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INDEPENDENT STRATEGIC ANALYSIS OF AUSTRALIA'S GLOBAL INTERESTS

Associate Paper

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# Regenerate Australia: The Concept

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**Key Points**

- Soils and bio-systems throughout Australia are generally in decline, leading to a loss of arable land, with serious water, food, economic and environmental consequences.
- Australia urgently needs to focus on regenerating the health and resilience of its soils and landscapes to reverse this decline and better survive the impact of climatic extremes.
- Australia needs to recognise that water is the key natural strategic asset and ensure that it is captured, conserved and used effectively.
- This can only be done if the soil structure is restored so that its "in-soil reservoirs" absorb and store more of the unreliable rainfall, which extends the level and longevity of green growth across Australia's landscape.
- Soil restoration also requires reducing both the loss and emission of carbon from vegetation and soils, which results from increasingly more intense and frequent wildfires, by converting these fuels into dung and soil carbon through the gut of grazing animals.
- To achieve this, there is a need to examine the potential for restoring the grazing systems that earlier created the soils, hydrology, resilience and productivity of large areas of Australia. The regeneration of these systems is now critical.

## Introduction

The United Nations, the World Bank, the Intergovernmental Panel on Climate Change, the United States Department of Agriculture and the vast majority of senior scientists and analysts agree that, over the coming decades, humanity needs to address fundamental challenges relating to the provision

of adequate and sustainable food and water supplies, protection of habitats and meeting changing climatic conditions over. This challenge will become more pronounced as the global population increases from just over seven billion to about 10 billion by 2050.

Urgent action is required to regenerate the resilience of bio-systems so they can withstand increasing climatic extremes and reverse the process of soil degradation. The natural hydrology of the soil must be restored to bolster the resilience of these bio-systems to stabilise the climate. Fortunately, practical options exist to do this. They include:

- Reduction of the impact of wildfires and thus their carbon emissions and the degradation and further aridification of the landscape. Currently, 30 to 70 million hectares of Australia are burnt annually by wildfires, releasing some 600 million tonnes of carbon or four times Australia's industrial emissions. While these fires are deemed natural and are not included in the national register of carbon emissions, they severely impact the carbon draw-down capacity of residual bio-systems and Australia's climate. If it were possible to bio-convert much of the fuel feeding these fires into dung and soil carbon by restoring former natural grazing ecologies, it should be possible to reduce these fires, their emissions and the degradation of soils and bio-systems and thus aid their nutrient cycling, health, resilience and carbon draw down capacity.
- The restoration of more ecological grazing systems will aid the development of deep-rooted perennial pastures, capable of fixing and drawing down far more carbon in soils than our current grazing systems, which still often lose carbon. This will help with the restoration of the 'in-soil reservoirs' that formerly underpinned the high productivity and resilience of landscape and natural water habitats.
- By restoring these natural surface water habitats and 'in-soil reservoirs', and thus the hydrology and resilience of the natural bio-systems that still extend across 90 per cent of inland and northern Australia, it should be possible to significantly extend the longevity of green growth and thus the carbon draw-down capacity of the landscape even with climate extremes.

This is an update of a paper, first published in October 2013, which sought to outline and encourage discussion of these issues and how they might be addressed. It is based on detailed analyses of the science, practical grass roots experience, consideration of what has been done and proposals of what else can now be done. While not all the substantiating evidence can be presented in this brief, views, questions and alternatives of how to regenerate northern and inland Australia are welcomed.

The concept paper explores the potential and practical options for implementing such a commercial, grass roots regeneration strategy. This strategy could potentially cover half of rural Australia, or over 300 million hectares, and could deliver valuable outcomes for Australia in the decades ahead.

The six strategies, discussed in this paper, are key steps towards achieving these outcomes:

- Prevent the collapse of bio-systems at risk from climate extremes.
- Increase the availability of permanently distributed surface water.
- Regenerate the structure, hydrology and resilience of soils.
- Manage additional stock to reduce fire risks.
- Manage increased grain production.
- Revitalise regional communities.

**Prevent the collapse of bio-systems at risk from climate extremes.**

The priority strategy is to prevent the collapse of bio-systems, which are the living organisms and habitats that underpin a population's wellbeing and future. Since the mid-1970s, well before C02 levels rose significantly, Australia has failed to cope with the systematic spread of aridity in its southern latitudes and a more extreme northwest monsoon. These changes threaten the collapse of many inland and northern seasonal bio-systems through extended periods of drought and numerous wildfires in what is already the driest inhabited continent with the most variable and unreliable rainfall.

Masses of vegetation are produced through seasonal rainfall and from 30 to 70 million hectares burn each year, emitting from 5 to 15 tonnes of carbon per hectare. Previously, grazing by Australia's now extinct mega-fauna and controlled burning by the indigenous had limited this impact, but these fire controls have now been compromised. Without adequate grazing to consume such plants, and with the introduction of exotic grasses and a more extreme climate, wildfires now threaten the collapse of these bio-systems. Only by re-introducing former grazing levels can these risks be reduced. To do this, however, introduced stock will need access to permanent water, separate from the seasonal natural water habitats that also need to be protected and restored.

**Increase the Availability of Permanent Distributed Surface Water**

The second priority, therefore, is to ensure the availability of permanent surface water distributed across some 300 million hectares of inland and northern Australia, especially during dry periods. Without adequate water, grazing levels will not be sufficient to reduce fuels and the risk of fire to protect natural bio-systems as climatic extremes intensify.

Proposals for major public investment in new dams across northern Australia will not provide the means to distribute, and thus use this water where and when it is most needed. Instead, this concept involves the commercial construction of up to 200,000 additional water tanks distributed across northern and inland Australia, able to secure over 500 billion litres of additional water.

The proposed additional earth tanks, each with a capacity of two to four million litres, could be covered to reduce evaporation and recharged from surface flows in the wet and from the natural 'in-soil reservoirs' in the top 10 metres of soil. The latter will be restored through the regeneration of the native pastures as a result of improved grazing management. This additional 'in-soil' water should be more than 100 times the quantity needed to recharge the tanks and to increase the productivity of the regenerated pastures.

These additional distributed water sources will be fenced to control stock and feral animal access. This will enable the controlled reduction of fuel levels as well as assist in the management of feral animals. As the water will be provided to stock through drippers and troughs, it will enable grazing periods to be limited to ensure the recovery of pastures. Most importantly, these additional water sources should help take stock pressures off the natural water systems of inland Australia which have been seriously degraded by grazing over the last 150 years. They now need to be protected and restored to help restore the resilience of these habitats and their native biodiversity.

**Regenerate the Structure, Hydrology and Resilience of Soils**

The third priority is to regenerate the productivity and resilience of the soil on these rangelands. Improved control of stock and fires should make it possible to regenerate the previous higher carbon

levels in these soils and thus their structures, water holding capacities and ability to sustain deep-rooted, perennial pastures and shelter woods. While over 90 percent of Australia is still vegetated, over 70 percent of this vegetation is brown and dormant for much of the time due to soil water shortages. Restoring soil carbon levels, structure and water holding capacity, should make it possible to significantly extend the longevity of green growth and thus the productivity and resilience of this natural vegetation. Over time, this has the potential to double the current productivity and carbon fixation levels and to improve the resilience of Australia's residual "green deserts" and northern savannas.

With improved access to soil water, these bio-systems should be able to fix 5 to 10 tonnes of carbon per hectare per annum. With over 300 million hectares involved, this represents a potential sequestration of over 1500 million tonnes of carbon per year or 10 times Australia's current annual industrial carbon emission. Combined with the potential to reduce current emissions from wildfires and the oxidation of soil carbon, these changed management practices could potentially 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 through these regeneration strategies could exceed $140 billion per annum.

**Manage Additional Grazing Stock to Reduce Fire Risks.**

The fourth priority is to manage the additional stock that will be needed to bio-digest the existing and increased grass fuel generated by these strategies. Some three billion tonnes of grass may need to be bio-digested annually over the 300 million hectares to reduce fire risks. Consequently, up to 100 million additional cattle, or their equivalent, would be needed to turn the grass into bio-fertilizer and soil carbon. The natural growth and replacement of these herds will inevitably result in the production of sufficient grass-fed beef to help meet the protein needs of up to one billion people. This high-quality meat could have a market value of some $500 billion per year.

In time, the regeneration of these bio-systems and the expanding industry could contribute greatly to revitalising not only the farming industry, regional communities and the economy, but also the ecological health of the region. Indigenous communities could benefit greatly through enhanced and enduring employment opportunities.

**Manage Increased Grain Production**

The fifth priority, or opportunity arising from the regeneration of the natural 'in-soil reservoirs' in some of these regions, is the resultant potential for the extension of opportunistic pasture cropping in some seasons. This could greatly increase Australia's grain production capacity and help to provide "bread for a billion people".

Much of inland Australia, including the key grain growing areas, is becoming drier. Similar stresses are impacting on China, India, the Middle East and the US as the availability of ground water declines, climate extremes intensify and soils become increasingly degraded. Within a few 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.

Consequently, urgent priority must be given to regenerating the structure of their soils so that they can again retain and make available water to sustain grain crops despite these 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 in dormant perennial pastures with minimal inputs, ecological impact and economic risk. Conventional cropping is becoming financially more risky, due to unreliable seasons and high costs. Therefore, the extension of opportunistic pasture cropping, in suitable soil and water conditions, 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 with about 40 million hectares of land being deemed suitable for conventional cropping. Much larger areas, however, may be suitable seasonally, for opportunistic cropping of 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 yielded one tonne of grain per hectare, this could produce an additional 60 million tonnes of grain per annum, or up to three times the current average crop. This additional production could help to sustainably meet the food security needs of our wider region.

**Revitalise Regional Communities and Economies**

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

The creation of an expanded land regeneration programme through improved fire management, controlled grazing and periodic cropping will need to draw on an expanded regional supply chain, infrastructure and services. These have the potential to not only 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 also benefit significantly from such initiatives through public savings and various forms of taxation. These benefits and public incomes should far exceed the cost of provision of the services and other support needed to catalyse this regeneration, develop the supporting regional supply chains in support and attract commercial investors.

## Conclusion

This is a visionary concept on a very large scale. With further discussion planning and testing, the implementation of such regeneration concepts has the potential to deliver immense opportunities and outcomes for northern and inland Australia. They could regenerate a more productive, resilient landscape and create new social, economic and environmental opportunities. Similarly, it could deliver significant national and global benefits through increased food and fibre production and reduced greenhouse gas emissions. To realize these outcomes, however, requires a coordinated national policy involving inputs from farmers, local, state and federal authorities, the scientific community, indigenous communities, mining operators and other commercial interests and markets.

Above all else, there is a need to define a clear, national, strategic vision of the potential and importance of such regeneration initiatives. This would assist in gaining popular support and in coordinating the inputs of all stakeholders to achieve the agreed outcome.

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**About the Author**: Walter Jehne is a retired scientist with a specialist back-ground in soil micro-biology and plant ecology. He has worked in Australia and overseas and retired from the CSIRO some 15 years ago to concentrate on regenerating Australia's landscape and improving its agricultural and pastoral sectors. He is also a member of The Mulloon Institute's Science Advisory Council.

He is passionate about educating farmers, policymakers and others about the "soil carbon sponge" and its crucial role in reversing and mitigating flooding, drought, wildfires, and searing global temperatures. He shows how we can safely cool the climate and restore essential biodiversity by repairing our disrupted hydrological cycles. We thus return excess carbon to the soils, where it can build a sponge that soaks up water and revives the biosphere.

His ideas are gaining international attention. In 2017 he took part in an invitation-only United Nations Food and Agriculture Organization conference in Paris aimed at bringing soil into the next Intergovernmental Panel on Climate Change report.

Last year he was invited to India to present at a conference on Zero Budget Natural Farming, a promising method of farming which uses no-till, no-chemical methods and only local materials to regenerate the soils.

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