Teacher's Resource Guide

Landcare in Your School

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Landcare Australia

Landcare in your School

Landcare

Landcare is a national network of thousands of locally-based community groups who care for the natural resources of our country.

Australia is proud to boast more than 4000 community Landcare groups, 2000 Coastcare groups and many thousands of volunteers across the country.

Through Australia's people and communities, the Landcare movement is making a big difference in caring for our country.

All around Australia, Landcare volunteers are proving that together we can repair and viably manage our precious natural resources. This unique partnership between communities, government and organisations is achieving great things.

Improving our farmlands

Many primary producers are active participants in Landcare. They make significant contributions to combating soil salinity and erosion through sound land management practices and sustainable productivity. More than 40 per cent of farmers are involved in Landcare and many more practice Landcare farming.

Breathing new life into waterways

Groups work to conserve, rehabilitate and better manage our creeks, river systems and wetlands.

Bringing back trees

Each year Landcarers plant many millions of native trees, shrubs and grasses for a range of benefits, including improved soil and water quality. They restore bushland and conserve sensitive areas on both public and private land.

Restoring wildlife habitats

Volunteers have provided protection for thousands of native species, including threatened and endangered flora and fauna.

Urban action – protecting our urban environment

Active Landcare groups in Australian towns and cities work thousands of hours each year to tackle local environmental issues of most concern to their communities.

Contents

1. What's possible?

Many schools have incorporated Landcare activities into the school program whether it is:

- through the curriculum,
- as weekly sport,
- as an elective subject,
- as community service,
- as an environment club, or
- as an occasional activity or a one-off adventure!

The types of activities that schools can undertake include:

- treating weeds,
- seed collection,
- tree planting,
- propagation of native plants,
- installing tree guards,
- watering of plants,
- site mapping and planning,
- native gardens,
- plant identification,
- managing erosion, or
- undertaking aspects of the curriculum.

Ongoing activities on site may include:

- maintaining installed trees,
- identifying native animals / native animal habitat,
- identifying insects on site,
- identification of water flows on site,
- flora and fauna surveys,
- water testing,
- follow up weed treatment,
- seed propagation.

Landcare provides a multitude of opportunities to actively engage students in not only learning about the environment, but seeing environmental issues face to face, and participating first hand in its protection and enhancement.

2. How to start

The first step to Landcare in your school is to decide what activities the students can participate in. It might be possible to work onsite at school if you have a patch of bushland or agricultural paddocks. Alternatively you may want to partner with a local Landcare or Bushcare group, and work with this group on an existing site. Most groups are delighted to work with the local school and are keen to share knowledge and experiences. Ideally the site should be in walking distance from the school. The section below provides case studies of a variety of schools undertaking Landcare in different ways.

3. Case Studies

Starting a High School Landcare Group can take on many forms depending on your school and student interest. You do not have to limit the work you do to the school grounds or local reserve. There are many activities your school can get involved in for an afternoon, a day, a weekend or year-round. Below are a number of case studies demonstrating the range of Landcare activities that schools are undertaking in the region.

3.1 Landcare as Sport

Colo High School, North Richmond NSW

Colo High School is set on 23 acres in North Richmond, and includes a patch of critically endangered Cumberland Plain Woodland ecological community. The school recently started a Landcare group for sport, meeting for an hour and a half each week in term time, with the aim of removing weeds in the school's bushland. For their first term they were supervised by a bush regenerator who trained students in weed control, plant identification, seed collection, propagation and collecting and mounting herbarium specimens. Twenty students participated. By the second term, 27 students were enrolled in the group, and the Landcare teacher and returning students had enough experience that a bush regenerator was not required.

Figure 1:
Colo High School students tackle a wall of privet during Landcare

3.2 Landcare as Community Service

Macarthur Anglican College, Cobbity NSW

Macarthur Anglican College is located on 120 acres in Cobbitty, in south-western Sydney. The school, in partnership with the Hawkesbury Nepean Catchment Management Authority, has formed a high school Landcare group which is aiming to plant 1000 native trees and shrubs into the school grounds. The college also includes patches of remnant, critically endangered Cumberland Plain Woodland. Each student at the school undertakes a number of community service hours as part of the school's Community Service program, and hours can be accrued by working with the Landcare group.

Currently, a group of year 11 students and two teachers are planting local native plants after school hours on Fridays. So far the school has planted 650 plants.

Figure 2: Students planting at Macarthur High School as part of the school's community service program

3.3 Landcare and Duke of Edinburgh candidates

Adventure conservation group Willow Warriors work with Duke of Edinburgh candidates

In 2008, volunteers from Willow Warriors, an adventure conservation group that seeks to combine the excitement of white-water rafting, flat water kayaking and having fun in the outdoors with Landcare conservation activities, partnered with Duke of Edinburgh candidates from Pacific Hills Christian School to teach willow treatment techniques.

While in the area, the volunteers noticed many black willow seedlings growing along the river. Black willows (Salix nigra) are an invasive weed that dominates many river banks in eastern Australia, choking out native species and impacting on river health.

To deal with the problem, volunteers from Willow Warriors organised a four day camp on the river with six Duke of Edinburgh candidates from the school. The group was joined for two days by five Duke of Edinburgh candidates from Macmasters Beach Surf Lifesaving Club. Over the four days the group paddled and walked the 23 kilometres of the Macdonald River from the Higher Macdonald Bridge to St Albans Cemetery treating about 800 black willows saplings and seedlings and mapping another 70, when time ran out to treat them.

Figure 3: Duke of Ed candidates hand pulling crack willow in the Macdonald River *(Photo by Willow Warriors www.willowwarriors.org.au)*

In early 2009 Willow Warriors partnered on another three trips with students from Arden, Arndell, Marion and Abottsleigh who were also learning how to treat willows as part of their Duke of Edinburgh Awards. The trips aimed to follow up the previous work and extend the treatment down to Lower Macdonald and the junction with the Hawkesbury River. Over the course of the project, volunteers and students have treated 1,100 black willows along the river.

3.4 Landcare and the curriculum

1. La Salle Academy, Lithgow NSW

La Salle Academy is located in suburban Lithgow. The Lithgow Oberon Landcare Association partnered with La Salle Academy to establish an Environmental Education Centre in 2000 using funds from a National Environmental Trust grant. The centre was part of introducing agriculture into the curriculum of the school; however the site is also now used by science and geography classes.

The centre comprises an irrigated hothouse, a shed for equipment and an outdoor amphitheatre-style teaching area. The school has developed a booklet of lesson plans using the facilities and surrounding site (creek line, tree planting areas) as a back drop.

The following areas are taught to students using the site:

- Seed collection, germination, planting out and maintenance
- Weed identification and control
- Native grass identification
- Streamwatch[1] / bugwatch
- 'Living in the Cox's River Catchment'
- Sustainable Agriculture
- General care of our local area

Since its opening, groups such as The Girl Guides have also completed environmental activities at the site and equipment for Streamwatch and Bugwatch has been used for school education days within the local area. All community-based environmental groups as well as local schools and other interested parties are welcome to use the centre.

Figure 4: Year 9 students propagating plants in the irrigated hot house

[1] Streamwatch is a long running water monitoring program that supports local communities and schools to evaluate the positive impacts of remediation projects and identify local issues so that action can be taken. Groups monitor water quality and macroinvertebrates (water bugs).

2. Mulwaree High School, Goulburn NSW

Mulwaree High School is situated near the Wollondilly River in Goulburn NSW. The School includes 30 hectares of land which has been divided into a 15 hectare farm lot and a 15 hectare environmental field study area consisting of a set of connecting ponds or dams surrounded by grasslands and some native eucalypt woodlands. The 15 hectare farm is used to run cattle, sheep, alpacas and poultry and also contains some vegetable plots. Fruit and flowers are also grown depending on water availability.

The field study area has been used to teach basic Landcare principles in Science topics such as Ecosystems and Adaptations and Resources. Agricultural students study topics such as the impacts of salt in the soil, loss of biodiversity, over-clearing and overgrazing. These effects are then related to farm production outcomes and environmental factors. Actions to address these issues are then studied and on-ground Landcare activities implemented.

Senior Science courses such as Biology, Chemistry and Agriculture also use the area to study and enrich Higher School Certificate topics such as Water Quality Monitoring and Local Ecosystems. An Environmental Science course is also available to junior Science students who study ecology in more detail as well as water quality and salinity issues. In 2007 the school was able to build a free standing purpose built classroom adjacent to the wetlands, which they are able to make available to other schools in the area. The students also undertake Streamwatch at the site.

Landcare works undertaken by the school have included:

- Mass tree planting to re-establish native vegetation and prevent erosion;
- Predator-proof fencing to provide a safe place for local fauna;
- Establishing a wetlands area;
- Arresting and studying an identified salinity problem;
- Monitoring storm water and water quality within an identified Goulburn urban area;
- Developing an alternative and sustainable energy source (wind / solar turbines);
- Establishing a Remembrance Corridor of native trees for Goulburn military service personnel killed on active service; and
- Constructing a purpose built Environmental Field Study classroom.

The school has been successful in winning a number of grants and prizes, engaging the local community, and extending their Landcare works to other areas such as the Mulwaree High School Remembrance Corridor.

3.5 Landcare as a weekend adventure

High school students help to save the endangered Regent Honeyeater

Twice a year Birds Australia holds a weekend event in the Capertee Valley in central west NSW, planting native trees and shrubs to provide habitat for the critically endangered Regent Honeyeater. The Capertee Valley is one of the few remaining strongholds for this elusive bird, which has become endangered due to loss of habitat.

In May 2011, students from Nepean High School, Emu Plains, travelled out to the Capertee Valley as part of the NSW Premier's Student Volunteering Awards program.

The students worked alongside more than 100 other volunteers to revegetate five hectares of land that will provide habitat for the Regent Honeyeater in the future. In total 3,500 trees and shrubs were planted over the weekend.

Figure 5:
Nepean High School students tree planting in the Capertee Valley to create habitat for the endangered Regent Honeyeater

3.6 Landcare incorporated into a range of school programs

Oxley College, Bowral NSW

Oxley College is a small independent secondary school located in Bowral NSW. It has a flourishing kayaking group that regularly paddles the Wingecarribee River from near the school to Berrima Weir. In 1997, students and staff had become increasingly alarmed at the deterioration of water quality in the river. In combination with Year 12 Science for Life students and others in the Duke of Edinburgh Program, the school set about undertaking rehabilitation and replanting of the river bank owned by the school as well as a section of Council reserve. The school also undertook Landcare activities as Sport, rotating one sport group each week so as not to impinge too much on other training requirements and to give as many students exposure as possible.

The school's kayaking club also occasionally participated in Willow removal along the River on Saturdays.

Students have continued rehabilitation work onto private land up stream and down stream of the school.

Activities have included fencing out stock, removing willows, revegetation with trees and shrubs, and the creation of buffer zones to trap nutrients. Over 3000 trees have been planted, and the group continues to maintain rehabilitated areas along the river, particularly the removal of invading willow seedlings. The school has been successful in getting a range of small grants to help them undertake the work under various grant programs and government agencies.

Figure 6: Rehabilitated creek adjacent to Oxley College

3.7 Other ideas

3.7.1 Landcare as an elective subject

Schools may opt to introduce Landcare as an elective subject. Nepean High School, Emu Plains, already has a well-established agricultural curriculum with vegetable gardens and livestock, and has recently introduced Landcare as a Year 10 elective.

3.7.2 Occasional Landcare Group Support

Some schools or youth groups such as Scouts opt to help a local Landcare group with their site on an occasional basis, such as on National Tree Day. To find your local group speak to your local government or catchment management authority or visit the Landcare NSW website to find your Regional Landcare Facilitator.

3.7.3 Lunchtime Landcare

This is a group of students who participate once a week in a 'lunch time landcare' club planting and maintaining native trees around the school grounds. This works particularly well with younger children.

Figure 7:
Year 2 students (and teacher) weed around planted native trees during "Lunchtime Landcare" at Macarthur Anglican College, Cobbity NSW.

4. Some notes about Landcare activities

4.1 Weeds

Weeds are one of the biggest environmental problems in Australia. They degrade our productive land, can negatively impact stock, reduce the quality of bushland, and impact on the survivorship of revegetation.

4.1.1 Identification

Much Landcare work is about understanding and controlling weeds. Correct identification is essential for effective weed control. It is easy to confuse a weed from a preferred species when first learning to identify plants. The rule is “If you don’t know what it is, don’t kill it!”

Keeping a herbarium of common weeds and native plants is a good way of helping students to learn plant identification skills.

4.1.2 Weed control techniques

There is a range of ways to control all sorts of different weeds. The pictures below provide guidance on how to remove a range of weeds.

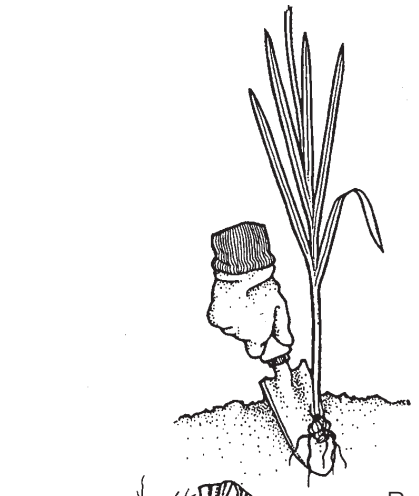
4.1.3 Timing

Timing weed control measures can help better control weeds. For example, targeting a weed when it is flowering (and therefore easy to spot) but before it sets seed, helps reduce weed issues in the future by reducing the seed bank of that weed.

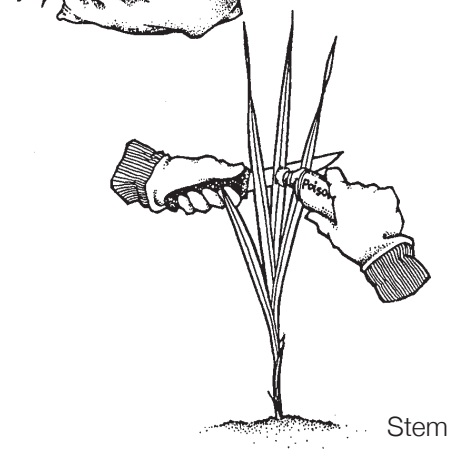
4.1.4 Use of herbicide

Many weed treatments involve the use of herbicide, such as Roundup Biactive®, and some weeds are difficult to control without herbicide. The diagrams below demonstrate weed control methods that include both herbicide treatments and labour-only methods.

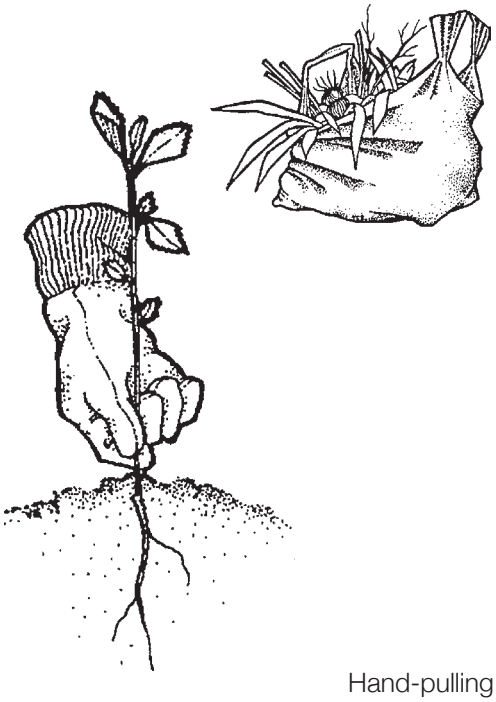
Some schools opt not to use herbicide at all, others have the students cut the weed, and the teacher applies the herbicide or older students take on this responsibility. It is important to use herbicide only according to the label.



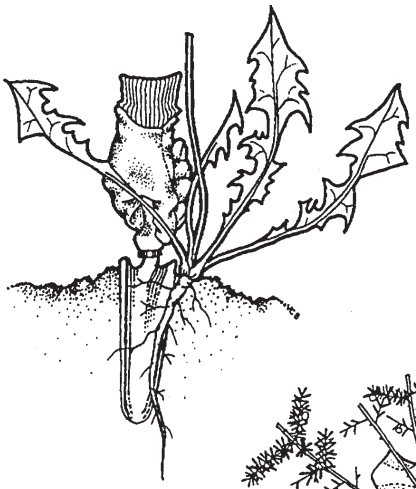
Removing plants with bulbs, corms and frilling



Stem swiping

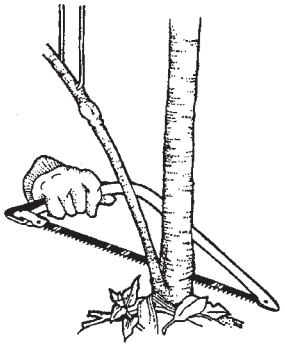


Hand-pulling small weeds

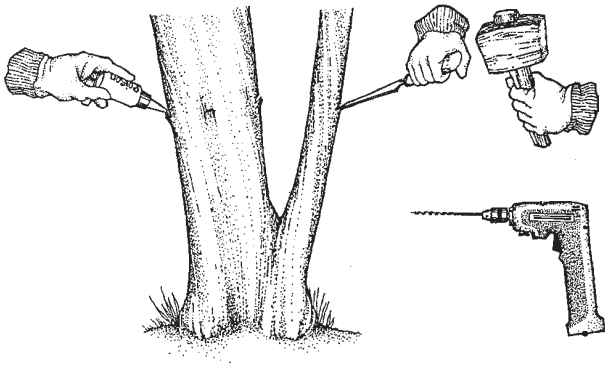


Removing taproots

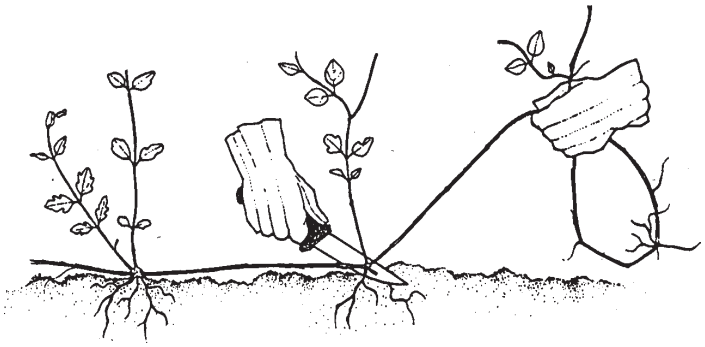
Crowning



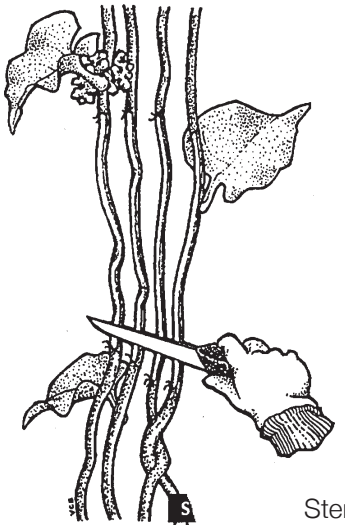
Cutting and painting



Drilling and frilling



Hand removal of vines



Stem scraping

4.2 Fauna habitat - who lives here?

Learning to identify fauna and signs of fauna is a very rewarding experience. Evidence of what sort of animals occur in your local patch can be all around you.

What birds can you hear calling? What birds can you see? Do you know what species they are and what habitat they require to live here? Some birds eat only seeds, some fruit or nectar. Some birds, like owls and raptors are carnivorous, eating lizards, small rodents or other birds. Powerful Owls will hunt possums and gliders.

Do the trees on your site have hollows? Many native bird and mammal species rely on hollows in trees for shelter and breeding. These hollows are formed when the centres of tree limbs rot away due to fungal or termite action. Hollows take many years to form and so are only present in aged trees (at least 60 years old).

Maybe you can see bird's nests or possum dreys? Scratches on trees can be evidence of tree-dwelling species such as possums, gliders or koalas. An animal's scats can show you that they occur in an area.

How many different species of lizards have you seen? What butterflies visit the school throughout the year? What about spiders?

Recording fauna sightings helps to build up a picture of how an area is used in different seasons and at different times of the year. What animals are resident? Which species only occur at the site in Spring? Recognising what fauna isn't present also gives important clues as to what environmental values need improving in the area.

A local speaker can help to raise student's awareness of local fauna, such as a representative from your local bird watching organization or WIRES.

4.2.1 Weeds as habitat and the importance of staged-removal

Areas of native vegetation, and even very weedy areas, act as a refuge for native fauna particularly in areas that are urbanised or have been extensively cleared of vegetation. Any Landcare activity needs to take into account the impact works might have on the habitat value of the site.

Some works may improve habitat in the long term but dramatically reduce habitat in the shorter term. For example, small birds love dense weeds like lantana and blackberry because these plants provide good protection from predators. However, lantana and blackberry degrade natural bush and farm land and reduce biodiversity by crowding out other plants.

It is important to undertake a staged approach to Landcare works, which allows for the removal of weeds in conjunction with the replacement of habitat for fauna.

Figure 8: A possum in an African Olive. African Olive is a serious environmental weed in south west Sydney (photo Rowan Wood, Greening Australia).

4.2.2 Nest Boxes

Nest boxes are a great way to add habitat to your site, and a good hands on project to undertake with students. Nest boxes help to replace tree hollows that may have been lost from the environment. A local Landcarer, local Council Bushland Officer or even volunteers from the local Men's Shed may be able to help teach your students about nest boxes.

Figure 9: A nest box established in a gum tree (Photo: John Turbill)

Further information is also available from The Nest Box Book by Jim Grant, published by the Gould League or online from BirdLife Australia.

4.3 To plant or not to plant?

It is often tempting to create an instant impact by planting an area with native trees. However, planting is not always the most ecologically appropriate or most cost effective solution to restoring an area.

4.3.1 Natural Regeneration

Some sites will "bounce back" with the regeneration of native plants once competition from weeds has been removed, or grazing pressure reduced or removed. Natural regeneration is desirable because:

- The plants that grow are already adapted to that site,
- Its cost effective and requires little labour (unlike tree planting), and
- The site will not require follow up in the form of watering, although may require follow up weed removal, but so will planted sites.

It is worth exploring if your site is likely to respond to weed removal with natural regeneration.

4.3.2 Endemic species

Endemic plants are those that belong to one particular vegetation community or geographic area. It is important to only plant endemics when restoring bushland in your local area. These species are already adapted to the local conditions e.g. climate, soil type etc. Planting endemics will also ensure that we do not introduce an inappropriate species that will thrive in an area – and end up as a weed! It will also ensure that animals of the local area are provided with the exact food and shelter they need.

4.3.3 Seed Collection & Propagation

Seed collection is an enjoyable activity to undertake with your high school Landcare group. Seed collection needs to be timed so that appropriate plant species (i.e. easy to propagate) are in seed. Seed collection really requires specialist help to ensure seed is collected in line with appropriate guidelines (http://www.florabank.org.au/), in acceptable amounts, and is cleaned and stored so as to best protect the seed. Greening Australia or a local Landcarer may be able to guide the group in seed collection activities. Seed can then be propagated and planted in the Landcare site.

4.3.4 How to plant a native plant

STEP 1: Water your seedlings while they are still in the pot/tube or immerse them in a bucket of water.

STEP 2: Dig a hole that is slightly deeper and wider than the seedling pot. Replace some loose soil into the hole to allow the roots room to move (Hydrated water crystals and low phosphorous slow release fertiliser may be added at this point).

STEP 3: Gently remove the plant from its container by gently tapping or squeezing the bottom of the pot, upturning it and gently teasing it out. Be careful not to tear the leaves or roots. If the roots are tangled, gently separate them at the base.

STEP 4: Place the plant in the hole, making sure the stem is straight.

STEP 5: Fill in around the plant with soil, being careful to cover the roots and not leave air pockets. It is preferable to have the plant sitting in a small hollow or reservoir so that it will capture water.

STEP 6: Press the soil down firmly to remove air pockets.

STEP 7: Add plenty of mulch or jute matting around the base of the plant, being careful not to bury it, to reduce evaporation and weed invasion (If grass and weeds have been sprayed, this step may not be required.)

STEP 8: If using tree guards, place them carefully around the plant. These help to protect the plant from pest animals (such as rabbits), and the drying effects of the wind, and weed invasion.

STEP 9: Water well to soak the area around the base of the plant. Add at least a couple of litres to each plant.

4.3.5 Maintenance of planted sites

Most sites that are planted will need some follow-up, either watering or weeding around plants to reduce competition. Follow-up will greatly increase the survivorship of newly planted sites.

4.4 Guest Speakers

High School Landcare also provides an opportunity to engage guest speakers, particularly speakers that can help to contribute a sense of the broader importance of Landcare and environmental volunteerism in general. Guest speakers can useful on days when the weather prohibits outdoor activity.

Some ideas for guest speakers include:

- Local Landcarers who can talk about the work that they do, why they do it and how the student's work fits into a broader context;
- Adventure and Remote Area Conservation Volunteers such as the Willow Warriors;
- Local experts in flora or fauna;
- Environmental students or researchers from local universities working in your area;
- State government staff with relevant local expertise or programs e.g. Department of Primary Industries staff researching the endangered Macquarie Perch in the Hawkesbury region

To identify potential guest speakers contact your local Council office, your regional Catchment Management Authority, your local Bird or Reptile Club, or you nearest University's School of Environment.

5. Health & Safety

As always, safety first! If your group plans on undertaking physical outdoor activities for Landcare, then the follow steps will help prepare your students for any risks they may encounter.

5.1 Site Induction

The first step to beginning your Landcare group is to undertake a site induction. The site induction may include the following activities:

5.2 Undertaking a Risk Assessment

A risk assessment is an activity that you can undertake with your school Landcare group. A site tour is required for the group to undertake a risk assessment together. Walking over the site and stopping to fill out all aspects of the risk assessment allows students to become aware of potential hazards in the area and provide suggestions on how to mitigate them.

Appendix 2 contains a Risk Assessment pro-forma.

5.3 Safe Work Methods

Safe Work Methods Statements outline safe ways in which to undertake particular activities.

Appendix 3 includes Safe Work Method Statements for activities relevant to Landcare. You can take students through each Safe Work Method Statement before you begin work. Students can break into groups to work through the Safe Work Method Statement, and sign off on each one as it is read.

Suggestion for delivery

- Split students into groups and rotate each safe work method statement through the groups
- Give each group the task of making a poster for each safe work method statement they are given and present to the group. Then all students can sign the safe work method statement after each presentation.
- Give a brief presentation on the safe work method statement before undertaking each specific activity. This allows for the overview and signing to be spread out and undertaken before each activity.

5.4 Uniforms

What should each student have when participating in the Landcare group?

- Hat
- Long Pants
- Gloves
- Enclosed Shoes
- Sunscreen

6. Landcare and the High School Curriculum

There are many aspects of the NSW Curriculum that can be incorporated into High School Landcare. Appendix 1 provides lesson plans for:

- NSW Stage 5 Sustainable Agriculture
- NSW Stage 5 Science
- NSW Stage 5 Geography

7. Appendix One – Lesson Plans

The following Appendix contains lesson plans for:

- **Stage 5 Sustainable Agriculture**

  Syllabus outcomes:

  5.1.2 Explains the interactions within and between agricultural enterprises and systems.

  5.2.1 Explains the interactions within and between the agricultural sector and Australia's economy, culture and society.

  5.4.1 Evaluates the impact of past and current agricultural practices on agricultural sustainability.

  5.4.2 Evaluates management practices in terms of profitability, technology, sustainability, social issues and ethics.

  5.5.1 Designs, undertakes, analyses and evaluates experiments and investigates problems in agricultural contexts.

- **Stage 5 Science and Sustainability**

  Syllabus outcomes:

  5.3 Evaluates the impact of applications of science on society and the environment.

  5.4 Discusses scientific evidence supporting different viewpoints.

  5.5 Analyses how current research might affect people's lives.

  5.10 Assesses human impacts on the interaction of biotic and abiotic features of the environment.

  5.11 Analyses the impact of human resource use in the biosphere to evaluate methods of conserving, protecting and maintaining Earth's resources.

  5.13 Identifies a problem and independently produces an appropriate investigation plan.

  5.20 Selects and uses appropriate strategies to solve problems.

- **Stage 5 Geography 5 Land and Water Management (A3 - Issues in Australian Environments)**

  Syllabus outcomes:

  5.1 Identifies, gathers and evaluates geographical information.

  5.2 Analyses, organises and synthesises geographical information.

  5.3 Selects and uses appropriate written, oral and graphic forms to communicate geographical information

  5.4 Selects and applies appropriate geographical tools

  5.5 Demonstrates a sense of place about Australian environments

  5.6 Explains the geographical processes that form and transform Australian environments

  5.7 Analyses the impacts of different perspectives on geographical issues at local, national and global scales

  5.10 Applies geographical knowledge, understanding and skills with knowledge of civics to demonstrate informed and active citizenship.

NSW Stage 5 Sustainable Agriculture

Task 1: The impact of European agriculture on the landscape

5.4.1: The impact of European and Aboriginal practices on the development of Australian agriculture; relationships between resource usage and sustainability of agricultural practices; and the impact of agricultural practices on sustainability.

"The tragedy of the commons develops in this way. Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. Such an arrangement may work reasonably satisfactorily for centuries because tribal wars, poaching, and disease keep the numbers of both man and beast well below the carrying capacity of the land. Finally, however, comes the day of reckoning, that is, the day when the long-desired goal of social stability becomes a reality. At this point, the inherent logic of the commons remorselessly generates tragedy.

As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he asks, "What is the utility to me of adding one more animal to my herd?" This utility has one negative and one positive component.

1. *The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1.*

2. *The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is only a fraction of - 1.*

Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another... But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit--in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all. "

(Extract from: Hardin G., "The Tragedy of the Commons": Science 13 December 1968: Vol. 162 no. 3859 pp. 1243-1248)

The changes in the region since European settlement are a reflection of the changes that have occurred across Australia.

- **Sketch or photograph your Landcare Site. Show any remnant bushland.**

- **Assess and describe the range of human activities that have taken place in the region and the surrounding area that have impacted upon native vegetation.**

- **Describe the direct and indirect impacts Agricultural production may have had upon native vegetation in the region and any efforts to remedy those actions.**

Task 2: Food we eat – are we getting what we need for a healthy lifestyle?

5.5.1: Planning and conducting first-hand investigations in agricultural situations

Whilst scientists (and parents) have always talked about the value of a nutritious and balanced diet for good health, a great deal of recent scientific endeavor has been linked to investigating the impact of soil on the "healthiness" of food and its influence on the rise in conditions such as cancer, heart disease, obesity, and diabetes.

A key point - around 99% of the mass of the human body is made up of just six elements: oxygen, carbon, hydrogen, nitrogen, calcium, and phosphorus. It is also vital for human health to ensure levels of other elements are available to small to trace amounts.

1. Oxygen (65%)
2. Carbon (18%)
3. Hydrogen (10%)
4. Nitrogen (3%)
5. Calcium (1.5%)
6. Phosphorus (1.0%)
7. Potassium (0.35%)
8. Sulfur (0.25%)
9. Sodium (0.15%)
10. Magnesium (0.05%)
11. Copper, Zinc, Selenium, Molybdenum, Fluorine, Chlorine, Iodine, Manganese, Cobalt, Iron (0.70%)
12. Lithium, Strontium, Aluminum, Silicon, Lead, Vanadium, Arsenic, Bromine (trace amounts)

Reference: H. A. Harper, V. W. Rodwell, P. A. Mayes, Review of Physiological Chemistry, 16th ed., Lange Medical Publications, Los Altos, California 1977.

- **Discuss how these elements enter the human body**

- **Describe using a flow chart how these elements might flow from the farm to the dinner plate**

- **Identify the choices you could make regarding your diet if you accepted the importance of soil in food? Discuss what information you need to make these choices**

  Reference: http://www.raw-food-health.net/SaveTheEnvironment.html

- **Evaluate the different roles farmers can play to ensure communities receive the necessary balance of elements in their food**

- **Describe the conflict between maintaining long-term healthy soil for food production and the current practice of large scale farming for domestic and export use**

Task 3: Farming with trees – the benefit of native plants to farming

5.1.2: The interactions between plants, animals, soils, climate and micro-organisms

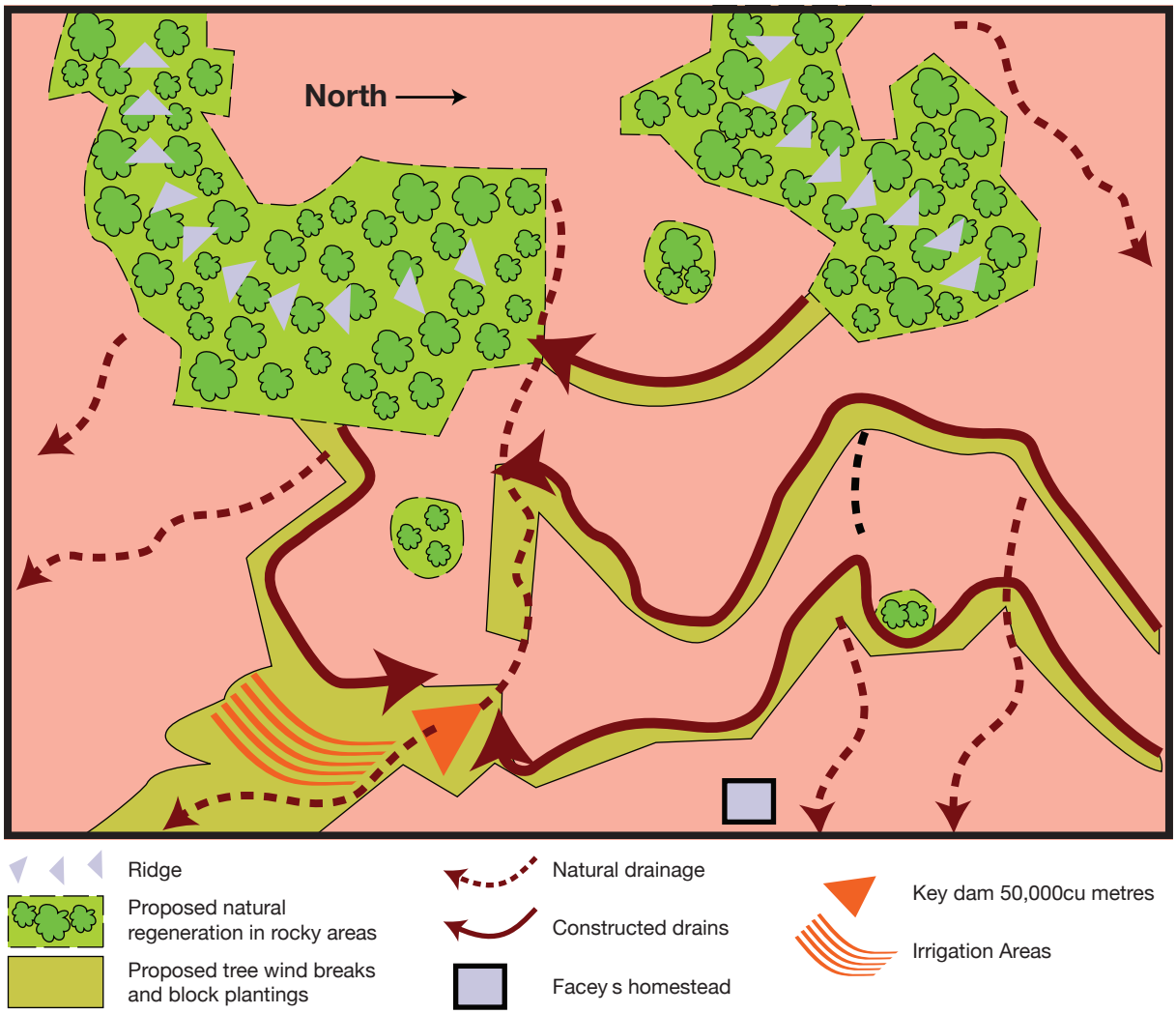
- **Ecoservices is a term that describes the resources and processes that are supplied by natural ecosystems and utilised by humans. List some of these resources.**

- **Native trees provide many services and benefits to Agricultural systems; list the roles that native trees can play on farms.**

- **Describe how the integration of native vegetation in an Agricultural system can affect the catchment.**

- **Consider how Landcare activities can have an impact on Agricultural systems within a catchment. Describe the ways that Landcare activities can support local Agricultural systems.**

- **Consider the aerial map of the farm below**



List the features on this farm that allow for sustainable agricultural production.

Task 4: Feeding Ourselves – the role of agriculture in our catchment

5.2.1: The role of agriculture within the Australian economy, relevant export and domestic markets, the range of training and employment opportunities in agriculture, the impact of global factors on Australian agriculture.

- **Name some of the main food and water sources in the your Catchment Management Area**

- **List ways that Australian Agriculture can be affected by the Global Market.**

- **Describe some ways to manage these issues on a catchment scale.**

Task 5: Sustainable agriculture – how do we balance economic, environmental and social impacts

5.4.2: The impact of community demands and attitudes on sustainable agriculture, social issues and ethics involved with the production of chosen agricultural enterprises, profitability as a measure of management success, new technology and its influence on management strategies

- **Define "Sustainable Agriculture"**

- **Describe how you would measure whether agriculture is sustainable on a farm level**

- **Describe actions that can be undertaken on a farm level to increase agricultural sustainability.**

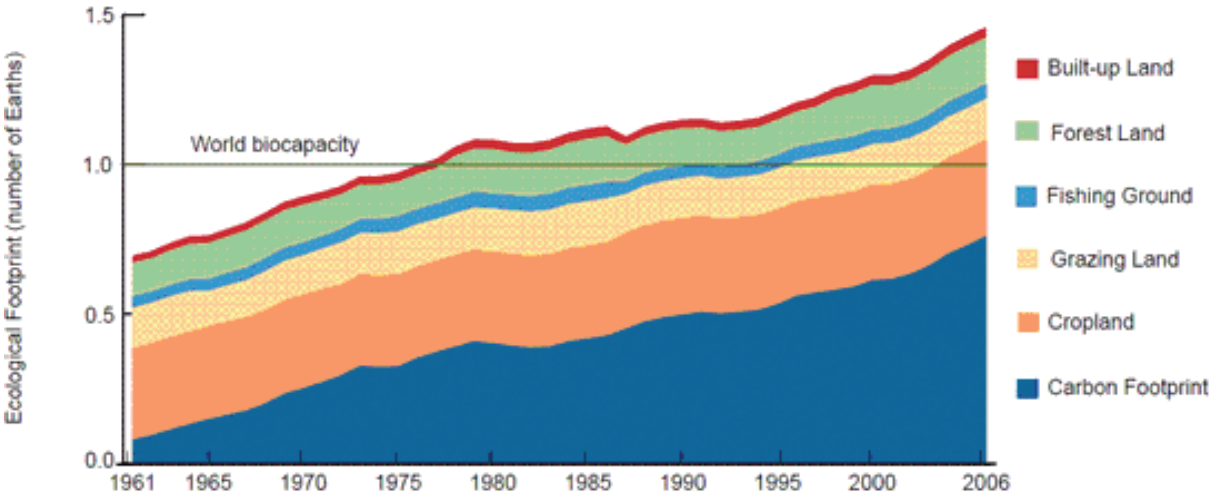
- **Describe how you would measure if Agriculture is sustainable on a catchment level.**

- **Research some new technologies that can be used on a farm to allow agriculture to sustainably interact with the natural environment. List below.**

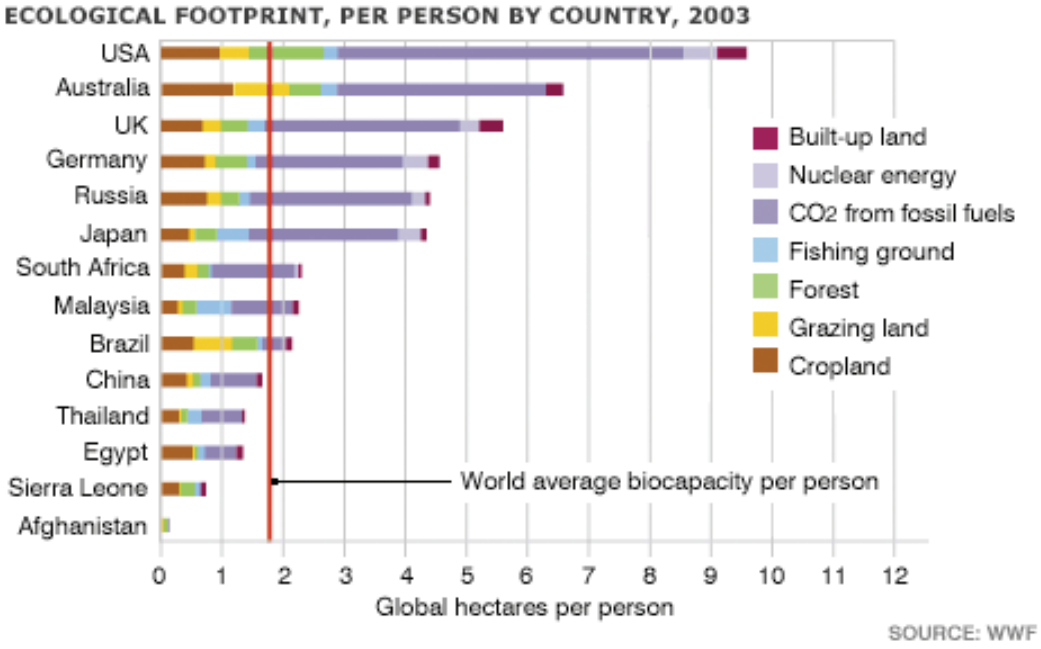
- **Describe some ways that the community and consumers can influence agricultural sustainability.**

Task 6: Sustainability & Sustainable Agriculture

If we continue along the "business as usual" path, by the early 2030s it is estimated we will need two planets to support humanity's demand for goods and services. The "Ecological Footprint" is a measure of the extent to which humanity is using nature's resources faster than they can regenerate. It illustrates who uses how much of which ecological resource and it shows to what extent humans dominate the biosphere at the expense of wild species.



Global Footprint Network http://www.footprintnetwork.org/



Country/Region	Total Ecological Footprint [gha per person]	Cropland [gha per person]	Grazing Land [gha per person]	Forest Land [gha per person]	Fishing Grounds [gha per person]	Carbon Uptake Land [gha per person]	Built-up Land [gha per person]
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Cropland

Cropland consists of areas used to produce food and fibre for human consumption, feed for livestock, oil crops and rubber. Cropland footprint calculations do not take into account the extent to which farming techniques or unsustainable agricultural practices cause long-term degradation of agricultural land or soil.

Grazing land

Grazing land is defined as areas that contain a low overall percentage of canopy cover, scattered trees and shrubs. Grazing land is used to raise livestock for meat, dairy, hide and wool products.

Forest for timber and fuelwood

The forest footprint is calculated based on the amount of lumber, pulp, timber products and fuel wood consumed by a nation on a yearly basis. These sources also provide information on plantation type, coverage, timber yield, and areas of protected and economically inaccessible forest.

Fishing ground

The fishing ground footprint is calculated using estimates of the maximum sustainable catch for a variety of fish species. These sustainable catch estimates are converted into an equivalent mass of primary production based on the various species' trophic levels. This estimate of maximum harvestable primary production is then divided amongst the continental shelf areas of the world.

Built-up land

The built-up land footprint is calculated based on the area of land covered by human infrastructure — transportation, housing, industrial structures and reservoirs for hydropower.

Forest for carbon sequestration

CO2 emissions, primarily from burning fossil fuels, are the only waste product included in the National Footprint Accounts. On the demand side, the carbon Footprint is calculated as the amount of forest land required to absorb given carbon emissions. It is the largest portion of humanity's current Ecological Footprint – in some countries though, it is a minor contribution to their overall Footprint.

- **Identify the area represented by a hectare. How many sporting fields is one hectare?**

- **Identify Australian's ecological footprint and compare with the average ecological footprint of the Asia-Pacific region.**

- **Define 'sustainability' and identify how we could live more 'sustainably'.**

- **Describe how we could improve our agricultural ecological footprint.**

- **Discuss what Australians can do to improve their ecological footprint at home?**

- **Evaluate how society can balance the needs of the environment with the needs to feed a growing human population?**

Greening Australia's BiodiverseCarbon

Greening Australia's Biodiverse Carbon sinks provide an outstanding opportunity to profitably restore marginal agricultural lands across Australia.

Greening Australia defines Biodiverse Carbon sinks as those established by planting a diversity of regionally-native trees and shrubs on cleared land that restores a long-lived and self-replacing diversity of native vegetation. Our Biodiverse Carbon sinks meet multiple performance criteria for profitable and sustainable carbon emissions offsets fully compliant with Australian Government CFI regulations.

Greening Australia's Biodiverse Carbon systems are a long-term and low risk option that have a proven record of rapid recovery from droughts, fire, and floods. Our carbon sinks are resilient to rapid climate change due to their ability to thrive in a wide range of environments. Millions of years of evolution are the foundation for this resilience.

Unlike other alternatives, our Biodiverse Carbon sinks have the flexibility to match the right native plant species in the right place to match inherent variations in micro-climate and soils that characterise Australia's ancient landscapes. Biodiverse sinks, based on the right native plants, can be established anywhere in Australia.

Our Biodiverse Carbon provides a diversity of ecosystem services in addition to carbon sequestration. Our carbon provides self-replacing habitat for native wildlife, and protects catchments by improving water quality reducing soil erosion and enhancing on-farm productivity. There are also cultural benefits given that a healthy Australian landscape is deeply embedded in both Aboriginal and non-Aboriginal cultures.

Greening Australia's Biodiverse Carbon provides whole of landscape repair and improves agricultural sustainability in the face of a changing climate. Our Biodiverse Carbon will leave a century-long legacy of social, economic and environmental benefits.

Contact Us

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www.greeningaustralia.org.au

Productive
Carbon

Greening Australia

Notes: Benefits of Biodiversity on farming landscapes.

Vision

A healthy, diverse and productive environment treasured by the whole community.

Mission

To engage the community in vegetation management to protect and restore the health, diversity and productivity of our unique Australian landscapes.

About Greening Australia

Greening Australia is one of Australia's leading environmental not-for-profit organisations with more than 250 staff across all states and territories.

Since 1982 Greening Australia has been developing sustainable environmental solutions for the challenges facing our nation's unique landscapes. We manage hundreds of projects nationwide at any one time and thousands of hectares of land.

Combining the best science with extensive on-ground experience and community engagement, Greening Australia develops on-ground, practical solutions to complex environmental problems such as remnant vegetation protection, river health rehabilitation, biodiversity management and the restoration of agricultural productivity.

Integrated Farm Restoration (IFR)

Greening Australia's "Integrated Farm Restoration"(IFR) incorporates large-scale native tree and shrub plantings (carbon sinks) into whole farm enterprises.

IFR provides an innovative carbon farming approach that boldly tackles pervasive land degradation by restoring paddock health which provides multiple farm production benefits. IFR reconfigures and restructures marginal land into viable, diverse and resilient farmscapes. Biodiverse carbon sinks are established on bare and eroding hillsides and along degraded creeks. Low input, high carbon native pastures and no-till cropping systems are promoted on lower slopes with deeper soils. Widely spaced native tree belts are embedded in production paddocks to improve livestock shade, shelter and nutrition.

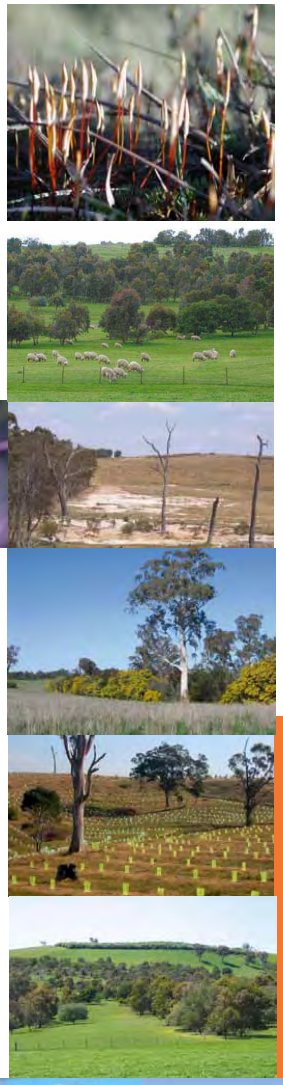
In addition to the carbon sinks, landholders benefit from more drought-tolerant pastures, reduced salinity, improved water catchment, and increased wildlife habitats. IFR blends carbon farming and traditional agriculture in a practical and profitable fashion for the long term benefit of farming communities.

Under the program, farmers work with Greening Australia to map prime agricultural land targeted for enhancement and less productive land better suited and more profitable as permanent biodiverse carbon sinks.

Benefits of Integrated Farm Restoration

Soil Health

Soil degradation is a national issue and there is a desperate need for new and profitable land uses that rapidly improve soil health. Biodiverse Carbon sinks integrated into tradition crops and pastures provide an unprecedented opportunity to greatly improve soil health across entire agricultural landscapes.



Provision of shade and shelter for livestock

The iconic scatter of paddock trees is rapidly disappearing from Australia's farmlands due to old age, disease and a lack of natural regeneration.This is a serious threat to farm animal welfare and productivity. The provision of shelter and shade by vegetation has been found to increase livestock fertility, reduce their energy requirements, prevent losses especially of newborns, lift carrying capacity and increase wool, meat and milk production.

Shelter for crop production

Rows of native trees integrated into crops (alley cropping) provide benefits to crops by reducing wind and soil erosion, and conserving soil moisture.

Salinity reduction

In many regions, replacement of woodlands with short-lived, shallow-rooted, winter-growing crops and pastures has resulted in increased groundwater recharge and rising saline water tables. Native vegetation carbon sinks are effective at drawing water from deeper in the soil profile thereby reducing the risk of salinity.

Reduction in agricultural pests

By retaining and increasing native vegetation cover across a farmscape, insect pest control can be improved. A diversity of native trees and shrubs harbour a diversity of beneficial wildlife (e.g. birds and bats) as well as predatory insects (e.g. spiders and wasps) that prey upon insect pests of crops and pastures.

Improvement in pollination

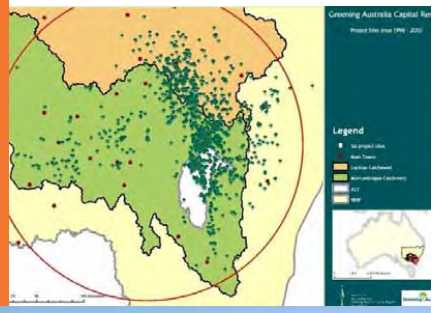
Pollination of many crops and pastures is provided by native bees, butterflies, moths, flies, beetles and wasps, as well as birds and mammals all dependent on native vegetation. These native pollinators complement the pollination services provided by commercially-managed bees.

Key features of IFR

- Opportunity to rest 'tired' farmland for at least five years while native trees and shrubs are established.
- Subsequent rotational grazing of pastures dominated by nutritious and drought-tolerant herbage and browse.
- Low cost 'green insurance' provided by an abundance of shade and shelter that reduces the risks of livestock losses from extreme weather.
- Drought fodder reserves within the permanent carbon sinks on traditionally marginal land.

Achievements

- *IFR is based on a Whole of* Paddock Rehabilitation (WOPR) approach developed by Leon Gary, a fine-wool producer near Yass, NSW in 1994.
- Greening Australia has since established a national WOPR program rehabilitating over 70 paddocks across a wide range of environments including the wheat belt of WA.
- IFR is an opportunity to scale-up WOPR to the whole farm.



NSW Stage 5
Science and Sustainability

Science in the Field

Science students and teachers are encouraged to undertake field research on a selected site/property in the local area. We recognize much of what scientists investigate is done outside the laboratory and the site should be chosen to provide a rich and varied context to challenge students on the many of the issues facing scientists today.

The notion of “sustainability” takes into account three key features: the economic, environmental and social impact of our lifestyle. The challenge for scientists is to consider how these factors inter-relate.

This program helps students focus on some of these issues and the fieldwork tasks centre around considering four aspects of our day-to-day life and how they relate to the sustainability of our lifestyle.

The students consider the issues and problems relating to:

- Energy
- Land
- Waste
- Water

The impact of our lifestyle should then be underscored by visiting a remnant of native vegetation to ask students about the impact of their lifestyle on this area.

Task 1: Waste – a by-product of our lifestyle

5.11.2: Waste from resource use

a. Relate pollution to contamination by unwanted substances.

b. Identify excessive use of fossil fuels as a contributing factor to a greenhouse effect.

c. Discuss strategies used to balance human activities and needs in ecosystems with conserving, protecting and maintaining the quality and sustainability of the environment.

One of our most compelling impacts of our lifestyle is the level of waste generated from our day to day actions. The more we consume, the more waste we generate, and the greater impact we have on our surrounding environment. As the population continues to expand, we need to look at our lifestyle and the ways we can reduce our impact.

- **Sketch the selected site for the fieldtrip and identify the impact of waste from human lifestyle.**

- **List different types of waste that might be impacting the selected region you are visiting. Categorize them as “solid”, “liquid” or “gas”.**

Solid	Liquid	Gas

- **Discuss the sources of at least two of the wastes identified above:**

Solid	Liquid	Gas

- **Greenhouse gases (GHG) are emitted from burning fossils fuels. Identify the different sources of GHG from human activities near or around your site.**

- **Describe how emissions of GHG could be reduced. Detail what new technologies we could use and what changes to our lifestyle we could adopt.**

Task 2: Energy - powering your region

5.11.1: Energy resources

a. Discuss the importance of energy as a resource.

b. Identify properties that make some natural resources economically important and describe their uses.

Humans depend on energy to provide many of our “wants” and “needs”. A comfortable house, reliable transport, entertainment, health services, food, and the list goes on. However, to accommodate the lifestyle we currently enjoy, we require a great deal of “fossil fuel energy”. If we are to become more sustainable, we need to reduce the amount of fossil fuels used in our day-to-day activities.

- **Identify the various sources of energy visible from around your vantage point**

- **Describe what sources of renewable energy (non-fossil fuel) could be available for use.**

- **With various renewable energy options available, discuss why they are not more widely used by businesses and schools.**

Task 3: Land - Soil to Society

5.3: The applications and uses of science

a. Identify and describe examples of scientific concepts and principles that have been used in technological developments (including Australian examples).

b. Discuss, using examples, the positive and negative impacts of applications of recent developments in science.

c. Identify and describe examples where technological advances have impacted on science.

d. Give reasons why society should support scientific research.

5.4: The implications of science for society and the environment

a. Discuss viewpoints about some issues with a major scientific component.

b. Give examples to show that different cultures or groups within a society (including Aboriginal and other Indigenous people) may use or weight criteria differently to make a decision about an issue involving a major scientific component.

c. Identify choices that need to be or have been made when considering whether to use particular scientific advances.

d. Discuss the place of social and ethical considerations in scientific practice and in applications of science.

Whilst scientists (and parents) have always talked about the value of a nutritious and balanced diet for good health, a great deal of recent scientific endeavor has been linked to investigating the impact of soil on the "healthiness" of food and its influence on the rise in conditions such as cancer, heart disease, obesity, and diabetes.

A key point - around 99% of the mass of the human body is made up of just six elements: oxygen, carbon, hydrogen, nitrogen, calcium, and phosphorus. It is also vital for human health to ensure levels of other elements are available to small to trace amounts.

1. Oxygen (65%)
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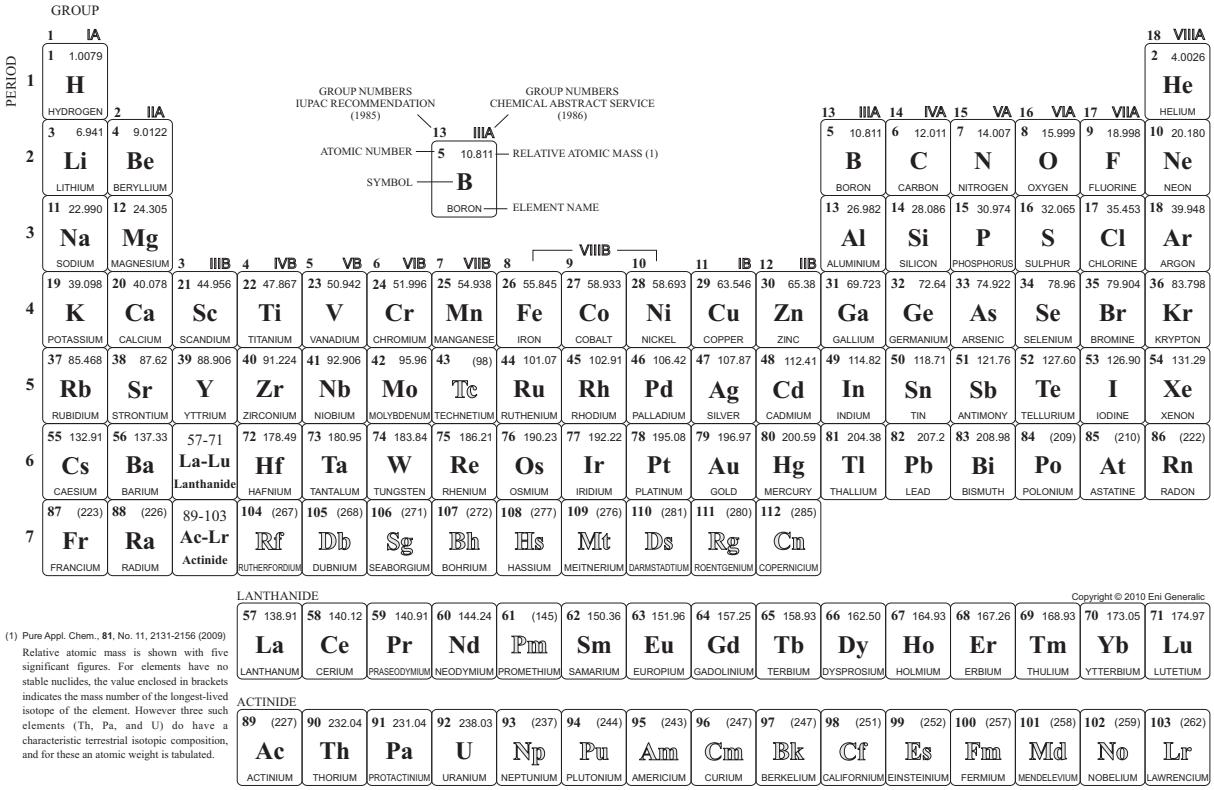
9. Sodium (0.15%)
10. Magnesium (0.05%)
11. Copper, Zinc, Selenium, Molybdenum, Fluorine, Chlorine, Iodine, Manganese, Cobalt, Iron (0.70%)
12. Lithium, Strontium, Aluminum, Silicon, Lead, Vanadium, Arsenic, Bromine (trace amounts)

Reference: H. A. Harper, V. W. Rodwell, P. A. Mayes, Review of Physiological Chemistry, 16th ed., Lange Medical Publications, Los Altos, California 1977.

- **Identify these elements on Periodic table**



(1) Pure Appl. Chem., **81**, No. 11, 2131-2156 (2009)
Relative atomic mass is shown with five significant figures. For elements have no stable nuclides, the value enclosed in brackets indicates the mass number of the longest-lived isotope of the element. However three such elements (Th, Pa, and U) do have a characteristic terrestrial isotopic composition, and for these an atomic weight is tabulated.

- **Describe any patterns or relationships of these element on the periodic table**

- **Discuss how these elements enter the human body.**

- **Describe using a flow chart how these elements might flow from the farm to the dinner plate.**

- **Identify the choices you could make regarding your diet if you accepted the importance of soil in food? Discuss what information you need to make these choices.**

- **Evaluate the different roles scientists can play to ensure society receives the necessary balance of elements.**

- **Distinguish between the scientific argument to maintaining healthy soil for food production and the economic argument for large scale farming for domestic use and export.**

Task 4: Water - Quenching our thirst

5.13.1: Identifying data sources

a. Describe a problem and develop an hypothesis or question that can be tested or researched.
b. Propose possible sources of data and/or information relevant to the investigation.
c. Identify what type of information or data need to be collected
d. Justify why particular types of data or information are to be collected.
e. Identify the appropriate units to be used in collecting data.
f. Recommend the use of an appropriate technology or strategy for collecting data or gathering information.
g. Formulate a means of recording the data to be gathered or the information to be collected.

5.13.2: Planning first-hand investigations

a. Identify variables that need to be held constant if reliable firsthand data is to be collected.
b. Specify the dependent and independent variables when planning controlled experiments.
c. Describe a logical procedure for undertaking a simple or controlled experiment to collect valid first-hand data.
d. Establish an appropriate timeline for an investigation.

5.13.3: Choosing equipment or resources

1. Identify advantages and limitations of using particular laboratory and field equipment for a specific task.
2. Select appropriate equipment (including safety equipment) and/or resources to perform the task.
3. Describe ways to reduce the risk to themselves and others when working in the laboratory or field.

- **Submit a proposal to the local water catchment authority for an experiment to measure the volume of water flowing into your school dam or nearby water source. Lay out your experiment including: Aim, Hypothesis, Background Information, Method, Equipment. Include the type of Results, Observations, and Conclusion you might likely expect from undertaking your experiment.**

Aim:

Hypothesis:

Background Information:

Method:

Equipment:

Observations:

Results:

Conclusion:

5.20: Problem-solving

a. Identify the nature of a presented problem.

b. Describe different strategies that could be employed to solve an identified problem.

c. Use identified strategies to develop a range of possible solutions to a particular problem.

d. Evaluate the appropriateness of different strategies for solving an identified problem.

- **If the rain doesn't fall in the dams, evaluate the options to providing a growing population safe and reliable drinking water?**

Task 5: Threatened ecosystems

5.10: Ecosystems

a. Distinguish between biotic and abiotic features of the local environment.

b. Describe the importance of cycles of materials in ecosystems.

c. Describe some impacts of human activities on ecosystems.

The changes in the local environment since European settlement are a reflection of the changes that have occurred throughout Australia. The impacts of these changes have directly affected native vegetation resulting in some ecosystems being regarded as "threatened".

Find a local site with threatened vegetation (See Appendix Four)

- **What does it mean for a vegetation type or species to be "threatened". Do you know what categories of threatened there are?**

- **From your vantage point, can sketch or photograph the threatened vegetation type?**

- **Assess and describe the range of human activities that have taken place at your site and the surrounding area to impact upon the threatened vegetation.**

- **Select the appropriate equipment and measure the abiotic features in and outside of the threatened vegetation area.**

Abiotic Factor *Inside* vegetation	**Name of apparatus used**	**Result**	**Units**
Site name			
Date			
Time			
Aspect			
Air Temperature			
Relative Humidity			
Light intensity			
% canopy cover			
Dominant plant species			

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Air Temperature			
Relative Humidity			
Light intensity			
% canopy cover			
Dominant plant species			

- **Describe what biotic features are assessable around the threatened vegetation**

- **Describe the direct and indirect impacts humans have had upon the threatened vegetation and efforts to remedy those actions.**

Task 6: Sustainability & Sustainable Agriculture

5.4: The implications of science for society and the environment

a. Discuss viewpoints about some issues with a major scientific component.

b. Give examples to show that different cultures or groups within a society (including Aboriginal and other Indigenous people) may use or weight criteria differently to make a decision about an issue involving a major scientific component.

c. Identify choices that need to be or have been made when considering whether to use particular scientific advances.

d. Discuss the place of social and ethical considerations in scientific practice and in applications of science.

5.5: Current issues, research and developments in science

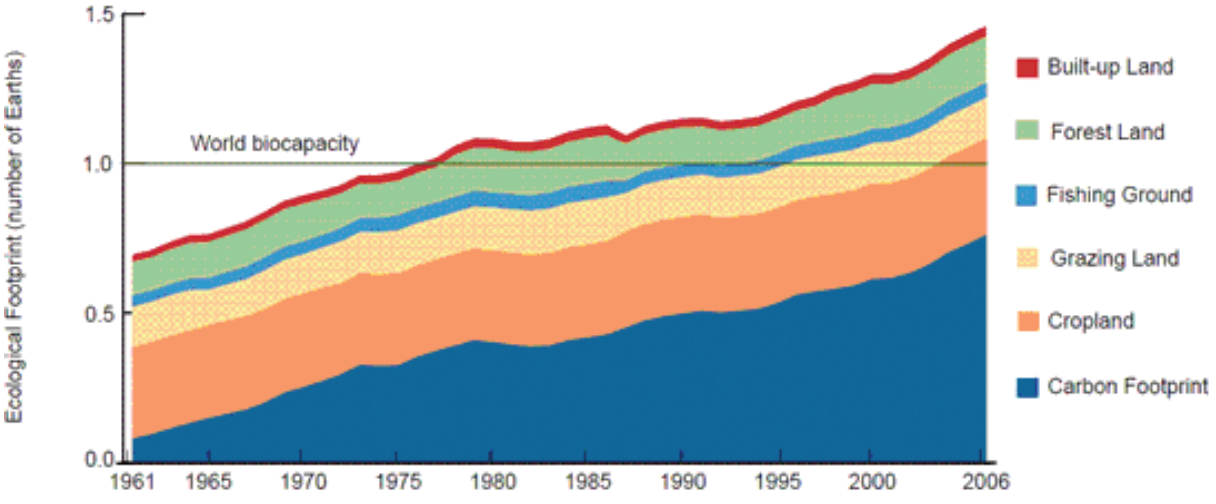
a. Describe some recent scientific contributions made by male and female scientists, including Australians, and discuss the effect of their contributions.

b. Evaluate the potential impact of some issues raised in the mass media that require some scientific understanding.

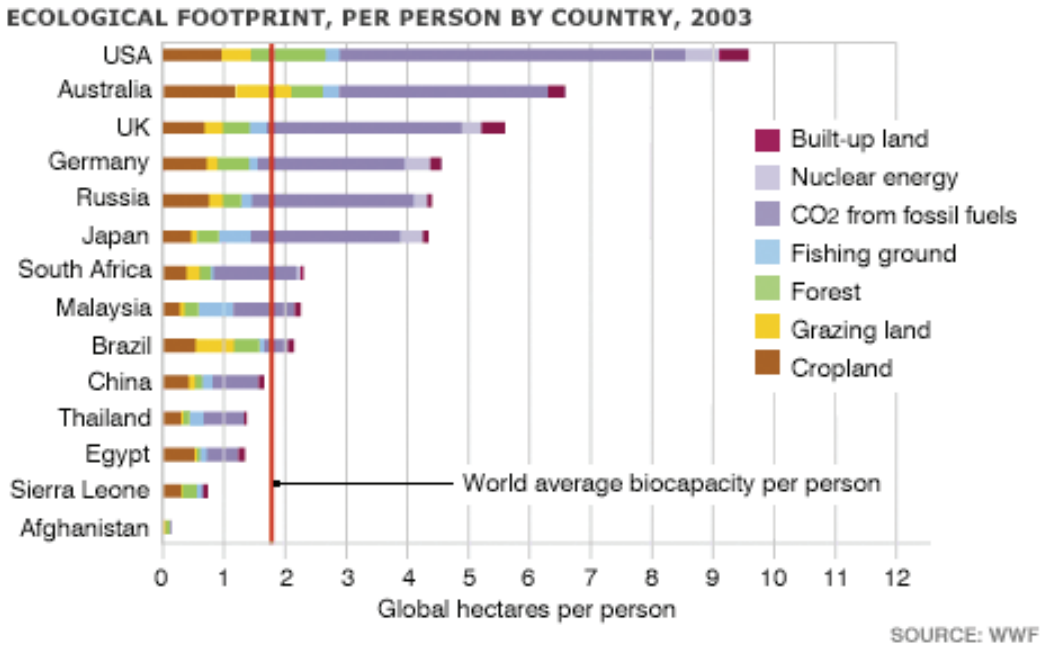
c. Identify scientific skills that can be useful in a broad range of careers.

d. Identify possible career paths in science.

If we continue along the "business as usual" path, by the early 2030s it is estimated we will need two planets to support humanity's demand for goods and services. The "Ecological Footprint" is a measure of the extent to which humanity is using nature's resources faster than they can regenerate. It illustrates who uses how much of which ecological resources and it shows to what extent humans dominate the biosphere at the expense of wild species.



Global Footprint Network http://www.footprintnetwork.org/



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- **Identify Australian's ecological footprint and compare with the average ecological footprint of the Asia-Pacific region.**

- **Define 'sustainability' and identify how scientists can assist society live more 'sustainably'.**

- **Discuss what Australians can do to improve their ecological footprint?**

- **Evaluate how society can balance the needs of the environment with the needs to feed a growing human population?**

NSW Stage 5 Geography Investigation: Land and Water Management

Fieldwork Study

Working in groups you will collect primary information at a selected site in your local area using a range of geographical inquiry methods. You will collect data on the **landuse patterns, micro climates, vegetation patterns** and **elevation profiles**.

Using a range of secondary information sources in combination with your primary data you will create a report which investigates any changes that have occurred and how those changes are a reflection of what has happened in the broader environment. Also in your report you will investigate the effects upon any local threatened habitats or species.

Your report will recommend appropriate management strategies for the long-term sustainability of the selected site.

Methodology:
Optional introductory exercises (to be completed prior to the fieldwork)

Task 1: Location of field work site

Resource: google maps or nearmaps

- **Identify a site or sites within the broader region for use as reference locations**

- **Describe the relative location with regards to distance and direction to:**
  - the largest nearest town centre
  - the nearest key land mark
  - Your school

- **What is the bearing of your site from your school?**

- **Describe the absolute location of your site (latitude and longitude)**

Task 2: Land use summary

Using google maps or nearmap, attach a satellite image of your site.

- **Describe the landuses apparent and their approximate proportions from the image. Land use may include residential, agriculture, commercial, industrial, utility (e.g. water reservoir), transport.**

Task 3: Your site and surrounding local area

Using google maps or nearmap, increase the magnification of your image.

- **Describe the landuses apparent at your site.**
  Calculate the approximate area of cleared land and that with tree cover.
  Describe the landuses in areas adjacent to the site
  Calculate the area of the site in km² and hectares.

- **What is your site like today?**
  Refer to nearmap and enter into the search bar *your site location*.

  - What date was this image taken?

  - Your task is to construct a land use map, identifying landuse both in and around the site as shown on the most recent *nearmap* image, using an appropriate key.
    Remember to use BOLTSS when completing the map.
    B- Border
    O- Orientation (or north arrow)
    L- Legend (or key)
    T- Title
    S- Scale
    S- Source of information

Title: _____

Your School Landcare Site

Task 1: Surrounding your school

Think about the surrounding area around your school, list the types of things you can find around your school.

- Residential (R)
- Industrial (manufacturing, warehouses) (I)
- Transport (T)
- Retail (Re)
- Commercial (C)
- Farmland (F)
- Parkland (P)
- Other

Suburb name	Landuse type

- **Describe the landuse as you approach the site. Estimate the age of the houses in the area.**

Task 2: Arrival at the site

When you arrive at the site, select a high point and look around in each direction.

Briefly describe what the land is being used for and its topography (the shape i.e. flat, hilly, rolling hills) and what type of vegetation is covering the area (grasses, tall trees, none).

North:

South:

East:

West:

Task 3: Vegetation, landuse and topography transect

- **Using a tape measure, create a 200 metre transect. At 20 metre intervals along the transect complete information in the following table**

  When describing the vegetation use the vegetation within a 3 metre radius of the post.

TRANSECT POINT											
Post Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
	0	**20m**	**40m**	**60m**	**80m**	**100m**	**120m**	**140m**	**160m**	**180m**	**200m**
Incline or decline to next point											
Evidence of logging or tree felling **(y or n)**											
Maximum vegetation height											
Canopy height											
% canopy cover **(if present)**											
No. of vegetation species											
No. of storeys of vegetation											

Use this data to construct a vegetation and slope cross-section when you return back to school.

Task 4: Measurement of abiotic factors (non-living elements of the environment)

This task requires you to measure a number of abiotic environmental factors.
Refer to teacher or equipment instructions, to determine how to use each piece of apparatus.

Site name:			
Date:			
Time:			
Abiotic Factor	**Name of apparatus used**	**Result**	**Units**
Aspect			
Air Temperature			
Relative Humidity			
Relative Wind speed	Beaufort Wind Scale		
Wind direction			
Light intensity			

On return to school, refer to Bureau of Meteorology (http://www.bom.gov.au) to source the climate data for the area near your site.

- **What is the average temperature range for the site for the month of your visit?**

Month: _____

Temperature range: _____° C

- **What is the average monthly rainfall for the site in the month of your visit?**

Average Monthly Rainfall: _____mm

Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects	
			On the Water	On Land
0	< 1	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1 - 3	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4 - 6	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	7 - 10	Gentle Breeze	Large wavelets, crest begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	11 - 16	Moderate Breeze	Small waves 1-4 ft becoming longer, numerous whitecaps	Dust, leaves and loose paper lifted, small tree branches move
5	17 - 21	Fresh Breeze	Moderate waves 4-8 ft taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	22 - 27	Strong Breeze	Large waves 8-13 ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	28 - 33	Near Gale	Sea heaps up, waves 13-20 ft, white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	34 - 40	Gale	Moderately high (13-20 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Whole trees in motion, resistance felt walking against wind
9	41 - 47	Strong Gale	High waves (20 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	48 - 55	Storm	Very high waves (20-30 ft) with overhanging crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, “considerable structural damage”
11	56 - 63	Violent Storm	Exceptionally high (30-45 ft) waves, foam patches cover sea, visibility more reduced	
12	64 +	Hurricane	Air filled with foam waves over 45 ft, sea completely white with driving spray, visibility greatly reduced	

1 knot = 1.852 kilometre per hour

Task 5: What type of vegetation is it?

- **Describe where the vegetation is, what plant species are dominant.**

- **What human activities since 1790 to today have been influential in causing this loss of native vegetation in the region?**

- **Describe what is being done to protect the remaining native vegetation.**

- **Is this type of vegetation considered important? Why?**

- **Describe the human actions that have caused the decrease in the amount of native vegetation and the current threats to the remaining stands of vegetation.**

Task 6: What has happened to the local vegetation of the area?

Change in the local area

- **List the different types of land use you see extending away from the site. Give specific examples.**

- **Field Sketch**

  Construct a field sketch in pencil from this site.A field sketch shows the most important features of a scene. It needs to be clearly labeled with the important features, notes to help explain what you have sketched, a title, aspect, time and date.

Post-site visit

The site selected is likely to have been impacted by past practises. Much remaining native vegetation has been under pressure from many sides since the arrival of Europeans.

The local Aboriginal people managed the lands of this area for thousands of years prior to the arrival of the Europeans, only slightly modifying the environment; they lived in balance with their environment, taking from it only what they needed. Their relationship was one of stewardship and they lived in an ecologically sustainable way.

Since the arrival of the Europeans to this area, native vegetation in Australia has been cleared for farming and to provide timber for houses, fences and heating. It was then often further cleared to make way for housing and industry. Their approach to the area was one of exploitation and utilitarianism.

- **On an outline map below indicate the current pressures that are being placed on your site.**

These pressures may include run-off from surrounding areas, weed invasion, non-native animals, erosion, air pollution and farm management practices. You may be able to decide on more.

- **Describe how your site has been managed throughout its lifetime since before the arrival of the Europeans to the present day. Include discussion on what land and water management practices are currently being used. Choose two management practices and evaluate their effectiveness in terms of ecological sustainability.**

8. Appendix Two – Risk Assessment

Greening Australia

Project Risk Assessment Form

Site:	Date risk assessment completed:

Task/s:

Bush Regeneration –

- Cut and Paint- Chemical Use and sharp tools eg: secateurs and loppers
- Drill and Fill- Chemical use and use of Hand held drill
- Scrape and Paint- Chemical Use and use of knife

Revegetation –

- Use of Auger
- Hand Planting
- Bagging and staking
- Manual Handling

The risk assessment must be filled in before work begins on a site. This includes selecting the relevant hazards for the site and estimating a Hazpak rating for before and after control measures. Any additional hazards or control measures can be entered into the appropriate blank spaces.

Work Cover Hazpak

For each hazard, think about:

1. How severylt could it hurt someone or how ill it could make someone?
2. How likely is it to be that bad?

	++very likely could happen any time	**+ likely** could happen sometime	**- unlikely** *could* happen, but very rarely	**-- very unlikely** *could* happen, but probably never will
Kill or cause permanant disability or ill health	1	1	2	3
Long term illness or serious injury	1	2	3	4
Medical attention and several days off work	2	3	4	5
First Aid needed	3	4	5	6

RISK/HAZARD TYPE	DESCRIPTION	HAZPACK RATING	CONTROL MEASURES	HAZPACK RATING POST CONTROL	ADDITIONAL COMMENTS
Slips, trips and falls	Access onto and within site. Hazard increases with logs, vegetation, unstable and uneven surfaces, steep slopes and proximity to water. Site has areas with a steep gradient.		• Identify and mark high risk areas • Appropriate footwear • Ensure all staff/volunteers are aware of type and level of hazard to be encountered. • Select work methods appropriate for site conditions. • Ensure that adequate site inductions are undertaken with volunteers/community groups • Identify areas of steep slopes as “no go zones” for volunteers • Ensure appropriate access gates and tracks are used. • First Aid Kit to be carried on site		E.g. the steep area next to the river is out of bounds.
Manual Handling	Repetitive tasks, lifting, bending, carrying, pulling, heavy loads, tool use		• Break up repetitive work with alternative activities • Use correct lifting and carrying techniques • Team lifting for heavy loads • Ensure volunteers are taken through safe work method statements for Manual Handling. • First Aid Kit to be carried on site		Ensure that demonstrations and inductions are done off site in preparation for entering site.

RISK/HAZARD TYPE	DESCRIPTION	HAZPACK RATING	CONTROL MEASURES	HAZPACK RATING POST CONTROL	ADDITIONAL COMMENTS
UV and Heat/ Cold exposure	Exposure to elements- sun, rain, wind, high and low temperatures. Risk of sunburn, heat stress, hyperthermia and hypothermia. Risk of skin cancer		• Select work methods appropriate to conditions. • Rotate staff through shade where possible. • Ensure regular water breaks are taken. • Appropriate PPE. Hat, long-sleeved shirt, sunscreen. • Cease work where these control measure are inadequate for conditions. • First Aid Kit to be carried on site		Ensure that all volunteers are adequately clotherd and are given access to sunscreen.
Venomous/Stinging/ Biting wildlife	Risk of bites from snakes, ticks, spiders, ants, bees and wasps.		• Assess risk prior to start of day (ie use information from previous days/weeks work to assess likely level of activity). • Identify if any allergic reaction known. Staff/ volunteers must describe level of risk and appropriate first aid response to bite. • Avoid areas of known infestation. • Where PPE appropriate to location. Boots, long pants, long sleeved shirts, insect repellent. • Ensure first aid training current. • First Aid Kit to be carried on site		

RISK/HAZARD TYPE	DESCRIPTION	HAZPACK RATING	CONTROL MEASURES	HAZPACK RATING POST CONTROL	ADDITIONAL COMMENTS
Chemical Use	Contact with skin/ eyes as an irritant Runoff into waterways		• Wear appropriate PPE- Gloves, Long sleeve shirt, protective eyewear • Users must be trained in ChemCert or supervised by a ChemCert supervisor. • Use correct applicator bottles at all time • Ensure “Biactive” chemical is used to avoid contamination of waterways. • Use chemicals as per label only • Reduce use of chemical near waterways. Do NOT spray near waterways. • Ensure MSDS is kept on site with chemical. • Spill kit is to be taken on site with all chemicals • Decanting is to be undertaken off site or in designated area away from waterways • Do not use chemical in the event of rain • First Aid Kit to be carried on site		

RISK/HAZARD TYPE	DESCRIPTION	HAZPACK RATING	CONTROL MEASURES	HAZPACK RATING POST CONTROL	ADDITIONAL COMMENTS
Rubbish and syringes	Danger of cuts and abrasion with possible medical complications from rubbish such as rusty metal, broken glass and syringes (needlestick injuries).		• Identify and mark high-risk areas. • Ensure all staff/volunteers are aware of type and level of hazard to be encountered. • Select work methods appropriate for site conditions. • Use appropriate PPE. Gloves, appropriate footwear and long pants. • Carry sharps container in vehicle along with appropriate tools to pick up objects. • First Aid Kit to be carried on site		
Prickly and irritation causing plants	Danger of cuts, abrasions, punctures wounds and eye damage from thorns, spines, sharp leaves and sticks. Skin and eye irritation and hay fever from plant material such as pollen, hairy leaves and sap.		• Identify high-risk plants. • Ensure all staff are aware of type and level of hazard to be encountered. • Select work methods appropriate for site conditions. • Use appropriate PPE. Gloves, appropriate footwear and long pants. • First Aid Kit to be carried on site		

RISK/HAZARD TYPE	DESCRIPTION	HAZPACK RATING	CONTROL MEASURES	HAZPACK RATING POST CONTROL	ADDITIONAL COMMENTS
Exposure to pollutants	Exposure to pollutants, both chemical and biological, mainly through contact with river water.		• Restrict work activities near water, especially where banks are steep • First Aid Kit to be carried on site • Report any sighting of pollutants to site owner.		
Falling braches/trees	Falling branches can occur due to high wind and storms. Risks are highest after heavy rains.		• Avoid working under trees in high wind. • First Aid Kit to be carried on site		
Hand Tool Use	Sharp edges/blades Repetitive Injury/strain		• Do not carry over steep gradients • Follow correct methods of use via SWMS • Ensure all staff/volunteers are taken through SWMS for use of hand tools • Ensure correct storage items are used eg: pouches • Rotate task to avoid repetitive strain		

RISK/HAZARD TYPE	DESCRIPTION	HAZPACK RATING	CONTROL MEASURES	HAZPACK RATING POST CONTROL	ADDITIONAL COMMENTS
Use of Machinery	Increased noise levels from use Pollution in to waterway Injury to operator		• Do not use on steep gradients • Operator must be trained and is appropriate-certified to use machinery • PPE to be worn by operator and others in surrounding area eg: earmuffs • Do not carry over steep gradients • Do not refuel near waterways- refuel at vehicle		
Floods	Creeks can rise quickly following heavy rain events.		• Keep clear of creeks during or following heavy rainfall. • Evacuate site in the event of heavy rainfall		
Fires	Bush fires involve exposure to heat, flames and smoke.		• Be aware of level of fire danger. • Identify easy egress in high fire danger conditions. • Evacuate site in the event of a fire		

EMERGENCY EVACUATION ARRANGEMENTS	**OUTLINE ARRANGEMENTS**
Emergency evacuation procedure	In the case of emergency evacuate site immediately. Return to vehicle and meet on the road out the front of the site. Evacuate site in the event of hearing three short blasts of a car horn
Emergency communication eg Mobile phone, nearest landline (number and location)	Mobile phone of On site Supervisor
EMERGENCY CONTACTS	

Project contact:	**Ph (B)**	**Ph (AH)**
Nearest hospital:		
Ambulance (Ph) **000**	Police (Ph) **000**	Fire (Ph) **000**

SIGNATURES (please sign below to indicate that you have read and understand the site risk assessment)

Name:	Signature:	Date:

Name:	Signature:	Date:

Name:	Signature:	Date:

9. Appendix Three – Safe Work Method Statements

SAFE WORK METHOD STATEMENT	Greening Australia NSW		
Work Description:	Potting Up	**Pages: 3**	**Date:** 8th July 2009 **Last updated:** January 2012

Department/Location of Work:

Richmond Nursery
University of Western Sydney, Hawkesbury Campus

River Recovery Nursery
100-106 Melbourne Street, Oxley Park

Authorised Person/s:	**Supervisor:**
Nursery Hands / Nursery Tradesperson	Qualified Nursery Supervisors
Qualifications/Training: Min. Cert II in Horticulture (Wholesale Nursery) Previous employment in a production nursery desirable Min. Cert III in Horticulture (Wholesale Nursery) Previous employment in a production nursery desirable Other Training if not covered in the above courses Senior First Aid Chemcert	**Qualifications/Training:** Min. Cert IV in Horticulture (Wholesale Nursery), plus At least 2 years hands on experience in a production nursery Other Training if not covered in the above courses Senior First Aid Chemcert

References:

NGIA guidelines and codes of practice, Florabank guidelines, OEH guidelines and policies

Tools/Equipment Required:	**PPE Required:**
Trolley / Hiko tray or Forestry tube Rack plus forestry tubes / the tray of seedlings required / production schedules	Gloves / Dust Mask / Goggles,

Task Steps	Hazard Identified	Risk	Risk Control Required
1. Check with Supervisor and collect seedlings (sown in flat trays) onto work bench			
2. Collect appropriate number of trays/pots out	Injuries caused by broken trays and pots	Cuts and abrasions	Be aware of injuries i.e. cuts and abrasions broken trays can cause
3. Fill wheelbarrow with potting mix from the potting mix bin and return to work area. Always fill only sufficient quantities at a time to avoid unnecessary waste of potting mix.	Manual handling	Strains	• Use correct posture and method for loading potting mix • See Manual Handling Risk Assessment sheet • Push Don't Pull
4. Scoop potting mix onto work bench	Dust	Inhalation	• Make sure potting mix has correct moisture content • Be aware of the weather conditions – do not do if too windy
5. Commence potting –hold the leaf of the seedling and carefully lower the roots into the container while you fill around it, making sure the stem of the seedling emerges from the media at the same level as it was in the seed tray.	Potting mix coming into direct contact with skin Manual handling	• Potting mix on hands and skin may be transferred to mouth or face • Sitting for long periods of time in the one position	• Wear PPEs – gloves • Vary repetitive actions so as not to be sitting or potting for long periods of time; take breaks; do stretches every fifteen minutes

Task Steps	Hazard Identified	Risk	Risk Control Required
6. Tidy up and clean after completing task	Equipment left lying around	1. Trips, falls. 2. Inhaling chemicals from cleaning 3. Manual handling – Use of backpack when spraying Phytoclean	• Put equipment back in its proper place when task is completed • Wear PPEs – Respirator when spraying
7. Working in the Heat	Heat radiation	Depositing plants in Polytunnel. Working under the work station tin roof.	• Wear sunscreen (30+ or greater) plus a broad brimmed hat • Drink plenty of water – small amounts often • Spend little time as possible in polytunnel. Put down seed trays and leave. Lift sides of polytunnel • Turn roof irrigation on if too hot • Seek and alert supervisor if feeling dizzy or unwell

Date of Issue: 8th July 2009
Date of Expiry: 8th July 2013

Authorised by: **Jordan Scott**
Position: **Project Manager**
Signature: **Jordan Scott**

TEAM MEMBERS SIGNATURES		
The following people have seen and understood the attached Safe Work Method Statement		
Name:	Signature:	Date:

SAFE WORK METHOD STATEMENT	Greening Australia NSW	
Work Description: Bush Regeneration Activities	**Pages: 3**	**Date: 22nd June 2009**

Department/Location of Work: On Ground Project Teams
Depot: 100-106 Melbourne Street, Oxley Park

Authorised Person/s:	**Supervisor:**
Manager (RCF 3), Supervisor(RCF 2), Project Officer (RCF 1)	Manager (RCF 3), Supervisor (RCF 2)
Qualifications/Training:	**Qualifications/Training:**
Chemcert level 3, Smart-train, weed identification training , Conservation and Land management certificate 2 and 3, White card (Workcover), tool and equipment training/induction	Chemcert level 4 or Smart train, OH&S for line managers and supervisors, White care (Workcover), Conservation and Land management certificate 2 upwards

References:

Herbicide label (to be carried at all times)

Relevant Off-Label Permits (to be carried at all times)

NSW Pesticide Act

NSW Protection of Environment Operations Act

Safe Use and Storage of Chemical in Agriculture: Code of Practice 1998 (stored in depot)

Labelling of Workplace Substances: Code of Practice 1996 (stored in depot)

Control of Workplace Hazardous Substances : Code of Practice 1996 (stored in depot)

Tools/Equipment Required:	**PPE Required:**
Secateurs / Loppers / Handsaws / Knives / Chemical applicators /Back packs / Shovels / Spades / Rakes / Chisels / Trowels /Handsaw	Hat and sun screen / Long sleeved shirt and long pants / Leather gloves / PVC gloves/ Safety glasses or goggles / Safety boots / Insect repellent if necessary

Task Steps	Hazard Identified	Risk Control Required
1. Load/unload vehicle for daily use	• Back injuries • Loose equipment • Manual handling	• Only load the equipment required for the job • Only lift weights that are safe and comfortable (use two people to lift herbicide containers if needed) • Tie down necessary equipment
2. Hand weeding	• Back injury • Repetitive Strain Injury • Slips, trips and falls • Heat stress • Insect/snake Bites • Eye stick injury • UV exposure	a. Do a risk assessment of the site prior to starting work b. Wear the following PPE: • hat and sun screen • long sleeved shirt and long pants • leather gloves • safety glasses or goggles • safety boots • insect repellent if necessary c. Do not work: • on excessively steep uneven ground • under any dead trees or tree limbs • near bee hives d. Alternate tasks regularly to avoid repetitive strain and back injury e. Be aware of uneven surfaces and trip hazards f. Use other weeding techniques if weeds are too large to hand pull eg. Cut and paint g. Use correct technique when hand weeding eg squat down instead of bending, if unsure ask supervisor for demonstration

Task Steps	Hazard Identified	Risk Control Required
3. Cut/paint using secateurs, loppers or handsaws	• Cuts • Back injury • Repetitive strain injury • Slips, trips, falls • Chemical spills • Skin contact with chemicals • Heat stress • UV exposure	a. Follow safety controls in point 2 a), b), c), d) and e) b. Wear chemical safe gloves c. Use correct tool for particular sized stem eg Secateurs for stems < 15mm radius d. Read SWMS for Chemical Handling, Storage, Transport and Disposal
Trad raking	• Back injury • Repetitive Strain Injury • Slips, trips, falls • Heat stress • Bites • Eye stick injury	a. Follow safety controls in point 2 a), b), c), d) and e) b. Use correct technique when trad raking, if unsure ask supervisor for demonstration
3. Reload/Unload vehicle after daily use	• Back injuries • Loose equipment • Manual handling	a. Only load the equipment required for the job b. Only lift weights that are safe and comfortable (use two people to lift herbicide containers if needed) c. Tie down necessary equipment d. Record chemical use

Date of Issue: 22nd July 2009
Date of Expiry: 22nd July 2013

Authorised by: **Jordan Scott**
Position: **Project Manager**
Signature: **Jordan Scott**

TEAM MEMBERS SIGNATURES		
The following people have seen and understood the attached Safe Work Method Statement		
Name:	Signature:	Date:

SAFE WORK METHOD STATEMENT	Greening Australia NSW	
Work Description: Chemical Management	**Pages: 6**	**Date: 7th July 2009**

Department/Location of Work: On Ground Project Teams
Depot: 100-106 Melbourne Street, Oxley Park

Authorised Person/s:	**Supervisor:**
Manager (RCF 3), Supervisor(RCF 2), Project Officer (RCF 1)	Manager (RCF 3), Supervisor (RCF 2)
Qualifications/Training:	**Qualifications/Training:**
Chemcert level 3, Smart-train, weed identification training	Chemcert level 4 or Smart train, OH&S for line managers and supervisors

References:

MSDS (to be carried at all times)

Herbicide label (to be carried at all times)

Relevant Off-Label Permits (to be carried at all times)

NSW Pesticide Act

Control of Workplace Hazardous Substances : Code of Practice 1996 (stored in depot)

Safe Use and Storage of Chemical in Agriculture: Code of Practice 1998 (stored in depot)

Labelling of Workplace Substances: Code of Practice 1996 (stored in depot)

NSW Protection of Environment Operations Act

Tools/Equipment Required:	**PPE Required:**
Backpack sprayers / Spill kit / Chemical applicators / Hand tools- saws, loppers	Uniform-long sleeve shirts, pants, steel cap boots / Safety glasses /Respirator if required from the MSDS / Gloves-PVC

Task Steps	Hazard Identified	Risk	Risk Control Required
1. Load/ unload chemical onto/off vehicle	a. Chemical contact	5	a. Wear chemical resistant gloves whenever handling closed chemical containers Do not eat or smoke whilst transferring chemical containers Ensure container is correctly labelled Read the MSDS's for chemicals being handled Read the chemical label prior to handling or using a chemical Read the risk assessment for the chemical being handled
	b. Back injuries	4	b. Load the amount of chemical necessary for the job Test the weight of the item prior to lifting Lift weights that are safe and comfortable Each person lifting to asses what is safe to lift Conduct two person lift for heavy items Drop the sides of the ute tray
	c. Spills	5	c. Ensure container lids are secure Tie down each container to secure on vehicle Load spill kit Ensure that a fire extinguisher is in the vehicle

Task Steps	Hazard Identified	Risk	Risk Control Required
2. Chemical Transport	a. Chemical contact	4	a. Ensure appropriate PPE is packed to go to site Read MSDS to determine the level of PPE required Take this MSDS to site Avoid storing chemicals in cabin of vehicle
	b. Explosion/spill	4	b. Separate fuels from chemicals on back of vehicle Ensure all containers are secure and in good condition (not likely to break open) Contain any spills that occur whilst transporting chemicals Report any spills to supervisor
	c. Public Exposure	5	c. Supervise chemicals when stopping in a public place
	d. Accident	4	d. Travel to and from site via the most direct route Adhere to all traffic rules

Task Steps	Hazard Identified	Risk	Risk Control Required
3. Chemical Handling on site	a. Chemical contact	4	a. Wear PPE indicated in MSDS Decant in a well ventilated area Avoid chemical handling in busy public areas such as footpaths and playgrounds
	b. Chemical reactions	5	b. Follow the label when mixing chemicals Ask the supervisor or manager for advice if you are uncertain in any way Contain spills immediately
	c. Explosion	5	c. Decant chemical into correctly labelled container that is not damaged or faulty Identify unknown chemicals before mixing Mix the minimum amount of chemical required for the job Only mix chemicals as specified on the label No smoking or eating when handling fuel or chemical
	d. Spills/Pollution	4	d. Ensure a spill kit is nearby when decanting chemical Inform supervisor of any spills Call for assistance from manager if unable to contain spill

Task Steps	Hazard Identified	Risk	Risk Control Required
5. Chemical Storage	a. Chemical contact	4	a. Read MSDS to determine storage requirements Store in lockable chemical shed Always wear chemical resistant gloves when entering chemical shed Rinse off the outside of each container on site Lock the chemical shed when not in use
	b. Manual handling	4	b. Drop the sides of the ute tray Test the weight of the object to determine if it is safe to lift Use a two person lift if lift is unsafe for one person Store heavier items on the waste height shelf
	c. Spills	5	c. Report any chemical container that is damaged or leaking in storage Store fuel in fuel shed within bund Purchase and store the minimum amount of chemical that will be required for each project Triple rinse empty containers on site Store empty containers on shelving next to chemical shed
	d. Expired chemical	5	d. Label unknown chemicals and store them in a separate area within chemical shed Label out of date chemical and store in designated area within chemical shed Maintain a register of expired and unknown chemicals
	e. Excess chemical	4	e. Left over chemical is to be sprayed over target weeds on site Tag any spray equipment that contains unused chemical solution with the date and name of the solution before storing. This is only to occur in exceptional circumstances
	f. Expired documents	5	f. Inspect chemical register and MSDS collection monthly to determine the currency of the information Update information before it expires

Task Steps	Hazard Identified	Risk	Risk Control Required
5. Chemical Disposal	a. Pollution hazard	4	a. When transporting chemical take spill kit All chemicals and chemical containers must be disposed of in accordance with the MSDS and chemical label Regularly take unknown and expired chemicals to a chemical waste disposal facility Gloves, suit, mask and goggles to be worn when dealing with unknown chemical Regularly dispose of empty containers at Drum Muster facilities

Date of Issue: 7th July 2009
Date of Expiry: 7th July 2013

Authorised by: **Jordan Scott**

Position: **Project Manager**

Signature: **Jordan Scott**

TEAM MEMBERS SIGNATURES		
The following people have seen and understood the attached Safe Work Method Statement		
Name:	Signature:	Date:

SAFE WORK METHOD STATEMENT	Greening Australia NSW	
Work Description: Drilling and Injecting (cordless drill)	**Pages: 3**	**Date: 25th July 2011**

Department/Location of Work: On Ground Project Teams
Depot: 100-106 Melbourne Street, Oxley Park

Authorised Person/s:	**Supervisor:**
Project Officer (RCF 1), Project Supervisor(RCF 2),	Project Supervisor (RCF 2), Project Manager (RCF 3)
Qualifications/Training: Chemcert level 3, Smart-train, weed identification training, Conservation and Land management certificate 2 and 3, White card (Workcover), tool and equipment training/induction	**Qualifications/Training:** Chemcert level 3 or Smart train, OH&S for line managers and supervisors, White care (Workcover), Conservation and Land management certificate 2 upwards. **Responsibility:** Conduct site risk assessment and Pre-work briefing

References:

Herbicide label (to be carried at all times)

Relevant Off-Label Permits (to be carried at all times)

NSW Pesticide Act

NSW Protection of Environment Operations Act

Safe Use and Storage of Chemical in Agriculture: Code of Practice 1998 (stored in depot)

Labelling of Workplace Substances: Code of Practice 1996 (stored in depot)

Control of Workplace Hazardous Substances : Code of Practice 1996 (stored in depot)

Bosch cordless drill operating instructions (stored in depot)

Tools/Equipment Required:	**PPE Required:**
Chemical applicator kit / Drill and drill bits	Hat and sun screen / Long sleeved shirt and long pants / Leather gloves / PVC gloves / Safety glasses or goggles/ Safety boots / Insect repellent if necessary

Task Steps	Hazard Identified	Risk Control Required
1. Load/unload vehicle for daily use	• Back injuries • Loose equipment • Manual handling	a. Only load the equipment required for the job b. Only lift weights that are safe and comfortable (use two people to lift herbicide containers if needed) c. Tie down necessary equipment
2. Filling applicator bottles	• Chemical spills • Skin contact with chemicals	a. Wear chemical safe gloves b. Read SWMS for Chemical Handling, Storage, Transport and Disposal c. Ensure MSDS folder is readily available
3. Operating drill	• Cuts and burns • Back injury • Repetitive strain injury • Slips, trips, falls • Skin contact with chemicals • Heat stress • UV exposure	a. Do a risk assessment of the site prior to starting work b. Wear the following PPE: • hat and sun screen • long sleeved shirt and long pants • leather gloves • safety glasses or goggles • safety boots • insect repellent if necessary c. Remove drill bit when walking extended distances. d. Secure/remove loose items of clothing likely to wrap around drill bit e. Ensure cutting tips are sharp and replace if blunt f. Do not work: • on excessively steep or uneven ground • under any dead trees or tree limbs • near bee hives g. Take breaks to avoid repetitive strain and back injury h. Be aware of uneven surfaces and trip hazards

Task Steps	Hazard Identified	Risk Control Required
5. Injecting herbicide	• Chemical spills • Skin contact with chemicals	a. Store applicator bottles upright with lid in place between uses b. Wear chemical safe gloves c. Read SWMS for Chemical Handling, Storage, Transport and Disposal d. Ensure MSDS folder is readily available
6. Reload/Unload vehicle after daily use	• Back injuries • Loose equipment • Manual handling	a. Only lift weights that are safe and comfortable (use two people to lift herbicide containers if needed) b. Tie down necessary equipment c. Record chemical use

Date of Issue: Enter date issued
Date of Expiry: Each SWMS expires after four years. Enter the date of expiry here.

Authorised by: **Jordan Scott**

Position: **Project Manager**

Signature: **Jordan Scott**

TEAM MEMBERS SIGNATURES		
The following people have seen and understood the attached Safe Work Method Statement		
Name:	Signature:	Date:

SAFE WORK METHOD STATEMENT	Greening Australia NSW		
Work Description: Manual Handling		**Pages: 4**	**Date: 14th July 2010**
Department/Location of Work: Oxley Park, Richmond, Marrickville, On-site			
Authorised Person/s: All Staff	**Supervisor:** Direct Managers, senior staff member on site		
Qualifications/Training: N/A	**Qualifications/Training:** N/A		
References: Manual Handling Training Program for Greening Australia, 2009, rehab Management			
Tools/Equipment Required: N/A	**PPE Required:** N/A		

Task Steps	Hazard Identified	Risk Control Required
Preparation: Assess size, shape, condition & weight of loads	• Slips, trips & falls • Fatigue & stress	• Ensure personnel are trained in manual handling lifting techniques and/or effectively supervised • Provide loads that are light & easy to handle eg compact, rigid & preferably with handles • Provide mechanical aids, straps, trolleys or team lifting for heavy loads • Ensure proper clothing, footwear & PPE that allows tasks to be performed without restriction, eg ▪ Gloves for hot, cold or slippery loads (NB: Gloves may adversely affect grip, strength & dexterity) ▪ Aprons to allow loads to be held close to the body (NB: Aprons may affect mobility & comfort) ▪ Non-slip, enclosed footwear • Reduce risk of injury by restricting: ▪ Lifting weights to less than 4.5kg when seated ▪ Lifting weights to less than 16-20kg when standing ▪ Lifting weights to less than 16kg to workers under 18yo ▪ Avoid pushing, pulling & sliding objects that are difficult to move (without mechanical aid)
Preparation: Assess workflow and work area	• Slips, trips & falls • Fatigue & stress	• Eliminate unnecessary manual handling • Allow for frequent rest periods & job rotation • Organise a smooth work flow • Ensure mechanical aids are available as required • Provide sufficient staff numbers • Train in safe team lifting procedures & use only when other means are not available • Provide even, slip-resistant floors • Provide an uncluttered, well lit workplace

Task Steps	Hazard Identified	Risk Control Required
Lift & carry objects	• Strain the spine & back muscles • Stress on back & limbs • Slips, trips & falls • Fatigue & stress • Lacerations & abrasions • Fractures & crush injuries	• Use mechanical aids where available • Hold loads close to the body • Vary work tasks during day or take regular breaks • Provide adequate numbers of trained staff to allow rotation • Ensure new workers are supervised adequately • Perform all movements in a controlled, balanced, comfortable position • Minimise repetitive bending, twisting and overreaching movements • Use correct lifting techniques as per manual handling training, including: ▪ Stand close to the load with feet apart for good balance ▪ Place one foot beside the object & one behind ▪ Bend your knees ▪ Keep your back straight as possible ▪ Ensure a comfortable grip of the object ▪ Lift gradually – straighten your knees & stand ▪ Use your leg muscles ▪ Avoid quick jerky movements ▪ Ensure the object does not obscure your vision or interfere with normal walking ▪ Avoid twisting your body – move your feet to change direction ▪ Support the object to change your grip
Lower & stack objects	• Strain the spine & back muscles • Stress on back & limbs • Fatigue & stress • Slips, trips & falls • Lacerations & abrasions • Fractures & crush injuries	• Ensure your feet & body face the spot the object is to be placed • Bend your • Allow room for your fingers • Ensure the object is secure when put down • Store loads where possible between knee & shoulder height & as close to the location to where they will be used • Provide adequate space to facilitate ease of loading

Task Steps	Hazard Identified	Risk Control Required
Staking out or hitting objects	• Strain the spine & back muscles • Stress on back & limbs • Slips, trips & falls • Fatigue & stress • Lacerations & abrasions • Fractures & crush injuries	
Working in weather extremes - Heat	• Sunburn • Heat stress • Sun Stroke • Reduced concentration, increasing levels of errors. • Rise in heart rate	• Wear sunscreen, hat, a light long sleeve shirt and sunglasses. Shorts not recommended. • Take water and drink plenty – about a cupful every 10 to 15 mins • Start work early in the cool part of the day. Plan to take regular breaks to sit in the shade • Keep an eye on weather forecasts and plan high stress tasks weekly to avoid hot days. • Stop if feeling dizzy • Report to a supervisor immediately if feeling unwell.

Date of Issue: 14th July 2010
Date of Expiry: 14th July 2014

Authorised by: **Jordan Scott**

Position: **Project Manager**

Signature: **Jordan Scott**

TEAM MEMBERS SIGNATURES

The following people have seen and understood the attached Safe Work Method Statement

Name:	Signature:	Date:

SAFE WORK METHOD STATEMENT	Greening Australia NSW		
Work Description: Manual Planting Activity		**Pages: 3**	**Date: 22nd June 2009**
Department/Location of Work:	On Ground Project Teams Depot: 100-106 Melbourne Street, Oxley Park		
Authorised Person/s: Manager (RCF 3), Supervisor(RCF 2), Project Officer (RCF 1)	**Supervisor:** Manager (RCF 3), Supervisor (RCF 2)		
Qualifications/Training: Conservation and Land management certificate, White card (Workcover), tool and equipment training/induction	**Qualifications/Training:** OH&S for line managers and supervisors, White care (Workcover), Conservation and Land management certificate 2 upwards.		
References: Workcover Manual Handling Code of Practice			
Tools/Equipment Required: Mattocks / Trowels / Steel rammers	**PPE Required:** Hat and sun screen / Long sleeved shirt and long pants / Leather gloves / Safety glasses or goggles / Safety boots / Insect repellent if necessary		

Task Steps	Hazard Identified	Risk Control Required
1. Load vehicle for daily use	• Back injuries • Materials falling from truck	a. Only load the equipment and chemical needed for the job b. Only lift weights that are safe and comfortable (use two people to lift if necessary) c. Make sure all items are securely tied down in truck
2. Dig holes	• Back injuries • Repetitive strain injury • Blisters • Foot injuries • Heat stress	a. Use correct technique for digging with mattocks/trowels b. Change jobs regularly c. Wear the following PPE • hat and sunscreen • long sleeved shirt and long pants • leather gloves • safety boots • insect repellent if necessary
3. Lay out materials	• Back injuries • Spiky plants • Cuts from removing plants from trays or pots • Splinters	a. Only lift weights that are safe and comfortable (use two people to lift if necessary) b. Follow safety controls in point 2 c)
4. Plant plants in ground and surround with disc	• Back injuries • Sharp objects in soil • Prickly plants	a. Squat down to plant and do not bend over b. Follow safety controls in point 2 c)

Task Steps	Hazard Identified	Risk Control Required
5. Stake plants using rammers	• Back injuries • Repetitive strain injury • Blisters • Splinters • Foot injuries	a. Squat down to pick up stakes b. Change jobs regularly c. Follow safety controls in point 2 c)
4. Bag plants	• Back injuries • Repetitive strain injury • Splinters	a. Bend at the knees when putting on bags b. Change jobs regularly c. Follow safety controls in point 2 c)
4. Reload/unload vehicle	• Back injuries • Materials falling from truck	a. Only load the equipment and chemical needed for the job b. Only lift weights that are safe and comfortable (use two people to lift if necessary) c. Make sure all items are securely tied down in truck

Date of Issue: 22nd June 2009
Date of Expiry: 22nd June 2013

Authorised by: **Jordan Scott**

Position: **Project Manager**

Signature: **Jordan Scott**

TEAM MEMBERS SIGNATURES

The following people have seen and understood the attached Safe Work Method Statement

Name:	Signature:	Date:

SAFE WORK METHOD STATEMENT	Greening Australia NSW		
Work Description: Seed Collection		**Pages: 4**	**Date: 29th June 2009**
Department/Location of Work:	On Ground Project Teams Depot: 100-106 Melbourne Street, Oxley Park		
Authorised Person/s: Project officers	**Supervisor:** On Site Supervisor, GA Seed Manager		
Qualifications/Training: GA seed induction, GA Internal seed training, plant identification skills	**Qualifications/Training:** GA seed induction, GA Internal seed training		
References: Florabank Guidelines, Scientific licence-conditions of consent, project Collection folder, Plant identification reference, site access consent			
Tools/Equipment Required: Wool bales / Wheat bags / Paper bags / Secateurs / Pole pruners / Loppers / Cargo covers / Ropes, Labels / Pens / Project Folders / Tarpaulins / Garbage bins / Small buckets / Picking bags / ID books / GPS / Binoculars / Water	**PPE Required:** Hats / Long sleeve shirts / Long sleeve pants / Boots / Hi Visibility Gear / Hard Hats / Gauntlets / Particle mask / Insect repellent / Water / Sun Screen / Phone / Eye Wear, Gloves		

Task Steps	Hazard Identified	Risk Control Required
1. Load vehicle for daily use	• Back injuries • Loose equipment	a. Only load the equipment needed for the job b. Only lift weights that are safe c. Tie down necessary equipment
2. Driving to site, 4WD driving	• Injury caused by contact with moving vehicle or vehicle accident • Conditions-wet, slippery, rocky	a. Adhere to all speed limits b. Wear high visibility clothing c. Do not leave designated site roads d. Slow down around pedestrian traffic e. Do not enter areas with moving plant or traffic f. Only licensed and experienced staff to drive vehicles
3. Off road 4WD (and grass harvester operation)	• Injury caused by hitting obscured object, rolling vehicle occasioning injury or death • Conditions-wet, slippery, rocky	a. Drive in the range suited to terrain. b. Ensure hubs are locked prior to driving off road c. Avoid driving across steep banks. If steep slopes must be negotiated drive directly up or down to avoid rolling vehicle. d. Ensure grass harvester machinery is maintained and is safe to operate. e. Watch out for pedestrians

Task Steps	Hazard Identified	Risk Control Required
4. Walking to seed collection areas	• Dust, allergies • Slips, trips and falls • Heat stress, exposure to sun • Exposure to cold • Insect/snake Bites • Eye stick injury	a. Do a risk assessment of the site prior to starting work b. Wear the following PPE: • hat and sun screen • long sleeved shirt and long pants • leather gloves • safety glasses or goggles • safety boots • insect repellent if necessary c. Do not walk: • on excessively steep uneven ground • under any dead trees or tree limbs • near bee hives d. Alternate tasks - regularly to avoid repetitive strain and back injury e. Be aware of uneven surfaces and trip hazards f. Drink plenty of water g. Have qualified first aid officer present and carry first aid kit on site at all times h. Inform manager of allergies, carry appropriate medication i. Watch out for other staff members
5. Seed collection – hand picking, cutting using secateurs, cutting using loppers, cutting using pruning pole, pruning saw, collection of cuttings	• Cuts • Back injury • Repetitive strain injury • Slips, trips, falls • Manual handling • Falling branches • Heat stress • UV exposure • Insect bites • Snake bites	a. Follow safety controls in point 2 b. Use correct tool for particular sized stem eg Secateurs for stems < 15mm radius c. Ensure area is clear when cutting branches and give warning of when cut branches are about to fall. Move out of way of cut falling branches d. Check for signs of fauna and avoid contact e. Wear insect repellent if necessary f. Carry snake bite first aid equipment

Task Steps	Hazard Identified	Risk Control Required
7. Carrying seed back to vehicle	• Back injuries • Repetitive strain injury • Slips, trips and falls • Heat stress • Bites • Eye stick injury	a. Follow safety controls in point 2 b. Only lift weights that are safe, share loads if necessary
3. Reload/unload vehicle after daily use	• Back injuries • Loose equipment	a. Only load the equipment need for the job b. Only lift weights that are safe and c. Tie down necessary equipment

Date of Issue: 29th June 2009
Date of Expiry: 29th June 2013

Authorised by: **Jordan Scott**
Position: **Project Manager**
Signature: **Jordan Scott**

TEAM MEMBERS SIGNATURES

The following people have seen and understood the attached Safe Work Method Statement

Name:	Signature:	Date:

10. Appendix Four - Further Information

About Landcare

- Landcare Australia New Group Starter Kit
  http://svc009.wic050p.server-web.com/wp-content/uploads/2010/06/NEW_GROUP_STARTER_KIT_LANDCARE.pdf
- Junior Landcare
  http://www.juniorlandcare.com.au/what-is-landcare-junior/get-involved
- Adventure Conservation Activities
  http://www.willowwarriors.org.au/adventure-conservation/

Grants and Funding

- Coles Junior Landcare Grants
  http://www.juniorlandcare.com.au/grants-2
- NSW Department of Sport and Recreation
  http://www.dsr.nsw.gov.au/grants/
- Australian Government Community Action Grants
  http://www.nrm.gov.au/cag/index.html
- National Australia Bank “Schools First”
  http://www.schoolsfirst.edu.au/index.php
- Office of Environment & Heritage Eco Schools Funding
  http://www.environment.nsw.gov.au/grants/schools.htm

What is an ecological community?

An ecological community is a group of species that occur together in a particular area of the landscape. Whilst most ecological communities are recognised by the plant species that occur within them, the community includes all the organisms that occur in that particular area (Source http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/tec_ec_overview.aspx)

Threatened ecological communities in NSW

The widespread clearing of native vegetation since European settlement has resulted in numerous species and ecological communities being identified as of risk of extinction or "threatened".

In NSW, ecological communities can be listed as "threatened" under the Threatened Species Conservation Act 1995, in the categories of Critically Endangered, Endangered or Vulnerable, depending on their likely risk of extinction. Ecological communities can also be listed as threatened under the Australian Government's Environment Protection and Biodiversity Conservation Act, 1999 under the same categories.

There are currently 102 threatened communities in NSW (as of January 2012). The following table provides a list of threatened ecological communities in NSW. To narrow done a EEC near your school use the 'Find a threatened species by geographic location' mapping tool at the following link http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/browse_geo.aspx or speak to your local NPWS office, an environmental office at your local Council or your local Catchment Management Authority.

Name	Level of threat
Acacia loderi Shrublands	Endangered Ecological Community
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	Endangered Ecological Community
Agnes Banks Woodland in the Sydney Basin Bioregion	Endangered Ecological Community
Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression bioregions	Endangered Ecological Community
Araluen Scarp Grassy Forest in the South East Corner Bioregion	Endangered Ecological Community
Artesian Springs Ecological Community	Endangered Ecological Community
Bangalay Sand forest of the Sydney Basin and South East Corner Bioregions	Endangered Ecological Community

Name	Level of threat
Ben Halls Gap National Park Sphagnum Moss Cool Temperate Rainforest	Endangered Ecological Community
Blue Gum High Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion	Endangered Ecological Community
Blue Mountains Swamps in the Sydney Basin Bioregion	Vulnerable Ecological Community
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	Endangered Ecological Community
Brigalow-Gidgee woodland/shrubland in the Mulga Lands and Darling Riverine Plains Bioregions	Endangered Ecological Community
Brogo Wet Vine Forest in the South East Corner Bioregion	Endangered Ecological Community
Byron Bay Dwarf Graminoid Clay Heath Community	Endangered Ecological Community
Cadellia pentastylis (Ooline) community in the Nandewar and Brigalow Belt South bioregion	Endangered Ecological Community
Carbeen Open Forest community in the Darling Riverine Plains and Brigalow Belt South Bioregions	Endangered Ecological Community
Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	Endangered Ecological Community
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion	Vulnerable Ecological Community
Castlereagh Swamp Woodland Community	Endangered Ecological Community
Central Hunter Grey Box - Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions	Endangered Ecological Community
Central Hunter Ironbark - Spotted Gum - Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions	Endangered Ecological Community
Coastal Cypress Pine Forest in the New South Wales North Coast Bioregion	Endangered Ecological Community
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion	Endangered Ecological Community
Coolibah-Black Box woodland of the northern riverine plains in the Darling Riverine Plains and Brigalow Belt South bioregions	Endangered Ecological Community

Name	Level of threat
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community
Dry Rainforest of the South East Forests in the South East Corner Bioregion	Endangered Ecological Community
Duffys Forest Ecological Community in the Sydney Basin Bioregion	Endangered Ecological Community
Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion	Endangered Ecological Community
Elderslie Banksia Scrub Forest	Endangered Ecological Community
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	Endangered Ecological Community
Genowlan Point Allocasuarina nana Heathland	Endangered Ecological Community
Grey Box - Grey Gum Wet Sclerophyll Forest in the NSW North Coast Bioregion	Endangered Ecological Community
Halosarcia lylei low open-shrubland in the Murray Darling Depression Bioregion	Endangered Ecological Community
Howell Shrublands in the New England Tableland and Nandewar Bioregions	Endangered Ecological Community
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	Endangered Ecological Community
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	Endangered Ecological Community
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion	Vulnerable Ecological Community
Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions	Endangered Ecological Community
Hunter Valley Weeping Myall Woodland of the Sydney Basin Bioregion	Endangered Ecological Community
Hygrocybeae Community of Lane Cove Bushland Park	Endangered Ecological Community
Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	Endangered Ecological Community

Name	Level of threat
Illawarra Subtropical Rainforest in the Sydney Basin Bioregion	Endangered Ecological Community
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Endangered Ecological Community
Kincumber Scribbly Gum Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community
Kurnell Dune Forest in the Sutherland Shire and City of Rockdale	Endangered Ecological Community
Kurri Sand Swamp Woodland in the Sydney Basin Bioregion	Endangered Ecological Community
Lagunaria Swamp Forest on Lord Howe Island	Critically Endangered Ecological Community
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community
Low woodland with heathland on indurated sand at Norah Head	Endangered Ecological Community
Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion	Endangered Ecological Community
Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast bioregions	Vulnerable Ecological Community
Lowland Grassy Woodland in the South East Corner Bioregion	Endangered Ecological Community
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	Endangered Ecological Community
Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion	Endangered Ecological Community
Mallee and Mallee-Broombush dominated Woodland and Shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion	Critically Endangered Ecological Community
Maroota Sands Swamp Forest	Endangered Ecological Community
Marsh Club-rush sedgeland in the Darling Riverine Plains Bioregion	Critically Endangered Ecological Community
McKies Stringybark/Blackbutt Open Forest in the Nandewar and New England Tableland Bioregions	Endangered Ecological Community
Melaleuca armillaris Tall Shrubland in the Sydney Basin Bioregion	Endangered Ecological Community
Milton Ulladulla Subtropical Rainforest in the Sydney Basin Bioregion	Endangered Ecological Community
Moist Shale Woodland in the Sydney Basin Bioregion	Endangered Ecological Community

Name	Level of threat
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions	Endangered Ecological Community
Mount Gibraltar Forest in the Sydney Basin Bioregion	Endangered Ecological Community
Mt Canobolas Xanthoparmelia Lichen Community	Endangered Ecological Community
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Endangered Ecological Community
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	Endangered Ecological Community
Natural Temperate Grassland of the Southern Tablelands (NSW and ACT)	Not listed
New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	Endangered Ecological Community
Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion	Endangered Ecological Community
O'Hares Creek Shale Forest	Endangered Ecological Community
Pittwater Spotted Gum Forest	Endangered Ecological Community
Porcupine Grass - Red Mallee - Gum Coolabah hummock grassland / low sparse woodland in the Broken Hill Complex Bioregion	Critically Endangered Ecological Community
Quorrobolong Scribbly Gum Woodland in the Sydney Basin Bioregion	Endangered Ecological Community
Ribbon Gum - Mountain Gum - Snow Gum Grassy Forest/ Woodland of the New England Tableland Bioregion	Endangered Ecological Community
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community
Robertson Basalt Tall Open-forest in the Sydney Basin Bioregion	Endangered Ecological Community
Robertson Rainforest in the Sydney Basin Bioregion	Endangered Ecological Community
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	Endangered Ecological Community
Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions	Endangered Ecological Community
Shale Gravel Transition Forest in the Sydney Basin Bioregion	Endangered Ecological Community

Name	Level of threat
Shale/Sandstone Transition Forest	Endangered Ecological Community
Southern Highlands Shale Woodlands in the Sydney Basin Bioregion	Endangered Ecological Community
Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion	Endangered Ecological Community
Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion	Endangered Ecological Community
Sun Valley Cabbage Gum Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	Endangered Ecological Community
Sydney Turpentine-Ironbark Forest	Endangered Ecological Community
Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	Endangered Ecological Community
Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions	Endangered Ecological Community
The Shorebird Community occurring on the relict tidal delta sands at Taren Point	Endangered Ecological Community
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	Endangered Ecological Community
Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion	Endangered Ecological Community
Upland Wetlands of the Drainage Divide of the New England Tableland Bioregion	Endangered Ecological Community
Warkworth Sands Woodland of the Sydney Basin Bioregion	Endangered Ecological Community
Western Sydney Dry Rainforest in the Sydney Basin Bioregion	Endangered Ecological Community
White Box Yellow Box Blakely's Red Gum Woodland	Endangered Ecological Community
White Gum Moist Forest in the NSW North Coast bioregion	Endangered Ecological Community

Further information on threatened species and communities

- Department of Environment and Climate Change
  www.threatenedspecies.environment.nsw.gov.au
- Threatened ecological communities under federal threatened species legislation
  http://www.environment.gov.au/biodiversity/threatened/communities.html
- Royal Botanic Gardens Sydney
  http://www.rbgsyd.nsw.gov.au/science/Evolutionary_Ecology_Research/Ecology_of_Cumberland_Plain_Woodland
- NSW National Parks & Wildlife Service's Wildlife Atlas
  (search to see what plants and animals have been observed in your area):
  http://www.wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp
- Threatened species publications (Australia Government):
  www.environment.gov.au/biodiversity/threatened/publications/index.html - factsheet-06
- Green kids guide to threatened species (9 ways you can help)
  www.environment.gov.au/biodiversity/threatened/publications/kids.html
- Green consumer guide to threatened species (45 ways you can help)
  http://www.environment.gov.au/biodiversity/threatened/publications/greencon.html

Other useful resources

- Australian Museum (Information about Australian plants and animals)
  http://www.amonline.net.au/explore
- Sustainable Schools Website
  http://www.sustainableschools.nsw.edu.au/
- Florabank Seed Collection Guidelines
  http://www.florabank.org.au/
- Gould Group Australia (2006) **The Nest Box Book** Wilkinson Publishing.

For further information please contact Greening Australia
on 02 9560 9144 or nsw@greeningaustralia.org.au
or your local Regional Landcare Facilitator http://www.landcarensw.org.au/rlf