Biochar defended

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The International Biochar Initiative met 8th-10th Sept in Newcastle (on Tyne) to advance the scientific understanding and policy role of this new boy on the block. And it's under attack, even though it has a key role to play in addressing the threat of abrupt climatic change, such as a sudden, possibly several meter, rise in sea levels sometime this century.

But first, what's biochar? It's finely divided pyrolyzed biomass prepared for soil improvement – any sort of biomass such as wood chips, lawn mowings, sewage sludge, kitchen waste, animal husbandry effluents, corn stover and other crop wastes, etc. – that is heated with little or no oxygen (pyrolyzed) till volatile components are driven off (and available for processing to sustainable biofuels) with the remaining porous and carbon-rich material subsequently loaded with nutrients e.g. through exposure to compost or nutrient-rich boiler flue gases.

It is to be distinguished from charcoal, which is coarsely divided pyrolyzed wood, prepared for barbeque or other cooking fuel or for artist's material (though otherwise useless charcoal dust from the charcoal making can be processed to biochar like any other finely divided pyrolyzed biomass).

So what's it got to do with abrupt climate change? Distinguished Australian climate scientist Will Steffan, speaking to the Wellington Climate Conference last year said "One thing that really does worry a lot of us is the idea of a single aggregate tipping point for the earth as a whole – a shift to a state that may be much less amenable for human life". Since then both theoretical climate modeling and climatic observation suggest that a tipping point may be near, with a point of no return, beyond which there is nothing we can do to get tipped back again, possibly following not long after.

The possibility of such a disaster is evident from studies of climate change over the last half million years which show many sudden temperature increases of several degrees within a few decades, linked to sea level changes of several meters. This link is thought to be due to the collapse of large land-based ice masses, such as, on a relatively small scale, the loss of the Larsen Ice Shelf a few years back, creating a vast ice island in the Southern Ocean.

So what are the policy implications of that? Like Noah, when he learned on high authority of a possible flood, we could get to be prepared, we could build an Ark. With the warning from Will Steffan, what form should our Ark take? An expert workshop I convened in Paris a few years back concluded that we need to be prepared to do better than reduce emissions, as is aimed for by the Kyoto Protocol. We need to be ready to actively take carbon out of the atmosphere and then put it somewhere safer.

Taking it out of the atmosphere means grow a lot of stuff, say trees – every ton of tree results from taking nearly two tons of carbon-dioxide from the atmosphere. Putting it somewhere safer means using the biomass of trees in ways that both keeps fossil fuel in the ground (Kyoto-fashion emissions reductions) and also prevents the Carbon that

had been taken from the atmosphere getting back there – what can be called ***carbon removals***.

Biochar does just that, providing it is based on sustainable commercial plantations, where harvested trees are replaced with new plantings that grow to maturity over the following years, or on biomass wastes co-produced with commercial food crops, resulting in synergy with food production, not competition. Done globally, and on a sufficiently large scale, carbon removals could restore carbon dioxide to pre-industrial levels by mid-century – far ahead of anything possible from Kyoto-style emissions reductions.

Interest in biochar sprang from archaeological studies of pre-Columbian civilizations in the Amazon basin. There it was found that large populations had been able to thrive, supporting themselves on the infertile yellow clay jungle soils by creating black earth (what is nowadays called ***terra preta*** in Brazil) through the accumulation of biochar residues from cooking fires.

Soil scientists involved in the Newcastle conference are investigating this fertility. It has been found that, with some soils and crops, productivity can be increased eight-fold. For the atmosphere that's a treble whammy – fossil fuel left in the ground, stable biochar carbon in the soil, plus increased labile carbon bound up in the life-cycle of the greater weight of crops and their in-soil roots.

Devoted researchers are working in developing countries to realize these benefits for indigenous communities, passing the treble whammy on to farmers on the ground – providing the policy settings post 2012 deliver a value stream for the carbon benefit, one of the concerns at the IBI meeting. That can then be added to the value stream from the bio-oil by-product of the pyrolysis process, and the value stream from increased crop production. But not always: in some soils there's no gain in crop productivity and in some there is even a reduction. So there is urgent need for research to find out where is best, which is what the IBI meeting is also about.

So why is this multi-win approach to the imminent threat to the survival of planet earth as we know it under attack?

Published by "eGov" it proclaims "International Biochar Conference uses False Claims to Promote Dangerous Technology", not waiting for the meeting to take place or to proclaim anything. 'Campaigners' warn the IBI will be misleading governments with claims that biochar can curb climate change and improve soil fertility. This from one woman who is world renowned for swimming with dolphins off Northwest Australia and another deeply involved with the Pacific Indigenous People's Environment Coalition – a group that will doubtless thank her sincerely if her actions see their homelands sink below the ocean waves.

Neither seems particularly well versed in soil science or knowledgeable about the carbon cycle. Almuth Ernsting adds that the IBI board members are well aware that science does not back their claims, citing Professor Lehmann's confirmation that there are no long term experiments to support them. Now Lehmann is a good and honest scientist and would not shrink from the reality that interest in this new boy on the block is, unsurprisingly, recent. So it is to be expected that no long term human

experimentation has yet yielded results regarding long term carbon sequestration. But Mr Ernsting cleverly twists his words by implying there is no evidence of improved fertility – in fact there is plenty, as he well knows and would report if he were honest. And there is more than one way to scientific knowledge – observing natures' experiment with biochar left in the soil by pre-historic civilizations provides plenty of evidence that biochar yields very long term sequestration indeed.

Whatever can possess these presumably well meaning people? It seems they are driven by hard cases, and it is well known that hard cases make bad law. There is much to be learned from bad experience with early biofuel projects – early biochar projects don't exist, since biochar work is all recent. This can ensure that land usurpation and tropical forest destruction have no place in the future pattern of land use improvements, based on investing in and caring for the soil so that it can deliver the food fibre and fuel that will be needed by 9 billion people a very few decades ahead. These people want to throw out the baby with the bathwater, bad law indeed when this baby can not only deliver the needed food fibre and fuel, but also grow up big, to save us from climatic catastrophe.

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