Professor Peter Newman
Director, Sustainability Policy Unit
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Dear Peter,

Submission on 'Focus on the Future'

Many thanks for the document which I am delighted to see in such detail and with such apparent Government commitment.

I have approached the Strategy from several points of view as follows:

1 As Convenor of the Steering Committee for the 1MPULS> Project (for revegetation of one million hectares for productive use of land with salinity) I have identified the areas of common interest for 1MPULS> and Focus on the Future and there are many. In view of the holiday season it has not been possible to run this past the Committee yet but a copy of my recommendations is enclosed.

2 As Convenor of the Ag School 2000 Committee which has successfully fought for four years to save the old Denmark Agricultural College for a Centre for Sustainable Living to be established. Late in 2002 we were advised that the Education Department agrees to a five year lease with two five year extension options and on Christmas Eve we were advised that our application for $150,000 towards renovating the building was successful. I have examined the Focus on the Future to see in what ways our Centre can contribute to and participate in the State Sustainability Strategy. There are many areas of common interest which will be taken up as the Centre develops. More specifically we will be having a public meeting to discuss progress and future action in early February and the State Sustainability Strategy will be raised at this time. Would it be possible for an officer from the Policy Unit to particpate?

3 As a concerned citizen I see a major challenge being to convince ordinary people that they have a responsibility for putting sustainability into practice in everyday life and that what they do is vital. We need to change everybody's self image from a 'consumer' to a 'sustainer'. The only way we are going to resist the pressures of the multinational consumerism push is for ordinary people to take the future into their hands and apply a quadruple bottom line evaluation to their living (economic, environmental, social and ethical). The State's Strategy needs to help people adopt this stance. One of the ways to do

this is to provide a way for ordinary people to communicate about their ideas and practices. We have just returned from an overseas trip on which we discovered about the way plastic bags are being taxed in Ireland and how people deal with that, how people in Galway are banding together to clean up their river mouth, how people in the village of Bedgelert in Wales are having a Sustainability Fair and so on. With the lack of interest of the media in little and positive things these events do not receive widespread coverage. We cannot all know about everything but maybe the 'one-stop-shop' could include a section for people to report ideas and actions for sustainability at the local level.

4 I see one of the barriers to progress being the general feeling of people that they cannot make a difference. I suggest that a way to give people the feeling that they are making a contribution is to establish a sustainable communities project. Under this project, within a community, Denmark for instance, persons and organisations would be able to 'register' contribuitions they are making towards the sustainability of their community. For example, persons who are caring for the aged and infirm, organisations educating children in environmental care, trades persons recycling their offcuts, shoppers using cloth shopping bags, people buying smaller cars or refrigerators, people bottling their own water instead of buying it, etc, etc. There would need to be a way of enabling the community to see that their combined efforts were making a difference. Perhaps this could be done through local government. In Wales there are sustainability officers in local government and one was helping with the Bedgelert Sustainability Fair. Perhaps there could be an incentive such as a scholarship for a representative of the most sustainable community to do an interstate or overseas trip looking for ideas and communicating with other communities. This is an idea which our Centre may be interested to follow up.

5 We need a way to protect 'the commons' from entrepreneurs and exploiters. Maybe the present approach of the Australian Broadcasting Corporation to highlight OUR ABC in its slot before the news gives a clue. Can we help people to develop a greater sense of ownership and responsibility for the welfare of the air, water, ecosystem services, etc so that they will resist attempts of the commercial sector to commandeer and degrade them for profit. One way to encourage concern for and interest in the environment may be to develop indicators which can be reported in a similar way to which the stock market reports are done. If criteria were available the media may be willing to incorporate them in the regular news coverage.

I hope these ideas may be of assistance.

Yours sincerely,

Clive Malcolm
9 January 2003

DRAFT

1MPULS> AND SUSTAINABILITY

In September 2002 the Western Australian Government released a Consultation Draft of "Focus on the Future", the Western Australian State Sustainability Strategy. The Strategy proposes six goals for sustainability:

1 Govern to drive the transition to a sustainable future.
2 Play a part in dealing with global sustainability challenges.
3 Ensure sustainable use of natural resources.
4 Have settlements that reduce their ecological footprint and enhance quality of life.
5 Support communities to fully participate in achieving a sustainable future.
6 Assist business to benefit from and contribute to sustainability.

Under these goals, 42 areas are proposed for implementation over the next five to ten years. For each area proposed actions are listed in the document. A number of these actions are relevant to the 1MPULS> Project. These actions will be examined in turn and recommendations made concerning the relationship between 1MPULS> and "Focus on the Future". The numbering refers to the Proposed Actions on pages 223-234 of the Consultation Draft.

1. Sustainability in Government

1.6 Agencies will develop a Sustainability Code of Practice requiring Sustainability Action Plans and Resource Guide.

RECOMMENDATION That 1MPULS> take steps to be included and/or accommodated in the relevant agency Codes, Plans and Guides.

1.7 Investigate how the government vehicle fleet and electric train system can reduce greenhouse gases by purchasing equivalent carbon credits from WA carbon sequestration projects.

RECOMMENDATION That 1MPULS> approach the relevant groups concerning purchase of carbon credits.

1.8 & 1.9 State and local governments are to establish partnerships and develop a Common Sustainability Framework with principles, goals, approaches and programmes.

RECOMMENDATION That 1MPULS> should endeavour to be included and/or recognised in the Framework.

1.12 &1.13 Planning agencies are to seek ways to support sustainability outcomes and give them local effect. Biodiversity conservation and regional revegetation programmes are specifically mentioned.

RECOMMENDATION That 1MPULS> alert the agencies to relevant aspects of the Project especially 'Saltland for Wildlife' and 'Redesigning Land Holdings'.

1.16 Refers to the development of Regional Sustainability Strategies.

RECOMMANDATION 1MPULS> should maintain good communication with those responsible and ensure that the aims of 1MPULS> are accommodated.

1.18 Conduct Sustainable Business Investment Tours to attract investment (including 'ethical investment').

RECOMMENDATION Promote aspects of 1MPULS> sustainable ethical investment opportunities.

1.20 Pilot an Indigenous Country Management Programme.

RECOMMENDATION Investigate whether indigenous people wish to be involved in 1MPULS> especially those parts which impact on the ancient drainage lines which some of the old indigenous song lines followed.

1.25 Development of a Global Centre for Sustainability dealing with globally significant sustainability projects.

RECOMMENDATION Propose that the research, development and implementation associated with 1MPULS> should be a project associated with the Centre and recognised for its global significance.

1.27 Determine research priorities and partnerships in sustainable research and development.

RECOMMENDATION Promote 1MPULS> as a priority area for research and development.

1.29 Establish a 'one-stop-shop' for sustainability information.

RECOMMENDATION Ensure that information on 1MPULS> is included.

1.30 Create an Annual Sustainability Award.

RECOMMENDATION Promote 1MPULS> as a candidate.

2 Contributing to global sustainability

2.1 Seek to bring WA expertise into global development projects.

RECOMMENDATION Encourage the Global Centre for Sustainability to build on the substantial overseas awareness of WA saltland revegetation technology to develop overseas projects.

2.10 Establish a Biodiversity Research Consortium.

RECOMMENDATION Ensure that the Consortium is aware of the 'Saltland for Wildlife' programme.

2.15 Establish a voluntary programme of Greenhouse Offsets.

RECOMMENDATION Investigate the possibility of attracting investment in carbon sequestration under this programme.

2.17 Facilitate a carbon sequestration facility under the Forest Products Commission.

RECOMMENDATION Establish a link with the Forest Products Commission to investigate the possibility for carbon sequestration by forestry aspects of 1MPULS>.

2.21 Establish an Adaptation Strategy for Climate Change (ASCC) with DCLM and CSIRO.

RECOMMENDATION Establish links with DCLM and CSIRO to explore the relevance of the ASCC for 1MPULS>.

2.22 Establish a carbon accounting system.

RECOMMENDATION Alert those responsible to the carbon sequestration aspects of 1MPULS>.

2.23 Create greenhouse accreditation for carbon accounting for carbon rights.

RECOMMENDATION Maintain links with those responsible.

Sustainable use of natural resources

3.1, 3.2 & 3.3 Develop regional targets for sustainable resource use for incorporation into regional natural resource management plans supporting diversification and landscape scale changes involving local government in biodiversity conservation and regional revegetation.

RECOMMENDATION Promote 1MPULS> to be included in the plans.

3.19 Support the Action Plan for Tree Farming in WA on previously cleared agricultural land.

RECOMMENDATION Investigate the relationship of the 'Saltland Tree Crops' sector of 1MPULS> to the Action Plan.

3.32 & 3.33 Develop nature-based and indigenous tourism.

RECOMMENDATION Investigate the possibility of walk trails in revegetated saltland biological conservation areas especially those associated with indigenous song lines.

3.36, 3.40 & 3.44 Protect water dependent ecosystems and ensure that catchment activities are appropriate and develop innovative approaches to catchment management.

RECOMMENDATION Include monitoring of aquatic ecosystems as part of the evaluation of 1MPULS>. and investigate whether pollution offset schemes are applicable.

Sustainability and business

6.1, 6.2 & 6.3 Establish a Centre of Applied Sustainability in TAFE to co-ordinate the new training agenda in sustainability. Expand Green Jobs and build on the Working Futures conferences to position WA on global sustainability issues.

RECOMMENDATION Alert those responsible to the needs of 1MPULS> and its opportunities.

6.4 Review the process of enterprise facilitation to ensure a core of sustainability principles and focus on economic opportunities in sustainability.

RECOMMENDATION Ensure that those responsible are aware of the needs and opportunities associated with 1MPULS>.

6.5 Provide leadership on certification and accreditation for professional services.

RECOMMENDATION Unsure that those developing quality assurance for activities under 1MPULS> are aware of these developments.

6.17 Develop a sustainability covenants program.

RECOMMENDATION Maintain contact with tose developing the program to ascertain its relevance for 1MPULS>.

There are many areas of common interest between 1MPULS> and the WA State Sustainability Strategy. It will be mutually beneficial to maintain links with those furthering the aims of the Strategy and explore ways to co-operate.

The 1MPULS> Project should contain a clear commitment to the aims of the State Sustainability Strategy.

SUBMISSION ON SUSTAINABILITY

by Clive V. Malcolm, Consultant in Land Rehabilitation

I submit that substantial areas of the salt-affected land in Western Australian farming areas can be revegetated for forage production or biological conservation and that the revegetated areas will be long term sustainable.

I further submit that the revegetation will result in many benefits for the farmers, the community and the environment.

I recommend that revegetation of saline land should be included in the State's sustainability policy.

The basis for these statements is as follows:

LONG TERM SUSTAINABILITY OF REVEGETATED SALTLAND

Starting in 1955, there was a specific research programme at the Western Australian Department of Agriculture on revegetation of saline land. References of relevance are in my publication list (Appendix 1) which includes a high proportion of the relevant literature. Plants have been identified which are capable of growing on virtually all salt-affected land in the farming areas except salt lakes. Establishment techniques have been developed and innovative grazing management methods are in use.

In the course of this research a total of about 280 research sites, mainly on private land, were used and a database with details of these sites is currently being produced with funding assistance from the CRC for Plant Based Management of Dryland Salinity (See Appendix 2). In the preparation of the database old sites will be visited to determine what changes have occurred over the years. In many cases the sites have remained fenced for decades with some controlled grazing being permitted by the farmers. Although only a few sites have been visited to date it has become apparent that stands of forage shrubs or puccinellia on saline land have survived in good condition for periods of up to at least 41 years. There is also evidence of recruitment of native grasses and other native plants including fungi and lichens. Casual observation of the use of revegetated areas by white fronted chats, ants, lizards and kangaroos indicates that although in some cases the revegetation species are not endemic they provide habitat which benefits wildlife.

In Table 1 are details for three sites, representative of three different valley types, and on which saltland pastures are known to have been in use for decades.

Table 1 Long term sustainable saltland pastures in different valley types

Pasture	Farmer & town	Rainfall	Valley type*	GrazingUse	Years
Puccinellia	Samwell, Kulikup	>375	Mortlock	Spring & autumn	25
Bluebush	Parker/ Lucchesi, Kulin**	<375	Baandee	Autumn	>41
River saltbush	Willis/McGellin, Korbelka	<375	Belka	Autumn	26

Five saltbush species	McClelland/ Tiller, Kellerberrin**	<375	Belka	Autumn	26

* Bettenay and Mulcahy, (1972)
** These sites have changed ownership

Of particular significance is the condition of the sites at Kellerberrin and Jilakin for which soil and plant data were collected and photos taken in the past.

In 1955 I was taken by the late S. T. (Tom) Smith to the property of the late Bevan Parker (brother of the late Dr Lex Parker) East of Jilakin Lake and with extensive areas of salt-affected land. Bevan had encouraged the spread of bluebush (*Maireana brevifolia*) on his saline land and made regular use of it by grazing his sheep on it in conjunction with dry pasture and stubble. He also fed hay on the bare areas resultingin the establishment of more bluebush from trapped seeds. Bevan's sheep were the cause of complaint from his shearers because they were so large, he had peak cuts of wool per head and peak prices for his wool and he attributed these achievements to the use of bluebush. Locals referred to him as 'Bluebush Parker'.

In 1960 I conducted soil sampling to 2.7 metres depth in a stand of bluebush which Bevan had established on saline land on his farm and in the adjacent grass paddock. The results of this sampling were reported in my M.Sc Thesis in 1963. The area was used most years for grazing and I observed and photographed the annual understorey which included grass and *Medicago polymorpha*. Salt and water contents of the soil were determined in September 1960 and February 1961. Moisture release curves were determined for the soil and it was calculated that the bluebushes were removing water from the saline soil to significantly below thewilting point and to a much greater degree than occurred under the adjacent grass (Figure 1).The property is now owned by Mr Lucchesi who purchased it from Bevan and has continued to use the area for grazing in autumn. Inspection of the area in February 2001 revealed that the stand has become denser and comprises smaller bushes than were presentin 1960 photographs. The stand still has an understorey of *M. polymorpha*. No analytical data have been obtained on the current condition of the soil but the plant indications are that on this site a stand of *M. brevifolia* grazed in autumn is a long term sustainable land use, in this case at least 41 years. The site is on soils grading from salmon gum to morrell and is representative of many wheatbelt situations.

On the site North of Kellerberrin (Table 1) five species of *Atriplex* were planted at five spacings in 1976. There were three replications and a total of 75 plots with 25 bushes per plot in five rows of five with the central nine being harvested after two years to determine the effect of plant spacing on biomass production. A two metre deep hole was augured in each plot with samples taken to represent twenty centimetre increments of the profile. Each hole was lined with downpipe and the watertable levels in all 75 test wells were monitored over two years and samples of the water taken for analysis. The results of detailed soil sampling have been reported elsewhere (Malcolm, et al, 1988 and Barrett-Lennard and Malcolm, 1999). Material was harvested from the bushes in 1978 and the soil was resampled. Between the two sampling dates the salt content of theroot zone from 0.2 to 1.4 m increased significantly by up to 21.7 t/ha of chloride as a result of the bushes having used 60-100 mm of water from the watertable beneath the plot (Barrett-Lennard and Malcolm, 1999). The plot has remained fenced but the farmer has made some grazing use of the bushes since the experiment ended in 1978. The site was inspected in March 2002. There has been a change in the species composition of the saltbush stand, *Atriplex vesicaria* and *A. undulata* having been greatly reduced and *A. bunburyana* having greatly increased. The overall result is that the stand is at least as dense 24 years lateras it was after the increase in salt in the root zone was measured in 1978. No soil analytical data have been obtained since 1978 but the plant indications are that a stand of *Atriplex* spp on this site is a long term sustainable form of land use, in this case 26 years. The site appears to be typical of many saline areas in the central wheatbelt.

The stands of puccinellia, bluebush and saltbush discussed above are in Mortlock, Baandee and Belka valley types (Bettenay and Mulcahy, 1972) respectively, indicating that long term sustainable saltland pastures are possible in a range of landscapes and rainfall zones. What is not known is how this is achieved. In the cases of both saltbush at North Kellerberrin and bluebush East of Kulin, there is evidence for the shrubs drying out the soil profile to a degree where there would be no leakage below the root zone. Indeed, the reverse is the case, because the saltbushes used water from the watertable. It may be inferred that the biomass production of the shrub stands would be related to the incoming fresh water (rain plus run-on if any). In my thesis are data for bluebush biomass production being related to the two year total of rainfall prior to measurement. The difficult factor to quantify is the amount of water and salt arriving in the root zone from up-catchment.

For the Lake Chinocup Catchment (Pingrup), calculations indicate that 5.73 million m^3 of water is flowing from the 'recharge' area to the 'discharge' area annually (Salama, et al, 2000) . If distributed over the extent of the 'discharge' area (2000 km^2) this amounts to a depth of 2.86 mm of water if evenly spread. No data are given for the salt content of the water. In Table 2 the salt load arriving in the valley floor is calculated based on assumptions of salt contents of 4500 or 9000 mg/L total dissolved solids in the moving water. The amount of salt arriving turns out to be of the same order of magnitude as the amount which falls in the rain each year.

Table 2 Perspectives on water and salt movement and storage in Western Australian wheatbelt landscapes.

WATER	Water or salt source	Water depth (mm/yr) OR salt (t/ha/yr)
	Arriving in Lake Chinocup discharge area by underground movement	2.86 a
	Rainfall at Lake Chinocup	
	Water use by *Atriplex* spp, N. Kellerberrin (rain + 30-50 mm)	239 to 300 b
	Water use by *M. brevifolia* at Jilakin	250-375 c
SALT		
Arriving in Lake Chinocup discharge area by underground movement	Groundwater 4500 mg/L TDS	0.125 (deduced from 'a')
	Groundwater 9000 mg/L TDS	0.250 (deduced from 'a')
	Rain at Quairading	0.070 d
	Atriplex tops at Kellerberrin	0.500 b
	Atriplex root zone increase, Kellerberrin	10.5 b
	In valley floor surface to bedrock	up to10,000 e

a Salama, et al b Malcolm, et al. c Malcolm, 1963, d Hingston, e Salinity, a situation statement for Western Australia, 1996.

These data indicate that the arrival of quantities of water and salt in valley floors comparable to that in the Lake Chinocup Catchment is unlikely to threaten halophyte vegetation. Lake Chinocup is similar to Lake Jilakin which adjoins the property of Bevan Parker and it is likely that there is an insignificant amount of salt and water arriving beneath the bluebush stand. The data focus attention on on-site recharge as the major contributor to rising watertables and revegetation of valley floors as the best way to lower watertables in at least some wheatbelt valley floor types. Similar conclusions were drawn by Bettenay et al. (1962) and Matta (1999) for the Belka Valley and the townsite of Merredin respectively. (Note the long term sustainability of the river saltbush in the Belka Valley in which Bettebay et al. did their research (SeeTable 1)). It is likely that these conclusions apply to a substantial proportion of the saline land in wheatbelt valley floors. The data challenge the claims made by some persons that plants above a saline watertable will salt themselves out. This will only be the case if the watertable is the only source of water for growth and there is no opportunity for flushing the root zone.

The salt balance of areas such as Samwell's puccinellia stand is also poorly understood. Mark has attested to the fact that there are flowing seepages growing *P. vaginatum* scattered through the puccinellia stand. It is likely that the watertable also intersects the surface in areas growing puccinellia during the winter. Presumably salt balance is achieved by salt from the puccinellia root zone flowing out of the soil and down the stream. Once again there is a case for further research.

ENVIRONMENTAL BENEFITS

The most serious environmental consequences of salt encroachment are soil erosion, loss of biodiversity and habitat, decline in stream quality due to silt, salt and nutrients, increased flood risk and severity, lost aesthetics and raised watertables.

The most obvious effect of revegetation is to reduce soil erosion to a minimum. This is especially true of saltland pastures involving shrubs because even efter heavy grazing there is always a stand of ungrazed branches to reduce surface wind velocity. Revegetation with perennial species has been shown to dry out the profile (Malcolm, 1963; Malcolm, et al, 1988) and to result in all incident water plus water from the watertable being used (Barrett-Lennard and Malcolm,1999) on saline sites. This results in the landscape having the capacity to absorb more water. It also results in reduced watertable levels and improved annual plant cover (Barrett-Lennard and Galloway, 1996). The presence of vegetation, especially perennial species would be expected to increase the cracking of the soil and leadto more rapid infiltration. Data have not been obtained but it can be hypothesised that these changes would lead to reduced flood risk and reduced nutrient flow to streams.

Data have also not been obtained formally on the effects of revegetation on biodiversity and habitat. An expected result of lowered watertable levels and reduced flood risk is that it would be beneficial. I have observed species such as *Danthonia caespitosa, Enchylaena tomentosa*, *Wilsonia humilis, Sclerolaena* sp., *Didymanthus rowei*(?), and samphires volunteering in areas that have been fenced for the growth of saltland pastures. Those who have collected bluebush seeds and spread them on the floor to dry will attest that the sample is alive with insects and spiders. White fronted chats have often been observed to colonise shrub plantings on saline land. It is time to measure these benefits.

An additional benefit from revegetation is sequestration of atmospheric carbon in the woody branches and roots of forage shrubs and in improved soil organic matter. A rough estimate of the amount of carbon dioxide equivalent sequestered by a saltbush stand based on data from North Kellerberrin is 10 t/ha (Malcolm, 2001).

It must be recognised that there may also be some negative effects from revegetation. *Paspalum vaginatum* has been observed to cause raising of creek beds resulting in the diversion of surface flows and puccinellia has been observed to spread into some areas fenced for biological conservation.

A major benefit to the environment would result from revegetation of areas which are too saline for pasture production with native species for biological conservation.

ACHIEVING REVEGETATION

The Saltland Pastures Association (SPA), based on the experience of many of its members proposed to the State Salinity Council (SSC) a major project for revegetation of one million hectares of saltland on Western Australian farms.It was proposed that land suitable for forage production would be revegetated with forage halophtes and land that was too saline and waterlogged would be revegetated for biological conservation (Malcolm and Lloyd, 2001).The SSC provided funding for the preparation of a Business/Project Plan which is being written prepared at the WA Department of Agriculture with guidance from a Steering Committee with representation from four Natural Resource Management Groups, the Department of Agriculture and the SPA. The project named '1MPULS>' (one million hectares of productive use of land with salinity) will benefit from the new Land Water and Wool project for Sustainable Grazing from Saline Lands. The possibility of attracting carbon credits for the carbon sequestered by the revegetation is being discussed with potential partners and the passage of the Western Australian carbon rights legislation would be helpful. It is anticipated that the plan will be completed by the end of the financial year and that action will commence in earnest soon after.

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