It Is 'Carbon Flows' That Drive Land Restoration

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Both sides of the fence are grazing paddocks and neither side is farmed. It demonstrates that poor management of carbon flows over time leads to poor water infiltration. (Photo: P. Francis)

Introduction

A grazing paddock is a dynamic system, not a static one. To understand how a paddock functions, it is important to understand the role of the element carbon as it flows through different paths after it enters the paddock.

Carbon is a carrier of energy through a natural system.[1] As it moves, carbon takes different forms – such as animals, plant leaves, plant roots and soil organic matter. These different forms contain carbon in different chemical combinations, and their individual carbon-containing molecules flow through the system at different rates. Carbon keeps flowing above ground as well as below ground, including through commercial livestock.

Energising the Landscape

Carbon compounds in a paddock can be loosely classified into short-term (labile), medium-term

[1] A simplified description of the process by which energy from the sun drives the process of photosynthesis that converts carbon dioxide in the atmosphere to cellulose, other carbohydrates, lignin, etc. These products are utilised by other plants, can provide fuel for animals or are burnt in industrial processes, releasing carbon dioxide back to the atmosphere. In this cycle the carbon dioxide is used as a 'carrier to trap the energy' from the sun and convert it into a useful form – ED.

and long-term. Approximately 80% of the new carbon that enters a paddock will return to the atmosphere within 12 months, with the rest entering the medium-term pool. A small amount of this medium-term carbon will progress to the long-term pool. A small amount is also leaving the long-term pool each year, which is why management of carbon flows influences the balance of this pool over time. The dynamic nature of carbon is not revealed by spot measurements taken at a point in time, as standard techniques of measurement capture only 'stocks'. The standard technique uses a 2 mm sieve that removes about a third of grass roots which are labile carbon. Soluble carbon, the fastest-flowing carbon, is outside the measurement process.

Short-term carbon, which accounts for the bulk of carbon flows, moves through the landscape by ongoing interchange between plants, animals, soil and atmosphere. This exchange powers the health of the paddock generally and pastoral productivity in particular. The volume of flowing carbon in a paddock reflects recent land management decisions.

On the other hand, the level of long-term carbon is a consequence of past decision making. Long-term soil carbon is important for paddock health, but its level is slow to change. This is why it is not responsible for short-term changes in paddock health or productivity. Short-term improvements in paddock health and productivity are driven by the short-term carbon introduced in the first phase of carbon flows. It is the flow of carbon through soils, rather than its sequestration in soils, that is the key to healthy soils and sustainable land use systems (Janzen, 2005). Also, the long-term soil carbon has to start the journey as short-term carbon in the first phase of carbon flows.

Carbon Markets Can Deal Only in Stocks

Soil carbon has become prominent in public debate because of climate change policy and carbon trading. Payments to landholders in the form of carbon credit schemes for storing carbon apply only to long-term forms of carbon, because short-term carbon flows cannot be secured. However, payments in the form of stewardship incentives can be justified for management changes that increase the flow of carbon and so improve paddock and catchment condition. The two purposes are distinct, and different metrics are needed to assess them.

The complexity of any trading regime that attempts to use investment by corporations who have a carbon liability to drive improvements in landscape management is compounded by the differences in motives of those involved. Carbon trades will be administered by brokers with a commercial interest; stewardship incentives distributed by public authorities will have a public interest objective in mind; and landholders' interest will depend on their life stage and financial status. Some of these misalignments have been lucidly highlighted in Blakers' and Considine's critique (2016) of the federal government's Emissions Reduction Fund.

Implications for Management

Central to the concept of sustainability is that pastures should be rested after rain to maximise carbon flows. Perennial grasses must be allowed sufficient time after rain to replenish their carbon-rich tissues, above and below ground, and must be protected from grazing animals (including kangaroos) until growth stabilises. Pasture rest is long enough when sufficient carbon has flowed to all the areas in the landscape that it needs to. In other words, graziers need to be harvesting only the surplus, not the means by which a usable surplus is generated. Pastures should be spelled for 4–6 weeks after rain at least once a year.

An understanding of carbon flows leads into recognition of the importance of timing when managing stock on a pastoral property. The *timing* of spelling (while plants are in the active growth stage) is more important than the length of *time* for which the pastures are spelled. Timing of pasture resting was central to my book *Carbon Grazing – The Missing Link* (Lauder, 2008).

Allowing plants to build carbon in the soil both improves the productivity of the pasture and also advances the process by which soil carbon is converted into durable forms, so improving sequestration potential.

Adoption of the principles of Carbon Grazing will always be financially profitable for the grazier and beneficial for the catchment, but carbon trading brings the risk that land will be taken out of pastoral production altogether.

Conclusion

The dynamic concept of carbon flows highlights the ongoing nature of carbon transfers; whereas the contrasting concept of carbon stocks (measured at one point in time) is a static one and says little about what is driving changes in the health of the landscape.

Literature Cited

Blakers, M., & Considine, M. (2016). *Mulga Bills Won't Settle Our Climate Accounts: An Analysis of the Emissions Reduction Fund*. The Green Institute.

Janzen, H. H. (2005). Soil carbon: A measure of ecosystem response in a changing world? *Canadian Journal of Soil Science*, *85*, 467–480.

Lauder, A. (2008). *Carbon Grazing – The Missing Link*. Saltbush Systems. Also at http://www.royalsocietyqld.org/carbon-stocks-and-flows/

Author Profile

Alan Lauder was a successful rural producer with 30 years' experience of property management in Queensland's south-western pastoral zone. While a wool grower, he produced the world's first guaranteed prickle-free jumper, supplying David Jones and Country Road. Alan was a presenter at the Deakin Lecture series in Melbourne in 2010. His material has been used internationally.