



Sustainability for Soils

Concluding the 2015 International Year of Soil (IYS) in this environmental education series by Jeanie Clark

As we come to the last part of 2015, let's reflect on this International Year of Soils aims, "healthy soils for a healthy life" and what we can do for soil health in a sustainable way.

The first three aims for the soil year

Below are the first three IYS aims, which apply to all of us. This year's articles have aimed to provide educational activities to support them, with this one focussing more on the third aim:

- Raise full awareness among civil society and decision makers about the profound importance of soil for human life;
- Educate the public about the crucial role soil plays in food security, climate change adaptation and mitigation, essential ecosystem services, poverty alleviation and sustainable development;
- Support effective policies and actions for the sustainable management and protection of soil resources;

How do we start to think about soils in a 'sustainability' context? Consider this icon to the left.



What does it suggest to your children? Do you agree with them? The FAO's intended meaning is found in the first aim above and in more detail in the box beside the IYS icon, (explored in *Celebrating Soils*, *Otherways* issue 143 p 30.) Have you developed in your children this sense of the dependence of human life on soils, like Olombo's on the next page?

Here are five distinct ways in which we depend on soil. How do your children interpret them? And you?



The second IYS aim is about understanding what soil does in various processes. In the icons, soil is behind:

- 2 growing enough food now and in the future;
- 3 growing timber and other plants which benefit us by providing material resources, including oxygen;
- 4 growing plants at the base of biodiversity, from which we discover medicines and recreation for our health;
- 5 forming channels to run and hold surface water and collecting in groundwater reserves; and
- 6 holding carbon directly in it and indirectly through its plants, slowing climate change.

Clearly human and other life depends on soils, possibly much more than we had noticed before this year. What do we do for the future? This is the third aim – to act where we are located for our soil's sustainable care and maintenance. Is this a 'soil only' issue? No. From ancient times, concepts like earth (another name for soil), fire, wind (air) and water reminded people to look for inter-relationships.



Soil is a non-renewable resource; its preservation is essential for food security and our sustainable future

Sustainability for soils

Are your children aware of how long it takes to create soil naturally? On average, a century for topsoil thumbnail-deep! So soil is a non-renewable resource. Its formation processes are so much longer than human life-spans! Regardless of whether your soil is in a pot plant, backyard, community garden, or farm, what problems might your soil have for its sustainable use? How can they be addressed sustainably?

The first step to sustainable caring is of course facts - know your soil and its issues! Did you do the 'Soil Tests' (*Otherways* issue 145, pp 26-27) and explore the list of '21stC Soil Concerns' (*Otherways* issue 144 p 27)? Care for soil is part of caring for an environment, which has land, water, air and Life features all affecting each other. So let's consider some actions at a personal level for problems that could be local, regional or global.

Managing Wind Erosion

In this El Nino year, rainfall is already low in some parts of eastern Australia. What do dry times do to your soil? If you have clays, do you notice them harden, clod together and eventually crack? Dry sands are loose. Grains of bare soils can be detached and moved by the wind – erosion. The tiny clay grains appear as dust on our shoes, and in big winds may be blown away as dust storms, e.g. photo below. When rains come, bare soils can be washed away by water.



What sustainable actions are there to reduce erosion?

- 1 Mulch - Are your children aware when they help put mulch on soil to retain moisture for the plants to use, they are also helping protect the soil against wind erosion and providing some habitat for little creatures?
- 2 Compost - Are they aware that by adding compost to sands and clays to provide nutrients for plants to use to grow, they are also improving the soil structure to hold it together longer against the wind's energy?
- 3 Watering - When they water plants, do they notice where water goes into the soil, helping it to hold together and keep habitat for soil life underground?

Managing Fertility

Soils have nutrients from their bedrock, organic matter, water and air. Growing plants use these nutrients. When we harvest flowers or foods, we take the soil's nutrients away in them. Soil naturally develops these nutrients in a long term cycle from decaying rocks underneath and plants above. If we want to grow more, we have to help the soil get nutrients back in it.

Sustainable ways of doing this include:

- 1 rotating crops - changing what is grown from one time to another on a farm, backyard or in a pot. This teaches a long-term view of caring for soil fertility.
- 2 Compost – worms and other small life break down rotting food scraps and organic waste into nutrients that can be returned to the soil, and reduce landfill.
- 3 Nutrients – 'chemical' additives may provide a quick replenishment, if soil needs have been tested first.

Nutrient cycles

Carbon and water cycles are usually learnt early on in environmental education. Where do soils fit into these? To sustainably manage soil nutrients, involves knowing about their place in soils. What nutrients are needed, what do they do and what are their sources? These three questions could be used with 'Plant nutrients in the soil' (2004) at <http://www.dpi.nsw.gov.au/agriculture/resources/soils/improvement/plant-nutrients>. Many of these nutrients in soils are part of whole environment processes, so to understand more how to manage soils sustainably, these cycles need to be known. Diagrams for Nitrogen, Phosphorus, Potassium and Sulphur start half way in *What nutrients do plants require?* (2015) at <http://www.dpi.nsw.gov.au/agriculture/resources/soils/improvement/plant-nutrients> Look for what comes from compost (dung and humus) and nutrient fertilizers in these diagrams. If you are ready for a higher level of complexity, then try 'Nutrient Cycles' (2006) at <http://www.uic.edu/classes/bios/bios101/Murraynutrient/index.htm>.

Managing Bare Soils

Should soil be left bare? Plants help protect soil from eroding. Their roots help hold soil against the energy of wind and water and their shade helps keep soils cooler. Are your children aware that their care for plants, especially in difficult seasonal conditions, is also caring for soil? Plant choice may help retain biodiversity, not just of the plant, but in other living things that depend on it, above and below the soil. (So try to notice what lives there.) Should we seal soils, e.g. with concrete, and stop soil formation processes?

Since the turn of this century, when our climate started noticeably drying, many grain farmers have adopted 'stubble retention' managements which keep a plant residue cover on soil through the dry, hot months. Both literacy and numeracy comprehension can be done with *Benefits of retaining stubble –Qld* (2015) at <http://www.soilquality.org.au/factsheets/benefits-of-retaining-stubble-in-qld>, for it contains clear statements of this practice's three benefits to soil, three former practices it replaced, the nutrient it needs more of, and two graphs of benefits. What is the backyard equivalent of stubble? Mulch. What mulches are available to you? Their sustainability values may differ. Test this by checking what Life comes to live in them.

Examples of sustainable soil carers

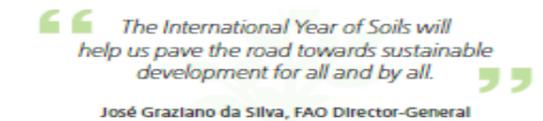
Examples of farmers and gardeners who practice sustainable soil care are in the Soil Selfies collection at <http://soils.enviroed4all.com.au/soil-selfies/locations/>. There are some inspiring food gardens at: Apollo Bay, Dimboola, Highfields, Horsham, Kilmore, Murtoa, Melbourne, Scottsdale, the Garden of Earthy Treasures and the Upper Danube. For grain farming, feeding the world, try Batchica and Bangerang; for grazing, Kilmore stock, Lima South and Werrigar. More in depth farming examples are in 'Snapshots' at <http://familyfarms.enviroed4all.com.au/family-farm-snapshots/>. Is Olombo's care for his soil like yours?

Nicholas Olombo, Kenyan permaculture farmer comments on soil:
"I am married to my soil. My farm sustains human life. I come from dirt and will return to dirt (dust)!"
 See p 2 of <http://familyfarms.enviroed4all.com.au/family-farm-snapshots/wp-content/uploads/2015/02/Foodforest-Kenya.pdf> (2015)

YUNGA's *Soils Challenge Badge*, (see <http://yunga-youth.weebly.com/soils.html>) suggests more ways we can contribute to sustainable actions for soil care:

- o Shopping – buy local and organic products
- o Cleanliness – avoid littering and polluting products
- o Carbon footprints – reduce energy use
- o Tourism – be an eco-tourist wherever you go
- o Raise awareness of soil and its care.

Which are appropriate for your lifestyle and environment? Where can this lead? Consider this:



To Sustainable Development Goals (SDG's)



(source: UN 2015 <http://www.un.org/sustainabledevelopment/>)

Seventeen Sustainable Development Goals (SDG's) came into effect, replacing the Millenium ones, on September 25 2015 with 80 countries signed on, including Australia. Back in April, at Global Soil Week, soil was shown to underpin each one. With your children can you work out how soil fits in each? Try reviewing your lifestyle for personal actions for them.

Soil as one of the foundation materials of Life on Earth can take us into many other explorations, e.g. soil-native plant associations. I hope you have discovered some things about soil, its values and needs that you can build upon in future, and act to care for your soil sustainably as a healthy base for your healthy life.

© Text and photo by Jeanie Clark, enviroed4all®, Warracknabeal 2015
Icons from FAO, 2015 under (cc) licence.