A Resource kit for Rural Landholders in the Northern Rivers Region
Introduction

Can I pump water from the river? Who can tell me why my cattle are doing poorly? What’s that weed in my paddock? Do I need to control it?

What is the Native Vegetation Act? Why has the Livestock Health and Pest Authority sent me a rates notice?

Whether you are thinking of taking up rural life on the north coast of New South Wales, or have already done so, it is often hard to know where to turn to for such information. There is an enormous amount of material available but unfortunately it is scattered across many organizations and in many formats (e.g. advisors’ knowledge, training courses, books and web pages). The aim of this kit is to bring much of this information together in one easy to use guide for intending and existing landholders in Northern NSW, and to direct them to where they can obtain further help.

The kit briefly describes the natural resources (soils, water, native vegetation and pastures) of the area and major factors that impact on them (climate, drought, flood, fire and weeds). These play major roles in determining the potential and limitations of rural land and thus, how the land needs to be managed. More information on any of these topics, is available from the Landcare offices listed in this kit.

Other factors that will smooth the transition to rural life (including the multiplicity of legislation) for intending and new landholders are described in the section “Rural Life”.

The kit also provides a selected guide to resources that will help you better understand your land and the enterprises you work with. While all attempts have been made to provide up to date information, this kit only provides general information as the rules and regulations affecting rural life are constantly changing. Hence, you should always seek professional advice for your specific situation. To aid your search for advice, the contact details of a range of government and non-government organizations are provided in the resources and contacts section of this kit.
Northern Rivers Region

The regional landscape

The Northern Rivers covers an area of 50,000 square kilometers from the Camden Haven River in the south, to the Queensland border in the north, and from Lord Howe Island in the east to Armidale and Glen Innes in the west.

Around sixty percent of the region is freehold tenure, with 21,500 km² managed as Crown Land, National Park and State Forest.

There are two distinct parts to the region - the coastal zone and the eastern slopes of the tablelands and several individual landscape types ranging from Coastal Floodplain to Volcanic Plateaus, Escarpments and Ranges.

The region is a National Biodiversity Hotspot, being the third most bio-diverse region in Australia and supports a large number of threatened species and ecologically endangered communities.

Landuse types

The Northern Rivers region is known for its agricultural (beef, sheep, dairy, sugar), horticultural, timber and commercial fishing industries and is an increasingly popular place to live and a destination for tourism, with an estimated 6 million visitors each year.

The region has more than 550,000 people and experiences a population growth of more than two percent a year along the coast. Major coastal urban centres include Port Macquarie, Coffs Harbour, Ballina, and Tweed Heads.

Key natural resource management issues include:

- threats to natural heritage values and biodiversity, including past plant and animal invasion, wildfire and loss of habitat through other landuses
- pressures associated with population growth, such as rural and urban landuse conflict, loss of arable land to urban use, increasing impacts on natural areas from human activity
- land degradation through erosion and non-sustainable use
- threats to water quality from urban and agricultural run-off, sedimentation, loss of riparian vegetation and quantity through over-extraction and the impacts of climate change
- specific issues to this area such as acid sulfate soils, blackwater and cane toad invasion

A regional plan for action

In 2006, the Northern Rivers Catchment Management Authority (NRCMA) prepared a strategic plan to guide regional natural resource management priorities and investment. The Northern Rivers Catchment Action Plan (CAP) incorporates six years of community consultation and planning and centres on seven broad themes – Community, Landuse Planning, Biodiversity, Water, Coastal Management, Marine and Soil/Land Resources.

To find out more about the NRCMA Region or the CAP visit http://www.northern.cma.nsw.gov.au

Introduction
Aboriginal Acknowledgement

The Northern Rivers region of NSW is part of the traditional lands of Aboriginal people. As non-indigenous Australians we are able to acknowledge that Aboriginal people are the traditional owners of the land and that Aboriginal people are the primary custodians of indigenous cultural heritage knowledge and expertise.

From the Booroongen Djugun College Aboriginal Natural Resource Agreement Kit (2007)...

"Traditional owners have a custodial relationship with the lands of their respective Nations. The custodial relationship includes ownership and responsibility for; lands, waters (including subterranean waters) airspace, minerals, plants, animals and cultural landscapes.

The custodial relationship extends to including ownership and responsibility for traditional stories, artwork, song, dances, ceremonies. It includes cultural practices and law, such as determining who may access an area, or when species may have harvested.”

“Removal of an element of the landscape, such as removal of forest to facilitate mining, forestry, or road building, may destroy the continuation of a cultural practice. It therefore removes a part of the cultural and spiritual relationship of the Traditional owners with their Land.”

“Traditional owners’ oral knowledge of seasons and events in their Nation are based on many thousands of years occupation, rather than the relatively short period of 200 years of written knowledge. Accordingly they bring knowledge and skills to decision making that other members of the community cannot.”

“Some Traditional owners have recognised rights to speak for their Nation as Registered Native Title Claimants. The Native Title Act 1993 (Native Title Act) provides limited rights to Registered Native Title Claimants such as a ‘Right to Negotiate’ and all the Aboriginal people, whether from NSW or elsewhere in Australia.

Informed Consent

Informed Consent means the ‘free, prior and informed consent’ of the Traditional owners of the Nation. In the ANRA Kit ‘Informed Consent’ means at least a formal role in the decision making process, including a right of veto.

Aboriginal people

Aboriginal people are people who are descendants of the original inhabitants of Australia, and identify as, and are accepted as, Aboriginal people.

Aboriginal Peoples

Aboriginal Peoples means all Aboriginal people, communities and groups in NSW and includes the Nations, Traditional owners, and all the Aboriginal people, whether from NSW or elsewhere in Australia.

definitions

Aboriginal Natural Resource Agreements

Aboriginal Natural Resource Agreements are agreements between Aboriginal Peoples and Governments, Corporations, or Individuals to deliver natural resource management outcomes, including agreements to communicate.

Aboriginal Land Council

Aboriginal Land Council means a Local Aboriginal Land Council constituted by the NSW Minister for Aboriginal Affairs or the NSW Aboriginal Land Council constituted by the Aboriginal Land Rights Act 1983. All members of Aboriginal Land Councils are Aboriginal people, but are not necessarily Traditional owners.

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Nation

Nation means the area traditionally inhabited by a self governing group of Aboriginal people. Aboriginal people of a Nation have an obligation to care for the land, waters, plants and animals which form part of the landscape of their Nation.

Native Title

Native Title means the limited rights and interests in land and water of Aboriginal and Torres Strait Islander people that are derived from the traditional laws and customs of their Nations and are currently recognised under Australian law.

Natural Resources

Natural Resources means all the naturally occurring substances, creatures and systems of the world around us that are considered valuable in their natural form. Natural resources include sunlight, air, water, land, minerals, animals, plants, fungi and other living things, as well as their natural products and the ecological communities and natural energy systems that generate and sustain them.

Traditional owners

Traditional owners are the Aboriginal people who are descendants of the original inhabitants of a Nation. They have a spiritual, cultural, political and often, physical connection with the area of their Nation.

Aboriginal Natural Resource Agreement Kit (ANRA) - Booroongen Djugun College.

Copies of this kit are available from website: www. booroongencollege.nsw.edu.au or contact Amie McElroy, Aboriginal Extension Project Officer acso@booroongencollege. nsw.edu.au

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Rural Living

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Abbreviations used in this document are:

DECC – Department of Environment and Climate Change
DWE – Department of Water and Energy
NRCMA – Northern Rivers Catchment Management Authority
NSW DPI – NSW Department of Primary Industries (Agriculture)
DPI – Department of Primary Industries and Fisheries
LHPA – Livestock Health and Pest Authority (formerly RLPB)
NRM – Natural Resource Management
PVP – Property Vegetation Plan
LALC – Local Aboriginal Land Councils
Rural living

Intending landholders

Are you currently searching for a rural property?

Many people who haven’t come from rural communities may not realise what it is like to live in a rural area. Rural areas are not always peaceful; sometimes they can be noisy, smelly and dirty. To better understand what you might expect, and what is expected of you, research the area you are planning to move to.

Some things you may want to consider are:

• Do you want a bush block where you can relax or a production property?
• What type of rural industry do you want to be involved in (e.g. horticulture, beef cattle, cropping)? Remember, that if you are not happy with what you are doing, the undertaking is less likely to be successful.
• How long can you wait before earning an income? Some rural enterprises take 3 or more years before they generate income (e.g. Tree crops)
• How much do you need to earn from the farm: many properties on the north coast are not large enough to support a family without a supplementary income?

• Where can you earn off-farm income?
• How far are you willing to travel between the farm and off-farm job?
• Do you want to live on the property or do you want a rural property, but live in town?
• How much time and energy do you have? Many enterprises involve long hours and require a lot of energy (e.g. dairying)
• Where will the kids go to school?

Once you’ve made these basic decisions you will need to gather information to help refine your ideas. For example, if you want to run an agricultural enterprise:

• What types of enterprises are undertaken in the area (e.g. beef cattle - store weaners, steer fattening or stud)?
• How profitable are the different enterprises in both the short and long term? All rural enterprises go through ups and downs in the market. Where in the pricing cycle, is the enterprise you are considering?
• Which parts of the region are best suited to your chosen enterprise?
• What types of soils or pastures are suitable for your chosen enterprise?
• Is irrigation required?
• What infrastructure and machinery outlays will be required to start the business? This can run into large amounts for some enterprises.
• What skills do you have and what are needed?

The best way to start gathering the knowledge you need is by reading through this kit and following its pointers to further sources of information.

All this will take time, but patient, detailed planning will save money and heartache in the end. As you amass information, don’t be surprised if you need to reconsider what you want from your rural lifestyle. Rural living is usually a compromise between what you desire and what is practical and affordable. With the information you’ve amassed, you will be better placed to provide real estate agents with a list of your requirements.

Be aware that government agencies can only provide information and advice about matters over which they have authority. They cannot break the confidentiality agreement they have with the current landholder and supply specific property advice to the buyer. It is the responsibility of the purchaser and the conveyancer to carefully inspect the property, examine the contract and ask all the right questions. Refer to Property check list.
Property checklist

Property address:

Asking price: Property size (hectares):

Nearest town: Distance to town:

Condition and suitability of the residence:

Is a residence permitted to be built on property? YES NO

Condition and suitability of other buildings:

Condition and suitability of the stock handling facilities:

Condition and suitability of the fences:

Number and sizes of paddocks:

Services to property:

Electricity YES NO Town water YES NO

Garbage service YES NO Town sewerage YES NO

Type, quantity and quality of domestic water supply (tank, bore, dam, creek, river, reliability):

Type, quantity and quality of stock water supply (tank, bore, dam, creek, river, reliability):

Type, quantity and quality of irrigation water (bore, dam, creek, river, reliability):

Does the property come with an irrigation license? YES NO

Size of license:

Condition and suitability of irrigation equipment:

Land types

<table>
<thead>
<tr>
<th>Wetlands</th>
<th>Alluvial flats</th>
<th>Gentle slopes</th>
<th>Steep slopes</th>
</tr>
</thead>
</table>

Soil description

<table>
<thead>
<tr>
<th>Depth</th>
<th>Colour</th>
<th>PH levels</th>
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</thead>
</table>

Vegetation

<table>
<thead>
<tr>
<th>Cleared %</th>
<th>Forest %</th>
<th>Pasture %</th>
<th>Crops %</th>
<th>Wetland %</th>
</tr>
</thead>
</table>

Main forest types or species:

Suitable shade for stock?

Condition of riparian vegetation (river, stream)

Condition of bush

Main pasture species (collect grass flower heads if not sure):

Crops:

Degradation issues (weeds/feral animals/erosion):

Other Notes:
New Landholders

I've bought a property! What should I do now?

Read this kit and know where to go for information. But first, a warning! Organizations and advisors will always try to answer your questions, but it often won't occur to them to tell you about things you haven't asked about. Hence, always ask:
• What information and services do you provide?
• What training, workshops, field days are available and how can I find out about future events that might be held?
• Are any funding opportunities available for training or on-farm works?
• Who else should I contact?
• Is there anything else I need to know about?

Let the Livestock Health and Pest Authority know that you have bought the property (if 4 hectares or more), so that they can start providing services to you. If you intend to own livestock, ask them about the National Livestock Identification Scheme (NLIS) – you’ll need a property identification code and identification tags. Also, find out about any pest animal programs being run in your area.

Contact your local Landcare Network or Community Support Officer and join the catchment network, so that you can receive regular updates on funding, workshops, field days and other events for rural landholders in your catchment.

Start planning by buying an aerial photo of your property (see Map Sales in the Department of Lands). First, talk to the NSW Department of Primary Industries (agriculture) the Northern Rivers Catchment Management Authority or local Landcare officer to see if there are other ways to obtain an aerial photo (e.g. Land Management Planning courses or Property Vegetation Plans – NRCMA). Ask about how to use the aerial photo for mapping your properties’ resources, problems and management. Find out if you are in a bushfire prone area by contacting your Rural Fire Service. If so, ask how to prepare your property for bushfire and prepare a bushfire action plan (what to do when a fire comes). Become a Rural Fire Service volunteer to learn how to fight bushfires and manage fire on your property. Be aware of fire legislation.

Find out if you are in a flood prone area by contacting your local council. If so, ask if there is a local flood action plan. Obtain information from your local State Emergencies Service on how to prepare a flood action plan for your property. If your property is on a floodplain, ask your local council about the extent and level of acid sulfate soil risk on your property (they have acid sulfate soil risk maps).

Map and assess your properties resources. Determine how to manage them and what funding opportunities are available
• Soils – NSW DPI (agriculture)
• Pastures – NSW DPI (agriculture)
• Native vegetation - NRCMA
• Water – NRCMA and Department of Water and Energy

Map and assess your properties problems. Determine how to manage them and what funding opportunities are available
• Weeds – NSW DPI (agriculture) and Local Councils.
• Pest animals – LHPA and DECC
• Erosion – NRCMA and NSW DPI (agriculture)

If you are involved in a rural enterprise, ask advisors in NSW DPI (agriculture) about the issues relating to your industry (e.g. best management practices, regulations, training opportunities, etc). for new and emerging rural industries. Find out if there is a local producer network or discussion group available for your industry. See resources and contacts sections. Join a producer association and learn from others in the industry. Find these groups through NSW DPI (agriculture), other producers or the internet (type “industry + association” into a search engine e.g. Alpaca association).

Determine if you are eligible for primary producer business status (this can provide tax savings) by contacting the Australian Tax Office or your local accountant or by typing “Australian tax office primary producers’ essentials” into any internet search engine (to access the ATO’s primary producer web page).

Remember to always check with your local council and NRCMA before undertaking any development on your property (no matter how small), as approvals are needed in many circumstances. This includes approvals which are required for riparian zones (riverbanks, streams, wetlands) which must be obtained before any work can be carried out (including weed removal). The last thing you want to do is cause erosion or negative impacts to land and water quality. There are also considerations for activities that may impact cultural heritage values of land and water.

The Department of Environment and Climate Change (formerly National Parks and Wildlife Service) administers a register of identified sites in NSW and nationally. Some local councils also have access to a register of culturally significant sites to assist with planning and development approvals.

IMAGE: Lee Weatherstone (dairy owner) and Pauline Wallace (Waterlands Landcare) at ‘Orana Dairy’ in the Clarence Valley.
Legislation

There are a number of pieces of legislation that affect rural land and rural enterprises. The following is a very brief outline of the Acts and where to go for more information.

**Apathes Act 1985**
Controls keeping bees, identification and use of hives, importation of bees and disease control of bees. Contact local NSW DPI (agriculture) for more information

**Companion Animals Act 1989**
Makes provision for registration of dogs and cats (working dogs are exempt) and rights of landholders to destroy dogs and cats. Contact your local council for more information

**Clown Lands Act 1989 and Crown Lands (Continued Tenures) Act 1989**
Covers the lease and use of crown land. Established local land boards, who deal with dividing fences. Contact the crown lands division of the Lands Department for more information

**Dividing fences Act 1991**
Covers dividing fences and fencing disputes. Contact the crown lands division of the Lands Department for more information

**Environment Protection and Biodiversity Conservation Act 1999**
Provides for the protection of the environment, especially in relation to matters of national significance (e.g. RAMSAR wetlands). Also lists threatened species and prohibits the export of native species without a permit. Contact the Federal Department of Environment and Heritage

**Environmental Planning and Assessment Act 1979**
Controls the extent and conditions of development on all land in NSW. Administered by local councils. Contact your local council if considering any type of development (buildings, intensive enterprise)

**Exotic Diseases of Animals Act 1991**
Any animal suspected of having an exotic disease must be reported to the Livestock Health and Pest Authority or police as soon as possible. Contact the LHPA for more information

**Firearms Act 1996**
You must be licensed to own or use firearms and firearms must be registered and suitably stored. Contact the firearms registry at www.police.nsw.gov.au/firearms for more information

**Fisheries Management Act 1994**
Permits are required to carry out aquaculture. Contact the fisheries division of the Department of Primary Industries for more information

**Impounding Act 1993**
Animals straying off (or on) to your property may be Impounded. Charges incurred to have animals released. Contact your local council for more information

**Inclosed Lands Protection Act 1901**
Deals with trespassers on your property, but common law remedies are more commonly used in rural situations. Trespass in a recreation vehicle is covered by the Recreation Vehicles Act 1983. Contact your local police station for more information

**Kangaroo Management Plan**
No kangaroo can be shot unless the shooter has a licence from the National Parks division of the Department of Environment and Conservation. See them for more information

**Local Government Act 1993**
Council levy rates for farmland and residential. If you disagree with your rating contact your local council

**Native Vegetation Act 2003**
Native vegetation can only be cleared as part of a defined routine agricultural management activity or in accordance with a vegetation plan (PVp) or development approval (Environmental Planning and Assessment Act 1979). Contact the Northern Rivers Catchment Management Authority for more information

**Noxious Weeds Act 1993**
Occupiers must control the spread of noxious weeds on their land, whether private or public lands. Contact your local council for more information or weeds authority.

**Oncological Health and Safety Act**
Every employer must ensure the health and safety of all employees. Contact Workcover for more information

**Pesticides Act 1999**
Controls the use of pesticides. It is an offence to harm people or property or non-target plants and animals. All users of pesticides must be licensed. See the EPA division of the Department of Environment Conservation for more information.

**Plant Diseases Act 1924**
Notifiable plant diseases and pests must be reported to NSW DPI (agriculture) inspectors within 24 hours. Regulatory Officers can make orders to landholders for the prevention, control or eradication of plant pests and diseases. Contact your local NSW DPI office for a list of notifiable diseases

**Plantations and Reafforestation Act 1999 (Code 2001)**
Plantations greater than 30 hectares must be authorised and must apply with the Code. Plantations 30 hectares and less are exempt. See the NRCSA for more information.

**Rural Fires Act 1997**
Sets out landholders’ responsibilities in relation to fire. Permits are required to light fires during the bush fire danger period or where a burn could endanger buildings. Contact the Rural Fire Service for more information.

**Soil Conservation Act 1938**
Landholders must control declared pest animals. Former RLPB offices will stay open as offices of the local LHPA’s (with the same contact numbers). Their core functions of livestock health, pest animal and insect management will continue.

**Threatened Species Conservation Act 1995**
It is a criminal offence to harm a threatened species or its habitat, sell a threatened species or have one in your possession. National Parks has the power to issue stop work orders if any activity is considered likely to harm threatened species or their habitat. Contact the National Parks division of the Department of Environment and Conservation for more information

**Water Management Act 2000**
Sets out landholder’s entitlements and obligations regarding water use covering streams, lakes, dams, bores and harvesting runoff. Contact water licensing in the Department of Water and Energy or the Northern Rivers Catchment Management Authority for more information.
Climate

Temperature
Summers in the Northern Rivers Catchment are relatively warm, with average maximum January temperatures of approximately 27 – 30° C. Greater temperature extremes are experienced away from the coast with maximum summer temperatures tending to increase by 1 – 2 °C for every 20km from the coast. For example, on average, Yamba experiences only one day above 35 °C each year, although warmer areas such as Lismore tends to experience more frequent summer extremes. Winters are cool to mild, with average maximum July temperatures of 19 – 21°C towards the coast and around 15 – 17 °C in more inland towns such as Nymboida and Bellingen. In summer, extremely hot drying conditions can be experienced throughout the valleys due to hot north-westerly winds from the inland. Temperature is also strongly influenced by elevation, with higher elevations having considerably lower winter temperatures.

Rainfall
Peak precipitation occurs between November and April with variability in rainfall from one year to the next being high. The catchments coastal areas receive approximately 1,350 – 1,650 mm of rainfall each year, while rainfall is significantly lower for example at Grafton with a median annual rainfall of around 980 mm. Local differences may also occur due to steep terrain altering the movement of clouds, in places and creating rain shadows. Rainfall in the spring to autumn months is often associated with thunder-storms which build up over the mountains during the day and move eastwards in the afternoon. Frosts are infrequent in coastal areas and when they do occur, are not usually severe (i.e. 0°C). Frost frequency and severity is highest further inland, with frosts rarely occurring within 1km of the coastline. Southern facing hillsides experience more frequent and severe frosts than do northerly facing slopes. Low elevation areas, subject to cold air drainage also have higher frequencies of frost and fog than surrounding areas.

Climate change
Information about Climate Change and the Northern Rivers Region can be found in the publication Climate Change in the Northern Rivers Region, prepared for the NSW Government by CSIRO and available from the NRCMA offices or visit the following websites for the latest information on climate change, its consequences and tools for managing risk:

- www.csiro.com.au
- www.greenhouse.nsw.gov.au
- www.northern.cma.nsw.gov.au

Up to date information about temperatures, rainfall, weather patterns, potential evaporation, prevailing winds, weather warnings and lots more can be found on the Australian Bureau of Meteorology website - http://www.bom.gov.au

Northern Rivers Region median annual rainfall

Figure 1: Northern Rivers Region Median Annual Rainfall
Drought

What is drought?

Drought is a prolonged period of lower than average rainfall, which results in insufficient feed (feed drought) and/or water in streams and dams (water drought).

From the tablelands and westward, drought is usually associated with bare and browned-off pastures. However, on the coast many pastures remain green during drought, although ground cover and feed availability may be low.

What are the effects of drought?

On the coast, there is typically a minor drought every 10 years and a major drought every 15-20 years. Droughts can be short and sharp or long and sustained. The last drought on the coast lasted from 2001 to 2004: this was a long and severe drought that caused both feed and water shortages.

During drought, pastures often become overgrazed and stressed; plant energy reserves are reduced and plants more easily succumb to pressures that they would normally survive in good times. Hence, it is essential to reduce stocking rates before pastures become overgrazed, and when coming out of drought, to carefully manage pastures to allow energy reserves and seed banks to rebuild.

Ground cover is reduced during drought and overgrazing exacerbates this. If management decisions are solely made on animal condition, drought strategies will be implemented too late. Serious pasture and soil degradation can then occur through wind erosion or water erosion.

Excessive erosion of manure and soils into water supplies may make it unsuitable for use. This is made worse by shallower, warmer and slow flowing water common in drought; nutrients or pest organisms (e.g. Algae) are not diluted and the warmer waters are ideal for algal growth.

Animals are obvious casualties of drought, not only through starvation, but through disease during and after drought. During drought illnesses are often related to supplementary feeding (e.g. grain feeding) and/or the weakened condition of animals. Animals are also more likely to suffer plant poisoning as feed becomes scarce. Wet cold conditions are often associated with drought breaking rains (even in summer) and this will badly affect animals in poor condition. Stomach upsets and plant poisonings are also common after drought.

Sudden changes in feed are associated with pulpy kidney, enterotoxaemia and other diseases.

During drought, river pumping restrictions are often necessary, this limits water supplies for irrigation, stock and domestic use, just when it is most needed. For information on river pumping restrictions, contact the resource access officer in the Department of Water and Energy at Grafton.

Animals are less likely to be properly cared for during drought. If you see an example of animal cruelty (starvation or lack of water), contact the Royal Society for the Prevention of Cruelty to Animals, who will try and rectify the problem with the owner of the animals.

Wildlife injuries, and hence the number of orphans, increases as animals are drawn to roadsides looking for food. If you find an injured or orphaned native animal, contact FAWNA/WIRES, who are experts in their management.

How do you know when a drought is coming?

Unlike floods, droughts can sneak up on you. Sometimes it is obvious when a drought is developing: its hot, dry and short and long-range forecasts predict no useful rains. However, at other times the development of drought is very gradual. Periods of rain, interspersed with long dry periods, can make it appear that drought has been averted, but water and feed supplies are showing a longer-term downward trend.

How do you prepare for drought?

Action plans for drought should be developed for properties as surveys of producers who survived the 2001-2004 drought reasonably well had plans that incorporated de-stocking, feeding and financial budget strategies.

Most importantly, they stuck to their plans. For more information on this read “Lessons from the drought – North Coast report” at www.agric.nsw.gov.au/headervld/hld/lert/dri/r/reports.html. Secondly, constantly monitor feed and water supplies and know how many days supply you have available if no further rains come.

How do you develop a drought action plan?

To develop a drought action plan for livestock producers, you need to know how to assess your pastures and livestock, know the likely diseases to watch for and how to undertake supplementary feeding of animals. Check with you local Landcare office, the Northern Rivers CMA or the nearest NSW DPI (agriculture) for information about courses being run in your area.

NSW DPI (agriculture) also has extensive information on planning for drought, and managing during and after a drought, including:

“Managing Drought”. A free book for NSW farmers covering most aspects of drought, including planning, feeding, farm management and assistance.


See the drought section in the NSW DPI publications web site at www.agric.nsw.gov.au/drought.

For horticulture crops, discuss the likely affect of drought and drought preparedness with your horticulture officer, NSW DPI (agriculture) at Coffs Harbour and Wollongbar.

Where can you get more information?

The Australian Bureau of Meteorology provides weather forecasts and radar images on its website (www.bom.gov.au) to help determine short-term weather patterns.

More information on animal health issues can be obtained from the booklet “Brief Cattle Health for the North Coast”, available from the Northern Rivers Livestock Health and Pest Authority formerly the Rural Lands Protection Boards) or by visiting the NSW DPI (agriculture) web site at www.agric.nsw.gov.au/How to manage pastures and crops.

Information on pasture and crop management during and following drought is available from agronomists in NSW DPI (agriculture) or from private agronomists (produce stores).

If your area is drought declared by the Minister for Agriculture, drought relief may be available to primary producers. The main forms of drought relief are transport subsidies for stock and water. This and other forms of assistance can be found on NSW DPI’s (agriculture) web site.

To help determine if you are eligible for drought relief, for help with processing of drought subsidies and to provide support information, contact the Rural Financial Counselling Service NSW Northern Region at http://www.rfsnsw.northernregion.org

To determine how much water you have available on your property and how to increase these water reserves, consult the water section in this kit.
Floods

The State emergency Service (SES) is the primary agency that deals with floods and coordinates the evacuation and welfare of communities affected by flood. If you are unsure whom to contact regarding a flood issue, try your local SES first.

Is flooding a serious problem?

In Northern NSW floods may result from various weather influences and prolonged or very heavy rainfall. General flooding is associated with east coast low-pressure systems, rain depressions and monsoonal low-pressure systems that bring rain for days or weeks, often over entire catchments.

The most severe floods are generally the result of the passage of degraded ex-tropical cyclones from the north during summer and autumn or east coast low pressure systems occurring during autumn and winter. When depressions such as these are characterised by very low central pressures, raised sea levels (storm surges) can occur. This exacerbates flooding when sea waters invade coastal areas and when flows in the river are retarded.

People, who live near rivers, or in low-lying coastal areas, live with the greatest threat of floods. Periods of heavy rain, not necessarily in their area, can lead to rises in the water level of streams and rivers to a point where channels can no longer hold the volume of water. Thunderstorms normally only result in local flooding, but these “gully rakers” can cause extensive localised damage; washing away fences, soils and livestock.

Because of the rapid flow of floodwaters down valleys, the time available for landholders to take action may be short (sometimes only 1 to 2 days). Flooding is usually of short duration and confined to areas close to rivers and their tributaries in the upper and steeper parts of the valleys. However, river heights may rise by 10 - 20 metres in these areas and damage may be severe due to the speed of the water flow. Stormwater flooding by itself can inundate extensive areas and when flows in the river are retarded.

Very heavy rainfall, in excess of 225mm in 24 hours and more than 400mm over the course of an event, are quite common for example in the Clarence River catchment. Dorrigo, in the far south of the catchment, has a recorded 24-hour rainfall of 809mm and monthly total of 1395mm and an average annual precipitation of nearly 2000mm.

Floods flooding not only leads to the loss of life and possessions, but it also creates a host of other short and long term problems, for example: loss of income; loss of pastures; fence damage; weed and pest invasion; livestock starvation and disease (e.g. Pulpy kidney and bloot); isolation from food and medical services, lack of drinkable water; and failure of sewage systems.

Insurance policies generally do not cover flood damage. If your property is in a flood-prone area, you should ensure you are protected as thoroughly as possible.

How do you know when a flood is coming?

The Bureau of Meteorology flood warnings are broadcast on all local radio stations. The SES will indicate in these warnings the likely consequences of the predicted flood height for local areas and advise on appropriate action. Warnings are also provided on the Bureau of Meteorology’s web site www.bom.gov.au/hydro/flood/nsw

What should you do to prepare for floods?

First, determine if you are in a flood-prone area or an area likely to be isolated by flood; if so, prepare a flood action plan for your property. To find out whether your property is susceptible to flooding and what critical flood heights are, talk to your local shire council and SES.

Know Your Local Flood History

Ask your local council or State/Territory Emergency Service about the following:

• What the terms major, moderate and minor flooding mean to your area and at what official river height your home becomes isolated or inundated.

• Local flood plans: whether you may need to evacuate; how to find the nearest safe location.

•  Local flood plans: whether you may need to evacuate; how to find the nearest safe location.

• Consult your local SES and neighbours who have experienced previous floods, to find out about local flooding idiosyncrasies. For instance, your property may not go under until a certain flood height, but by that time all of escape routes may be inundated.

• Obtain advice from the nearest Livestock Health and Pest Authority and NSW Department of Primary Industries (agriculture) to develop a livestock Flood Action Plan.

How do you develop a flood action plan?

A starting point is to obtain a copy of your local “FloodSafe” guide from your local SES or Council Office or on the web at http://www.ses.nsw.gov.au/info/pages.

These guides describe local flood problems, evacuation procedures and emergency contacts for the area.

• Consult your local SES and neighbours who have experienced previous floods, to find out about local flooding idiosyncrasies. For instance, your property may not go under until a certain flood height, but by that time all of escape routes may be inundated.

• Observe advice from the nearest Livestock Health and Pest Authority and NSW Department of Primary Industries (agriculture) to develop a livestock Flood Action Plan.

For example, factors you’ll need to consider for livestock are where can stock be evacuated to, how will they be evacuated (livestock transport trucks are likely to be in short supply during floods), what animal health issues may occur, how stock will be fed, how much feed is needed when pasture is not available and how long will livestock need to be away.

As SES flood action plans cover a large local area, you will need to modify them specifically for your property. Your property flood action plan should cover the people, possessions, machinery, pets and livestock and specify what you will do, how you will do it and what flood height triggers you will use. It should also cover the period immediately after the flood, as water quality, pastures, electricity, sewerage, etc can take a long period to return to normal.

If a disease outbreak does occur during or after a flood, contact the vet in the Livestock Health and Pest Authority or other private veterinarians.
Soils

Why care about soils?

Soils are the basis of all life; providing the matrix that supports homes, dams, plants and soil life, while providing the nutrients, water and structure that supports plant growth. Soils also regulate water flow across the landscape and filter water; thereby, controlling stream flows and water quality.

Without healthy soils we would not have productive pastures, crops and livestock, water quality would deteriorate, fish stocks would be reduced and our lifestyles degraded. Management of soils at a local level has catchment-wide effects.

Maintaining or improving the quality of soils should be a key goal of all landholders. Hence it is vital for all landholders to understand the potentials and limitations of their soils and how different management activities affect them.

What are the soil characteristics of the northern rivers region?

The following are descriptions of Australian Soil Classification orders that occur within the Northern Rivers. The erodibility and erosion hazard are also described for each classification.

Anthroposols

Anthroposols are soils resulting from human activities. Their extent is very limited, generally being concentrated in urban areas and mineral extraction/ quarry areas. These soils are extremely varied and can pose many management considerations.

Erodibility: highly variable.
Erosion hazard: highly variable.

Chromosols

Chromosols have a marked textural contrast but are mildly acid to alkaline, this being the major difference to the closely related Kurosols. These soils occur throughout the same areas as the Kurosols but tend to be more common in the drier parts of the region.

Erodibility: moderate to high.
Erosion hazard: moderate to very high on slopes; generally low to moderate on plains.

Dermosols

These are well structured soils that are commonly formed on basalts, but by no means restricted to them. Their depth is variable, generally up to 1 m, with a topsoil of clay loam to light clay and a subsoil of light medium to heavy clay. They are often dark and include the soils also known as Chocolate Soils. They are found west of Dorrigo, at Ebor, and east and northwest of Lismore including Kyogle and up to the McPherson Range. They are common soils of the steeper basaltic country, but also occur within alluvial plains and on other rock types.

Erodibility: Moderate to high.
Erosion hazard: Moderate to high on slopes; generally low to moderate on plains.

Ferrosols

Ferrosols are friable red soils generally derived from basalt. As the name suggests, these soils are high in iron. Their red colour is due to high iron oxide content, which promotes good structure. The soil profile grades from a clay loam topsoil to a medium clay subsoil. These soils are often very friable and crumbly. Ferrosols are the dominant soils of basaltic plateaux at Cudgen, Alstonville, Dorrigo and Comboyne. They have also formed on high level alluvial terraces, such as at Jackadgery, and on other iron-rich rocks.

Erodibility: moderate to high. The excellent structure of these soils enhances water infiltration which offsets the effects of erosive overland flow, however the crumbliness of Ferrosols makes them very prone to water erosion if left bare.

Erosion hazard: generally moderate but can be very high to severe on cleared sloping land.

Hydrosols

These are wet soils of coastal and inland swamps and other poorly drained areas. Those on the coastal floodplains often contain potential acid sulfate soil materials. These wet soils are generally characterised by a bluish grey subsoil, a reflection of the lack of oxygen available. Inland, Hydrosols are generally localised soils that occur throughout the region in poorly drained areas, such as backswamps. Coastal occurrences of these soils can be extensive, with most of the cane growing country on the Tweed, Richmond and Clarence Rivers being dominated by these soils.

Erodibility: variable.
Erosion hazard: Given their location they are highly unlikely to erode. However, acid scalds associated with extreme acidity in some acid sulfate environments may be subject to wind erosion.

Where can you get more information?

A useful reference for understanding cattle diseases is “Beef Cattle Health for the North Coast” by P. Freeman (2002), which is available from the livestock Health and Pest Authority or NSW Department of Primary Industries (agriculture) will also help producers understand the feed requirements of livestock and how to maintain their health through supplementary feeding and has information on property management during and after floods at www.agric.nsw.gov.au/reader/flood-frost.

For more information on flooding in your catchment area visit the flood web page at www.mhl.nsw.gov.au.

Many communities now have flood prevention or reduction strategies such as: restricting or not approving floodplain development; use of dams, diversions and levees; and building-rising or flood-proofing.

What can you do to reduce the negative impacts from flooding on your land?

• Replant riparian areas to reduce erosion of river banks and subsequent loss of pastures.
• Fence off stock from the creek and its banks to allow native plant regeneration and reduce erosion.
• Put in off-stream water troughs to eliminate the need for stock to enter creek areas.

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For more information on flooding in your catchment area visit the flood web page at www.mhl.nsw.gov.au.
Kandosols
These soils are generally uniform throughout the profile and lack structure. They usually grade from a loamy topsoil into a clayey subsoil. These soils have an earthy fabric and have previously been called ‘earths’ (e.g. red earths). Kandosols generally occur on the north coast as soils associated with a variety of other soils. They are more common on sedimentary, metamorphic and acid igneous rocks and their sediments. Kandosols are generally permeable, well drained and moderately to highly erodible. Areas within the region where Kandosols are more common include north west of Dorrigo, west of Sawtell, Illovo brick, and throughout the Burringbar and Blackwattle Ranges in the Tweed and Richmond catchments.

Erodibility: variable, but generally high to very high.

Erosion hazard: Highly erodible

Kurosols
These strongly acid soils have a marked textural difference between the topsoil (usually a sandy loam) and the subsoil (clay). They are also described as duplex soils because of this texture difference. They generally develop from sedimentary and metamorphic rocks, and acid igneous rocks such as granite or rhyolite. Kurosols can also develop on alluvial plains. These soils are extremely erodible once vegetation is removed so are best left under natural forest cover. Kurosols are widespread throughout the region, being a common soil in all the catchments. They are common in the high rainfall areas of the North Coast and may be associated with Chromosols and Sodosols.

Erodibility: moderate to very high.

Erosion hazard: Generally moderate to very high on slopes; low to moderate on plains. Very high in drainage depressions and drainage lines.

Organsols
Organsols are highly organic soils commonly known as peats. They are composed of vegetation matter in various stages of decomposition. Throughout the Northern rivers they are very localised and are often closely associated with Hydrosoils. Main occurrences are the poorly drained swale areas within localised and are often closely associated with Hydrosoils. Kandosols are generally permeable, well drained and moderately to highly erodible. Areas within the region where Kandosols are more common include north west of Dorrigo, west of Sawtell, Illovo brick, and throughout the Burringbar and Blackwattle Ranges in the Tweed and Richmond catchments.

Erodibility: variable, but generally high.

Erosion hazard: generally slight.

Podosols
Podosols are sandy soils with a bleached (white) horizon overlying subsoils that have accumulated organic matter and/or iron oxides. Subsoils of younger Podosols are usually weakly coherent coloured sand, those of older Podosols are often dark, compacted layers (‘coffee rock’). The bleached horizon can vary from several centimetres thick in young soils to several metres in older soils. Podosols are the typical soil of the extensive coastal sand bodies, such as in Bundjalung and Yuraygir National Parks, but can also be found inland, derived from granites and quartz sandstones and their sediments.

Erodibility: high to very high, particularly prone to wind erosion.

Erosion hazard: High to very high on exposed, non-vegetated dunes and other sand bodies.

Rudosols
Rudosols are soils that lack any distinctive evidence of soil forming organisation (generally the development of horizons) other than a thin dark topsoil layer. Apart from the lack of soil horizons their properties are variable. They range from stony, shallow soils on steep slopes, to deeper sandy or earthy soils in areas of recent deposition, such as floodplains and dunes. Rudosols are best left under natural cover to reduce erosion hazard. These soils occur throughout the region, their location being governed by landform and landscape position more so than parent material. Rudosols will often grade into Tenosols.

Erodibility: variable, but generally high.

Erosion hazard: generally high.

Sodosols
Sodosols are mildly acidic to alkaline duplex soils with high levels of exchangeable sodium cations in the subsoil. They are similar to Chromosols and some Kurosols, the higher amounts of sodium being the main difference. When sodic soils are wetted, each clay particle becomes surrounded by a significant water film which forces the particles away from each other. When this happens, the clay particles are said to have dispersed. The dispersed particles are seen as cloudy water in runoff. Dispersible soils are of concern to farmers because they are easily eroded by water. Erosion in sodic soils is often in the form of gully and tunnel erosion. Sodosols are generally localised soils that occur within the lower parts of the landscape where sodium accumulates such as drainage depressions and floodplains. Usually occurring as an associated soil with Chromosols and Kurosols, they are generally derived from sedimentary and metamorphic rocks, and acid igneous rocks.

Erodibility: very high.

Erosion hazard: high to extreme.

Tenosols
Tenosols are soils with some rudimentary soil development. They are similar to Rudosols but have better developed A horizons and some evidence of a B horizon, such as a change in colour. Like Rudosols, these soils are variable and have similar modes of occurrence. Can range from shallow stony soils to deep sandy or earthy soils. Tenosols occur in locations where soil development has progressed beyond that of Rudosols and/or parent material is dominated by quartz. They have developed throughout the region on footslopes in quartz sandstone, on alluvium, on recent dunes and sand bodies and on some quartz sandstone and granitic rock.

Erodibility: variable, generally high.

Erosion hazard: generally moderate to very high.

Vertosols
These soils are also known as cracking clays due to their tendency to develop distinctive cracks when dry. Vertosols within this region are clay soils that have commonly developed on basalt and basaltic sediments. The main occurrence of Vertosols within the region occurs on the Richmond River floodplain upstream of Coraki, and on lower slopes and fans within basaltic hills of the Richmond catchment. The main clay mineral in these soils is montmorillonite which promotes significant shrinking and swelling with changing soil moisture contents. Gilgai (‘melonholes’) are a phenomenon associated with the high shrink - swell. Some Vertosols are described as self-mulching due to the development of a fine aggregate assemblage on the surface.

Erodibility: moderate to high.

Erosion hazard: generally slight to moderate on plains but high to very high on cleared lower slopes and fans.

How agricultural production and soil structural stability are affected by the geology of each catchment can be complicated and is best discussed with advisors in the NRCSA or Department of Primary Industries agriculture offices.

Why is soil acidity important?
Soil pH is a measure of the acidity or alkalinity of a soil. The pH scale ranges from 0 (most acidic) to 14 (most alkaline). Soil pH is commonly measured in three ways, using: a field test kit; 1:5 water solution (pHW); or weak 1:5 calcium chloride solution (pHCa). A field kit is useful as a rough guide as to whether there are likely to be acidity problems in a paddock; these can be purchased from most produce stores.

However, laboratory pHCa tests should be used for management decisions, as they are more accurate than test kits and are less affected by fluctuations in soil salt concentrations due to rainfall or fertiliser application than pHW tests. Most agricultural soils in Australia have a pHCa of 4.5 to 9.

However, most hillslope soils in the region are moderately to strongly acidic (pHCa 4.0 to 5.0), with a tendency for the acidity to increase with depth. This is lower than the ideal for plant growth of pHCa 5 to 7. Alluvial soils of streambanks and floodplains, and soils derived from limestone or calcareous shale tend to have pHCa of 5 or more, but this is no guarantee and should always be checked.

Soil acidity affects the availability of essential and non-essential elements to plants and hence, their growth and survival. In the acid conditions of the coast:

- Large quantities of aluminium and manganese often become available. These can be toxic to plants if they occur in excessive amounts.
- Bacterial activity is reduced. These microbes fix nitrogen in legumes and break down organic matter to available forms for plants, so less nitrogen and sulphur is available for growth.
- Phosphorus becomes bound chemically to aluminium and so is unavailable to plants.
- Less calcium, potassium and magnesium is present.
- Manganese can become available at toxic levels if the pHCa drops below 4.5.
- Molybdenum becomes less available if the pHCa drops below 4.5.

Many pastures and horticultural crops grown on the coast are tolerant of the acidity levels that occur on the coast. However, failure to address increasing acidity levels reduces the options of what can be grown and in the longer term can degrade soils so much that there is a permanent reduction in soil fertility.

The most common methods for addressing acidity problems are:

- Applying lime to neutralise surface acidity and prevent future subsurface acidity.
- Building up organic matter to make more nutrients available and improve soil structure.
- Replacing the nutrients that are removed by livestock or crops.
- Choosing nitrogen fertilisers carefully and applying them in smaller split applications.

To determine whether acidity is likely to be a problem for you and how to best manage it, seek advice from one of the advisory services (listed in the resources and contacts section) to find the best guides to correcting soil problems.

Why are acid sulfate soils important?
Acid sulfate soils are a special case of soil acidity peculiar to much of the floodplains. During the last major sea rise that occurred about 10,000 years ago, new coastal landscapes formed through rapid sedimentation. Bacteria in the organic rich sediments converted sulfates in the tidal waters and iron in the sediments to iron sulfides. As sea levels dropped, river-born sediments covered these iron sulfide rich sediments. As long as the iron sulfides layers remain waterlogged they cause few problems (called potential acid sulfate soils). However, if they become exposed to air (e.g. by drainage) the iron sulfides oxidise to form large amounts of sulfuric acid (actual sulfate soils). One tonne of iron sulfides can produce about 1.5 tonnes of sulfuric acid.

The release of sulfuric acid produces widespread environmental problems. As the acid moves through the soil it strips iron, aluminium, manganese, cadmium, etc from the soil. This can create soils that are so acid and toxic that few plants can survive. It can make water unsuitable for domestic, stock or irrigation use and corrode concrete, iron and steel structures. If sulfuric acid and aluminium reaches waterways in sufficient quantity, it can affect the entire aquatic food chain: altering plant composition, increasing fish diseases and occasionally causing massive fish kills.

Because of the environmental risk from acid sulfate soils, councils have placed controls on any activities that are likely to disturb, expose or drain acid sulfate soils (e.g. dam building and drain cleaning). Developments requiring council approval are listed in Local Environmental Plans available through your local council.

The best way to manage acid sulfate soils is to know where they occur on your property and how far they are below the surface. This information can be obtained from environment officers in the shire councils, who can help determine your properties risk to acid sulfate soils (they have acid sulfate risk maps developed by the Department of Natural Resources), how they are best managed and what developments require approval.

Why is soil fertility important?
With some exceptions (e.g. alluvial soils on the floodplains and along rivers), coastal soils are mostly old, leached and of low to moderate fertility. Generally, there are multiple nutrients that are less than optimal for plant growth. These deficiencies: reduce the productivity of the land; limit the type of agricultural enterprise that can be run; make it harder to maintain high levels of ground cover; and increases the risk of erosion.

Soil tests are the most reliable way to determine what nutrient deficiencies are present. Soil analyses can be processed through local produce stores or directly with the testing companies. It is best to talk to an agronomist to determine the pros and cons of different tests.

While soil tests are the best way to determine the fertility status of soils, the colour of the soil (darker soils are usually better than lighter soils) and what plants are present can act as a guide in many situations. For example, carpet grass and spotted gum are most abundant on acid, lower fertility soils, while kikuyu and flooded gum are more abundant on soils with good water availability and higher fertility. However, plants composition can also be influenced by other past and present factors, so it is best to seek further advice.

Nitrogen and phosphorus are the most widespread and limiting nutrients to plant growth in the region. Nitrogen can be obtained from legumes, which fix nitrogen from the air, or from fertilisers. However, in pasture situations it is rarely economical to apply nitrogen fertilisers.
To maintain the fertility of your soil:
- Test the soil regularly. How often the tests need to be taken depends on how much product is being removed from the property (e.g. dairies and croppers need to test every year, high stocking-rate beef cattle every 2-3 years and low stocking-rate beef cattle every 4-5 years).
- Replace the nutrients that have been removed.
- Correct soil acidity to make nutrients available.
- Recycle the soils nutrients.
- Try to ensure that livestock manure is returned to the paddock where the original feed was grazed – rotational grazing helps here.
- Encourage soil organisms, such as earthworms and dung beetles.
- Increase soil organic matter by such practices as retaining stubble, growing cover crops, mulching, including a pasture phase in a cropping system, and keeping soil disturbance to a minimum.
- Include legumes in the pastures. This boosts nitrogen availability.

Why are soil depth and soil structure important?

All fertilisers, whether natural or man-made, have the potential to cause environmental problems such as ground water pollution, eutrophication of waterways or soil acidification. Problems usually occur when fertilisers are applied too close to dams or streams, just before heavy rains especially when the ground cover is low or too high a rate is applied.

Always seek advice on suitable rates and types of fertilisers to use from an agronomist or soil advisory service (listed in the resources and contacts section of this kit).

Why is organic matter important?

Organic matter is any living or dead animal or plant material and on farms it is primarily composed of plant litter and animal manures. It acts as a major source of nutrients for plants and as glue that improves soil structure. This in turn, reduces the chance of soil erosion, improves drainage and increases water storage. Organic matter is concentrated towards the soil surface. Any reduction in organic matter (from regular cropping, soil inversion by ploughing, over-grazing, etc) can lead to poorer plant growth and increased soil erosion.

Soil organic matter levels can be maintained or increased by:
- Increasing soil organic matter levels
- Removing stock from wetter paddocks
- Keeping vehicles and farm machinery off wet paddocks
- Maintaining a dense cover of perennial pasture
- Placing fences strategically, so that stock can be kept off wetter areas when needed
- Slashing or mulching paddocks rather than burning them
- Minimising soil disturbance
- Cultivating only when the soil moisture is right
- Deep ripping only if a compaction layer is present.

How should soils be managed to keep them healthy?

Because of the variability in soils across the region, the potential of your property and the limitations of its soils should always be assessed before undertaking any land management activities.

For further information on managing soils your local NSW DPI (agriculture) agronomist and Northern Rivers Catchment Management Authority can provide advice on these matters. (Listed in the resources and contacts section).

Landholders are encouraged to attend “Soil Health” field days (which gives landholders some simple tools to assess the chemical and structural fertility of their soils) and other workshop series that show landholders how to assess the natural potential and limitations of their properties using soil, slope and aspect.

One of the most useful overviews of soil management north coast is provided by the book “Soil Sense: Soil Management for NSW North Coast farmers. It describes the main soils on the north coast; the soil management techniques needed for each of the region’s man agricultural enterprises and provides a farmer’s A-Z of soil terms. Another useful publication, specific to soil erosion management is Saving Soils – A Landholders Guide to Preventing and Repairing Soil Erosion. Both publications are available from Northern Rivers Catchment Management Authority and NSW DPI.

There are also numerous free soil related publications on the NSW DPI website (www.agric.nsw.gov.au).

High levels of plant ground cover are essential for most soils on the coast to reduce erosion and sustain the production potential. Ground cover percentages that are required will depend on the erodibility of the soil and steepness of the land. However, most coastal soils require a minimum year-round cover of 90-95%. Drainage lines and steep areas are more prone to soil erosion due to greater volumes of water flow and higher flow rates, respectively. These areas should have 100% ground cover year-round.

In essence, maintaining healthy soils is about: maintaining healthy vegetation, high levels of ground cover and appropriate levels of fertility; addressing acidity; minimising soil disturbance and avoiding compaction or erosion.
Pastures

What terms do you need to know?

When discussing pastures it is useful to understand the following terms, as they are often confused:

- Native species are those that were present before European settlement (e.g. kangaroo grass and pitted bluegrass). Native pastures are pastures where native species predominate.
- Introduced species are plants that have been introduced from outside Australia (e.g. setaria and Rhodes grass).
- Improved pastures are where some management practice has substantially lifted production or quality (e.g. where clover and superphosphate have been oversown into native pastures or introduced species have been sown into a ploughed paddock).
- Naturalised species are plants that were originally introduced, but now do not require the intervention of people to persist (carpet grass and paspalum). Naturalised pastures are where production is dominated by naturalised species, but native species may still be abundant.

Why do I need to know about pastures?

For most landholders it is essential to be able to identify pasture species and know how to manage them as pastures form the basis of much of the agricultural production of the region. Mismanagement can lead to weed invasion, soil erosion and loss of profits.

Pasture species composition is a major determinant of pasture productivity, and hence, the type of stock enterprise that can be run and likely performance of the stock. Pasture species also provide information about the soils and/or previous management on a property (e.g. a plastic grass grows on compacted soils, blady grass is abundant where pastures are regularly burnt and kikuyu prefers high fertility conditions).

A number of pasture species are noxious weeds (e.g. giant parramatta grass) and are required to be controlled under the Noxious Weeds Act 1993 (see “Weeds” in this kit). Noxious weeds are where the soils are poor (shallow, steep or rocky), machinery can’t gain access and/or rainfall is low. This tends to mean that they are most common in the steeper upper parts of catchments, in the west of the region and on sedimentary based soils. Swamps are also dominated by native species: wetlands being a valuable grazing resource, as well as providing major bird habitat and fish breeding grounds. Even though native pastures tend to be less common than naturalised and sown pastures, far more species are present and they form an important store of native biodiversity. Some of the more common species are Kangaroo Grass, Blady Grass, Red Grass, Love Grasses and Barbed-wire Grass.

Knowing these potential problems helps in managing the pastures. Native pasture management is regulated by the Native Vegetation Act 2003 (see “Native vegetation” in this kit) and certain management activities (e.g. ploughing) need a permit. See your local Northern Rivers CMA for more information.

What are the characteristics of the pastures of the north coast region?

Due to the high, summer-dominated rainfall and relatively warm winters, pasture production in the area is best suited to, and is dominated by, tropical and subtropical warm-season perennial grasses. Most of the more fertile land and lower slopes are dominated by sown and naturalised species; the most common of which are Kikuyu, Setaria, Rhodes Grass, Paspalum and Carpet Grass. Kikuyu dominates fertile and deeper soils, where drainage is reasonable (e.g. floodplains and basalt plateaux), while Paspalum, Setaria and Rhodes Grass tend to occur where fertility or moisture are lower. Carpet Grass is most abundant on low fertility, shallow soils that have previously been disturbed.

In the earlier days of agriculture, virtually all potentially productive land was sown to introduced species. Hence, native pastures are only common where the soils are poor (shallow, steep or rocky), machinery can’t gain access and/or rainfall is low. This tends to mean that they are most common in the steeper upper parts of catchments, in the west of the region and on sedimentary based soils. Swamps are also dominated by native species: wetlands being a valuable grazing resource, as well as providing major bird habitat and fish breeding grounds. Even though native pastures tend to be less common than naturalised and sown pastures, far more species are present and they form an important store of native biodiversity. Some of the more common species are Kangaroo Grass, Blady Grass, Red Grass, Love Grasses and Barbed-wire Grass.

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The dual challenges of pastures of the region are related to quantity and quality. Most pastures have a relatively short growing season (mostly late spring to early autumn) and produce little or no growth over winter. During the growing season, pastures can quickly get away from stock and rapidly lose quality as they mature. Slashing is one of the main tools used to maintain a better level of pasture quality (and control weeds).

Legumes are desirable to have in pastures as they provide nitrogen for grass growth and are high quality pasture components. While summer-growing legumes often do well in the north of the region, the growing season is too short and frosts too severe in the south for them to thrive. It is also relatively difficult to maintain winter-growing legumes at desirable levels, due to adverse climate (rain at wrong time of year) and soils (too acid and low in phosphorus).

The two main ways of meeting these challenges is 1) by matching stock enterprises to the pasture production cycle (e.g. weaner production) and 2) modifying pasture production to match the stock enterprise needs (e.g. using lime and phosphorus fertilisers to lift legume production, and silage making). While winter-growing grass species could fill the winter feed gap, the region’s low winter rainfall and hot wet summers are generally unsuited to winter-growing perennials. While species such as Phalaris, Fescue and Cockfoot were sown in the past, they rarely survived for more than 1 or 2 seasons, except on the higher plateaux. Winter-growing annual grasses have been more successful, with annual ryegrass and oats commonly sown.

How do I know what pastures I have?

Your NSW DPI agronomist can identify pasture plants for free. See your local NSW DPI (agriculture) for more information about “How to Collect Plants for Identification”. While samples can also be identified by the National Herbarium, they charge landholders. Samples sent through NSW DPI (agriculture) incur no charge.

- The botanic gardens at Coffs Harbour also identifies plants for a small donation.
- Northern Rivers Landcare Networks and other organisations and agencies commonly support and refer landowners to one-day workshops and various courses being conducted across the region for landholders. See your list of contacts for more information about workshops and courses in the supplementary section of this kit. Ask to be placed on the mailing list so you can be sent information regularly about courses and workshops that may be of interest to you. Most of these are free or subsidised to keep costs for landholders to a minimum.
- NSW DPI (agriculture) have produced a wide range of publications that can help you identify your pasture species and these are listed in their publications catalogue found at: www.agric.nsw.gov.au/reader/pastures. “Native and Naturalised Grasses” and “Paddock Plants”, “Floodplain Grazing Project” is some of the topics covered in their publications and workshops.

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How do I manage my pastures if I don’t have stock?

If you are living in a bushfire prone area, a build-up in pasture mass can be a serious fire hazard for you and your neighbours. You need to maintain firebreaks and asset protection zones (see fire management later).

To control pasture build-up, consider:

- Agisting stock, if your external fences are in good condition (see your stock and station agent for more information). Having a written agreement stating all conditions of the agistment avoids misunderstandings. Note that if your boundary fences aren’t in good condition, you may be liable for any damages caused by stock wandering from your property.
- Slashing, if you only have a small area or you are not mechanically minded, contract slashing may be the best option: your neighbours will probably know a local contractor. If you intend to buy your own tractor and slasher, consult experienced neighbouring farmers as to the most appropriate machinery for the job (e.g. in steep or boggy country a 4-wheel drive tractor may be needed).

How do I manage pastures if I have stock?

While it is possible to run stock on pastures with only limited pasture knowledge, it is more likely that adverse changes will occur without your realising the causes (e.g. regular burning causing the spread of blady grass, loss of biodiversity and soil erosion); it will be more difficult to get through the hard times; and profitability will be reduced. What pastures should be grown, where they should be grown and how they should be managed is a complex topic that depends on what mix of enterprise, landscape and soils are present.

General principles for good pasture management include:

- Thoroughly plan before undertaking pasture improvement.
- Always spend money first on areas which will give the greatest return – these are generally the flats, but only soil testing will tell.
- Always maintain appropriate levels of groundcover (in most situations 90%) .
- Fence for better stock management and better pasture utilisation.
- Fire can be used as a hazard reduction tool in particular situations (see fire management later), but is not recommended as a general pasture management tool across a property. Burning can lead to adverse changes in pasture composition (e.g. increased percentage of the fire tolerant blady grass), increased erosion (as ground cover is reduced or lost) and weed invasion (reduced pasture composition unless great care is taken).
- Always control noxious and other problem weeds (see “what weeds have I got?”). Your control options will depend on the weed species and level of infestation. See your NSW DPI (agriculture) agronomist for more information.
- Consider whether you need pastures at all. Is the area better suited to any other types of production and/or revegetation with local native species? Investigate all opportunities.

There are a number of sources available to build the knowledge that is needed for good pasture management:

- Your local NSW DPI (agriculture) agronomist or produce store agronomists can provide property specific advice as well as generalised advice.
- Various workshops, courses and field days run by NSW DPI (agriculture), Landcare and others are designed to develop skills in pasture and livestock assessment and management, help landholders develop skills and knowledge to assess their natural resources (pastures, vegetation, soils and topography) and better manage land and use.
- Check your local paper to find out when and where these courses and workshops will be held.
- NSW DPI (agriculture) publishes a wide range of information on pasture management. These are available from your local office and on the web at www.agric.nsw.gov.au/reader/pastures. Primenotes CD is a collection of about 5800 information sheets dealing with agriculture and natural resource management.
Native vegetation

What is native vegetation?
Native vegetation is any plant species that existed in NSW before European settlement. This includes trees, saplings, shrubs, scrub, understorey plants, groundcover (any type of herbaceous vegetation) and wetland plants.

What is the value of native vegetation?
Just part of the value of native vegetation is that it;

- provides pasture for stock in difficult areas, where introduced pastures are unsuitable
- shelters stock from rain, wind and heat, improving their comfort and performance
- protects horticultural crops, increasing their yields
- shades and cools streams and dams, providing better quality drinking water and fish habitat
- filters water runoff, reducing nutrients leaving the land and causing algal blooms in streams and dams
- harbours wildlife; many of which help control agricultural insect pests
- stabilises soils and reduces erosion
- improves the value of properties
- provides aesthetic value
- supports biodiversity and ecosystem function

What types of native vegetation are there in the northern rivers region?
The north coast has a very diverse range of native vegetation communities including rainforest, wet sclerophyll forest, dry sclerophyll forest, grassy woodlands, heathland, swamp sclerophyll forest, freshwater wetlands, estuarine and saline wetlands and grasslands.

The type of plant community can be a useful indicator of soil type and water availability. Rainforests occur on soils with the highest phosphorus and water availability. As soil fertility drops, eucalypts become more common. Wet sclerophyll forests (understorey with softer leaves such as rainforest plants and ferns) occur on the more fertile soils with good water availability. On drier low-phosphorus soils dry sclerophyll forest (understorey with tough leaves such as acacias and heath) becomes more common. An abundance of kangaroo grass, blady grass and bracken in the understorey of sclerophyll forests is usually a sign of too frequent burning.

Heathlands occur on very low fertility soils, usually sands along the coast. However, it is not unusual to see scattered heath growing in hilltop pasture were soils are shallow and periodically waterlogged.

Swamp sclerophyll and wetlands occur on the floodplains where soils are periodically or permanently waterlogged.

Natural grasslands are usually a good indication of soils that are unsuitable for intensive agriculture (e.g. crops or sown pastures). They mostly occur on soils that are not suitable for cultivation (e.g. steep, rocky) or are agriculturally poor (e.g. sandy, very acid, shallow or waterlogged soils). At the start of European settlement grasslands were not common (mostly along rivers), although grassland species also occurred in the understorey of forests. Extensive forest clearing for agriculture up until the 1940’s, expanded the distribution of grasslands.

Native forests typically have a high plant diversity. Few species tend to be sown in introduced plantations and their more uniform age and structure provides a less diverse habitat for other species to exploit (e.g. epiphytic orchids and ferns).

Native vegetation maintains a higher diversity of animals than its introduced equivalent. Many native animals are adapted to a diet of particular native plant species (e.g. koalas). The greater number of plant species and ages in native vegetation also provides a more diverse food source that is spread throughout the year.

What are the hazards to native vegetation?
In the early days of settlement, the greatest hazard to native vegetation communities was widespread clearing. Early settlers cleared large tracts of forest, mostly for beef cattle and sheep grazing. Towards the end of the 1800’s dairying was taken up and rapidly expanded, until by the 1930’s there were more than 1200 dairies in the Macleay alone. This increase in farming intensity led to further clearing, pasture improvement; and cropping in areas where today it wouldn’t be considered viable. Frequent burning was also widely used to promote early spring pasture growth and for bushfire hazard reduction. This further reduced the extent of some communities (e.g. rainforests) and changed the structure of most others. For example, forest understoreys became grassier; there was less diverse habitat (e.g. fallen logs and tree hollows) and fewer species, while native grasslands were increasingly dominated by blady grass, a fire tolerant species.

However, cropping and intensive pastures removed most native species, except where these practices were not suitable. Today grasslands dominated by native species usually only occur where machinery couldn’t be taken or where it was uneconomical to plough.

The coastal floodplains also underwent significant changes. Originally, the floodplains were naturally inundated by water for long periods and wetlands covered much of the area. This limited the use of the fertile soils for dryland agriculture. Hence, in the 1900’s, large-scale drainage works (mostly in the Macleay, Clarence and Richmond) were undertaken to remove floodwaters more rapidly and allow for the expansion of dryland agriculture such as dairying and later, cane farming. This led to the loss of considerable tracts of wetlands and more recently, acid sulphate soil management issues.

Since the mid 1900’s, the profitability of agriculture has declined and less profitable areas have been taken out of production. In these areas widespread forest regrowth has occurred. Today, the greatest hazards to native vegetation communities on the north coast are no longer widespread clearing, but the degradation of what is left.

Many communities are fragmented and substantially modified by disturbances such as grazing, overly frequent fire, logging and weeds. Modified forests are not as valuable to biodiversity as the original old growth forests. Old growth forests are mature or even mature forests that contain large old trees with many hollows and dead branches. They tend to have a more diverse understorey structure and species composition than other forests. These forests have been substantially reduced from their original extent and need to be conserved wherever present, as their loss has serious consequences for biodiversity.

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Where native vegetation has become fragmented the patches created become isolated, especially where the land between is substantially altered for farming activities. This leads to a breakdown in species migration, dispersal, pollination and other functions required for functioning of the habitats. Ultimately, as the patches shrink, biodiversity declines, sensitive species become locally extinct and weeds invade.

To maintain the functioning and value of native vegetation these patches need to be linked by corridors within properties, between properties and at the regional level.

**How can native vegetation be identified?**

Unless you are experienced with plant identification, it is often most efficient for landholders to have an advisor identify their plants. However, no agency deals with all plant communities and the species they contain, so you may need to visit several sources including:

- Coffs Harbour Botanic Gardens Herbarium
- Botanical information service, Royal Botanic Gardens, Department of Environment and Climate Change, Sydney
- Agronomists in NSW Department of Primary Industries (agriculture) mainly for pastures.
- Environmental officers in local councils.
- National Park Rangers in the National Parks division of the Department of Environment and Climate Change.
- Most Landcare Offices will have species lists and publications for locally occurring species and plant communities.

It is best to ring ahead to ensure that someone can identify your plants (see resources and contacts section).

Alternatively, if you develop a Property Vegetation Plan (see management through the Northern Rivers Catchment Management Authority, you will receive a property map and an assessment of the native vegetation present.

There are a number of useful books/CDs to help landholders identify native plants. Many of these are available from local libraries - Here are a few titles to get you started:

- *Wildflowers of the North Coast of New South Wales* by B. Kemp (2005).
- *Grasses of the North Coast of NSW* by H & C. Rose and Tac Campbell (2006). Available from NSW DPI.

NSW DPI (agriculture) runs “Native and Naturalised Grasses” workshops, which covers how to identify and manage native species. Other workshops and field days on native vegetation are run by many different organizations in the region, so it is worthwhile joining your local catchment network to stay informed (contact your Landcare or NRM Community Support Officer).

**How can the quality of native vegetation be assessed?**

Assessing the health of your remnant vegetation is the first step in restoring the health of the native vegetation on your property. Unlike other areas of the farm, untidiness is a positive feature of native vegetation: over-mature trees, dead trees, fallen logs, bush rocks, tree hollows and a diverse understory of saplings, bushes and groundcovers are all vital to conserving biodiversity. For further information on how to assess the quality of native vegetation contact your nearest NRCMA office or Landcare Office.

**How can native vegetation be best managed?**

Expert advice in all aspects of the management of native vegetation is somewhat fragmented, partly because there are different goals (production, conservation) and many types of habitats. The best initial contacts are the Northern Rivers Catchment Management Authority and Landcare, as they have networks of contacts in native vegetation management and can advise as to what funding and training is available.

Other useful sources of information and advice can also be obtained from:

- National Parks division of the Department of Environment and Climate Change for conservation of most habitats. They also offer a range of conservation schemes (view at www.nationalparks.nsw.gov.au/news/Content/conservation_partners)
- Agronomists in NSW DPI (agriculture) for production and conservation of native pastures
- Environmental officers in councils
- Private consultants (see “Environmental and/or Pollution Consultants” and “Natural Resource Consultants” in the yellow pages) for all habitats and management goals

While there are many books that are relevant to vegetation management, much of the information is available on the web. Nearly all organizations provide their information on the web, which is now becoming the best place to access information. There are enormous numbers of articles available on every aspect of native vegetation management. The following will help you quickly link to them:

- www.northern.cma.nsw.gov.au for rules on vegetation clearing and many other issues
- www.npws.nsw.gov.au for biodiversity information and conservation management
- www.environment.gov.au for links to local, state and federal information
- www.rivers.gov.au for riverine vegetation management and river landscapes free publications
- www.greeningaustralia.org.au/index - native vegetation assessment, seed collection, free publications
- www.floramark.org.au/ seed collection and revegetation design information
What rules control the management of native vegetation?

While there are many pieces of legislation that may impact the management of native vegetation in rural NSW, the two major pieces of legislation are the: 1) Environmental Planning and Assessment Act 1979 and 2) Native Vegetation Act 2003. The Environmental Planning and Assessment Act 1979 controls the extent and conditions of development on public and private land. Councils administer the Act at the local level through the development of local environment plans. The planning laws are quite complex and undergoing change, so it is best to refer to council before undertaking any development.

The Native Vegetation Act 2003 is the principal legislation controlling the management of native vegetation in rural NSW and is administered by regional Catchment Management Authorities. The key objective of the Act is to prevent clearing unless it improves or maintains environmental outcomes. Details of the legislation can be obtained from the Northern Rivers Catchment Management Authority, who has published a series of information sheets on the Act. The following is a brief outline of the Act and some of its implications for landholders.

The Act defines three types of native vegetation: remnant, protected regrowth, and unprotected regrowth. For the north coast, remnant vegetation is defined as any vegetation that has regrown before 1st January 1990. However, remnant vegetation also remains remnant if it has regrown following illegal clearing or following clearing by natural causes (flood, drought, etc.). Regrowth is any vegetation that has regrown since 1st January 1990. Protected regrowth is native vegetation that has been grown or protected for biodiversity conservation purposes with the assistance of public funds or is recognised as protected growth in a property vegetation plan, environment plan, natural resource management plan or interim protection order. If none of these circumstances apply, then it is classed as unprotected regrowth.

The Act makes it an offence to clear native vegetation unless:

- there is an approved property vegetation plan
- development consent has been obtained
- the vegetation is unprotected regrowth
- for certain types of groundcover
- for approved routine agricultural management activities (RAMAs)
- for continuation of existing cultivation, grazing or rotational farming practices; or for sustainable grazing

The Act does not apply to certain types of clearing authorised under other legislation, such as the Rural Fires Act 1997, State emergency and Rescue Management Act 1989, etc.

A property vegetation plan is a voluntary, but legally binding, agreement developed in conjunction with your catchment management authority. It may address matters such as thinning, clearing, identification of regrowth and the continuation of farming practices. A property vegetation plan is the primary means by which landowners can take advantage of funding being offered by the government for conservation on private land (e.g. fencing, off-stream water supplies and weed control).

RAMAs are farming, safety and other activities where necessary clearing of native vegetation does not require approval under the Native Vegetation Act 2003. These activities and the extent of clearing permitted on the north coast is defined in the information sheet “What are the exemptions for routine agricultural management activities in coastal CMAs?” available from the NRCMA website. www.northern.cma.nsw.gov.au or from CMA offices.

Where illegal clearing is occurring, CMA officers have the power to stop the work, order remedial work and undertake criminal prosecutions.

Weeds

What is a weed?

Weeds are simply plants growing where they are not wanted. They may be any species of plant, including algae, ferns, grasses, forbs, vines, shrubs and trees.

Why care about weeds?

28,000 plant species have been introduced to Australia since European settlement. This is more than the total number of native plant species - 25,000 (source Weeds CRC, 2005). Over 2500 of these introduced plants are now established in the wild, and this is increasing at 10% per year, 65% of these established invasive plants have escaped from parks and gardens, and many are still traded. Of the 460 pastures and legume species traded in northern Australia between 1947-1985, 21 proved useful and 60 became weeds – 13 of these are now serious crop weeds. Others have become serious threats to the ecology of Australian landscapes. The cost of weeds to Australian agriculture now exceeds $4 billion per year - no estimate has been made of the cost to the environment.

Invasive plants and pests are second only to clearing as a cause of biodiversity loss. Invasive plants out-compete natives, change the habitat, and force out the Australian animals and birds. This can lead to local extinction of rare plants and animals. Invasive plants threaten the integrity of some of our most valued places.

The Northern Rivers Invasive Plant Action Strategy is one of the first documents of its type to pull together the needs of various weed managers; and to facilitate a coordinated and catchment approach to invasive plant management. It recommends actions which will enable a strategic approach to the management of weeds, and their capacity to rapidly establish, travel downstream of catchment’s headwaters, and spread across regions. This strategy, emphasises the importance of preventing new weeds from establishing and the need to respond quickly to incursions as these are the most cost-effective techniques for managing weeds. The document is available from local councils and the NRCMA offices and website.

Rural landholders need to be aware of the different weeds on their properties as different species can:

- poison stock (e.g. red lantana)
- reduce pasture production and quality (e.g. giant Parramatta grass)
- harbour pest animals (e.g. lantana and rabbits)
- cause injury (e.g. spear thistle and Honey Locust)
- degrade natural habitats (e.g. cat’s claw creeper, smother Riverine vegetation)
- increase soil erosion (e.g. willows and camphor laurel along streams and annual weeds in pastures)
- taint milk and meat products (e.g. Hashem Scent)
Weed control often represents a considerable cost in both time and money. This is because the climate is ideal for weed growth and weeds often grow in areas that are difficult to access. Control costs tend to rapidly increase, and available control options decrease, with weed density and extent.

What types of weeds are there?

There are several terms for weeds that are often confused by landholders and which can have important implications for actions landholders need to take.

Noxious weeds are plants that are declared to be noxious under the Noxious Weeds Act 1993. To be declared noxious, a weed must have a detrimental effect or cause serious economic loss to agriculture, to the environment or human health. However, a weed meeting these criteria will only be declared noxious if there is a reasonable and enforceable means of controlling the weed (e.g. although fireweed is a serious weed of pastures, it is not declared noxious in the Macleay or Hastings as it is no longer regarded as feasible to control it). The declarations may be on a state or local basis, each district on the north coast having its own declarations.

The Noxious Weeds Act 1993 requires that landholders and/or the occupiers of land must control noxious weeds on land under their control. Occupiers may also be responsible for noxious weeds along riversides or other watercourses and on adjoining unfenced roads even though the land is not their property. Each noxious weed is given a category that specifies the degree of control that is required (see “Noxious Weed Guide“) provided with this kit or available from local council offices and weed authorities listed in the resources and contacts section.

On the north coast, local councils are responsible for enforcing control of noxious weeds on council land, private land and vacant crown land.

Each council or weeds authority employs weeds officers whose duties include the inspection of private land for the presence of noxious weeds on private property. Where noxious weeds are found, the officer will notify the landholder and provide control advice. If they are not satisfied reasonable and effective measures have been undertaken they can resort to legal action, issuing fines or undertaking control measures at the owner’s expense.

Noxious weeds are costly for rural landholders and the environment. Poisonous weeds are weeds that are toxic to stock and/or humans. There is no legal obligation for poisonous weeds to be controlled unless they are also declared noxious, but it is in the best interests of landholders who are carrying stock to do so. Many stock die each year in the region from eating poisonous plants, so an animal’s natural instinct to know which plants are good for them cannot be relied on. Poisoning can occur whether an animal has been on the property its entire life or has just been moved from another area. The seriousness of a poisonous weed depends on the weather and the plant’s toxicity and palatability (e.g. mother of millions is highly toxic, but rarely eaten: however, during drought it may be eaten as nothing else is available).

Some of the most prevalent poisonous weeds for rural landholders on the north coast are red-flowered lantana, bracken, green cestrum andcrofton weed (for horses).

Environmental weeds are plants that invade natural areas. Some of the effects of environmental weeds are that they: impede or suppress natural vegetation; prevent regeneration of indigenous plants; disrupt or displace native animals; and create habitat for past animals. Environmental weeds are the major threat to conserving, restoring and rehabilitating native vegetation on the north coast. Generally, plant communities will naturally regenerate if weeds are suppressed; hence, weed management is the primary tool for conserving native vegetation.

Some of the most costly and aggressive weeds for rural landholders on the north coast are red and pink flowered lantana, cat’s claw creeper, madeira vine, coastal morning glory, cockspur coral tree, small and broadleaf privet, camphor laurel and water hyacinth. Your local Landcare office, local council and NRCMA office will be able to provide you with a list or fact sheet on how to recognise and appropriately control environmental weeds in your locality.

Agricultural weeds are plants that have a detrimental affect on agricultural production. They may affect grazing enterprises by replacing desirable species e.g. Giant Parramatta grass, inhibiting stock from grazing e.g. dense stands of spear thistle or poisoning e.g. fireweed. Some of the agricultural weeds that are widespread and resulting in significant costs are red and pink-flowered lantana, giant parramatta grass, fireweed and spear thistle.

Riparian corridors are particularly susceptible to weed invasion and are often invaded by multiple weed species. This susceptibility to invasion is a result of the natural disturbance processes associated with flooding, favourable environmental conditions and the continued input of weed propagules from upstream and adjacent areas. The impacts of human activities have also increased the likelihood of weeds establishing in riparian areas. However, well designed weed management programs can achieve positive outcomes in riparian areas.

For more information on managing weeds in riparian areas (land links to riparian management advisors) visit the NRCMA website www.northern.cma.nsw.gov.au/publications_project_report_library and download “Habitat Management Guide: Weed Management in Riparian Areas” and other useful publications or contact your nearest NRCMA or Landcare office.

Whether a weed is declared a noxious, environmental or agricultural weed will depend on the location or district within each state.

How can weeds be identified?

Where weeds are found it is essential to get them positively identified as the species determines:

- the seriousness of the weed (giant parramatta grass is far more serious than african parramatta grass);
- how it is spread (fireweed has wind blown seed, while parramatta grasses have sticky seeds that are spread by stock and vehicles);
- what management practices may need to change to prevent re-infestation (spear thistle flourishes where there is high nitrogen availability);
- the timing and methods of weed control (much money is often spent using the wrong chemical on the wrong weed).

There are no guides that cover all the weeds of the north coast. Hence, it is often most efficient for landholders to have one of the following advisors identify their weeds and provide management advice:

- Agronomists in NSW Department of Primary Industries (agriculture) for pasture and cropping weeds;
- Horticultural Officer in NSW DPI at Coffs Harbour for horticultural weeds;
- Wildlife Officers located in councils and Far North Coast Weeds Authority for noxious weeds;
- Agronomists at local agricultural produce stores for agricultural weeds;
Private consultants (see “Environmental and/or Pollution Consultants” and “Natural Resource Consultants” in the yellow pages) for all weeds

Landcare officers for all types of weeds (see contact list for nearest office)

Where the above advisors cannot identify the weeds, samples can be forwarded to the Coffs Harbour Botanic Gardens herbarium and Botanical information service (Royal Botanic Gardens, Department of Environment and Climate Change) in Sydney for identification. However, these organisations do not provide management information. Ensure weed samples collected are suitable for identification.

There are a number of useful books to help landholders identify weeds. Many of these are available from local libraries and bookshops. The following will be useful;


Two useful publications for the Richmond Catchment -


The following are available from NSW Dept of Primary Industries district offices;


A range of weed information sheets and booklets are listed in the “NSW DPI publications catalogue”.

Various organisations run “Weed identification and Management” field days.

Some of the most useful weed identification and management web sites (containing photos) are;

- North Coast Weeds Advisory Committee at www.northcoastweeds.org.au
- NSW Department of Primary Industries at www.agric.nsw.gov.au/reader/pests
- CRC for Australian Weed Management at www.weedscrc.org.au
- Weeds Australia at www.weeds.org.au

How can weeds be managed?

Weed management does not equal weed elimination. It is rarely physically or economically possible to fully remove all weeds and their seeds and exclude further entry. Weed seeds are constantly being imported by means over which landholders only have limited control (e.g. wind, water, vehicles and animals).

Like all plants, weeds need light, water and nutrients to grow. Situations that free these resources up increase the opportunity for weed establishment. Hence, the principles of good weed management are to limit the availability of weeds to be able to utilise these resources and limit the availability of these resources to weeds that are present.

Common situations in rural landscapes that make these resources available to weeds on the north coast are;

- Poor ground cover – most weeds need an open area to establish, as this provides them with light, water and nutrients to grow. Often the openings do not need to be for long periods or large in size. Hence, maintaining high ground cover year-round is necessary to limit weed establishment. This can be achieved by: using stocking rates, fertiliser rates and species that are best suited to the conditions; controlling bushfires; limiting the use of fire as a management tool; fencing conservation areas and streams; and mulching. Sometimes decreases in ground cover can’t be helped, as during (and after) droughts, floods and fires. However, good management (early destocking in drought, provision of sacrifice areas, provision of firebreaks, extra vigilance, etc) can greatly minimise these effects.

- Soil disturbance – most areas have a large buried weed seed bank, even in what appears to be pristine native vegetation. However, most weed seeds won’t germinate unless they are brought to the surface by soil disturbance, as many seeds require light to germinate. Disturbance also frees up nutrients and water for weed growth. Always consider the consequences of any action that are likely to cause soil disturbance and whether a better alternative is available.
Weeds

Resource Kit for Rural Landholders

Weeds

- Keep new stock in a holding paddock for up to a week to entry, spread and establishment on a property
- Good farm hygiene can go a long way towards limiting weed weeds, yet this is the most costly and time-consuming strategy. Unfortunately, many landholders only address established
- 1) entry of weeds onto the property
- Weed management strategies should limit the:
  
  Basing fertiliser applications on soil tests and plant needs will
- 3) spread of established weeds between areas within the property
- 4) abundance of established weeds (if they are causing problems).

Unfortunately, many landholders only address established weeds, yet this is the most costly and time-consuming strategy.

Good farm hygiene can go a long way towards limiting weed entry, spread and establishment on a property

- Keep new stock in a holding paddock for up to a week to allow weed seed to pass through their system
- Don’t let machinery drive across a property unless it has been thoroughly cleaned. Machinery and stock are the main means by which giant parramatta grass is spread around the coast.
- Keep machinery to set tracks if it must driven on the property
- Regularly slashing along the main entrance to the property
- Use equipment in the cleanest paddocks first. Paddocks with noxious weeds should always be last.
- Have a washdown area and thoroughly cleaning equipment after use on weedy paddocks

- Only feed out introduced feeds (hay, silage) within set areas. These areas should preferably be arable, in case it needs to be resown.
- Regularly inspect for new occurrences of weeds, especially around holding yards, washdown areas, sheds, tracks, creeks and feedout areas.

Often several weed control methods will be needed, varying with the location, density and area of weed infestation, as well as the vegetation community in which the infestation occurs.

Always obtain advice on the best strategy (see advisors under “How can weeds be identified?”). The main control methods available are:

- **Hand** – cheap and useful for small infestations, but time consuming e.g. hoeing, hand pulling
- **Mechanical** – moderate to high cost, but useful for large continuous infestations e.g. slashing, mowing or ploughing
- **Cultural** – cheap to expensive. Often has beneficial side effects, such as more productive and profitable pastures e.g. grazing, competitive pastures or cropping in extremely weedy situations
- **Biological** – introduced pests and diseases of weeds
- **Chemical** – cheap to expensive, but has environmental and human hazards (the Pesticides Act 1999 places conditions on the use of herbicides – see Pesticide usage). Generally used where the above methods are ineffective.

Other points to consider in weed management are:

- If weeds are to be removed, what will fill the gap in the short-term (e.g. placing mulch over a bare area and long-term (re-invigorated pastures or native species to replace weeds), otherwise weeds will keep returning.
- Established agricultural weeds (e.g. fireweed) in production situations are not always economical to control until they reach a certain threshold density.

Bush regeneration

Bush regeneration involves the control of weed species in situations where the recovery of native vegetation (rainforests, riparian areas, remnant bushland etc.) requires careful treatment and specific outcomes. Bush regeneration is usually carried out by experienced operators who are able to assess and implement the required weed control, usually in accordance with a management plan that is prepared for the areas rehabilitation. Bush regenerators often work in teams of 2 – 4 people depending on the extent of the work and will use various methods to achieve the weed control without harming the native vegetation or causing erosion. Initial work often requires follow up treatment to control emergent weeds – the soil beneath large weed infestations (e.g. camphor, cockspur coral tree, privet, lantana, vine weeds, etc.) can be full of weed seed or propagules along with native species. Vine weeds such as cat’s claw creeper have a serious network of underground tubers that can grow back even when the vines are removed or cut. Other weeds may have varying survival mechanisms – making their control difficult and costly e.g.; Mother of Millions can grow from a single leaf that falls to the ground. Be sure to remove all weed seed and potential growth from the site to help prevent the re establishment of weed species.

**If you have noticed certain plants are taking over your patch of bushland, wetland, rainforest, river or creek bank then seek advice on the situation as soon as possible. There are various funding opportunities available for landholders who wish to undertake activities that control the spread of invasive plant species.**

(See resources and contacts section of this kit for bush regeneration advice - including all Landcare offices). There are various publications which cover how to identify and control weed species available on the websites listed in the section on How Can Weeds be Identified?

**Image:** Green Corps team removing weeds from bushland (J. Mouley)

**Image:** Dichoma serrulata, weed of rainforest and riparian zones (B. Jarman)
What approvals may be needed to undertake weed control?

Whether an approval is needed will depend on the location, type of weed and form of weed control being undertaken.

Listed below are the approvals that are, or may be, required from different bodies.

- Rural Fire Service approval is required to burn off in the bушfire danger period
- Council approval is required from all councils to; work on road sides, on land zoned as Environmental Protection and areas identified as significant vegetation and wildlife corridors, for some tree species covered by a Tree Preservation Order and for earthworks (e.g.; on floodplains because of acid sulphate soils disturbance and Riverine zones because of the possibility of bank erosion)
- Northern Rivers Catchment Management Authority approval may be required for the control of native weed species e.g. native peach and blady grass, for the control of non-native weed species where the works will also clear native vegetation and to carry out certain earthworks within 40m of a watercourse.
- Department of Lands approval is required for all activities affecting crown land unless specified in the lease.
- National Parks (Department of Environment and Climate Change) approval is required if your work will affect threatened species, populations or ecological communities or aboriginal relics or sites.
- Consult with National Parks if you will affect flora/fauna and require consent from councils or other departments.
- Consult with Department of Water and Energy if weed clearing or any vegetation disturbance is to be carried out on a river or stream bank. www.dwe.nsw.gov.au
- Department of Urban Affairs and Planning approval is required if undertaking development affecting wetlands, littoral rainforests or koala habitat
- Environmental Protection Authority (Department of Environment and Climate Change)
- A licence is required if you will pollute waterways (including herbicides)
- A permit is required to use an unregistered pesticide, or a pesticide contrary to the label

Pesticide usage

The Pesticides Act 1999 regulates the transport, storage and use of pesticides. Pesticides include bactericides, baits, fungicides, herbicides, insecticides, lures, rodenticides and repellents. Under this act, training is compulsory for commercial users of pesticides. (see “New Law for Training People Who use Pesticides in Their Work”).

If a landholder employs a contractor to apply chemicals on a property, it is their responsibility to ensure the contractor is suitably qualified. Be aware that the landholder can be held liable if they fail to provide essential information, provide wrong or misleading information, or coerce or pressure a contractor so that pesticide misuse occurs (see “Pesticides Act 1999: your Responsibilities”).

Pesticides are often toxic to non-target organisms. Always follow the instructions on the label and never apply herbicides close to waterways unless the product is specifically designed for that purpose.

Chemical users face the problem of what to do with their empty chemical containers. Since 1999 chemical users have paid a 4c a litre levy on pesticide products to fund drumMUSTER; a program to help chemical users dispose of containers. Normally drumMUST collections are organised by local councils. Enquire with the local council or reseller to determine when the collection will be run. All that is required of the user is that the containers are cleaned immediately after use and stored in a safe location until collection.

For more information on pesticide usage, talk to local advisors listed under “How can weeds be Identified” or visit NSW DPI’s website at www.agric.nsw.gov.au/reader/pests.

NSW DPI (agriculture) also regularly publishes the free “Noxious and environmental Weed Control Handbook” and “Weed Control in Lucerne and Pastures”, which are available from their offices. Information on the Pesticide Act 1999 is available from the Environmental Protection Agency at www.epa.nsw.gov.au

Pesticide training courses are organised by NSW DPI (agriculture) and TAFE (www.tafe.nsw.edu.au/studenttraining). ChemCert (NSW) Ltd. (02) 93874714 or www.chemcert.com.au and NSW farmers Association (0268848822 or www.nswfarmers.org.au). Other training organisations are listed in the yellow pages under training organisations.

Information about DrumMuster is available at DrumMUSTER (www.drummuster.com.au)

Water

Why worry about water?

While the north coast has a high annual rainfall, it does experience extended dry periods, usually from late autumn to late spring. During this time, rain is often light, with little run off to replenish streams and dams, and domestic water usage typically exceeds water-tank replenishment.

Predictions (based on climate modelling) suggest there will be a slight increase in summer and autumn rainfall and a decrease in winter - spring rainfall. Evaporation rates will be higher due to the increased temperatures, further reducing the effective rainfall, particularly in the spring. The impacts of climate change will mean more prolonged dry periods, particularly in inland areas of NSW.

Even during the high summer rainfall period, water usage can exceed storage, as water usage rises dramatically. The north coast also suffers from drought. While it isn’t possible to totally drought proof your property, rural landholders that plan their water supply are much less susceptible to the affects of dry periods than their unprepared neighbours. The alternatives to good planning can be expensive (e.g. reliance on water carriers, selling off stock during unavailing prices, death of horticultural crops, etc).

The quality of the waters in our rivers and aquifers is naturally influenced by inputs of salt and nutrients from the surrounding landscape and its geology. However, water quality can also be degraded by a wide range of factors including point source activities (such as sewage discharge, mine wastes) and diffuse source activities such as land clearing and cultivation, urban and agricultural development.

How landholders manage their water supplies also affects: the quality and quantity of domestic, stock and irrigation water for downstream users; fish stocks; wildlife (e.g. waterbirds); and the recreational and aesthetic values of waterways throughout the catchments.

What regulations control rural water usage?

The Water Management Act 2000 and Water Act 1912 control the extraction and use of water, construction of dams and activities in or near water courses in NSW. Extraction of sand and gravel from waterways is only allowed under an approved DWE permit. However, local environment plans also place controls on what activities can be undertaken. Hence, it is always best to contact the resource access officer in the Department of Water and Energy (DWE) at Grafton and local shire council to obtain the latest information and determine what approvals are needed for activities that extract or use water or occur near water sources (including floodplains).
As part of the national water reform process, the Water Management Act 2000 is gradually replacing the Water Act 1912. Only a brief summary of the Acts implications for landholders is provided here.


The Water Management Act provides for NSW to be divided into areas, each of which will have a water management plan. Currently, there are several water sharing plans in place on the north coast, information on these can be accessed on the Department of Water & Energy website: www.dwe.nsw.gov.au/water/sharing.

Water management plans address water sharing, drainage and floodplain management and water source protection. All rural landholders in NSW currently have rights to access water for their basic needs. These are domestic and stock rights, harvestable rights in farm dams and native title rights.

Landholders, who own or occupy land that includes a riverbank or lake edge or that overlies an aquifer, can take water without a licence for stock (not intensive industries) and domestic use. However, the water cannot be used for irrigation, crops that will be sold or bartered or for washing down machinery sheds; these still require a water use licence.

Landholders are also allowed to capture up to 10% of the average regional rainfall runoff on their property; capture in excess of this requires licence (see dam). The captured water must be stored in dams that can be used for any purpose, including crop irrigation. However, the amount stored is unlikely to be sufficient for a significant area of irrigation. Anyone who holds native title rights to water under the Native Title Act 1993 can take water for personal, domestic and non-commercial needs. During dry times, restrictions may be placed on the amount of water that can be extracted. Prior to water management plans, commercial use (e.g. irrigation, dairies, aquaculture and intensive animal production) of water requires a licence. When water management plans are put in place, licences will be converted to water access licences. The licences will be allocated to individuals rather than properties, allowing users to purchase water from licensed users who are not extracting their full quota. All water plans will define rules for extraction during low river flow conditions, such as when pumping is not permitted and how much water can be taken at different flow levels.

In addition to water access licences, approvals are required under the Water Management Act to undertake water supply (e.g. bores) drainage and flood works, and to remove material from land, dump material on land or undertake any other activity within 45 metres of a river that affects the quantity or flow of water. More information on water management plans can be found in the information sheets “Overview of Macro Water Plans” and “Benefits of Macro Water Plans”, which are available from DWE offices or at www.dwe.nsw.gov.au/water/macro.

How much water do you need?

How much water is needed on a property depends on many factors, such as: the source of the water; the number of people and stock; whether it is to be used for fire fighting; and the properties' location (hotter, drier areas further from the coast lose more dam-water to evaporation). See the DWE information sheet “How much water do I need for my rural property?” that will help you estimate your water requirements. http://www.dwe.nsw.gov.au/water_trade/rights.shtml

How much water have you got?

The maximum amount of water that can be stored on a property at any time can be estimated from the dam capacity (see the information sheet “Farm dams – What size are your existing dams?”) available on the DWE website, bore and river-pump flow rates and water tank volumes. These figures can be used to seek advice about the sufficiency of your water supply from the resource access officer in DWE at Grafton, local suppliers (e.g. water-tank suppliers and local dam contractors) and neighbours.

Although the volume of water potentially available to your property may appear large, its reliability for different uses during dry periods can vary because: river water quality often deteriorates during low flows; smaller streams may completely dry up; bores and wells may become increasingly saline when water levels are drawn down too far; and rainwater capture by roofs may be insufficient to refill water tanks except in wet periods.

How you meet the difference between what you need and what you have depends on the reliability and cost of different water sources. One of the simplest ways to conserve water for domestic use is to use water tanks to capture rainfall runoff from home and shed roofs. To get the most from your water supplies read “Farm Water”, listed in the NSW Department of Primary Industries (NSW DPI) publication catalogue.

Bores and wells

Accessing water from an aquifer under a property doesn’t require a licence for stock and domestic use. However, the bore or well must be licensed (no charge) through the licensing unit of the DWE. Water use for other purposes also requires consent from the licensing unit. If you are considering constructing a well or bore on the floodplains, seek advice from your local shire council first, as planning permission is needed for works which may disturb acid sulphate soils.

The flow rate and quality of the water needs to be determined to assess its adequacy for different uses; many aquifers are too saline for certain uses or become increasingly saline as the water level is drawn down. There are also a range of metals, such as iron and aluminium, which affect water quality. Information about the location and depth of aquifers in your region can be obtained from the DWE at Grafton, local suppliers (e.g. bore and river-pump flow rates and water tank volumes). These figures can be used to seek advice about the sufficiency of your water supply from the resource access officer in DWE at Grafton, local suppliers (e.g. water-tank suppliers and local dam contractors) and neighbours.

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Dams

If you are intending to build a dam, seek advice from the resource access officer in the DWE at Grafton and your local council, as consents are required in a number of circumstances, including:

- if the total volume of all dams on a property will exceed the harvestable rights limit. However, if you find the dams currently on your property exceed the harvestable limit, you also need to obtain a licence from the licensing unit of the DWE
- if the dam is to be constructed on a floodplain. As it may divert flood flows, consent is also required from the licensing division
- for dams with an area of more than 0.5ha and located in or within 45 metres of a natural waterbody, wetland or environmentally sensitive area; or in an area with high water tables, acid sulfate soils or saline soils. In this case DWE approval is needed
- if any new dam, or alterations to existing dams, affects fish passage, then consent may be needed from the DPI (fisheries)
- farm dams that are part of your harvestable rights can be located on hillsides, gullies and minor watercourses. The definition of a minor watercourse and how to work out the stream order is explained in the information sheet “Farm Water”
dam's - where can they be built without a licence?” on the DWE website www.dwe.nsw.gov.au/water/farmdams/ factsheets.shtml or by contacting their resource access officer. If you wish to build the dam on a permanent river or creek you will need to obtain permission from the DWE first. You will need to calculate whether your maximum harvestable rights dam capacity (MHRDC) is, or will be, exceeded if you want to: irrigate from dams; build a new dam; or sell part of your property (subdivision of a property can mean one part may then exceed its MHRDC as this is based on the area of each new property). In all cases, if the MHRDC is exceeded, a licence will be required. How to calculate your MHRDC is described in the information sheet “Farm dams – what size can you build without a licence?” on the DWE website or by contacting the resource access officer in DWE at Grafton. Depending on how they are constructed, dams can either be rather sterile places or a haven for wildlife. Dams provide for wildlife if they have: a range of water depths near the edge; reeds, rushes and other water plants; surrounding and overhanging woody native vegetation; and refuge areas (e.g. fallen logs, dense shrubs or central mound). It is also beneficial to restrict the access of stock, so the entire dam bank isn’t trampled.

One of the benefits of building a dam that considers biodiversity conservation is that it also provides better quality drinking water as: vegetation above a dam filters sediments out of the water, reducing eutrophication and algae growth; overhanging vegetation cools the water; and exclusion of stock from much of a dam’s edge reduces faeces and urine entering the water. Water quality can also be protected by maintaining a (approximately) 20m spray and fertilizer buffer around a dam, combined with high ground cover. For a fuller discussion of how to create a dam for stock and/or wildlife, read:

- “Farm Dams. Planning, Construction and Maintenance” by B. Lewis (2002), which is available from the DPI bookshop

Further information is available on the DWE website http://www.dwe.nsw.gov.au/about/search.shtml:
- What are rural landholders’ basic rights to water?
- Water for my rural property - do I require a licence?
- How much water do I need for my rural property?
- Farm dams - do you need a licence?
- Farm dams - where can they be built without a licence?
- Farm dams - what size dam can you build without a licence?
- Multiplicator factor from maps

Locate your property on the map that shows the Maximum Harvestable Right Dam Capacity multiplier. It is easy to do this is on-line http://www.farmdamscalculator.dnr.nsw.gov.au/cgi-bin/ws_postcode.cpl

Further information on dam construction can also be obtained from the DPI website at www.agric.nsw.gov.au/reader/dams-storage.

Before starting the construction of a dam or earthworks, it is advisable to consult with Soil Officers in your local catchment management authority as they have responsibility for soil conservation in NSW.

Always check with neighbours for a reliable dam builder, as a good knowledge of local soils and landscapes is needed to build a successful dam.

Rivers

You do not need a licence to pump water if your property fronts a river or lake and you want to use the water for stock or domestic purpose. However, you will need one for commercial activities. Applications for licences can be made to the licensing division of the DWE in Grafton, but may not be approved - check before applying. The water can be pumped directly to your home or stock trough or into a dam for storage.

Local councils regularly monitor the quality of some streams and it is worthwhile checking with them as to what problems may exist and how best to treat the water.

While stock can obtain water directly from streams, their urine and faeces reduces the quality of water for downstream users. At the same time, they can erode streambanks and degrade riparian vegetation through trampling and grazing.

Healthy riparian vegetation is vital for:
- reducing streambank erosion (by stabilising the soil and reducing the velocity of stream flows)
- providing wildlife corridors
- decreasing pest insects (by providing habitat for insect-eating native animals)
- preventing nutrient loss (by acting as a filter)
- increasing fish stocks (by shading and cooling stream water and providing log habitats and food)
- decreasing algal growth

To provide these benefits, wherever practical, a vegetation buffer of at least 10m wide should be maintained along streams. This should be fenced (plan wires, as barbed-wire is more likely to catch vegetation during floods and wash away the fence) and off-stream water supplies provided. This does not mean that stock can’t graze the fenced-off area, but only that their access is controlled. Stock are useful to reduce grass and weed growth at appropriate times. The Northern Rivers Catchment Management Authority (NRCSMA) and other organisations provides funding opportunities to landholders for riparian management (fencing, off-stream water supplies, replanting, etc) and should be the first port of call to find out what is available. Your local Landcare or Community Support Officer can also put you in touch with others who have practical knowledge with riparian management, as well as inform you of current training and funding opportunities.

Riparian land doesn’t just cover the immediate streamside, it also includes gullies that sometimes run with water, areas surrounding lakes and wetland and river floodplains that feed into rivers during floods.

To find out more about the benefits of riparian land and how to manage waterways read: Australian Government Land and Water - River Landscapes publications and information sheets at http://www.rivers.gov.au/RiverManagement, issues/index.html and CD may also still be available. The Land and Water website has a wealth of information about managing riparian lands and waterways with free publications that can be ordered online.


IMAGE: Lomandra hysterix (U. Mitusay)
Water Licensing

Controlled activities near rivers, lakes or estuaries

A controlled activity approval is required for certain types of developments and activities that are carried out in or near a river, lake or estuary.

The controlled activity approval provisions commenced on 4 February 2008.

Under the Water Management Act 2000, a controlled activity means:

a. The erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or
b. The removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or
c. The deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
d. The carrying out of any other activity that affects the quantity or flow of water in a water source.

For more general information about the controlled activity provisions, read the ‘frequently asked questions’ fact sheet on the DWE website.

Before you undertake a controlled activity you must submit an application form to the Department of Water and Energy.

Irrigation

Irrigation, whether from a river, bore, well or dam requires a licence from the DWE. However, new irrigation licences are not being made available, so if your property doesn’t have a licence, you will need to purchase one from a current licence holder if you wish to irrigate.

The licences are currently based on a set area (e.g. 10 hectare irrigation licence), so you will also need to find a landholder with an appropriately sized licence. However, meters are progressively being added to pumps and all licences will be based on volume (e.g. 10 mega litres per year) under the new water management plans.

The supply of water for irrigation is not completely secure. During low stream flows, pumping can be halted by the DWE (advertised in local papers) on the recommendation of local water user associations (landholder groups). To find out more, talk to the resource access officer in the DWE at Grafton.

NSW DPI (agriculture) also provides information on many aspects of irrigation at http://www.dpi.nsw.gov.au/agriculture/resources/water For advice, design and installation of irrigation systems contact private irrigation specialists (see irrigation &/or reticulation systems in the yellow pages).

Water quality – is it usable?

The coast’s high rainfall and tidal rivers may give the appearance that copious amounts of water are available for all users. However, farm water comes from different sources and so its quality varies. Water may be unsuitable for domestic, stock, irrigation or other farm uses. Problems may be chemical (e.g. salinity) or physical (e.g. algae) and on the coast can involve acidity, iron and other metals, salts, hardness, algae and bacteria. For example:

- within the tidal range of streams (e.g. to Copmanhurst on the Clarence River, salt levels are often too high for human, stock or irrigation purposes).
- above the tidal range of streams, algae levels (e.g. blue-green algae) can increase to toxic levels during periods of low flows. Dams can also have toxic algal blooms due to nutrient runoff from paddocks.
- on the floodplains, aluminium, iron, manganese and sulfur can be high due to the presence of acid sulfate soils or salt layers within the soil.

For more information on drinking water quality issues, visit:

For more information about farm water quality, visit the DPI’s website www.agric.nsw.gov.au/reader/water-irrig

Or specifically for blue-green algae visit:
- The Cooperative Research Centre (CRC) for Water Quality and Treatment website; http://www.waterquality.crc.org.au/dwfacts
- www.murraybluegreenalgaecom/graziers.htm.

If you have doubts about the quality of your stock and irrigation water supply, water testing can be conducted by:
- DPI (agriculture), with water sampling kits available from some local offices.

Strategies rural landholders can use to maintain water quality on their property and across the catchment include:
- maintaining high levels of ground cover throughout the year.
- maintaining a broad healthy riparian vegetation strip.
- retaining native vegetation on steep slopes.
- controlling stock access to dams and streams.
- using off-stream watering (e.g. troughs and tanks).
- not applying fertilisers or sprays just prior to heavy rainfall events, especially if the soil is already saturated.
- using split applications of fertilisers rather than a single heavy application.
- only applying fertilisers when pastures are actively growing.
- maintaining fertiliser and spray buffers around dams and streams.
Fire

What impact does fire have on the environment?

Fire is a natural part of the Australian landscape, but its incorrect management (both bushfires and deliberate burning) can have many undesirable consequences such as:

- Death and injury to people
- Loss of homes and other assets
- Loss of vegetation communities (e.g. rainforests and wetlands)
- Changes in the structure and composition of communities (e.g. loss of shrubby understoreys that act as habitat and food sources for a wide range of birds, bats and mammals)
- Loss of wildlife because animals can’t escape the flames, or later, due to the destruction of habitat and food sources.
- Changes in the composition of animal species (e.g. animals that prefer dense shrubby understoreys are displaced by other species that are adapted to more open understoreys as fire frequency increases)
- Degradation of soils from the loss of ground cover, organic matter and nutrients
- Contamination of water sources from increased soil erosion brought on by the loss of ground cover.

The degree of impact that fire has on the environment depends on its frequency (how often fires occur), intensity (how hot the fire is), extent (the area burnt by the fire) and season (what time of year the fire occurs).

Most Australian plants and animals are resilient enough to tolerate a single fire, as long as it is not too great in extent or too intense. However, plants that rely solely on seeds to regenerate require sufficient time between fires to grow to maturity and set seed, otherwise they will fail to recolonise after fires. Equally, if fire is suppressed for too long, larger longer-lived species may out compete smaller species for space and light.

Generally, when fire is excluded, long-lived species such as trees and bushes come to dominate and as fire frequencies increase the vegetation becomes more open and grassy.

The desirable fire frequency is very dependent on the type of vegetation communities and its species composition. It is highly recommended to seek advice before embarking on any fire ecology regimes for your property including the correct classification of the vegetation types. The following examples of fire frequency recommendations are based on what scientists currently know about fire ecology, and will continue to be refined as more information comes to hand.

- **Coastal Heathland** A fire frequency of 7-30 years is recommended (with most fires around 8-12 years) to maintain overall biodiversity. For heathland in drier, rocky inland areas, fire intervals between 15 and 50 years are suggested.
- **Dry Sclerophyll Shrub Forest** - includes low forest and woodland dominated by eucalypts, with a hard-leaved shrubby understorey. Variable fire intervals mostly in the 7 to 30 year range are recommended to maintain diversity.
- **Dry Sclerophyll Shrub/Grazing Forest** consists of open eucalypt forest with a sparse hard-leaved shrub layer and continuous grassy ground cover. Intervals in the 5 to 25 year range, with occasional intervals up to 50 years in some areas, have been recommended. The grass component is likely to be best maintained by short intervals (e.g. 5 – 7 years).
- **Wet Sclerophyll Forest (grassy subformation)** is dominated by straight-trunked eucalypts, with a grassy understorey and sparse shrubs, which may have hard or soft leaves. The present state-wide recommendation is for fires every 10-50 years.
- **Wet Sclerophyll Forests (shrubby subformation)** are tall eucalypt forests with a dense understorey of broad soft-leaved shrubs, ferns and herbs. Currently, variable fire intervals in the range 25-60 years are suggested for these forest types.
- **Forest wetlands** typically feature hard-leaved trees (eucalypts, casuarinas and paperbarks), scattered shrubs and a continuous ground-cover of water-loving sedges and herbs. Scientists have not yet studied the role of fire in this vegetation type in any detail however variable intervals between 7 and 20 years, with some intervals up to 35 years have been suggested for this vegetation type.
- **Freshwater wetlands**; fire frequency between 6 and 35 years have been suggested for this vegetation type which is vulnerable to peat fires when the substrate is dry. Planned fires are therefore best conducted when the substrate is wet. Freshwater wetlands are areas of environmental sensitivity and need to be treated with care. Most coastal wetlands are covered by legislative protection, such as SEPP 14, Threatened Species Conservation Act (as endangered ecological communities), or Development Control Plans.
- **Rainforest** is very sensitive to burning and fire should be excluded.
- **Riverine vegetation**; fire should be excluded from river and creek vegetation and other vegetation surrounding water bodies (e.g. dams). These communities act as biological filters that reduce the movement of soils and nutrients and hence minimise the contamination of water sources.

As the intensity of a fire increases, so does its destructive ability. Intense fires may kill the dominant overstorey (e.g. trees), damage plant regeneration sites (e.g. buds) and destroy soil seed banks; thereby, reducing the ability of plants and community types to regenerate.

Intense fires can also degrade the soil by reducing the organic matter content (soil glue and nutrient store) and biological life, resulting in poorer water infiltration and greater erosion. This in turn increases water pollution, as soils and nutrients are washed into dams, rivers and wetlands.

Extensive fires that burn out large areas reduce the ability of plants and animals to recover. Patch burning provides animals with refuge and forage and creates a seed source for plants to more quickly recolonise burnt areas. Patch burning also reduces fuel loads, potentially slowing the spread of wild fires.

While the protection of life and property come first, if landholders use a zoning approach to fire management then the risk to farm and assets can be minimised while other areas can be managed for biodiversity.
What impact has fire had on the North Coast?

There have been many vegetation changes associated with the inappropriate use of fire, including: a reduction in the extent of rainforest; degradation of wetlands (at times forming scalds that cover many hectares and which takes decades to reclaim); loss of shrubby understoreys in forests; invasion of pastures by less desirable species; loss of wildlife habitat; weed incursion; and soil erosion.

Just two examples of inappropriate fire use are included here;

- Until recently, regular burning of pastures in late winter and early spring was a widespread practice on the north coast. While regular burning is still practiced today, it is far less common. One of the most common reasons for burning was to stimulate early spring pasture growth (especially of the native species blady grass), at a time when most pastures were dormant and of poor quality. However, the high frequency of burning gave blady grass a competitive advantage over other pasture species, so that blady grass now dominates large areas and often occurs as a monoculture. Unfortunately, blady grass only provides good quality feed for about 4-6 weeks after burning and then becomes rank and unpalatable to stock. One of the most common practices to remove the rank growth and stimulate new growth in the following year was to re-burn the pastures, further exacerbating the spread of blady grass, loss of species and shortening of the pasture growth period.

Regular pasture burning has also led to the loss of soil organic matter and soil nutrients. As a consequence, the soils tend to: form crusts that limit water infiltration; be more prone to erosion, thereby reducing the depth of topsoil; and provide a less nutritious medium for crop and pasture growth.

- Hazard reduction burns in forests have also had negative impacts. Frequent burning tends to open up many forest types, removing shrubs and increasing the grassiness of the vegetation. The most common species to benefit are fire-loving grasses, such as blady grass and kangaroo grass, that grow rapidly and produce a large bulk of highly combustible material. The increased rate, at which combustible material is produced, increases the need for more regular burns. These fires also burn hotter, increasing its affect on the forest structure. Hence there is a downward spiral, where fire opens the forest structure; this increases the abundance of grasses, more bulk is then produced more quickly and then even more frequent fires are needed to reduce the bushfire hazard.

Fire, What are your rights and responsibilities?

The Rural fires Act 1997 (and Regulations) and Worker Compensation Act 1987 are the current legislation affecting bushfires. The Rural Fires Act established the Rural Fires Service, which is responsible for the management of fires in rural areas of NSW. Under the Rural Fires Act, a bushfire danger period has been established, from the 1st October to the 31st March each year. The dates can be varied for different local government areas depending on local conditions. The approach of the bushfire danger period and any variations to the dates is extensively advertised in local papers and over local radio stations. However, landholders can also obtain the information from the NSW Rural Fire Service’s web site at www.rfs.nsw.gov.au. During the bushfire danger period, you can only light fires under permit from the Rural Fire Service. These can be obtained by contacting your local Rural Fire Service control centre.

The Rural Fire Service can also declare a total fire ban at any time. During this period, you are not permitted to light any fires, even if you have a permit from the Rural Fire Service that is still current. If you do become aware of an unauthorised fire on any land during the bushfire danger period (or total fire ban period), you must take all possible steps to extinguish it. Where you can’t do this, you need to inform the Rural Fire Service (on their emergency number) as soon as possible.

If you are responsible for lighting an unauthorised fire on your property during the fire danger period or total fire ban period, you will be liable to a penalty of up to $5,500 or 12 months prison. Where the fire escapes to someone else’s property (or you set light to the property), the penalty may be up to $11,000 or 5 years prison.

You may complain to the Rural Fire Service, if you believe a fire hazard exists on an adjacent property. The Service will then discuss control measures with the owner. Where recommendations are ignored, the Rural Fire Service will issue a fire hazard reduction notice, which obliges a landholder to undertake the hazard reduction at their own expense. If they don’t comply, the Service can employ someone else to do the work and charge the landowner for it.

If you clear away all combustible material within 6 metres of a dividing fence, then unless your neighbour does the same, they will be responsible for all fire damage to the fence.

How can you learn to manage fires?

The Rural Fire Service is responsible for managing fires across 90% of NSW. To do this, it largely depends on volunteers to fight the fires. Becoming a volunteer not only provides a community service, but is the best way to learn how to prepare for, manage and fight fires. All volunteers are trained in fire fighting and there is a range of courses offered for different specialities. To find out more contact your local Rural Fire Service control centre or go to (www.bushfire.nsw.gov.au - Joining the RFS.)

A number of government organisations are available to provide advice to landholders on fire management on private properties. These include;

- Rural Fire Service – contact fire control centres for all aspects of fire management;
- NSW DPI (agriculture) – contact agronomists for pasture management
- Shire councils – contact their environment officers
- National Parks division of the Department of Environment and Climate Change.
## Resources

**Abbreviations used in this document are:**
- DECC – Department of environment and Climate Change
- DWE – Department of Water and energy
- NRCSMA – Northern Rivers Catchment Management Authority
- NSW DPI – NSW Department of Primary Industries (agricultural)
- DPI – Department of Primary Industries and Fisheries
- LHPA – Livestock Health and Pest Authority (formerly RLPIB)
- NRM – Natural Resource Management
- PVP – Property Vegetation Plan
- LALC – Local Aboriginal Land Councils

### Introduction to rural life

The most comprehensive introduction to rural living is available in the recommended reading and web sites listed below.

After you have read some of these, seek local advice on specific areas from the contacts listed under each topic heading.

#### Reading:

- "Rural Living" section in this kit
- "Living and Working In Rural Areas" A handbook for managing land use conflict on the NSW North Coast, (2007) produced by the Centre for Coastal Agricultural Landscapes and NRCSMA. Published by and available from NSW DPI Wollongbar.
- "Farming in a Small Way": ISBN 0 7347 1500 5. Available from NSW DPI (agriculture) bookshop. Provides information on finding the farm you want, choosing the right enterprise, and avoiding the perils and pitfalls of rural life;
- "Town and Country Farmer" magazine is a quarterly publication available from newsagents;
- "Small Farms" is a monthly magazine available from newsagents; they also have a bookshop (02) 4861 7778.

### Web Sites

- Farm Ready - Two grants are available through the FarmReady program which assists landholders to access training opportunities and grants eg: FarmReady Rambouillet Grants and FarmReady Industry Grants. More information can be found at http://www.daff.gov.au/climatechange/australias-farming-future/farmready;
- Small Farms magazine and bookshop at www.smallfarms.net;
- Regional Services www.regionalnsw.gov.au is the Commonwealth government's site outlining services available to regional Australia. For questions call the Australian Government Regional Information Service 1800 026 222.

### Natural resources

#### Soils

**Contacts**

- General information about local soils
  - Agronomists, NSW DPI (agricultural)
- Location of acid sulfate soils and planning controls
  - Local Shire Councils

- Suitability and management for pastures and cropping
  - Agronomists, NSW DPI (agricultural)
  - Horticulture officer, NSW DPI (agricultural) at Coffs Harbour
- Suitability and management for horticulture
  - Horticulture officer, NSW DPI (agricultural) at Coffs Harbour
- Management of acid sulfate soils
  - National Acid Sulfate Soil Information Officer, NSW DPI
  - Woolongbar Agricultural Institute
  - Environmental officers at Shire Councils
- Soil erosion control measures
  - NRCSMA at Coffs Harbour
  - Landcare and Community Support Officers at various locations across the northern rivers – see contacts list in folder.
  - NSW DPI (agriculture)
  - Soil Conservation Services in the Department of Lands at Coffs Harbour and Grafton for advice and works
- Soil erosion control funding
  - NRCSMA at Coffs Harbour
  - Landcare Officers
- Earthworks
  - Shire Councils for planning controls
  - Soil Conservation Services in the Department of Lands at Coffs Harbour and Grafton
  - Local contractors (see “excavating &for earth moving contractors” in the yellow pages)
- Soil chemical testing
  - NSW DPI (agriculture) offices for advice and list of testing laboratories
  - Soil Conservation Services in the Department of Lands
  - Produce stores (see yellow pages)

**Training Courses**

Soil health field days are provided by various organisations and agencies including NSW DPI (agriculture). Contact your Community Support Officer or nearest Landcare office for news of any field days or courses in your local area.

**Reading**

- "Soils" section in this kit
- "Soil Landscapes -Technical manuals and maps that describe the soil landscapes, and their potential and limitations, of much of the eastern section of the region. Best referred to with an advisor, most of who will have copies.

### What help is available after a fire?

The Department of Community Services is responsible for welfare and recovery services. They can coordinate food, accommodation, clothing, advice and financial and personal support. Contact the State Recovery Centre.

The Department of Primary Industries (agriculture) coordinates the provision of animal relief services to primary producers, such as coordinating the supply and distribution of fodder, managing the care of pet animals. Contact should be made through your local RFS control centres.

Visit the Department of Primary Industries (agriculture) website www.agric.nsw.gov.au/bushfire for information on assessing burns on stock, humane destruction and disposal, pasture recovery and caring for native animals.

Where wildlife is injured or orphaned by fire, contact WIRES (groups that specialises in wildlife recovery).

### Where can you get further information?

To find out more about preparing your property for fire using protection zoning, go to the NSW Rural fire Service’s web site at www.rfs.nsw.gov.au.

- Hot Spots Fire Project. “Managing Fire on Your Property”:
  - A booklet for landholders in the Northern Rivers region
  - Northern Rivers Hot Spots Fire Project Fact Sheets;
  - Burning Approval Fact Sheet, Dry sclerophyll Forest, Heath-leaved Banksia, Glossy Black Cockatoo, Landholder Fire Plan
- Fire and Grazing in the Northern Rivers Region (Draft 1)
- Fire Frequency Guidelines and the Vegetation of the Northern Rivers Region (Draft 2)
- Bushfire preparedness, restrictions, permits and management at www.bushfire.nsw.gov.au

**Reading**

- “Managing Fire on Your Property” - Local Shire Councils
- “Soils and Landscapes” by C. Benjamin (2002). ISBN 0 7347 1500 5. Available from NSW DPI (agriculture) bookshop. Provides information on finding the farm you want, choosing the right enterprise, and avoiding the perils and pitfalls of rural life;
- "Small Farms" is a monthly magazine available from newsagents; they also have a bookshop (02) 4861 7778.

### Web Sites

- Farm Ready - Two grants are available through the FarmReady program which assists landholders to access training opportunities and grants eg: FarmReady Rambouillet Grants and FarmReady Industry Grants. More information can be found at http://www.daff.gov.au/climatechange/australias-farming-future/farmready;
- Small Farms magazine and bookshop at www.smallfarms.net;
- Regional Services www.regionalnsw.gov.au is the Commonwealth government’s site outlining services available to regional Australia. For questions call the Australian Government Regional Information Service 1800 026 222.

**Natural resources**

**Soils**

**Contacts**

- General information about local soils
  - Agronomists, NSW DPI (agricultural)
  - Location of acid sulfate soils and planning controls
  - Local Shire Councils
plans that will affect all rural water users. Available from all DWE offices and online at http://www.dwe.nsw.gov.au/water/plansMacro.shtml


Web Sites
• Dam construction at www.dpi.nsw.gov.au/agriculture/resources/water/storage
• Irrigation management at www.dpi.nsw.gov.au/agriculture/resources/water/storage
• River and riparian management at www.rivers.gov.au

Reading
• “Water” section in this kit
• “Overview of Macro Water Plans” and “Benefits of Macro Water Plans” information sheets outline the new water management

Reading part one - Identification


“Native and Naturalised Grasses” Grass identification and management. Contact the agronomist in NSW DPI (agriculture) at Kempsey.

“Native Vegetation Recognition” field days. Other identification and management workshops are often run. Contact your local Landcare and Community Support Officer for more information.

“Bush Regeneration” and “Conservation and Land Management”. Contact your local TAFE College for more information.

Reading
• “Native Vegetation” in this kit

Reading part two - Assessment and Management


“Native and Naturalised Grasses” Grass identification and management. Contact the agronomist in NSW DPI (agriculture) at Kempsey.

“Native and Naturalised Grasses” Grass identification and management. Contact the agronomist in NSW DPI (agriculture) at Kempsey.

“Native and Naturalised Grasses” Grass identification and management. Contact the agronomist in NSW DPI (agriculture) at Kempsey.

“Native and Naturalised Grasses” Grass identification and management. Contact the agronomist in NSW DPI (agriculture) at Kempsey.
Reading
“Pastures” section in this kit
“Fertilisers for Pastures” by E Havilah et al (2005) is a free booklet
designed to help landholders make better fertiliser decisions.
Available from NSW DPI (agriculture) offices or download
“Best Management Practices for Temperate Perennial Pastures in
NSW”\(^*\): Describes best management practices for sustainable
dryland grazing. Although designed for the tablelands, the principles
are the same for the coast. Available to download at http://www.dpi.
“Grasses of the North Coast”\(^*\) is a booklet that describes the
most common paddock grasses of the North Coast.
“Pasture Plants of the North Coast: Non grasses”\(^*\)
By Harry C. Rose. Both of these booklets are available from
NSW DPI (agriculture) and local Landcare offices.

Web Sites
All aspects of pasture selection and management in NSW at
A more tropical emphasis on pasture management at

Impacts on natural resources
Climate
Contacts
- How climate affects pastures and cropping
  - Agronomists in NSW DPI (agriculture) at Grafton or Kempsey
- How climate affects horticultural crops
  - Horticulture officer in NSW DPI (agriculture) at Coffs Harbour
Training Courses
“Farming in a Changing Climate”\(^*\). Contact Greg Reid at DPI NSW
Wollongbar (02) 6621212. FarmReady eligible course.
Reading
“Climate” section in this kit.

“Weather and Climate in Farming – Managing Risk for Profit”\(^*\)
describes how to manage climatic risks on farm. Available from
NSW DPI bookshop, see website www.dpi.nsw.gov.au/aboutus/
resources/bookshop, search by location “Tocal (Paterson)”,
publications listed alphabetically by title.
Web Sites
- Local weather forecasts, current weather and climate averages at
  agriculture/resources/climate-land-weather
- Summary of climate change impacts for the north coast region at
  08F51NorthCoast.pdf

Drought
Contacts
- How to manage pastures and crops
  - Agronomists in NSW DPI (agriculture) at Grafton or Kempsey
- How to manage horticultural crops
  - Horticulture officer in NSW DPI (agriculture) at Coffs Harbour
- How to manage livestock
  - Beef cattle officer in NSW DPI (agriculture) at Casino
- Drought support subsidies for primary producers
  - Rural Assistance Authority
- Processing of drought subsidies and providing support information
  - Rural Financial Counselling Service at Armidale or Mackselle
  - LHPA at Grafton
- Disaster welfare assistance
  - Department of Community Services at Coffs Harbour
- Financial advice
  - Rural Financial Counselling Service at Armidale or Mackselle
- River pumping restrictions
  - Natural Resources officer in DWE at Grafton
- Livestock starvation/cruelty
  - Royal Society for the Prevention of Cruelty to Animals
- Injured and orphaned wildlife
  - WIRES
Reading
“Drought” section in this kit.

farmers that helps producers develop drought recovery strategies
and make other important management decisions. Available at most
NSW DPI (Agriculture) offices.
Web Sites
- Drought planning, management and financial assistance at
  agriculture/emergency/flood/publications/weed-strategies
- LHPA drought assistance at www.lhpa.org.au/drought-assistance
- Rural Financial Counselling Service drought assistance
- Rural Assistance Authority www.rsa.nsw.gov.au

Flood
Contacts
- Flood and storm warnings
  - listen to local radio stations for updates and advice
- State Emergency Service
- Emergency help for people and animals
  - State Emergency Service
- To determine if you are in a flood-prone area
  - Local councils
- Local flooding knowledge
  - Local State Emergency Service
- neighbours
- Local flood plans
  - Council Offices
  - State Emergency Service
- Develop a household flood-action plan
  - State Emergency Services
- Develop a livestock flood-action plan
  - LHPA at Grafton
  - Livestock officers in NSW DPI (agriculture)
  - How to manage livestock during and after flood
    - Dairy officer in NSW DPI (agriculture) at Kempsey
    - Beef cattle officer in NSW DPI (agriculture) at Casino or Taree
- Financial advice
  - Rural Financial Counselling Service at Armidale or Mackselle
- Disaster relief
  - Rural Assistance Authority
  - Department of Community Services
- Livestock starvation/cruelty
  - Royal Society for the Prevention of Cruelty to Animals
- Injured and orphaned wildlife
  - WIRES

Reading
“Flood” section in this kit.

Web Sites
- Flood management of livestock at

Fire
Contacts
- All fire management information, fire danger periods, burn-off permits and training
  - Rural Fire Service control centres
- Advice on fire management on private properties
  - Rural Fire Service control centres
- Agronomists in NSW DPI (agriculture)
  - Environment officers in local councils
- National Parks division of the DECC Coffs Harbour and Dorrigo
- Disaster relief
  - Department of Community Services
- Local Landcare Office for more information.

Reading
“Fire” section in this kit.

Weeds
Contacts
- Identification of weeds
  - Coffs Harbour Botanic Gardens Harbourn
  - Botanical Information Service, DECC, Sydney
- Identification and management
  - Agronomists in NSW DPI (agriculture) at Grafton and Kempsey
  - Horticulture officer in NSW DPI (agriculture) at Coffs Harbour
  - Noxious weeds officers at local councils.
- Far North Coast Weeds Authority for noxious weeds
  - Landcare Offices
  - NRCMA
  - Agronomists at local agricultural produce stores for agricultural
  - Private consultants see “environmental and/or pollution
  - Natural resource consultants in the yellow
- Approvals may be needed in a number of circumstances
  (see “Weeds” section in this kit

Training Courses
“Weed Identification and Management”\(^*\) - contact Tocal College at Paterson runs various weed management
workshops (see www.tocal.nsw.edu.au)

Reading
“Weeds” section in this kit.


Primary producer status
Eligibility for primary producer status means that expenses incurred in running the enterprise are tax deductible, tax liabilities can be spread over time and fuel rebates are available. To determine your status Contact
• Local taxation specialists (see Taxation Consultants in the yellow pages)
• Australian Tax Office (Phone: 13 28 86)
Reading
Web Sites
• Australian Taxation Office. Go www.ato.gov.au > Your industry type > Business > Primary Production

Legislation
Land and agricultural enterprises are affected by many pieces of what is often complex legislation. Included here is the link to all legislation and two books that make it all easy to understand.
Reading
Web Sites
• NSW at www.law.nsw.gov.au
• NSW Environment law www.edo.org.au
• Commonwealth at www.scalplus.law.gov.au

Animal enterprises
Beeef cattle
Property identification codes and identification tags must be obtained from the LHPA before buying or selling cattle. Find out about the National Livestock Identification Scheme.
Contacts
• National Livestock Identification Scheme
- LHPA at Grafton for information on its operation
- Beef Officer in NSW DPI (agriculture) at Casino for information on its operation
• Identification and transport
- LHPA at Grafton
- Management (e.g. grazing management, supplementary feeding, animal assessment, etc)
  - Beef Officer in NSW DPI (agriculture) at Casino or Taree
• Buying and selling stock
  - Stock and station agents (see yellow pages)
  - Stock disease
    - Vet in LHPA at Grafton for hard disease or a history of recurring disease only
    - Private vets (see yellow pages)
• Development consent for feedlots
  - Local councils

Training Courses
“Prograze”, Workshop series designed to develop participants’ pasture and animal management skills, and show how to use these skills to improve on-farm grazing decisions on beef and sheep farms. Contact NSW DPI (agriculture) at Grafton or Kempsey
“Agriculture Information & Monitoring Services” (AIMS) Contact AIMS 02 6771 1273
“Grazing the Coastal Floodplains” contact Christina Clay at NSW DPI (agriculture) Wollongbar. (02) 66261395
Reading
“Beef Agskills” a basic guide to some of the skills and practices of beef production. Available NSW DPI online bookmark www.dpi.nsw.gov.au/abouts/resources/bookshop
Web Sites
• Extensive facts sheets on beef cattle at www.dpi.nsw.gov.au/agriculture/livestock/beef
• Markham Information, research and development and industry programs at www.mla.com.au/AudienceHierarchy/CattleProducers/default.htm

Dairying
Dairying is a specialist field that requires high levels of capital as well as extensive pasture, cropping, animal husbandry and administrative skills. It is generally not suited to new landholders. Before contemplating dairying, talk to a dairy officer.
Contacts
• Dairy Officers in NSW DPI (agriculture) at Kempsey or Taree
• Other contacts for owners of a few cows are the same as for beef cattle
Reading
Web Sites
• NSW DPI dairying at www.dpi.nsw.gov.au/agriculture/livestock/dairy-cattle
• Dairy Australia www.dairyaustralia.com.au

Horses
The following resources are for owners of stock horses and are not meant to meet the needs of a horse enterprise.
Contacts
• Horse owners will need to contact veterinarians, horse associations, industry bodies and local horse owners to obtain advice. Also, see the yellow pages for horse-based services
• Animal health
  - Vet in LHPA at Grafton or Kempsey for multiple animals or a history of recurring disease only
  - Private vets for individual animals (see yellow pages)
• Branding and brand registration
  - LHPA at Grafton or Kempsey

Training Courses
“Horse Care & Handling” Introductory horse handling short course. Contact Tocal College, NSW DPI (agriculture).
For those wishing to enter any sector of the horse industry, both Trenayr TAFE campus (near Grafton) and Tocal College at Paterson offer diploma courses for those wishing to enter the horse industry.
Reading
Web Sites
• NSW Dept of Primary Industries at www.dpi.nsw.gov.au/animal/livestock/horses
• The Australian Horse Industry Council with extensive links to sites on health, management, horse industries and horse associations at www.horsecouncil.org.au
• Rural Industries Research and Development Council’s horse research program at www.rirdc.gov.au/RIRDcprograms/established-rural-industries/horses/

Pigs
Contacts
• All aspects of management
  - Livestock Officer, Pigs – General Production in NSW DPI (agriculture) at Orange
• Development consent for piggeries
  - local shire councils
• Producer groups
  - Australian Pork Ltd
  - NSW Farmers Association
  - Meat and Livestock Australia
Web Sites
• NSW DPI’s pig information at www.dpi.nsw.gov.au/agriculture/ livestock/pigs
• More pig industry and management information from Qld DPIF. Go www.dpi.qld.gov.au > Animals > Pigs
• Australian Pork, Ltd at www.australianpork.com.au

“Bush Invaders of South-East Australia: A Guide to the Identification and Control of Environmental Weeds found in South-East Australia” by A. Muyt (2001)
Available from NSW DPI bookshop, or download from the website http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/publications

Web Sites
Weed identification and management at
• www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds
• www.northeastweeds.org.au
• www.weeds.org.au
• www.envirote.org.au

Vertebrate Pests
Declared pest animals in the region include wild dogs, European rabbit and feral pigs. Landholders have an obligation to eradicate pest animals on their property and notify the LHPA of their presence. However, there are many other vertebrate pests that cause both environmental problems and agricultural losses (e.g. cane toads, Indian Mynas and deer).
Contacts
• Advice and assistance in eradicating declared pest species and other nuisance animals
  - LHPA
• Advice and assistance in controlling environmental pests
  - Local councils
• Licence to keep pest animals
  - LHPA
• Registration of domestic dingoes (obligatory)
  - Local shire councils
• Licence to control native pest animals on private property
  - National Parks division in the DECC

Reading

Web Sites
• Pest animal control and the LHPA’s role at www.lhpa.org.au/past-control
• Australian agricultural portal to local, state and commonwealth information on past animals at www.agriculture.gov.au/browse/health/pests
• Native pest animals and pests affects on native environments at www.environment.nsw.gov.au/pastpestsweeds/index.htm

• Development consent for feedlots
  - Local councils

“Bush Invaders of South-East Australia: A Guide to the Identification and Control of Environmental Weeds found in South-East Australia” by A. Muyt (2001)
Field crops, horticulture and forestry

Field crops

Contacts
- Agronomists in NSW DPI (agriculture) at Grafton and Kempsey

Reading
- "Field crop herbicide injury: the Ute Guide" Catalogue number 8666, available at NSW DPI Bookshop Orange

Web Sites
- Qld DPI's horticultural site, www.dpi.qld.gov.au > Plants > Field crops and pastures

General horticulture

These resources are relevant for most horticultural crops

Contacts
- Horticulture Officers in NSW DPI (agriculture) at Coffs Harbour

Reading

Web Sites
- Qld DPI’s horticultural site, www.dpi.qld.gov.au > Plants > Fruit and vegetables
- Links to horticulture at the federal, state and local level via the Department of Agriculture, fisheries and forestry’s agricultural portal at www.agriculture.gov.au
- Rural Industries Research and Development Corporation http://www.rirdc.gov.au/ see Plant Industries
- Horticulture Australia at www.horticulture.com

Avocados

In addition to General Horticulture resources.

Contacts
- Producer body - Avocados Australia Ltd

Reading
- "Talking Avocados" is the official magazine of Avocados Australia. Contact Avocados Australia on 07 3846 6666 or subscribe online at www.avocados.org.au/industry/avocados_talking.asp.

The "Agrilink Avocado Information Kit", the computerised management package Aviman and the avocado reference database AvoInfo are all available from Old DPI. See www.dpi.qld.gov.au > Plants > Fruit and vegetables > Fruits & nuts – Major crops – Avocado.

Web Sites
- Avocadosource – a free electronic library of avocado knowledge at www.avocadosource.com
- Avocados Australia Ltd at www.avocados.org.au

Bananas

In addition to General Horticulture resources.

Bananas planted with bumpy top, Black sigatoka and Panama disease must be destroyed immediately. Banana plant material may not be removed from any place without a permit. Growers must notify a regulatory officer within 24hrs of the presence of notifiable diseases or pests.

Contacts
- Permits and advice about disease control measures - Regulatory Officers in NSW DPI (agriculture) at Coffs Harbour
- Advice about management - Banana NSW
- Producer representative body - Australian Banana Growers Council is the peak body of the industry

Reading
- Newsletters
- "Australian Bananas". Contact the Australian Banana Growers Council
- "Banana Bulletin" Contact Bananas NSW

Web Sites
- Bananas NSW www.bananasnsw.org.au
- Australian Banana Growers Council www.abgc.org.au

Citrus

In addition to general horticulture resources.

Contacts
- Producer representative body - Australian Citrus Growers Inc.
- Auscitrus (The Australian Citrus Propagation Assoc.)

Reading
- Auscitrus Newsletter, subscribe by contacting Australian Citrus Growers Inc or downloading editions at www.auscitrus.com.au > Newsletters
**Vegetables**

In addition to General Horticulture resources

**Contacts**

- Horticulturalist in NSW DPI (agriculture) at Murwillumbah for general enquiries
- Horticulturalist in NSW DPI (agriculture) at Grafton for greenhouse and hydroponic vegetables
- Horticulturalists in NSW DPI (agriculture) at Yanco for larger scale field vegetables

**Reading**


**Sugar cane**

The New South Wales sugar industry occupies approximately 34,000 hectares of the Northern Rivers region and extends from near the Queensland border in the north to Grafton in the south. Sugar cane is a major crop in the region, being produced in the near-coastal areas of the three northern river valleys (Tweed, Richmond and Clarence). Mills are located at Condong, Broadwater and Harwood and sugar is a significant contributor to the economy of the region.

**Reading**

- "Master Tree Growers" course. Contact your local Landcare office
- "North Coast Bushfoods Group Co-operative." Contact your local Landcare office

**Soybeans**

On the North Coast of NSW, rain grown soybeans have been successfully integrated into agricultural systems for the past thirty years. These systems include the beef, sugar and cropping (maize and cereal) industries.

**Reading**

- "What are the exemptions for Routine Agricultural Management Activities in Coastal CMAs?"
  
**Websites**

- [www.nrcma.org](http://www.nrcma.org)
- [www.arfgpa.com](http://www.arfgpa.com)
- [www.vegetablesnewsletter](http://www.vegetablesnewsletter)
- [www.macadamias.org](http://www.macadamias.org)

**Macadamias**

In addition to general horticulture resources

**Contacts**

- Peak industry body
  - Australian Macadamia Society

**Reading**

- "MacMan!" Farm recording software. Order from the MacMan team on (07) 5453 5800 or email macman@dpi.qld.gov.au

**New and emerging industries**

Government departments tend to concentrate their expertise on larger established industries. Hence, there is often little research and expertise available for landholders taking up new and emerging industries. You may also need to seek out producer networks or associations for support.

**Contacts**

- Northern Rivers Regional Development Board (NRRDB) Facilities development of new industries, including coffee and horticulture.
- Northern Region Development Corporation. Many publications and links to new and emerging industries
- Local NSW DPI (agriculture) offices
- Australian New Crops. University of QLD website with information on potential, new or emerging crops and who is working in the area.
- North Coast Bushfoods Group Co-operative.
- Native Flower Growers Association

**Reading**


**Web Sites**

- For information about Alpacas [http://www.alpaca.asn.au]

**Organic farming**

Organic farming covers production in all areas of agriculture. If there is an advisor for the particular enterprise (see above) refer to them first. However, many organic enterprises involve small and emerging industries that do not have a specialist government advisor. In this case, you will need to contact local and state and national organizations to develop the networks and knowledge required.

**Contacts**

- Organic Farming Liaison Officer, NSW DPI (agriculture) at Yanco
- Coffs Regional Organic Producers Organisation Inc (CROPO)
- Biodynamic Agriculture Australia
- Biodynamic Agriculture Australia
- Biodynamic Agriculture Australia
- Biodynamic Agriculture Australia
- Organic Farming Liaison Officer, NSW DPI (agriculture) at Yanco
- Coffs Regional Organic Producers Organisation Inc (CROPO)
- Australian Certified Organic & Biological Farmers of Australia
- Australian Certified Organic & Biological Farmers of Australia
- [http://www.alpaca.asn.au](http://www.alpaca.asn.au)

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**Reading**


**Web Sites**

- For information about Alpacas [http://www.alpaca.asn.au]
"Organic farming – Livestock". Shows how to produce livestock using organic methods, with an emphasis on sheep and wool. All available on the NSW DPI (agriculture) web site http://www.dpi.nsw.gov.au

Web Sites
• Rural Industries Research and Development Corporation’s organic produce research program at www.rirdc.gov.au > Rural Environment > Organic Farming
• The Organic Federation of Australia and its newsletter “Organic Updates” at www.ofa.org.au

Farm basics
Pesticide usage. Certification is required to use pesticides.

Contacts
• Pesticide usage in pastures or crops
  - Agronomists in NSW DPI (agriculture) at Grafton and Kempsey
• Pesticide usage in horticulture
  - District Horticulturalist in NSW DPI (agriculture) at Coffs Harbour
• Pesticide usage for stock
  - Private vets (see Veterinarians in the yellow pages)
  - Livestock Officer in NSW DPI (agriculture) at Casino

Training Courses
“SmartTrain: Chemical Application (AQF Level II)”. A 2-day course that provides accreditation for those who use pesticides with powered and hand held application equipment.

“SmartTrain: Chemical Risk Management (AQF Level IV)”. A 2-day course for contractors, landholders and managers that concentrates on risk management. Contact Tocal College, Paterson, NSW 2421. Phone 1800 025 520 520, email info@tocal.com, www.tocal.com

Reading
• Tractor PTO guarding subsidies
  - WorkCover
Training Courses
“Operate chainsaws.”, “Safe use of Tractors.” and “Safe operation and maintenance of tractors.” Contact Tocal College, Paterson, NSW 2421. Phone 1800 025 520 520, email info@tocal.com, www.tocal.com

“Chainsaw Operations.” Contact NSW TAFE

Reading

Equipment
A permit is required from the RTA to drive an unregistered vehicle (e.g. tractor) on public roads. 4WD tractors are needed to safely work much of the steeper country in the region. All tractors weighing more than 560kg are required to have Roll Over Protection Structures (ROPS)

Contacts
• Tractor PTO guarding subsidies
  - WorkCover

Reading
• “Spray drift and how to prevent it” see QLD DPI fact sheet at http://www.dpi.qld.gov.au/cps/dltp/hst.xls/14790_4909_ENA_.HTML.htm
See list of Qld DPI Publications Catalogue online at http://www.dpi.qld.gov.au/aboutus/resources

Web Sites
• All aspects of the requirements for pesticides use at http://www.environment.nsw.gov.au/pesticides/

Fencing
Adjoining owners are jointly responsible for maintaining a sufficient dividing fence between properties (Dividing fences Act 1991). The Act spells out your rights and obligations.
Rural Industries Research and Development Corporation
A government organization that is responsible for funding research on, and helping develop, rural industries. They supply a range of reports, newsletters and other publications on new and established rural industries.
Level 1, AMA House, 42 Macquarie St, Barton, ACT, 2600
Phone: (02) 6272 4819.
email: rirdc@rirdc.gov.au.

Shire Councils
Contact about rates, roads, bridges, waste, community services, water and sewage services, flood mitigation, noxious weeds, tree clearing, acid sulphate soils and all development applications. Listed in local phone books.

State emergency Service (NSW) - SES
A volunteer emergency and rescue service that is the lead response agency for floods and storms across NSW. Contact when requiring assistance for storms and floods and about preparing for them.
For emergencies phone: 132 500
For volunteering and safety information phone: 1800 201 000
Email via the enquiry form at www.ses.nsw.gov.au/contacts.htm
Web site: www.ses.nsw.gov.au

TAFE NSW – North Coast Institute
Provides training in computing, accounting, agriculture, aquaculture, environmental studies, horticulture, horse management.
Email: nci.courseinfo@tafensw.edu.au
Web site: www.nci.tafensw.edu.au
For course information Phone: 131 601

University of New England
Offers a range of publications on vegetation identification and natural resource management.
Web site: www.une.edu.au

United Campus Bookshops
Madgwick Building, University of New England, Armidale, 2351
Phone: (02) 6772 3468
Email: armidale@ucb.net.au
Web site: www.ucb.net.au

Water and Energy, Department of (NSW) - DWE
Farm dams, licensing, irrigation, water sharing plans, river bank works – approvals.
North Coast Regional Office;
Level 2, 76 Victoria St, GRAFTON
Phone: 0266416500
Web: http://www.dwe.nsw.gov.au

Weeds – Far North Coast Weeds Authority

Weeds - Far North Coast Weeds Advisory Committee

Wetland Care Australia
Information on wetlands and their management
PO Box 114, Ballina, 2478
Phone (02) 6681 6069
Email: ballina@wetlandcare.com.au
Web site: www.wetlandcare.com.au

Wildlife Information and Rescue Service (WIRES)
For your nearest WIRES rescue service, look in the white pages of your local area telephone book under WIRES.

Workcover NSW
A statutory body, whose purpose is to achieve safe work places (including farms). Contact for information about how to manage safety risks, OH&S training and legal obligations as an employer.
For enquiries phone: 131 050
Email via the enquiry form at www.workcover.nsw.gov.au/Contactus/default.htm
Web site: www.workcover.nsw.gov.au