

**MAJOR GENERAL THE HONOURABLE
MICHAEL JEFFERY, AC, AO(Mil), CVO, MC (Retd)**

**NATIONAL SOIL ADVOCATE,
CHAIR, SOILS FOR LIFE**

**OPENS THE DAY 2 SESSION AT THE
2018 NEGATIVE EMISSIONS CONFERENCE: INTEGRATING INDUSTRY,
TECHNOLOGY AND SOCIETY FOR CARBON DRAWDOWN**

**“BENEFITS AND CHALLENGES OF KEY LAND AND OCEAN BASED
TECHNOLOGIES”**

AT THE SHINE DOME, 15 GORDON STREET, ACTON, ACT

WEDNESDAY, 31 OCTOBER 2018 – 9.00 AM

Acknowledgements:

National Committee for Earth System Science

The ANU (who helped fund the conference)

**Dr Pep Canadall (Exec. Dir, Global Carbon Project, CSIRO Oceans and
Atmosphere)**

Ladies and Gentlemen

- I would like to recognise the original owners of this land and pay my respect to their elders, past and present.
- Thank you for inviting me to your conference, and to hear me echo your concerns about the really Big Issue facing us – carbon, how to get it out of the atmosphere and back to where it belongs, in the soil (and as a result of yesterday’s deliberations, in the oceans).
- As Australia’s National Soil Advocate and the Chair of Soils For Life, that answer is pretty obvious to me.
- Soil – healthy soil, regenerated soil, active working soil, has a proven capacity to draw down carbon and keep it there, yet we’ve literally overlooked it in the national debate about climate change.
- Simply put, I believe, along with a former Chief Scientist Robin Batterham, that healthy soils have the capacity to absorb, like a sponge, at least sufficient CO₂ to meet our Paris Agreement target, and accordingly we should be pursuing with the utmost vigour, a cheap, accurate, broad acre soil carbon measurement system.
- Such a system may well demonstrate the possibility of neutralising Australia’s total annual industrial emissions of around 550 million tonnes of CO₂, thus allowing a more orderly transition to renewable energy options, or even nuclear.
- Some suggest that healthy soils may also have the capacity to catch up with the last 50 years’ legacy emissions, but whatever the case, I don’t think we have been focusing hard enough on the possible answer; sequestering carbon into our soils through enhancing our photosynthetic capacity.
- At Soils For Life, we demonstrate how to regenerate, maintain and protect strong healthy soils through some 24 carefully selected and performance measured farming case studies. We intend rolling these out to 100 in the coming 2-3 years, Australia wide.
- These 24 innovative farmers have studied their landscapes closely, and worked out how to maintain permanent vegetation cover, retain more precious water in their soils – where it does its job - and reduce or, in some cases, even eliminate the use of fossil fuel inputs, chemicals, pesticides and inorganic fertilisers.
- In so doing, they have successfully scored the healthy landscape trifecta, by integrating the management of their soils (microbial, nutrient and fungal function), their water (the hydrology) and their plants (diversity, rather than monocultures).
- Monocultures mine the soil - diversity enriches it.

- With integrated, regenerative landscape management, farmers store and retain large amounts of soil organic matter, which can remain in those soils for millennia. It is a fact that in our Australian agricultural landscapes, our soil carbon levels have decreased from a healthy 4%-5% at settlement to around 1% today and I suggest this is one reason why we are not maximising the retention of water in the soil.
- There are, of course, various established methods of sequestering carbon in our soils, such as slowing down water, conservation tillage, managed cell grazing, forest rejuvenation, pasture cropping, and crop rotation.
- And yet a lot of that good work can come undone by oxidation.
- So – like any sponge – our soils can absorb and convert CO₂, but they can also have it squeezed out.

PAUSE

- I talk to you today with a real sense of urgency, and some frustration.
- According to Walter Jehne from Healthy Soils Australia, ***in the last 70 years*** our industrial forms of agriculture have accelerated carbon oxidation through excessive use of fire, non organic fertilisers, bio-cides, irrigation and fallowing.
- It's not news to this audience that we must cool the surface of the planet to convert carbon oxidation to bio-sequestration, in order to regenerate the resilience and hydrology of the soil carbon sponge.
- And we can do it, but only with an enormous, coordinated effort at grassroots, scientific and government levels.
- Organisations like ours and Healthy Soils Australia set out the urgent steps we have to take:
 - Somehow, we must safely and naturally cool the regional and global climate through increased photosynthetic action to offset and buffer greenhouse warming.

EXPLAIN: Paddock, House, Tree, Car Park

- We must secure essential water and food, for more than 5 billion people who are expected to live in urban areas by the middle of the century, and
- We must regenerate the Earth's soil carbon sponge and its capacity to infiltrate and retain rainfall and sustain the growth and transpiration of bio systems,

particularly forests across our landscapes.

- So what have we done to the Earth?
- We've degraded half of the planet's soils.
- We've turned 5 billion hectares – or 40% of the land surface – into desert and wasteland.
- We've polluted most of our great river systems and reduced their flows by damming.
- In India, sub Sahara Africa, China and the Middle East we are steadily mining aquifers established over geological time.
- You can see now why I have a sense of urgency...
- What we must do is to maximise photosynthesis and do it quickly by maximising the area of land under perennial green plant growth, including in our cities.
- Our Soils For Life farmers – even those technically in drought – proudly show us paddocks and plantations with full green cover, sometimes up to the knees.
- Once we establish that green cover, we have to keep it there permanently, and hence the need for selected native perennials that grow green in our traditional summer months.
- And we have to maximise the degree to which the carbon fixed is bio-converted into stable soil carbon rather than being oxidised back into the atmosphere through poor soil management, hot fires and so on.
- Our Soils For Life farmers know this and are happy to share their knowledge.
- Unfortunately, many of their neighbours still continue with their old industrial agriculture practices, but this drought is forcing them to ask questions of themselves, including taking a look at the land management practices we promote.
- I tell them not to be afraid to go for change – to give it a go, one step at a time, to transition, if you like.
- Their futures as farmers, and the generations to come, depend on their getting it right, to preserve, maintain and protect their landscapes and their precious water, and to push carbon into the sponge beneath their feet.

- But they can't do it on their own, and this is where you, our scientists, must rise to the challenges I would now like to set before you....

PAUSE

- Today's session focuses on technology, and most farmers employ some technology, with drones the latest addition to the technological toolbox.
- But many are working in the vacuum of their own farms, or their own catchments, without being provided with a regional, national or global picture of how much carbon they are storing, or how little.
- *There is, to my dismay, no co-ordinated, clear approach to measuring carbon in our soils, cheaply, accurately, quickly and broad acre. Yet soil carbon is the common indicator of soil health.*
- Perhaps a suitable technology might include satellites working to ground sensors, to detect soil carbon in real time. EXPLAIN: CSIRO, Soil CRC, Australian Space Agency and the Chief Scientist.

PAUSE

- So, my challenge to you is this:
 - As scientists, please find a way to measure soil carbon on a broad scale cheaply, accurately and quickly. Establish where our soil carbon levels are good and vice versa.
 - As scientists, work with other scientists to update, collate and co-ordinate that knowledge, and provide it to non-scientists like me in a straightforward and timely manner.
 - Provide that knowledge to government, as the basis for funding, perhaps under the Emissions Reduction Fund.
 - And – most important – provide that information to farm businesses through a revised extension service system, so that farmers can make good decisions about their land and animal management and qualify for carbon credits.
 - And we really need science to help provide answers in retaining more of the 50% of all the rain water that falls in this country either evaporating, and/or running off because it cannot penetrate the soil. This is 25 times the quantity of water in all our dams and five times the quantity in all our rivers – wasted.

- Our Soils For Life farmers can provide you with some of the answers to that last question –they’ve established top cover year round and thus slowed the movement of water from the hill tops and in their water courses so the water better filtrates their soils. Some of you may have witnessed Australian Story on Monday night, explaining this. Having sufficient carbon in the soil is also very important to water retention: every gram of carbon in the soil facilitates the retention of 8gms of water in the soil and VICE VERSA.
- And what about urban run off. The average Canberra home runs off around 350KL of rainwater per year. Surely our urban planners across the country should be directed by law to design systems that capture all of that roof run off and recycle it productively.

PAUSE

- I have a second challenge for you and, again, it has soil health at its core.
- Some of you would have read that the increase in childhood allergies, cancers, diabetes and obesity, may be directly related to the mineral and vitamin deficiencies in our food.
- And those deficiencies are directly related to the mineral, carbon and vitamin deficiencies in our soils.
- I suppose it’s not surprising – as wealthy consumers, we demand and get fruit and vegetables which look shiny and perfect.
- As any backyard vegetable grower will tell you, that’s just NOT how they grow.
- But growers have had to meet the demand for mass production, often off-season, and have responded with food grown under cover, treated with chemicals to make them ripen all year round, and sometimes grown without any soil at all.
- One expert who has spent a lifetime linking agriculture to human health, tells us that our food has lower mineral content, lower nutrients, antioxidants and vitamins, and is likely to have chemical residues and a higher water content.
- It is suggested that the result impacts on our immune systems.
 - We’re told that an accumulation of chemicals in our bodies are stored in cells, causing inflammation which can become chronic disease, depending on the organ where the inflammation occurs
- Our immune systems, according to some reports, are being gradually diminished, reducing the diversity of the bacteria in our gut.

- This is where science can and must come forward and tell us honestly and in a timely fashion, what is happening in respect to food nutrition.
- As scientists you therefore need to effectively, and in a completely unbiased way, test the level of chemical residue in our bodies and in our children's bodies.
- And, again, such research needs to be done in a co-ordinated way; write, review, test and publish widely. Indeed is it too far-fetched to have the major chain stores advertise on the shelves, meat, vegetable and fruit nutrition levels, in much the same way as white goods manufacturers have to show energy efficiency ratings?
- Finally, I want to address the issue of people, especially our young ones.
- We face a major deficiency in soils and food science, and I've highlighted my concerns.
- But we also have a deficiency of young agricultural scientists on the ground, armed with the knowledge that you provide, to advise farmers on how to go about improving their hydrology, managing their landscapes better and keeping carbon in the "soil sponge".
- It is not good enough that farmers now have to depend so heavily on the local agronomists – good people, but often employed by companies that make their profits out of selling more of a particular product that is not necessarily the right solution to the problem.
- To deal with this, I suggest we need to urgently re-establish sufficient numbers of research stations in rural and regional areas, to service our 100,000 farmers, and employing young, well trained and independent agricultural scientists, who have a properly planned, long term career path. A love of such science could come from the establishment of a vegetable garden in every primary and junior high school in the country with a mandated syllabus, agreed by the Curriculum Council. EXPLAIN:
- Unfortunately, there've been too many conversations around farm kitchen tables which start: "Son, don't go into farming".
- And so, young people haven't seen agricultural science as a career, and we have to change that.
- As today's scientists you have the capacity to tackle the challenges I've laid out for you today and find the solutions.
- Let me conclude with some encouraging observations from the PM's drought summit held in Canberra last Friday.

- It was an excellent occasion attended by the PM, Premiers, bankers, CSIRO, the NFF, the opposition shadow minister for agriculture and federal/state agricultural department heads.
- The PM made it clear that he not only wanted to ensure that drought aid was being efficiently and quickly delivered, but he also wanted advice on how to help farmers better prepare for the inevitable future droughts.
- I put it to the forum that farmers need to be better supported with knowledge and resources on the ground to get their soil, water, plant and animal assets functioning as an integrated whole, with good and transparent science to back them.
- I suggested a national objective or aim “to restore and maintain the health of Australia’s agricultural landscape through the integrated management of the soil, water and plants”.
- The PM said that he supported such an objective. I raised various other sub-sets to that objective which received considerable approbation, including from Joel Fitzgibbon, various premiers and Bob Katter.
- A garden in every school received enthusiastic support including from the ABC’s Macka.
- I will now be following up post haste with the PM and Premiers.
- I think my time is up. Thank you for inviting me to speak
- FDR once said – “the nation that destroys its soil, destroys itself.” My contribution for what it is worth is – “To save the planet, save the soil”.

Thank you.