

Food Production in Context – a regenerative approach

Introduction

My name is Stuart McAlpine and I am a fourth-generation primary producer who owns and manages a 5000-hectare mixed farming enterprise at Buntine in Western Australia's Wheatbelt region. I have been farming since the early 1980's and have devoted many years into finding ways to improve the way we do things in the Wheatbelt and beyond. I realised some time ago we that we were making some grave mistakes in the way we produce food.

With a passion for long-term sustainability in food production using a regenerative approach, I am keen to play a role in a change to a better way to produce food and regenerate regional areas.

Following are some concepts and ideas that I feel are needed to invoke meaningful change. These views are based on my experiences. I hope that you can use my comments to question, evaluate and perhaps change how you approach your part in the food chain by coming to your own conclusions.

To understand what are the agricultural drivers for improving soil health, we must examine the impact of agriculture practice on our soils. Agriculture advances have focused mostly on the chemical and physical properties of soil and the third component of soil health, soil biology, has been largely ignored. This is changing and there is an increasing awareness of the importance of biology, not only in soils but the role it plays in all life. The increasing understanding of the human gut biome is a great example of this. It is becoming clearer that promoting soil biology can see us start to regenerate the health of our soils which really are so important to the wellbeing of our planet.

Experiential Capital

Life experiences shape our values and drive our needs at many levels. These will be a meld of needs at a personal, family, business, cultural, philosophical, spiritual and ecosystem level. There will be a wide range in priorities for each individual. This diversity in values has shaped our impact on planet earth and makes it difficult to get agreement on change. But it is this diversity that also makes us strong. We need to recognise and respect that there are many solutions to the problems and challenges that we all face. As long as we learn and then adapt, we will survive by making improved decisions based on past experiences. It is the sum of continued improvement that is important. The experiences and influences that shape our life, evolve our values, and how on reflection we can share that knowledge - this is **experiential capital**.

Background

Let us look at the farming system in the context of history to see how we are going. How are we are tracking and what are the consequences of a predominantly chemical based agricultural production system? I will use examples mostly from Western Australia as these have been the drivers that have been most obvious to me and why I advocate a strong focus for regenerative farming practice. Unfortunately, these problems express themselves globally and it would be great for you to seek some figures that represent regions or data sets that are meaningful to you. For too long we have tried to find simple solutions to problems. Meaningful change takes time and unfortunately most research is measured in very short timeframes. This works against practices of incremental changes that rely on the development

of symbiotic relationships that lead to compounding benefits over longer timeframes before they can be measured against a starting point.

Farmers to remain competitive on the global commodity market have tended to specialise on cropping. A decreasing lack of enterprise diversity has led to an increasing reliance on technology and agrichemicals to maximise the production per hectare. With comparatively poor soils and yields compared to our global competitors, coupled with an extremely variable and changing climate, farmers will continue to come under increasing pressure to remain viable. This current agricultural system has extracted, leveraged and continually eroded the natural soil capital for financial returns. With the high intensity and lack of diversity there is little chance of rebuilding this natural capital.

Regenerative agriculture can be defined as “an ecological approach to farming that allows landscapes to renew themselves” (Massey, 2018)

My broader definition of “Regenerative” is that it defines agricultural practices that improve soil health and return the water and mineral cycles that are so critical to ecosystem function, but also regenerate the businesses and communities that engage with that land (both economically and socially).

Regeneration of the land and rural communities will generate real wealth, wellbeing and provide inspiration and hope for an alternative economic system that is not driven by exploiting the natural resources of the earth but rebuilding them. To do this we must examine, review and understand the current conventional production system. To embrace change and draw on the knowledge and experience from as many people as possible. Fundamentally the pressure to maximise production and financial returns in the short term have plagued agricultural systems from the very beginnings of agriculture.

Looking back - drivers for change and why there is increasing interest

To understand the opportunities that exist in an environment to drive change one must first understand its history, evaluate and recognise how this has shaped the landscape both positively and negatively before there can be any design for a future that will enable meaningful change. This will mean different things for everything and everyone and will start at the very smallest area in the ecosystem to large biomes and how we as the human race evolve to inhabit this space.

It is important to recognise that wealth creation is a result of ecosystem services that flow from natural capital and that maximising the return on investment (ROI) per hectare, over time, leads to ecosystem degradation in exchange for financial capital. This pressure increases as new technologies and economies of scale increase the degradation of the ecosystem and ROI per hectare. Regional areas suffer from the industrialisation of agriculture over time as economies of scale ultimately see a decline in the population as farm units increase in size and utilise technology and machinery to replace labour. This has an effect on the social infrastructure where it eventually becomes unused, closes, or lacks the support to justify the cost and maintenance required for it to remain open.

This ultimately leads to four losses - job loss, economic loss, the loss of fertile soils and biodiversity, and finally the loss of purpose, meaningfulness and joy. So how are we travelling? Is this really the case? Are we honestly seeking to understand where we are at? There are many

people and growing examples of industries that are moving from a degradation industry to a restoration industry of economic growth. One such study is the publication by the Rotterdam School of Management publication of Commonland founder Willem Ferwerda titled ["4 Returns, 3 Zones, 20 Years - a holistic framework for ecological restoration by people and business for next generations"](#) (4R3Z20Y model). This document offers a framework to regenerative change.

Change is already upon us *"Australia is no longer a low-cost supplier of grain ... its future lies in producing grain for which end users will pay a premium"* Ross Kingwell, AEGIC 13th August 2017. There are two reports from the Australian Export Grains Innovation Centre (AEGIC) on the competition Australia will almost certainly face from Ukraine and Russia. The Black Sea region has a competitive advantage in that it is one of the two "chernozem belts" in the world. The other is in the Canadian prairies. With rich black soil containing humus levels ranging from 7-15% and high percentages of phosphoric acid, phosphorous and ammonia to depths of over a meter they are able to leverage that natural capital without inputting vast quantities of external fertilizer inputs. Along with an advantageous geographical location, cheap labor and cheaper inputs any improvements in logistics and storage will see them increase their pressure on our Australian grains industry. Their export grain costs run around a \$100 per hectare less than us.

Although we have continued to enjoy productivity gains, the key drivers to this have come at a cost and the rate of productivity gains in cropping is slipping. In a report titled "Changing climate has stalled Australian wheat yields: A study" (2017) by Zevi Hochman, David L. Gobbet and Heidi Horan from CSIRO in "The Conversation", they report that wheat yields after trebling during the first 90 years of agriculture of the 20th century, have stalled since 1990. The report predicts that if the climate trends over the past 26 years continue at the same rate for the next 26 years then the recent Australian average of 1.74 tonnes per hectare will slip to 1.55 tonnes per hectare. Analysis of the last 100 years of rainfall data on my farm shows that 5 of the 10 driest winter rainfall deciles have occurred since 2000.

Andrea Gaynor (2015) recently observed of the Wheatbelt. *"Now the industrial paradigm is facing a bleak future. Utterly dependent upon fossil fuels and agrochemical inputs to grow crops and conserve the soil, while demanding ever greater economies of scale that whittle away at its social sustainability, it is not clear that the industrialised Wheatbelt as a social and economic unit will survive the next century."*

Industrial agriculture, with increasing costs for technology, a highly variable climate and comparatively low yields compared to our competitors mean, we must explore all alternatives to our current practices.

Neville Ellis in his Paper *"Where have the family farmers gone? Climate change and farm loss in the Western Australian Wheatbelt"* reports a near three-fold decline in farm numbers since the 1970's falling from 13106 in 1970 to 4941 in 2013.

These numbers would not include the loss of farm workers that have not been replaced as farms increase in size with larger and more productive machinery units. One only has to drive through the wheatbelt to see the flow on affect into the towns with many commercial buildings empty, particularly in the smaller towns.

Andrea Gaynor also gives a fantastic summary of Western Australian agricultural in "Looking Forward, Looking Back: Toward an Environmental History of Salinity and Erosion in the Eastern

Wheatbelt of Western Australia.” It is clear that a lot of warning signs dating back as far as 1897 regarding clearing and secondary salinity have been ignored. The encouragement of the agriculture expansion, in spite of these warnings, for conditional clearing by the State Government and the Agriculture Bank’s incentives to clear, have left us today with the consequences of these policies. This study puts some of the problems of today into context. We have known and recognised these problems for more than a century and yet science has yet to come up with methods that have addressed these problems in a sustainable and affordable way to regenerate these degraded areas.

Science has to come to terms with the fact that we still have much to understand. We cannot “measure the immeasurable” at this point in time. That is, that through our senses we can still observe so much that is still unavailable scientifically to measure or understand. Cost also prohibits us from exhaustive studies with the research dollar mainly invested in to quick fixes and not longer-term system changes. Humans have five basic senses: touch, sight, hearing, smell and taste. The sensing organs associated with each sense send information to the brain to help us understand and perceive the world around us. The skilled regenerative practitioners make sound interpretations based on these sensory experiences and can observe processes that lead to incremental transformations leading to improved ecosystem restoration.

We should of course strive to improve science to be able to explain these sensory observations. However, it is time to admit that we cannot justify interventions or solutions based purely on simplistic science. There is so much that science is yet to discover or understand, in the complex interactions that “natural intelligence” can deliver if we let it. The following is the report card of more than a century of this approach and it does not paint a successful picture of the consequences of agriculture practise to date.

The Agricultural area of Western Australia in an economic analysis prepared by the Department of Agriculture and Food, as part of the Grain Research and Developments Corporation’s Subsoil constraints programme in 2015, highlight the loss of fertility on the farm.

- Soil acidity affects 70% of the Wheatbelt or 11 million hectares is moderately or strongly effected by acidity costing growers an average of \$141 per hectare per year or \$1.6 billion dollars a year in lost production potential
- Subsoil compaction affects about 75% moderately to highly or about 12 million hectares costing grower’s production losses of \$50 per hectare per year or \$880 million per year with yield penalties 10-30% in about 67% of years
- Subsoil acidity has similar production loss to soil compaction with losses estimates at \$580 million per year affecting 62% of cropping land and about 10 million hectares
- Transient salinity where there are short term changes in salinity levels affect 11% of arable land or 2 million hectares costing around \$19 per hectare or \$92 million per year

The Department of Agriculture and Food state on their website that more than one million hectares in the south-west of Western Australia is severely affected by dryland salinity costing at least \$344 million per year. Dryland salinity could potentially affect 2.8-4.5 million hectares of productive agricultural land into the future.

Although many of our soils were already in a poor state of fertility, there is little evidence that we can remediate these areas with just the complex chemical and physical based solutions that are becoming economically unaffordable to many of the state's farmers and often do not provide long term solutions or change to the health of our soils. Ironically many of the current solutions utilise natural capital mined to either provide energy, fertilisers or agrichemicals from an external source (often imported).

The South West of WA is one of 34 internationally recognised biodiversity hotspots. Degradation with the advent of wholesale clearing for agriculture and the loss of soil function has affected ecological function. This biodiversity was managing this old landscape very well with the pre-colonial aboriginal Australians working and understanding its fragility. Further degradation will place many more species at risk coupled to the biodiversity loss that has already happened.

Without recognition of the four losses (including jobs, economic, the loss of fertile soils and biodiversity and finally the loss of purpose, meaningfulness and joy) and a lack of collaboration between stakeholders we will continue to spiral down a pathway of continued ecosystem degradation creating economic models that support greater pressure and scale on the ecosystem to survive as we know it.

This will lead to a greater divide from the "have and have-nots". Unfortunately, these problems are not confined to the wheatbelt and are expressing themselves globally. Poorer countries and areas of degraded ecosystems with lower population and regional areas will experience this divide first. We see examples of this as people are drawn to larger cities and the increased lifestyle choices they offer.

Looking forward - practices for improving soil health/biology

How long earth can support this degradation before this economic model fails is the big question with history showing that often real change does not happen until a system collapse. Are there alternatives to economic growth based on ecosystem degradation? Suicide rates are double the rates of our city cousins. Surely this is not acceptable to society. Can we create an environment that allows for more people to want to live in regional areas and participate in ecosystem restoration and sustainable economic growth and not feel the pressures that are adding so much stress to farmers?

John Perkins certainly thinks so. He concludes in his book "The New Confessions of an Economic Hitman" a belief that a conversion from debt based "death economy" based on the destruction of natural capital to the birth of a "life economy" that profits by the building of natural capital or the regeneration of ecosystem functionality can prevail.

Fortunately, there are many practises that seem to be having a positive effect on soil health and biology. It will be possible to adopt a system that will enable you to adapt your practices to embrace a move to a greater focus on the health of the soil. I urge you to read and seek out information that can help you try new concepts.

I would like to recommend a few books by David R. Montgomery to broaden your knowledge on the evolution of Agriculture. The first book "Dirt: The Erosion of Civilization" tracks the

impact of agriculture over time on soil and ultimately civilizations. The second book is written using some personal examples and is co-written with his wife Anne Bikle exploring how microbes are transforming the way we see nature and ourselves. The third book "Growing a Revolution" talks about a regenerative approach to agriculture combining ancient wisdom and modern science to lay a solid case where agriculture becomes a solution to environmental problems.

Meaningful regenerative change will take time and is likely to be far more complex than methods currently used. Regenerative solutions as highlighted in Charles Massey's book "Call of the Reed Warbler" provide a tremendous insight into the rebuilding of natural systems that start again to build natural capital in our soils leading to improved natural resilience and improved production over time.

Alan Savory has been advocating systems thinking for managing our resources. I would highly recommend his book Holistic Management – a commonsense revolution to restore our environment.

Gabe Brown in his latest book Dirt to Soil – one family's journey into regenerative agriculture also provides some great material and thought-provoking insights into many innovative solutions.

For those who enjoy listening to podcasts I can highly recommend Regenerative Agriculture Podcast hosted by John Kempth and Investing in Regenerative Agriculture hosted by Koen van Seijen. They interview a wide range of players in the regenerative agriculture space.

There are no quick solutions. We have all become accustomed to treating a problem and seeing a result that provides immediate benefit. Some solutions have been short-term and may have created or deferred issues for a later date and likely to have an increased cost. Our farming system has ever increasing input needs to be more productive to remain viable financially which has led to further specialization, increased costs of production and decreasing diversity with the major productivity driver being increasing the scale of operation. Coupled with climate risk does this really make sense?

A process of reflection with an honest examination of "business as usual" is also needed along with openness to innovative ideas and alternative approaches. This in itself creates a problem as we need to retrain our mind set to think in terms of change that will take time to express its benefits and allow for a more complex and diverse landscape for change. This is not about immediate wide spread change but a preparedness for looking, investigating and implementing projects that can be scaled up if beneficial.

Dianne and Ian Haggerty, whom are great friends of mine and one of the great regenerative farmers highlighted in Charles Massey's book "Call of the Reed Warbler", describe their approach to biological farming as "Natural Intelligence Farming". I remember attending a lecture at the University of Western Australia early into my biological journey by John W. Crawford who is now the Director of Sustainable Systems Programme at Rothamsted in the UK on "interaction and self organization in the soil-microbe complex". It answered so much about

what I was observing on my farm. This “Natural Intelligence” description really resonates with me. Our challenge is to try and assist nature to regenerate our soils and let nature get on with the job. History tells us that by focusing on the chemical and physical and ignoring the biological component of soil health we have made little impact to the health of our soils. I believe that the adoption of an increased focus on biological health must also be part of the interaction around the drivers to economic, social and natural benefits at the same time. We can transform agricultural production into a new model that solves many of the modern-day issues around health and well-being that affect us today and seem to be increasing in prevalence.

There is a growing number of people that are having huge successes and growing their knowledge base around a regenerative approach to agricultural production with a strong focus on biology’s important role in this. We must all work together collaboratively or if I may use the term “symbiotically” to change the way we approach the way we produce food.

Summary

So, the *wicked problem* is that life is very rarely absolute in what is right or wrong. Particularly when we react to problems in the shorter time frame. Although we continue to come up with quick fixes they come at an increasing cost and negative secondary impacts. I feel humankind is at a critical period in time with how we are damaging the environment that we live in. We have to find a way to recognize and make bold changes to reduce the negative human induced impact that we have had on this beautiful planet. This is earth’s natural capital with its inherent blue print for survival. Rather than continuously depleting natural capital in exchange for economic growth we must create a new economic model that allows for the rebuilding of natural capital in unison with economic growth. This I believe is our greatest challenge. We need to recognize the functionality of natural systems and find a way to embrace that complexity in a supportive way, using all the wonderful technological advancements that humans have made and will continue to develop. We can nurture and assist the planets ability to regenerate and speed up these natural processes as our knowledge increases in a collaborative way.

Food production must play a role in building soil and not be treated as an industrialised commodity in its production for “least cost” in the short term without accounting for environmental damage it brings. Collectively ***we can*** make change, leading by example to improve and evolve our agriculture systems to create positive impact on the long-term health of our soils and the wellbeing of the animals and humans that consume the food produced from this system.