



HAND PRINT™
action towards
sustainability

Re-using shower and bath water



A Share-Net Resource Book

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



Acknowledgments

The Handprint resource books have been compiled by Rob O'Donoghue and Helen Fox of the Rhodes University Environmental Education and Sustainability Unit. Lawrence Sisitka was responsible for coordination and review, and Kim Ward for editorial review and production for curriculum and Eco-School use. Development funding was provided by CAPE. Cover illustrations are by Tammy Griffin.

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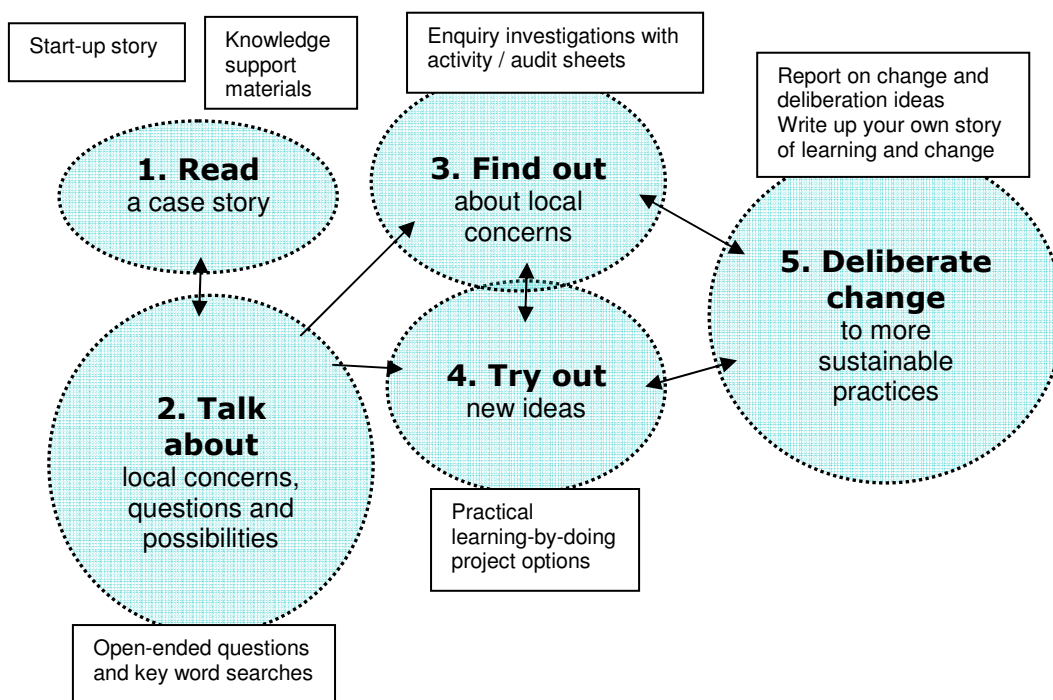
RESOURCE BOOKS

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.

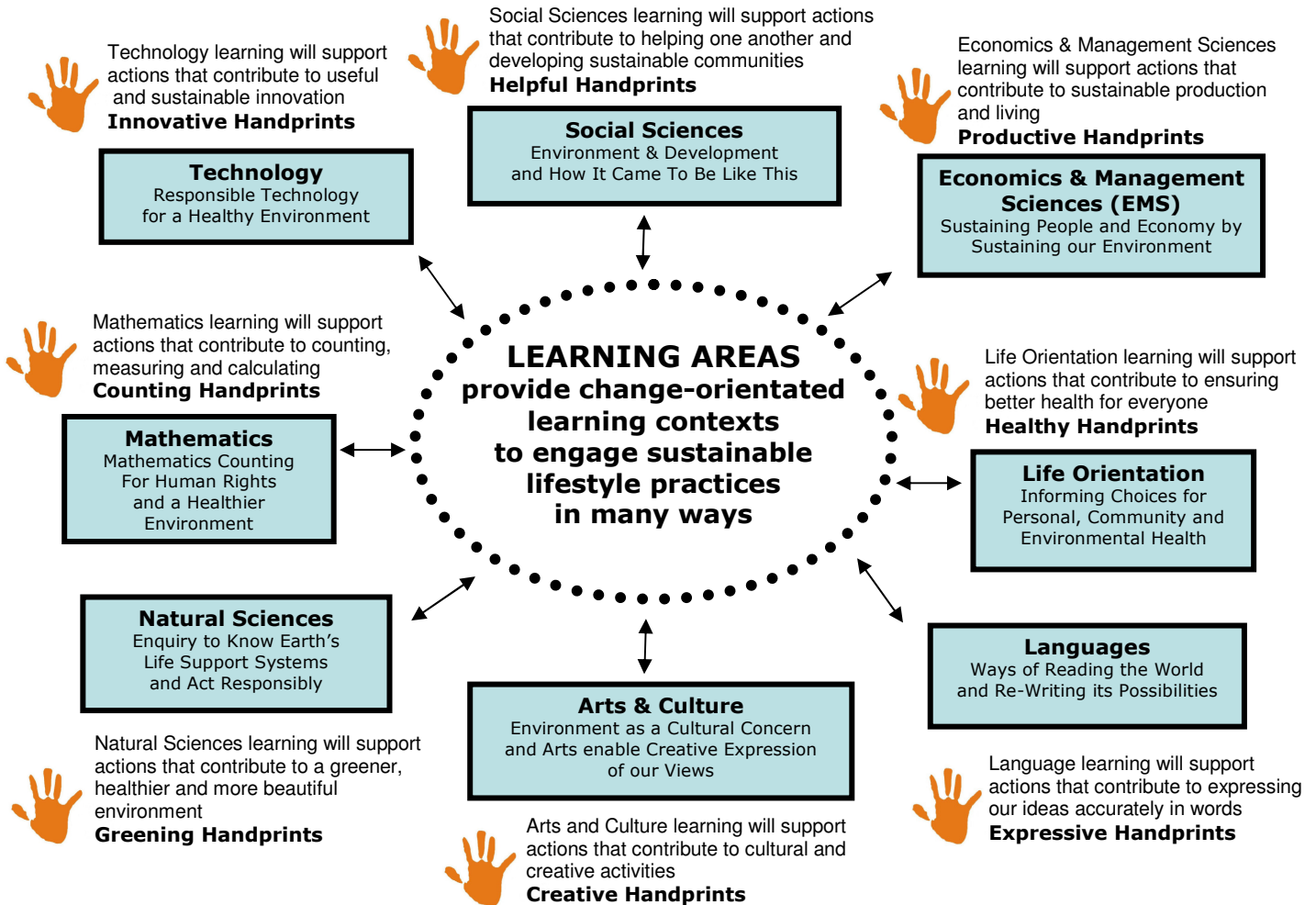
The resource books are intended to provide teachers with authentic start-up materials for change-orientated learning. The aim is to work towards re-imagining more sustainable livelihood practices in a warming world. Each start-up story was developed as a **reading-to-learn** account of environmental 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.

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Ideas and Tools for Local Learning

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Growing vegetables for free using a shower-water filter

Key words		
Biodegradable	Grey water	Propagate



Pat grew her own vegetables in a tyre garden at home. She used waste water from her shower to water the green leafy vegetables she

had planted. She was very excited because this was a way of producing vegetables without having to pay for municipal water. She enjoyed her first crop. But soon production began to decline as white streaks of soap pollution appeared in the soil.

By chance she spoke to Rob who was having a similar problem. Some of his plants had even gone yellow. He had seen a video about a grey water filter used by Robert Swan at the 2041 E-Base in Antarctica (**SM 1**). The filter was made using a plastic drum that contained a mix of wood ash, charcoal,

sand and crushed stone. It was used to filter out the soap and other contaminants in washing water so that clean water was returned to the pristine Antarctic environment.

Rob decided to make a similar drum filter to reduce the soap and other contaminants that seemed to have accumulated in his garden.

Like Pat, his plan had been to use shower water to produce fresh, home-grown vegetables at low cost. Friends were not very encouraging. They told him that by the time he had bought vegetable seedlings and paid for the municipal water to grow vegetables at home, he might as well have bought shop vegetables. They said that supermarket vegetables are cheaper, better quality and less hard work.

With a little help from the Internet Rob



Drum water filter



This vegetable garden is watered with waste water that has been filtered

worked out that he could grow his own seedlings by collecting seed from vegetables that had been left to go to seed **(SM 2)**. Then, if he used waste water from the shower, his home-grown vegetables would, with a little propagating, weeding and watering work, be free!

An Internet search confirmed that it is important to treat grey water before using to water your garden **(SM 3)**. A friend directed Rob to other interesting information on how a little soap in the water would help to control aphids that feed on leafy vegetables in the warm weather **(SM 4)**. After a few failures, Rob and some students from the

university who had become interested in the project, designed a shower water filter to produce organic vegetables for free! They posted information about the filter on the web so that others with the same problem could try out the biodegradable bath water filter. The group used bath and shower water because it has low levels of contamination that can be filtered out for safe use on vegetables. Kitchen and washing machine water is much more contaminated. It can be filtered but it's not advisable to use it for vegetables. This water is best used for watering lawns, flower gardens and trees.

Glossary

Biodegradable: A substance or chemical that is biodegradable can be changed to a harmless natural state by the action of bacteria, and will therefore not damage the environment.

Grey water: The waste water from baths, basins, sinks, washing machines, dishwashers etc., which has been used to clean things and which is considered to be only mildly dirty.

Propagate: To produce new plants from a parent plant.

Comprehension Questions

1. What materials did the water filter used in Antarctica contain?
2. What was the purpose of this water filter?
3. What are the costs involved in growing your own vegetables?
4. What can you do to reduce the costs of growing your own vegetables?
5. What do you think about what is happening at the Antarctica E-base? **(SM 1)**
6. What are the important tips you learned for collecting your own seed? **(SM 2)**
7. What are the possible negative effects of using grey water and what can be done about them? **(SM3)**
8. Select one of home-made sprays and describe how to make it. What is the usefulness of this particular spray? **(SM 4)**

Discussion Points



FINDING OUT ACTIVITY

Get your learners to undertake a survey of who grows their own vegetables in their neighbourhood. Find out what the costs were, in each case, of growing one's own vegetables. Think about what can be done to reduce these costs.

TRYING OUT ACTIVITY

Make a cooldrink bottle filter for re-using bath and shower water (grey water) to water a small plant or seedling. Support material 5 guides you in how to do this.



DELIBERATION IDEAS

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

Deliberate the re-design of your garden to use rain water, tap water and grey water for low cost gardening and food production. Vote on the design that is best in terms of low cost and practicality.



2041 E-BASE IN ANTARCTICA

The E-Base

Following his success in removing 1 500 tons of rubbish from Antarctica, Robert Swan stood at the Bellingshausen Russian base on King George Island looking down on the beach that had been cleaned. From that moment he believed that an education station in Antarctica, where the world could see the



beauty of this incredible continent, would inspire and educate people around the world about climate change and play a crucial role in promoting renewable energy, preservation and conservation for future generations.

Since that time Robert has taken over 20 teachers from different nations to Antarctica and they in turn have created the 2041 curriculum to inspire and educate young people and bring Antarctica back to the classroom. The 2008 'E-Base Goes Live' project created educational dispatches from the field that demonstrated renewable energy and sustainable living in one of the harshest environments on Earth.

The E-Base is a sustainable green building operated in an environmentally efficient manner. The materials were very carefully selected and included recycled and renewable resources. All the building materials chosen are sustainable products and include structurally insulated panels from WinterPanel, 100 percent post consumer recycled rubber interior flooring from EcoSurfaces and an energy star watertight blanket with low VOCs for the roof and siding from Metacrylics. During the ceremonial opening of the E-Base in February 2007 Robert Swan pledged to use the E-Base to inspire people to create extraordinary results in preserving our environment.



"Here at our 2041 E-Base we are using green, innovative and sustainable materials and applying them to the cleanest, coldest place on earth. The E-base will serve as a model globally and locally." Robert Swan

E-Base Goes Live: 1-18 March 2008

In March 2008, Robert Swan embarked on a pioneering Antarctic project 'E-Base Goes Live', where he relied solely on renewable energy (solar, wind, thermal) for two weeks at the newly launched E-Base on King George Island, which is Antarctica's first dedicated educational base. Robert shared his daily experiences with the world through an interactive website, reporting from the field via exciting daily video dispatches, photographs, live text and video chats. Robert and the 2041 team aim to bring the message of preserving Antarctica, promoting sustainable lifestyles and combating climate change to a wider web audience, including business, universities and schools around the globe, the media and greater public.

You can find the video clip on being Water-Wise at <http://ebase.2041.com/view-by/topic/living-in-antarctica/>

Reference:

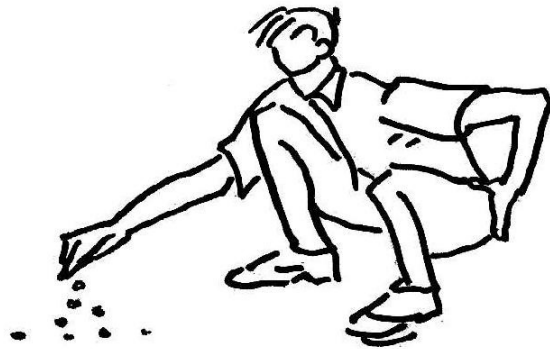
<http://www.2041.com/antarctic-expeditions/e-base/>

TIPS FOR COLLECTING VEGETABLE SEED



Collecting and planting your own seeds from vegetables is an exciting and cost-effective thing to do.

- Firstly you need to have something to put your vegetable seeds in, such as an envelope or paper bag. Plastic bags are not so good. Make sure that you label what seeds are in the envelope.
- On the plant you will find the seeds where the flower was growing. Using a pair of scissors, cut off the end where the seeds are, e.g. the seed pod.
- Some seeds are better than others. The best ones will look the most 'healthy' – they'll either be the fattest, heaviest, shiniest and toughest looking seeds.
- It is important to know when to collect the seeds. They need to be collected when they are mature and ripe. There are three stages a seed needs to go through before it is ready to be collected. The first stage is when the seeds are fertilised. The second stage is when they mature. The third stage is when they ripen. If the seed hasn't been through all of these stages it will not produce a plant. Sometimes it can take weeks and even months after the flower has died before the seed is ready.
- You will know the seeds are ripe when they are ready to be dispersed. The seed pod will be dry and often changes colour, usually from green to brown or white. The seeds will also have changed colour, often from being green or white to brown or black. When the vegetable or fruit you're collecting the seed from is ripe, then you know the seed is ready to be collected.
- Place the seeds in a warm dry place so that they are completely dry before storage.
- When the seed is completely dry it is ready for storage. Make sure that wherever they are stored is cool and dry and that the container they are in is well labelled.
- Remember that the best seeds come from 'heirloom' varieties and open pollinated plants rather than plants that have been hybridised.



References

(adapted from)

McConnell Hughes, M. Seed-Saving Tips. <http://lifestyle.msn.com/your-home/gardening/articlebhq.aspx?cp-documentid=9496093>

Harrison, J. 2008. *Harvesting, saving and exchanging seed*. The seed site. <http://theseedsite.co.uk/>



ASK THE EXPERT – WATER SAVING

Grey Water – Washing Machine
Monday, February 26, 2007

Question

*Hi there,
Listening to people chat at work and on public transport, it still amazes me how few people have linked the waste water from (at least) their washing machine to a hose so they can water their garden. Is there a reason for not doing this?
Melanie*

Profile

John Grimes



Perpetual Water – Home inventor John Grimes is a passionate gardener. From water tanks to grey water, John can advise you on ways to use water effectively in your home and garden and maximise this precious resource.

Answer

Melanie,

The washing machine is a high water user in the home. The average top loader uses 150 litres of water per load, and the average front loader 70 litres of water per load. That is a lot of water, and on the face of it, seems like a great source of water for you to keep your parched garden alive. In fact water from washing machines is very contaminated by the soaps and detergents that we use. I have sampled water from over 1 000 washing machine loads and have found that

1. The pH of the water is very high – often high enough to kill many types of plants and lawns.
2. The water is also high in salt. The largest single ingredient in powered detergents is salt – it is used to stop the detergent sticking together. This salt builds up in the soil and can kill plants and erode certain soil types.
3. The water is high in phosphorous. When allowed to run off into the environment this is one of the major causes of algal blooms.
4. In addition I was amazed by the high levels of bacteria I found in washing machine water. The health authorities set a “safe” limit for bacteria of 10cfu/L. Typical values in the testing we have done have been around 5 000cfu/L – with some as high as 140 000cfu/L!

If you want to use the water from the washing machine here are some tips: Use a grey water treatment system to purify the water and make it safe for the garden. This will take away all of the problems outlined above. The water comes out with a safe pH, with low salt, low phosphorous and sterile. See <http://www.perpetualwater.com.au>

If that is not possible though:

- Disperse the rinse water through dripper hoses under mulch. This will reduce the health risk.
- Don't let untreated grey water run off your property – especially into waterways.
- Don't use untreated grey water on vegetables.
- Wash your hands after touching untreated grey water – and do not let children play with the grey water.
- Move the hose regularly, to avoid the build up of salt in the soil.

Hope this helps,
John Grimes



HOME-MADE SPRAYS

The sprays below are cheap to make. They are effective against a range of pests, and are also relatively safe for children to make and use.

Simple soapy water spray: To control aphids and other sucking insects. Use one teaspoon to two tablespoons of normal liquid detergent soap for every four and half litres of water. Spray as often as needed, especially under the leaves. Increase the amount of soap if necessary. (Guy et al., 1996)

Chilli pesticide spray: For sucking insects. Slice a handful of dried chillies and some onion or garlic and mix together in a litre of water. Grate in a small handful of hard soap. Leave overnight, then strain through a cloth and add 5 more litres of water. Brush, sprinkle or spray on affected plants, but not in direct sunlight. Don't get it on your skin or in your eyes. If plant leaves burn, make the mixture weaker with more water. Repeat the treatment as often as necessary. (Adapted from FAO, 2001)

Flour or ash dusted onto leaf vegetables suffocates caterpillars. Flour is also a stomach poison for them. (Chris Landon-Lane, 2004)

Tea or coffee spray To deter insects. Soak coffee grounds or tea leaves in water and spray on plants.

White oil or "summer oil" spray: To suffocate chewing and sucking insects. Make a concentrated mix with half a litre of vegetable oil (e.g. coconut oil) and half a cup of detergent or soap dissolved in water. To spray, mix 1 tablespoon of the mixture in a litre of water. If you store the mixture, shake well before using to mix up the ingredients. (Adapted from ABC Brisbane, 2004)

Tomato leaf juice Useful in controlling aphids and caterpillars on many plants. Boil 500 grams of tomato leaves in 5 litres of water. Strain and dissolve 30 grams of soap in the mix. For spraying, use one part of the mixture to 4 parts of water. NB Do not use this mixture on tomato plants or members of the tomato family (e.g. pepper or Irish potato). (ABC Brisbane, 2004)

Marigold leaf juice made the same way as tomato leaf juice, is a powerful, broad spectrum pesticide (it even deters fleas on dogs!). Wild marigold, which comes up in fields, on roadsides or any patch of disturbed soil, is much more effective than the garden variety.

Tip: Spray bottles are not always easy to come by. A large paintbrush, broom head or tied bundle of grass will work just as well. Dip this into a bucket of the pesticide and shake it to splash the mixture onto the plants

Reference

Nutrition Programmes Service of the Food and Nutrition Division. 2005. Setting up and running a school garden. <http://www.fao.org/docrep/009/a0218e/A0218E16.htm#app3.9>



A COOLDRINK BOTTLE WATER FILTER

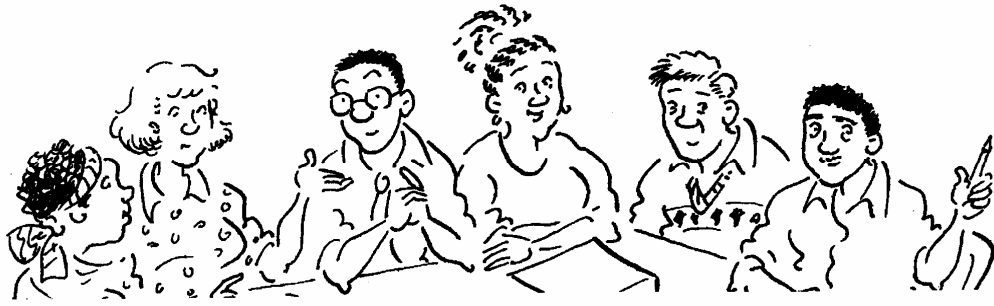
Materials needed

- 2 litre cooldrink bottle
- Pair of scissors/cutting knife
- Cup of gravel
- Cup of sand
- Cotton wool
- Dirty water that will be purified

Instructions

1. Cut the 2 litre bottle in half. The top half should be cut below the label.
2. Place the top half of the bottle upside down in the bottom half, so that it's like a funnel. You build your filter in the top half and the filtered water flows into the bottom half.
3. Put the cotton wool into the place where the lid was. Then layer the filter materials in the top half of the bottle. As you're doing this think about why that material might filter water. Also consider the order that the materials should be layered in.
4. Pour the dirty water through the filter.
5. Then take the water filter apart and examine the different layers. Can you work out what the different layers removed and why.
6. Think about what other filter materials you could use and experiment with them.

















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 sharenets@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