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**Submission to the Parliament of South Australia
House of Assembly
Select Committee on Sustainable Farming Practices
by Graham Brookman, Joint Managing Director,
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Definitions

Sustainable Farming - A farming system that can go on for hundreds or thousands of years without running down its essential inputs, thus leaving future generations with the capacity to feed, clothe and house themselves comfortably.

Natural resources – Those parts of the planet's environment that have not been made by man, including the atmosphere and climate.

Mineral resources – Those natural resources that come or have come from mining in its broadest sense

Clean food – Food free of contamination and is safe to consume over a full human lifetime

Green food – Food produced using environmentally responsible techniques (that do not compromise the health and sustainability of the global ecosystem)

Food supply for SA – The staple foods and specialty foods that are can be rationally grown and consumed in SA as well as food to be exported from the state to offset imports of food from elsewhere (and possibly to derive extra export income).

A general rider to the submission – I am aware that the State has limited jurisdiction in some of the matters discussed however it should be lobbying for those changes at the Federal level

Why have a sustainable farming system?

The key advantage of a sustainable farming system is that it promises long term viable occupation of SA by humans. It will also enable the community to 'exchange' foods grown here for foods that are better grown in different climates (coffee, spices etc).

Understanding limits to growth

In the future it may or may not be feasible for SA to grow food for substantial export income, depending on population, climate change and technological developments.

We know how fragile the production base of the state is in the light of the period of time the Murray River failed to flow to sea in recent years.

To grow the population to the point where the state cannot reliably feed itself with staple foods including grain, vegetable and fruit crops, would be both irresponsible and unsustainable.

At this stage South Australia could feed itself comfortably, with minor need for food imports but:

- Is it doing so sustainably?
- Will changing environmental conditions change our food growing capacity?
- Will growth in population seriously erode our State's capacity to feed itself?
- Is food security a serious issue for the future?

Are SA's current farming systems sustainable?

Our current farming system fails a basic physical sustainability test in that it relies almost completely on non-renewable inputs such as fossil fuels and concentrated mineral deposits. The time-lines to the peak global extraction of each of these inputs (after which it will become unviable, globally, for economic or physical reasons, to extract increasing amounts, are constantly debated but they are all within years, decades or centuries. Some well-referenced estimates are:

- Liquid fossil fuels – 2013 (Note that urea is made from liquid natural gas)
- Coal – 2030 (Note that coal can be used to produce liquid fuel)
- Phosphate rock and guano - 2035(Effective exhaustion 100-150 years)
- Potassium – 2150

Other key ingredients in the current farming system include biocides which are largely derived from fossil fuels and, to a lesser extent, minerals.

Economic viability of farming

The financial situation of farmers and their employees is parlous at best, so it is little wonder that students do not flock to study agriculture. Most farms rely on off-farm income (teaching, nursing, truck driving etc) to keep their indebted agricultural businesses afloat.

Today, despite the ageing of their parents, the children of farm families have continued to stay away from food production and a life devoid of financial reward. There is no point in printing glossy brochures about 'careers in

farming' unless the economics are changed. Farmers in Australia are still not competing on a level playing field internationally and rather than take up the insulting Government exit packages offered during the drought 'they just died on the job'.

Just to give an idea of the direct subsidies other western farmers receive, full time American farmers in recent years annually received \$AUS75B (over \$150,000 per farm) and European farmers almost \$AUS60B (over \$AUS100,000 per farm); there are also a range of other embedded subsidies in the economic framework of these jurisdictions. If foreign investors or rich city folk buy farmland, they soon learn how little is to be made from conventional farming, let alone ecologically sustainable farming.

The dogma that international free trade will solve food insecurity has been proven to be faulty over centuries. Billions continue to starve while others die of obesity in a world with relatively free movement of food. Australia has unilaterally elected to enact a carbon tax. It can do the same in terms of agricultural subsidies, just as the USA and the Eurozone has done.

Expertise and manpower

One of the few renewable resources available for agriculture is people, however trained agriculturists are not being produced at a sufficient rate and the few that are, will not be not taught sustainable farming systems; the education facilities to produce practicing farmers and technologists have largely disappeared. There is no world class horticulture training available in Australia and virtually no agricultural technology is being taught at 'higher education' level.

Roseworthy Campus now teaches Veterinary and Animal Science and the vets it will produce will largely treat companion animals. The 750 places Roseworthy had in Agribusiness, Agricultural Production, Agricultural & Horticultural Technology, Farm Management, Horse Husbandry, International Agriculture, Wine Marketing (full time and external), Oenology, Viticulture, Natural Resource Management are gone; partly replaced by some 230 places in Oenology, Wine Marketing and the 3 year Agricultural (science) course at The University of Adelaide's Waite campus and the Bachelor of Science at the North Tce campus. Many students interested in agricultural technology or ecological agriculture look interstate for relevant training, particularly to Charles Sturt University, only to find that it is presented only by 6 years of external study.

Due to the unprofitability of the sector, farm staff are generally paid at the bottom of the relevant pay scales, and in the horticulture industry backpackers and WWOOFers (willing workers on organic farms) do much of the manual work for minimal remuneration as they travel around the country.

As a result, little excellence is built up, accident rates are high and rural towns are dying.

Research

Agricultural research and plant breeding has been massively scaled back in the CSIRO, state departments of primary industries and the universities over the last 20 years and most research units are so small as to be unviable on

the World stage. Allowing the free market (profit-driven multi-national agribusiness companies) to take control of all agricultural research and development is an abrogation of the government's responsibility to care for the farmscape and its people.

Landscape capability

Erosion, depletion of aquifers and surface storages, dryland salting, loss of native species, effects of the overuse of biocides and significant incursions into our most productive land by suburban development all show that, even with today's population, our food production system is not sustainable. Doubling the Australian population to 44million in 2040 (ABS series A projection) seems like a quite unnecessary recipe for disaster.

Will changing environmental conditions change our food growing capacity?

For SA the CSIRO predicts:

- higher temperatures including more extreme hot days, with spring and summer warming more than winter and autumn
- decreased rainfall in agricultural regions (especially in winter and spring)
- greater frequency and severity of drought with decreased flows in water supply catchments
- increased flood risk (despite drier average conditions)
- shifts in conditions affecting our food production and biodiversity
- increased incidence or severity of bushfires
- damage to infrastructure, for example from coastal erosion, flooding and extreme heat.
- Looking at the grain bowl of Eyre Peninsular as an example; in 50 years time it may well experience a 4 degree increase in summer temperatures and a 30% decline in rainfall (mainly in what is now the growing season). Cereal growing would simply not be viable.

In short it predicts an enormous negative impact which would threaten the State's food security, even at current population levels.

CSIRO's most recent report saw no concrete advantages flowing from climate change for SA.

From our personal experience at The Food Forest we know that temperatures have risen generally, but daily minimum temperatures have particularly risen. In our farming operation pistachios are the most significant single crop and for flowering to occur normally a certain number of chill hours (0-7degreesC) need to be accumulated during the winter and early spring. There have been a number of years since the year 2000 when this has failed to occur and the perturbation of flowering has demolished pistachio yields across southern Australia. To my knowledge there has been no initiation of a task force to identify or breed new cultivars to save this industry.

This is but one crop and one part of the farming ecosystem that is already under threat.

Will growth in population seriously erode our State's capacity to feed itself?

The loss in production of dryland crops and pastures and the loss of irrigation water due to climate change will reduce SA's potential to export food and fibre and may threaten its food security, even at current population levels.

Any increase in the size of our cities will mean the withdrawal of good farmland for housing.

The precautionary principle should inform our decision-making.

Is food security a serious issue for the future?

Globally we have already seen food riots, government bans on the export of food from various countries and millions of refugees fleeing from starvation and the civil unrest caused by food shortages. This will only increase as peak-oil, climate change and the growing population team-up to destroy farm-land and reduce food production.

How can SA farming systems be made sustainable?

- Reduce the need for non-renewable inputs
- Mitigate climate change by reducing the production of greenhouse gases
- Adapt to the changing climate
- Contain population growth
- Empower the whole population to grow food for themselves
- Encourage the formation farmers markets
- Provide suitable education for future farmers at both VET and higher education levels
- Alter the economic model within which Australian farms operate

Reduce the need for non-renewable inputs

- The areas of best soil, rainfall and topography should be reserved for agricultural production in a manner similar to the bills protecting the Barossa and Southern Vales but with more exact categorisation and protection. These areas naturally grow abundant food and exist within metropolitan Adelaide as well as the Adelaide Hills, the Lower and Mid North and the South East. The proposed World Heritage listing of the Adelaide Hills is an appropriate way of protecting that area's resources and culture.

Potential production areas within Greater Adelaide are of particular value in terms of food miles, cycling of 'waste', provision of healthy outdoor jobs and food value-adding employment opportunities.

- Reduce the energy costs of transport, of nutrients and water to farms and of food from farms to consumers
- Reduce the energy and non-renewable materials required for packaging and storage
- Reduce the need for biocides

- Reduce the need for non-renewable and highly manufactured fertilisers
- Utilize energy efficient technology
- Return 'waste streams' to the production cycle
- Reduce the use of food that could be eaten by humans for feeding animals
- An expertly staffed public authority on the energetics of systems, greenhouse gas production is required to provide calculations and advice on many of the above matters to the government and the public.

Mitigate climate change by reducing the production of greenhouse gases

- Further encourage solar and wind farming
- Encourage practices that sequester carbon in the soil
- Encourage practices that fix Nitrogen in the soil (legumes, higher carbon content)
- Encourage the use of technology to fix exhaust gases from tractors in the soil during cultivation and seeding
- Discourage the burning of organic crop residues
- Reform the sewerage treatment facilities at Bolivar to prevent the current levels of N₂O and methane emissions. Utilise Nutrient-laden water for irrigation or at least strip nutrients from waste water to create fertiliser before discharge into the sea.
- Prevent wildfires
- Encourage the use of fuel-efficient vehicles and equipment and replace the use of liquid fuel with green-power where feasible
- Discourage feed-lotting
- Adopt the approaches outlined above in relation to *Reducing the use of non-renewables*
- Replace a percentage of high methane-emitting ruminant animals for meat production with animals such as kangaroos and wallabies (particularly in rangeland areas). Between 50000 and 100000 wallabies have been culled annually on Kangaroo Island alone (and left to rot because harvesting for meat is not legal). A number of other low methane producing grazing species (deer, geese etc) are also available for integration into farming systems.

Adapt to the changing climate

- Appoint a dedicated task force including agronomists, horticulturists, farmers, soil scientists plant breeders, animal scientists, agricultural economists etc to gather productive biota including animals, plants, insects micro-flora and fauna etc from around the World in climate zones approximating what is predicted for SA's climate in 2030 and 2070. Its task would also include assessing the performance of the organisms in SA and arranging the breeding and promotion of new varieties of plants animals, microbes etc adapted to the hotter and drier conditions. The group would ensure that integrated systems were created, marrying new pasture species with new livestock breeds, new types of meat production with markets; all with the aim of sustainability

in the background. Quarantine facilities, horticultural stations and farms would be provided.

- Facilitate the growing of food close to population centres such that storm water, sewerage, green waste and food waste can be efficiently returned to the food production cycle on sustainable farms in and around cities and towns.

This will require protection of the land from housing development and excessive rates. There are significant parcels of land still zoned for horticulture even at the western end of the Torrens River which would be appropriate for agricultural production but are extremely vulnerable to rezoning.

The example of Baix Llobregat Agricultural Park, adjacent to the Barcelona airport in Spain is an excellent example of urban farming.

Contain population growth

- SA's population in 2010 was driven by approximately 12000 Net Overseas Migrants and about 7000 births above deaths. Some 3000 residents moved interstate leaving an increase of 16000 in a population of about 1.6M. Whilst only 1 percent growth, it has contributed to an increase of 100,000 people in 5 years; people who will contribute to climate change, require food and provide a natural increase of 7000 people per annum for the foreseeable future.
- Adopting the ABS scenario of a 2.2M population in SA by 2056 would see a need for an extra 40% of food and water at a time when climate change is predicted to really bite and the upstream states may become even less gentlemanly about what water is allowed to flow into SA.
- SA should be adopting a far lower population target and giving the State time to develop sustainable practices.

Empower the whole population to grow food for themselves

- The suburban community itself can take much responsibility for the growing, harvesting and preparation of fruit, eggs and vegetables in their yards and nearby community gardens, often using currently under-used resources.
- Encourage the capture, natural treatment and storage of urban storm water in aquifers for subsequent re-use by urban farms, community gardens and community orchards. Urban orchards can also use treated sewerage water as long as it is applied by sub-surface irrigation.
- Encourage urban households to develop food gardens and orchards and promote gardening and small livestock management skills (chooks etc) that can be practised at home or at community gardens or orchards.
- Enable all families to have access to soil and water for growing some of their own food through the establishment of community gardens in strategic points proximal to public transport.
- Further support the use of domestic grey water systems in gardens and orchards
- Facilitate access by householders to mulch and compost derived from urban areas

Encourage the formation farmers markets

Farmers markets:

- achieve better economic outcomes for farmers
- reduce greenhouse emissions and food miles
- provide the community with fresher food at reasonable prices
- ensure that consumers have access to locally grown Australian food
- encourage environmentally sustainable farming
- fit well with urban and peri-urban farming
- introduce new foods to people and encourage kitchen skills
- build community capacity, provide recreation and education

The SA Government has provided some small grants (\$5000 - \$10,000) for projects at the market with clear health outcomes and has recently committed to assist in the development of an auditing scheme to ensure the authenticity of food traded at farmers markets. This is to be commended but pales into insignificance when compared with the Victorian Government's recent multi million dollar support (now into its second 3-year term) which has led to the formation of 30-40 farmers markets to a total of some 90 in Victoria.

To smoothly start a successful farmers market seed money of \$50-100K is required. The foundation committee for a Mt Gambier Farmers Market is currently in endeavouring to raise this capital. Much human energy will be expended in starting up such a market when a large percentage of that effort could have been saved by having executive support from a central office or organisation eg an executive role within the SA Farmers Market Association. Some Government support for the formation and staffing of SAFMA would pump-prime development of farmers markets.

Support community gardens and orchards

- Provide support for and encourage the provision of land for community gardens in all significant subdivisions
- Support the employment of community garden coordinators and master gardeners as facilitators and trainers
- The City of Adelaide has some 500 hectares of parklands immediately around the CBD, supplied with reticulated recycled water. Neither the land nor the water are used for food production.

Provide suitable education for future farmers at both VET and higher education levels

- Commission the creation of TAFE courses in sustainable agriculture and associated learning materials, demonstration/learning properties and recruit appropriate staff to provide training at various levels.
- Accept the nationally accredited Diploma of Permaculture as a course attracting Fee-Help for eligible full-time and part-time students
- Encourage the creation of programs and courses in Permaculture and Sustainable Agriculture in universities

Provide encouragement for young people to consider agriculture as a career

Given the price of Australian land and gross margins achievable in our unprotected agricultural system it is impossible for most young people to buy farm land. If Australia is to have a viable farming culture it must support young entrants to the industry or face a future of agricultural instability, foreign land ownership and lowered productivity. Canada has used the ultra low interest system of Landbank as well as agricultural subsidies and many other countries have systems to enable orderly renewal of land ownership.

Mineral and petroleum exploitation

Mining locations and methodology must be strictly limited to ensure that aquifers are neither depleted nor compromised by leakage of gases or fouling by other contaminants. The potential for a mineral deposit to provide relatively short term income to a company must give way to the long term capacity of land to produce food and fibre. Mining in the complex geology and hydrology of the Adelaide Hills should generally be discouraged. There are already examples of long term contamination from even small mines which have contaminated catchments. Over-extraction of water from the artesian basin for the Olympic Dam project has been shown to have lowered the pressure in the system to the detriment of the unique ecology of the mound springs. Regulation and enforcement clearly needs to be tightened to protect water resources.

EXTRA NOTES ON NUTRIENT CYCLING

Nutrient cycling

Dr Richard Simpson, a senior scientist with the CSIRO's Sustainable Agriculture Flagship says that "Of the tonnage of phosphate we put on in agriculture about 75 per cent accumulates in our soils, 20 per cent we export and five per cent gets consumed domestically. So if we take our waste streams in Australia and recycle them totally efficiently, we simply cannot make up the amount of phosphorus we need to maintain current levels of production."

This suggests that SA:

- Should think about a model that has less emphasis on export
- Should make major investments in infrastructure to enable both the water and the nutrients involved in the sewerage system to be cycled back into agriculture.

SA's current system wastes over 80% of both. The Ostara system installed in Hillsboro Oregon is a working example of an effective recovery system.

- Should do significant research work on ways of modifying soils and fertilisers to make the phosphorus accumulated in soils available to plants. Biochar treatments have been shown to capture and make plant-available over 30% of phosphorus present in various organic sources.

Conclusion

'Business as usual' will end in the next decades, particularly when conventional oil supplies diminish and Australia can either wait to be forced into austerity measures that create misery and civil disobedience or get onto the front foot and create sustainable cities that can go a long way to feeding themselves and providing a lot of public open space and useful things for people to do at all levels of society.

Current Carbon-related initiatives can be used to pump-prime changes toward sustainability and the SA Government needs to organise a task force to plan and apply for federal carbon funds to the highest possible degree. Now.

Rural agriculture will need every bit of skill and youthful energy that can be brought to bear on the challenges that lie ahead so lets train and support the new generation of prospective farmers

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A society that forgets agriculture has truly lost its way.

I am happy to provide further explanation or evidence concerning the submission

Graham Brookman

June 2012