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Principles of Regenerative Agriculture

Ross Mars shares five important guiding actions for holistic food systems and how these are relevant to growing systems of all scales

Forty percent of the global food system emissions are generated by agricultural production, which some experts put at roughly 18 GtCO₂e per year. Imagine if we could transition quickly to an agriculture that is organic, highly productive, is not only net zero but sequesters carbon in the soil and creates habitat for other species. That is the goal of a genuinely regenerative approach to agriculture and it is in all our interests – consumers, foodies, farmers, gardeners and scientists – to lobby government for radical change for all our futures.

Humans are not separate from nature. We need to acknowledge our place in the living world and, ultimately, that everything that affects nature will eventually affect us. Most thoughts about regenerative agriculture list various principles, mainly focussing on improving the soil. While all of these, in one way or another, form part of the following list, a truly regenerative system also needs to consider the impact of any farming system on the environment, on the local community, on all organisms on the farm and the surrounding area, on the natural processes and cycles of matter, as well as developing strategies to build a resilient system that can withstand predicted changes to our climate, fluctuation in pests and disease, and, with all of this, still be profitable.

These principles provide some guidelines to consider as your journey into regenerative agriculture starts or continues.

They are not in any order of importance and, for you, some may have more relevance than others, but any regenerative enterprise should keep these overarching principles in mind.

We could argue what is a principle and what is a practice. Is 'cover the soil' a principle or a practice? I tend to think of practices as the techniques we undertake on our farming properties. For example, we might say "I practice holistic planned grazing" or "I have set up a permaculture property" or "I follow the Regrarians Platform".

However, Ethan and Lorraine Gordon (Southern Cross University) have proposed a set of more philosophical principles which are an overarching framework that can be used to make decisions about what actions and practices would be suitable for a particular farm. Their principles are briefly:

- Think holistically: Farms and farming should be seen as a 'whole' so all aspects of this and the environment are considered.
- Have an understanding of complex adaptive systems: We need to have a good understanding of nature as both complex and dynamic.
- Be comfortable in ambiguity: We need to accept that we cannot control or know everything, so endeavour to do the best you can with what you have.

- Have the capacity for continuous, transformative learning: We need to reflect on our world view and recognise and embrace that this can alter as we learn more about our place in nature.
- Understand that human cultures are co-evolving with their environments: Our biological and cultural roles within landscapes change along with any environmental and ecological community changes.
- Make place-based decisions within bioregions: Any changes to farming practices should be site-specific. Some practices will be inappropriate in some areas and at some times.
- Acknowledge and involve diverse ways of knowing and being in landscapes: Consider various ecological perspectives and use those that align with your vision.

To me, principles are those beliefs guiding our actions, so 'cover the soil' is an overarching statement of what we need to do. How that is achieved is the practice we employ: Use mulch, plant a cover crop or plant a perennial pasture. If we are transparent and honest, then healthy discussion will follow. The following five out of 20 principles can be seen as complementary and inclusive of those philosophical ones developed by Southern Cross University.

1. Know Your Farm

This probably is the most important principle. Farmers must know all aspects of their operation, including the various soil types present, the nutrient status of these soils, annual and monthly rainfall patterns, prevailing winds in each season, sun angles and sun movement during summer and winter to enable them to determine areas of shade in the morning or afternoon, frost lines, water movement across the landscape, typical seasonal temperature ranges, areas that tend to become waterlogged in winter, and water quality of their dams, soaks, bores or creeks.

Some of these observations will help inform whether various microclimates can be exploited to increase production.

For example, you should note which areas are shaded longer as they may be on the south (or north) slope or alongside large stands of trees and the sun doesn't hit the ground till late morning or vice versa – the trees shade the other side of the paddock from mid-afternoon onwards. All of these observations and the climate and landscape data are essential to develop a whole farm plan.

This data enables you to have a baseline, a starting point, from which you can measure improvements or deterioration, as well as providing the information you need to develop the plan and way forward. You will also need contour maps of the property to help plan new dams and water capture and movement.

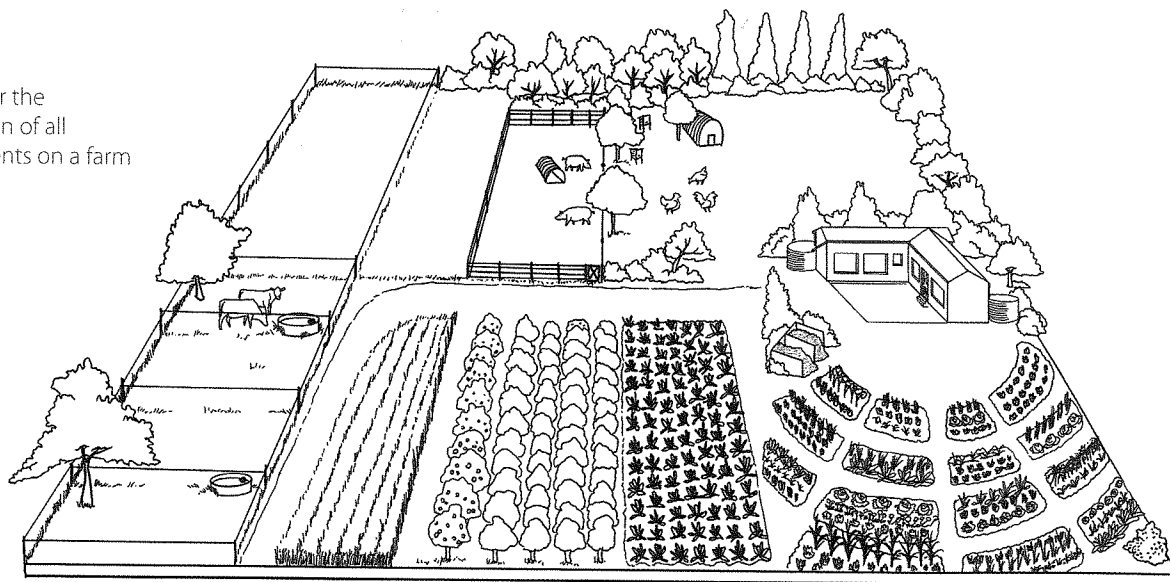
By compiling the data for your property you will have a good picture of when rains first come or are last to arrive, the maximum and minimum temperatures each day so you know what months or parts of months typically bring frost, how your soil is changing as you improve fertility or add amendments to correct out of whack soil acidity or alkalinity, and soil temperature and moisture when and if the need arises as you begin your journey of improvement. You need a benchmark so that you know what you are starting with and can measure future improvements.

2. Design for Resilience

Many farmers and organisations working in the regenerative agriculture space seem to focus on climate change. While this is crucial, designing for resilience asks you to also consider future market forces, potential crops more suitable in a changing climate, ways to improve soil fertility, environmental enhancement, social capital, and working out strategies to enable you and your family to strive and survive in a rapidly changing world. We will all need that mental toughness as the future unfolds.

Designing also implies a plan, like a whole farm plan with details about species, timeline for implementation, resources available and needed, estimated budget for various projects and careful consideration of the spatial placement of new structures, earthworks and multifunctional plant and animal systems.

Design for the integration of all components on a farm



The design process itself may not be a simple linear one as ecosystems are complex, although it can usually be done in a series of steps. Each farm design is site-specific and context-based, but connections between organisms are recognised and drawings evolve about the eventual layout of all of the components in the farm. In any case, think about a design in nature, with nature in mind.

3. Meet the Needs of All – Respect all Life

We need to recognise and understand that all living things are worthwhile and have their particular roles or niches in the environment, although I must confess I struggle to understand why we have mosquitoes, ticks and viruses.

We need to assess the uses, function and products, wherever applicable, of whatever we have in our farming systems to see how each of the components of the system can be integrated, so that the needs of one are met by the products, services or functions of another. For example, planting a nitrogen-fixing cover crop provides many products, uses and functions. The ground cover protects the soil, the exudates (substances released from plants) from its roots feed beneficial fungi and microbes, the plant may be grazed or mown to provide food for stock or more organic matter for the soil, nitrogen will be released either when the plant dies away or via the manure that stock excretes thus improving soil fertility, the above-ground plant mass can be cut and made into hay or silage, and soil structure will improve as roots penetrate deeper into it. As it is in every natural ecosystem, the plants, animals and microorganisms found there all support each other in various ways.

Finally, you must ensure that all of the needs you and your family members have are met, as they are the most important parts of the farming operation.

4. Integrate all Components of the Farm

If we acknowledge that we want to have an agricultural ecosystem on our farms then the question becomes: 'How do we integrate all of the components (what permaculture practitioners call elements) so that the wastes or products of one become the needs of, and used by, another. That plants requiring pollination can have this ecosystem service performed by particular insects or other organisms, and if animals need protection from harsh weather, what shelterbelts and windbreak tree and shrub species will need to be planted?'

We shouldn't just think about what trees, shrubs, ground covers, crops and animals we want to have or grow, but also the other elements we need to support these. These other components include plants we use to attract predators for pest control, fodder species for stock, a particular mix of cool season and warm season cover crops, native (local endemic) plants to rehabilitate degraded landscapes, plants to entice pollinators, and amendments including manures to build soil fertility and health.

Ideally, we look for multifunctional elements – those components that provide several products or functions for the system. For example, wattles such as *Acacia* spp. (Australia), Italian alder *Alnus cordata* and sea buckthorn *Hippophae rhamnoides* (Europe) or black locust *Robinia*

These principles, and the remaining 15 not mentioned here, are guidelines for everyone – whether farmer, landowner, or gardener – and together they create a whole picture of what it means to create regenerative systems.

pseudoacacia (America) are all nitrogen-fixing trees that are fast-growing pioneer plants that may have some combination of uses such as fodder, windbreaks, providing flowers for pollinators and for honey production, or fruit or seed for animals to eat, or timber or firewood. They may be predator attracting, grow in a range of soils, have some salt tolerance, be either evergreen or deciduous, or act as nurse plants to protect other trees.

5. Maximise Biodiversity

Every natural ecosystem exhibits high plant and animal diversity. It is true that a greater diversity above the soil equates to a greater diversity below the soil. We need to develop polycultures on our farms and move away from a single crop (monocultures of large areas of wheat, corn, soybeans or barley, for example). Not only should we aim for crop diversity, but if we plant a cover crop for animal fodder then we shouldn't restrict this to only a few species. The more biodiversity we have on our farms the more robust and resilient our crops will be. Diversity helps with the stability or resilience in nature while monocultures are vulnerable. When we look at nature we never see monocultures of particular plants.

Building biological ecosystem diversity is a mirror to what happens in nature. Biodiversity is the key to resilience when catastrophes affect an ecosystem. There is enough variation in plant populations to withstand external pressures and to bounce back, enough groundcover to protect the soil and soil life and enough species (multispecies) to continue with essential ecosystem functions (including pollination, predation and nutrient cycling). Having more diversification on our land ensures a successful farming operation.

More on regenerative agriculture:

'From Slash and Burn to Food Forests' (PM107)

'Regenerative Agriculture: Empowering Nature' (PM98)

Dr. Ross Mars is a permaculture pioneer, elder, educator and author. He was the author, co-author and/or editor of 20 books on permaculture and science-related topics for both primary and secondary students. After 30 years of teaching science in high schools he worked in the greywater and wastewater industry for 20 years before semi-retiring and devoting himself to develop and deliver accredited permaculture training courses in Western Australia.

This is an extract from Ross Mars' new book, *The Basics of Regenerative Agriculture*, published February 2024. Preorder via PM's online shop: <https://shop.permaculture.co.uk>