

COMMENTS ON  
**"PROSPERING IN A CHANGING CLIMATE -  
A DRAFT CLIMATE CHANGE ADAPTATION FRAMEWORK FOR SOUTH AUSTRALIA"**

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## **Introduction**

The use of South Australia agricultural land for existing production is drifting inexorably into the eye of a storm where landscape-scale collapse is a high probability. The Draft Framework document alludes to this by stating "many natural systems ... are already degraded". Indeed it is reasonable to contend that most of the natural capital of the state's agricultural lands is degraded.

No consideration of adapting to changing climate can occur without connecting the long term sustainability of existing practices with the loss that has occurred in the natural environment. My examination of available information during the past 20 years or so of agriculture in the state reveals a truth – that there will come a time when inputs (e.g. fertilisers, nutrients, lime applications on acidic soils, applications of chemicals to combat pests and diseases) reach a threshold at which the soil's capability to respond is reached, and thus outputs will decline. It has happened in the past, and will occur again. This will determine whether any adaptation strategy is required. It is a truth that is not being openly confronted today. A cynic would say that there is too much profit in cropping and primary production today to get in the way of future sustainability.

Some of the concerns I am referring to are dryland salinity, sodic soils, boron toxicity, soil acidity, low fertility, loss of biodiversity, pests, and weeds. Therefore, what is to be done if, as written in the Draft Framework document, predicted consequences of a changing climate are combined with these problems? They must be connected, for it is natural capital that we are talking about. Adaptation to an existing paradigm of land use is likely to fail in the long term.

In the past 12 years or so I have examined the fundamental issue of connecting land degradation with climate change and have concluded that there is only one way to proceed for South Australia, and that means there has to be massive restitution of formerly cleared agricultural land. Although the Draft Framework document touches on some aspects of revegetation and biodiversity support, it does not cover these to the extent that is needed. There has to be recovery of abandoned agricultural land, and in the Mid North region and around the state there is plenty of that. It is a sad indictment on the human capacity that a blind eye continues to be turned to failed past ventures, including forgetting what nature once provided. It is no more evident than in the NRM Plans that exist today.

My submission explores why we need a new approach throughout the state, and how it can be achieved. The Draft Framework of itself is not sufficiently extensive to achieve adaptation goals – what is needed are sustainability goals.

## Lost Connections

More than 50 million hectares (51% of the State's area of 98.3 million ha) was used for agriculture in 2006-07 (ABS – Agricultural State Profile, SA 2006-07 ... <http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/>)

The gross value of agricultural production in 2006-07 was \$3.7 billion, and \$4.4 billion in 2005-06. Compare these with the Draft Framework figure at section 4.6 ... "In 2008/08 the State Gross Food Revenue was \$12.3 billion". Whilst "agricultural production" may not mean the same as "State Gross Food Revenue" (whatever that means), the gap is massive and needs explanation.

Nevertheless, one way or the other, there is a huge economic risk at stake if essential connections between productivity and natural capital are not made.

The Draft Framework contains an underlying theme of 'economic advantage' in a climate of adversity, but it misses a fundamental connection. (Even the title uses the word 'Prospering' as if prosperity can be forged from a declining a stressed natural state).

Just as the connection has been made in the Draft Framework document between changing climate and risks to agricultural production, so must there be a connection of these with the destruction of the mallee landscapes and other woodland/grassy landscapes in the ranges and plains of the state, including loss of biodiversity. There have been copious numbers of research reports over the years extolling the virtues of revegetation on farms. Sadly, and with few exceptions, these have largely been ignored.

The mindsets of farmer, land user, politician, natural resources manager, local government representative, the general public, need to change if there is any chance of attaining those other lofty goals in the State Strategic Plan. IVA's in the Adaptation Framework will not provide this change.

What do I mean by 'change'? The sacred balance, as David Suzuki writes in his book of the same title, must be returned. Consider water as an example. Most agricultural endeavours in the state have unwittingly removed water from the hydrologic cycle as quickly as possible.

- Remove vegetation from the landscape and the result is rapid exit of rainfall runoff from a catchment.
- Resist planting of windbreaks and the result is rapid removal of moisture from crops.
- Remove native vegetation from the surface and the result is increased evaporation and moisture loss from the soil.

These actions have adversely affected climate at the local and regional scales (see later for discussion on this topic).

Conclusion The Draft Framework would do well to include a good dose of history prior to the establishment of IVA's and the structure to implement the Framework. It is an understanding of the historical context of this state that is a precursor to tackling the problems confronting the environment today.

Now consider the following example.

In "A Land Transformed – Environmental Change in South Australia – Ed. C. Nance and D.L. Speight (1986)", S Barker writes (pg 27):

“Probably the most depressing of the vegetation types, as perceived by settlers, were the endless stretches of mallee, or open-scrubs as we call them today.”

“Explorers and settlers had trouble coming to terms with mallee because it lay in seemingly interminable stretches and had no tall trees which were strong enough to support a man climbing them to get compass bearings.”

The mallee therefore, was seen to having to be conquered. And governments at the time provided requirements and incentives to do so. Here was the start of massive land clearance, and of great disturbance to ecosystems, and the forerunner to a changing climate. No thought was given to the consequences. The land clearance was of epic proportions, and thus became the first root of the big problem today.

C. Nance in “A Land Transformed – Environmental Change in South Australia” perhaps provides a sharper focus. Nance states (pg 204) :

“The European settlers came from Christian countries, and the Bible reinforced the notion that the natural environment should be conquered and controlled for the benefit of mankind.” Nance says that the book of Genesis gave instructions and “the right (or so it was believed) to treat the land, sea, animals and plants in any way (mankind) chose”.

I think there is a reasonable degree of accuracy in this statement. Travel through rural SA and note the abundance of abandoned churches in the landscape. Note the traditional conservative slant accorded the rural sector today. Thus, what has happened to the landscape could be viewed by many rural people as their calling – this view conceivably remains intact today, and that is a compelling reason why little has been done in terms of environmental repair and revegetation. It may not be seen to be necessary. And why would any farmer want to forego land that could be used for agricultural production?

Conclusion This is a principal issue that the Draft Adaptation Framework needs to address.

There is a second root to the problem, and is more contentious, and exceedingly more obscure. In a few words, I believe the answer lies in the human condition, the unconscious state. This is a far more compelling reason to me, than any other. Why is it, that what was created from around the 1850's onwards in rural SA, that the results of the “war” on the landscape have largely been ignored? Successive governments, and rural folk, have generally ignored repairing the destruction that has occurred. This is fundamentally a moral issue.

If one travels through the back-roads of rural SA, searches local history, or examines the states historic terms of trade in the agricultural sector, a sense of boom-and-bust is palpable. The natural environment has been largely erased in many areas of the state in the name of 'progress', but when failure has arrived no efforts have been made to restore the damage. Wastelands have resulted.

It seems that what went before is what exists now, and if one is born into a landscape devoid of vegetation, then that is how it has always been. And this may explain a part of the puzzle – it is an antipathy towards recreating a part of the past, long before white man colonised the landscape. Today, the sense of place, of harmony, is but a shell of reality.

David Tacey in "Edge of the Sacred – Transformation in Australia" (1997) provides some support for the historical context, and of reconnecting with the earth and Nature. Tacey writes (pg 66) ...

"Is it the Australian unconscious or the landscape that is peculiarly vicious and malign? Or is it, as I suspect, that the *distance* between spirit and nature, conscious and unconscious has a destructive and enervating effect on human life? When there is no organic connection between spirit and earth, earth rips spirit out of its human context and gives it an earthen death-mask. If Australians do not build a connection between mind and earth in life, a connection will be forced upon them destructively, in death."

Tacey continues (pg. 71-72) ...

"Conquerors of new lands are themselves eventually conquered by the land, because internally they are racked by self-doubt, plagued by fears, tortured by personal inadequacies. The natural world within and without seems to turn against them."

"Conquerors of land can find no ultimate solace or fulfilment, no deep satisfaction, if they do not embrace the spirit of place, allowing themselves to connect spiritually, organically, to the world around them."

"We cannot psychically and physically abuse nature on a grand scale and then expect it to nurture and protect us."

To my mind, this is a defining statement. It drills into the core of "natural resources" and human exploitation. It diminishes the Biblical reasoning to control and conquer the landscape. And it exposes the gaping hole in "natural resources management", which today comes across as more about managing what exists, rather than restoring some semblance of balance. If there is no embrace of "the spirit of place", there is only one final journey – it is collapse of ecosystems (or what's left of them), and ultimately death. It has happened before, as witnessed by the retreat of the wheat frontier in the upper Mid North in the 1880's, the decline of dairy farming around Orroroo, the devastated landscape of the Willochra Creek – these are just a few examples. A journey through the Mid North region can reveal many other examples.

## **A New Direction**

In "Report of the Condition of Agricultural Land in South Australia" (Department of Water, land, and Biodiversity Conservation, December 2004), the Executive Summary states ...

*"There are 10.2 million hectares of land used for farming in South Australia. This land has been cleared of its native vegetation and almost all of it has suffered some form of degradation as a result of farming systems that are inadequately aligned with sustainability requirements of its natural resources. Loss of productive capacity of agricultural soils results in adverse environmental, economic and social impacts, many of which are effectively irreversible."*

This same report states for agricultural land in South Australia:

- *"About 781,000 hectares...have a moderate to high inherent susceptibility to water erosion by virtue of soil type and land slope."*
- *"About 2.4 million hectares ... have a high inherent susceptibility to wind erosion, due mainly to having sandy soils."*
- *"At least 1.9 million hectares ... is either already in a degraded state due to acidity, or is on the brink of damage due to acidification."*
- *"The area of land directly affected by water-table induced secondary salinity in the agricultural and remnant native vegetation areas of the state is estimated to be around 398,000 ha. This is predicted to increase to about 593,000 ha in the next 20-50 years, with most of the increase on the coastal plain of the Mid and Upper South East."*
- *"Almost 1.7 million hectares...have soils with physical properties that make them inherently susceptible to soil surface structure breakdown."*
- *"The majority of South Australian soils have very low natural phosphorus levels, and often have trace element deficiencies. Without very large inputs of key nutrients, agricultural productivity would be very low."*
- *"There are about 2.48 million hectares ... that are moderately to severely affected by water repellence."*
- The rate of revegetation of native species for non-commercial purposes is about 4,000 ha annually. *"It will take many decades of revegetation at this rate to have a significant impact on major NRM issues like dryland salinity, soil erosion or native habitat restoration."*

The situation has not changed in the state since that report of 2004. There are numerous statements similar to these in the literature.

What does all this mean?

It means that South Australia needs a new direction, and urgently. It needs to be substantially more than an "adaptation" model. Adaptation to my mind means acceptance of the inevitable – and of course these inevitabilities have been clearly enunciated in the Draft Framework document – but there is one aspect that is absent, and it is as though it is beyond comprehension or indeed beyond the realms of economic capacity. I'm referring to very extensive landscape-scale change.

The real danger is that there are few if any plans in place for a new direction. We should not accept that declining rainfall will continue, because it may just be possible to have an effect (see discussion below) by taking action in restoring a natural balance.

The concern for the future is continual decline and further retreat of agricultural production and decline of the rural population. The effects will be continued urban sprawl of metropolitan Adelaide as people migrate to where jobs are available.

The adaptation response (section 4.6) "increasing demand for agricultural crops as world population

rises" will count for nought if soil fertility, rainfall, and different agricultural responses can not provide the output.

South Australia's soils are trending towards exhaustion, and the cropping and grazing systems risk more frequent episodes of failure. It will be insufficient, and inappropriate in terms of sustainability, to rely on genetics and biotechnology to maintain farm and rural productivity in the future.

So, what has all this got to do with adapting to a changing climate? Because it is all about SUSTAINABILITY.

When land clearance was in full swing in the period 1860-1880 and then from 1900, there was no consideration of the long-term effects on landscapes, soils, ecosystems, biodiversity. The prime motivation for the government of the day was to remain the number one grain producer in the land. As history reveals, other states soon caught up as the years rolled by.

But the legacy of those years of land clearance are being felt today more than ever. At least 10.2 million hectares of land have been cleared, ecosystems wiped out, and extinction of species unknown. It is only in recent years that two species thought to have been extinct have been "rediscovered" - the spiny daisy and the pygmy bluetongue lizard, both in the Mid North region. How many other species are out there surviving in tiny enclaves? How many have been erased forever?

Mallee was once widespread across the state, generally in a band along the southern extents, but today there are just remnants, some tiny, many very isolated and disconnected. The mallee lands were seen as good cropping land. What has been lost is affecting local and regional climate today.

If we are to accept what is contained in the report "It's About People : Changing Perspectives On Dryness" ("Drought Policy Review Expert Social Panel" - Report to the Minister for Agriculture, Fisheries and Forestry, Canberra, September 2008), then the underlying assertion is that at the very least a proportion of what was removed from the landscape in those many decades of land clearance must be replaced, if community health is to prevail.

If we are to accept the statement made earlier that "*farming systems ... are inadequately aligned with sustainability requirements of its natural resources*" then change must occur.

Of critical importance, if we accept the outcomes of the report "Modelling impacts of vegetation cover change on regional climate" (Land and Water Australia, July 2009) then there is only one option for South Australia. To illustrate my point, I quote extensively from the study for this report, which concluded :

The study demonstrates the need for more integrated, long-term and adaptive policies and regional natural resource management strategies that restore the beneficial feedbacks between native vegetation cover and local-regional climate, to help ameliorate the impact of global warming. There is a critical need to reassess national climate change and natural resource management policies to include the interactions and feedbacks between the land surface and regional climate, particularly the role native vegetation plays in ameliorating climate extremes and the severity of

droughts.

And in another two extracts :

In recent decades, the deforestation of the Australian landscape has been compounded by increased and sustained land use pressures arising from a steadily growing human population, rapid economic growth and rising global demand for Australian commodities, especially mineral and energy exports. There are also pressures on the extensive rangelands, with the sustainable management of rangeland landscapes continued to be outpaced by the need for growth, droughts, personal gain and invasive species. It is likely therefore that loss of ground cover due to drought and overgrazing will have a similar effect on energy fluxes and convective processes as broad-scale land clearing. A major uncertainty in attributing causes to changes in perennial land cover (trees and shrubs) in agricultural and rangeland landscapes results from the number of interacting factors involved (CO<sub>2</sub>, grazing management, frequency of pasture burning and wildfires, and severity of intermittent drought).

The risks of ignoring the role of land surface feedbacks in current and future droughts are potentially catastrophic for Australia's environment, economy and communities. Climate changes due to increased anthropogenic greenhouse gases coupled with land surface feedbacks appears to be amplifying the natural climate variability and has the potential to tip Australia's climate, especially in southeast Australia, into a new regime of more extensive, frequent and severe droughts. The combined effect of transient increases in greenhouse gases and pressures from land use/land cover change may already be contributing to more severe droughts for eastern and southern Australia, and is an ominous sign for the increased incidence and severity of projected future droughts.

For years I have been writing about the urgent need for landscape-scale change in South Australia. I have presented submissions to Northern & Yorke NRM Board (my regional board) on this subject, and I have presented similar responses to other research investigations. Unfortunately there does not seem to be the will to embark on landscape-scale change. These are opportunities lost. I see it everywhere I drive (and that is extensively) in rural South Australia. I witness decline of natural capital.

Conclusion All of this decline can be arrested, but it will take a new direction, a new form of agriculture and land use, to be introduced.

## **What Can Be Done?**

Nationally and globally there is an incremental movement towards a carbon economy. The discussion around the myriad arguments about carbon is outside the scope of this commentary. It is sufficient to say that a balance has to be returned to our natural capital in South Australia, and the store of carbon has to

be returned. For decades, carbon has been released from its earthly chambers by mining and burning of coal. In addition, 10.2 million hectares of land clearance has released an enormous store of carbon, when much of the cleared material was burnt and the residue released to the atmosphere.

In both cases – coal mining and land clearance – huge quantities of carbon dioxide have been released and have become greenhouse gases. And all this has resulted from a relatively small population. The impact per capita is extraordinary.

Consider the 10.2 million hectares of cleared land. When living in an irrigated area of Victoria between 1987 – 97, I concluded that irrigated agricultural properties would need to give up at least 15% of their space for re-establishment of native vegetation just to remain viable and to limit the dire consequences of rising saline groundwater (this was the conclusion of the MDBC many years later). In the South Australian context, dryland farms will conceivably need to convert up to 20% of their land to native revegetation. The same applies to irrigated farms. Research may be needed to test the 20% assumption. There are sound economic reasons why this should occur, aside from environmental and ecological reasons. This means that 2 million ha would need to be revegetated – it is a staggering figure.

If we accept that 4,000 ha annually is being revegetated in the state (and I'm not sure if it is this much), then that is equivalent to 500 years of revegetation work. I don't think we can wait that long.

If just 10% of cleared land (i.e. 1 million ha) is revegetated, it would take 250 years at the present rate. I don't think we can wait that long.

To have a real impact on a changing climate at the state and regional level, what is needed is a new agricultural economy based on a 50 year time horizon of revegetation – i.e. 40,000 ha annually. Not only would this protect farm incomes, but it conceivably would add to state income.

How can this be achieved? By direct seeding primarily. However, any on-farm revegetation would also include new crops (e.g. Guayule, a latex-producing plant with non-allergenic properties). This is an example of the new economy. In abandoned, semi-arid, cleared, agricultural land there is potential and opportunity to introduce new crops – there just needs to be the will.

It is predicted that the rural sector would resist allocating 20% of land to revegetation, but what is happening on the farm now is generally poor practice. A better way involves the following:

- vegetation buffers along all paddock fences
- fencing off paddock trees to at least twice the height to allow micro ecosystems to evolve and for tree survival
- establishment of native vegetation corridors linking remnant scrub
- exclude cultivation within a 20 metre zone of watercourses
- exclude cultivation within 10 metres of the edge of woodlands for the establishment of understorey
- revegetate land that has remained idle or abandoned
- exclude grazing from existing woodlands to allow understorey to re-emerge

Land owners may be surprised at how much can be achieved from these actions, and the economic benefits that can be derived.



Some outcomes of landscape-scale revegetation are :

- establishment of new businesses and support services in rural and regional economies in land restoration
- substantial flow-on effects, with jobs and businesses created in site assessment and monitoring, native seed production, direct seeding, native crop products harvesting, establishment of new markets in sustainable products, higher education etc.
- participation in the voluntary carbon market (it exists right now) in the interim whilst the carbon tax/ETS issue is evolving at the political level
- farm diversity in seed production and new crops
- provision of a buffer to economic and climatic (drought) cycles
- scope for local government to use its enormous vacant road reserve inventory for revegetation corridors and participation in the carbon market
- participation in the provision of environmental services (refer to "**Creating Markets for Environmental Goods and Services: A Mechanism Design Approach**" by Gary Stoneham, Research project number DSE3 of the Social and Institutional Research Program, Land & Water Australia - Project completed June 2007)
- bio-energy potential
- improved crop output by reduction in soil moisture loss

These aspects have all been examined by others in the past, so there's nothing new here. But what is needed is an integrated approach and a commitment to a new rural economy embracing these ideas.

Neither the State Strategic Plan nor the Draft Adaptation Framework, nor other government/agency plan to my knowledge, has examined the scope for massive revegetation of the cleared landscape as proposed above.

Conclusion It is recommended that the Draft Framework re-set its compass on ameliorating changing climate impacts in partnership with adaptation strategies.

#### How is landscape-scale revegetation to be funded?

Funding of revegetation has always been a thorny issue, as it is seen by land owners not to produce tangible economic benefits. This is not true. An interesting report by CSIRO "*Market-Based Instrument approaches to implementing priority revegetation in the South Australian Murray-Darling Basin*" (December 2005) concludes the following ...

"We have found that conservatively, revegetation of deep-rooted perennials for both biomass production and carbon trading are likely to be at least as profitable as existing agriculture, particularly sheep grazing in spatially optimised locations. At higher prices, both activities are likely to be substantially more profitable than existing agriculture over much of the SA MDB."

Should such an exercise be extended to all agricultural areas of the state, then it is logical that there would be negligible decline, if any, of farm income in the future. It is the diversity that improves income yields.

### Specific comments about the Draft Framework

I have made dozens of comments in my copy of the report, but rather than provide a commentary on each one, I have preferred to focus on a few to illustrate what I consider to be significant points.

Item	Comment
In 1.3 "SA's early adaptation responses"	<p>It is fine to "build research capability" but the priority now should be about on-ground action, for there is little time to waste.</p> <p>It is not strictly correct to reference the "five well-established biodiversity corridors" - these were supposed to have been implemented by 2010.</p> <p>"Landscape scale management that maintains healthy natural systems ..." illustrates the distinctive problem we have with language and meaning. Maintaining a system means basically 'as it is now' not as it needs to be. It is not semantics to point this out, but a state of mind. We must move away from seeing what exists now as the norm, to visualising the landscape as it ought to be in terms of real sustainability for all ecosystems and human productive systems.</p> <p>"Local government across South Australia are implementing a range of actions to address adaptation." I have worked for a number of rural Councils as a consultant and I have not witnessed this. It is a fact that rural Councils are generally under-resourced and under-skilled.</p>
In 1.4.1 "Local government"	Comment as above. Without commitment, and appropriate resourcing and skills, Councils will not be able to carry out the stated roles.
Objective 3	The acknowledgement that "many natural systems ... are already degraded" and that the need is to "increase ecosystem resilience and connectivity across the landscape through restoration and rehabilitation", signals the fundamental problem but only goes part way for a solution. This illustrates the gap in the understanding of the role that native vegetation land-cover can provide in buffering some of the potential impacts of a changing climate.
In 3.2 "Regional integrated vulnerability assessments"	Regional IVA's will become useful tools, but I predict that there will be many years before they will be finalised. The critical need is on-ground action in revegetation on a very large scale. It has all been stated in the past, but there is little to show for the scattered efforts provided by volunteer groups and a few farmers that have made the connection between farm productivity and natural capital.
In 4.1 "Sectoral Impacts ..."	Under "Adaptation responses" - two of the categories refer to 'losses' and acceptance of losses. This approach is defeatist and subverts opportunities for changes at the landscape-scale. There is a moral responsibility in the second decade of the 21 <sup>st</sup> century to recover a significant portion of this loss.
In 4.5 "Biodiversity"	What is stated here about the ability of natural systems to continue to deliver the wide range of benefits and services can be supported by following the strategy I have outlined above about revegetation on a very large scale. The economic outcomes for the "multi-million dollar tourism industry" would be sustained.

In 5 "Implementation"	My concern is that the Adaptation Framework will consume too much time and will handicap the implementation of what I consider to be first priority strategies – i.e. widespread landscape revegetation. The will to change to a more resilient and robust landscape must commence now, not years down the track.
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## Summary

The government is commended for the initiative in preparing the Draft Adaptation Framework document and my sincere hope is that the implementation of it will be properly and adequately resourced.

As is evident from this commentary, I have not focused on the quite alarming possible outcomes that have been described in the Framework document. Rather, my focus is for a different approach in landscape change in conjunction with adaptation strategies. I have illustrated why we should pursue a framework that involves restoring the beneficial feedbacks between native vegetation cover and local-regional climate. This approach will help to ameliorate the impacts of a changing climate and global warming, and create a new rural economy based on a 'green revolution'. If substantiation of this approach is needed, then I urge the authors of the Adaptation Framework document to examine the research work that has already been undertaken in Australia.

Implementation of the Adaptation Framework will run into detractors of the process and those who believe that no change is/should be necessary. Such people should be reminded that climate change has been on the agenda of many organisations for decades, and a good start would be to reference the Proceedings of a symposium "***Climate Change And Its Implications For South Australia, 11 November 1993***". One could say that the Adaptation Framework has been a long time in the making.

Nevertheless, the weakness in many environmental documents that evoke change is that there is a lack of a historical context and connection. I have articulated several explanations about the human condition, and I suggest that a similar rationale be adopted during the IVA and Framework implementation process to underpin why adaptation is needed.

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