Regional State of the Environment Report 2004-2008

Regional Sustainability

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1. INTRODUCTION

At a time of economic and climatic uncertainty regions have opportunities that are not available to urban Australia. Good quality food, clean water and pure air – the essentials of life – originate in regional Australia. Regions also provide much of the nation's export earnings from minerals, agricultural commodities and high value produce. And regions hold the key to the nation's sustainability. They provide the natural capital on which the whole Australian economy ultimately depends.

The Australian Capital Region (ACR) is located in south east New South Wales and comprises the Australian Capital Territory and seventeen surrounding local government areas: Bega Valley, Bombala, Boorowa, Cooma-Monaro, Cootamundra, Eurobodalla, Goulburn Mulwaree, Gundagai, Harden, Palerang, Queanbeyan, Snowy River, Tumbarumba, Tumut, Upper Lachlan, Yass Valley and Young.

The ACR has a total area of 6.7 million hectares and a population of 571,561 people: a population density of around 11 hectares per person. It is the third most populous non-metropolitan region in Australia: the NSW Hunter region (626,000) and the Qld Gold Coast (903,000) are both larger and more densely populated.

This paper sets out some practical suggestions for regional administrators and land managers across the ACR to take local action in the face of the current climate and economic uncertainties and to take advantage of the untapped potential of the region.

In times of uncertainty the central message for the ACR (and for all regions) is to focus on building economic and environmental resilience; in a word, *diversify*. It means spreading risks and avoiding excessive specialisation. In nature, over the long term, excessive specialisation, more often than not, is the route to extinction. For regional economies dependence on a small number of specialised income sources likewise, makes a region highly vulnerable.

2. ECONOMIC SUSTAINABILITY

Sustainability requires a progressive shift from a *linear* to a *cyclical* economy. A linear economy extracts resources, uses them and then wastes what is no longer useful; a mindset that assumes that there will always be another resource when this one runs out and wastes can be endlessly dumped into the environment. Australia has a long history not only of mining minerals, but also of mining the nutrients in our soils (especially phosphorous), the water in our rivers and aquifers, and our biodiversity (especially our native vegetation).

A cyclical economy re-designs and re-manufactures what we need from the same resource stock. It adds value to everything it does and is characterised by a rich diversity of economic activity. Like a rainforest, or a coral reef, a cyclical economy recycles everything and supports a rich diversity of economic and cultural activities. It offers the highest quality of life for the most people.

The ACR has gone some way towards a cyclical economic system, but much more needs to be done to improve both our economic and ecological sustainability. Fortunately the region is in a strong position to shift to a cyclical economy. It is Australia's most diverse region with iconic natural assets such as beaches, snowfields, rich agricultural lands and protected wilderness areas. It comprises highly educated and strongly committed communities.

A key indicator of progress towards sustainability is a region's *ecological footprint*. This is a measure of *carrying capacity*: the total amount of land a person, town , city or region requires to supply all the goods and services needed to sustain everyday life and lifestyle.

3. OUR ECOLOGICAL FOOTPRINT

In 2007 the ecological footprint for Australia was 6.4 hectares per person (Australian Conservation Foundation, 2008). Using the same methodology, the ACT's footprint was 8.7 hectares per person (the highest in Australia) while the rest of the ACR was below the national average at 5.96 hectares per person. Ten years earlier using a slightly different methodology, the CSIRO and University of Canberra calculated Canberra's footprint as 4.44 hectares per person (Close and Foran, 1998): a doubling in a decade.

As the population density of the ACR is around 11 hectares per person, on the face of it, the region is well within its ecological carrying capacity. Only biologically productive land is counted when measuring carrying capacity and Australia is fortunate in that its relatively small population and large areas of productive land ensures that, as a nation, we are well within our carrying capacity which is estimated at around 9.7 hectares per person (Wackernagel, 1997).

However, a fair share of the Earth's limited capacity is around 1.7 hectares per person thus the region, and particularly the ACT, needs to reduce its footprint. This will become even more critical when cheap oil runs out and the global population reaches 10-11 billion over the next 40 years. If the region can reduce its footprint it can sustainably increase its population and its level of productive economic activity. Such a strategy will require major innovations in agriculture, construction, and consumption by shifting to an economic model that switches from a linear to a cyclical paradigm.

4. REGIONAL GOVERNANCE

In practice the ACR functions as an integrated economic unit for employment and investment. This is despite being administered by 20 different elected governments and a plethora of overlapping government agencies. Service provision in the areas of health and education is increasingly being integrated through cooperative arrangements between the NSW and ACT Governments.

There is a Regional Leaders' Forum (chaired alternately by an appropriate NSW Minister and the Chief Minister of the ACT) and an independent Regional Development Board. However there is no coordinated regional planning and the potential for the region to develop as an integrated sustainable region is barely recognised within the region and not at all in wider Australia.

While a strong case can be made for better co-ordination of planning, especially in the area of water supply, transport (a regional light rail system?) and urban development (especially around the borders of the ACT), there is much that can be done within the current administrative arrangements.

5. CLIMATE

Just as local governments have taken the initiative when it comes to sustainability, so too with climate. National and international efforts are slow and unfortunately slower than the rate at which climates are actually changing. The scientific evidence accumulated over the last 20 years leaves no doubt that:

- global temperatures are rising, resulting in more variable and extreme weather events
- ice bodies are melting, resulting in rising sea levels, and ironically
- while atmospheric moisture levels are rising, water shortages are increasing.

The debate on *mitigating* climate change tends to focus on air quality: how to reduce the greenhouse gases that industrialised economies release into the atmosphere. Here the focus of the debate is typically at the international level.

The present debate on *adapting* to climate change is focused on water, particularly on how to manage under conditions of drought and water shortages. In Australia the focus of this debate is shifting to the national level with the Commonwealth's new Water Authority which began operations on 1 January 2009.

But the most important way of adapting to climate change is to build the resilience of our food production and natural eco-systems, particularly through improving soil health and enhancing biodiversity. The way to do this is through *vegetation management* which has the potential to also address both mitigation and adaptation imperatives locally. Taking each of these in turn:

5.1 Greenhouse gas mitigation

Water vapour in the atmosphere (as measured by evaporation rates) is increasing with higher global temperatures. In addition to water vapour itself being a virulent greenhouse gas (accounting for around 60% of the greenhouse effect), reducing the desiccation of the land is of paramount economic and environmental importance. Reduced desiccation offsets the impact of lower rainfall.

Local action to reduce desiccation includes:

- strategic tree planting in shelter belts to provide shade, reducing the impact of drying winds and, during cooler months, enhancing the surface area for dew formation, and enhancing nutrient cycling

- minimisation of soil disturbance (ideally by maintaining 100% vegetation cover for 100% of the time), and
- shading and, when and where possible, covering water bodies to reduce evaporation.

Carbon dioxide levels (accounting for around 20% of the greenhouse effect) are increasing as a result of clearing vegetation, soil disturbance and burning of fossil fuels. Local action to reduce or reverse each of these activities should therefore be a high priority.

Examples of local carbon dioxide abatement actions (many of which are already being undertaken) include:

- reducing land clearing
- minimising soil disturbance not only in agriculture, but also in road building and construction generally
- enhancing the efficiency of fossil fuel based energy sources
- substituting carbon neutral energy sources such as solar and wind power (also reduces health costs and promotes innovative technologies), and
- replacing fire hazard reduction burning with other biological fuel reduction strategies (see also under vegetation management below).

Molecule for molecule, greenhouse gases such as methane and nitrous oxide, are particularly virulent (together they account for the remaining 20% of the greenhouse effect).

Providing livestock with good quality, easily digestible food will greatly reduce emissions from that source, and vegetation management that relies on fungal rather than termite breakdown of litter will also reduce methane emissions (see below).

Nitrous oxide is released from soil during cultivation and can be controlled by the choice of cultivation and fertilising regimes.

Australia wide, agriculture is responsible for about 16% of Australia's greenhouse emissions. And while national and international debates about the best ways to account for these continues to be controversial, there is much that can be done to reduce these emissions locally.

5.2 Water adaptation

In Australia drought has traditionally been seen as a rural issue, but this is no longer the case as urban water supplies are also under threat. Southeastern Australia, and particularly in Canberra, Goulburn and the Yass Valley, are particularly vulnerable. However, unlike other catastrophic events like earthquakes, cyclones and wildfire, droughts advance slowly.

As people become increasingly concerned with an advancing drought, they hope that it might rain and tend to hang on. If the rain doesn't come, the intensifying dry triggers panic reactions, and often very poor policy decisions. If it does rain, everyone breathes a sigh of relief and goes back to business as usual, the possibility of another drought forgotten: the *'hydro-illogical cycle'*.

The right time to prepare for drought is when conditions are favourable for resilience building and desiccation reduction using vegetation management.

In southwestern Australia, where water shortages have been more apparent for longer, and where there are limited options for increasing water supplies, the focus has been primarily on demand management. In our region the main long-term focus has been on increasing supply.

Demand management strategies for severe water shortages typically involve some sort of *water rationing*. Fortunately a standardised system for water rationing has been developed that, by and large, people understand and accept.

Other options for *demand* management include:

- higher water pricing (to reflect both the supply and externality cost associated with down-stream water treatment and reduced environmental flows)
- two tier pricing that provides a basic supply at a low price (to help low income earners) and a much higher price for those using more, and
- better metering to enable people to manage their own water usage.

Options for increasing *supply* include:

- new dams (generally considered impractical in the ACR for environmental, economic and social reasons)
- increasing the capacity of existing dams (a risky option that assumes that the runoff from future rainfall will be sufficient to supply the new capacity)
- linking existing pipe systems (like the electricity grid, it is possible to interlink adjoining water systems as now occurs between Queanbeyan and Canberra. Melbourne has chosen this option to enhance that city's water supply by drawing additional water from the Murray system, as has Canberra by drawing from the Murrumbidgee. It should be noted that Canberra's water, unlike Melbourne's, is used, treated and made available for downstream users)
- desalination (this is potentially a win-win solution for inland Australia where highly saline water can be desalinated using solar rather than electrical energy to provide clean water for environmental as well as human purposes. Disposal options for the residual salt may be a limiting factor in some areas)
- recycling (this is the optimum solution whenever there is a limited water supply. On land it can best be done through systems that control evaporation and condensation – phase change rather than osmosis - much the way that nature does it)
- underground cisterns and rainwater tanks, and
- harvesting grey water and urban storm water.

In Canberra and surrounding rural settlements (where about 50% of household water consumption is typically used in the garden), recent water restrictions result in green lawns generally turning brown during the summer months. But established vegetation (both trees and shrubs) shows they can handle a reduced water supply well. Perhaps there has been a tendency to use too much water in the past.

5.3 Vegetation management

For some years now, Australia has used strategic tree planting in an effort to combat erosion, manage ground water and restore degraded areas to pre-European conditions. It has also invested heavily in tree planting for economic purposes.

Vegetation management has also been used to build resilience, enhance biodiversity and protect threatened species. We now need to think of vegetation management to buffer the region from the extremes of climate change.

Indigenous peoples, farmers and amateur naturalists have long recognised that there is a close relationship between cloud formation, rainfall and vegetation, especially trees, but a scientific explanation of this phenomenon is only slowly emerging. While trees use water, they also reduce drying winds, provide shade, capture dew and cool the air and soil under the canopy.

With a changing climate however, using local vegetation as a model for what could or should be planted where and when, may no longer be appropriate as the circumstances that supported them in the past may no longer exist. So what is to be done?

Canberra is something of a model here. Since its inception the 'bush capital' and 'garden city' has been transformed from a dusty sheep paddock to a hugely biodiverse ecosystem. Similar transformations have occurred in and around many of our regional towns.

While many of the species used to achieve these transformations were exotic to the region (and indeed to Australia) and some became serious weed problems, we need to learn from these successes and mistakes locally. In particular, with climate change, plant species may no longer thrive in their traditional ranges. Cool climate plants may shift to higher altitudes, and arid species to drier ones. Halophytes will thrive in newly salted areas and new plant communities will emerge on restored wetlands and flood plains.

It will be important that land managers and land care groups work with these natural processes and not seek to impose some artificial boundaries or limits on mother nature as she seeks to adjust herself to rapidly changing climatic realities.

5.4 Fire management

It is expected that drier conditions will increase the risk of wildfire. In Australia the extinction of large herbivores such as diprotodonts and the giant macropods resulted in a buildup of woody vegetation and fire risk. Aboriginal people managed this risk (as they still do in northern Australia) by using hazard reduction burns. Fire management also encouraged new growth and improved hunting (fire-stick farming). In southern Australia land managers also use hazard reduction burning to reduce the risk of wild fire.

Unfortunately, regular burnings encourage the survival of fire tolerant species such as eucalypts at the expense of fire resistant plant communities. Examples of such communities are found in the wetter mountain gullies, natural soaks and of course

rainforests. In these systems fungi breakdown litter. If local land management practices aim at restoring these systems they will naturally reduce wildfire risk and reduce the need for hazard reduction burning.

Techniques for rebuilding these ecosystems using vegetation to manage runoff and ground water movements are well advanced. For example by inoculating suitable areas with appropriate fungi and reducing hazard reduction burning.

6. FOOD PRODUCTION

The world population is expected to continue growing (barring epidemics and other catastrophic events) until 2050, but global food production based on existing food species and using existing technologies has almost certainly peaked.

At the same time fossil fuels (which powered and fertilised the 'green revolution') are also peaking with the result that both fuel and fertiliser costs are escalating. And then there are the growing problems with water supplies, particularly in temperate areas where most of the world's food is grown. Worst of all, in many parts of the world people are undernourished and starving. At the same time Western nations are seeing very significant increases in preventable chronic diseases linked to diet such as heart disease, stroke, Type 2 diabetes and cancer. The ACR is experiencing similar increases, especially in economically disadvantaged areas and among indigenous communities.

Some countries that are particularly vulnerable to rising fuel costs are choosing to use productive agricultural land for growing biofuels instead of food. This is expected to further exacerbate looming food shortages.

Here are some suggestions as to what regions can do in the face of such looming difficulties and uncertainties:

- focus on diversity and quality rather than quantity with marketing through local farmers' markets and local outlets. This will also give a boost to local tourism and the experience in value adding will lead to high quality surpluses for potential export. Speciality honeys for example can attract 10 times the price of bulk (mixed, undifferentiated) honey.
- establish a regional *wholesale produce market*. At present most local produce including fruit, vegetables and fish travels first to wholesale markets in Sydney and Melbourne and then comes back a day or two later and a lot less fresh.
- facilitate the recycling of organic wastes back to the land. Australia has an appalling record of not returning organic matter to its soils. India, China and Europe have supported huge populations sustainably using these techniques. A recent history of Australian agriculture (Henzell 2007) gives the lack of local markets as the main reason for this. But with a growing population in Australia and a more discerning public abroad, speciality, high quality foods promise to be much more viable than the traditional focus on bulk commodities.

- make municipal composting of food and garden waste mandatory with free or subsidised distribution to farmers to reduce landfill costs for local governments and fertiliser costs for farmers. (Enormous amounts of food are wasted by retailers, wholesalers, institutions and households; around 14% according to some estimates).
- increase the cost of water to encourage a change from low value high water usage commodities, to high value, more labour intensive produce (Chardonnay instead of rice). This will also have an added benefit of making smaller land holdings more productive and boosting local employment opportunities.
- diversify. Traditionally Australia has concentrated on a small number of agricultural commodities, originally wheat and wool (both of which feature strongly in the ACR) and more recently, beef, dairy and viticulture (other commodities such as sugar and cotton are not suitable for the ACR's climate).
- in the longer term, the key will be to "perennialise" commodity agriculture. Annuals are characterised by big seeds that store energy while waiting for the next season. Perennials are characterised by big root systems to see them through seasonal variations. If we can breed varieties of wheat, rice and other staple grains than can be grown like perennial pastures, we can reduce the need for tillage and fertilisers. In the meantime pasture cropping and biological farming techniques are also reducing input costs while protecting farmland from erosion and sequestering significant amounts of carbon.
- replace industrialised "spray and drive" agriculture (which has reduced the skill base of traditional farming communities) with new techniques such as "natural sequence farming" (developed by practicing farmers such as Peter Andrews in the Hunter region), cell grazing, minimum till and intercropping practices. These techniques coupled with strategic tree planting boost productivity, retain soil moisture, and recycle nutrients. They significantly reduce input costs.
- decentralise food systems to enable communities to rebuild the sustainability of agriculture. The diversity of the ACR with its coastal high rainfall areas, cool climate mountains and temperate slopes and plains will enable local sub-regions to specialise to meet the growing global demand for local food and food low in food-miles.

The shift to smaller scale, high value production will not only help reverse the decline of rural populations, it will also shift the focus from using the land as a resource for exploitation to conserving it as a natural capital base. Europe is well ahead of Australia in the way its regional communities are recognised and in some cases remunerated for enhancing and maintaining these vital services.

7. WASTE

Waste in the region is unsustainable. While all regional councils and the ACT have adopted waste minimisation strategies, an estimated one tonne per household per annum finds its way into landfill. Of this some 32% comprises vegetable matter, 25%

food waste and 14% paper. All three are of organic origin and can be composted or turned into bio-char which is produced by pyrolysis (incomplete burning to provide energy) and produce a valuable soil amendment. Bio-char is a relatively stable soil conditioner and its carbon will remain sequestered in soil for hundreds of years. It enhances the water holding capacity of soil and provides habitat for soil microorganisms that recycle nutrients.

Returning these bio-based materials to the soil will reduce fertiliser costs and simultaneously enhance vegetation cover. The increased vegetation will take up atmospheric carbon (mitigating climate change) and the microbial activity in the soil will build soil structure (adapting to climate change).

There is also evidence that increased vegetation may improve the supply of aerosols suitable for nucleating clouds and rainfall.

8. ENERGY

The region includes Snowy Mountains Hydroelectric Scheme which in 2005 produced about 4500 gigawatt hours of electricity or around 74% of all renewable electricity produced in Australia. As other sources of renewable energy come on stream (particularly wind and solar) this proportion will decrease.

Fortunately the region is well placed to produce renewable energy. Currently there are 8 wind turbines operating at Crookwell, and a further 55 have been proposed for that area. There are 78 under construction in the region (at Bungendore and Cullerin Range) and 31 approved (for Berridale and Conroy's Gap). In addition to the 55 proposed for Crookwell a further 352 are under active consideration (Boco Rock, Cullen Range and Yass). Early feasibility work has been announced for a further 230 (Cooma, Molonglo and Goulburn).

According to the Bureau of Meteorology, Canberra experiences a yearly mean of 7.6 hours of sunshine per day. Darwin, 8.5; Brisbane and Perth both 7.9, are higher while Sydney, 7.2; Adelaide, 7.0; Melbourne 6.0 and Hobart, 5.9 are lower. With this level of sunshine and our colder winters, solar hot water and photovoltaic electricity generation are attractive options.

Unfortunately, despite the highly favourable conditions, according to the Australian Bureau of Statistics survey undertaken in 2006, NSW generally (including the ACR without the ACT) found that electricity use was high and the take up of solar was lagging.

Other energy efficient steps that can be taken include:

- encouraging buildings, businesses and homes to be solar-passive designed, and generate electric power
- zoning new areas as energy self-sufficient
- introducing smart metering so that people can see when and where they are using electricity.

9. TOURISM

In addition to the national capital, the region includes iconic natural assets such as beaches, snowfields, rich agricultural lands and protected wilderness areas. These assets underpin tourism.

With the decline in overseas visitors and an increase in the number of Australians touring within the country rather than abroad, there is potential for increasing regional tourism. All over the region local producers of wines, cheeses and fresh foods from have the potential to enhance the tourist potential and the quality of the experience. Local markets and festivals further add to the attractiveness as has the systematic improvements of local streetscapes. Other activities that could be adopted include:

- promotion of the benefits of buying local
- establishment of community gardens with links to community gardens around the world, and
- establishment of local fauna reserves such as wetlands and areas for endangered species such as koalas, bandicoots, potoroos and bettongs.

10. IN CONCLUSION

Like Australia's regions generally, the ACR and particularly its rural areas, has been under enormous pressure as a consequence of globalisation. Fortunately the region as a whole has been able to adjust to the changes. Nevertheless five local government areas in the ACR are experiencing declining populations and smaller villages have seen a marked decline in services and incomes. Climate change and the current economic uncertainties are yet new challenges, but ones that also have the potential to deliver a host of new opportunities.

What will be critical for the ACR is the development of a regional sustainability strategy that identifies trends and opportunities without prescribing specific solutions.

Fortunately, the region is well endowed with the natural, human and intellectual capital.

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