



*An answer to
climate change
could be right under
our feet.*

NATURAL

STORY: [GEORGIE OAKESHOTT](#)

When the McKellar family started farming at ‘Inveraray Downs’ in northern New South Wales back in the 1960s, the cultivators turning the soil in preparation for planting were continually being clogged by giant earthworms.

Forty years on, those “three-foot worms” are long since gone but a second generation McKellar is doing everything he can to get them back.

Working overtime to restore soil fertility and wishing he could start all over again, Cam McKellar regrets the impact that traditional chemical farming has had on their land.

“Basically we stuffed it,” he says of the soil which went from a healthy carbon level of three per cent to under one percent in 30 years.

The turning point came in the 1990s when costs were spiralling out of control and, plagued by headaches from a chemical herbicide, Cam McKellar began questioning the

way things were done and realised there was another, more environmentally friendly way.

He turned to biological farming, which meant winding back the use of chemical fertilisers to restore the soil’s health. Not only has the soil improved but his plants are healthier, bushel weights are higher and the end product is more nutritious.

“Biological farming is taking better care of your soil biology and plant nutrition,” he says. While it’s taken 10 years, soil carbon levels are improving, insecticides are hardly ever needed, fungicides are non-existent and the worms are coming back.

“We basically had to start from scratch but now we’re seeing the results. The soil is totally different to what it was 10 years ago. It looks good, it smells good, and I’m enjoying farming again.”

McKellar’s Spring Ridge property was recently visited by members of the House of Representatives Primary



RICH EARTH: *Getting the best out of the Liverpool Plains soil.*
Photo: AAP Image

RE'S WAY

Industries Committee who came to the Liverpool Plains to meet farmers at the leading edge of adaptations that could play a vital role for agriculture as it deals with the impacts of climate change.

Cam McKellar believes increasing soil carbon levels has the potential to solve one of the nation's biggest environmental challenges.

"If we did this across western New South Wales we'd fix the Murray Darling system in a matter of five or 10 years. You would have your water cycle back to where it's meant to be and everything would be pretty sweet. I know that's a big call but it would be lovely to see."

Not far from Spring Ridge, Quirindi farmer David Wallis is also seeing the benefits of biological farming.

Faced with a 95 per cent reduction in his water allocation and knowing that carbon increases the soil's ability to hold water, David Wallis used biological farming techniques to increase his soil carbon levels from two to three per cent, which is close to the optimum level in these heavy black soils.

"The biological principles change your thinking a bit," he says. "It's sometimes referred to as 'soft' farming. We don't use acid based fertilisers anymore. We actually spray nutrients on that will feed the life in the soil to build up the bug life in the soil which helps create nutrients for your plants."

He told MPs that biological farming has improved both the health of the soil and the health of his plants. His lucerne is now 80 per cent 'solid stem' which is better and stronger than the 'hollow stem' lucerne which used to dominate his crop.

Breeza farmer Andrew Pursehouse is another Liverpool Plains innovator who has had to make changes to cope with a 68 per cent reduction in his water allocation.

Instead of cultivating the soil, he has adopted a no-tillage technique on some parts of his property to conserve soil moisture, and it's worked. Along with a few other adjustments, the no-tillage approach has helped achieve the equivalent of an additional six inches of rainfall per year.

"The whole thing is a really wonderful story," he says, "and if you combine legumes in there as well to provide

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organic nitrogen, it’s a wonderful system we now have in place.

“These black soil plains have a tremendous water holding capacity and in days gone by to eliminate weeds we farmed the land and cultivated the weeds. That was actually creating a sealed off zone which limited moisture penetrability of the soil, and the big heavy tractors were basically acting as compactors.

“Now under no-tillage farming the tractors are lightweight and they use defined, controlled traffic lanes. We’re finding the soil is more porous, stubble retains moisture and a lot of our earthworms have come back. They didn’t like the tillage.”

The achievements of these farmers on the Liverpool Plains are something Primary Industries Committee member Tony Windsor (Member for New England, NSW) describes as leading edge.

“The farming community isn’t sitting around waiting for the climate to get drier,” Mr Windsor says.

“In fact the farming community already knows some of the answers to a lot of the problems and the political process has to go back to the grassroots and, rather than impose policy on them, actually ask some of these people how to get the answers, because the answers are there.

“Lifting carbon levels from two to three per cent may not sound a lot but that’s a 50 per cent increase in the amount of carbon being stored in the soil.

“If you could improve the capture of carbon in our soils by 50 per cent across the good soils in Australia or even the good soils in the world, there would not be any need for an emissions trading scheme. We would have that problem solved,” Mr Windsor says.

Primary Industries Committee Chair, Dick Adams (Member for Lyons, Tas) says there clearly needs to be more research and support for their findings.

“I think we went out to save the world and environmental science became the sexy thing, but now some of that effort needs to be put back into agriculture. We need to encourage people to look in these areas, to study these areas and get degrees in these areas which are important for growing food and fibre in Australia.”

At a public hearing in Canberra, committee members heard from one of Australia’s leading soil scientists, Christine Jones, who believes soil carbon is the prime determinant of agricultural productivity, landscape function and water quality.

“In our never-ending quest for technological quick fixes we frequently overlook the obvious, the simplest and most effective solutions,” she told the hearing.



“Without doubt, increasing the level of carbon in agricultural soils is the most obvious, simple and effective solution to climate change. But we cannot increase soil carbon unless we change farming methods,” she said.

The statistics speak for themselves. In little over 200 years of European settlement more than 70 per cent of Australian agricultural land has become seriously degraded.

On average seven tonnes of topsoil is lost for every tonne of grain produced. At the same time there has been a reduction of between 50 per cent and 80 per cent in the organic carbon content of surface soils.

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“Losses of carbon of this magnitude have immeasurable economic and environmental implications,” Dr Jones said.

“Further, the carbon and water cycles are inextricably linked. Humus holds approximately four times its own weight in water. The most beneficial adaptation strategy for climate change would therefore be one that focuses on increasing the levels of both carbon and water in the soils.”

Warning that a fundamental redesign of food, fuel and fertiliser production is vital to the survival and profitability of the Australian agricultural sector, Dr Jones said landholders are realising they need to change.

“I cannot tell you how many people at recent workshops have almost been in tears saying ‘we know we need to change, we desperately need information’. They’re ripe for change,” she said.

According to Dr Jones, the answer is based on a simple, natural process involving green plants which draw down carbon from the atmosphere. This is then converted to stable soil carbon through microscopic organisms around the plants roots.

“All living things are made of carbon and the carbon cycle is the basis of all life on Earth. We need to learn how to properly complete that cycle, how to draw down excess CO₂ from the atmosphere and sequester it in a stable, life-supporting form in the soil.



BETTER YIELD: (opposite page) Andrew Pursehouse and 'Charlie' at Breeza Station; (above) Primary Industries Committee members hold discussions with the NSW Department of Primary Industries at Breeza; (left) Cam McKellar demonstrates the benefits of biological farming. Photos: Georgie Oakeshott

“The sequestration of CO₂ requires a green plant. The conversion of the liquid carbon in the plant to a stable soil carbon requires a microbial bridge. Life in the soil cannot flourish in the absence of green plants, nor can it tolerate a constant barrage of toxic chemicals.”

The reason many current land management systems are failing, she said, is because green plants are only present for part of the year, with bare ground the remainder of the time. It's vitally important that soil be covered with living plants in all seasons, particularly summer.

She believes perennial groundcover has multiple agricultural, ecosystem and landscape benefits, including erosion control and combating weeds that colonise land when it's empty.

Using a technique known as perennial cover cropping, annual grain or fodder crops can be direct drilled into dormant perennial ground cover with excellent results.

In fact, she said, in 2007 the only grain harvested in the Geraldton region in Western Australia was from crops sown into pasture by the WA Department of Agriculture and Food.

“These crops yielded over a tonne per hectare when everyone else's crops simply died. It was because the perennial pasture had improved the soil and helped the 'pasture crop' survive under extreme conditions.”

Another positive outcome of this 'year-long green' agriculture has been an increase in biodiversity such as snakes, lizards, birds, even marsupials like bettongs which feed on fungi and earthworms.

“We thought their absence was due to predators but it was actually due to lack of food supply and lack of habitat. Now we have the year-round grass cover there, although there are still plenty of foxes and feral cats around, I am seeing more and more bettongs all the time. I'm blown away every time I see one,” she said.

Dr Jones told the committee the federal government could fast track the adoption of innovative, productive farming technologies through a proposed Green Agriculture Stewardship Scheme (GASS).

The scheme proposes to provide incentive payments of \$200 per hectare for the establishment of green agricultural sites to provide on-ground proof of resilient high quality profitable agricultural production, active soil-building, carbon sequestration, biodiversity enhancement, improvements to landscape function and the aesthetic benefits of year-long green farming techniques.

Dr Jones said these sites would serve as design and innovation templates for expansion to other properties in their designated region as well as nationally and internationally.

“As a result of the measured and publicised benefits of the stewardship scheme, it is anticipated that regenerative farming techniques would be widely adopted throughout the agricultural community, hence not requiring further government funding other than an initial five year allocation.”

Dr Jones told the committee that if there was government support to encourage landholders to make some of these changes, there would be no valid reason for the Australian agricultural sector to be a net emitter of CO₂.

“It would require only a 0.5 per cent increase in soil carbon on two per cent of agricultural land to sequester all Australia's emissions of carbon dioxide. That is, the annual emissions from all industrial, urban and transport sources could be sequestered in farmland soils if incentive was provided to landholders for this to happen.”

This may sound too good to be true, but if it is true, it's one simple solution to save agriculture, the environment and the planet all at once. And all along it was right under our feet. ●

For more information on the inquiry into farmers and the impact of climate change visit www.aph.gov.au/pir or email pir.reps@aph.gov.au or phone (02) 6277 4500.