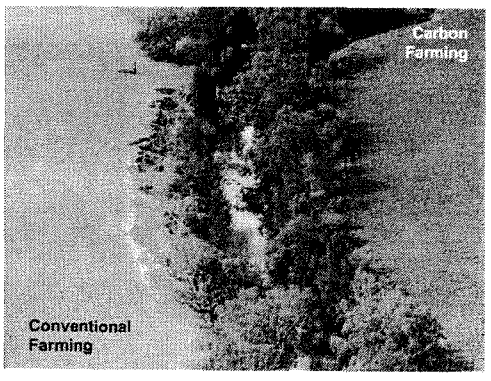
A Submission to the

Inquiry into the role of government in assisting Australian farmers to adapt to the impacts of climate change

by the Parliament of Australia House Standing Committee on Primary Industries and Resources



Carbon Coalition Against Global Warming

20 March, 2009

Introduction

There are many reasons to be optimistic about Australian Agriculture's response to Climate Change.

Grassroots farmers have reacted to the challenge in characteristic fashion: by seeking solutions and, if none could be found, inventing them.

By encouraging the spirit of the entrepreneur and innovator in producers, the Government can expect the highest level of farmer involvement and the most realistic and workable solutions.

"Carbon Farming" is a form of Climate Change Agriculture that builds the health and resilience of the natural resource base, for immediate benefits in production and anticipated benefits of better water efficiency and lower temperatures from the creation of local microclimates by land management.

The Carbon Coalition Against Global Warming is a grassroots farmer organization that is campaigning for the right to sell the carbon we can grow in agricultural soils on the global carbon offsets market.

Enabling producers to trade the tonnes of CO2 they can sequester is the single action that would deliver the highest degree of Climate Change readiness, and the best outcomes for the environment, for rural communities, and the Nation

Brief Responses to the Terms of Reference

"Current and prospective adaptations to the impacts of climate change on agriculture and the potential impacts on downstream processing."

Carbon Farming is an adaptive land management approach that maximises the farm landscape's performance under stress of increased temperature and reduced rainfall. It can create a micro-climate around a property that actually increases rainfall.

It reverses the degradation of the natural resource base. It buffers the land against extremes of temperature and rainfall. It provides the grower with a means to underwrite the cost of offsetting the Greenhouse Gases that they cannot eliminate by changing practices.

* "The role of government in:

"- augmenting the shift towards farming practices which promote resilience in the farm sector in the face of climate change;

Government can enjoy the benefit of 'polluter pays' funding of the incentives to drive behaviour change among land managers.

Farmers respond best to opportunities to sell what they grow, without interference from authorities.

The most powerful incentive for primary producers is the prospect of a new revenue stream from a new commodity market: soil carbon offsets.

"- promoting research, extension and training which assists the farm sector to better adapt to climate change.

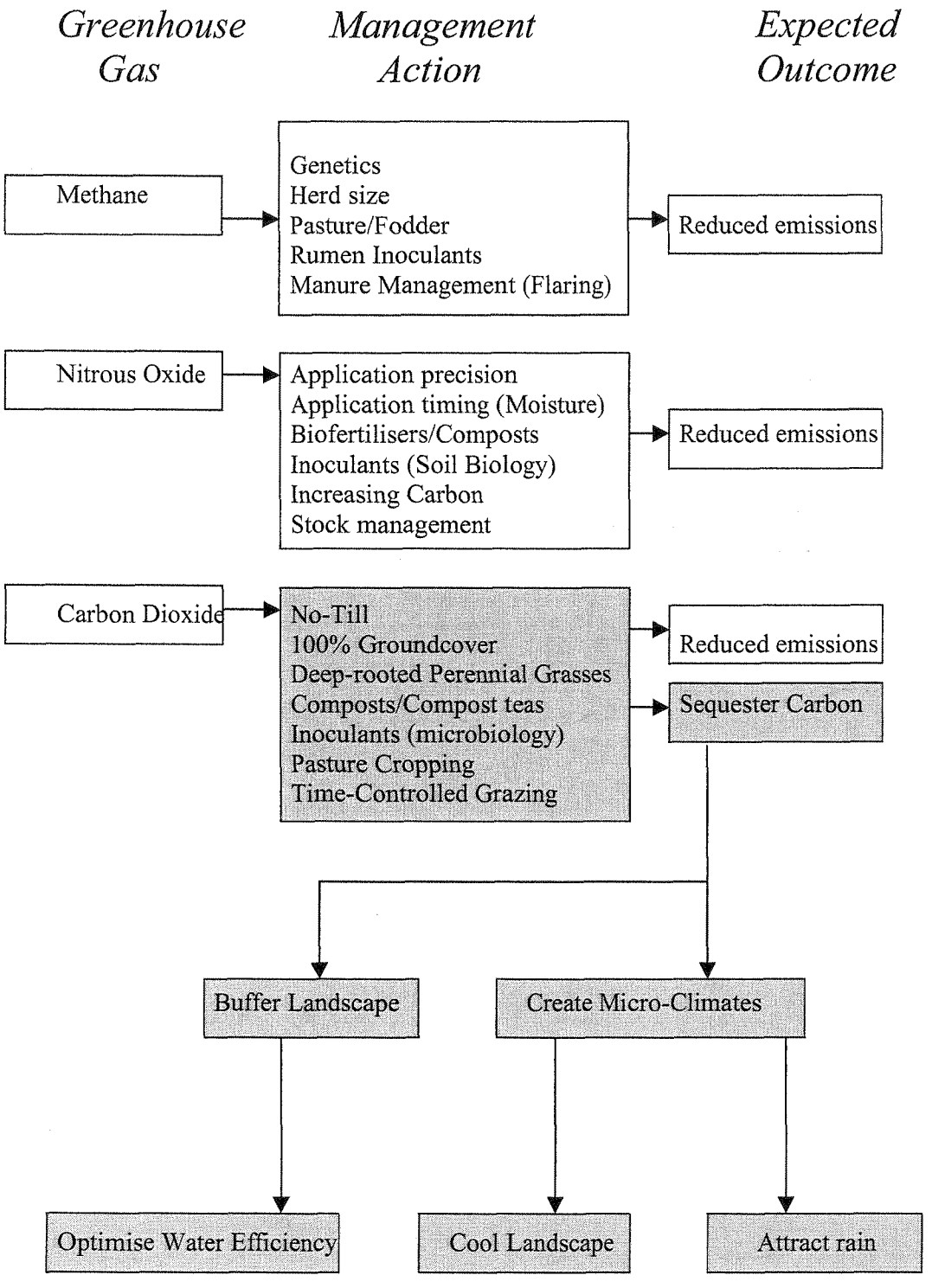
As a free enterprise system, Soil Carbon Sequestration and Trading provides a strong incentive for landholders to seek information on land management practices that maximise carbon capture and, at the same time, build defences against the worst of Climate Change.

Demand for science, education, and consultation will require new thinking on information delivery, including online solutions such as Soil-C-Central, a comprehensive Climate Change Agriculture website outlined below.

"The role of rural research and development in assisting farmers to adapt to the impacts of climate change.

The Carbon Coalition has petitioned the Minister For Agriculture to adopt "Collaborative Science in Agriculture", whereby farmers and scientists discuss how best to approximate real world on-farm conditions in scientific studies in order to increase the value the Government and industry gain from research.

Climate Change Agriculture
Adaptation Strategies



Climate Change and Australian Agriculture

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.

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.

The severity of Climate Change can be reduced by building carbon in soil, and consequently more vegetation and more moisture in the environment, which cools the air and can create a 'micro-climate'.

What is Soil Carbon?

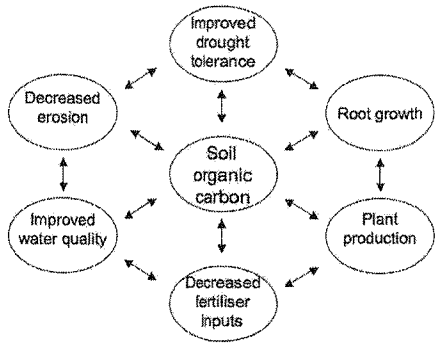
Soil Carbon is one of the many resting places of Carbon as it cycles throughout the biosphere (the liveable area on the planet). Carbon is the basic chemical building block of all life on Earth. It also resides in mineral form in rock formations and in fossil fuels, coal and oil as well as in the ocean. 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 it. The result is a cycle as Carbon moves between the oceans, rocks, soil, and atmosphere.

There are 33,000 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. (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.

Soil Carbon as Agent and Beneficiary of Ecosystems Services



Soil Carbon is Contextual. It acts as both Cause and Effect in a Ecosystem that is multifaceted and matrixed.

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.

The Benefits of Soil Carbon

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

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

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

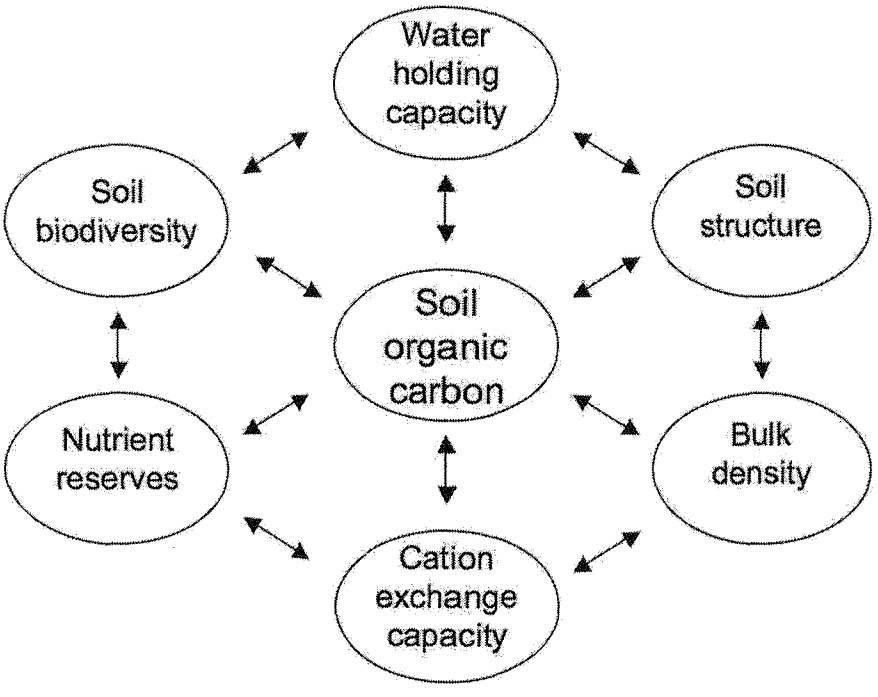
Soil carbon increases soil stability which means greater resistance to erosion, which in turn means cleaner waterways.

Soil carbon effect on soil's ability to hold water reduces recharge to groundwater and can reduce or eliminate salination

Soil carbon also 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.

Soil Carbon as an Agent and Beneficiary of Soil Health Processes



Soil Carbon acts as both Cause and Effect in a Complex Integrated Biological, Chemical and Physical Mechanism that generates new life from the death and decomposition of the old.

Climate Change Agriculture and Carbon Farming

Carbon Farming 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 overgrazing, (or "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 officially 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 till 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 till 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 drillsthe seed into pasture while the other slices a line through the pasture and inserts theseed. 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), Probiotics (beneficial microbes brewed for a long time in a food source medium), 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 water management. And they help lift yields and productivity in both livestock and crops, with increases of between 20% and 40%.)

Carbon Farming Makes It Rain

But there is another way that Australian farmers can influence the climate: by creating a micro-climate around their property.

A micro-climate will affect wind, rainfall, sunshine, and air temperature. It is a technique normally used by croppers. They use slope and row placement and alignment to determine a 'solar budget'. They use alley-cropping and shelter belts and mulches. Usually it is orchardists and horticulturalists, managing small holdings, who have used micro-climate management to their advantage. But we must adopt ideas from wherever they can be found, for broadacre farming.

Often a land manager will say, in the depth of a drought, 'there's no drought at my place'. By that they mean that they have managed their vegetation such that they have retained moisture in the landscape. When you protect your groundcover and don't overgraze or strip the earth bare by poisoning weeds or ploughing, you build or moisture reserves. Then water starts to cycle on your property. Some managers report receiving 1mm a day in dew from fogs and mists.

When your next door neighbour complains that you get more rain then he does, it is a joke... until you compare rainfall records.

A micro-climate managed for moisture will attract more passing clouds via the "Reverse Nauru Effect." Pacific Islands which have a lot of vegetation reportedly attract rainclouds whereas Nauru seems to repell them. Why? Could it be that the almost bare island of Nauru is sending up a column of heated air whereas the moist, lush micro-climate send up a column of cool air?

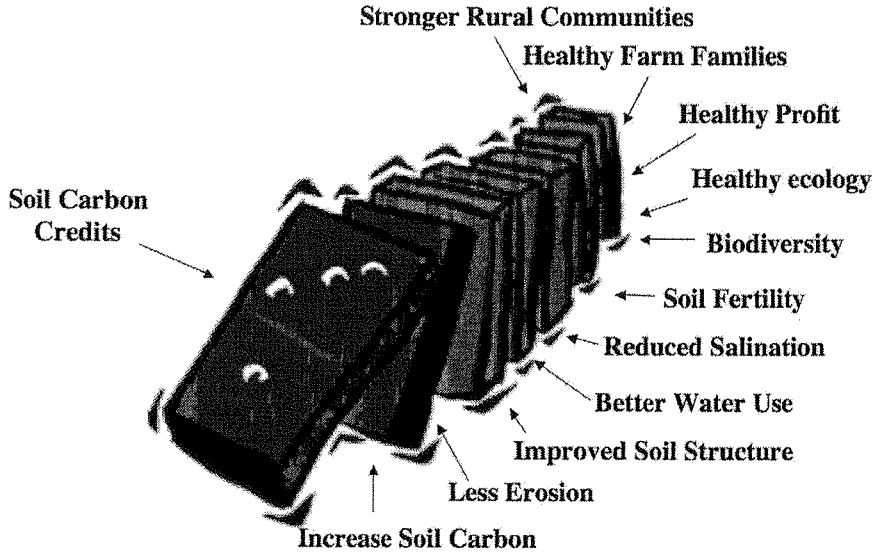
The Carbon Farmer has several practices that can be used to cool the environment in the vicinity: 1. Green vegetation, no matter what it is, it is valuable. 2. Mulch to keep bare earth from heating up. 3. Trees are useful in belts and scattered thoughout paddocks, both for their vegetation and their wind circulation effects.

There is much to be learned abut climate management. If every farm was managed for the microclimate effects, what would happen?

Changing The Way We Farm

Governments everywhere are trying to find a way to achieve ecologically sustainable natural resource use in a climate change environment. Soil carbon is a key performance indicator of ecological health. By focusing land

Change problem that will face land managers with increasing severity: increasing temperature and reduced moisture. Governments are also seeking management systems for achieving sustainability measures for natural resources. As proven by the conflict and confrontation in the Western Division of New South Wales over land clearing, a win-lose situation is always the outcome when Government seeks to impose its



The Benefits of Soil Carbon Credits

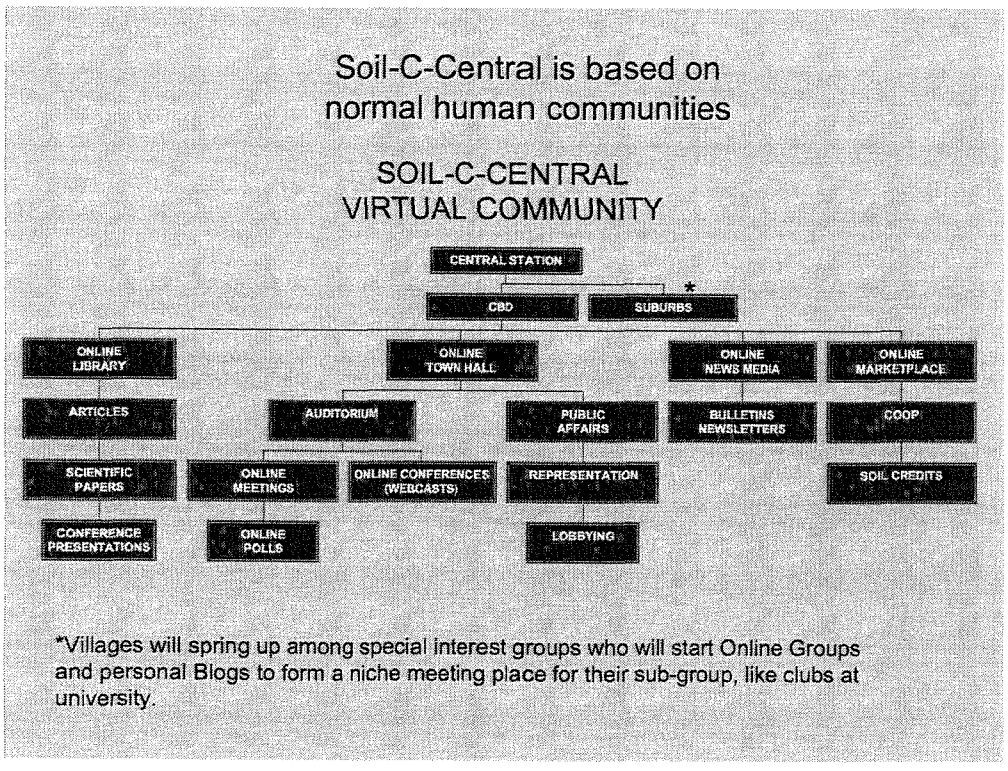
www.carboncoalition.com.au

managers ttention 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.Governments trying to identify land and water use management practices that can act as a tool to tackle climate change need look no further than Carbon Farming techniques to address the dual Climate

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 good-will of governments and which can be discontinued with changes in government.

Meeting demand for information on Adaptation

Soil Carbon is central to Climate Change adaptation in Agriculture.



SOIL-C-CENTRAL is an easy-to-access, easy-to-understand service. It contains the world's most comprehensive collection of information on soil carbon and non-CO2 on-farm emissions in an online library, resource centre, news service and meeting place for the soil C community of scientists, farmers, extension officers, agronomists, policymakers, media, and students, etc.

Soil carbon is a major buffer against the expected impacts of Climate Change in Australia: increased temperatures and reduced moisture. It also represents a potential carbon sink, given the space devoted to agriculture around the world. This factor and the potential for revenue from soil carbon as a tradable abatement has meant land managers are interested in soil C.

Soil Carbon can also beneficial with issues such as erosion and salinity, fertility and soil structure, water and production. It can also increase biodiversity, above and below the ground.

Knowledge Is Power

1. Comprehensive: Every piece of information of value will be available on or through the site. Types of information includes • scientific research findings • case studies • new approaches in various industries • new species • conference presentations • trading news

2. Accessible: SOIL-C-CENTRAL has two dimensions of access:

Web technology: The web gives 24/7 access anywhere. However download speeds are not the same in rural and regional areas. So the richness of media will be balanaced against fast access.

Editorial "Digest" services: For easy understanding by the non-specialist reader, all scientific papers and professional articles will be abstracted and the core points bulleted.

3. Communities: A powerful source of information is found in peer networks. SOIL-C-CENTRAL has meeting places for each of its communities: scientists, farmers, agronomists, policy makers, students, media, etc. Online meetings, bulletin boards, online polls, webcast conferences and special interest groups can be accommodated.

4. Market: An online marketplace can be established to enable trade between members, including the sales of soil treatments, consultancies, no-tillage equipment, etc.

5. Emissions: A total enterprise approach includes emissions management. As non-CO2 emissisons will impact on the carbon sink value of a landholder's property, methane, nitrous oxide, and CO2 will be included in the information services.

6. Self-education: A complete novice could gain a total education by choosing the "Boot Camp" Option called "Welcome to the World of Soil Carbon and On-farm Emissions" – a combination of Introduction, FAQ, Glossary, and Beginner's Tips.

7. Credible: The reliability of information contained on SOIL-C-CENTRAL will be clearly identified by means of a star system. Peer-reviewed science which is current will rate 5 stars, case studies which include data and financials 4 stars, and so on, down to opinion pieces at zero stars.
to an expert panel.

* easy access to information about managing on-farm sinks and sources
• access to information on industry best practice as released by Government agencies and other sources
• access to independent advice on dealing with market aggregators and brokers.
• easy access to independent advice on the likely realistic outcomes of climate change in districts and regions
• easy access to news and information on emerging technologies
• easy access to new case studies of real farmers inventing new techniques

Conclusion: Getting Back To Basics

There are few facts and much supposition in Climate Change.
But one of the few facts that can be relied upon is this:

In Australia it takes between 25 and 30 years for innovations to get from the lab to the paddock, according to The Farm Institute.

We need to change. And to do that we need to be motivated to change. Farmers and graziers are conservative and slow to change their attitudes.. but not their practices.

They will switch from growing one commodity to another commodity without a qualm. They know commodities. And they follow the dollar.

Soil Carbon- it's a commodity. Part of the largest commodity market in the world.

It is a powerful motivator for behaviour change.

And it doesn't cost the Government a cent.