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AC, AO(Mil), CVO, MC (Retd)**

NSW FARMERS' ASSOCIATION

**SYDNEY MASONIC CENTRE, 66 GOULBURN STREET SYDNEY
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Ms Fiona Simson - President, NSW Farmers' Assn

Mr Matt Brand - CEO, NSW Farmers' Assn

Executive Council Members

Ladies and Gentlemen

Good morning ladies and gentlemen. A pleasure to be here albeit very briefly. I have always had the highest regard for agricultural and out back Australia, being a Wiluna boy by birth and a lad who spent every school holiday on a dairy / beef property in Nannup, south west Western Australia.

Thank you for your invitation to share with you something about our Soils for Life Program. We have now launched our Report 'Innovations for Regenerative Landscape Management' that describes the urgent need to address the challenges of land degradation and climate change and documents the stories of nineteen innovative landscape management leaders from various regions across Australia.

These individuals have made the change to sustainable landscape management through good soil, vegetation and water management and, whilst common themes are evident, each has implemented a different approach but their ideas provide a range of ideas that I hope the next generation of early adopters can and will embrace.

The good news is that our Report has been well received. This is an important first step which we hope will not only raise awareness across our whole community but also encourage those farmers and land managers not already involved to address the urgent need for change to ensure the continued viability of agricultural enterprises, the health of our environment and the well being of every Australian.

Our Global Situation

You might well ask why a retired soldier and former Governor General established the Soils for Life Program. Well, it is fundamentally because I believe that globally we face a very serious problem; let me put it this way. The globe has about 14bn hectares of land not covered by water, ie 2ha per person. Of that 2, one is no longer useable, leaving 1ha per person to provide all the resources necessary for living. By 2050 that will be 1 1/2 persons per hectare to meet food, energy, building and other needs. Today I want to address the food security element of that problem; namely how to almost double the globe's sustainable food production by 2050 to meet a projected population increase from 6bn to perhaps 10bn, in circumstances where unless we take action now:

- There will be less available agricultural land; global loss is around 1% per annum
- Where soils are likely to be increasingly degraded
- Where there will be substantially less water
- Where farming input costs of fuel, fertilizers, fencing and labour will be higher, and
- Where R & D funds are likely to be inadequate.

Landscape degradation is an issue of global and national importance. Landscape management practices including, but not limited to agriculture, forestry and fire have caused significant damage and in the process have altered the earth's natural bio system. Consequently the precious resources of soil, a bio diverse vegetative cover and water, necessary to sustain life, are being lost at unsustainable rates.

At the current rate of topsoil loss, indications are that areas of the earth may have only 48 years of topsoil left.¹ Three billion people globally already have inadequate water and it is assessed that by 2050 80% more water will need to be accessed.²

Water is key and it is alarming to note that most of the world's great rivers including the Indus, The Ganges, The Euphrates, the Nile, the Rio Grande and the Murray Darling are in poor condition. The fresh water Aral Sea, the size of Belgium and Germany combined, has dried up because of appalling management and perhaps most importantly of all, critical aquifer irrigation resources are being depleted unsustainably in India, China, Africa, the Middle East and in SW USA.

The Situation in Australia

Even in Australia, where notwithstanding fortuitous recent rains in some areas, a number of innovative farmers (including many here today), and some good science, we are facing the reality that we are already impacted by climate extremes and a series of interrelated challenges that include:

- An increasingly aridifying landscape particularly in the southern half of the continent, where 60% of our arable land is degraded, much seriously,
- More salinity and erosion,
- More severe storms, cyclones and flooding,
- More erratic and unreliable rainfall, excessive evaporation, diminishing river flows and dam storage,
- Spiralling input costs,
- Increased mining and urban expansion,
- Population growth with increasing demand on resources including the need to substantially increase food production, and

¹ <http://www.nutritionsecurity.org/PDF?NSI> White %20Paper Web pdf

² Barlow M 2007 The Global Water Crisis and the Coming Battle for the Right to Water, McClelland & Stewart

- Uncoordinated regulatory overburden.

All these will impact significantly on the productivity of agricultural enterprises and I am sure, ladies and gentlemen, you are all too familiar with these realities.

Solutions

I believe a comprehensive, nationally coordinated but locally implemented approach to improved land management practices is the key, including the integrated management of water, soil and vegetative cover.

Our nineteen well researched case studies demonstrate such management and show quite conclusively that as a result, sustainable productivity and increased profit are achievable.

Managing water (particularly in soil), improving soil health and restoring a bio diversity of vegetation are strongly interrelated and mismanagement of one, causes problems for the other two, whilst better management in just one of these areas can result in the overall regeneration of the total bio system; because to fix one (say water management), you have to fix the other two, namely soil health for filtration and vegetative cover for carbon fixing. Essentially land managers and farmers need to implement practices that have the capacity, as far as possible, to mimic natural processes. Thus, we need to recognise and reward farmers not simply as producers of food and fibre, but as primary carers of the agricultural land. Some of the principles that I see as important are:

- Water should be seen as the nation's primary, natural strategic asset and managed and probably priced accordingly. We need to properly capture and conserve it and efficiently use every drop that falls on our landscape.
- Water can only do its job through the aegis of healthy soils that promote filtration and retention of rain for uptake by plants
- Healthy soils provide the basis of sustainable food productivity and the capacity to revegetate the landscape to positively influence local climate and flood/drought remediation, and
- Carbon in the soil is key to healthy soil.

Carbon

There is general agreement that Australia needs to transition to a sustainable but effective low carbon future. To achieve this, the only practical large scale mitigation option is to rebuild the resilience of our landscape and the key to this is soil carbon as carbon is the one measurable driver that underpins the natural system from which all life is derived.

Across Australia's cropping and grazing sector, it would be unusual to find actively farmed soils with a carbon content of 1.5% or more. Normal soil carbon levels for quality agriculture should be about 5%.³ To build soil carbon levels, we urgently need to increase high organic matter in soils by striving, for example, to have 100% of mixed ground cover 100% of the time. Soil carbon sequestration is also assisted through systems that use minimal tillage, planned rotational grazing and new bio fertilizers and these holistic principles enhance microbial and fungal ecologies that optimize humate formation from the bio mass produced rather than oxidation.

The restoration of functional vegetative cover has the capacity to facilitate a cooler landmass by re-establishing the small water cycle thus bringing about a more even and regular distribution of precipitation. This in turn has the capacity to reduce flood, fire and drought severity. Increased soil organic matter improves penetration and retention of rainfall. Every gram of carbon can hold up to 8 grams of water and of course, vice versa.

Good soil then acts as a sponge where water seepage is slower and available for plants and animals over a much longer period.

By increasing soil carbon levels we have the means to reduce our reliance on costly fossil fuel based inputs as the level of in soil carbon directly impacts soil health and fertility. And soil carbon promotes plant and animal resistance to disease and insect infestation. Good landscape management also provides the means to substantially increase draw down on CO₂ emissions. Farmers and land managers have the capacity therefore to significantly contribute to climate change mitigation. Indeed some innovative farmers are sequestering up to 10 tonnes of carbon per annum through bio farming techniques. What is now urgently required is a broad acre, quick and accurate measuring system, perhaps satellite driven. We are urging CSIRO to move on this.

Water

Securing an adequate supply of safe, reliable water will become a strategic determinant for communities, regions and nations worldwide. Australia is the driest inhabited continent with variable rainfalls and our landscape used to be characterised by 'in soil' reservoirs. Complex microbial ecologies maintained soft deep soils which allowed for infiltration and retention of water into well-structured subsoils. These 'in soil' reservoirs leached salt to depth and slowly discharged and sustained wetlands and waterways.

It is assessed now that over a quarter of Australia's river systems are close to unsustainable extraction, 94% of our wetlands (the kidneys of any river system) have been drained and over one million kilometres of our river systems have been incised, such that in

³ John White Sustainable Biological Agriculture June 2009

flowing below their flood plains they are disconnected from them.⁴ We have altered the essential, natural hydrological water cycles of much of the land through intervention to deliver above-ground water to storage and irrigations systems.

So how do we redress this situation and maximize the capture and retention of the rainfall that falls on our landscape? Well first of all, what is the problem? Ladies and gentlemen, are you aware that for every 100 drops of rainfall that falls on our landscape only 12 go into various flows; 4 out to sea, 6 into rivers and waterways and only 2 are stored in dams for agricultural, industrial, urban and domestic use? Another 2 drops fall on our rooftops and roads where they are wasted as run off. Only some of the remaining 86 units of rainfall penetrate the soil with 6 units going into groundwater and 30 units into vegetation. A staggering 50% of Australia's rainfall is lost to evaporation, ie 25 times the quantity in all our dams every year.

We need, therefore, to understand the processes that govern the natural hydrology of our landscape including wetland, flood plain and stream management. We need to adopt a 'front of pipe' philosophy that focuses on capturing, storing in soil and using rainfall where it falls. Many of the innovative farmers documented in our Soils for Life Report describe measures they have taken to return to natural hydrological processes; by restoring riparian zones, and recharging wetlands they have made water available for uptake by plants and animals over longer periods.

Some have adopted natural sequence principles like constructing leaky weirs and swales to slow down water flow, a Peter Andrews' philosophy.

Slowing down flows has the capacity to properly and evenly disperse water, sediments and nutrients over the landscape and our case study samples reflect increased carrying capacity and comprehensive overall ground cover even in times of drought. All have secured more efficient rainfall retention by restoring the structure and health of the soil.

It is of interest to note that if we were to restore the key environment asset of the Murray Darling Basin, namely the upland wetlands, it could be possible to retain 20,000 giga litres more water in the landscape every year. Where is this key point stated in the Murray Darling Basin Plan?

Vegetation

World deforestation is estimated as 13.7 million hectares a year.⁵ Australia has some 770 million hectares of land, including 550 million hectares under agriculture/grazing. Although former policies of active land clearing are no longer in practice, around 1 million hectares of

⁴ Australia State of Environment 2011

⁵ <http://en.wikipedia.org/wiki/Deforestation> by region

native vegetation was cleared in Australia in the decade to 2010.⁶ Land health is further at risk from changed water and fire regimes and overgrazing and as remnant vegetation continues to deteriorate, topsoil is increasingly lost and erosion occurs.⁷ Poor soils are unable to support regeneration of healthy vegetation and nutrient cycles break down.

Nutrients are necessary for healthy soil and vegetation functioning. They are also fundamental to healthy plants and thus healthy food. Mineral depletions in fruit and vegetables have been identified and today the food we eat, whilst medically okay, is generally less nutritious than it was before World War II.⁸

Vegetation has the ability to fix nitrogen in the soil and deep-rooted plants have the ability to recycle nutrients. Again, a number of our case study farmers have reported that by restoring the health of their soil and thus its microbial and nutrient cycles, through the use of organic fertilizers and composts and planned rotational grazing, not only have native grasses proliferated but crop production and animal numbers have significantly increased. The weight gain of animals and the quality of crops have also been improved.

Trees moderate temperature and vegetation protects the ground from overheating and drying out. Vegetation also influences the transformation of solar radiation in its ability to bind up solar energy in transpired water vapour which is then released as condensation. This cooling system from transpiring plants, especially trees, is the perfect air conditioning system for the earth and a key component in moderating precipitation.⁹

EXPLAIN: Field, house, tree and car park.

Some of our case study reports describe large scale reforestation in the form of shelter belts to mitigate salinity problems, to build organic material into soils to enhance its health and fertility, to protect from further topsoil loss and to encourage the cooling down effects of transpiration.

Urbanization

Ladies and gentlemen, I want also to comment on cities. Cities contribute substantially to environmental degradation, rising surface temperatures, loss of precipitation and water availability, CO₂ emissions from transport and industry, pollution of air and water and increasing volumes of waste. There is growing pressure around the world to expand and create cities and the bulk of the globe's burgeoning population will be living in the built environment of a city. In China, for example, it is estimated that 350 million people will move to cities in the next 20 years.¹⁰ And here in Australia, as the most urbanized country

⁶ State of the Environment 2011

⁷ State of the Environment 2011

⁸ Mead B Improving Pasture Quality for Animal and Ultimately Human Nutrition and Health.

⁹ Kravik M Water for the Recovery of the Climate: A New Water Paradigm.

¹⁰ Wikipedia.org-expansion of cities worldwide

in the world, most of us will face the environmental consequences of city living unless we change the way we approach the issue.

Urban activity and the massive useage of cement and asphalt have disrupted not only rainfall patterns and atmospheric humidity over cities, but have interfered with the functional vegetative cover of the landscape. The loss of vegetation has resulted in cities becoming heat banks as impervious surfaces, such as concrete, store heat. Cities are 'hot islands, that divert rain bearing clouds and facilitate weather extremes.

Another significant factor in the increasing urbanization of the globe is the direct effect this will have on food security. The UN Environmental Program estimates that up to 1% annually of arable land worldwide is lost to cities. The encroachment of cities threatens prime agricultural land and the projected massive population increase in cities present critical challenges.

So What Must we Do?

Fundamentally, we have an opportunity to influence the 'greening' of our cities through better urban design, better town planning, better use of sustainable 'green', materials in construction and better ways of capturing rainfall and recycling water. Cities represent a huge wasted water catchment.¹¹ Buildings and roads have an enormous potential to catch and collect water as do pervious surfaces such as parks and gardens. Roof rainwater can be harvested and recycled for further use and the construction of infiltration basins, swales and soak wells can promote water retention. Another alternative to slow down runoff is to create a 'green roof' which is a roof wholly or partially covered with vegetation.

Precipitation which enters the turf on the roof is retained and evaporated back into the atmosphere and the 'more water there is in the atmosphere, the stronger its moderating effect on temperature and the fewer the deviations in the weather'.¹²

We also have an opportunity to push for local councils, state and federal governments to legislate for the protection of the best and most versatile arable land on the urban fringe from reckless development. This means a radical shift from low density housing in suburbs to medium density housing and apartment dwellings.

Town planners and construction companies need to ensure 'green belts' within cities. Green spaces like parks, sports fields, municipal gardens and shelter belts must be integral to any urban landscape. There is also a real place for 'urban farming.' These green spaces can also function as productive community gardens such as in Havana, Cuba or Melbourne where citizens are being actively engaged in inner city food production.

¹¹ www.percpcrete.com

¹² Kravik.M Water for the Recovery of Climate: A New Water Paradigm.

Urban waste is one of the greatest environmental disasters of our time. Effluent for example, can be passed through structures and microbial processes that treat the water and aid the uptake of nutrients from the effluent by plants. The plant material can be harvested as pelleted, nutrient- rich stock feed which farm animals then distribute back over the landscape. Functional water produced by such 'bio domes' can then be used for irrigation.¹³

How Do We Catalyse Change?

Back to agriculture.

Clearly, catalysing the fundamental paradigm shifts required involves a considered approach. Leading and managing this change will require continuing dialogue with a wide range of stakeholders, specialists and interest groups. I suggest that to pull the changes together quickly and efficiently requires coordination at the highest political levels, namely Deputy Prime Minister and Deputy Premier equivalent.

Soils for Life is actively engaged in promoting and supporting leaders already implementing innovative land management practices. We have undertaken a thorough assessment of selected demonstration sites across many regions of Australia and documented the stories of 17 individual farmers and two government funded natural resource management organisations. We hope that our recently published report 'Innovations for Regenerative Landscape Management' and our website www.soilsforlife.org.au will not only facilitate awareness across all stakeholders involved in land management and food production but also, eventually, to every concerned Australian.

We want to show potential innovators that making changes in their landscape management is good business and we want to demonstrate to policy makers how effectively farmers can manage natural resources while producing food and fibre.¹⁴

Piecemeal management of natural resources fails to recognise that regenerating the landscape involves the cohesive management of all aspects of the environment. To date there are a plethora of differing regulatory requirements that address the separate elements of the environment and are not consistent throughout Australia. So, we urgently need to get relevant agencies working together to ensure the continued viability and sustainability of our agriculture.

Conclusion

The wider adoption of regenerative landscape management is a strategic imperative for Australia's wellbeing and Australia's soil, water and vegetation are our primary, national,

¹³ W Jehne, Helahy Soils Australia.

¹⁴ Cawood M Protecting our Assets, The Land 13.9.2012

natural assets. They are interlinked and impact significantly on each other and are inextricably linked to a prosperous society. We need to recognise this and reward land managers and farmers who are practising land management in an integrated way. We must also recognise these individuals not only for their product but for their stewardship of the land. The 'big players' in the food industry too need to be involved in recognizing the primary importance of farmers and the consumer needs to be prepared to pay appropriately to guarantee the longevity of sustainable agriculture.

Business as usual: that is utilizing outdated practices of treating the symptoms of land degradation rather than the cause is not sustainable. This needs to change. The Soils for Life case studies illustrate that high performance regenerative landscape management practices can rebuild an efficient bio system. They also illustrate that the triple bottom line outcomes –economic, environment and social- can be achieved.

To change, there needs to be a better connection between innovative farm practice and peer reviewed science. Funding to research and development needs to be reallocated to focus on addressing land management practices that can have immediate and long term effects on landscape regeneration and its continued ability to meet food requirements sustainably for a burgeoning population.

There needs to be sound national policy to drive the necessary change and a national, integrated mechanism at the highest level must be established to facilitate the required cooperation between national, state and regional authorities. And programs to inform, educate and mentor a broad range of stakeholders on leading performance in landscape management need to be established, all singing from the same sheet of music.

Ladies and gentlemen, the globe is about to face a food/water crisis of immense proportions and Australia is not isolated from this. But solutions do exist. Innovative farmers across Australia are meeting the integrated challenges of climate change, more erratic rainfall, diminishing water flow, depleted soil and rising costs with some considerable success. We have the opportunity to redress the critical issues we are currently facing here in Australia and, by example and with the knowledge we have, we can lead the world.

Please look up our Soils for Life website www.soilsforlife.org.au and contribute your knowledge to it. If you'd like a copy of the Program Report, send me your details via your Chairman.

May I end with a quote from Franklin Roosevelt: 'The history of every nation is eventually written in the way it cares for its soil.'

Thank you.