Carbon Coalition Against Global Warming[1]

Submission to
Legislative Assembly Standing Committee on Natural Resource Management (Climate Change)

17th December, 2008

Contents

Introduction

The Carbon Coalition Against Global Warming is an alliance of farmers, land managers, and soil scientists. Formed in late 2005, its mission is to campaign for the right of farmers to access the trading value of the carbon

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they can grow in their soils.

The Carbon Coalition welcomes this opportunity to reveal to the Committee the soil carbon phenomenon and the dramatic potential it has for addressing Natural Resource Management and Climate Change issues simultaneously.

Information about soil carbon and the Carbon Coalition can be found at the following sites: www.carboncoalition.com.au http://carboncoalitionoz.blogspot.com and www.carbonfarming.net.au

Scope of Submission

The Carbon Coalition Against Global Warming wishes to submit relevant information to address the following terms of reference of the enquiry:

b) Options for ensuring ecologically sustainable natural resource use, taking into particular account the impacts of climate change;

(c) Approaches to land and water use management practices on farms and other natural resource management practices, having regard in particular to the role of such practices in contributing to climate change or as a tool in helping to tackle climate change;

(d) The effectiveness of management systems for ensuring that sustainability measures for the management of natural resources in New South Wales are achieved, having particular regard to climate change; and

(e) The likely consequences of national and international policies on climate change on natural resource management in New South Wales.

Soil Carbon Solution

The “Soil Carbon Solution” provides answers for these challenges:

b) achieving ecologically sustainable natural resource use in a climate change environment

(c) identifying land and water use management practices as a tool to tackle climate change;

(d) choosing management systems for achieving sustainability measures for natural resources in New South Wales

(e) consequences of national and international climate change policies on natural resource management in New South Wales

Soil Carbon and Climate Change

Climate Change is expected to mean the following for Australian landscapes:

1. General increases in temperatures – hotter summers, warmer winters
2. Less rainfall particularly in the south during winter and spring
3. Increased frequency of dry seasons
4. Increased evo-transpiration
5. Greater frequency and intensity of extreme weather events
6. Reduced flows in inland waterways.[2]

The Carbon Coalition contends that increasing soil carbon levels and the processes required to do this are an effective strategy for adapting to and compensating for these conditions.

Increasing soil carbon levels in the 450m Ha of agricultural soils in Australia and the 5.5bn Ha of agricultural soils in the world is also an effective strategy for absorbing excess CO2 from the atmosphere and reducing the severity of Climate Change.

What is Soil Carbon?

Soil Carbon is one of the many resting places of Carbon as it cycles throughout the biosphere (the liveable area on the planet). Carbon is the basic chemical building block of all life on Earth. It also resides in mineral form in rock formations and in fossil fuels, coal and oil as well as in the ocean. The amount of Carbon on Earth is fixed. So the many processes that use it need to access a supply of it and have somewhere to get rid of

[2] CSIRO analysis of IPCC 3rd Report

it. The result is a cycle as Carbon moves between the oceans, rocks, soil, and atmosphere.

There are 38,000 Gigatonnes (Gt) of carbon stored in the oceans, 2500 Gt/C in soil, 750gt/C in the atmosphere, and 650 Gt/C in forests, grasslands, and other vegetation[3] (The "Greenhouse" effect is caused by the cycle getting out of balance, resulting in the atmosphere housing more on a rolling basis than it was designed to hold in order to manage stable weather patterns.)

Photosynthesis is a process that cycles Carbon out of the air and into plants, to be eaten by animals and humans as well as being deposited in soils. Photosynthesis is the only process that can take CO2 out of the atmosphere. It separates the C atom from the O atoms, releasing the Oxygen and incorporates the C in the plant, or transfers it to the soil where it becomes humus or other forms of Carbon. Some of it is released into the air if plants die and oxidize or dry out, or rot, releasing C in the form of methane.

Soil Carbon takes two main forms: 1. All the decomposed bodies of microbes such as bacteria, fungus, nematodes and root systems that die when plants are grazed as well as other decomposed plant residues. These forms of Carbon can be cycled quickly, within weeks. 2. The Carbon which is incorporated into the soil itself, such as humus. In these forms it can remain stable for thousands of years.

Total Organic Carbon is the amount of C stored in the soil of whatever type, source, or location. It can be measured very accurately. While soil carbon is subject to "flux" – different amounts can be measured according to time of day, time of year, and weather conditions – averaging techniques make assessing the amount of increase or decrease in soil C percentage possible.[4]

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[3] *Lal, R., "Soil Carbon Sequestration in Latin America", in Carbon Sequestration in Sils of Latin America, Haworth, 2006*

[4] Kimble, B*, "Advances in Models to Measure Soil Carbon", in Carbon Sequestration in Sils of Latin America, Haworth, 2006*

The Benefits of Soil Carbon

Soil carbon improves the fertility and health of soil which is the source of life.

Soil carbon:

- increases soil's ability to transfer nutrients to plants, for greater productivity which can improve farmers' incomes.

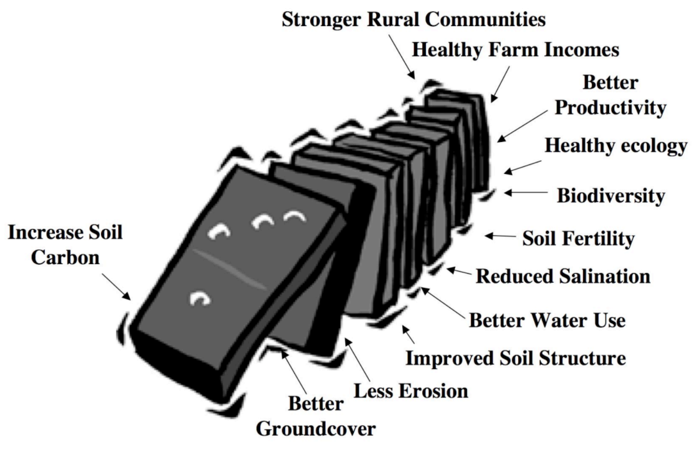
- increases soil's water-holding capacity, holding the water until it can be used by the plants rather than letting it run off into waterways.

- increases soil stability which means greater resistance to erosion, which in turn means cleaner waterways.

- reduces recharge to groundwater and can reduce or eliminate salination

- has a direct relationship with biodiversity: soil organic matter contributes to the health of soil microbial 'wildlife' and micro-flora which are the very start of the food chain. Greater diversity at this level translates into greater diversity above and below the ground.

Carbon is a major component of soil and catchment health.[5]



The Benefits of Soil Carbon

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[5] *Reed, D. Economic and Societal Benefits of Soil carbon Management: Policy Implications and Recommendations, Soil Carbon Management, Kimble, et. Al. CRC Press, 2007*

Soil Carbon and Natural Resource Management

The greatest interaction between Humanity and Nature takes place in the field of Agriculture.

Farmers control around 60% of the terrestrial surface of the Earth. The land management approach they take has a profound effect on the natural resource base.[6]

Traditional European farming practices were not sympathetic to conditions in the Southern Hemisphere and the result has been losses of productive resources. Eg. Australia is said to have lost at least 50% of its topsoil and that soil has lost 70% of its organic matter in 200 years. [7]

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[6] *Mayeux, H., Foreword, Follette, Kimble, & Lal, The Potential for US Grazing Lands to Sequester Carbon and Mitigate the Greenhouse Effect, Lewis, 2001*

[7] *° Dr Christine Jones,, "Aggregate or aggravate? Creating Soil Carbon", YLAD Living Soils Seminars: Eurongilly - 14 February, Young - 15 February 2006. ° Lal, R., "Soil Carbon Sequestration in Latin America", in Carbon Sequestration in Sils of Latin America, Haworth, 2006. ° Percentage losses of organic carbon from Australian soils, already low in carbon compared to European soils for example, varied from 10–60 per cent over 10–80 years of cultivation. Russell JS and Williams CH (1982). Biogeochemical interactions of carbon, nitrogen, sulphur and phosphorus in Australian agro-ecosystems. In The Cycling of Carbon, Nitrogen, Sulphur and Phosphorus in Terrestrial and Aquatic Systems. (Eds LE Galbally and JR Freney) pp. 61–75 (Australian Academy of Science: Canberra).°'More than 75 per cent of Australian farming soils have organic carbon contents less than 1.75 per cent, indicating a widespread need to improve soil organic matter concentrations.' Dr Brian Tunstall, Environmental Research and Information Consortium, and formerly with CSIRO. James Porteous and Steve Davidson, "Saving the life of farmland soils", ECOS, DEC/JAN 2007, CSIRO ° Brian Tunstall calculates that an average organic matter increase of 2 per cent to a depth of 30 cm, achievable in many clay soils, represents a sequestration of 35 tonnes of carbon or 128 tonnes of CO2 per hectare … and there are many hectares of farm land.. James Porteous and Steve Davidson, "Saving the life of farmland soils", ECOS, DEC/JAN 2007, CSIRO ° Estimates of pre-clearing soil carbon levels in Australia range from < 10 t/ha to 30 cm depth in arid areas to > 250 t/ha to 30 cm depth in highland areas of the Southern Alps and Tasmania and coastal swamps. Adrian Webb (Editor), "PRE-CLEARING SOIL CARBON LEVELS IN AUSTRALIA", National Carbon Accounting System Technical Report No. 12 Australian Greenhouse Office, March 2002*

There are two theories for restoring the natural resource base to health:

1. Remove stock and lock it up.
2. Move stock and build it up.

The first theory is popular with those who believe in the possibility of returning to an 'arcadian past' when everything was 'native' to the environment. But which past and which environment? Tim Flannery in The Future Eaters revealed that the first human invasion of the continent of Australia dramatically changed the flora and fauna by the farming techniques employed.[8]

"Firestick farming" by Indigenous people burnt many species of plant to extinction and hunting saw the disappearance of the megafauna. However, some commentators claim that, prior to 1770, this race of farmers lived in a way that was more sympathetic to the landscape. But which landscape? They were not sympathetic to the landscape they found when they arrived 40,000 years before white settlers. However they lived in harmony with the landscape as they had changed it to suit their practices. They achieved a state of sustainability. But only after a period of disruption.

In following the pattern set by their Indigenous forerunners, White European settlers are still in the disruption stage of their occupation. And now they are seeking to achieve a state of sustainability. Returning to the state of balance that existed in 1770 is not possible. A new state of balance must be sought, that is sympathetic to the natural resource base.

Locking up land and removing stock can lead to 'bare earth' and desertification because it ignores the symbiotic relationship between plants and animals. Native grasslands – which covered vast areas of Australia in 1770 – need to be grazed and disturbed by stock, then given time to recover, in order for the mechanism of soil carbon manufacture to operate. Grasses left to go rank "oxidize" (emit Carbon) as they dry out and their shadows keep the sun away from new shoots. Consequently groundcover reduces. And deserts begin.

Instead, a new sustainability which includes increased biodiversity and native species can be achieved by the change to Carbon Farming. Carbon Farmers report increases in species of insects, birds, marsupials, and lizards as well as increase numbers of species of native plants as they transition to the new way of farming.

Allan Savory, winner of the 2003 Banksia Environmental Award, discovered the symbiotic relationship between grazing animals and native grasses. [9]

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[8] *Flannery, T., The Future Eaters, Reed, 1994*

[9] *. Allan Savory is a wildlife biologist and founding director of the Savory Center for*

The key to increasing soil carbon is biological activity in top soil. Soil carbon is created by insects and microbes living and dying. They do a lot of living and dying when there is a lot of root activity in the soil – vigorous growth and regular decaying of rootmass. Roots that are continually reaching down deep into the soil and then dying back and retreating. Their rotting remnants feed the microbes which produce the soil organic carbon. [10]

This activity is encouraged when the plant is grazed, but not entirely, then disturbed and fertilized by the action of grazing animals, and then given a lengthy time to recover its foliage. With this recovery comes the recovery of rootmass and so the cycle goes on. Savory invented a grazing management system to encourage this activity. By "moving" the stock in concentrated groups relatively quickly through a large number of small paddocks, grazing management encourages the growth of plants, soil and soil carbon.

Grazing management is one of the fundamental techniques that make up a new approach to agricultural landscape management known as Carbon Farming.

Holistic Management in Albuquerque, New Mexico. The Zimbabwe-born scientist has won international acclaim for his innovative methods to reverse desertification, now being used successfully around the world. In 2003 he received the Australian Banksia International Award for the person or organization doing the most for the environment on a global scale. Allan's book, Holistic Management: A New Framework for Decision Making, Island Press 1999, is today in use in a number of colleges and universities.

[10] *There are cities and towns and villages, whole societies living down under the soil. They are connected by highways and contain millions of creatures just trying to make a living, from one-celled bacteria, algae, fungi, and protozoa, to nematodes and tiny microscopic spiders, to earthworms, insects, and ants. Dr Jill Clapperton, "Managing the Soil as A Habitat," Canadian Rhizosphere Ecologist, South Australian No Till Farmers' Association Conference, February 2007.*

Carbon Farming and Natural Resource Management

Carbon Farming is not a new practice. It is a new way to describe a collection of techniques which can increase soil organic carbon in agricultural land. Land management practices that encourage healthy, growing soil microbial communities and, in so doing, create soil organic carbon and strengthen the natural resource base, include the following:

100% groundcover 100% of the time - This is a Carbon Farmer's goal. Soil covered by plants cannot be blown or washed away. It is cooler and more attractive to microbes than if it was exposed to the sun. Therefore over-grazing ("flogging the land", in Australian parlance) and burning grasses and stubble and ploughing are anti-carbon actions. In fact, they release tonnes of carbon into the atmosphere. These practices, along with clearing native vegetation, have put Agriculture in 2nd place, behind coal-burning power stations, as the biggest source of Australia's Greenhouse Gas emissions.

Grazing management – Stock are concentrated in small paddocks for short periods (days) so that they graze evenly and at the same time 'til' the soil with their hooves, stomping old grass and manure into it. The plants are then left to grow a full head of foliage so that their roots go down as far as possible into the soil. When they are grazed, the roots die back upwards in proportion to how much of the foliage was eaten. Overgrazing can cause the roots to shrink so short they struggle to get started again. So short grazing periods and long periods of rest are best.

No till cropping – Ploughing disturbs the microbes and dries out the soil. It also releases tonnes of CO2 per hectare. 'No til' techniques sow the seed in the top soil without tearing off the existing foliage or applying herbicides which are also bad for microbes. There are several no till techniques, including "Pasture Cropping" and "Advanced Sowing". The one 'direct drills' the seed into pasture while the other slices a line through the pasture and inserts the seed. The crop grows up above the pasture and can be harvested or grazed. The pasture usually thickens and grows more vigorously after such treatment.

Mulching – This takes two forms: 1. Covering bare earth with hay or dead vegetation. This protects the soil from the sun, cools it, and attracts soil-producing microbes. It also holds water where it can be used instead of letting it run off immediately. 2. Cutting down and dessicating tall, dead plants and thistles to form a layer of litter on the soil and allow the sun to penetrate and foster plant growth. Gardeners know the value of mulching.

Water management systems – Water is essential to the carbon growing process. Several systems have emerged for maximising us of water that falls on a farm. Two names are prominent: Natural Sequence Farming (NSF) and Yeoman's Keyline System. NSF slows the flow of water through the landscape by returning eroded gulleys and creeks to swampy meadows and chains of ponds that they were when white settlers arrived. The water stays long enough to make more grass and plants grow, rather than rushing down widening gullies carrying the topsoil away. NSF is based on the natural topography of the land. So is Keyline Planning. It uses the shape of the land to determine the layout and position of farm dams, irrigation areas, roads, fences, farm buildings and tree lines. Both methods increase soil fertility and carbon

Biodynamics – This is a method of treating soil, based on the theories of mystic and theorist Rudolf Steiner. He postulated that vital forces or energies flowed throughout the universe and that these can be harnessed to increase plant growth. Biodynamics adopts a homeopathic approach to preparing natural fertiliser and times activities to align with cycles of the moon and the stars. Many ordinary, sober farmers report great results with biodynamic preparations

Biological Farming – This is the umbrella term for the use of natural compounds to stimulate biological activity in the soil. These compounds range from compost teas (concocted after an analysis of the soil for deficiencies), worm 'juice' (active enzymes created from worm castings), Biosolids (human effluent which needs to be plowed into the soil for hygene and odour reasons (not a favourite of carbon farmers), Nitrohumus (treated human effluent, needs no ploughing) etc.

Composting - This largely involves breaking down manure into a rich humus ready to spread on the fields. There is also a growing movement for recycling green wastes from cities for use on agricultural lands.

Trees – Trees scattered across grasslands ("Grassy woodlands") provide shelter for stock and wildlife and also have the effect of causing the soil adjacent to be richer in carbon. They can also assist in the management of water movement. And they contribute directly to increase yields and productivity in both livestock and crops, with reported increases of between 20% and 40%. [11]

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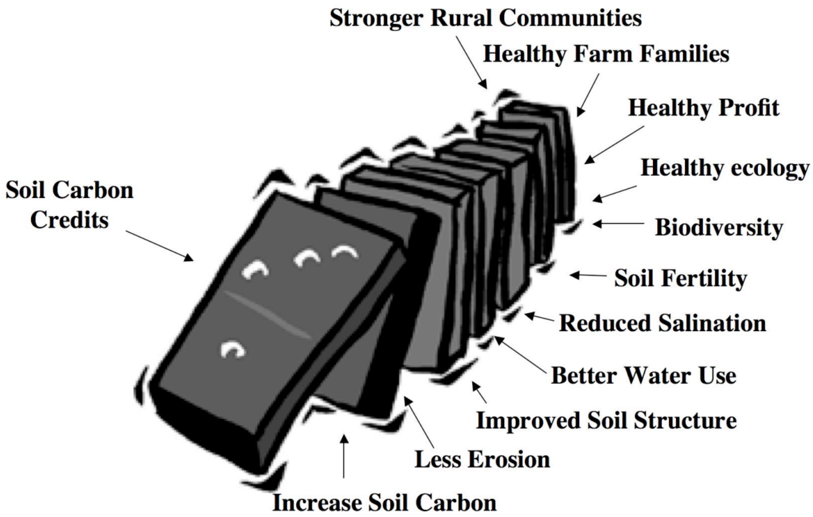
[11] *Gillespie, R. (2000) Economic Values of Native Vegetation, Background Paper Number 4, Native Vegetation Advisory Council, Sydney. Lockwood, M., Walpole, S.C. and Miles, C.A. (2000), Economics of remnant native vegetation conservation on private property, LWRRDC Research Report 2/00, LWWRDC, Canberra. Miles, C.A., Lockwood, M. Walpole, S., Buckley, E. (1998) Assessment of the on-farm economic values of remnant native vegetation. Johnstone Centre Report No. 107. Johnstone Centre, Albury. Walpole, S.C. (1999),*



The Benefits of Soil Carbon Credits

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Carbon Farming and Climate Change

Scientists now believe that Carbon Farming can reduce CO2 in the atmosphere fast enough to avert the very worst consequences of Global Warming. [12]

The major cause of CO2 release from land management in farming is opening the soil to the air, by clearing native vegetation, by ploughing, by burning, and by over-grazing.

Substituting other methods for these practices prevents CO2 emissions. But these other methods are not only useful in cutting emissions. They can turn agricultural soil into a massive carbon sink, capable of 'sequestering' millions of tonnes of carbon beneath the ground.

The IPCC, NASA, and the Australian Greenhouse Office agree: there is already enough CO2 in the atmosphere to push the globe through the 2°C increase that will cause climate chaos. The only way to remove it is

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Assessment of the economic and ecological impacts of remnant vegetation on pasture productivity, Pacific Conservation Biology, 5: 28-35.

[12] . *Lal, Dr. Rattan, "Farming Carbon", Soil & Tillage Research, (6 (2007); "soil Science and the Carbon Civilization", SSSAJ Vol 71 No. 5 Sept-Oct 2007; "Soil Carbon Sequestration Impacts on Global Climate Change and Food Security", Science, Vol 304, 11 June, 2004. Dr Lal is President of the American Soil Science Society.*

Photosynthesis. Plants and Trees.[13] No other popular solution can do it – clean coal, nuclear power, solar and wind power, these can only avoid future emissions. And Forests, even if we planted enough today, cannot reach critical mass in less than 15-20 years. The Stern Report said we have 10 years in which to act, and NASA agrees. The only solution is agricultural soils. They already have critical mass and can start sequestering carbon instantly on a large scale.

A slight increase in soil carbon across Australia's agricultural regions can sequester more than half our greenhouse gas emissions. A 0.1% increase in organic carbon across only 10% of Australia's agricultural lands would sequester 387 million tonnes CO2. Australia's emissions are projected to reach 603 million tonnes annually over 2008–12. (Soil C in the top 20 cm of soil with a bulk density of 1.2 g/cm3 represents a 2.4 t/ha increase in soil OC which equates to 8.8 t/ha of CO2 sequestered.)[14]

Pasture cropping/time controlled grazing combination in Central West NSW recorded increase in soil carbon from 2% to 4% over 10 years (0.2%C/yr) (CSIRO and DPI project on "Winona", Gulgong)

Soil carbon credits could underwrite the income of many farm families and enable them to offset their emissions from methane and other greenhouse gases. Australia's soils are badly in need of restoration.[15]

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[13] *In its recent draft report, the Intergovernmental Panel on Climate Change's Chair Dr Rajendra Pachauri said: "Twenty-first century anthropogenic (human) carbon dioxide emissions will contribute to warming and sea level rise for more than a millennium, due to the time scales for removal of this gas." Britain's Chief Scientist Sir David King has said: "Even if humanity were to stop emitting carbon dioxide today, temperatures will keep rising and the impacts keep changing for 25 years." America's senior ozone hole scientist, Dr Susan Solomon, senior scientist of the of the Global Monitoring Division of the U.S. National Oceanic and Atmospheric Administration: "The carbon dioxide that's in our atmosphere today – even if we were to stop emitting it tomorrow – would live for many decades, centuries and beyond. A fraction of the carbon dioxide that we've put into the atmosphere today due to human activity would still be there in 1,000 years." The Australian Greenhouse Office, Department of the Environment and Heritage ("Climate Change Risk and Vulnerability", 2006) said: "Much of the climate change likely to be observed over the next few decades will be driven by the action of greenhouse gases already accumulated in the atmosphere."*

[14] *Dr Christine Jones, Aggregate or aggravate? Creating soil carbon, YLAD Living Soils Seminars: Eurongilly - 14 February, Young - 15 February 2006*

[15] *The Department of Environment and Climate Change, and the Central West Catchment Management Authority estimated that the soils in the Catchment can capture 183 million tonnes of Carbon by 2020 if farmers switch to "advanced farming practices". The shift would result in a doubling of the soil carbon contained in paddocks.183 million tonnes of Carbon = 671 million tonnes CO2e (Carbon tonne x 3.67 = Carbon Dioxide tonne)*
At $25/tonne = $16.75 billion dollars. At only $5/tonne = $3.35 billion dollars
$3.35 billion dollars ÷ 5500 farms = $609,440 per farm*
*$600,000 ÷ 15 years** = $40,000/year (At $5/tonne, the low point.) *In the Central West Catchment (ABS) **2005-2020 – the average period for soils to saturate with carbon.*

Soil Carbon, Climate Change, and Urgency

Given the fact that there is a critical amount of CO2e already in our atmosphere, soil carbon has, by an accident of history, a significant and urgent role to play in shaping the world community's response to the Climate Crisis. It is the only solution with the capacity and capability to make a meaningful difference immediately in the likely severity of the consequences of CO2 overload.

IPCC economists and scientists agree:

"Unlike many other technologies to offset fossil fuel emissions, land management for soil C sequestration can be implemented immediately, provided there are incentives to do so." - Professor Bruce A. McCarl, Climate Agricultural Economist, Texas A&M University (IPCC)

"C Sequestration in soil and vegetation is a bridge to the future. It buys us time while alternatives to fossil fuel take effect." - Dr Rattan Lal, Director, Carbon Management and Sequestration Center, Ohio State University, Columbus, Ohio (IPCC)

Soil sequestration is the most cost effective mitigation strategy for the first half of the 21st century. - *Battelle, Global Energy Technology Strategy: Addressing Carbon Change, Washington, 2000*

"Increasing terrestrial carbon stocks is attractive because it can potentially offset a major fraction of emissions and serve as a bridge over an interim period, allowing for development of other low-CO2 and CO2-free technologies."- *Battelle, US Climate Change Technology Program Strategic Plan, Washington, 2006*

"Terrestrial C sequestration has immediate application in climate change mitigation due to its availability and relatively low cost."
- Professor Charles Rice, Department of Agricultural Economics, Kansas State University, Director of the Consortium for Agricultural Soils Mitigation of Greenhouse Gases. Dr. Rice is recognized as one of the leading soil microbiologists in the United States.

"Terrestrial sequestration is here and now. It's user friendly. It's easy to do. It can play a critical role in the early stages of our response, ahead of other methods [forestry, geologic burial]."
- Dr. John Antle, Professor of Agricultural Economics and Economics at Montana State University, Technical Leader, Economics, BigSky Carbon Sequestration Partnership

Neither "Clean Coal" nor Solar Energy nor Wind Turbines nor Lightbulbs can remove existing atmospheric overload of CO2. Only the process of photosynthesis through vegetation and soil can absorb existing emissions.

Forests do not have the capability to do it.[16] Even if there was sufficient land suitable for planting forests, the world does not have the time or the resources available to plant them.

Only SOILS can sequester enough CO2 in the time we have left (10 years according to the Stern Report).

Neither "Clean Coal" nor Solar Energy nor Wind Turbines nor Nuclear Power can remove existing atmospheric overload of CO2. Only the process of photosynthesis and storage of carbon in agricutlural soil can absorb existing emissions.

Agricultural soils cover 60% of the earth's surface. A simple change in land management, from 'carbon mining' to 'carbon farming', could start the process of absorbing the existing CO2 "overload" immediately.

To do so the world's policy makers must come to terms with the soil carbon solution immediately.

[16] *The UK Department of Energy estimates that to offset the UK's total carbon dioxide emissions would require the planting of a new area of tropical forest about 1.5 times the size of the UK. World Rainforest Movement claims that to compensate for the eight gigatonnes of carbon the US currently releases into the atmosphere every year would require planting four times the area of the United States with trees, never letting these trees die and decay thereafter.*

How the Soil Carbon Solution Answers the Standing Committee Inquiry's Terms of Reference

The "Soil Carbon Solution" provides the following answers for the challenges set down in the Inquiry's Terms of Reference

Term of Reference b): Achieving ecologically sustainable natural resource use in a climate change environment.

Soil carbon is a key performance indicator of ecological health. By focusing land managers' attention on their soil carbon scores – via the incentive of carbon trading revenue – policy makers responsible for Natural Resource Management would be harnessing the two primary drivers in farmer psychology: 1. The profit motive, and 2. Pride in selling what they grow.

Term of Reference (c): Identifying land and water use management practices that can act as a tool to tackle climate change;

The Carbon Farming techniques outlined above all address the dual Climate Change problem that will face land managers with increasing severity: increasing temperature and reduced moisture.

Term of Reference (d): choosing management systems for achieving sustainability measures for natural resources in New South Wales

As proven by the conflict and confrontation in the Western Division over land clearing, a 'win-lose' situationis always the outcome when Government seeks to impose its will on fiercely independent individuals who choose to live the life of struggle that we call agriculture. The soil carbon solution is a management system that manages through self interest and respect for the independence of the individual. Farmers would prefer to earn money from what they grow rather than accept "stewardship" payments which rely on the goodwill of governments and which can be discontinued with changes in government.

Term of Reference (e): consequences of national and international climate change policies on natural resource management in New South Wales

It is in the hands of policy makers in the carbon industry to make soil carbon credits tradable and unlock the greatest revolution in land

management since the invention of the plough. The continued obfuscation of officials who seek to force soil carbon into the same mould as other tradable commodities when it requires special consideration and innovative thinking are denying the world access to what could be the most significant 'technology' solution to Climate Change within reach.

Appendix 1: Soil Carbon trading possible, says CSIRO

Australian farmers can grow carbon levels in their soils, and advances in science are making a market in credits more likely, according to senior CSIRO soil scientist Jeff Baldock.

Dr Baldock, who presented at the world's first "Carbon Farming" Expo & Conference in November at Mudgee, organised by the Carbon Coalition, the Central West Catchment Management Authority and the Australian Soil Science Society. Dr Baldock says a fully-functioning market in soil carbon could make it 'more economic to farm for carbon than to farm for yield.'

Speaking on ABC Rural Radio, said the CSIRO is discovering more about the dynamics of carbon in the soil, seeking ways to predict the influence of agricultural practices on soil carbon levels. The only barrier to a healthy market at present is the price of carbon, he said.

"I could go most places in the country and institute some sort of agricultural practice that will build soil carbon," he said. But at current low prices he says it is difficult to justify building carbon for carbon's sake.

Dr Baldock believes that there are many other reasons to build soil carbon. "Carbon fulfils a whole bunch of roles in soils: it holds nutrients, it helps water-holding capacity, it buffers pH change, it provides energy for soil microbes. It has a lot of spin-offs for enhancing the productivity of soil."

Appendix 2: Desert or Diversity: Allan Savory

DESERT OR DIVERSITY?

*Itâs time to stop seeing what we believe and start believing what we see. By Allan Savory**

This is a global warning. We can turn our lands in seasonally dry climates into lifeless deserts, or we can keep them alive and vibrant, conserving and nurturing every drop of water. Land on the threshold of desertification can become a shining example of biodiversity. It doesnât take any fancy tools or expensive equipment. All it really takes is for ranchers and environmentalists to stop seeing each other as enemies and look critically and dispassionately at examples from around the world. Itâs time to stop seeing what we believe and start believing what we see.

In my homeland of Zimbabwe, there is a worse land degradation, poverty and loss of wildlife situation than in the arid West of the United States. That can be changed. It has already been dramatically changed in one area known as the Dimbangombe Ranch.

My wife and I donated the ranch to the people of Africa to allow them to benefit from Holistic Management practices. The ranch is owned by a local nonprofit organization alongside a community of over 145,000 people living on communally owned land totaling over a million acres. Dimbangombe staff work under a board of trustees that includes all five of the local tribal chiefs and I am the chairman.

The ranch and the adjacent communal land have the same soils and rainfall. The communal land was settled because it held greater potential for agriculture. Everything depends on the rains that fall from November to March. After March, the area gets increasingly hotter and drier until the rains come again. The average rainfall is about 30 inches, but the last two years have been below that.

When we began using Holistic Management on the ranch, its land was in a seriously degraded state as photos illustrate, although not quite as bad as the communal lands. Over the last seven years, the contrast between the two areas has grown increasingly marked.

At the outset, when we donated the ranch land, it had no elephant and buffalo at all (due to a veterinary fence, since removed), and a sparse, fluctuating population of other game. While the communal land still supports little wildlife, the situation on the ranch is very different today. The ranch now supports significant and increasing numbers of elephants, buffalo, kudu, sable antelope, waterbuck, zebra, impala, giraffe, reedbuck and many other diurnal and nocturnal animals. Widely ranging elephants can on some days number 300 or more and, likewise, buffalo herds from 500 to 1,000.

Clearly there is a lesson in Africa for us in the West. Some will say what works in Africa does not necessarily work here. But as I have pointed out for years, the ecological principles I am suggesting we use are universal. A number of ranchers in the United States as well as many in Australia have adopted Holistic Management and its associated planned grazing. They have shown this principle of using grazing as a tool to reclaim and revitalize the land to be correct wherever properly used. Without adequate animal numbers and biodiversity, water and vegetation decrease. Holistic Management-planned grazing is an ecologically sound tool that can be used in even the most primitive circumstances.

We have a choice: Abundant food and water for a thirsty world or deserts where nothing grows and potentially productive soil becomes windblown dust. It is a matter of life and death.

**Allan Savory is a wildlife biologist and founding director of the Savory Center for Holistic Management in Albuquerque, New Mexico. The Zimbabwe-born scientist has won international acclaim for his innovative methods to reverse desertification, now being used successfully around the world. In 2003 he received the Australian Banksia International Award for the person or organization doing the most for the environment on a global scale. Allan's book, Holistic Management: A New Framework for Decision Making, Island Press 1999, is today in use in a number of colleges and universities.*

http://www.rangemagazine.com/features/spring-05/desertordiversity.htm