlton 3053
Phone 03 9341 6507
Fax 03 9347 5199
www.wwf.org.au/tsn

Country Fire Authority

The CFA is one of the world's largest volunteer-based emergency services organisations, with around 58,000 volunteer members supported by over 400 career fire fighters and officers, and more than 700 career support and administrative staff.

North West Region
45 Chapel St
Bendigo 3550
Phone 03 5443 7444
Fax 03 5442 2246
www.cfa.vic.gov.au

Regional Cultural Heritage Program Units

Overarching the network of local Aboriginal communities is the Regional Cultural Heritage Program. This program, funded by Aboriginal Affairs Victoria, divides Victoria into five regions overseen by Aboriginal committees, which include representatives from each local Aboriginal community. The regional bodies act as resource agencies in cultural heritage matters in their

A rainbow over Central Victorian bushland

regions and can be a useful source of information about who you need to talk to regarding cultural heritage issues in your area. Each region has a cultural heritage protection unit that is responsible for site protection, preservation and management, community education and enforcement of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

North West Region Cultural Heritage Program
231 Campbell St
Swan Hill 3585
Phone 03 5033 0666
Fax 03 5033 0600

Community Groups

Many community groups throughout Central Victoria can offer you specialist information, support and advice. Most towns have field naturalists clubs, for example, and some of their members are not only a wealth of local knowledge but only too willing to share it with others.

One of your first stops should be your local council, many of which have publications listing all the local community groups with their contact details.

Rock Isotome

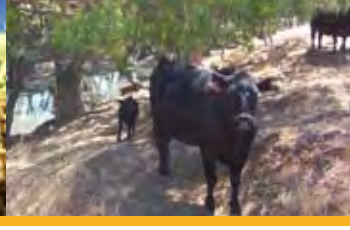
Native seed suppliers

Business	Contact	Address	Phone	Email /Web
Ballarat Regional Seed Bank	Christine Gartland	Creswick Nursery and Landcare Centre P.O. Box 3 **Creswick** 3363	03 5345 2200	info@creswicknursery.com www.creswicknursery.com
Greening Australia Victoria (Melbourne Indigenous Seedbank)	David Lockwood	Burnley College, Yarra Boulevard **Richmond** 3121	03 9250 6863	www.greeningaustralia.org.au
Swan Hill Seed Bank	David Ellemor	P.O. Box 1417 **Swan Hill** 3585	03 5032 2436	seedbank@iinet.net.au

Suppliers of tree guards and planting materials

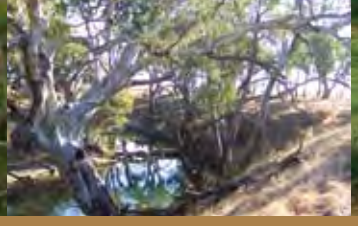
Business	Contact	Address	Phone	Email/Web
Sure Gro Products	Brian Fardon	2 Plane Tree Avenue **Dingley** 3172	03 9558 1060 03 9558 0505	sales@suregro.com www.suregro.com
Treemax	Carmel Thomson	P.O. Box 1069 **North Richmond** 3121	03 9429 6000 03 9429 6001	info@treemax.com.au www.treemax.com.au
GD & JL Coutts Pty Ltd	Graeme Coutts	Sullivan St **Malmsbury** 3446	03 5423 2210 03 5423 2579 (Fax)	



Indigenous nurseries

Business	Contact	Address	Phone	Email /Web
A&B Trees	Liz Spillane	P.O. Box 245 **Heathcote** 3523	03 5433 2236	a-btrees@netcon.net.au
Acres Wild Nursery	Robin Baker	42 Anslow St **Woodend** 3442	03 5427 2007	
Goldfields Revegetation	Marilyn Sprague	230 Tannery Lane **Mandurang** 3551	03 5439 5384	goldrevg@netcon.net.au www.goldfieldsrevegetation.net.au
Granite Ridge Indigenous Plants	Emma Stevens and John Webb	P.O. Box 634 **Lancefield** 3435 At the Lancefield Farmers Market or by appointment	03 5429 1904 0428 291 904	emmajohn1@ssc.net.au
Ironbark Ridge Nursery		Cnr John and Crane Streets **North Bendigo** 3550	03 5442 2674 0434 401 255	
Neangar Nursery		By appointment 8 McClelland Drive **Eaglehawk** 3550	03 5446 9260	neangarnursery@bigpond.com www.neangarnursery.com.au
Newstead Natives	Frances Cincotta	By appointment **Newstead** 3462	03 5476 2691	natives@newstead.vicmail.net
Pye's Plants	David Pye	1220 Bacchus Marsh Rd **Bullengarook** 3437	03 5428 9369	pye@ssc.net.au users.ssc.net.au/pyesplants
Sanctuary Nursery – Skydancers		Cnr Blackjack Rd and Midland Highway **Harcourt** 3453	03 5474 2468	davakent@vic.chariot.net.au
Sandhurst Nursery		1–13 Cecil Street **Bendigo** 3550	03 5442 2152	sandhurst@hitech.net.au www.nativenursery.com.au/sandhurst/main.html
Vens Creek Nursery		Yando Road **Boort** 3537	03 5455 2154	pchaw@bigpond.com
Victorian Indigenous Nursery Cooperative	The Nursery Manager	P.O. Box 24 **Fairfield** 3078	03 9482 1710	vinc@vicnet.net.au www.vinc.net.au
Western Plains Flora (Large orders only – 100 or more plants)	Ian Taylor	628 Wildwood Road **Wildwood** 3428	03 9740 3178	wpflora@iprimus.com.au

acknowledgements

Text

Genevieve Barlow; Nathalie Brown; Ian Higgins; Sally-Anne Mason; Peter McRostie; Lachlan Milne; Nathaniel Muller; Keith Reynard; Lyndall Rowley; Sandra Volk.

Photographs

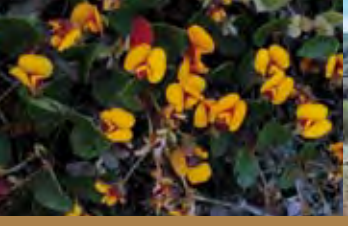
Gary Cheers; Francis Cincotta; Country Fire Authority; Brad Drust; Julie Flack; Angela Gladman; Ian Higgins; David Kleinert; Adrian Martins; Laurie Martins; Peter McRostie; Lachlan Milne; Geoff Park; Darren Perry; Tadao Shimba; Norm Stimson; Jenni Thomas; Chris Tzaros; Peter Weaving; Terri Williams.

acronyms

AAV	Aboriginal Affairs Victoria
ACUP	Agricultural Chemical Users Permit
CMA	Catchment Management Authority
DEH	Department of the Environment and Heritage
DSE	Department of Sustainability and Environment
DPI	Department of Primary Industries
EPA	Environmental Protection Authority Victoria
G–MW	Goulburn–Murray Water
PV	Parks Victoria
RCS	Regional Catchment Strategy
RHS	River Health Strategy

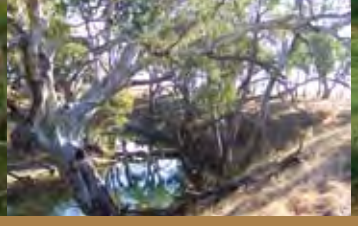
glossary of terms

Agro-Forestry	Land management practice in which farmers cultivate trees in addition to their other agricultural activities.
Annual plant	Plant that grows to maturity, sets seed and dies within one year.
Aquifer	A layer of rock or sediment able to hold or transmit water.
Biennial plant	Plant that germinates and grows to a small plant in the first year then flowers, sets seed and dies in the second year.
Biodiversity	The variety of all life-forms, the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part.
Bioregion	Areas that capture the patterns of ecological characteristics in the landscape, providing a natural framework for recognising and responding to biodiversity values.
Catchment	An area of land where run-off from rainfall goes into one river system.
Catchment Management Authority	Regional body responsible for strategic planning and coordination of Victoria's land and water resources. There are 10 CMAs in Victoria.

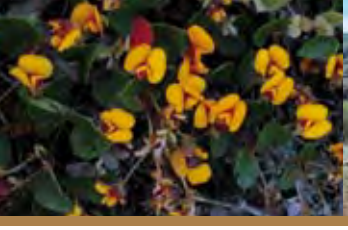



glossary of terms (cont.)

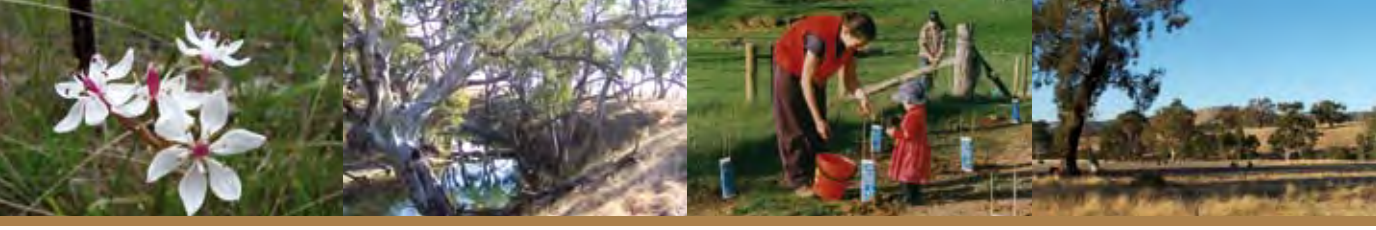
Carrying capacity	The number of stock you can sustainably graze on a property.
Corridor	Vegetation along road and rail reserves and verges, steep uncleared ridges, drain and canal sides, river and creek edges, lake and ocean foreshore reserves, travelling stock routes, and easements for utilities such as power, water, etc.
Discharge area	The area in which there is upward movement of groundwater and where groundwater is discharged from the soil surface. Groundwater escapes via springs, evaporation, transpiration and surface drainage (see recharge area).
Ecological Vegetation Class (EVC)	A type of native vegetation classification that is described through a combination of its floristic, life form, and ecological characteristics, and through its preferences for a particular environment.
Ecosystem	A term used to encompass all the organisms in a community, together with the associated physical environmental factors (living and non-living) with which they interact.
Ecosystem services	'Services' provided by nature, such as habitat for native plants and animals; erosion control; reduction of greenhouse gases; natural pest control; maintenance of the land's productivity; protection of good water quality; provision of shade and shelter for farm animals; and aesthetics.
Erosion	Loss of soil by the action of wind and water.
Fauna	Animals.
Flora	Plants.
Forest	An area of land covered by trees and understorey vegetation with a top height greater than five metres, and described in terms of foliage (crown) cover such as closed forest, open forest, etc.
Grassland	Area dominated by native grasses. Native grasslands are now a severely threatened plant community.
Habitat	The place or environment in which a plant or animal naturally occurs that contains everything it needs to live.
Heath	Natural area of land dominated by shrubs and other plants less than two metres tall. The plants generally have hard, thick leaves which reduce their water loss.
Heritage	Aesthetic, historic, scientific, cultural or social value for past, present or future generations.
Indigenous vegetation	Vegetation native to a particular location.
Large woody debris (LWD)	Branches and whole trunks fallen onto the stream bank and into the river (snags).
Native vegetation	Refers to plants that are indigenous, including trees, shrubs, herbs and grasses.
North Central Regional Catchment Strategy (RCS)	A framework providing a vision for the future landscape of the region and the way its natural resources will be managed.
NVR	Native Vegetation Retention – controls in the state section of all Victorian Planning Schemes to protect and manage native vegetation.
Potable	Drinkable; fit for human consumption without causing disease.
Provenance	The place of origin of a species, subspecies or variety.

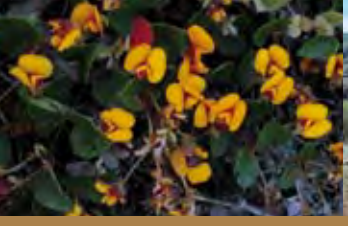



Perennial	Plants that live for more than two years.
Prescribed burn	A planned fire ignited by the manager in accordance with a fuel management plan or for ecosystem management purposes.
Recharge area	An area that allows water to enter the aquifer.
Remnant vegetation	Any patch of naturally occurring native vegetation around which most or all of the native vegetation has been removed. It may include corridors or islands of vegetation located on land being used for a variety of purposes.
Regeneration	The process of reintroducing vegetation to a site by natural regenerative processes, which may include human intervention but excludes planting.
Revegetation	Planting an area with its original species.
Riparian	Land that adjoins or directly influences a body of water, i.e. the river bank.
River Health Strategy	A regional strategy providing an integrated approach to river health management which sets a clear direction and priorities for taking action to meet the long-term vision of improving the health of rivers of Central Victoria.
Salinity	The concentration of salts in land and water, usually expressed in EC units.
Sustainable	Activities that preserve and improve the long-term health of soil, water, vegetation, native animals and community.
Threatened species	A generic term for a plant or animal generally considered as vulnerable or endangered under various threatened species conservation laws. It is used to indicate that there is some level of threat to the species' viability in the wild.
Topsoil	The surface or upper level of soil, generally within 10 cm of the surface.
Tube stock	Plants in tubes.
Native Vegetation Framework	Statewide planning control introduced by Victorian Government to regulate the clearance of native vegetation.
Weed – environmental	Plant species that invade and choke native plant communities.
Weed – noxious	Introduced plants that have been declared 'noxious weeds' under the *Catchment and Land Protection Act 1994*. They may affect the productivity of agriculture, invade native vegetation, or both. Noxious weeds are classed as State Prohibited, Regionally Prohibited, Regionally Controlled or Restricted.
Wildfire	Any fire that is unwanted or unplanned by the land management authority, or any fire out of control. Bushfire.
Wildlife	Native animals (fauna).
Woodland	Natural area of land dominated by widely spaced trees.




index






index (cont.)

caring
for country

Crops, pastures, biodiversity, horses, salinity, revegetation … there are so many possibilities and potential obstacles associated with owning your own block in the bush that it can be overwhelming to know where to begin.

***Caring for Country** is an excellent start. It explains in plain English some of the problems you may face and the rewards you can achieve as you set out on your own block of land in the bush.*

*What you do on your property can have a profound impact on others many kilometres away. **Caring for Country** will help you meet your responsibilities as a landholder. It will help you care for your land – your soil, pastures, plants and animal life – so that it will be in better shape for the next generation.*

NORTH CENTRAL
Catchment Management Authority

P.O. Box 18 (628 - 634 Midland Highway) Huntly, Victoria 3551
Phone 03 5448 7124 Fax 03 5448 7148
Email info@nccma.vic.gov.au

www.nccma.vic.gov.au

action
Salinity & Water
AUSTHALA