

Climate change is already affecting Australia's producers and the environment. Reducing emissions is critical for reducing future climate risks for the agriculture and land sectors, as well as ensuring our industries are well-placed to compete in global markets. Australia is committed to taking action on emissions and both the agriculture and land sectors have an important role to play in supporting our national contribution to global efforts. (Page 9).

1. What are the opportunities to reduce emissions and build carbon stores in agriculture and the land? What are the main barriers to action?
 - I. Opportunities –
 - i. In this instance, reset priorities making environmental considerations the master. Any successful policy can't have more than one outcome/target.
 - ii. Establish which current practices can be modified or removed from modern land management/agricultural systems. Typically they can include soil disturbance (cultivation, weed management, over-harvesting, tree/vegetation removal), chemical usage, landscape design to include habitat/shelter, multi-tiered farm production (mixed farming to encourage diversity),
 - iii. Revisit some fundamentals beliefs in farming. Challenging the view that agriculture must include inputs and there are zonal boundaries for growing based on (mostly) weather and soil
 - iv. Conduct studies that investigate why regeneration has become so popular in short time. Is it because many can see the damage done since the input-driven Green Revolution of the 1960's has left its profound effects on health (Soil, plants, animals, human, land, globe)? Or is it simply the recognition limited independent science has demonstrated that growing on nature's model (biomimicry) can restore damage – and costs less!
 - v. **Ban any and all tree/vegetation removal and encourage diverse planting to design according to local and regional identified needs. Needs can and should include soil stability (erosion and landslip) which underpins carbon sequestration, water quality, biodiversity and other publicly funded programs.**
 - II. Barriers –
 - i. The belief that farming must use inputs to be successful is one barrier. Another is to not change this belief!
 - ii. Input providers want to maintain the status quo so they can continue to draw their profits
 - iii. Limited independent scientific research support to show the benefits of regeneration
 - iv. Funding for education, research, extension is very limited and not likely to come from the corporate sector
 - v. Government not taking responsibility for its inaction in the expectation that the corporate sector takes the lead.
2. How can we progress emission reduction efforts whilst also building resilience and adapting to climate change?
 - I. Put a moratorium on present farming system input usage and management practices.
 - II. Holistically and widely benchmark soil for its nutrient (including carbon), physical and key biological qualities.
 - III. Assess with independent scientific research the effects of each of the actions or inputs taking particular attention to the effects on the soil foodweb. (Without a healthy and functioning Soil Foodweb, soil carbon will not increase or be stored).

Building on existing effort and knowledge

There has already been significant action taken by industry, governments, First Nations peoples, local and regional communities to address climate change. (Page 12)

3. Are there initiatives or innovative programs underway that could be applied or expanded on at a national scale?
 - I. Firstly, invest more in local measurement and monitoring of the primary drivers of land management – soil, water, vegetation, stock (including free-loaders).

- II. Update mapping of the whole country and specific regions for soil stability – erosion and landslips as a priority. Unstable soil undermines every effort to build resilience and maintain a healthy landscape which holds and grows carbon.
 - III. Update widespread vegetation mapping filling the gaps over what has already been done and changed since previously mapped
 - IV. Fully integrate present scientific understanding of soil biology into extension and application. Anecdotally, far too many conventional practices (often unknowingly) damage and deplete the soil foodweb. This in turn leads the land manager to reach for a 'silver bullet' solution which can exacerbate the situation further.
 - V. Include the new NPK model of holistic understanding and management in any decision making pertaining to soil, plant, animal, human, land and global management.
4. How can the Australian Government bring together existing effort and new initiatives into one coordinated plan?
- I. Be open to pushback when the primary goal is announced by Australian Government as not economic gain.
 - II. Be clear that fundamentally soil health and function at a microscopic level determines how resilient an ecology can grow in time – and be steadily productive
 - III. Conduct an audit of all practices presently in use and historically applied across Australia and beyond. Practices to include organic/biodynamic, traditional First Nations, permaculture, conventional, syntropic, biological/biomimicry, regenerative, agroecology to name some...
 - IV. Establish a track record of each of the practices based on soil health and function measures, followed by environmental and economic considerations as second and third tier measures.
 - V. Create a matrix to cover goals of the practice, regional fit/how widely practiced, scope of application, positive aspects, shortcomings
 - VI. Bring representatives of each method of management together to reach consensus about which parts of each practice are detrimental and can be modified or noted as part of a transition plan

Opportunities to reduce emissions

Looking in more detail, there are technologies, practices and other measures that can reduce emissions and increase carbon stores. Some are established and others are still emerging. (Page 15).

5. What are the most important options to be further adopted or supported, looking in the short and the longer-term?
- I. First and foremost, in Agriculture and Land, immediately cease any and all practices that are scientifically proven to deplete soil health and function by a significant amount. If not yet proven but a hypothesis has merit, fund research to make appropriate findings.
 - II. Factor in a soil health/function index in farm business planning and support. The index needs to represent current productivity benchmarks against future farm productivity potential which inherently includes carbon sequestration/soil carbon targets reaching pre-colonial levels
 - III. Begin education about the actual and full costs of some of the entrenched practices of modern farming and land management, if known!
 - IV. Take a holistic approach using the new NPK model or similar. (We can do much better than reach for the 'farming in a bottle' by learning through personal observation and thinking, the scope of the natural regional ecosystem under changing climatic conditions).
6. What are the practical solutions to increase uptake?
- I. Take a multipronged approach:
 - i. Government to invest in and fully fund education, extension and research on regenerative systems of which the carbon cycle is a part
 - ii. Government to take the lead in offering transition pathways that are seen as an evolution rather than an imposition. It needs to come from government to instil the importance of the issue and also because of the long term nature of this journey.
 - iii. Begin to connect the important subject of soil condition to the impact of floods, drought, pest and disease, climate variation. For example, a compact soil holds less air and water than a well structured soil. It is recorded that before sheep farming, Australian soils were

originally very spongy able to absorb and hold significant quantities of air and water. Recent science has calculated 144,00 litres of water can be held in each hectare of soil to 30cm deep for every percent of soil carbon. How much soil carbon is held today compared with pre-colonial days? Presumably much is to be gained outside of the singular goal of returning carbon back to the soil.

- iv. Establish numerous demonstration farms across the country that operate under various regeneration strategies which emphasise the importance of regular and detailed measurement/monitoring (based on the new NPK method) for ongoing and well informed decision making.
- v. Support any and all investment in soil that may need financial support and time to turn soil health around. In other words, provide financial support/grants to landholders taking the course of forgoing agricultural production to rest and recover the soil to become fully functional and healthy again. It is called rest and recovery. Of course if this should come about, it will require detailed structure and set of rules – and won't be easy!

Developing emissions pathways

The plan will explore different ways for agriculture and land to contribute to whole-of-economy emission goals, whilst also delivering on national priorities that include a profitable and productive future for agriculture, and sustainable management of Australian landscapes. (Page 21)

- 7. How do you see the agriculture and land sectors contributing over the medium and longer-term? What are the opportunities to deliver emission reductions in parallel with wider goals?
 - I. Significant catch up to restore soil health and function to the level of the early days of colonisation where soil carbon was said to be very high
 - II. Plant more trees and diverse vegetation not for a targeted market but for healthy landscapes and ecology
 - III. Recognise the damage being done to living soil and hydrology through disturbance, and assist in recovery by closer monitoring and rule setting
 - IV. Accept that there can only be one master/goal/outcome priority – and it isn't necessarily the one that might drive the initiative. For example, to reduce the farm carbon footprint might best involve restoring and optimising the soil foodweb without which soil carbon sequestration/storage would not occur biologically

Supporting and enabling change

The plan will explore ways in which the Australian Government can help to accelerate emissions reduction in agriculture and increase carbon storage in the land. (Page 24)

- 8. How can the Australian Government better support agriculture and land sectors to:

- a) drive innovation

There is no need to 'drive innovation' unless this means to take notice of all existing science and basic biological principles which are largely being overlooked. Already too much importance is being laid on the 'we'll fix the problem' innovation when the problem was created by poor understanding and management of the intricacies of sound natural systems in the first place.

- b) build capacity

the best form of capacity building comes organically when all parties can see the benefits of emerging practices and consolidation of long held traditional practices. Of course there will be a need to quell the resistance by those who want to maintain business as usual. Aside from the corporate players, industry bodies and sector representatives need to be brought inside. Farming out of a bottle needs to be challenged as no longer being the band aid but instead the beast. Practices have evolved to reach for the 'silver bullet' often neglecting the full consequences of these actions. Over decades, this wider damage to soil, plant, animal and human health has normalised and become accepted in the name of productivity and economics.

- c) ensure the system enables emissions reductions

Put in place a framework that recognises the importance of soil health and function as the key foundation for a sturdy future in food/fibre production and ecosystem management. Without the actions of the whole soil foodweb, there would be little growth and no capture of atmospheric carbon through the pathway of photosynthesis and plant root exudates to allow restoration of soil carbon levels. The principle is simple – the understanding not.

8. What new initiatives could the Australian Government design that would support emissions reduction and carbon storage in agriculture and land and help ensure a productive, profitable, resilient and sustainable future for the sectors?

Firstly, revisit the purpose and success of established carbon markets. It is questionable whether sufficient land coverage can be attracted since most carbon players seem to be corporates, larger land holders and the carbon market middle-men. Reluctance by many smaller land holders to enter this uncertain market leaves large areas untapped and not directly invested to this market. Instead, promoting regeneration which has many other benefits, including carbon capture, provides opportunity for astute landholders to not be tied to this additional speculation yet gain from a new holistic management approach to soil and land.

9. A consistent and trusted approach for assessing and reporting emissions is often raised as a barrier to reducing emissions. Is there a role for the Australian Government in addressing this concern, and how can producers and land managers be supported?

“If it can’t be measured and monitored, it can’t be managed”. As long as some form of consistent measurement/monitoring is taken and not assumed, there is some chance of trending emissions. Model audit proformas designed to comprehensively represent the various ag sectors can mandate the common criteria to be measured and scored. A scoring system for reporting on carbon footprint status (zero, positive or negative) for each farm business can sit alongside budgets and plans as a source of leakage resulting in an actual measurable cost.

11. What skills, knowledge and capabilities do you think producers and land managers need to implement change? What information and data would help them make decisions about emissions reductions and sustainable land management in the short and longer-term?

- I. The realisation that higher order life is dependent upon unseen micro-organisms for a healthy and productive existence must be made clear to all.
- II. At least secondary school level biology knowledge be held by practitioners and any decision makers. (Understand that tertiary level education moves away from much of the pure science of biological systems instead providing training to ‘farm out of a bottle’. This is often deleterious to the soil foodweb as collateral damage occurs in achieving targeted outcomes such as weed control).
- III. An understanding that the 3 basic parameters of nutrients, physical condition and key biology (the new NPK) must be considered equally as a whole to become the basis for informed decision making in soil health/function management.
- IV. Training in physically assessing soil by sensory means (and not given over to technology which too often pushes people away from the soil) should become an essential skill. (refer to Visual Soil Assessment Guidebook Volume 2 by Graham Shepherd as a starting point).

12. Do you have any additional views or feedback that you would like to include in your response?

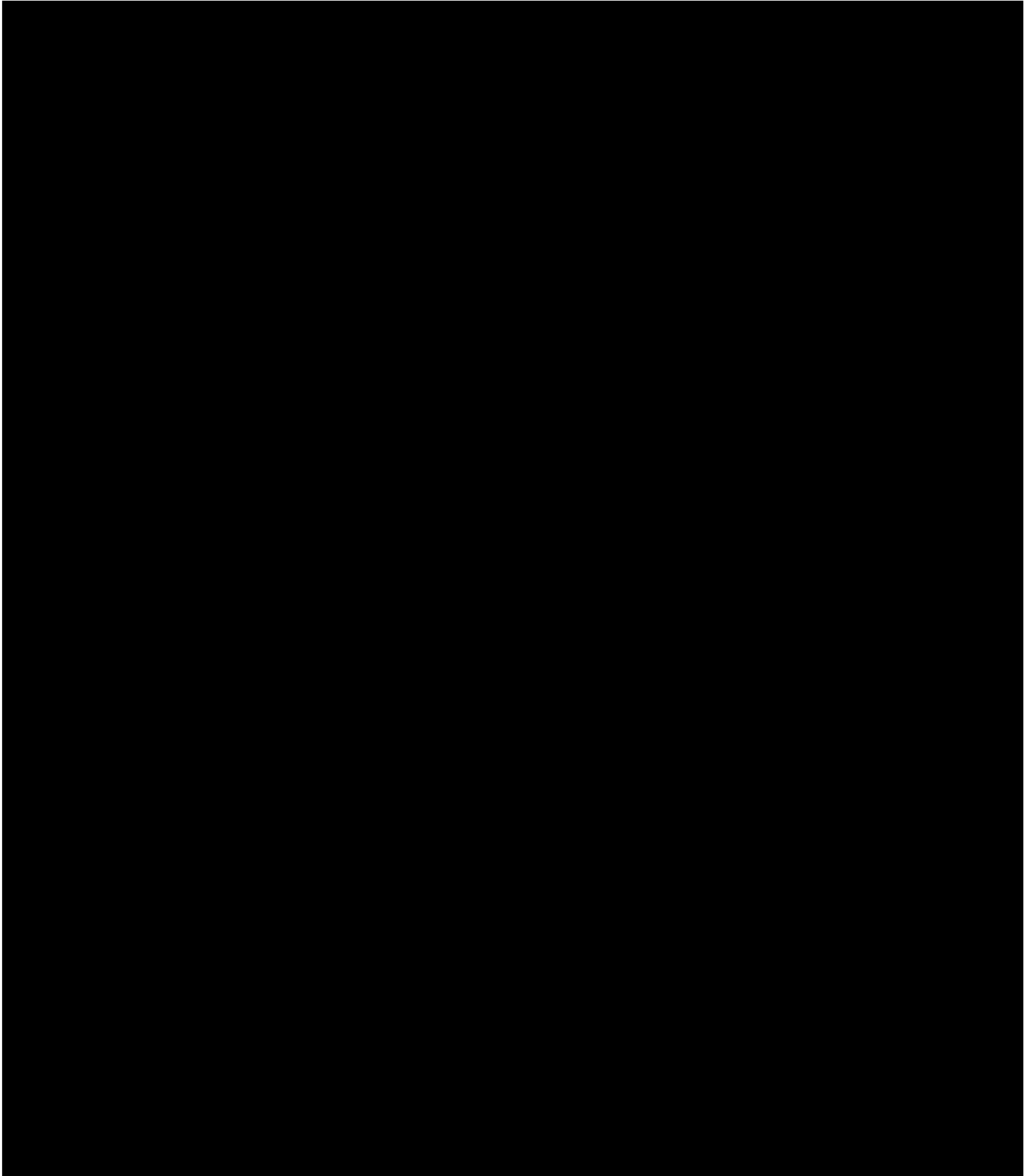
The “State of the Environment” report handed down by the Federal Government Environment Minister last year hasn’t to my reading adequately quantified the extent and detail of soil damage across the nation. Simply put, a damaged soil is an unstable soil unable to remain resilient to adverse weather and disturbance conditions – and certainly not capable of channelling and holding optimum carbon levels in the soil. Soil carbon is a by-product of the degree of soil function through the effort of soil life consolidating its position in the environment. Consequently, the focus needs to shift back to support a biologically active stable soil and this can only be done when adequately measured and monitored.

Your attention is drawn to a 2008 report by the West Gippsland CMA on its Soil Erosion Management Plan where 42,000 ha of land was identified as damaged or under severe threat of soil

erosion. This report was released 16 years ago and nothing has resulted from this effort in capturing data for this Catchment. Refer

<https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjL94CBptuD AxUwZmwGHaQABrsQFnoECAkQAQ&url=https%3A%2F%2Fwgcma.vic.gov.au%2Fwp-content%2Fuploads%2F2023%2F03%2FSoil-Erosion-Management-Plan-Final-2008.pdf&usg=AOvVaw2c3JgEONSsoPzdb2MidP8N&opi=89978449>

It is past time that an update be conducted and the management plan be put into practice, at least in part, to justify the investment and effort taken. In the meantime, damage at a landscape level continues on private and public land, and the opportunity to maximise soil carbon sequestration to offset carbon emissions over an unknown catchment area in only one CMA goes wanting.



Agriculture, land and emissions

Discussion paper – additional comments to the survey questions:

The following comments/statements are put forward by Gerhard Grasser, Director of AgriSolutions P/L (since 1998) to capture salient points and opinions related to Soil Health implications and management – (refer [https://www.agriculturalsolutions.com.au/info/fact sheets](https://www.agriculturalsolutions.com.au/info/fact%20sheets) for more details):

1. Nature is not broken. Input providers would have us believe that nature needs to be fixed to grow food and fibre successfully.
2. While a favourable economic position (preferably circular in nature) is important, it should never be prioritised over environmental considerations. Try breathing in an economy devoid of a sound and healthy environment. The cost of environmental trauma will inevitably catch up and override any investment in environmental research, extension, application, mitigation and recovery.
3. More research must be underwritten by government alone as an investment for the future common good. Any industry body or corporate investment in 'research' needs to be phased out to remove self-interest influence and business-as-usual profiteering from future scientific research findings.
4. Among the fundamental principles, the notion that human health begins with soil health needs to be understood and learned. Denial is at the peril of the denier – but then this is a good subject for further independent (not industry body or corporate) research.
5. Soil health => plant health => animal health => human health => landscape health => global health => soil health =>...
6. Soil and soil health are not well and consistently defined. Generally, they do not include reference to an active soil foodweb in its many parts (as we presently know). Science tells us that soil biology together with plants hold soil secure acting as a mediator of nutrients, to buffer disturbance and enable recovery appropriate to the prevailing and changing climatic conditions.
7. A healthy soil is a stable soil. The binding agent of a stable soil is an active soil biology. Amongst other functions such as decomposing organic matter and storing it in the soil as humus, a healthy soil can better tolerate and recover from traumatic events such as fire, drought, floods, chemical applications, cultivation/fallowing which each negatively impact

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beneficial soil life. Methods of assessment of damage and recovery programs require a scientific framework that goes beyond the presently known and practiced.

8. Not enough heed is being taken of the historic records of the early explorers and settlers and connecting this with current conditions. The nature of the soil was very different in the early days before native vegetation removal, (overgrazing) sheep, acceptance then mandating by convention of inputs and machinery became widespread.
9. Two hundred years later, we are faced with depleted and degraded soils due to the imposition of northern hemisphere agricultural and land management practices of the time. Now to undo this damage and still remain productive – and profitable (with government support).
10. Our collective aim should be to transition the land back to nearer the conditions found 2 centuries ago. This can be done by using the present understanding of what is lost/damaged ecologically and learning to transition to recovery based on monitoring and measuring all aspects of soil – total **Nutrients**, **Physical condition** and **Key biology** together. This is known as the new NPK – a holistic appraisal method slowly gaining acceptance.
11. Regenerative practices (see definition here [The Definition of Regenerative Agriculture - Regeneration International](#)) is moving land managers away from high energy dependence, chemically subsidised, input based farming. Resulting from the 20th century “Green Revolution” of agriculture where “feeding the world” was the mainstream farming mantra, the uptake and surge of Regenerative Practices to support natural processes by informed management is understandable. Not only does it reduce input costs, including energy, but also introduces many ancillary benefits. One such benefit is carbon sequestration as a vehicle to achieving better soil health and resilience outcomes.
12. A healthy soil with increased biological activity holds more water (up to 144,000 litres /ha for each percent of organic carbon to 30cm depth) – see <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwih6qDVzsKDAxU-Q2cHHsOYDokQFnoECBIQAQ&url=http%3A%2F%2Fwww.amazingcarbon.com%2FPDF%2FCHRISTINE%2520JONES%2520-%2520Catching%2520carbon%2C%2520storing%2520water.pdf&usg=AOvVaw2OtrLayAYtvwM0px6QyDd&opi=89978449> More and more diverse soil life means the potential for more carbon sequestration can occur,
13. A healthy soil is physically well structured (25% air, 25% water, 45% minerals, 4-5% OC, 1% soil biology) able to dynamically absorb or release more water. Over a whole catchment area, this can significantly mitigate/buffer the degree of flooding which has recently been widely experienced over compacted and paved landscapes. But then who measures compaction as a small but significant part of their soil management regime? Well informed regenerative farmers and land managers attuned to the limitations of their soil – that’s who.

In summary, much can be practically achieved if the various elements are distilled to the three building blocks of biological systems:

- ❖ **Nutrients** – correctly sampled and laboratory measured
- ❖ **Physical condition** – assessed by trained observers
- ❖ **Key biology** – observed and laboratory measured
- The process of bio-sequestering carbon in soil and plants offers many benefits:
 - Improves and regulates water holding capacity of soil,
 - Act as a nutrient buffer to regulate supply of plant available elements at the right time in the quantity required by plants,

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- Through the magic of photosynthesis, puts into storage the energy freely available from the sun in the form of carbohydrates,
- Contributes to soil stability with the formation of glomalin – a glue-like carbon compound created by mycorrhizal association to hold soil particles together,
- Pest and disease suppression when the soil foodweb functions optimally under ideal conditions,
- The water cycle is enhanced and fully functional when the growing system is managed towards this outcome and not outside biological boundaries,
- Nature's time is respected and control given over to the ebb and flow of carbon flux in response to growth phase, weather changes and climate variation over time,
- A healthy soil holding adequate populations of diverse soil life living and working in a highly carbonaceous environment will grow a healthy nutrient dense plant that cannot be achieved with soluble nutrients alone

Most modern farming systems don't understand or recognise the many benefits of a healthy and functioning soil. Therefore they tend to override and disregard this huge digester and cauldron of life using it instead to simply hold the plant roots. With this approach, the opportunity is lost to gain the many other benefits that can be attributed to the soil foodweb.