

## Healing Agriculture - Transition from Conventional to Regenerative

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### SUMMARY

Permaculture and regenerative agriculture has the potency to provide food and materials on the small scale, and address the wider issues of carbon emissions, and resource deficits. Since over half the World's population lives in cities, it seems likely that strengthening the resilience of these environments may be a crucial strategy in achieving a measured descent in our use of energy and other resources, rather than an abrupt collapse of civilization.

### INTRODUCTION

The term Regenerative Agriculture is no alien to anyone and has no universal definition. Most commonly, the concept revolves around the core to describe practices aimed at enhancing soil health by restoring soil organic carbon content. Today the study of soil involves practical science based on empirical observation discovering directly what works and what fails. In 2011, the world population crossed 7 billion and it is projected that by 2050 it will be exceeding 9 billion. Soil is the cradle of life as it provides food fibre fuel supporting wildlife and a range of rural and urban activities. From the end of the 1940s to the beginning of the 1990s, over 90% of the degradation of productive land occurred from overgrazing, deforestation and other degenerative agricultural practices. Such losses to the health of soil affect all of us, particularly the 3.7 billion who are malnourished and the 3 billion living in poverty. Among all other considerations of the challenge to feed such a multitude, the quality and fertility of soil is a critical aspect and good soil should be regarded as a fundamental resource that requires urgent conservation. According to the International Soil Reference and Information Centre (ISRIC) World Soil Information data, 46.4% of the world's soil has lost its productivity in due course of time. 33% of this biological loss is occurring in Asia and about 20% in Africa. Globally, 15.1% of soil is unfit for farming. About 9.3 Mha (0.5%) of soil is declared biologically inactive (dead). Deforestation comprises of 40% soil degradation in Asia, 41% in South America and 38% in Europe. Africa comprises of 36% of the world's overgrazed soils. Asia constitute 37% of degraded soil caused by unfit agricultural practice. As a solution, the importance of soil ecosystem management, especially in the search for solutions to fight desertification and certain forms of soil should be emphasised. This involves taking a holistic view of the soil system as an element, which is part of a greater whole, rather than considering it in isolation, as has been done traditionally.

### Permaculture as A Way Forward

Bill Mollison and David Holmgren coined the word permaculture (derived from permanent agriculture) in mid 1970s. According to Holmgren, permaculture can be best defined as "Consciously designed landscapes which mimic the patterns and relationships found in nature, (Biomimicry) while yielding an abundance of food, fibre and energy for provision of local needs. People and their buildings and the ways they organise themselves are central to permaculture. Thus the permaculture vision of permanent (sustainable) agriculture has evolved to one of permanent (sustainable) culture." Broadly, permaculture may be classified as a branch of ecological design and ecological engineering, which aims to develop sustainable human settlements and self-maintained agricultural systems modelled from natural ecosystems. Masanobu Fukuoka (1913–2008) was a Japanese farmer and philosopher who established an ecological farming approach called "natural farming", which has been regarded as the prime component of permaculture. The method is sometimes also known as "the Fukuoka Method", "the natural way of farming" or "do-nothing farming": the latter refers not to lack of labour, but avoiding manufactured inputs. The system exploits the complexity of living organisms that sculpts each particular ecosystem. Natural farming is a closed system, one that demands no inputs and mimics nature, and differs from conventional organic farming, which Fukuoka considered another modern technique that disturbs nature. Permaculture is about making

an interconnected design comprising of landscape, function, and species assembly. The fundamental principle of permaculture is, therefore, to maximise useful connections between components to achieve their best synergy in the final and optimal design. Permaculture does not focus on individual elements, in isolation, but rather on the relationships created among those elements in the way they are placed together; the whole becoming greater than the sum of its parts.

### Regenerative Agriculture as a Transitional Approach

The primary concept of permaculture and regenerative agriculture lies in the fact that the energy source is the native soil fauna and is derived from photosynthesis, where the fuel for soil microbes is delivered from plants as the factories that supply carbon-rich nutrients. The main difference between the two approaches is that permaculture follows an initial design, while regenerative agriculture tends to be more pragmatic and is an adaptation of existing methods of field farming. The health of the soil is improved in both processes since its organic component becomes regenerated. In a wonderful symbiosis, the living soil microbes, especially fungi, can draw other nutrients and water from the soil to nourish the plants. The individual elements of life feed one another in a mutually dependent and beneficial manner. While the strategies of the two methods can be defined and envisaged quite clearly, the intermediate means for transition from industrial to regenerative agriculture and permaculture is rather more nebulous, since it has not been done before, or at least not in the degree that necessity now demands. Modern farming almost entirely relies on such synthetic fertilisers in "open systems", whereas regenerative agriculture refers to "semi-closed systems": i.e. those in which inputs of energy, in the form of fertilisers and fuels, are minimised because these key agricultural elements are recycled as far as possible. Conventional agriculture is mostly "open", and hence large inputs are necessary since much of the materials are wasted, and it is a matter of maintaining a sufficiently productive density of fertilisers, pesticides and mechanical energy, to maintain production on poor soils with much of the living matter and natural animal life (earthworms, beetles, microbes etc.) gone. Indeed, modern soils have been described as dead, and only remain productive because of artificial and voluminous inputs to farming derived mainly from crude oil and natural gas. As the latter sources of energy and chemical materials begin to wane, and finally fail, so will most of the world's agriculture. Although they are usually more energy efficient overall, regenerative systems generally need higher on-farm labour than open systems do. From a conventional economic standpoint, this is seen as a disadvantage and a disincentive to use regenerative systems, rather than mechanised, industrialised methods. Off-farm inputs for regenerative systems are rarely zero<sup>31</sup>, but are much lower than is the case for the open systems of conventional agriculture. SOM invariably increases as systems become more closed, and both soil quality and health appear to be related to the amount of organic matter they contain. However, the relationship between soil quality and its crop fertility varies according to the particular soil system. In specific studies, mineral fertilisers (nitrates and phosphates) and tillage were applied to compensate for the loss of soil health, and yet, as this declined further, and the soil became increasingly degraded, these mineral additions became relentlessly less effective.

### CONCLUSION

The term "Sustainable Agriculture" should be realised in utilitarian and not as an oxymoron. Overall, a change in thinking and concept is required from conflict and limit to cooperation and abundance. The scale of the transition may be compared with other milestone transitions throughout human history, such as the hunter-gatherers becoming farmers, and the progression ultimately to modern industrial societies. It is the latter that are under threat and unsustainable, and a compromise devolution to a more localised collective of small communities (pods) is required, supplied by local farms and infrastructure, with rail links between them for essential movement of goods and people.

### REFERENCES

- Rhodes, C. J. (2012). Feeding and healing the world: through regenerative agriculture and permaculture. *Science progress*, 95(4), 345-446.
- Rhodes, C. J. (2014). Soil erosion, climate change and global food security: challenges and strategies. *Science progress*, 97(2), 97-153.