Soil carbon
will it deliver?

Dr Mark Dangerfield
Technical Director, Greencollar Climate Solutions

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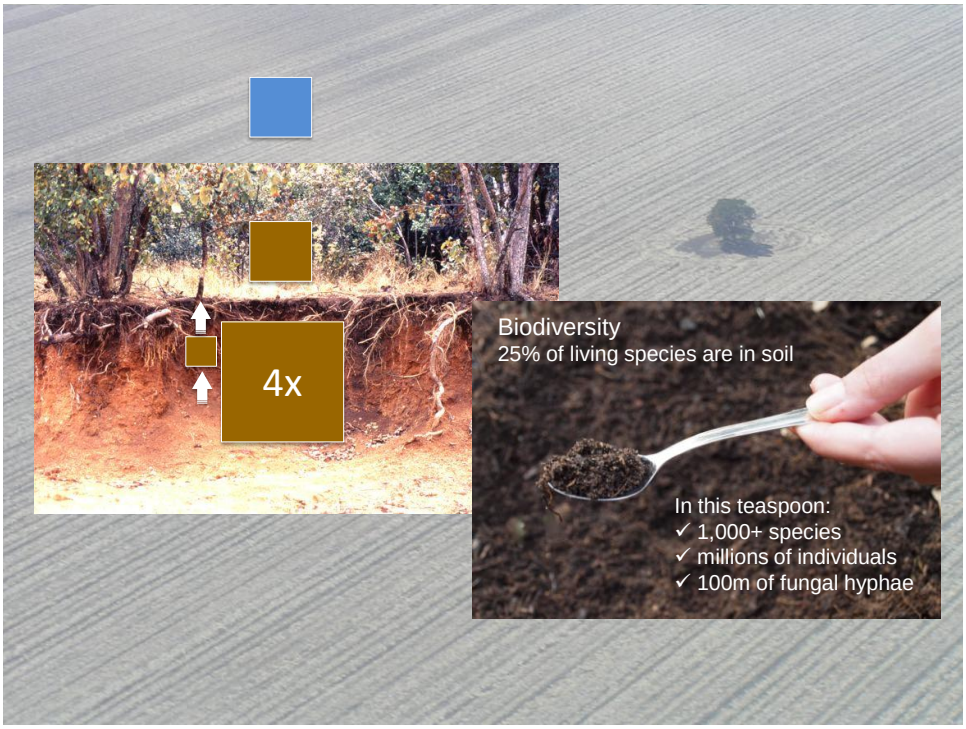
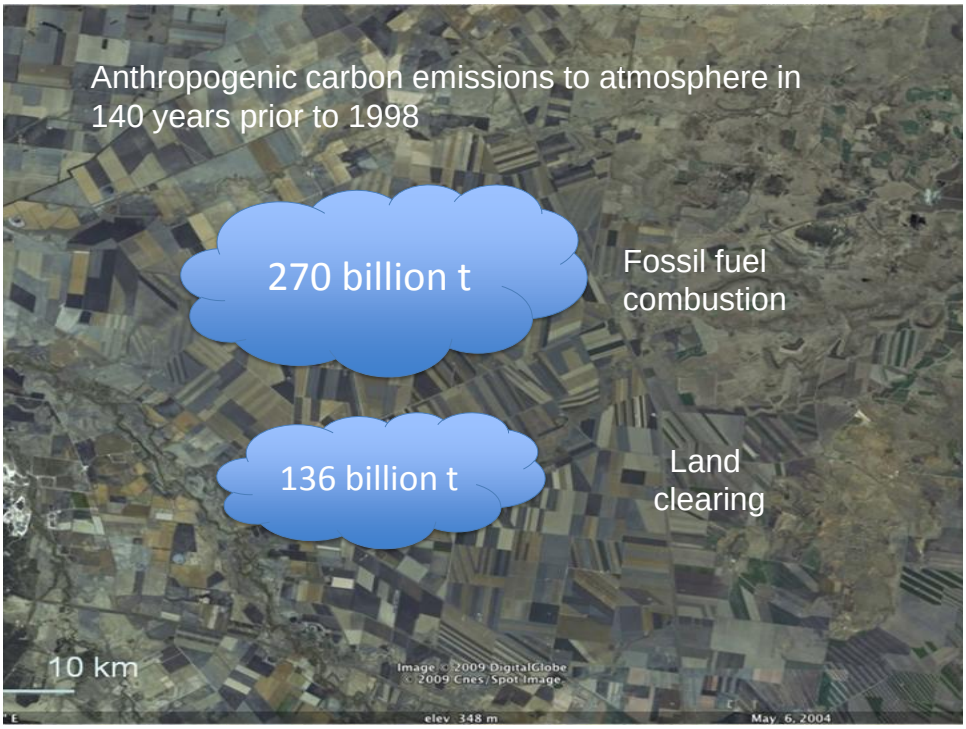
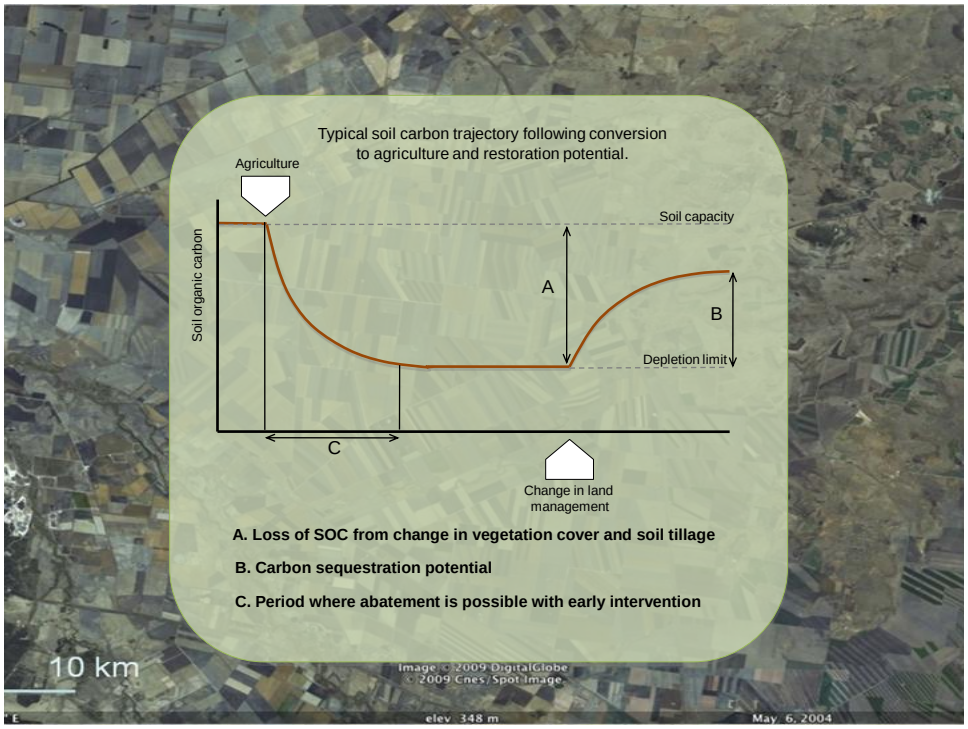
will it deliver?
Yes

definitely, absolutely, unequivocally, without doubt…


4x
Biodiversity
25% of living species are in soil
In this teaspoon:
✓ 1,000+ species
✓ millions of individuals
✓ 100m of fungal hyphae


Anthropogenic carbon emissions to atmosphere in 140 years prior to 1998
270 billion t
Fossil fuel combustion
136 billion t
Land clearing
10 km
Image © 2009 DigitalGlobe
© 2009 Cnes / Spot Image
elev 348 m
May 6, 2004


Typical soil carbon trajectory following conversion to agriculture and restoration potential.
Agriculture
Soil capacity
Soil organic carbon
A
B
Depletion limit
C
Change in land management
A. Loss of SOC from change in vegetation cover and soil tillage
B. Carbon sequestration potential
C. Period where abatement is possible with early intervention
10 km
Image © 2009 DigitalGlobe
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elev 348 m
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Soil carbon will deliver, NOT because…

Soil organic carbon is the natural engine of agricultural production that

- ✓ maintains biological activity
- ✓ promotes soil structure
- ✓ retains moisture
- ✓ exchanges nutrients

NOT because…

Management to enhance SOC promotes biodiversity (both above and below ground) and helps secure environmental services

✓ retain soil cover
✓ enhance habitat structure and condition
✓ improve connectivity

✓ more energy and carbon in the system
✓ more biological opportunity
✓ promotes resilience

NOT because…

Management to enhance SOC is adaptive in the face of climate change…

SOC improves soil structure so there is
✓ improved root depth and density
✓ better water retention
✓ improved nutrient exchange

NOT because there is…

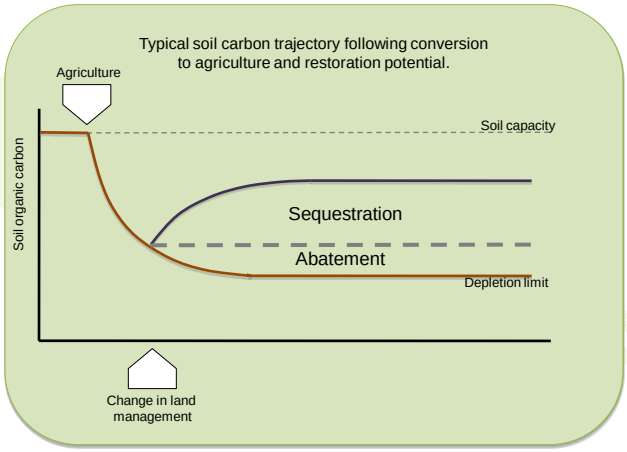
Huge carbon sequestration potential in soil

Even though there are challenges from old soils, extensive management, dry and warming climate

A modest return of 0.04 t C ha^{-1} across the grazing land of Australia would sequester
60 million t CO_2e a^{-1}

10% of Australia's 2007 emissions

NOT EVEN because…
SOC can generate carbon returns from reduced emissions and sequestration



But because…

Sensible management for SOC will **increase profit**

The biological and structural benefits of an increase in SOC combine to

- ✓ increase NPP and output
- ✓ improve quality of production
- ✓ decrease the need for inputs

Change to agricultural practice	SOC benefit	Confidence
Cropping/mixed systems		
water + nutrient efficiencies	0/+	L
irrigation/fertilizer use	0/+	L
stubble management	+	M
tillage	0/+	M
rotation – no fallow	+	M
rotation – pasture crops	++	M/H
organic matter additions	+++	H
Pastoral systems		
irrigation/fertilizer use	0/+	L
rotational grazing	+	L
perennial species	++	M
Shift to different system		
conventional to organic	(++)	L
cropping to pasture	++	M
retirement and restoration	+++	H

Table summarised from Sanderman et al (2010) Soil carbon sequestration: A review for Australian agriculture. CSIRO

So why don't farmers do this already?

- lack of awareness
- lack of understanding
- mindsets
  - command and control
  - gamblers and stoic conservatives
  - fear of change, risk, failure
- cultural values that affect mindsets
- financial interests lobby against low input systems
- management for SOC requires effort

How will these barriers be overcome?

The **slow way** is to allow time, peer pressure and logic to take effect

> Once a critical number of farmers in a district start making more money than their neighbours, the masses will join these early adopters

The **very slow way** is to set some sound policy directions with incentives for best practice carbon management

The **faster way** is to promote incentives under the existing voluntary carbon markets to realise carbon assets

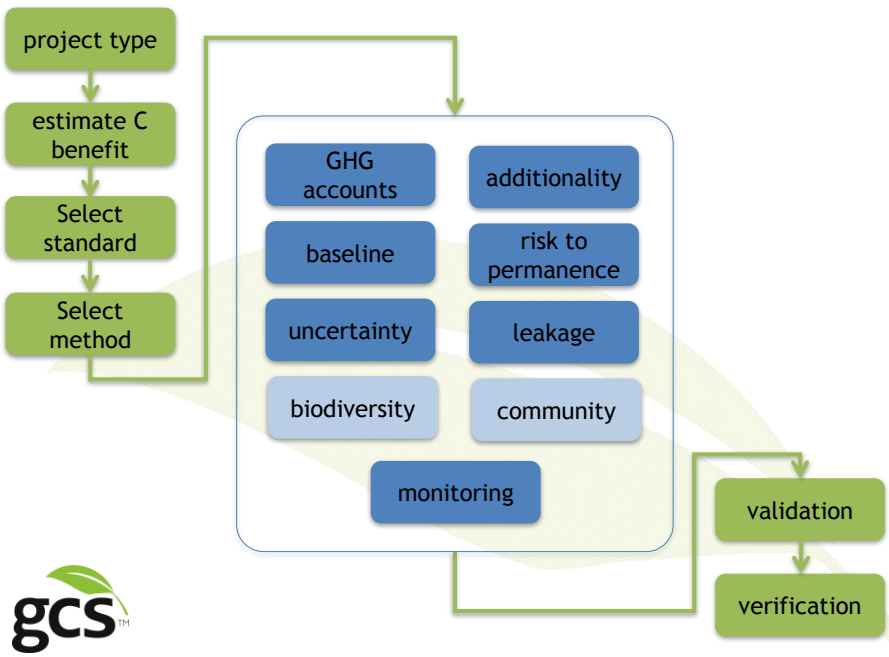
Specific challenges for SOC assets…

Permanence
Accounting
Certainty

Overcome by…

Process rigor (already exists in voluntary markets)
Conservatism and precision
Innovations such as portfolio approach

Problem solving capacity of the market



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- ✓ roughly 100 Mt CO_2e annually (27% total emissions)
- ✓ 10-20% more production per property
- ✓ more reliable environmental services
- ✓ adaptation to climate change effects
- ✓ biodiversity bonuses

Why, because there is money in it

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Because we will need the food

391,600

The number of people added to the global population since the welcome cocktails on Tuesday

There will be people able to buy it

9%

Projected annual growth in GDP in China to 2015 on the back of an average of more than 10% annually since 1950

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