Webinar – 10th February 2021:

The importance of regenerative agriculture practices, key Earth systems and the Anthropocene crisis

Presented by Dr Charles Massy BSc PhD OAM, hosted by the Environmental Institute of Australia and New Zealand (EIANZ)

(Written by Adam Walter – HOPE researcher Qld)

Charles Darwin once said that it is not the strongest species that survive, but those most adaptive to change. According to Charles Massy (2021), regenerative agriculture is this change. It is an exciting and developing system of farming, characterised by an aim to increase biodiversity in farmland, improve the quality of soil, sequester greenhouse gases from the atmosphere and produce nutritious products in a profitable manner (LaCanne & Lundgren 2018).

Dr. Charles Massy has been an advocate of regenerative agriculture for approximately 40 years, with observed extreme environmental and climatic events at the time forcing him to reassess his initially industrial approach to farming. He completed his PhD in human ecology from the Australian National University, exploring why traditional agricultural practices fail and the transformative new agriculture taking its place. In this webinar, hosted by the Environmental Institute of Australia and New Zealand, Massy (2021) provides a general insight into the impacts of industrial agriculture on the biogeophysical earth systems. This is partly reflected in Figure 1, which identifies the accelerated effect of the post-1950 Anthropocene on several crucial climate and environmental indicators. Massy (2021) provides a solution-driven and proactive approach to farming, pondering that if industrial agriculture is a significant factor in landscape destabilisation, then an avenue to nurture landscape functions is surely the key solution.

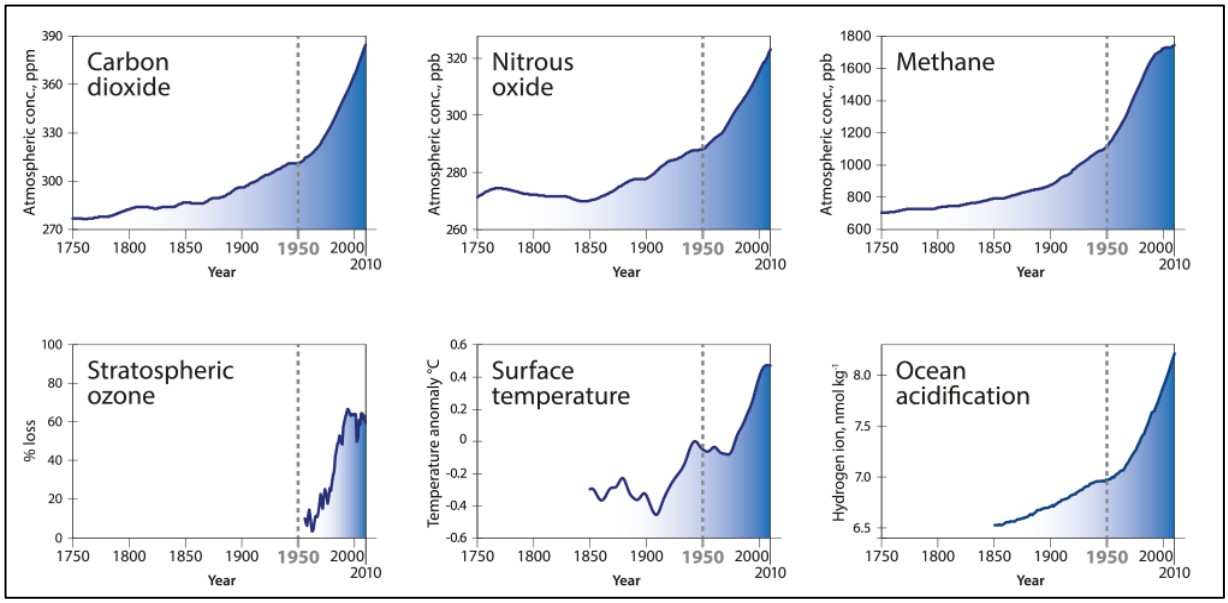

Figure 1: *'The Great Acceleration', outlining impacts of human enterprise on the Earth system over recent centuries; adapted from Future Earth (2015).*

Agriculture has seriously degraded over 5 of the 13.7 billion hectares that are available for global agriculture. Ensuring this number does not become considerably higher requires a significant shift in thought, away from the industrial paradigm that believes we need to simplify and dominate agricultural systems, and towards a more ecologically literate agricultural system. Developing healthy landscapes through ecological literacy requires a deep understanding of key landscape functions. These include:

i) **Solar cycle:** this encompasses all landscape and global functions in a virtuous cycle. Massy (2021) believes that nature has provided us with its own template to maximise the flow of solar energy on our landscapes. This can be achieved through the expansion of the primary tropic base – that is, planting more green perennial plants and cover crops, which also assist in the sequestration of atmospheric CO_2. Combining this with well-managed cloven-hooved ruminants in a mutually beneficial way (see Figure 2) has been shown to assist soil health.

Figure 2: *A sustainable agroecosystem featuring cloven-hooved ruminants and cover crops (Open Access Government 2020).*

ii) **Water cycle:** the retention of water within the soil is a particularly crucial characteristic of a regenerative agricultural system. This retentive ability is primarily achieved due to the increased soil biodiversity and organic matter as a result of increasing the primary trophic base (Gosnell, Gill & Voyer 2019), some of which can be seen in Figure 3. Farmers should optimise soil structure and quality by encouraging natural biological and nutrient cycles, in order to maximise the presence of mycorrhizal fungi (Frey 2019) and hence, the capacity for the soil to hold water more effectively (Augé et al. 2001).

Figure 3: *Some common soil microbes and biodiversity, including: (A) viruses; (B) bacteria; (C) fungal hypae (D) protist amoebae; (E) fruiting bodies of fungi; (F) protist slime molds; (G) nematodes; (H) enchytraeids; (I) earthworm; (J) springtails; (K) mites; (J) pseudoscorpions; (Geisen, Wall & van der Putten 2019).*

iii) **Soil-mineral cycle:** Ex CSIRO soil scientist Walter Jehne describes soil structure as similar to a cathedral – where the cathedral stones are the mineral particles, and the cement is the organic matter of the soil. If we don't add the cement, the cathedral falls

apart, as it is with the fundamentally important biological components of soil. The removal of soil cover, particularly through overgrazing and overploughing is likely to result in huge evaporative losses of water, soil desertification (exacerbated by climate change) and degradation of soil biological content (Rodale Institute 2021). Effective crop cover, stock rotation and agroforestry can help decrease soil density and allow for greater nutrient retention and rainfall penetration and hence, moisture content.

iv) **Fostering a dynamic ecosystem:** this involves identifying and nurturing the mutualisms, symbioses, food webs, complexities, networked communities and diversities of an ecosystem. This has been achieved by the Stewart family in the Otway Ranges, Victoria (Figure 4), where native vegetation was reintroduced to 20% of the landscape. This rapidly and greatly increased soil carbon and landscape resilience, increasing productivity and minimising the impact on the climate and environment.

Figure 4: *The Stewart family, standing in front of native vegetation planted in 1994 (Humans in Geelong 2019).*

Massy (2021) synthesises regenerative agriculture under the Complex Adaptive Systems View, which essentially means encouraging landscapes to self-heal, primarily by optimising carbon sequestration and soil structure, whilst minimising damaging anthropogenic inputs and degenerative practices. Put simply, if we stop suppressing landscapes, they will self-heal. From an environmental and climate perspective, this is of great significance, as demonstrated in a case study on John & Robyn Ive's carbon-negative farm 'Talaheni' in Yass. Through the introduction of regenerative agricultural practices, the soil Carbon quadrupled from 1% to 4%, which was 11 times higher than the total emissions of their farm. They achieved this remarkable feat by maintaining ground cover and nurturing their landscape through integrative farming and agroforestry practices.

The importance of combined regenerative agricultural practices on a global scale is summarised by its ability to reduce over 217GT of CO_2, which is more than 240% higher than the highest individual practice of refrigeration. More than 10 of the top 20 practices listed in the top 100 carbon draw-down techniques (Hawken 2017) are variants of regenerative agriculture. What this tells us is that there is room for vast achievable improvement on local and global scales, particularly when it comes to reducing CO_2 emissions.

Dr. Massy (2021) makes it abundantly clear that the Anthropocene is the greatest crisis humanity has ever faced. This is in part due to the oversimplification of our agricultural systems, that have relied for too long on poor understanding and management of landscapes and their biodiverse ecosystems. Figure 5 displays a brief summary of how creating agricultural systems and practices that are in-sync with nature means we can bounce back from the anthropogenic degradation of the climate and environment. Through maintaining soil cover, minimising chemical and physical interventions, reintroducing native vegetation and smart management of livestock and crop diversity, we can achieve a remarkable feat of climate mitigation and enhanced richness of biodiversity, whilst increasing productivity and landscape resilience.

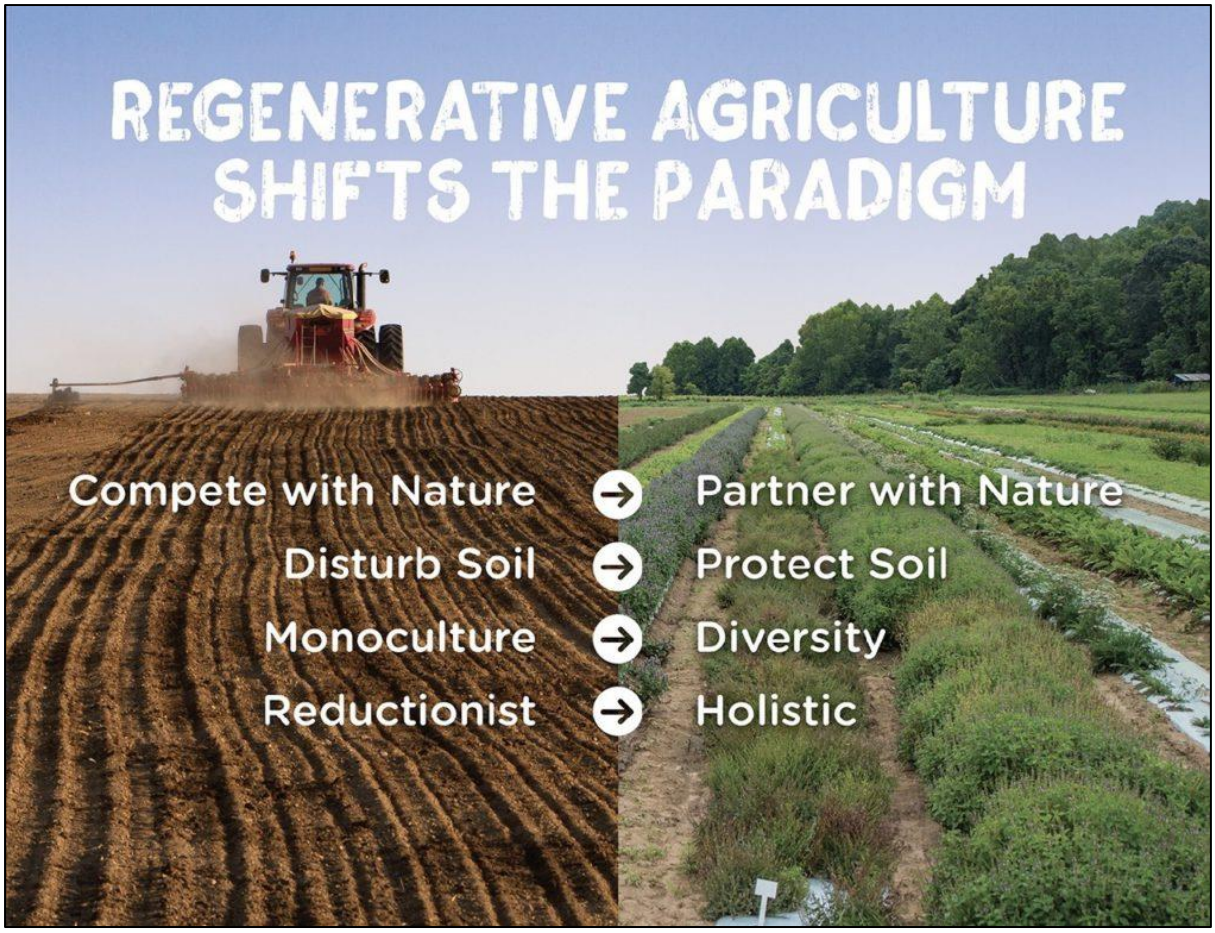

Figure 5: *Industrial agriculture vs regenerative agriculture (Ambreen 2020).*

Massy (2021) states that before we can nurture our landscapes effectively, we must first adjust our mindscapes – a viewpoint that aligns with the values of HOPE in seeking to enhance ecological sustainability, economic viability and social cohesion through education and awareness. Regenerative agriculture is a fascinating step towards sustainable agriculture and climate change mitigation, and Dr. Massy is a wonderfully down-to-earth proponent of this essential and rapidly developing needed systemic change.

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