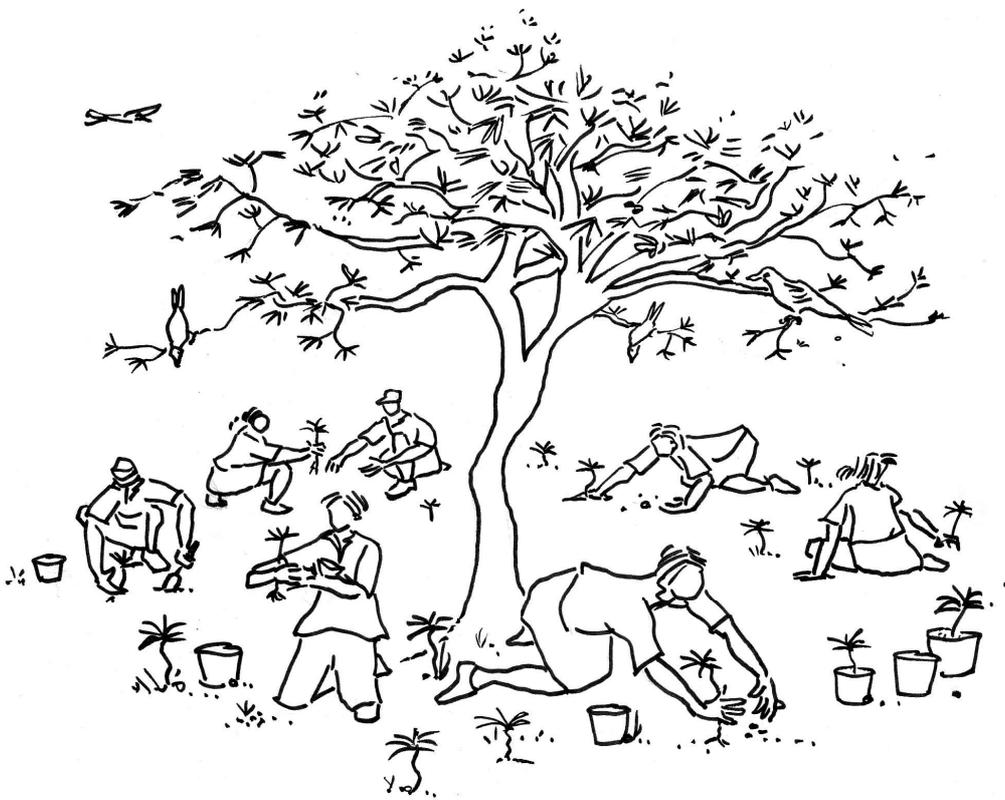




HAND PRINT™
action towards
sustainability

Growing Mother-tree Seedlings



A Share-Net Resource Book

Reading-to-learn curriculum materials to support
Technology, Natural Sciences and Language learning areas



Acknowledgments

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Knowledge and activity support materials have been adapted from various sources including the Internet, and web addresses have been provided for readers to access any copyright materials directly.

A very big thank you to Garth Cambray, PhD in Biotechnology, for his time and knowledge shared. His experience and information formed the basis of the narrative.



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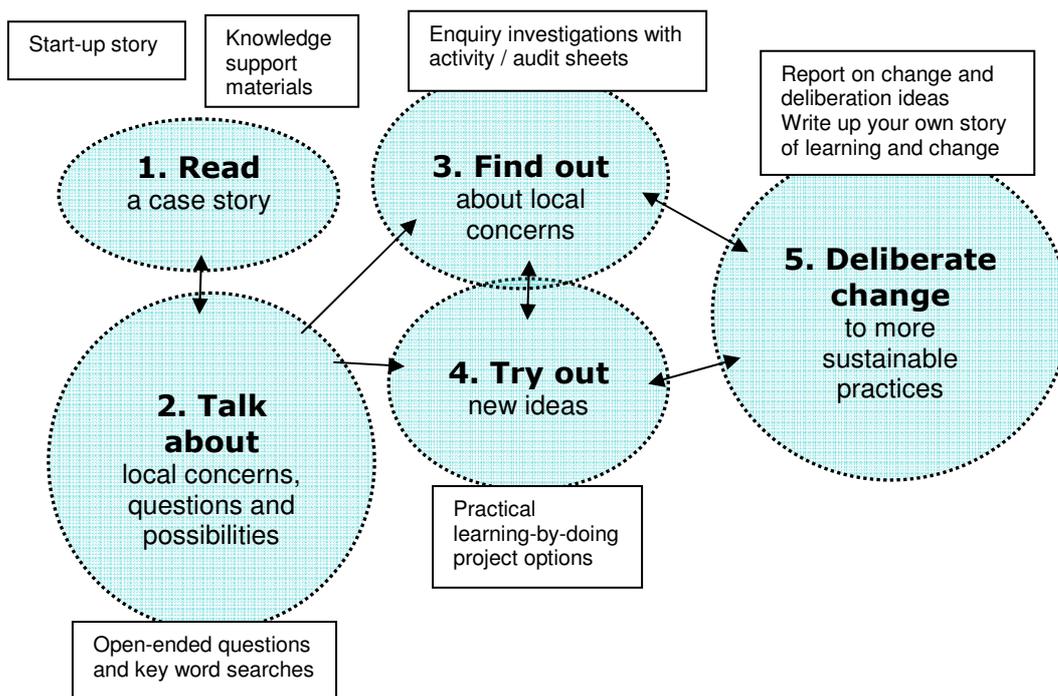
RESOURCE BOOKS

The **Handprint Resource Books** have been designed for creative educators who are looking for practical ideas to work with in the learning areas of the National Curriculum. The focus is on **sustainability practices** that can be taken up **within the perspective that each learning area** brings to environment and sustainability concerns.

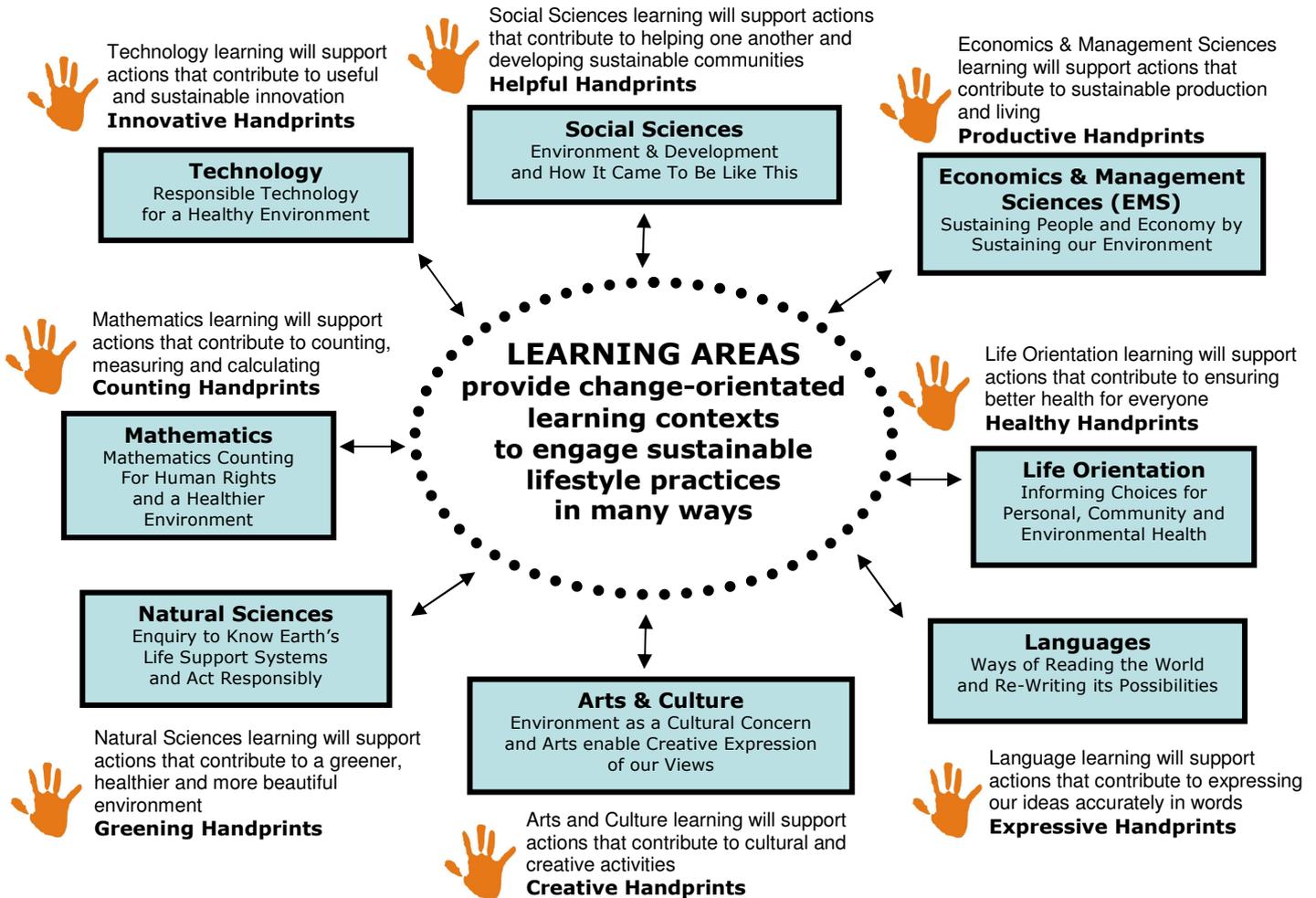
The resource books are intended to provide teachers with authentic start-up materials for change-orientated learning. The aim is to work towards re-imagining more sustainable livelihood practices in a warming world. Each start-up story was developed as a **reading-to-learn** account of environmental learning and change. Included are copies of the knowledge resources that informed those involved in the actual learning experiences described here. Working with local cases of learning and change has allowed us to develop the resource books around **locally relevant knowledge resources** and **practical learning activities** that relate to our African context. We are grateful to teachers and Eco-School support groups who have willingly shared their learning experiences and activities.

The **Handprint Resource Books** are an attempt to work from authentic cases of environmental learning and change. They combine some of the best teaching and learning tools that are being used to support change-orientated learning in the everyday realities of our South African schools. The resource books include:

1. **Start-up stories** with **knowledge support materials** (*Reading for information to build up a picture*)
2. Questions to **talk** about (*Talking to clarify issues and to plan local enquiry*)
3. Tools to **find out** about local concerns (*Writing about and reporting on local issues*)
4. Things to **try out** (*Writing up and reporting on what has been tried out*)
5. Ideas to **deliberate** (*Discussing, weighing up and recording decisions that will allow us to 're-imagine and re-write' our sustainability practices in a warming world*).



Change-orientated learning & the curriculum



The activities in this book can be used to support learning in the **Natural Sciences, Technology** and **Language** learning areas, and can contribute to the development of **Greening, Innovative** and **Expressive Handprints**.

Teachers should consult the learning outcomes and assessment standards and should adapt the activities to suit their grade requirements.

CONTENTS



Starting points

1. Reading to Learn	1
School story: How a yellowwood tree can become a forest	
2. Comprehension Questions	3
to guide local learning	
3. Discussion Points	3
to start local enquiry and action	
4. Finding Out Activities	4
5. Trying Out Activity	4
6. Deliberation Ideas	5
to think carefully about and debate	



Ideas and Tools for Local Learning

Knowledge & Activity Support Materials (SM)

SM 1. <i>Podocarpus Latifolius</i>	5
SM 2. The Rameron Pigeon	6
SM 3. Propagating Seedlings in a Milk Carton	7
SM 4. Mycorrhiza.....	8
SM 5. How to Plant a Tree	9



How a yellowwood tree can become a forest

Key words

Cross-pollinate

Germinate

Propagate

Reforestation

Mycorrhiza



Pikisile Zondane is a local champion in Grahamstown. In 2004 he initiated the Millennium Tree Planting

Project. This project encourages people to plant trees in township gardens. He gets trees from the municipality. Pikisile and his colleague Thandoxolo teach members of the family how to look after the tree. After a year they go back to the same family to see how the tree is growing. By the end of 2007 they had planted over 400 trees and many of these had survived. Their next plan was to establish a tree nursery of their own.

Garth Cambray is a scientist and entrepreneur who works on the outskirts of Grahamstown, producing honey mead and bio-diesel. He is well known in Grahamstown and his face often appears in local and national newspapers. Garth also knows a lot about yellowwood trees. Did you know that this is South Africa's national tree?

Pikisile was interested to meet Garth and hear his story about mother-tree seedlings. Garth started: "I was always fascinated to see so many little yellowwoods growing beneath the single yellowwood tree on our plot without any other visible tree to cross-pollinate with". He gave Pikisile a page of information on the yellowwood tree (scientific name *Podocarpus latifolius*) that he had found on the Internet **(SM 1)**.

"I realised that the seeds under my tree had come from somewhere else, and had been brought there by the rameron pigeons who would come to roost in the yellowwood tree and would drop their faeces on the fertile ground below."

Pikisile was surprised when Garth gave him another page of information, this time not about trees at all, but about the rameron pigeon **(SM 2)**.

Garth continued: "Yellowwood seeds have an inhibitor in the skin that prevents them from germinating until they have been digested by an animal as this removes the skin. Birds like the rameron pigeon thus play an important role in the germination of new seedlings. I would see the rameron pigeons flying from the direction of a small grove of yellowwoods in the valley to the west of where I live. It was seeds from this grove which were germinating beneath my yellowwood tree. In the past the whole area used to be a yellowwood forest and you can still see the old logging pits for cutting the yellowwoods."

He went on to say that the pigeons have brought a variety of other seeds too – little knobwoods, wild plums and loquats are all coming up. "It's always a surprise to see what's growing." Garth and his gardener had been pulling up the tree seedlings like weeds so he was very willing to let Pikisile collect some to propagate for his nursery. Pikisile propagated about 40 seedlings in milk cartons **(SM 3)**.



Propagating seedlings in milk cartons

Pikisile had read somewhere that it is important to use some of the forest soil in the potting soil mix when propagating seedlings. He asked Garth about this, who explained that forest soil contain mycorrhizal fungi. These fungi play a very important role in supporting the intake of plant nutrients by roots. Pikisile did some research on the Internet to find out more about this fascinating relationship **(SM 4)**. He made sure he added some mycorrhizal fungi to the potting soil for his seedlings.

Pikisile’s enthusiasm inspired Garth to propagate some of these seedlings to plant around his plot. “I am excited about growing these trees as they will have some important benefits. We experience strong westerly winds from Cape Town on our plot because we are on a plateau. In about three years, if we look after the trees well, they will have grown tall enough to provide us and our livestock with shelter from the wind. Another problem is that our cellars keep flooding. This is because the water table is very high on our plot, only a metre below the ground. Because trees take up a lot of water, in some cases as much as 190 litres per day, they should lower the water table and our cellars should no longer flood as frequently, if at all. The most important benefit for me though is that this is a mini reforestation project. There used to be many more yellowwoods growing here, but they have been over harvested. My hope is that in ten years time we will have another yellowwood forest.”

Glossary

Bio-diesel: a biofuel produced from vegetable oils, animal fats or algae.

Cross-pollinate: when pollen is transferred from the flower of one plant to the flowers of a different plant.

Germinate: when a seed grows into a young plant.

Faeces: poo

Mycorrhiza: special relationship between a fungus and the roots or rhizoids of a plant.

Over-harvesting: taking out more plants or animals than can be reproduced.

Propagate: to produce new plants.

Reforestation: the replanting of trees in to forests that were previously removed.

Comprehension Questions

1. What prevents yellowwood seedlings from germinating before being eaten by an animal?
2. What impact do you think logging had on rameron pigeons and yellowwoods?
3. What are the three benefits that planting trees will bring to Garth Cambray's plot?
4. Why do you think *Podocarpus latifolius* was heavily harvested in the past? **(SM 1)**
5. What interesting information did you learn about the role of rameron pigeons?
(SM 2)
6. What did you learn about propagating seedlings in a milk carton? **(SM 3)**
7. What did you find out about mychorriza the relationship between a special fungus and the roots of trees? **(SM 4)**

Discussion Points



FINDING OUT ACTIVITIES

Activity 1: Undertake a historical investigation of the vegetation that used to grow in your area. Find out whether there has been a change and if so what have been the causes of this change.

Activity 2:

- a.** Find out what indigenous plants are growing in your area.
- b.** Do a survey to find out when these plants flower, seed and how they spread.
- c.** Collect the seeds and describe them. How do you think they germinate based on the observed characteristics?
- d.** Research three of these species (their benefits, threats, botanical characteristics and connections with other species in the ecosystem).

TRYING OUT ACTIVITY

Collect seeds or seedlings from a tree and propagate them, using **SM 5** to guide you. Select a site that would benefit from tree planting and plant them out when ready.

DELIBERATION IDEAS



To deliberate is to think carefully about, to consider, to discuss in a focused way, to weigh up and debate. Here are some ideas to support this process in your learners.

- Deliberate which areas would benefit the most from tree planting and why?
- What would be good trees to plant in your local area and why?



PODOCARPUS LATIFOLIUS

Common Names: real yellowwood (English); opregte geelhout (Afrikaans); Umkhomba (Xhosa); Mogobagoba (Northern Sotho); Muhovho-hovho (Venda); Umsonti (Zulu).

The real yellowwood is one of South Africa's most valued timber trees. It is also South Africa's national tree.

Botanical Description

Podocarpus latifolius is a slow-growing, usually large, evergreen tree, which grows to 20-30 m in height. The wood is yellow and quite similar to *P. falcatus*, the Outeniqua yellowwood, although not as dark or of the same quality. The bark is greyish and smooth when young but shows longitudinal fissures or 'long cracks' as it matures. The bark peels off in strips. The glossy green leaves are long and narrow. The leaves on young trees are always larger than on mature trees. The new leaves are very noticeable as they form clusters of pale green or bronze at the ends of branches, compared to the dark green of the older leaves. There are male and female trees. The male cones (July to September) resemble catkins (a type of flower adapted for wind pollination) while the female tree develops round, grey/blue seeds on thickened, fleshy, stalks known as receptacles, which turn purple as they mature.

Status

All the species of *Podocarpus* are protected in South Africa. In the past, they were so sought after as timber trees, that from being an abundant resource they became almost extinct in some areas. Yellowwood furniture is expensive today because the trees are becoming rare.

Distribution and Habitat

The real yellowwood grows naturally in mountainous areas and forests in the southern, eastern and northern parts of South Africa, extending into Zimbabwe and further north. It is also found on rocky hillsides and mountain slopes but does not get as tall where it is exposed as it does in the forests.

Derivation of name and historical aspects

The genus and species names are derived from Greek words, *podo* which means foot, *carpus* which means fruit, *lati* which means wide and *folius* which means leaf. *Podocarpaceae* is a small cone-bearing family, which, along with the indigenous cedars, represent the small number of coniferous tree species indigenous to South Africa.

Ecology

When the berry-like receptacles ripen, birds such as pigeons and turacos feed on them. They are also eaten by monkeys, bushpigs and sometimes by people. The real yellowwood is slow-growing, but very long-lived and it is able to withstand some frost.

Uses and cultural aspects

The real yellowwood has apparently been used more than any other South African timber. Floors in the old Cape homesteads were made of this wood. The soft yellow colour of the wood contrasts beautifully with the dark-coloured stinkwood (*Ocotea bullata*) and these two timbers were often used together to make furniture. The real yellowwood was often used for tables and cupboards, as it polishes up very well. The South African Railways used to use the timber to make railway sleepers.

Reference: (adapted from) *Podocarpus latifolius*.
<http://www.plantzafrica.com/plantnop/podocarplati.htm>



THE RAMERON PIGEON



The **African Olive Pigeon** or **Rameron Pigeon** (*Columba arquatrix*) is found in much of eastern and southern Africa from Ethiopia to the Cape. There are also populations in western Angola, southwestern Arabia and northern Yemen.

This species lives in moist forest canopies above 1400 m altitude, although it occurs locally as low as 700 m. It will use mountain fynbos, second growth and clearings, and feed on agricultural land if it is not persecuted.

The Rameron Pigeon builds a large stick nest up to 15 m high in a tree and lays one (rarely two) white eggs. The eggs are incubated for 17-20 days till they hatch, and the chicks can fly in another 20 days.

The male has a display consisting of deep bows, and a display flight which consists of a climb, wingclapping, and slow glide downwards.

The adult male Rameron Pigeon is a large pigeon (37-42 cm in length). Its back and wings are maroon, with the shoulders heavily speckled with white spots. The underparts are maroon with heavy white spotting, and the head is grey with yellow patches around the eye, and a yellow bill. The neck plumage, used in display, is streaked maroon and white, the underwing and undertail are dark grey, and the feet are yellow.

Females are very similar but somewhat duller. Juvenile birds have the maroon and grey replaced with dark brown, the bare parts are a dull greenish-yellow, and the wing feathers have pale fringes. In flight, this pigeon looks very dark. Its flight is quick, with the regular beats and an occasional sharp flick of the wings which are characteristic of pigeons in general. The call is a loud *coo coo*.

The Rameron Pigeon feeds on fruit and berries, mainly picked in the canopy, but it will also descend for fallen fruit and take some insects and caterpillars. In the south of its range, it favours the fruit of the bugweed, *Solanum mauritianum*. Birds will fly considerable distances from their roosts to feeding areas, and young or non-breeding birds will form flocks.

Reference

Adapted from http://en.wikipedia.org/wiki/African_Olive-pigeon



PROPAGATING SEEDLINGS IN A MILK CARTON

Step 1: Make a potting soil mix that consists of

- 1 part river sand
- 2 parts compost
- 2 parts top soil (you can get excellent top soil from mole hills).

Make sure the potting soil is well mixed.

Step 2: Collect 1 litre rectangular milk cartons (as seen in the picture).

Step 3: Fill these milk cartons with your potting soil.



Step 4: Snip off the bottom four corners to allow water to drain, but ensure that soil is still contained in the milk containers.

Step 5: Carefully dig up each seedling, making sure that you don't damage their roots. If the tree is growing in a healthy forest be sure to collect some of the soil the seedling was growing in as this will contain the fungi (mychorriza) that will help the little tree grow.

Step 6: If you want to make sure your plant survives, buy some mychorriza from the local nursery and add a teaspoon to the soil before you put your seedling in.

Step 7: Make a hole in the potting soil and carefully plant your seedling. Press the soil gently around the roots of the little tree.

Step 8: Water your seedling well and watch it grow.

Step 9: When your seedling looks strong enough (this can take between 6 months to two years), carefully remove it from the milk carton and plant it in a 1 metre square hole in the ground. Make sure you put in lots of compost and water well.



MYCORRHIZA

Mycorrhiza describes the close association between fungi and plant roots. This relationship is an example of mutual symbioses. The mycorrhizal fungi affect a plant's growth, health and also strengthen the plant against environmental stress. The fungi benefit from the relationship by gaining nutrients from the tree.

Almost all plants need mycorrhiza. The fungus provides soil resources to the plant and in exchange gets energy manufactured by the plant. The symbiosis means greater productivity under stress for the plant and a steady energy supply for the fungus.

Mycorrhizal associations play important roles in the ecological functioning of ecosystems, as they form an important part of the nutrient cycle. Mycorrhizal fungi break down organic nutrients, absorb inorganic nutrients and transport these to the plant. This is necessary for the survival of over 90% of all flowering plants.

Plants grown in bare soils often perform poorly without the addition of spores of mycorrhizal fungi to colonise the plant roots and help with the uptake of soil mineral nutrients. If there are no mycorrhizal fungi in the soil (e.g. if the landscape is degraded), this can also slow down plant growth.

References

(Adapted from)

- Hawley, G.L., and Dames, J. F. 2004. *Mycorrhizal status of indigenous tree species in a forest biome of the Eastern Cape, South Africa*. South African Journal of Science 100, Nov/Dec.
- Wikipedia.<http://www.wikipedia.org/>

Soul Shava, a botanist in the Environmental Education Unit explained the complex detail of mycorrhizae more simply, by answering two questions asked by Pikisile.

Question 1: What are mycorrhizae?

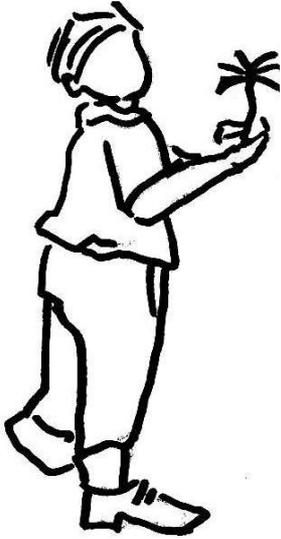
The word "mycorrhizae" literally means "fungus-roots" and defines the close mutually beneficial relationship between specialized soil fungi (mycorrhizal fungi) and plant roots. About 95% of the world's land plants form the mycorrhizal relationship in their native habitats. It is estimated that mycorrhizal fungal filaments explore hundreds to thousands more soil volume compared to roots alone.

Question 2: What are the benefits?

- Improved nutrient and water uptake
- Improved root growth
- Improved plant growth and yield
- Reduced transplant shock and drought stress



HOW TO PLANT A TREE



Trees start life as seedlings. Seedlings can be grown in four main ways:

- From seed
- From stem or branch cuttings (large branch cuttings are called truncheons)
- From root cuttings
- By transplanting wild seedlings

The raw materials:

Wild seedlings and cuttings: Look around where you live. You may find young plants close to trees. These have grown from root suckers or seeds that have fallen from the tree. With permission from the landowner, you could transplant some of these. As long as you do not take them all, and do not harvest plants that are endangered and protected by law, this will do no harm as most of them will die in competition for light. It is best to transplant wild seedlings early on when they are yet to develop larger tap-roots. Cuttings from branches can also be grown. If you are making a cutting from a root sucker, you may need to cut it away from the parent root underground. Take care not to damage the parent plant.

Seeds: Collect your own seeds from the ripe fruit of local trees. Fruit or seed pods that are ripe and ready to be planted may fall off the tree and split open when they hit the ground, shooting out the seeds. Find out when useful tree species flower and go on a collecting expedition. This is probably the best source of seeds as the trees you grow will already be adapted to the climate and soil in your area.

- Choose healthy-looking trees to collect seeds from.
- Collect seeds from more than one tree, so that your seeds will have natural genetic variation. This means that later, when the seeds have been planted, you can select the healthiest seedling.
- Store collected seeds in a porous bag or sack.
- Have a good look at the seeds when you get back home. Some seeds may have been damaged by insects. Seeds that will grow when planted look solid and full, and will not have any holes.
- Perform the float test. A good way to tell whether a seed is healthy is to put it into a container of water. Good seeds sink, poor seeds float.



How do we prepare seeds before planting?

Some seeds in nature will only germinate after a fire or after being chewed and eaten by animals. We need to imitate these conditions to encourage them to germinate. Ways to do this include:

- Making a cut in the hard outside cover (called scarification).
- Removing completely the outside cover.
- Soaking the seeds in hot (not boiling) water overnight.
- Heating seeds on the edge of a fire for a few minutes.

Find out the best way to prepare each seed before you plant it. Books and experienced people will be able to help.

You can plant seeds into seedbeds or containers.

- Prepare a potting soil - one part sand, two parts compost/manure, two parts top soil. Two or three handfuls of wood ash for every wheelbarrow of soil will help feed the seedling.
- Put the potting soil into a seedbed or container (leaving a space at the top of the container for water).
- Put the seed at its own height below the surface of the soil.
- Water well with a fine spray of water and put mulch on top.
- Label the container or seedbed.

Once planted in soil, seeds need moisture, darkness and warmth to germinate. Seedbeds and containers need to be kept under shade cover and somewhere you can move them to out in the sun. After a few weeks, you should expect to see seedlings poking through the soil.

How do you plant a cutting?

- Some species can be grown from cuttings taken towards the end of the growing season.
- Select a healthy shoot from the current year's growth.
- Cut a straight 25cm section directly above a bud at the top and below a bottom bud. Clean the leaves off the cutting, leaving only four at the top.
- Bury two thirds of the cutting into free draining soil or sand.
- Water regularly.
- Plant several cuttings at a time, to make sure at least one survives.
- If available, cuttings can be dipped into root hormone mixture to help rooting.
- Some trees can sprout from truncheons (thick cuttings of 70 – 150mm in diameter and 2-3 metres long). Plant lots of truncheons in a row to make a living fence.

How can we look after our seedlings while they grow?

- Shade containers and seedbeds from the sun for two months.
- When seedlings are old enough, move them to a place with lighter shade and make sure they are getting enough sun during the day. Plants need light to grow!
- If you live in a place where the nights are cold, you may have to put a plastic bottle cover over the seedling containers when they are young. This helps to keep

the heat in, but still allows light through. At some point, the seedlings need to learn to survive without any covering. This is called "hardening off." Starting in the late afternoon, the plastic cover should be taken off for one hour the first day, for two hours the next day, and so on until the plant can survive a whole night and day without its cover.

- Protect from animals: Fence out goats, rats, sheep and cattle.
- Protect from termites: Termites hate wood ash!
- Protect from cold: Apply mulch around the seedlings but do not cover them. Mulch warms the soil like a blanket; prevents weeds from growing; and helps water get to the plants.
- Weed seedbeds regularly. Pull weeds out by the roots when they are still small. Don't let weeds make seeds! Pull them out before they flower. Avoid disturbing the tree seedling when weeding – hold the soil around the seedling down with one hand while you pull out the weeds
- Protect from each other: Don't let the seedlings get overcrowded. Pull out weaker, sick or dying plants to make more space for the strong ones.

How often should we water our seedlings?



- Keep the soil damp until the seeds germinate.
- Water daily afterwards.
- Test the soil before watering. If it sticks to your fingers, it is wet enough.
- Plants need more water in hot summer weather.
- Don't over-water! It can kill the seedling. You will know you are over watering if you get green algae or moss (green slime) growing on top of the soil.
- Water gently next to the base of the tree, until the water runs out of the bottom of the container. Don't splash the leaves.
- Never let your tree go to sleep with wet feet! It can cause disease and makes it easier for frost to kill the plant.

How should we transplant seedlings?

- Transplant seedlings from containers when they have become as big as their containers. Transplant seedlings from a seed bed when the first two sets of leaves are open.
- Transplant seedlings on a cloudy day and never in the sun at the hottest part of the day.
- Prepare the ground, removing unwanted plants.
- Always keep bare tree roots damp while planting.
- Dig a hole large enough to take the roots and some compost.
- When planting, spread the roots and fix in soil or soil/compost mix, firming well as you progress; do not add soil above the previous soil line on the stem.
- Prepare a hole where you want to plant the seedling.
- Carefully dig around the roots of your seedling.

- Hold the seedling by its leaves and gently lift the roots out, supporting the ball of soil around its roots.
- Plant the seedling into the hole without bending the roots.
- Plant the seedling so that only the first two leaves are above the ground.
- Firm the soil down around the seedling.

How to look after trees whilst they grow?

- After planting out, it is important to care for the tree as it grows. You need to make sure your tree has enough water and is not in competition with other plants for food.
- Keep weeding around the tree whilst it becomes established.
- Mulch around the base of the tree. Spread a layer 3cm thick on top of the soil, but do not let it touch the stem of the tree. Renew the mulch every six months.
- Feed the growing tree through the soil by adding compost, bone meal, or manure tea. If you use mineral fertilizer, be sure to follow guidelines for use carefully.
- Water every day for the first two weeks after planting. After that, check the tree daily and water as required. Make a water drip next to your young tree.
- When seedlings are about 30cm high, they need to be staked (supported by a straight stick). This will help them grow straight and stop them from falling over. Put the stake in about 2cm away from the tree on the windward side and secure the tree to it with a strap made of soft material. Never use wire or string as it may bite into the tree and damage it. Allow the top of the young tree to move freely in the wind - this is vital as it helps to build up strength in the tree against strong winds in its later life.
- Make tree guards to protect growing trees from wild animals. Plastic bottles can make a good guard for the stems.



Reference

(Adapted from) PACE. A step by step guide to planting a tree from seed. Action sheet 49. www.paceproject.net. (This Action Sheet was compiled by Nancy Gladstone)



NOTES



Handprint resource books available from Share-Net

TITLE	LEARNING AREAS COVERED (BROADLY)
 1. Reusing Shower and Bath Water	Language Natural Sciences Technology
 2. The Buzz on Honey Bee Economics	Language Natural Sciences Social Sciences Technology Economics & Management Sciences
 3. Have you Sequestered your Carbon?	Language Natural Sciences Technology Mathematics
 4. Did you Grow your Greens?	Language Natural Sciences Social Sciences Life Orientation Arts & Culture
 5. Clearing Invasive Weeds	Language Natural Sciences Technology
 6. The Secret of a Spring	Language Natural Sciences Social Sciences Life Orientation Technology Mathematics
 7. The Secret of the Disappearing River	Language Life Orientation Social Sciences Economics & Management Sciences
 8. Creative Garden Design	Language Natural Sciences Technology
 9. Recycling, Waste Reduction and Creative Re-use	Language Social Sciences Life Orientation Arts & Culture Technology Economics & Management Sciences
 10. Worming Waste	Language Natural Sciences Technology
 11. Growing Mother-tree Seedlings	Language Natural Sciences Technology
 12. Rooibos: a Biodiversity Economy at Risk	Language Natural Sciences Economics & Management Sciences

Many more Handprint resource books are in the planning stages. These resource books and many others for teacher educators and teachers are available electronically in pdf format on www.tessafrica.net. The Handprint resource books can also be downloaded from www.handsforchange.org.

The adaptive use of these resource books for educational purposes is encouraged. Anyone wishing to develop their own resource or adapt one, can contact Share-Net sharenet@wessa.co.za for a version in Microsoft Word.



HAND PRINT™
action towards
sustainability

This handprint is of a 10-year-old girl, Srija, from a school in Hyderabad, India, who was involved in a project taking action for sustainability. Her handprint can be taken as a symbol for positive action.

Increase your handprint. Decrease your footprint.

Human impact on the Earth has tripled since 1961 and our human footprint is now 25% bigger than the planet can support. In other words we are using 25% more natural resources and services than the planet can create and provide. The 'Ecological Footprint' is one way to measure what area of land and water the whole human population requires to produce the resources it consumes and to absorb its wastes, and we now need 25% more area than is available on the whole planet. This means that the planet is simply being damaged beyond what it can repair, and this cannot continue without causing very serious threats to all life, including our own.

Education is a key way to achieve the changes we need to live in a manner that the planet can support. Environment and Sustainability Education (an environmentally focussed approach to Education for Sustainable Development – ESD) is a move away from seeing education just as a means of producing the skills to carry on doing what we are doing. It develops the abilities needed to address the big issues affecting the planet, and builds the capacity in communities to make important decisions about their future. Environment and Sustainability Education calls for action.

The Handprint is one measure of Environment and Sustainability Education action. The idea is to decrease the human footprint and to make the world more sustainable. The Handprint is a new approach or 'tool' being developed by the Centre for Environment Education (CEE), in Ahmedabad India, with many partners across the globe. The purpose of the Handprint is to help measure **positive action for change** at different levels. We all need to decide **what we can do** at the individual, community, national and global level in order to increase our Handprint, and decrease our Footprint.

“Through our actions, we add substance and vigour to the quest for sustainable living.”

The Ahmedabad Declaration 2007: A Call to Action, 4th International Conference for Environmental Education



www.handsforchange.org