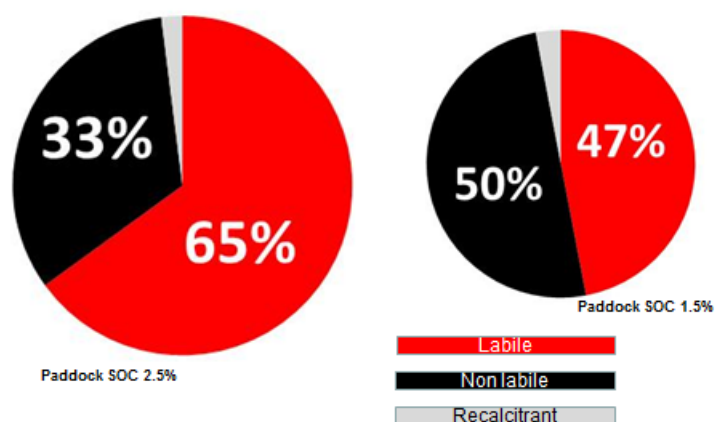


## Short-term carbon is the driver of change

When people get their head around the carbon flows way of thinking, they quickly discover that the bulk of the carbon that is **moving** in the paddock involves short-term carbon compounds, not long-term carbon compounds. Over a twelve month period, maybe 2% of the flowing carbon in a paddock involves long-term carbon. In other words virtually none. As you know, long-term carbon is moving, but it is moving very slowly. Carbon flows involve pasture as well as the soil.

The point being made is that in the short-term, long-term carbon is not driving change in the paddock. The grazing industry does not manage long-term carbon, it manages short-term carbon. Long-term carbon is an outcome. The management decisions graziers make, relate to short-term carbon. This begs the question, has extension to the grazing industry focused on the wrong aspect of carbon from a “management perspective”. Looking at soil carbon provides a good example.

The pie diagrams below show the short-term outcomes of changed management. The red section is the fast moving short-term carbon and the black section is the slow moving long-term carbon. Chan’s diagrams show how the ratio of short-term carbon to long-term carbon changes as soil organic carbon increases. As the circle gets bigger, the red component becomes larger.



Derived from: Chan et al A farmers guide to increasing soil organic carbon under pasture. NSW Industry and Investment 2010

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When soil organic carbon went from 1.5% to 2.5%, the change was driven by increases in the short-term carbon (called labile carbon) – the red section. Look closely at the actual size (area) of the black section in each circle, which is long-term carbon (non-labile), and there is virtually no change. The percentage of long-term carbon has changed on the left hand diagram, but this is because the increase in short-term carbon has changed the total.

This diagram sums up what happens in the soil part of your paddock when you change the management of carbon flows. The left hand circle is larger because changed management has increased the flow of carbon through **all of the paddock**.

The energy agriculture relies on is sitting in the red pool. The bulk of the carbon movement in your paddock involves the red section.

*“Field experiments have demonstrated that the level of labile carbon is sensitive to management. Soil organic carbon is diverse in composition, and it is the labile fraction that is the most important for maintaining soil functionality. Labile carbon is a better indicator of soil health than total organic carbon. (Phil Moody et al)”.*

Chan's diagram is consistent with scientific understanding that long-term carbon is slow to change. Logic dictates that if long-term carbon is slow to change then long-term carbon can't be responsible for short-term changes in production levels or the health of the paddock. Bankers and environmentalists both have a vested interest in promoting the role of carbon flows that are based almost solely on short-term carbon.

I am not suggesting that long term soil carbon is not important, because it is. It is a resource for production and protection of the environment. The reality is that it shouldn't be the starting point of discussion around best management.

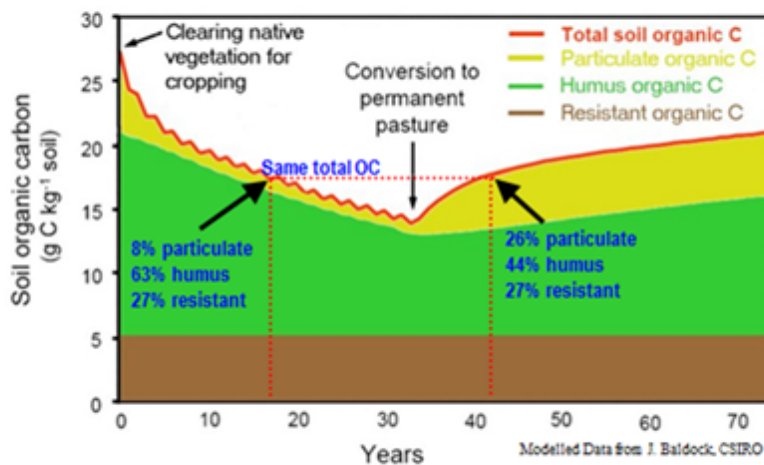
While the discussion above relates to soil carbon, carbon also flows above ground. Management changes also influence the level of ground cover, remembering that grass is 45% carbon when dried. Ground cover in the form of pasture is short-term carbon, another example of carbon flows being mainly short-term carbon.

Carbon trading is more focused on the slow moving stable forms of carbon, while rural producers set out to increase the volume of the faster moving short-term carbon. If you want to increase production in the short-term, it is the fast moving carbon that increases production, not slow moving carbon. Ground cover is what cattle eat and it is short-term carbon.

## Another example linking management changes to short-term carbon

The next diagram further reinforces the point that management changes are reflected in short-term carbon before long-term carbon.

## But pastures can rebuild organic carbon



If you look at the change from cropping to pasture (34 year point), the increase in carbon flows with the change to pasture immediately shows up in the short-term carbon stocks (particulate), while the long-term carbon stock (humus) hardly changes initially.

For those of you only interested in long-term carbon, long-term carbon has to start the journey as short-term carbon in the first phase of carbon flows. Even people focused on sequestration have to focus on carbon flows.

## Changing carbon flows changes production

Two paddocks can have equal long term carbon stocks, but it is the one that has the most carbon flowing through it, that will have the highest level of production.

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Given that what all rural producers sell is based on short-term carbon, be they farmers, graziers or vegetable growers, it is easy to understand why increasing carbon flows with better management decisions, increases production. Nobody seems to talk about cattle being 18% carbon and grain 45% carbon, all short term-carbon.

## Conclusion

It is climate change policy that is keeping the focus on carbon stocks in extension whereas producers actually manage carbon flows, that is their day job. They set out to increase the flow of carbon so that they have more to harvest and sell.

The short-term carbon you can't trade is just as big a driver of environmental outcomes as long-term carbon. In fact, many would say it is a bigger driver.

Changes in land management are initially reflected in short-term carbon levels, not long-term carbon. This is simply because management changes are reflected in the level of carbon flowing through the paddock. Chan demonstrated this in the pie graphs he produced which showed the breakup of soil carbon changes.

7 June, 2018

**Next week's discussion: "Sustainable Beef can't be defined without discussing carbon flows"**