EcoCover | New Zealand | New Thinking

Healthy soil is the secret solution to global warming

ECOCOVER'S SUSTAINABLE LANDCARE SYSTEM

AN INTELLIGENT SOLUTION TO GREENHOUSE GAS MITIGATION, WATER SHORTAGES, DEGRADED SOILS, CLIMATE CHANGE AND PAPER WASTE

INDEPENDENT RESEARCH ENDORSEMENT AND ECOCOVER'S COMMITMENT TO FURTHER R&D

Living Systems, Sustainability Consultants of Auckland supervised the research projects and soil sampling
Hill Laboratories of Auckland undertook the soil analysis testing
EcoCover is committed to substantial ongoing research on this important question. **A 5 year University R&D project commenced September 2008**

KEY RESEARCH FINDINGS | AVERAGE SOIL | NEW ZEALAND

- EcoCover will increase the total organic carbon in the soil, sequestering carbon dioxide [CO_2], mitigating climate change
- A single application of EcoCover may sequester an additional **188.6+ tonne/hectare*** [t/ha] of CO_2 over a two [2] year period compared to soil under bark
- This would have a monetary value based on tradable carbon credits of **USD $6,365 /hectare**** based on the New Zealand Government forecast for carbon trading prices in 2008
- EcoCover will also deliver **236,000+ litres/hectare*** [l/ha] of free water as a result of the increased organic carbon content of the soil

Notes:

* **This** is the New Zealand interim research data. Results are soil / climate dependent and will differ from country to country

** **This** monetary value is calculated from EcoCover's independent research data, standard conversion tables for soil / CO_2 sequestration and a carbon trading value presently used in the future carbon calculations of the New Zealand Government.
EcoCover makes no claim as to how a user of the product might financially benefit from this carbon credit $$ value. Exchanges will have different: rates [$$ value] of exchange; audit requirements [time and substance]; and calculations for the annual values that can be claimed in respect of actual cash remuneration year on year.

BACKGROUND

Recent research in geophysics and biology has provided a new, broader perspective on climate change. This research shows that the most effective answer to sequestering large volumes of greenhouse gases, particularly CO_2, is through soil using natural biology.

Sequestering and conserving greenhouse gases can be effectively achieved by promoting and nurturing the growth of top soil which acts as a net sink for both carbon and nitrogen. Despite beliefs to the contrary, soil is a renewable resource and growing new soil is very much like growing a tree – both processes require carbon dioxide, water and light to fuel the production of photosynthetic materials. In trees, some of the carbon sequestered from the atmosphere combines with other elements to form new wood. In the upper horizons of soil, some of the carbon sequestered from the atmosphere via green plants combines with weathered mineral particles to form new topsoil. Microbes and water are an essential part of this equation.

The world's soils hold three times as much carbon as the atmosphere and over four times as much carbon as the vegetation. Soil therefore represents the largest carbon sink over which we have control. ***Groundcover management*** is the prime determinant of whether soil acts as a source *[net loss]* or a sink *[net gain]* for atmospheric carbon.

Recognition as to the importance soil plays in the Earth's climate change debate is growing.

- The British Royal Society has called for soils to be the primary focus for global carbon sequestration
- The United Nations is now focusing more actively on promoting natural biological systems for sustainable management
- Refer the attached 2008 newspaper articles – Sydney Morning Herald, The Australian Financial Review

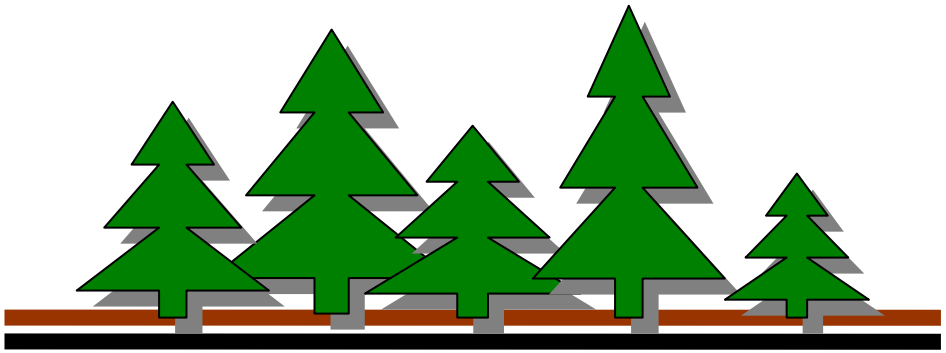
The EcoCover Landcare System has been independently tested and proven to increase and sustain soil carbon, with correlating increases in soil moisture and natural fertility. EcoCover provides a natural soil skin, balanced to secure moisture in the soil and provide an incubator-type environment for healthy topsoil growth. EcoCover's patented laminate can also deliver to the soil speciality minerals and trace elements like no other groundcover.

The components of this soil science has been well known to 'organic' advocates for many years; however the significant contribution EcoCover can make to the imperative of climate stability has only recently been highlighted through the results of research and the improved understanding of the science of climate change

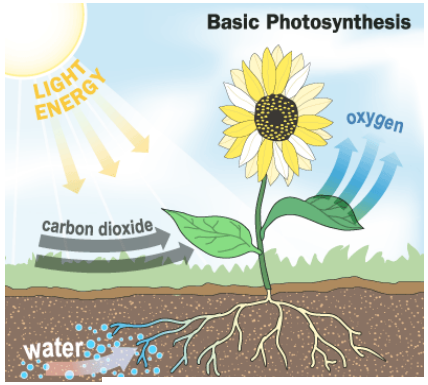
Notes:

- The processes that build new topsoil require that *more carbon* be stored in soil than is lost to the atmosphere
- When carbon dioxide is removed from the atmosphere and stored in the biosphere as either organic or inorganic carbon it is said to be **sequestered**
- Places where carbon is stored are called carbon sinks
- Green plants are the conduit between the atmosphere and the soil and provide the 'way in' for soil carbon. At the plant roots, an interchange with soil microbial life occurs that enables long term organic carbon and nitrogen storage in the soil.

Yesterday | ozone layer protection; bio mass in trees and plants; healthy top soil sequestering greenhouse gasses such as CO_2



Healthy soil, healthy plant growth

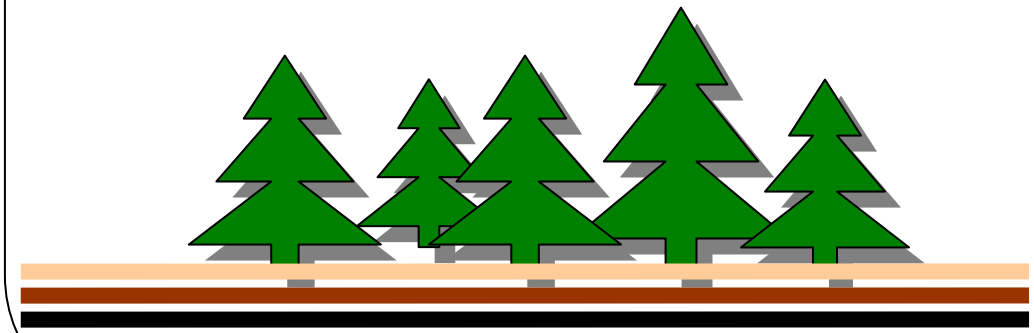


www.howstuffworks.com

Today | depleted ozone layer; depleted bio mass; depleted soil; climate change

Degraded soil, prone to erosion, high moisture loss and decreasing productivity

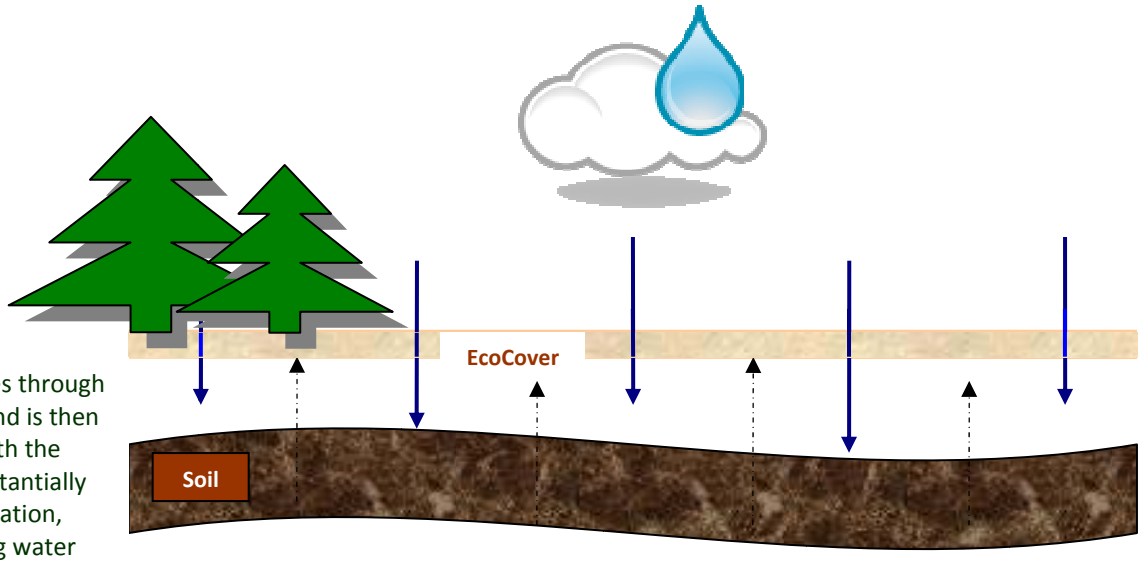
Tomorrow | with EcoCover's patented landcare system. A groundcover management protection system that: enables soil remediation; stops erosion; delivers higher retained moisture levels and total soil carbon; increases the biomass; achieves higher levels of CO_2 sequestration; thus leading to a recovery of the ozone layer; and the reversal of climate change



EcoCover Landcare system reverses soil degradation, increasing productivity

EcoCover is an intelligent new technology, with systems designed and developed to sustainably reverse soil degradation, water shortages and climate change

ECOCOVER'S PATENTED LAMINATE TECHNOLOGY PROTECTS AND REPLENISHES THE SOIL



Moisture moves through the laminate and is then trapped beneath the EcoCover, substantially slowing evaporation, thus conserving water

EcoCover's patented laminate can carry nutrients, fertilizers, minerals to the soil via leaching and biodegradation over time

Key statement
EcoCover increases the organic carbon in the soil and traps the extra [free] water

The EcoCover Landcare System has over many years been independently tested and proven to increase and sustain soil carbon, with correlating increases in soil moisture and natural fertility. EcoCover provides a natural soil skin, balanced to secure moisture in the soil and provide an incubator type environment for healthy topsoil growth. This soil contains valuable sustainable nutrients, a healthy geomagnetic field and active microbial life for optimising the growth of sustainable vegetation. EcoCover's patented laminate can also deliver to the soil speciality minerals and trace elements like no other groundcover. A 5 year University research study commenced in September 2008 on the very question of EcoCover and soil carbon.

The necessary soil science has been well known to 'organic' advocates for many years; however the nuances and imperatives of climate stability have only recently been highlighted by connecting the dots relating to greenhouse gases.

BENEFITS OF INCREASING THE ORGANIC CARBON LEVELS IN SOIL

Managed groundcover for sequestering and storing large volumes of soil carbon results in improved soil structure, lower bulk density, greater porosity, higher infiltration rates, more effective use of rainfall, enhanced water quality, greater sequestration of nitrogen and sulphur, enhanced availability of phosphorous and trace elements, reduced costs, reduced chemical inputs, improved biodiversity, increased productivity, improved soil stability, resistance to erosion, significantly reducing the impact of dryland salinity, reducing sedimentation rates in rivers and streams, improving air quality and decreasing the impact of the Greenhouse Effect and climate change.

These positive outcomes are all linked to what could be the core business of every 'soil based' enterprise - the sequestration of atmospheric carbon. With changes to management regimes there is no doubt significantly more carbon can be stored in soils than they currently hold and losses reversed.

Dr Lal, director of carbon management and sequestration centre at Ohio State University said, *"the amount of carbon that can be restored to the world's degraded soils will directly influence global food security and climate change within our lifetime."*

The maths:

- every tonne of carbon lost from soil adds 3.67 tonnes of carbon dioxide [CO_2] to the atmosphere
- conversely, every one tonne increase in soil carbon represents 3.67 tonnes of CO_2 sequestered from the atmosphere and removed from the greenhouse equation
- another way of expressing this relationship is that every 2.7 tonnes of carbon sequestered in soil represents 10 tonnes of CO_2 removed from the atmosphere.

ECOCOVER AND CARBON CREDITS

For an understanding of Carbon Credits, go to: **http://www.amazingcarbon.com/carbon-credits.html**

Sequestered carbon is a tradable commodity. Carbon trading has different values in different markets and the price is subject to market fluctuation.

Independent research trials in New Zealand has validated that EcoCover can return carbon credits of [some] USD $0.64 /sq.m. [USD $6,365 /ha] from just 30cm of soil depth over two years. Over time, as the soil begins to further recover this carbon number would continue to increase whilst bare soil would decrease.

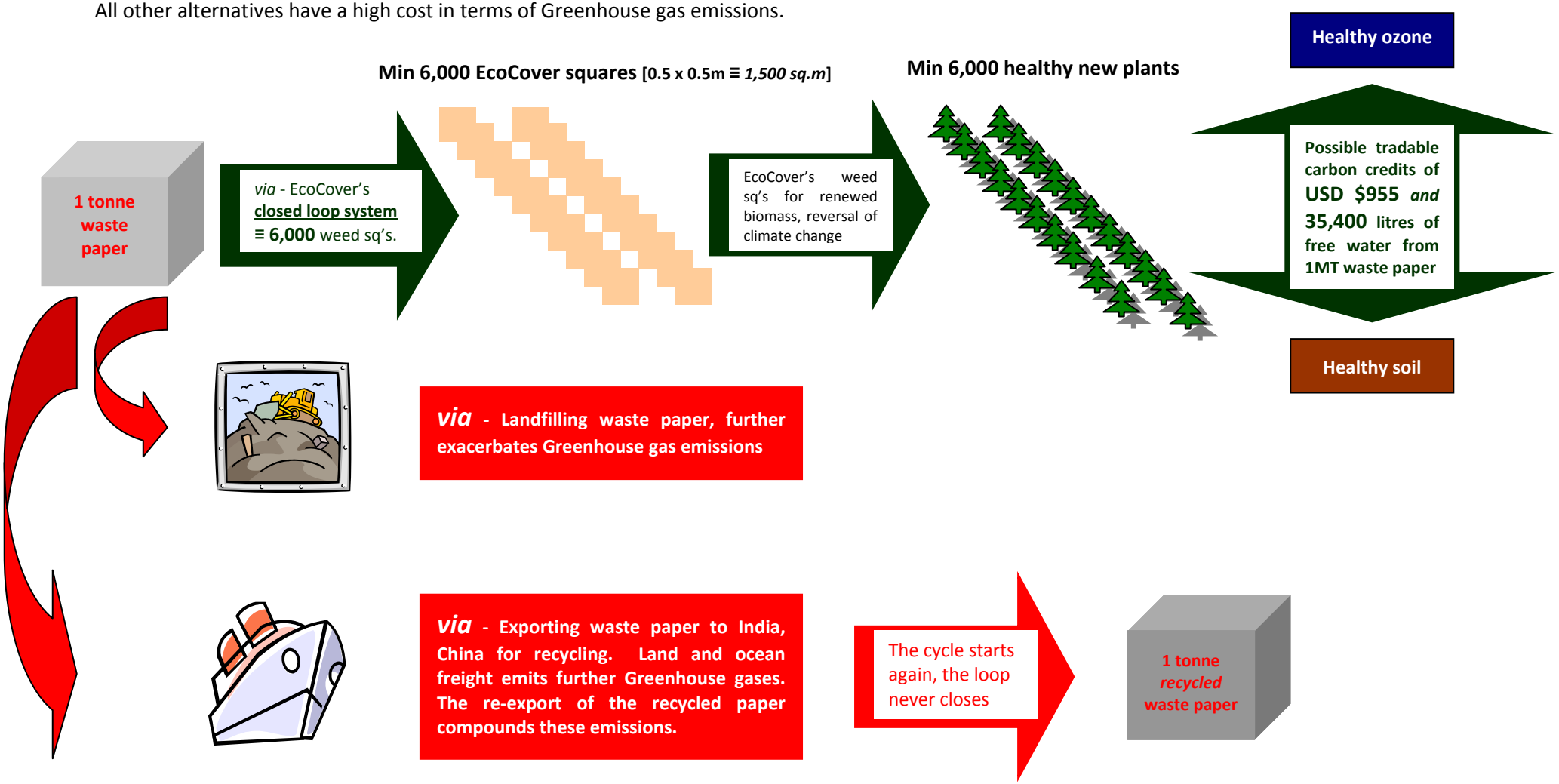
Soil under the EcoCover Landcare system with new plantings, increased total soil carbon 2.1% over two years, sequestering increased levels of [some] 188.6+ tonnes CO_2 per hectare, or 18.86kg CO_2 per sq.m. *A copy of the research analysis report is available upon request.*

ECOCOVER'S CLOSED LOOP SOLUTION TO PAPER WASTE AND CLIMATE CHANGE IMPACT BENEFIT

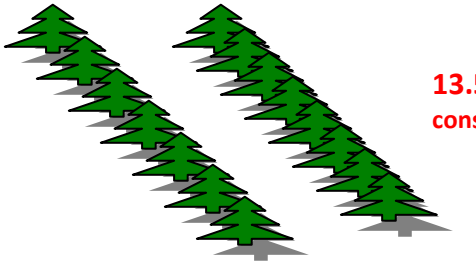
EcoCover's closed loop solution for Governments' waste paper problem. With EcoCover, the waste paper over time simply degrades in an environmentally friendly way back into the soil, building the organic carbon in the soil, trapping moisture, improving soil health and productivity.

I tonne of waste paper produces approx ***6,000 EcoCover weed squares*** [0.5m x 0.5m], ***protecting 6,000 trees,*** building the earth's biomass, mitigating climate change and generating possibly **USD $955 in carbon credits** and **35,400 litres of free water** to 30cm depth.

All other alternatives have a high cost in terms of Greenhouse gas emissions.



Common references show that to produce 1 tonne of paper it takes



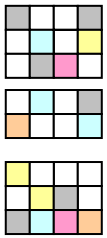
13.5 mature trees with possible consequential erosion

5.4 tonnes carbon released [consumed] during paper production and 5,000 litres of water consumed

1 tonne *[waste]* paper

1 tonne of waste paper, usually given away at no cost, in fact has a market price of approx. **USD $195 /MT.** Placed into the EcoCover closed loop system this waste could generate carbon credits to the value of approx. **USD $955.** A 500% added value increase, higher if the paper waste is historically given away.

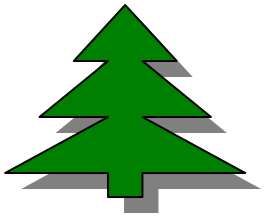
EcoCover's closed loop solution made simple. Current practise is usually for Governments' to give this valuable waste paper resource away free



Just 32 sheets of A4 office paper waste will produce

one 0.5m x 0.5m EcoCover landcare weed square

Protecting **one** new tree planting



Delivering approx. **USD $0.16** in carbon credits from the soil remediation alone plus the tree's CO_2 mitigation and **5.9 litres** of free water

Key Statement - EcoCover is bio mimicry technology – post consumer waste from trees is processed in such a way that the product helps to put the tree back to replace the bio mass lost in the first place.

It is only a matter of time before Carbon Credits from soil carbon sinks are freely traded on a voluntary market and first movers will benefit from this opportunity. Forecasters have suggested that carbon is poised to become the world's largest commodity market, generating financial innovation in hedge funds, futures and derivates. Carbon emissions are a global problem and credits for both emission reduction and carbon sequestration are an important part of the global solution.

Anything that removes tree cover and topsoil, leading to increases in the amount of bare ground results in the loss of organic carbon. If bare earth is produced by chemical or mechanical means, we also burn fossil carbon in the process, further adding to atmospheric pollution.

The innate properties of the EcoCover landcare system substantially enhance the biological activity in soil, ensuring an embodied energy surplus during the life cycle of the program and beyond.

Photosynthesis is enhanced because of the increased nutritional and moisture values for the root system of the vegetation.
Soil life thrives in the enhanced dark, moist conditions which occur when the EcoCover system shields soil from ultraviolet radiation, whilst the soil temperature is stabilised day and night by a warm blanket effect.
As a result of these compelling factors the EcoCover landcare program cost effectively redresses some of the detrimental energy and climate damage caused by urbanisation and suboptimal rural landcare.

EcoCover not only restores valuable carbon nutrients to the soil, as a greenhouse gas sink, it also compensates for the initial damage caused by felling trees for paper, in a **cradle to cradle** system of implicit elegance.

ORGANIC CARBON AND FREE WATER

Without water, photosynthesis cannot take place

The significance of soil water is becoming more apparent as we lose soil carbon. Low moisture and low levels of soil organic carbon go hand in hand. In these days of Climate Change, water is worth its weight in gold

The plant absorbs carbon dioxide [CO_2] from the atmosphere, draws water up through its roots and uses light to photosynthesis sugars, which it uses as food. It excretes oxygen [O_2] as a by product of the process.

Increasing the organic carbon level in the soil means a healthier soil that retains moisture compared with degraded soils that lose moisture. EcoCover provides significant benefits in two ways:

- University research proves EcoCover will retain up to 80% moisture in the soil by slowing down evaporation
- EcoCover will build organic carbon levels in the soil further improving the volume of water available for plant growth, and
- 236,000 litres per hectare of long term “free water” [in addition to the improved short term moisture retention above] has been proven to be available under EcoCover compared to adjacent bare soil

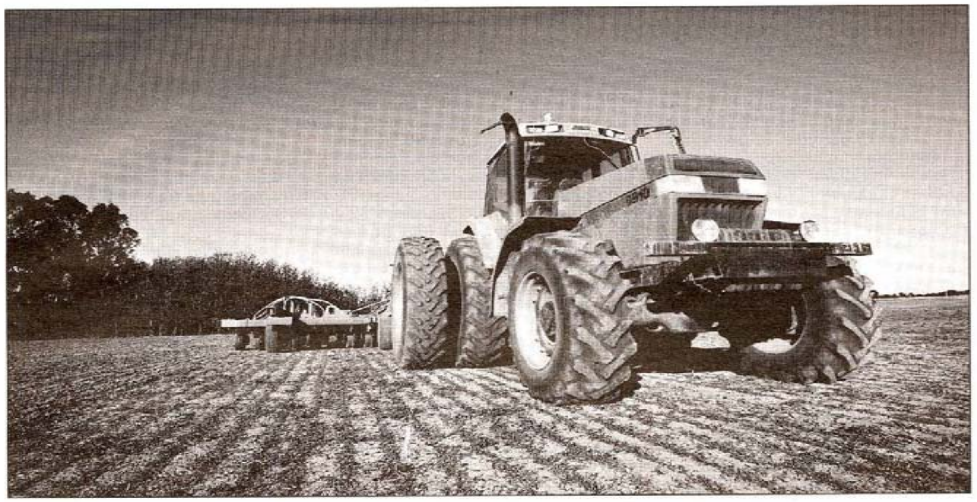
EcoCover is the world’s most complete, patented groundcover management system, delivering benefits to the soil that impact on global climate change, increasingly scarce water for food and plant production, in addition to offering a unique closed loop system for paper waste

EcoCover’s Sustainable Landcare System | The Responsible Choice

The Australian Financial Review
www.afr.com • Wednesday 5 March 2008

It pays to stop treating soil like dirt

Our prosperity and ability to meet greenhouse targets rely on soil management, writes **Andrew Campbell**.



Healthy soils retain, store and filter water resources, and recover quickly after a drought. Photo: JESSICA SHAPIRO

Food, water and energy security are finally being recognised as the most important national and international security issues, but an important element has been missing from the discussion — the soil.

That was the case until the Prime Minister's announcement at the Australian Bureau of Agricultural and Resources Economics conference yesterday that Agriculture Minister Tony Burke would look into ways to incorporate soil carbon in emissions trading.

Kevin Rudd's announcement was welcome recognition that Australia will be unable to maintain its food exports, achieve water security or meet its greenhouse targets without a major improvement in soil management.

As a rule of thumb, every calorie we consume requires a litre of water to produce. With increasing population and changing consumption patterns (like increasing meat consumption in China), the world will need to produce twice as much food by 2050 as it does now, from about the same amount of land and water, or probably less.

In the past, we have kept up with increasing food needs mainly by clearing and irrigating more land, diverting more water resources, using improved varieties and applying more fertilisers. Those options are narrowing.

The International Water Management Institute recently found that existing water resources are already fully utilised or over-allocated in most of the world's great food production basins. Moreover, many countries are now reallocating land and water resources from food to energy by growing biofuels.

Clearing more land for agriculture is highly undesirable from a greenhouse perspective. There will be an increasing squeeze on food production from climate change, reduced water availability and increasing energy and fertiliser prices. We are already seeing rising food prices. How to beat the squeeze?

One of the most fascinating aspects of the climate change debate is not water, or energy, or greenhouse gas emissions per se, but the intersections between them. They usually involve wicked trade-offs. For example, many water supply "solutions", such as desalination plants, are energy guzzlers. Biofuels to improve energy security use a lot of water and land (and energy in their full production cycle). Reforestation for carbon sinks also consumes energy, land and water.

In this tricky context, improving soil management delivers win-wins all around.

Soil structure and fertility (soil health) is fundamental for food production. The soil contains 55 per cent of Australia's terrestrial carbon store (vegetation the rest). Healthy soils retain, store and filter water resources, reducing run-off, absorbing waste and recharging groundwater aquifers. Good soil management can make the difference between getting a harvest and not getting one in a poor season, or between minimal erosion losses and major land degradation during drought or flood. Well-managed soils recover quickly after drought.

Improving soil organic matter (carbon) content should be a priority goal for public policy. At a broadacre scale, building soil carbon is achieved mainly through farming systems that maintain higher levels of groundcover, retain trash and stubbles, and make better use of perennial plants.

Rudd is right to identify the importance of soil carbon, but delivering approaches that make good public policy and can be adopted widely by land managers won't be easy.

Soil conservation extension services have been run down. The teaching of soils at tertiary levels has declined. Soil resources monitoring programs are patchy and fragmented, like the overall soils information base, and we lack user-friendly tools for people to measure soil carbon.

We are unable to determine in a nationally consistent manner with any authority, whether the condition of our soils is improving or deteriorating. We accept without question the need for good economic data to inform economic policy decisions, yet we continue to underinvest in basic national data about natural resources like soil.

There is a strong demand for soils information, but people with the know-how to access and interpret existing information are scarce and aging. Soils research is fragmented, thin and under-resourced.

The time is ripe for a coherent, genuinely national focus on improving soil management.

■ *Andrew Campbell is an environmental consultant and an independent director of the Co-operative Research Centre for Future Farm Industries.*

The Sydney Morning Herald

Better soils can soak up carbon emissions – fast

Carrie LaFrenz

MANAGED farmlands could help mop up much of the carbon emitted into the atmosphere, converting a hazard into a productive opportunity, some farmers and scientists say.

The scientists say Australia has the largest greenhouse gas emissions per capita in the world and carbon storage in soil has been largely overlooked as a solution for cutting the carbon footprint.

Biological Farmers of Australia say that soil managed under organic and other regenerative farming systems could be an important tool for combating the warming effect of greenhouse gases.

"Carbon can be stored in the soil in the form of stable humus fractions, which can last for more than a thousand years – longer than most trees live," said Greg Paynter, a soil health technical adviser and spokesman for the farmers' group.

The Australian Society of Soil Science says about 1500 gigatonnes of carbon is stored in soils worldwide, twice the amount that is stored in plants, and double the amount that is contained in the atmosphere.

(One gigatonne is the equivalent of 1 billion tonnes.)

The director of the consulting group Organic Knowledge, Alasdair Smithson, said the potential benefits from soil carbon capture and storage had not received enough attention from policy makers.

"Well-managed soil is a highly effective method of storing carbon from the atmosphere," he said. "It happens in real time – not like planting a tree, which can take 25 years to mature."

Zucchini capture ... Andrew Monk, organic farmer and technical officer for Biological Farmers of Australia, on his property. Photo: Angela Wylie

Mr Smithson said carbon soil storage could provide farmers with additional income via carbon credit trading schemes.

The Prime Minister, Kevin Rudd, who recently ratified the Kyoto Protocol, has said that a national carbon trading scheme will be in place by 2010.

The "benefits [of ratifying the protocol] could be significant in the near future, with developments in carbon trading programs meaning farmers could be paid for sequestering carbon as an additional farm income in the future," Mr Smithson said.

One such carbon facilitating program is the Australian Soil Carbon Accreditation Scheme, begun early this year in collaboration with 14 organisations. They include the West Australian Department of Agriculture and Food and the mining group Rio Tinto.

The scheme pays participants carbon credits for activities that reduce levels of atmospheric carbon dioxide by returning it to the soil.

Some forecasters have suggested that carbon is poised to become the world's largest commodity market.

The World Bank says that the value of the global carbon market tripled in 2006 – to $US30 billion ($32.2 billion) from $US10 billion in 2005.

The ecologist and founder of the Australian Soil Carbon Accreditation Scheme, Christine Jones, said that in a healthy ecosystem soils were a dynamic part of the carbon cycle.

"When people think carbon, they usually think trees, but in reality 82 per cent of carbon in the terrestrial biosphere is in the soil," she said.

"A 1 per cent increase in soil carbon in just 10 per cent of Australia's farmland could remove 10 years' worth of Australia's CO_2 emissions, while a 4 per cent increase in soil carbon could remove 40 years worth."

Dr Jones said putting carbon back into soil required the adoption of regenerative farming and grazing methods that resulted in the formation of new topsoil.

Groundcover, which needed topsoil and included plants and crop stubbles, provides the channel between the atmosphere and the soil, providing the "way in" to soil for carbon, she said.

"Carbon can not be sequestered in soils if we continue with the same forms of land management that cause the carbon losses in the first place," she said.

"People cannot function without a skin, soil cannot function without cover."

Agriculture accounts for 30 per cent of the world's carbon emissions and 17 per cent of Australia's total carbon emissions, the Australian Bureau of Agricultural and Resource Economics says.

Agencies