ALEP

Aboriginal Landcare Education Program

2

Carry Out Natural Area Restoration Works

Learning Guide

Greening Australia

CONTENTS

Front cover photo shows seedlings emerging on a direct seeding site.

Student name:.....

Student number:.....

INTRODUCTION

Welcome to *Carry Out Natural Area Restoration Works.* This learning guide will help you put native plants back into an area using revegetation. You might need to be able restore natural areas when doing land management work for your council, when doing ranger work or when managing your own country. Training should be completed on the job, in the field, over an extended period of time.

This ALEP learning guide refers to other ALEP learning guides and the information in them. It is expected that you will work through this learning guide over a long period of time while working on a revegetation project. During that time you are likely to work through other learning guides that cover skills needed for the project.

EQUIPMENT REQUIRED

To complete this training you will need the following:

1. Appropriate Personal Protective Equipment (PPE).
2. Safety gear including first aid kit and water.
3. Tools and equipment for treating weeds.
4. Tools and equipment for preparing soil.
5. Tools, equipment and supplies for doing revegetation.

ASSIGNMENTS

There are three assignments you will need to complete.

Some of these assignments may go towards your final assessment.

NOTE

This learning guide focuses on a revegetation project, but the steps covered will be relevant to other projects such as landscaping and making gardens, including bush tucker and vegetable gardens.

Section	Assignment	Competent (C) Not yet competent (NYC)	Date Achieved
Getting Prepared	Assignment 1. Project Risk Assessment		
Treating Weeds	Assignment 2. Plan Revegetation		
Preparing Soil			
Revegetation	Assignment 3. Carry Out Revegetation		
Finishing up			

1 GETTING PREPARED

1A. COLLECTING INFORMATION

Information about restoring natural areas, including revegetation, can be obtained from many sources. There are many books available (see References on page 20). Greening Australia's *The Bush Book* is an excellent resource.

There is also information online.

1. Greening Australia has lots of resources about revegetation and also runs native plant nurseries that may be able to supply plants for your project.

   www.greeningaustralia.org.au

2. For information on Northern Territory plants go to the Department of Natural Resources, Environment, the Arts and Sport.

   www.nretas.nt.gov.au/plants-and-animals

3. For information on Northern Territory weeds, including the *Northern Territory Weed Management Handbook*, go to the Department of Natural Resources, Environment, The Arts and Sport.

   www.nretas.nt.gov.au/natural-resource-management/weeds

1B. WORKING SAFELY

There are some dangers associated with carrying out revegetation work. It is important that you be aware of the dangers so you can avoid getting injured or sick (if you are using other learning guides, read the safety sections carefully and carry out the risk assessment before you start).

A safe workplace improves job satisfaction and means everyone works better. Safety is everyone's responsibility and the law says we must all take safety seriously. Many people are hurt at work every year and this is very traumatic for workers and their families.

Know and understand your organisation's health and safety procedures.

Personal protective equipment

- Wear appropriate clothes for outdoors (at least long trousers, shirt and hat) and any other Personal Protective Equipment (PPE) needed.
- Wear protective footwear at all times – good steel capped work boots are the best, sometimes you will need rubber boots.
- Wear gloves to protect your hands from injury and to avoid soil borne diseases like meliodosis.
- Wear dust masks or respirators if there is dust, soil or chemicals in the air.

Working in the field

- Never work alone – always work with other people.
- Tell someone about where you are going and check the fire, road and weather reports.
- Make sure your vehicle is properly maintained and always carry maps.
- Always carry a mobile phone, in remote locations use a satellite phone or vehicle UHF radio – check they work before you leave.
- Always carry plenty of water.

Tidy work site

- Keep your work site clean and tidy, make sure there is nothing to trip over or slip on, and store everything safely.
- Clean up long grass and old rubbish that can house snakes, spiders and other insects.

Tools and equipment

- Learn how to maintain and use hand tools correctly to avoid injury.
- Wear ear protection like ear muffs if noisy machinery is being used.
- Be very careful around electricity and make sure there are no loose cords around.
- Make sure there is a fire extinguisher handy, including have one in the vehicle.
- Only properly trained people should used motorised machinery and power tools (see the learning guide for *Maintain Properties and Structures* for more safety tips).

Chemicals

- Only properly trained people should use chemicals (see the learning guide for *Treat Weeds* for more safety tips on using herbicides).
- Follow correct procedures for storing fuel and chemicals – some things should not be stored together.

Safe lifting

- Always lift heavy objects correctly to avoid injuring your back (see Resource on page 18).

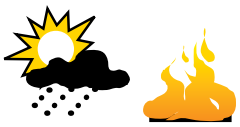
First aid

- Know where your first aid kit is stored and make sure someone has a first aid certificate.

Before you begin, use this checklist to confirm you have followed good safety procedures.

SAFETY CHECKLIST ACTIVITY ✓

Long trousers, shirt and boots		
Waterproof clothing		
Hat (hard hat if necessary) and gloves		
Sunscreen, insect repellant and sunglasses		
Dust mask		
Respirator		
Safety vest		
PVC gloves for using chemicals		
Safety glasses		

Ear muffs		
Water		
First aid kit		
Fire extinguisher		
Traffic safety cones		
Notified others and have phone/2 way radio		
Checked weather, road and fire reports		
Permits (if required) and maps		
Compass or GPS		

1C. TALK ABOUT YOUR PROJECT

You might be interested in restoring a natural area though revegetation because:

- The native birds and animals are disappearing.
- Weeds have taken over.
- Many or all of the plants have been cleared away.
- Wrong burning of country has degraded the area.
- The area is eroded – erosion can be caused by land clearing, vehicles, roadworks, feral animals and too many stock.

Before you start planning your project make sure you have talked to all the right people. You should talk to:

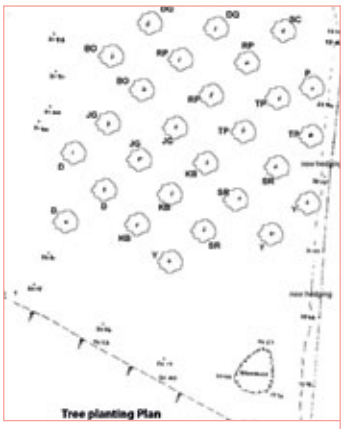
- The traditional owners.
- The legal owners of the land – you might need to get a permit.
- Other people who live near the area or who are interested in it.
- People who are responsible for managing the land (eg. council or ranger group).
- People who can provide expert advice in weed management, soil conservation and revegetation techniques.

ACTIVITY

Start a **PROJECT DIARY** (see Resource 2). You should use the diary to write down anything that happens on the project and anything else you find out. You could make a booklet with project diary pages and space to put photos, maps and other records of your project.

With your group, sit down with the traditional owners of your project area and talk about the project. Write down the key points in your diary. Maybe you could use some of these questions.

Who is responsible for looking after this area?
What do people use this area for – both now and in the past?
What animals live here?
Do you think this area is healthy and why?
Have things changed here over the years? How?
What do people do to look after this area?
What can we do to make areas like this healthier?
We are thinking about bringing some of the native plants back – is this something you would like to see happen?
Is there anything else you would like to see happen here?



1D. PLANNING

Once you have worked out what you want to achieve you need to develop a plan for your revegetation work. Chapter 3 of *The Bush Book* has lots of information about planning. Use your project diary to record all the information you find and decisions made.

- Write down what the goals of the project are.
- Describe the area – what native plants and weeds are on the site – you might need to draw some maps for this (the learning guides for *Recognise Plants* and *Collect, Prepare* and *Preserve Plant Specimens* will be good for getting to know the native plants).
- Decide what site preparation will be needed in relation to weed and soil work (see sections 2 and 3).
- Decide what type of revegetation will be best (see section 4 on revegetation).
- Make up a planting plan – draw a map of the area showing where the plants are to go, make a list of species and numbers needed.
- What is going to happen when – a project timetable.
- Who is going to look after the revegetation once it is planted (this is very important)?
- How are you going to monitor the work – you might decide to take photos in the same place every few months.

1E. ENVIRONMENTAL IMPACTS

Your project should make the environment better. But it is important to think about possible negative impacts as you plan:

- Will your project cause any erosion?
- Will any of your plants escape and become weeds?
- Will the fertiliser run into the creek?
- Will there be lots of noise and dust?
- Will there be vehicles driving all over the place?

DIAL BEFORE YOU DIG

Before digging holes or trenches, call the 'Dial before you Dig' service to make sure you won't dig into underground pipes and cables.

Phone: 1100

Fax: 1300 652 077

DIAL BEFORE YOU DIG www.1100.com.au

ACTIVITY

In your group talk about any negative environmental impacts of your project. Write the answers in your project diary.

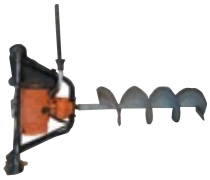
1F. UNDERGROUND SERVICES

Before digging any planting holes or irrigation trenches you will need make sure there are no services underground. Telephone, power and water lines are often located underground. Your local council or ESO (Essential Services Officer) is probably the best place to start (Dial Before You Dig is another resource). It will also be useful at this stage to work out what water supply is available for planning your watering system.

1G. TOOLS AND EQUIPMENT

ACTIVITY

There is a whole range of tools and equipment you might need for revegetation. Many of these will be covered in the various other learning guides. Make a list in your project diary of all the tools and equipment you think you will need. Below are some examples.

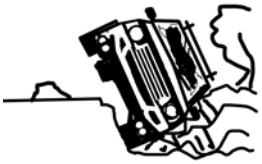
Tape measures	
Paper, pencils, ruler and compass for plan	
Calculator	
Spray pack	
Herbicide	
Buckets	
Auger	
Mattock	

Trowel	
Rakes	
Wheelbarrow	
Shovel and spade	
Hammers	
Pliers	
Irrigation punches	
Steel post driver	

ASSIGNMENT 1 A1

PROJECT RISK ASSESSMENT

- Stop and think before starting work.
- What needs to be done so you can work safely?
- Complete the **What to do about it?** column – we have written one thing in each box – try and think of some others.
- Fill in all of the last row by adding a new hazard.

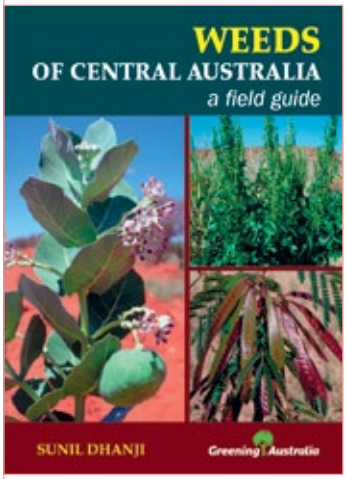
HAZARD **and what can happen = the risk**	**What to do about it?**
SUN EXPOSURE Risk of: Heat exhaustion and sunburn 	• Drink plenty of water • • •
ROAD TRAVEL Risk of: Injury in vehicle accident 	• Pre-departure vehicle check • • •
TRIP HAZARDS Risk of: Injury from falling over 	• Keep tools and materials neat and tidy • • •
BITING INSECTS Risk of: Bites and stings 	• Wear protective clothing • • •
LIFTING THINGS Risk of: Injured back 	• Lift correctly bending knees and not straining back • • •
	• • • •

TREATING WEEDS

2

A weed is a plant growing where it is not wanted. Weeds can threaten the survival of new plants on a revegetation project. Weeds can smother new plants as they compete for light, moisture and nutrients. Weeds can also support fires which may burn or kill seedlings.

You should work through the learning guide for *Treat Weeds* before starting your weed control work. The *Northern Territory Weed Management Handbook* also has lots of useful information and Chapter 5 of *The Bush Book* covers weeds.



2A. WEED IDENTIFICATION

The *Treat Weeds* learning guide has information about identifying weeds. The *Recognise Plants* learning guide will also give you tips on getting to know weed plants. The main weed field guides for the Northern Territory are:

- *Weeds of Central Australia: a field guide* (2009) by Sunil Dhanji and published by Greening Australia.
- *Weeds of the Wet/Dry Tropics of Australia: A field guide* (2002) by Nicholas Smith and published by the Environment Centre NT.

2B. TREATMENT METHODS

You are most likely to use physical or chemical methods to control weeds. These are covered in more detail in *Treat Weeds* and the other references. Make sure you only kill the weeds, not the native plants you are trying to protect.

Physical methods include: hand pulling, grubbing, slashing, cultivation, mowing and mulching. The wet season is a good time for hand pulling and grubbing as weeds are actively growing and the soil is softer, making removal easier. It is important to make sure the roots are removed as some species can regenerate from underground roots.

Chemical methods include: foliar spray, rope wick applicators, basal bark applications, cut stump and soil applications. Use only registered herbicides, follow all directions on the labels and seek advice from local experts or garden centres.

ACTIVITY

Examine your site and determine what weeds are present and what treatment measures will be needed.

Weeds present	Treatment method

3 PREPARING SOIL

3A. EROSION CONTROL

Erosion is caused by the soil being blown or washed away. It can be caused by:

- Land clearing.
- Vehicles.
- Roadworks.
- Feral animals.
- Too many stock.

The best protection against erosion is having a good cover of plants. When rain falls on bare soil it easily washes the soil away. When rain falls on soil covered with plants and mulch it soaks in easily and the soil stays in place.

Large bare areas and big gullies are common erosion problems. How bad the erosion is depends on:

- How steep the slope is.
- How much rainfall there is.
- What type of soil it is.
- How much vegetation is in place.

When carrying out your project you may need to fix up some eroded areas. You also need to make sure your own work does not cause erosion.

Good planning: Preventing erosion is better and cheaper than fixing it up later.

- Keep vegetation and mulch cover in place as much as possible.
- Be careful not to cause soil disturbance when weeding.
- Plan so that areas are not left bare for long periods, and especially not when it is raining.
- Keep ground disturbance to a minimum.
- Mulch planted areas.
- Put erosion control measures in at the start of the project if they will be needed.
- Seek advice when making walking tracks, firebreaks and roads to make sure erosion is minimised.

Fixing erosion problems: Serious erosion can be fixed by:

- Filling gullies.
- Using contour banks.
- Diverting water flow.
- Stabilising areas using rocks, jute matting, geotextile, concrete, wire baskets filled with rocks and treated logs.
- Using drop structures and retaining walls.

Seek some help from a soil conservation expert.

NOTE

The Soil Conservation Handbook *has lots of information about dealing with erosion.*

3B. SEDIMENT CONTROL

Sediment is the soil that washes off an eroded area. It is important this sediment is kept on site when you are working so it does not wash into the local creeks.

Sediment control devices can be made from hay bales, shadecloth fences and other materials. Sediment traps can be put in drains.

3C. RIPPING

If the soil is hard and compacted the surface must be loosened to improve water getting in to help the plants to grow. Ripping with a tractor or other machinery is the usual method. This is especially important for direct seeding projects.

Other methods which help retain water on bare areas include: ponding banks, furrows, checkerboard plowing and pitting (seek some help from a soil conservation expert for these).

3D. IMPROVING SOIL

Selecting native plants that come from the same area will reduce the need to change the soil conditions as local native plants are well adapted to the local soil.

- In poorer gravelly soils and very rocky soils, extra soil or compost may have to be brought in to replace some of the poor soil so plants can get a good healthy start. Rip the area then mix the new soil or compost in to improve the poor soil.
- Clay soils with poor drainage are often sticky and wet. The soil sticks to boots and digging equipment. This type of soil can be improved by adding gypsum or compost to improve the aeration and drainage.
- Sandy soils often cannot hold a lot of water and have poor plant food supplies. These soils can be improved by adding composted organic matter to the planting hole.

ASSIGNMENT 2 A2

PLAN REVEGETATION

With your group plan out your project – in your project diary make sure you have recorded:

- Information from traditional owners and anyone else.
- The goals of the project.
- What weed and soil work is needed.
- What type of revegetation is going to be used and species to be planted.
- Environmental impacts of the work.
- Underground services you have found.
- Tools and equipment you will need.
- Project timetable.
- Who is going to look after the revegetation once it is planted.

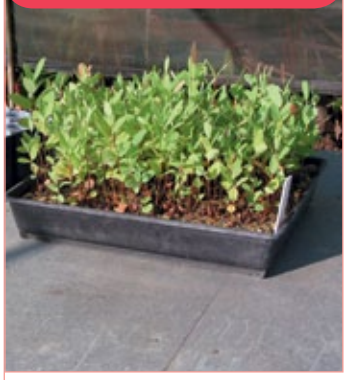
Draw a map here showing the area and where the plants are to go (you might want to combine this exercise with the Irrigation Plan from *Install Micro-irrigation Systems* and the Planting Plan from *Plant Trees and Shrubs*).

REVEGETATION

4

4A. WHAT IS REVEGETATION?

Revegetation means putting native plants back into the bush. Chapter 6 of *The Bush Book* has plenty of information on revegetation and regeneration including using seedlings and direct seeding.



4B. LETTING NATURE DO THE WORK

Sometimes the easiest way to revegetate an area is to protect the plants that are there and encourage seeds in the ground to grow. Wind, water and rain will naturally spread seeds and help regenerate an area. This process can be slow but requires little expertise and resources. This type of revegetation works best where there are few weeds, little soil erosion and plenty of mature native plants around to spread their seed.

Weed management will be very important, the learning guide for *Treat Weeds* will give you information. It might be necessary to fence the area to keep animals and vehicles out – see the learning guide for *Install, Maintain and Repair Fencing*.

However if the area is in bad condition and there are few plants left, then revegetation will not occur naturally. In which case planting seedlings or using direct seeding will be needed.

4C. PLANTING SEEDLINGS

You should make sure you plant seedlings that come from the same area. You can buy seedlings or grow your own by setting up a nursery and working through the following learning guides:

- *Collect, Treat and Store Seed*
- *Maintain Properties and Structures*
- *Install Micro-irrigation Systems*
- *Undertake Propagation Activities*
- *Pot Up Plants*
- *Tend Nursery Plants*

When you are ready to plant you should use your plan and work through the learning guide for *Plant Trees and Shrubs*. Using a tube planter can be a great way to speed up planting for large areas.

The distance between plants depends on the type of planting but usually varies from as little as 1 or 2 metres apart for monsoon forest and riverside plantings to up to 4 to 6 metres apart for woodland plantings. It is best to try and plant in the early wet season. This will give the plants a good start in life and they should get natural rain for their first few months.

NOTE

Fertiliser is not usually applied to direct seeding sites as it tends to promote weed species over native species. You might need to fence off the site to protect it.

4D. DIRECT SEEDING

Direct seeding involves the spreading of seed directly on the soil surface, like a farmer sowing a crop – this avoids growing seedlings in nurseries. The main advantages of direct seeding are:

- Low-cost and large areas can be established quickly.
- Plants are stronger.
- A natural look can be achieved with a good variety of trees shrubs and grasses.

Some disadvantages of direct seeding are:

- Can be less reliable, especially if rainfall is low.
- Seeds can be eaten by birds and insects.
- Less successful if good weed control not achieved.

PREPARE THE SITE

Good weed control is essential as weeds can easily take over from native seedlings. Weeds emerging after early rains can be cultivated and sprayed to achieve good control. See the learning guide for *Treat Weeds* for more weed information. The site should be ripped using a tractor or other machinery. This will provide a good surface for the seeds to grow in.

PICK THE RIGHT SPECIES

Pick species from the habitat you are trying to create (eg. woodland or monsoon forest etc.). When selecting the seed always make sure that you use native plant species that come from the same area. Try and use as broad a range of species as possible using trees, shrubs and grasses. See the learning guide for *Collect, Treat and Store Seed* for more information. You can also buy seeds. Some seed needs to be treated before sowing.

SOW THE SEED

When: The seeding should take place just as the wet season rains start – November to December – as the seeds will be relying on the rains for water.

How: Seeds can be sown by two main methods:

Hand sowing: Seed is mixed with sand in buckets. Handfuls of the mix are spread out over prepared soil. This method is useful for small areas or areas where it is very difficult to get machinery into. It is also needed for large fleshy seeds.

Mechanical seeding: Specialised direct seeding equipment is used to sow seed at the correct depth and rate. Seed sprayers can also be used. Good for large areas.

Rate: The standard seeding rate is between 2 and 5 kilograms per hectare. The high rate helps the new seedlings outcompete weeds. Find out some local information to get the best rate for your site.

LOOKING AFTER THE SITE

Keeping on top of weeds will be the most important task to make sure your direct seeding succeeds. Weeds can be hand pulled or spot sprayed by people who are good at knowing which plants are weeds and which are natives. Good fire management will also be essential through use of fire breaks and brushcutting grasses in between the plants.

FINISHING UP

5

5A. WATERING

If your planting was done at the beginning of the wet season you may not need to water at all. But usually you will need to water - sometimes the rains are late, or stop for a while, and some plants need watering through their first dry season or for longer.

Remember, revegetation is not gardening, the idea is to get plants growing so they survive on their own. Watering too often will encourage a shallow root system that won't survive drought or cyclones. Mulching will help keep the water in the soil for longer. See the learning guide for *Plant Trees and Shrubs* for more information about mulching.

If water is available it will help your plants establish. Watering options include:

- **Hand watering** using hoses from taps on site or from vehicle mounted water tanks (like a fire unit).
- Installing an **irrigation system**. See the learning guide for *Install Micro-irrigation Systems*. In most cases the irrigation system is installed before the work starts.
- If you don't have mains water you may need to consider a **temporary water supply** like drums placed around the site (with gravity fed drip systems attached) that you fill with a vehicle mounted water tank.

5B. GUARDS AND FENCING

While the vegetation is establishing it will need protection. Grazing by native and feral animals and vehicles driving around can all damage your project. Guards and staking are covered in the *Plant Trees and Shrubs* learning guide. Fencing is covered in the *Install, Maintain and Repair Fencing* learning guide.

5C. SITE MAINTENANCE

Regular monitoring will be needed to check that the plants are growing well. Replace dead plants as soon as possible.

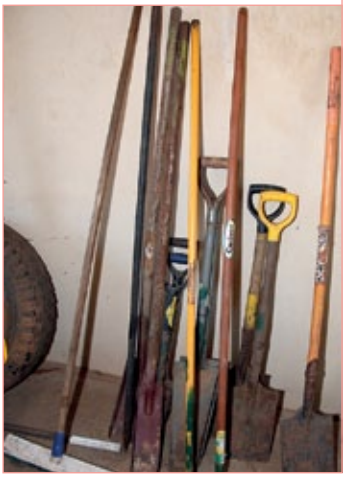
Weed management is the most important job. Weeding should occur regularly (see *Treat Weeds* learning guide). How often depends on how bad the weeds are. Even when the site is well restored the site should be checked a few times a year and spot weeding done to keep any new weeds under control.

Managing fire is also important and firebreaks will need to be properly maintained.

5D. RECORD KEEPING

You should keep your plan and any maps you have made so you can remember what was planted where. Try and take regular photos and keep notes about them in your project diary.

You might be interested in working through the learning guide for *Perform Basic Water Quality Tests*. The health of the water is linked to how healthy all the country is, and water quality information can help with planning land management work.



5E. CLEANING UP AND DISPOSAL OF WASTE MATERIAL

Make sure your site is properly cleaned up and all tools and equipment have been taken away and stored properly.

After tree planting there is often a range of unwanted waste material left behind that needs to be dealt with. Things such as pots and tubes, unused root bound plants, soil, fertiliser, stakes, mulch, and plant debris. It is best practice when finished to leave a completely clean site free of rubbish.

Methods of waste disposal could include:

1. Organic waste: mulch and composting.
2. Inorganic waste: plastic/metal/paper based materials may be recycled, reused or returned to manufacturer.

Always clean up and reuse or dispose of your old pots.

5F. TOOL AND EQUIPMENT MAINTENANCE

It is very important to keep tools and equipment in good condition. Make sure you follow the manufacturer's instructions to keep your equipment maintained properly.

Follow the steps below to look after your hand tools:

- Wash all tools of mud and dirt, and oil any metal parts to prevent rusting. Steel wool and a light oil will remove any surface rust.
- Keep tools sharp and in good working order. Bevel the back edge of a spade off with a bench grinder or a coarse sharpening stone.
- Replace any broken handles. Never use bush sticks as handles as they often break causing injury.
- Sand and oil all wooden handles to avoid getting nasty splinters. Use 50% mineral turpentine and 50% raw linseed oil on wood.

ASSIGNMENT 3 A3

CARRY OUT REVEGETATION

With your group and following your plan and information in your project diary, prepare your area and carry out the revegetation. Record all main activities in your project diary.

Answer these questions. Write the answers here OR tell them to your trainer.

What weed treatments did you use?

.....

.....

What soil preparation did you do?

.....

.....

What revegetation method did you use?

.....

.....

How many species did you plant?

.....

How many plants were planted all together?

.....

What fertiliser and mulch did you use?

.....

.....

What watering system did you use?

.....

.....

What tree guards and fencing did you use?

.....

.....

RESOURCE 1: BASICS OF GOOD LIFTING

Correct handling of materials is important to ensure a safe working environment. Improper lifting techniques can lead to back pain and learning the right way to lift will help you avoid this.

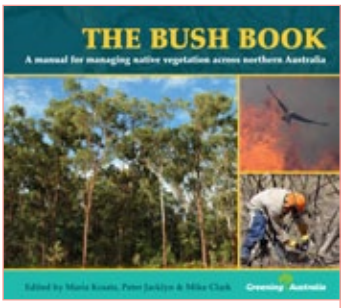
1. **Plan ahead**
   - Size up the object and test to see if it is possible to lift by yourself
   - Clear a path and make sure there are no obstacles in your way
   - Practice the lifting motion before you lift the object

2. **Lifting the object**
   - Place your feet shoulder width apart with your feet close to the object
   - Keep the object close to your body
   - Bend your knees and tighten your stomach muscles
   - Get a firm hold on the object and stand up slowly keeping your back straight
   - Let your legs do the lifting work
   - Take short steps and do not twist

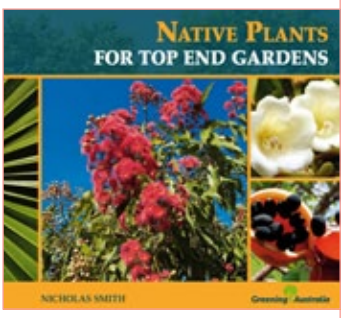
3. **Putting the object down**
   - Keep the object close to your body
   - Bend your knees and keep your back straight
   - Let your legs do the work
   - Wait until it is firmly in place before letting go

RESOURCE 2: PROJECT DIARY

DATE	ACTIVITY/INFORMATION



Go to the Resources *section of Greening Australia's website* (www.greeningaustralia.org.au) *for more information about books – look for the link to NT publications.*



The Recognise Plants *learning guide has a great reference list for more plant books.*

REFERENCES

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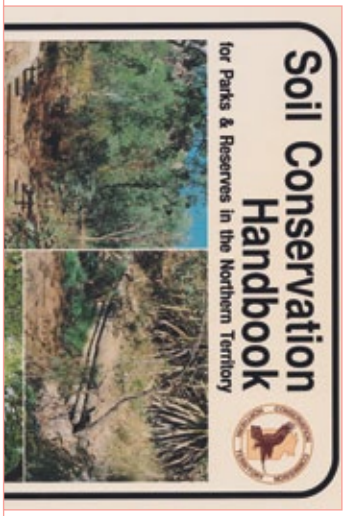

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