

Associate Paper

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Regenerate Australia: Our Greatest Challenge and Opportunity A Conceptual Paper

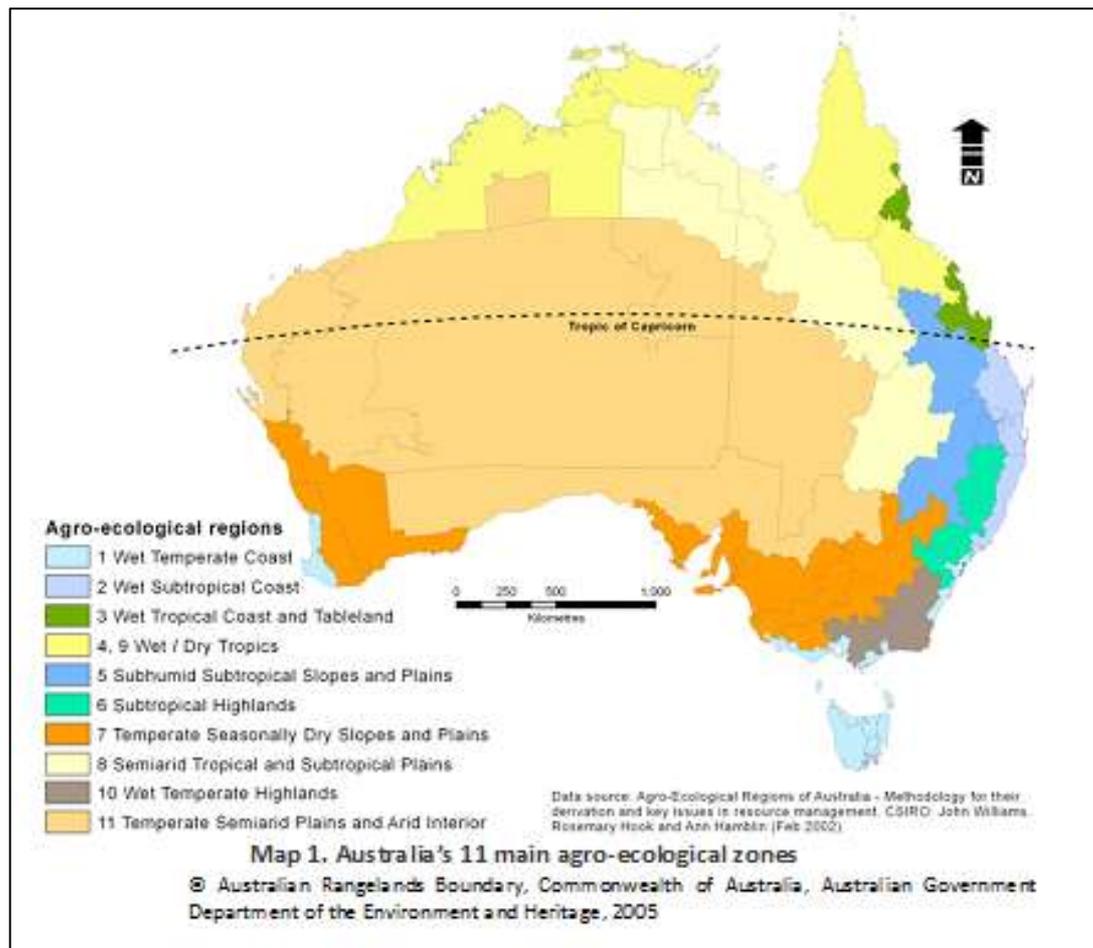
Soils for Life and Future Directions International staff

Key Points

- Soils and bio-systems in northern Australia are in decline, leading to a loss of arable land and fibre production, with consequent social, economic and environmental problems.
- Up to 30 million hectares burn each year, emitting 5 to 50 tonnes of carbon per hectare.
- Innovative capture and use of water, however, could arrest these negative outcomes and regenerate up to 300 million hectares in northern and inland Australia.
- Six strategies are essential for this to happen:
 1. Introduce sufficient grazing stock to reduce vegetation.
 2. Increase the availability of surface water.
 3. Regenerate the carbon content, structure, resilience and productivity of soils.
 4. Develop the capacity to manage up to 100 million additional cattle.
 5. Manage an increase in grain production to feed up to one billion people.
 6. Revitalise the economic and social viability of regional communities.

Summary

Australia faces major challenges with some resultant opportunities in the decades ahead. A major challenge is that our soils and bio-systems are in a constant threat of decline, which could result in a significant loss of land suitable for food and fibre production with subsequent social, economic and environmental problems. There is, however, an opportunity to restore this situation, resulting in the regeneration of up to 300 million hectares of northern and inland Australia. (See Map 1 – Regions 4, 7 (part), 8 and 11)



Through innovative use of existing water, this may also lead to a significant reduction in fire risk, carbon footprint, a trebling of the cattle industry to up to 100 million head which, with the periodic production of grains, could provide sufficient protein and grains for up to a billion people in a given year.

Such a contribution of food, along with enhanced agricultural knowledge could markedly assist a global society likely to be characterised by insecurity, debt and health problems resulting from a lack of access to fresh water and sufficient food.

Analysis

Regeneration Concept

To realise the opportunities available to us in northern and inland Australia we need to take advantage of the benefits that stock can provide in regenerating the landscape and restoring natural bio-systems. To achieve this, additional water supplies need to be distributed across remote and currently un-grazed areas. With planned grazing, stock can then be used to manage the extensive seasonal biomass in these areas, while distributing and returning nutrient back into the soils and in the process fragile natural water systems can be protected.

This paper produced by Soils for Life and Future Directions International staff, describes why and how this unique regeneration concept may be accomplished. The paper, which is

supported by scientific detailed analyses, may require further research. It is also likely that the complete outcome will not be realised for some years and that the concept will need to be introduced in selected areas of the region, at least initially.

The imperative, however, is to explore the concept with its multiple benefits and to take appropriate validation steps now. Without such action, present and future generations certainly miss the opportunity of exporting increasing volumes of food products to an expanding and in part wealthier global population.

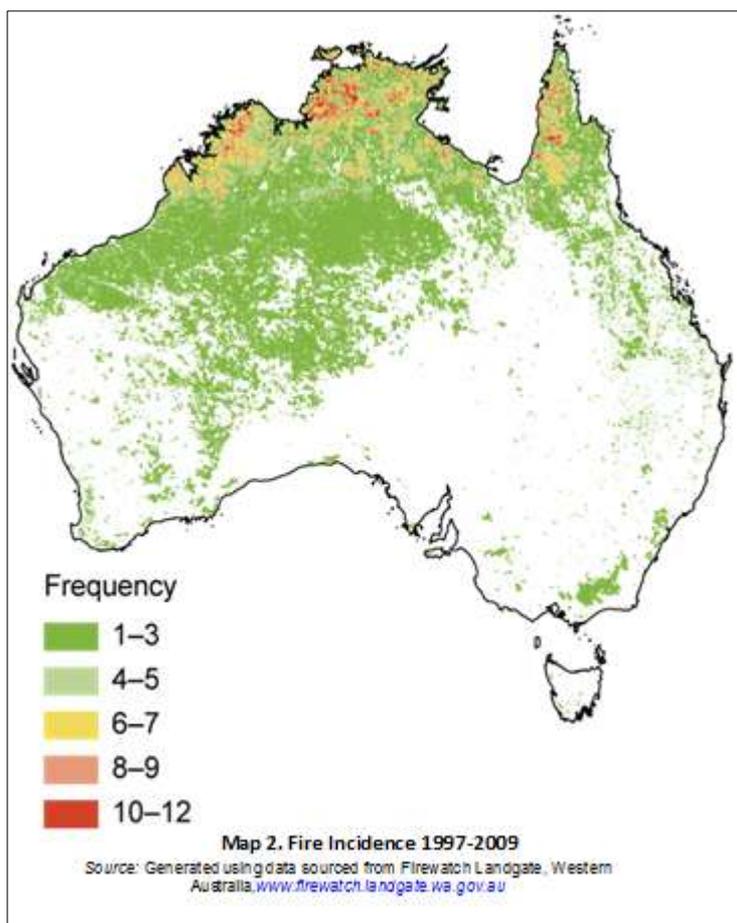
What are needed are policies and actions that reinforce the resilience of the natural bio-systems. To do this, we must draw carbon from the air into soils to restore their structure, hydrology and ability to sustain green plant growth. This will also hydrologically cool regional climates to help buffer and offset climatic extremes.

Fortunately, effective commercial options exist. They need, however, to be initiated urgently before climate, economic and social stresses limit them. Six priority strategies are considered essential.

Prevent Bio-system Collapse

The first is to prevent the collapse of the bio-system, which is the system of living organisms that can directly or indirectly interact with other systems. Since the mid-1970s, well before CO₂ levels rose significantly, Australia has been subject to the systematic aridification of its southern latitudes and a more extreme northwest monsoon. These threaten the collapse of many inland and northern seasonal bio-systems through extended droughts and wildfires in what is already the driest inhabited continent with the most variable and unreliable rainfall.

With the masses of vegetation produced with seasonal rainfall, up to 30 million hectares burn each year emitting from 5-15 tonnes of carbon per hectare. (Map 2) While indigenous controlled burning has limited the impact, without animals to consume such plants, the introduction of exotic grasses and more extreme climate, are all likely to intensify fires and threaten the collapse of bio-systems.



Grazing stock can limit these risks, but they must have access to permanent water, separate from the seasonal natural water habitats of rivers, streams and lagoons that need to be protected and restored.

Increase Permanent Surface Water

The second priority therefore is to increase the availability of permanent surface water across some 300 million hectares of inland and northern Australia, especially during dry periods. Without adequate water, stock numbers will not be adequate to reduce the fuels and fire risks to protect natural bio-systems. These issues will be even more pronounced as climate extremes intensify.

The proposed major public investment in new dams for northern Australia does not have the means to distribute and thus optimally use the water where and when it is most needed. Instead, this concept would involve the commercial construction, over time, of up to 200,000 additional water tanks across northern and inland Australia, to secure over 500 billion litres of additional water.

The proposed 200,000 additional earth tanks each of 2-4 MI capacity could be recharged from surface flows in the wet and from the natural 'in soil reservoirs' in the surface 0-10 m of soil that will be restored via the regeneration of the native pastures via improved grazing management. By restoring their former structure, these soils will be able to infiltrate and retain up to 10 million litres per hectare of extra rainfall, or some 15, 000 MI per 1500 ha grazing cell. This additional 'in soil' water should be more than adequate to supply the 50 MI/an needed to recharge the tanks and extend the longevity of active green growth and productivity of these regenerated pastures.

These additional widely distributed but controlled water sources are critical to control grazing and fuel levels as well as for potential feral animal control. The water will be provided to stock through drippers and troughs and enable grazing periods to be controlled to ensure the recovery of pastures after intense grazing for short periods. Subject to local needs, the new tanks could be raised to aid gravity-flows to the troughs, covered to reduce evaporation and fenced to control stock and feral access.

Above all, these additional water sources will help take stock pressures off the natural water systems of inland Australia that have been seriously degraded by grazing and drinking pressures over the last 150 years and help protect and restore them as well as improving the resilience of their soil and bio diversity.

Regenerate Soil Resilience

The third priority is to regenerate the carbon, structure, productivity and resilience of the soil of these rangelands. As a result of the improved control of stock and fires it should be possible to regenerate the previous higher carbon levels in these soils and thus their water holding capacities and ability to sustain deep rooted perennial pastures and shelter woods. This should extend the longevity of green growth and thus the productivity and resilience of these pastures. Over time, this could double the current productivity, carbon fixation and resilience of Australia's "green deserts" and northern savannahs.

With improved access to water, these bio-systems should be able to fix 5-10 tonnes of carbon per hectare per annum, resulting in the possible sequestration of over 1500 million tonnes of carbon per year; or 10 times Australia's current annual industrial carbon emissions. By extending their longevity of green growth and preventing wildfires, the existing vegetation could over time fix up to 3,300 million tonnes of carbon per annum or 20 times Australia's current emissions. At current carbon prices the nominal value of the emissions prevented via these regeneration strategies could exceed \$140 billion per annum.

Manage Additional Stock

The fourth priority is to manage the stock needed to bio-digest the existing and increased grass fuel and maximise value from this production. Up to 100 million additional cattle, or equivalent, may be needed to reduce the risk of fire and to regenerate the 300 million hectares. The natural growth and replacement of these herds should result in the production of sufficient high quality beef to provide sufficient protein for up to one billion people and have a market value of some \$500 billion per year.

While this may take several decades to fully achieve, such an outcome would contribute greatly to revitalising not only the farming industry and regional communities and economies, but also the ecological health of the region. Indigenous communities would also benefit greatly through greatly enhanced and enduring employment opportunities.

Secure Increased Grain Production

The fifth priority is to secure Australia's grain production and to provide "bread for one billion people".

Much of inland Australia, including our key grain growing areas, is becoming drier. Similar stresses are impacting in China, India, the Middle East and the US as ground water declines, climate extremes intensify and soils become increasingly degraded. Within decades, several billion people will rely on the ability of their farmers to secure grain from marginal rain-fed regions in a drier, more variable climate.

While Australia's wheat farmers have led in meeting such challenges, even in key cropping regions, such as the wheat belt in Western Australia, changing climatic conditions are making grain production more difficult. Consequently, urgent priority must be given to the regeneration of soils so that they can again retain and make available water to sustain grain crops over wider regions despite climate extremes.

Innovative Australian farm leaders have confirmed that this can be done by "pasture cropping", a technique whereby quick growing annual grain crops are planted into dormant perennial pastures with minimal input, ecological impact and economic risk. Indeed, as conventional cropping becomes financially more risky due to unreliable seasons and high costs, the extension of such opportunistic pasture cropping, where and when soils and water are suitable, may often become the most viable and ecologically safe grain production strategy, particularly for marginal and even semi-arid regions.

Australia presently grows some 20 million hectares of grain annually on some 40 million hectares of land deemed suitable for conventional cropping. Seasonally, however, much

larger areas may be suitable for opportunistic cropping grain or pulse crops using tailored pasture cropping approaches. For instance, if opportunistic pasture cropping was possible one year in five over these areas and yield one tonne of grain per hectare this could produce an additional 60 million tonnes of grain per annum, or up to three times our current average crop. This could help feed up to a billion people for one year.

Revitalise Regional Communities

The sixth priority is to revitalise the economic and social viability of our regional communities.

The creation of an expanded ecological land regeneration programme through improved fire management, controlled grazing, periodic cropping and the associated expansion of regional infrastructure and services, has the potential not only to revitalise farming communities but also rural towns and remote regions. This would lead to improved economic outcomes and increased employment, particularly for Indigenous communities. Such a programme would also improve the ecological health of the region.

Governments at all levels should benefit significantly from such initiatives through public savings and various forms of taxation. These benefits should exceed the cost of provision of services and other support needed to catalyse this regeneration, develop the region and to attract investors.

Conclusion

Implementation of this concept after rigorous testing and trialling would realise the immense opportunities to regenerate and develop northern and inland Australia, leading to national and global benefit through increased food and fibre production. To achieve these outcomes, a coordinated national policy involving inputs from farmers, local, state and federal authorities, science, indigenous communities, commercial interests and markets will be needed.

Above all else, a clear national strategic vision that results in popular support, with a determination by all parties to achieve an agreed outcome is required. Incentives to attract investors and a regulatory regime that emphasises a positive outcome based on practical, scientific and economically based models will be essential.

Any opinions or views expressed in this paper are those of the individual author, unless stated to be those of Future Directions International.

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