“DEVELOPING A NEW CLIMATE CHANGE STRATEGY

FOR SOUTH AUSTRALIA”

2015

A SUBMISSION PRESENTED BY DES MENZ

ABOUT THE AUTHOR

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Des has an abiding interest in educating the community about the environment and ecology, with some of his writings on display at SustainableSpace.info

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SUMMARY

Of the five consultation papers and the main strategy paper, scant regard has been placed on the single most pressing issue confronting a future climate change scenario for South Australia of rising temperatures and diminishing rainfall.

Landscape-scale change.

Such change involves revegetation, reforestation, and restoration of agricultural and degraded lands. I am not referring to the tiny amount of revegetation work, excellent though it is, that is done voluntarily each year throughout the state.
I am talking about the revegetation of up to 2 million hectares of agricultural land. In other words, around 20% of cleared agricultural land.

This is deserving of its own consultation paper. And yet, again, it does not rate. Why?

Given all the conclusions documented in reports, studies, and strategies[1], about the impacts of climate change on farming systems, biodiversity, and rural communities, one would have thought that landscape-scale change would be at the apex of actions.

Land clearance in South Australia did not happen by design. There was no plan. From the 1840's onwards it was a land grab, an uncontrolled movement of squatters extending out from Adelaide, until George Goyder brought some semblance of order to colonisation[2]. But then even he was dismayed about the extent of land clearance that was occurring during his time. He was very concerned back then. The rest is history.

It seems that a very persuasive economic argument must be offered about landscape-scale change for it ever to be considered. So that is what I have attempted to do in this submission.

My submission also focuses on the very substantial opportunities in transitioning to a new agri-economy based on woody plants i.e. trees and shrubs. The research and the science has been done. All that is needed now is to apply it. Action is needed.

Indisputably, very large scale revegetation and reforestation of cleared agricultural land ;
- ticks every box set out in the Low Carbon Investment Plan Strategy Paper
- exceeds the various approaches revealed in the other five consultation papers
- will create thousands of jobs
- will re-set the compass of many country towns

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1 See the list of some of these documents at the end of this submission

2 "Natures's Line George Goyder", Janis Sheldrick, 2013

- re-focuses on the rural economy
- creates a huge carbon sequestration potential that could have national and global implications
- can be established in a very quick time-frame using existing organisations and community assets
- supports greater social cohesion between city and country
- enhances the capacity of biodiverse systems to survive under the threat of a changing climate

The benefits extend much wider than these.

It is acknowledged that the consultation papers and the Low Carbon Investment Strategy paper all contain good introductory material. But the most obvious climate change action of all is fundamentally ignored.
If we are to truly understand what the real impacts of climate change will be on the state, we need to have a good dose of history of land clearance, and then formulate a strategy to correct the overshoot that has happened. This is my appeal to the designers of the Climate Change Strategy.

South Australia lives at the door of a desert environment. Do we want more of that in the future? No amount of science or genetic intervention will see the continuance of grain cropping, horticulture, and viticulture at the present scale under scenarios presented by scientific research and modelling presented by Bureau of Meteorology, and as articulated in many reports.

It is time to change. Landscape-scale change. The Climate Change Strategy must be the vehicle for it, because time is not on our side.

INTRODUCTION

In August 2012, after much public consultation, a climate change adaptation framework was released - "Prospering in a Changing Climate; a climate change adaptation framework for South Australia".

This document described in detail what a climate change strategy was to be for the future of South Australia. In late 2011 I spent a lot of time preparing a submission for the Adaptation Framework. My focus then was on landscape-scale change, for it was that very aspect that was absent in the Framework document. It scarcely rated a mention.
In the three years since the release of the Framework, negligible visible progress has been made. It has been a huge disappointment, just as is the absence of thought on landscape-scale change.

A strategy not implemented is a diversion from the truth.

But what is a "strategy"? Let's remind ourselves. It is a **plan of action** designed to achieve a long-term aim, such as achievement of a goal or solution to a problem. Simple, yet so difficult to achieve in practice.

What this state needs is to **implement the ACTIONS** that have already been identified in many previous and current strategy reports and frameworks. After the new Climate Change Strategy is

finalised, we do not need more similar strategies. We need real action plans, funded and resourced, not just for a couple of years but for the next 20 years, the next 30 years, and beyond. Later I outline how to achieve this.

The Climate Change Strategy consultation papers appear to focus on economic imperatives, with strong threads about "innovation", "leading", "adaptation", development, partnerships, and priorities. But of course, the climate change story for South Australia will have far wider implications that involve the health of towns and communities, the well-being of individuals, retention of people on the land and in towns, arresting the decline of biodiversity, and water availability.

Too often today, economic mantras drown the voice of reason. When was the last time we heard a government, state or federal, extoll the virtues of large-scale revegetation and reforestation? It seems it is just not fashionable to talk up the environment today. No votes. Costs too much.

It would be a mistake to continually believe this. Consider the following.
In the report ***Modelling impacts of vegetation cover change on regional climate***[3], the following is concluded (words in bold are my emphasis);

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[3] Land and Water Australia, 2009
https://eprints.usq.edu.au/22824/1/McAlpine_Syktus_Deo_Lawrence_McGowan_Watterson_Phin_AV.pdf

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****.*

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 (CO2, 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.***

This report is not the only one sounding the warning bell about the need for landscape-scale change, but it succinctly represents my appeal about the necessity to restore the connection between land cover and regional rainfall, a vital aspect that should be included in the new Climate Change Strategy.

The "catastrophe" that confronts rural SA is palpable. We can change this potential scenario if the right strategy and action plan are implemented.

The case for re-forestation on a large scale is more than just about trees. It's about a new agri-economy, it is about rural and regional support, and it is about green jobs.

There has to be a change in the mindset of policy-makers, politicians, farmers, agricultural scientists, agricultural businesses, land-owners, and the general community. Before change can happen there has to be an acceptance of the need for it. And this is where the Climate Change Strategy should play its part.

THE REALITY OF THE LANDSCAPE

- One of the significant drivers of increased CO2 emissions globally is the depletion of forest lands over many centuries of human interference. About 54% of tree cover now remains on the planet[4] because of the clearance for agriculture extending back 12,000 years.

- In our contemporary world, South Australia now contributes a tiny proportion to greenhouse gas emissions. But it has not always been that way. For more than a century, commencing in the 1850's, uncontrolled land clearing supported by both colonial and state governments, resulted in an extraordinary amount of carbon dioxide being released into the atmosphere in conjunction

  with a huge consumption of oxygen. This came about by burning vast expanses of native scrub and grasslands. The land was alight for many decades.

  Thus, **legacy emissions** from agricultural development have never been accounted for, and they still reside in the atmosphere. This is an issue that has never been addressed in Australia.

- In South Australia, more than 10.2 million hectares of land have been cleared for agriculture[5].
  Just 13% of the area of the state is farmed for grain cropping and mixed farming purposes. The remaining 87% is predominantly semi-arid and desert land. Of that 13%, 85% has been cleared of native vegetation.

  In a land dominated by desert, the first casualty of European settlement were the trees.
  Most of South Australia's dense tree cover has disappeared in the past 150 years. This is the great disruption. Large areas have been degraded, biodiversity pushed to the brink, remaining that way today.

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4 A recent audit - http://www.nature.com/nature/journal/v525/n7568/full/nature14967.html

5 *Report On The Condition Of Agricultural Land In South Australia*, 2004, DWLBC

- The report "Prospering in a Changing Climate; a climate change adaptation framework for South Australia" and to a lesser extent, the Consultation Papers, assert that the state is likely to experience higher temperatures and declining rainfall in the decades to come. Other sources such as Bureau of Meteorology and State of the Environment South Australia 2013 express similar convictions.

  Bureau of Meteorology states that the low pressure systems (generally rain-bearing) that usually migrate from west to east across the continent and the state, are moving southwards and deeper into the Southern Ocean. Consequently, there is likely to be less rainfall on the land in the future. Will there be sufficient rainfall from predicted dumps in the interior from north-west front movements, to supplant this loss? We don't know.

  Thus, the double impact of rainfall decline from land cover change and the movement southwards of rain-bearing low pressure systems, will have a major influence on the rural sector of South Australia.

- Every citizen in the state will be impacted, but none more so than those who live in rural regions and those who farm the land. They will be in the grip of climate change where they will be powerless to stop it. Water availability will be a massive issue. Biodiversity survival will also. Regional economies will be hit very hard. How can this sequence of tragedies be attenuated?

  Firstly, by waking the people up to what is coming their way. This is a significant deficiency in the consultation papers and one that needs to be addressed as soon as possible.

  Secondly, starting immediately with a solution that will have the greatest impact of all those described in the consultation papers. Reforestation and revegetation.

  This is a critical issue that also has not been articulated in the consultation papers. People in the country do not realise, nor understand, the gravity of the problem. It is as though the landscape that they were born in, and live in, has always been that way. It is as if the agricultural landscape as it exists now should never be partially returned to what it used to contain - woodlands, scrub, grasslands. These are both fallacies.

- Whilst there is a *30-year Plan for Greater Adelaide*, part of which calls for the development of green technologies and industries, a 20-year plan or even a 30-year plan for the sustainability of the rural sector does not exist. This needs to be corrected.
  What should the strategy be for farmers whose plight steadily worsens under the grip of climate change? This is an issue that farmers in inland Queensland are now being confronted with.

- In South Australia, the Climate Change Strategy must give clarity about what will be done in the event of another big drought, of rising temperatures, of no water, and of diminishing hope.

Consider again that 13% of cleared agricultural cropping land mentioned earlier. Remember, 51% of the state[6] (i.e. 50 million hectares) is used for "agriculture", which includes pastoral activities.

Within this 13% there is a fragile native vegetation remnant that now exists, generally consisting of scattered, separated, isolated islands, a strip here and a speck there, a lone paddock tree. When confronted with predicted higher temperatures and less rainfall, that fragility could cascade into collapse.

> *"The loss of South Australia's native plant and animal species since the arrival of European settlers is alarming. At least 23 mammals, 2 birds and 26 plants have already gone forever. Our State's extinction rate is one of the highest in Australia.*
>
> *Today about one quarter (over 1000 species) of all terrestrial vascular plants and vertebrate animals in South Australia are considered to be threatened – 63% of our mammals and 22% of our vascular plants are formally listed as threatened at the State level. Our ecological communities are also threatened."*
>
> *"Native biodiversity within South Australia is in decline, yet relatively few threatened species and ecological communities are being managed for recovery.*
>
> *The threat is real and present for terrestrial, aquatic and marine ecosystems. We can no longer modify habitat, fragment ecological communities and populations, introduce invasive species, and alter environmental water flows and fire regimes. Climate change is now adding further challenges and often unknown complexity to how we might manage current threats, and restore ecosystems in the future.*
>
> *Instead we must intervene with serious planning, innovation and endeavour."*
>
> "No Species Loss - Overview; A Nature Conservation Strategy for South Australia 2007-2017" (Department for Environment and Heritage)

If ever there was a call for large-scale revegetation, then there it is in the "No Species Loss" strategy. But what has happened?

It is contended that the "No Species Loss" Strategy, like others, has not achieved its 5 main goals. *Goal 4 - Adjustments to the impacts of climate change*, has 8 targets and 1 recommendation. Now into the 8th year since the commencement of the Strategy, the wind has gone out of its sails?

- The new Climate Change Strategy must factor in the impacts on biodiversity. A key component would be support to existing native vegetation areas with revegetated systems on a very large scale.

[6] Australian Bureau of Statistics – Agricultural State Profile, SA 2006-07

WHY LAND COVER CHANGE?

- Here is what numerous reports in the public domain, and science, say about land clearance;
  1. produces less rain
  2. results in higher evaporation
  3. produces higher surface ground temperature and radiant heat
  4. results in greater runoff and soil erosion
  5. less retention of moisture within catchments
  6. disrupts biodiversity inordinately
  7. pushes species to the brink of extinction (refer to the box above)

- I have read many reports about grain cropping, sustainable production, yields, dryness, vegetation cover, social impacts, water impacts, biodiversity decline, climate change risks, changing climate patterns, and so on. Some are listed in References at the end of this submission.

  These reports originate from national and state organisations. The reports dealing with agricultural production do not attend to the obvious and necessary change that must happen, either because of a mindset with a false paradigm that says what exists today has always been, or because it would be unthinkable to contemplate agricultural contraction and the economic implications that go with it.

- It is almost without exception that the solutions offered today about climate change do not countenance the most obvious - putting back a proportion of what was taken away. The balance between nature and farming in South Australia has been severely disturbed. Large-scale action must be commenced within the next few years to avert the threats to ecosystems.

- The “Adapt consultation paper” just hints at carbon sequestration, but only with reference to the federal government’s Emissions Reduction Fund and Carbon Farming Initiative.

  The ERF in my view is flawed - it is a pseudo carbon tax that uses taxpayer funds to hand out to corporations to reduce emissions. It is not right, and it dismisses the “polluter-pays principle” that has been with us for many decades. Sure, people all have a responsibility both as individuals and as collectives, but none more so than the big emitters.

  The Carbon Farming Initiative (CFI), from my own experience at a workshop earlier this year, is very limited and selective, and for the general farmer there is no business case to get involved in carbon farming. That was the outcome of the workshop - no business case! The CFI is flawed. In addition, there is very little scope or opportunity for small landholders to become involved; it is too difficult, and too expensive. An opportunity lost.

  So, let us not overplay the CFI as it is currently presented in the “Adapt consultation paper”.

- The Climate Change Strategy should have at its core a new paradigm about landscape-scale change, because this is the only solution that embraces every facet of the economy, the environment, and the human factor, across the whole state.

- Large scale re-vegetation, re-forestation, and land restoration are not mentioned by research institutes, agri-businesses, government departments, agronomists, farmers, and the like.

  However there are two exceptions, although described in reports some years ago (see References below).

  Example 1

REPORT ON THE CONDITION OF AGRICULTURAL LAND IN SOUTH AUSTRALIA

REVEGETATION

Revegetation, particularly with native perennial plants, can provide a range of environmental, economic and amenity services. Initial surveys of NHT planting records indicated an annual rate of revegetation, by tubestock and direct seeding, of 6,000 ha in 1997 and 1998. Over a subsequent 4-year survey period, the rate of planting of native indigenous species for non-commercial purposes was consistently around 4,000 ha per annum, with a further 400-1000 ha of Australian native plants that are not local species.

Commercial planting of Eucalypts for the pulp and paper industry varied from 3,000 ha to 21,000 ha per annum. Overall, an estimated 74,000 ha of revegetation (including hardwood plantations but not including commercial pine forest plantings) were undertaken between 1999 and 2002, with most in the South East and Mt Lofty/Kangaroo Island regions.

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.

Revegetation Indicators	Current (Ha/yr)	Desirable (Ha/yr)
Plantings of:		
– Native species	5 – 6,000 ha/yr	20,000 – 50,000 ha/yr

Note To my knowledge, these types of figures have not been published anywhere since that report in 2004.

This report states that a “desirable” land re-cover rate would be up to 50,000 hectares per year. It is contended this is a minimum, and to achieve a 20% re-cover of cleared land at this rate would take 40 years.
I have explored this aspect later in the submission.

Example 2

State government actions are already described in the current Greenhouse Strategy, but there is no evidence of these having been implemented.

Consider the following extract.

> Objective 8.4
> *To reduce greenhouse gas emissions from the natural resources sector and increase carbon sinks*
> **Government actions**
> Priorities for government in reducing emissions and sequestering carbon will be to:
> > establish a voluntary offset scheme as part of the climate change legislation
> > develop and implement a series of pilot projects for adopting commercial and noncommercial perennial vegetation options in the NRM regions of South Australia
> > to promote and achieve biosequestration and deliver multiple NRM benefits.
>
> Support can be provided for these actions by investigating perennial vegetation options for biosequestration.
>
> **Tackling Climate Change - South Australia's Greenhouse Strategy 2007-2020, pg. 51**

This is acknowledgement about re-establishment of vegetation, presumably at a large scale, across the state.

To my knowledge, **no action has been taken** on a "voluntary offset scheme", "series of pilot projects", and achieving "biosequestration". And what is just as concerning, the Greenhouse Strategy (like many others) lists the government departments that will undertake the action.

Which departments are they?

- Department of Premier and Cabinet
- Department of Water, Land, and Biodiversity Conservation (now renamed)
- Primary Industries and Resources SA
- Department of Environment and Heritage

Who is making these departments and organisations accountable for actions under the Greenhouse Strategy 2007-2020?
Should the Climate Change Strategy contain similar types of actions and responsibilities, then there must be an accountability mechanism.

A 20/40 STRATEGY

I will now focus on the agricultural sector and what I refer to as the "new agri-economy". I say "new", because it means the adoption of a different type of farming and environmental services.

Firstly, it needs to be understood that agricultural output in South Australia is just 4.5% of Gross State Product. The state is dominated by the service sector with 76% contribution to GSP.
South Australia is also the most centralised state in Australia in terms of population, administration, and decision-making.
These factors produce an underlying impediment to investment in the rural sector for very large programs such as reforestation and revegetation.
This nexus must be broken.

Secondly, South Australia has not faced up to its historic legacy of land clearance by restoring a sizeable proportion of what was removed. The environmental and ecosystem problems in the regions today are a result of this legacy. Let's correct this now, or be accused by future generations of not caring when we all well knew of the problems.

What is a 20/40 strategy?

20% land re-cover in 40 years, representing the equivalent of 50,000 hectares annually for 40 years, and aligning with the following reports;

1. **"Opportunities and Threats for South Australia's Agricultural Landscapes from Reforestation under a Carbon Market" (CSIRO Sustainable Systems, 2010)**

Carbon sequestration on a large scale is a huge opportunity that should be seized. It could provide an economic uplift to the agricultural sector that could not be contemplated under present dryland cropping arrangements. It could mean an additional $1 billion annually in farm income as stated in the CSIRO report.

> … adoption of carbon plantings and sale of permits could see a boost in income to the State's agricultural sector in the order of 20%, or $1billion annually. This growth includes any economic losses from the conversion of traditional dryland agriculture to permanent reforestation.
>
> Executive summary, pg. 1

But next is the most compelling statement from the CSIRO report that matches everything that is presently expounded in the new Climate Change Strategy consultation papers.

> **South Australia's annual carbon emissions could be offset by reforestation** under a carbon price of $20/t of CO_2-e and this would require less than 20% of existing agricultural lands.
>
> Executive Summary, pg. 1

Need we do any more than this? Of course, and everything described in the ***"Low Carbon Investment Plan"*** strategy paper should be pursued, but so should reforestation and revegetation.

A price on CO_2 emissions would provide a significant boost to towns and the rural economy, and it could be transformative in terms of new opportunities in agriculture.

2. "Carbon Sequestration from Revegetation: South Australian Agricultural Regions"

This recent 2014 DEWNR report provides the blueprint for assessment of large-scale revegetation. The science and the economics are there for all to read and understand. This report is about what I have been advocating for years - a suite of measures involving different planting regimes from simple monoculture woodlots, larger agroforestry plantations, connected revegetation systems, to biodiversity plantings with all their complex fauna and flora associations.

Each of these types of systems can be measured for carbon sequestration, and this is where DEWNR has developed reliable techniques to estimate plant biomass across a range of landscapes and climate conditions.

> Resulting productivity models have been applied to the cleared agricultural regions of the State to estimate their carbon sequestration potential using woodlots and tree-dominated environmental plantings.
>
> Executive summary, pg. iii

These reports and others like them, should be taken very seriously, because what would their point be if they were just ignored?

Too often, these types of studies fade away into oblivion, whereas in reality they present incredible opportunities.

How can Large-Scale Revegetation 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; oil mallee for biofuel and other eucalyptus oil products).

This is an example of the new economy. Over many years, government departments and CSIRO, and Land & Water Australia, have examined the potential of new crops, but for reasons unknown there has been almost nil uptake at scale in South Australia. This symbolises opportunities lost or foregone in favour of existing farming systems, which we know many will be under inordinate pressure to survive in decades to come.

In abandoned, semi-arid, cleared, agricultural land there is potential and opportunity to introduce new crops – there just needs to be the will.

I predict right now that the rural sector would resist allocating 20% of land to revegetation and reforestation, but what is happening on the farm is generally not "best practice". I say "generally", knowing that there are some great examples of enlightened farming. But in some areas what has befallen the landscape has been "poor practice". It is all too evident in South Australia's agricultural margins.

A better way of farming in the 21st century in South Australia involves the following, and they are all very simple; there's nothing complicated about them. Natural Resources Management Plans have not adopted these simple remedies.

- 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 for years
- exclude grazing from existing woodlands to allow understorey to re-emerge
- exclude grazing on hilltops, ridgelines, and fragile hilly zones

Land owners may be surprised at how much can be achieved from these small actions, and the economic benefits that can be derived, and they all provide a buffer to climate change and rising temperatures.

Simple actions such as these would provide the backbone to broader landscape-scale change, so let's now see what some of these are.

THE BIG BENEFITS TO RURAL COMMUNITIES

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 pricing mechanism/ETS issue is evolving at the political level
- farm diversity in seed production and new crops
- provision of a buffer to economic and climatic cycles (drought)
- scope for local government to use its enormous vacant road reserve inventory for revegetation corridors and participation in the carbon market (more on this aspect below)
- participation in the provision of environmental services (see "**Creating Markets for Environmental Goods and Services: A Mechanism Design Approach**" in References)
- 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.

The employment effects of such a scale of work would be very substantial, and very long-term, and

would conceivably underpin a resurgence in many rural communities in SA.

For example ... on-ground assessors, establishment of seed orchards, seed harvesting, direct seeding, nurseries, TAFE training in all aspects of assessment-orchards-planting-management-measurement, carbon storage assessors, technical capabilities, labourers, off-site managers, carbon traders, biodiversity managers, teachers, program managers, site supervisors ... the list goes on.

Here are two key examples.

The opportunities for local Councils

Rural Councils are sitting on one of the largest idle land banks that exist - vacant road reserves!
And then there are the old defunct water reserves and Crown land. The combined area of this land bank is staggering. It is away from the community eye.

This land bank was created in the latter decades of the 1800's when land was opened up for settlement, but in later years became redundant when the means of transport changed from horse-and-cart to rail to motor vehicle.
Also, through aggregation farm size increased substantially from those early years, thereby resulting in the redundancy of the small farm block that once upon a time had to be fronted by a road.

Today, vacant road reserves lie like ghosts of the past in the landscape. Ribbons of emptiness, some rented for a pittance by local Councils, thereby excluding a higher purpose for the land. Renting is not the best use of this land, nor is it the best use in terms of natural resources management and biodiversity support.

It's now time that this land was given the hand of care, to return its true value, and to restore its "natural capital". Economic advantage can be sourced by participating in carbon farming and biodiversity initiatives.

What an income stream this would be for local Councils and communities in the future. I have yet to see any comprehensive assessment from any rural Council in the state about using vacant road reserves as integrated carbon sequestration and biodiversity corridors, including an assessment for bioenergy purposes.

Vacant road reserves, water reserves, and Crown land could be aggregated amongst a group of neighbouring Councils, a single operating unit then created, and the means to revegetate these areas established. Perhaps a joint venture with the private sector would be the optimum model.
Councils could go it alone and include their other vacant and under-utilised land.

Whichever way it is done, there are enormous opportunities to be had in the carbon market and the firewood market, and local Councils need to participate in this. And of course, farmers also.

The ***Low Carbon Investment Plan*** should include re-purposing of vacant road reserves as a special case.

Now to the second example.

The Firewood Market

The almost forgotten, but very significant, component of the renewable energy mix is firewood. Wind and solar energy seem to be uttered first in any conversation about renewables, but it is firewood and its derivatives (e.g. charcoal, briquettes) that contribute substantially to the total consumer energy mix. Firewood production is basically carbon neutral, and its ultimate use as a fuel can displace fossil fuels.

Although there is a poor amount of data and information about the firewood market, older reports state that between 385,000 tonnes and 440,000 tonnes of firewood is consumed annually in South Australia[7]. Most of the firewood is sourced from interstate, from Victoria and the red gum forests around Deniliquin in NSW. Whatever the figure is today, it is staggering.

Consider this conservative scenario.

If Adelaide consumes 200,000 tonnes of firewood annually, and it is imported from interstate, this represents about $40 million (maybe more) that exits the state economy.
This money should be retained in the state. How?

Large-scale firewood forest systems planted on rural land could ultimately inject a further $40 million or more into the rural economy.
Although firewood is already sourced from existing forests and other sources in South Australia, it is incapable of supplying the total market, and in all likelihood only a minor proportion is provided.

Specific species of trees for optimum firewood results have already been identified, one of which is what I call South Australia's great indigenous tree - the sugar gum (Eucalyptus cladocalyx). Its features include multiple cropping, relatively fast growing, pest and disease resistance, able to re-grow following fire events, drought tolerance, able to grow in a wide band of rainfall, is noted as a very good firewood species.

Although the firewood market is just one component of a new agri-economy, it is a very significant opportunity, and one that should be an integral part of the new Climate Change Strategy.

ARE THERE THREATS FROM PERMANENT REVEGETATION AND REFORESTATION?

The main argument we often hear today about revegetation and reforestation programs on agricultural land is about the reduction of agricultural production; in other words, impacts on food and fibre.
We also hear that Australia must grow food to feed the world.
How valid are these two assertions?

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[7] Adelaide Firewood Conference 2002

Since European settlement, South Australia (and indeed Australia) has always been an entrepreneurial food producer for profit. It has always exported its produce, for the local market is relatively small. Most of the agricultural land is allocated to export and profit. Terms of trade have declined at periods (for example the millennium drought) and export income has declined accordingly. This is the nature of farming that is subjected to many variables.

The reader is invited to take a virtual flight over the agricultural areas of South Australia. This is easy to do - just go to Google Earth or Nature Maps. Take off from anywhere and travel to the margins of cropping land. On your journey look at the landscape.
What you will see is a land devoid of native vegetation, except for patches and strips and the few remaining larger areas of scrub.

Recall that 13% of the area of the state that I wrote about earlier. This is meant to be the desert buffer, that once big green strip extending inland from the coast to provide a moderating influence of variable climate. Today, much of that buffer has gone, exposing the land to higher evaporation, much less shade, rising regional temperatures, and less rainfall.
Add these influences to changes in **global** climate where both rainfall will decline and temperatures will rise, and the outcome appears dire for South Australia's agricultural regions, particularly those in the northern regions. Agricultural production will decline, exports will decline, there will be less food for the ever-expanding global population.

So, are there real threats from revegetation and reforestation?

Taking action now to re-transform the agricultural sector with a 20/40 strategy could be the only sustainable option left for regional South Australia.

A FUNDING MODEL

Funding of revegetation work, regardless of the scale, has always been a thorny issue, as it is seen by land owners not to produce tangible economic benefits. This is not true. Here is an example of a report by CSIRO that concluded 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."*
>
> "**Market-Based Instrument approaches to implementing priority revegetation in the South Australian Murray-Darling Basin**" (December 2005)

Should reforestation and revegetation 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.

The next key issue is finding a way to deliver the outcomes in the new Climate Change Strategy, and indeed to find a new model of delivering environmental and natural resources management outcomes in general. So here is what I propose.

- Devolution of environmental responsibilities to all NRM regions; this means many of the functions presently administered by DEWNR.
- Establishment of an independent Environment Trust Fund that has ultimate oversight of the operation and projects of the NRM regions.
- The state government to step back from its current "control" structure, and allow the regions to get on with creating a new agri-economy as outlined above. This is about decentralisation, a subject that has yet to enter the public discourse.
- The state government to provide initial funding of around $10 million to each NRM region, but based on a formula that includes area and population. Funding to proceed for an initial 5 years period, then reviewed for the next investment period.
- Each NRM region can make decisions and take actions on climate change and landscape scale change in accordance with climate factors, soil types, biodiversity needs, existing strategy plans, and other requirements as determined.
- Each NRM region can engage their own resources to achieve the outcomes.
- Every year there will be a conference among the NRM regions to interact, exchange ideas, form partnerships, and develop new industries.

It is strongly suggested that delivery of climate change outcomes should come from local and regional communities. The state government can show leadership be devolving responsibilities accordingly, but with a broader scope as already outlined.

What this means is a "bottom-up" approach rather than "top-down".
It needs to be tried, if just for a trial 5 year period. A new way is needed because actions on the ground are not happening at the pace required.
Allow rural communities and organisations to form their own structures and systems to deliver the change required.

Start-up funding

A bold new policy initiative also requires some lateral thinking. And so, here are some more ideas.

- NRM regions to seek partnerships with local authorities about carbon farming projects.

- Forge partnerships with Department of Planning, Transport, and Infrastructure for the establishment of roadside carbon farming projects on old travelling stock routes and wide road corridors, and defunct railway corridors. There is a very large vacant land bank awaiting revegetation and reforestation.
- Form community co-operatives whose members contribute funds for purchase of shares to create biodiversity and carbon sequestration plantings.
- Introduce a special levy (say $20 per property annually) within the NRM levy framework. These funds must be used for revegetation work.
- Seek philanthropic funding. This could be done through the auspices of NRM Boards, and it might be surprising what arises.
- Examine the potential for crowd-funding (it seems to work in some other popular areas).
- Seek joint venture partners with corporations who are already participating in the voluntary carbon market.
- Farmers organisations and farmers themselves must be involved and it would be expected that they would forge joint venture partnerships with community co-operatives, NRM Boards, or with corporations, with agri-businesses (after all, they would have an important vested interest in the outcomes).

It will be noticed that no reference has been made of federal government involvement, and this is intentional. The present response from the federal government to global climate change responsibilities is insufficient and disappointing. A government that prioritises the provision of the feedstock (coal) to greenhouse gas emissions, further imperiling the human race, that ignores the best available science on climate change scenarios (vis-a-vis IPCC Report 5), also puts at high risk those regions of Australia that are predicted to suffer the most. This includes South Australia.

Thus, this is a state issue, and one that can be addressed by the SA community. This is adaptation and resilience at the core.

There is one further aspect about funding that needs to be countenanced.

Mining royalties

Western Australia has experience with its **Royalties for Regions** program, and I am aware of interest in parliament last year about a similar scheme for SA. To date, it has not gained much traction.
I saw widespread evidence of the benefits of the RFR during travels through WA in 2012.

A scheme similar to this to provide consistent and on-going funding for a landscape repair, revegetation, and carbon sequestration program would produce significant economic returns.

SA's estimated mining royalties are $258 million in 2014-15 (ref GST Review). Previous years' royalty income was around $225 million.

Just 10% of this sum, about $26 million, would be a significant contribution of support funding as mentioned earlier.
And 10% annually could then be used by the regions to further develop new crop opportunities (e.g. oil mallee and biofuels) and associated activities in revegetation.

CONCLUSION

As laudable as pursuing a "low carbon economy" is, as described in the ***Low Carbon Investment Plan for South Australia***, the over-riding principle of the new Climate Change Strategy must be based on social and environmental and ecological outcomes, not just economic outcomes.

In South Australia, the most urgent and important action that needs to be undertaken is to transition the rural sector to a more sustainable footing.
Everything else will follow; investment, improvements to well-documented environmental stressors, social improvements, biodiversity resilience, rural sustainability. This is the real adaptation.

It is my view that a bold new conversation, a new vision, a new language, and committed action must commence about the future of the rural sector. The opportunities are there to grasp, but it will take courage and commitment. A new policy, a new framework, a new way, are needed.

The story of South Australia can continue. A large scale landscape repair/revegetation/carbon sequestration project in the agricultural lands would put a global focus on the state.

I am deeply concerned about the condition of the environment and biodiversity; I am very concerned about the sustainability of regional towns and communities; I am very worried about the decline in attention to our rural areas; and I am troubled about the ignorance and lack of concern from rural communities about agricultural landscapes, climate change impacts, and the future; and I want my children and grandchildren to have a better chance of confronting their own climate change actions that we can provide a foundation for right now.

All this can change with a resetting of the compass, a re-focusing on the resources that really matter for the future sustainability of South Australia's regions, and leadership.

My appeal is to grasp a new vision for the regions and put it into action as soon as possible.

The new Climate Change Strategy must include large scale landscape repair/revegetation/carbon sequestration as a core component to give the best chance for the rural sector in the decades of climate change to come.

In conclusion, consider the following 30 reasons to seize the opportunity to change the face of agriculture and the regions in South Australia, by converting 20% of agricultural land to reforestation and revegetation;

1. Creates at least 1,000 new full-time jobs in an industry sector never tried before at that scale
2. Generates up to 2,500 additional jobs
3. Has the ability to create hundreds more jobs, industries, and products … all within a short time-frame
4. Is not "pie-in-the-sky", as a part of it has been examined by CSIRO which has postulated that there is a potential gain of $1 billion annually (an uplift of more than 20% of current agricultural output) for the state's regional communities
5. Is enduring, totally sustainable, has an endless time-frame, and can be scaled up to produce far greater impact and employment
6. With an initial time frame of 20 years, it can therefore be the basis of a "20 year Rural Plan" along the same lines as the "30 year Plan for Greater Adelaide"
7. Will put South Australia at the forefront in Australia of a sector never undertaken before in Australia
8. Will result in South Australia adding significantly to its international reputation
9. Offers a financial dividend to the state government by way of GST revenue
10. Will become self-supporting and have very significant social, environmental, and economic benefits
11. Is a fully integrated system in which multiple products will be produced
12. Supports rural communities, especially those with declining populations
13. Will arrest the decline of rural towns and will foster their development
14. Uses a forgotten, neglected, and idle resource - vacant road reserves and water reserves, former travelling stock routes, and defunct railway corridors
15. Has instant commencement and is able to start at the local level and expand outwards
16. Uses established organisations and networks, and local/regional skills for its implementation and management
17. Fulfils long-standing government strategies and objectives
18. Offers rural local Councils an opportunity that is "too good to refuse", and dispels what they have resisted, or have not wanted to realise, for many years
19. Provides a pathway for individual metropolitan Councils to partner with rural Councils for mutual benefit and economic gain
20. Supports intrastate import replacement of around $40 million annually, money that should go into supporting South Australian regional industries and thereby creating 400-500 more jobs in South Australia
21. Involves education at high school and TAFE levels, research, training, monitoring, value-adding, marketing, and trading
22. Will provide openings for university research involvement
23. Offers significant scope to attract federal government partnership funding

24. Provides significant benefits for farmers, with the ability to hedge against commodity price fluctuations
25. Addresses some of the greatest challenges confronting the state in the eye of climate change and declining rainfall in decades to come
26. Will attract a new type of tourist, offer a new experience, and connect with existing and neglected heritage
27. Solves the decline of the natural resources base
28. Is good for the state, Australia, and the world
29. Offers scope for employment of job-seekers, displaced peoples, and migrants
30. Has the capacity for export of the methodology of the integrated system

All worth thinking about, all worthy of taking action on.

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REFERENCES and RESOURCES

Links have not been provided, however a simple online search of the titles will produce the document.

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