

Brussels PIP December 15 08

My aim today is to discuss agriculture's ongoing contribution to climate change and to look at how agriculture can become part of the solution instead of part of the problem.

The classic definition of sustainable development is:

Brundtland Commission definition of
Sustainable Development:

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

Agriculture does not meet this definition and has not done so for more than a century

Allow me to go back 60 years or so.

I was born on a farm in Nebraska just 60 years after the prairies first went under the plough in the 1880s.

Louisiana Territory - Virgin Prairie



An area of carbon-absorbing virgin prairie equal in size to all Europe's arable land was brought into production in the late 1800s. Our greenhouse gas problems began that long ago.

All that land that is green and blue was carbon rich humus, 1 meter deep - 3 meters deep in places. Now its depth is measured in centimetres, not metres and it has lost more than $\frac{3}{4}$ of its carbon content. Once it held 30-40 tonnes of carbon per hectare, now it holds 5-10. Every time farmers ploughed, the carbon-rich humus of the soils oxidised and floated skywards as carbon dioxide. The same thing has happened in Brazil, Argentina, Central Asia, China, India and parts of Africa.

Cheap oil and tractors played a major role in this.

With oil at ten cents a barrel in 1933 horse power became obsolete overnight as tractors took over.

With tractors, instead of having to devote part of your land to growing oats for horse feed you could devote all of it to growing food. Yields immediately jumped by $\frac{1}{3}$. No horse manure or other carbon-rich organic matter was returned to the land, so carbon losses increased and fertility declined.

In the short term tractors could plough deeper, bringing fertility up to the surface. But this just increased the rate of decomposition of the carbon-rich humus content of the prairie soils. The poet Wendell Berry summed it up:

"We ploughed the prairie
and never knew what we
were doing because we
did not know what we
were undoing."

Wendell Berry

The result was a human tragedy

Dust Cloud 1935



My mother remembers the huge clouds of dust that swelled up from nearby Kansas and Oklahoma in the 1930s as the soil of the prairie disintegrated and darkened the skies for months on end. 200,000 American refugees abandoned their farms and homes – the ‘Okies’ described in Steinbeck’s *The Grapes of Wrath*. Many of them were arguing that Stalin’s way made more sense.

President Roosevelt mobilised between 1933 and 1941 3 million unemployed men to form a Green Army, the Civilian Conservation Corps, who planted 10 billion trees to hold down the soil and

restore fertility. Then came World War 2 and those men changed their spades for guns and farmers moved back in, ploughed out the trees and planted wheat on every inch of land to feed the hungry of Europe.

By the end of World War 2 the American Midwest and Canada, the breadbasket of the world, was farmed out, the soil lifeless and infertile. The Dust Bowl was a terrifying early sign of what was to come.

In post War US and Europe, governments nationalised agriculture by subsidising fertilizer use and fixing food prices.

There is not a single example of high-tech industrial agriculture that can operate profitably without subsidies. Adding nitrates to soil breaks down humus, accelerating carbon loss while increasing emissions of nitrous oxide, a greenhouse gas 300 times worse than carbon dioxide

Now we're hitting a brick wall.

Agriculture has higher emissions now than ever before, responsible for an estimated 30% of GHG emissions.

50% of total CO₂ increase 1850-1980 is from farming

From 1850-1980:

Total CO₂ from Farming: 160 Billion Tonnes

Total CO₂ from Fossil Fuels: 165 Billion Tonnes

Fully half of all greenhouse gas emissions between 1850 and 1990 came from agriculture. Only agriculture, given the right incentives, can recapture and store this CO₂ back in the soil

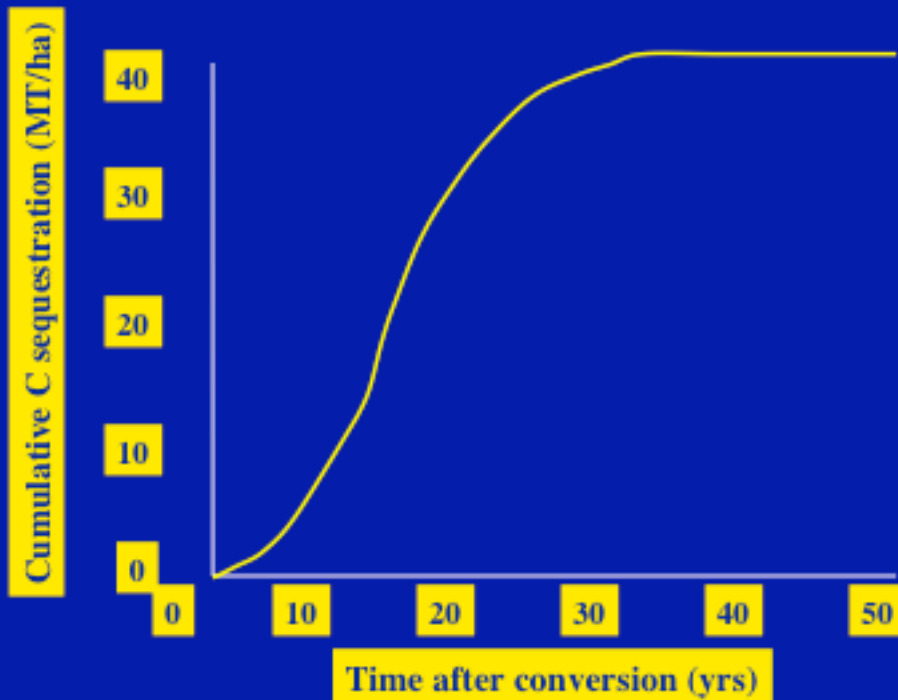
**The magnitude of soil C loss since
the 19th Century**

30-40 tonnes/ha

We've lost 80% of our topsoil because the income from the land is more important than preserving the capital value, measured as Carbon.

It is possible to build up the carbon content of soil and in 30 years we could replace what we've lost in the past 150 years.

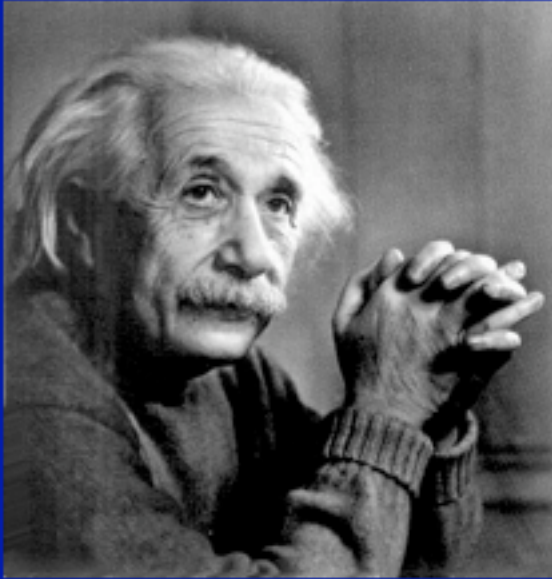
Putting Carbon Back in Soil



Organic farms, with no financial incentive, increase their soil C content by a net amount of as much as 1 tonne per hectare per year.

But most farmers use nitrates which increase nitrous oxide, carbon dioxide and methane emissions. This is plainly unsustainable.

We need to take a radical approach, business as usual has failed.



Albert Einstein

“We can’t solve problems by using the same kind of thinking we used when we created them.”

So where is the thinking that can solve this problem?

In May this year we saw the most authoritative study ever:

Johannesburg
April 2008
400 experts
Report:



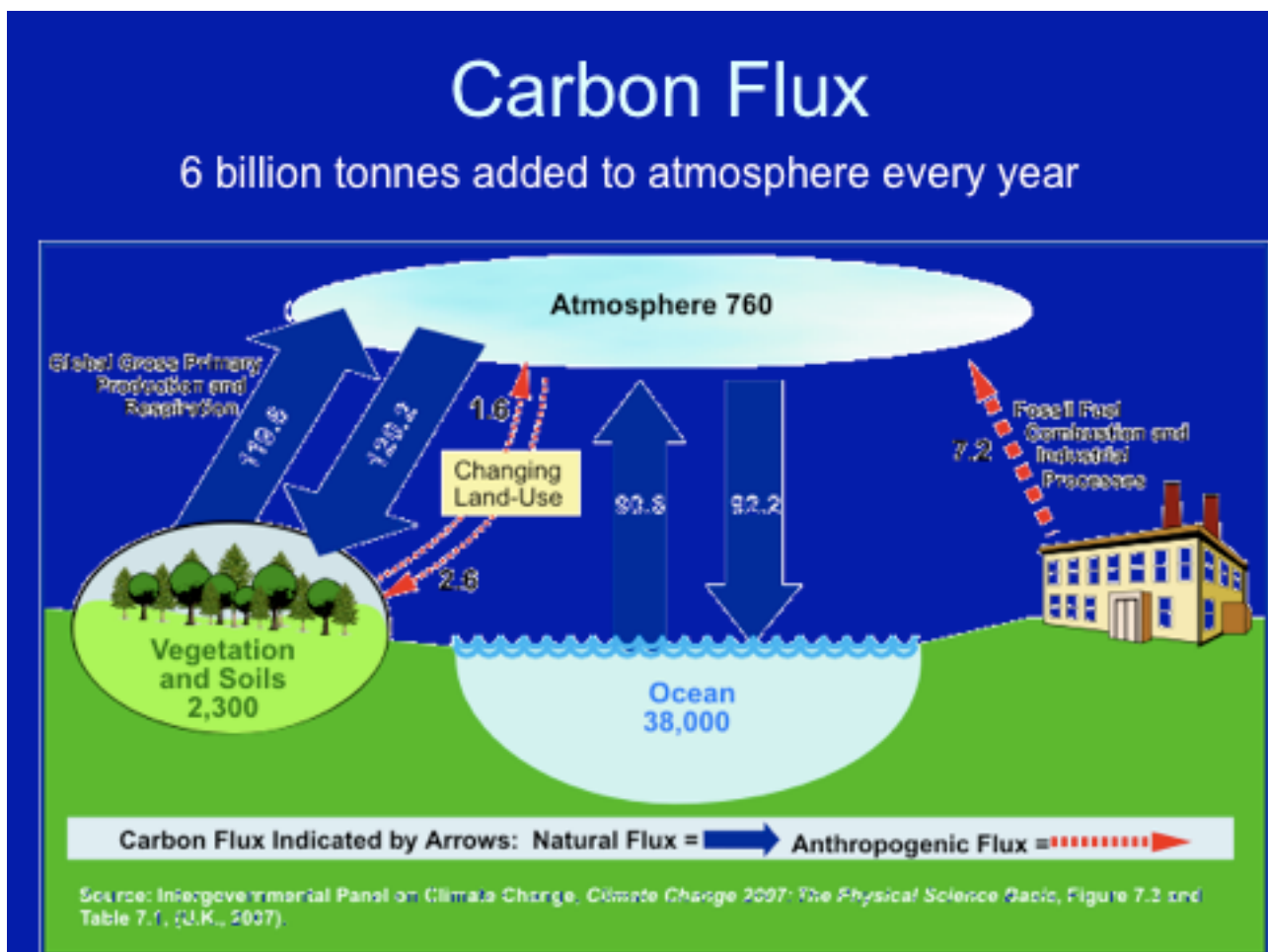
Stop subsidies
Put human health first
Green Revolution had unintended consequences
Genetic Engineering a problem, not a solution
Little time left
Protect our agricultural capital (soil)
Support small farmers and diverse ecosystems
Reward farmers who prevent climate change
Study and learn from traditional farming

4 years ago the International Assessment of Agricultural Science and Technology for Development was set up. It was sponsored by FAO, the UNDP, UNESCO, the World Bank, the WHO as well as NGOs and with support and input from Syngenta and Monsanto. They selected and commissioned 400 scientists to focus on agriculture and development. When it published its report in May, Monsanto and Syngenta pulled out claiming it was ‘not sufficiently supportive of genetic engineering in agriculture.’”

It called for an end to EU and US subsidies.
It said the Green Revolution had unintended consequences

Said we must change course now - little time left
It called Genetic Engineering a problem, not a solution

It said we must support small farmers and diverse ecosystems and, most importantly - **reward farmers who prevent climate change.**



But we are still increasing atmospheric carbon by 6 tonnes per year

We need to . How can we help farmers to do this and reward them for doing so?

From Biomass to Charcoal

Dry weight biomass 1000 Kg yields:

Charcoal (40% of biomass) 400 Kg yields:

Carbon (80% of Char) 320 Kg C

1/3 of biomass dry weight is Carbon

Converting biomass into charcoal is the way to do this. Every tonne of biomass converts to 1/3 tonne of pure carbon in charcoal, with only 10% of its carbon content used to fuel the process.

What's more, it improves the soil and reduces nitrate leaching and stays in soil for hundreds of years.

Bio-char improves Soil

Increases Soil Carbon

Reduces leaching of nitrates, phosphates, potash

Increases microbiological population

Increases water-holding capacity of soil

It increases healthy microbiological populations and it reduces the need for irrigation by holding moisture in the soil

So what is the scale of the problem and how long would it take for biochar to make a difference?

Let's go along to Valhalla and take a look from the viewpoint of the Gods.

Climate Change

The One Year Quick Solution:

HOW?

So what's the quick solution? It's totally impractical but the following slide helps to illustrate the scale of the problem and to show that it's manageable.

We just stop eating or buying new clothes for a year. We take every bit of biomass that the planet accumulates during that year and turn it into charcoal. The 55 billion tonnes of carbon we would sequester would enable a reduction in atmospheric carbon from 400 ppm to 280 ppm.

“FASTING AND RAGS”

1 billion tonnes of soil Carbon = 0.47 ppm of CO₂

To reduce from 400 ppm to 280 ppm we need to remove 120 x .47 ppm

= 56 billion Tonnes

1 hectare of land can produce 20 tonnes of biomass or 5 tonnes of C

Farmland 1.4 billion hectares

Pasture and scrub 5.6 billion

Forest 4 billion

TOTAL 11 billion available

5 tonnes per hectare C **= 55 billion Tonnes**

We could do it in one year

Obviously it's impractical to stop all agriculture overnight, but it helps to see what would happen if we did. We have time, maybe 30 years, to make the transition to low emissions living. If we allocated 1/30 of our biomass each year to carbon sequestration we could do it by 2040. 1/40 or 2.5% would do it by 2050. We set modest targets of 350 ppm CO₂, we need to get back to pre-industrial levels and biochar can help us do it.

Of course, if we all went vegan and planted miscanthus or trees on all that pasture the annual harvest of 5 tonnes of Carbon per

hectare could give us an annual carbon harvest of 20 billion tonnes of carbon, which would solve our climate change problems in a few years.

What is Rainforest worth?

Carbon content per hectare: 150 tonnes

ECX price Dec '08: €15 MT CO₂ x 3.76 = € 57 tonne C

Value of 1 hectare rainforest = € 8500

Current Brazilian soybean land price: € 300 hectare

Income from biochar harvesting: 5 x €57 = €285 per ha p.a

How can rainforest or pasture compete with soybeans in Brazil?

What if they had an economic incentive comparable to the incentive to clear forests to grow soybeans for chickenfeed or palm oil for bio-diesel? At € 15 tonne for CO₂ a fully grown rain forest is worth €8500 but we cut forest down to produce soybean land that is valued at

€300 per hectare. If that isn't market failure, I don't know what is.

If a farmer manages regenerating rainforest to generate charcoal and is rewarded for this action then farmers will manage regenerating forest to maximise the yield of biomass over time. At 5 tonnes per annum yield at €57 a farmer could sustainably harvest biochar from a rainforest and earn €285 per hectare per annum, more profit than from growing soybeans.

But at the moment, making charcoal is excluded from the Clean Development Mechanism. This must change.

The final list of acceptable emissions reductions will be decided at the UNFCCC conference in Copenhagen in December 2009.

Submissions at Poznan

UNCCD - United Nations Convention to Combat Desertification

According to the IPCC biochar management would be a valid C sink in the current and post 2012 LULUCF guidelines. However, the following policy action is urgently required:

1. Raising awareness on the role of the land on mitigation and adaptation to climate change and in particular the importance of Biochar in enhancing the sequestration of carbon in the soils.
2. Inclusion of biochar in the CDM mechanism along with currently already included afforestation and reforestation (A/R).

Micronesia - 'Fast-start' strategy to mitigate climate change In the near term:

"A focus on fast-action strategies offers great advantages particularly to LDCs, small island states and other states vulnerable to extreme weather events and flooding."
Enhancing sequestration. Promoting bio-char carbon sequestration as a near-term carbon mitigation and storage strategy.

So the International Biochar Initiative went to the COP-14 conference in Poznan, to present the case for biochar. There was already a rise in awareness and support. I can report success

The UNCCD made a submission on Friday, December 5th, to the 4th Session of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA 4) relative to Ideas and Proposals on Paragraph 1 of the Bali Action Plan. The submission proposes the use of biochar as a mitigation and adaptation

technology that also replenishes soil carbon pools and restores soil fertility.

Now the submission is officially tabled we have until February 6 to increase support. Belize, Honduras, Ghana, Senegal, Ivory Coast and Denmark have all indicated willingness to endorse the submission.

Micronesia - 'Fast-start' strategy to mitigate climate change

In the near term

"A focus on fast-action strategies offers great advantages particularly to LDCs, small island states and other states vulnerable to extreme weather events and flooding."

We need support from larger countries as well:

In September Sir Nicholas Stern asked me to give him an executive summary of the case. Lord Adair Turner, who is head of the Climate Change Committee, asked to be copied in.

And the What about the all important USA?



At Poznan Celeste Connors, Director of Environment at the National Security Council, part of the White House, asked for a meeting with the International Biochar Initiative to discuss how it can help the US as part of the anticipated coming in from the cold after Obama takes over.

Historically our money was backed by reserves of gold. The financial system fell apart when we unlinked gold from money and allowed money to reproduce beyond the value of the underlying assets.

The Soil is the bank where we store carbon, the gold that underpins our food system and our climate system.

Farmers should get capital payments for creating this gold and banking it in the ground.

They should also receive an annual interest payment for the value of this carbon gold that they are maintaining, or pay for dissipating this capital.

The technology is simple and tested and clean



Good karma for oil drums

This is Cool farming and the food it produces is cool food.

I've formed a company called Carbon Gold with Dan Morrell, who founded the Carbon Neutral Company and traded the first tonne of carbon in 1989. He coined the term 'carbon neutral.'

We are creating an impeccable product in carbon offsets with char and bury projects. It is set to take off in the tropics and with several projects here in the UK, France and the US.



€1000 unit cost - 4 hectare farm
20 tonnes per annum
€ 1000 value of Carbon credit
plus: €1000 fertility value

The investment is low and the payback period is less than one year.

In Belize we are trialling 4 projects that can be scaled up globally:



Belize - Organic cacao

Cacao prunings and shade
Trimmings:

12 MT/Ha = 3 MT C/Ha

1100 cacao farmers in Belize

6.5 million cacao
farmers worldwide



Cacao prunings can yield 3 tonnes of Carbon per hectare

Conservation forest can yield 4 tonnes of Carbon per hectare and producing charcoal can defray ranger costs for private protected areas. Rice husks from rice mills makes excellent biochar fertilizer.

In the UK we are working with the traditional Charcoal making regions of Kent and Sussex to produce biochar

In Iowa we are initiating a feasibility study to retrofit an ethanol plant to produce biochar

If the carbon markets work properly – and this is very dependent on political will – then biochar production offers a way to rebuild fertility in the world's soils, reduce green house gas levels and also reduce the burden on the EU and the US taxpayer of directly subsidising agriculture.

We will be marketing a biochar based garden compost that will carry embedded carbon credits so that with every bag you not only add 4 Kgs of pure carbon to your soil but an additional 46 Kgs of offsets from our projects. This means that for every 20 bags of compost you are reducing atmospheric carbon by 1 tonne. It's a start and it engages the citizen at an active level.

It gives me great pleasure to say that the future is beginning to look very black indeed.



Cool Farming - Biochar and Climate Change

Craig Sams
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Brussels

