Models to Integrate Sustainable Conservation and Resource Use - Bioregional Reserves beyond Bookmark.

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ABSTRACT

The international network of biosphere reserves was originally implemented by UNESCO (MAB) to protect the worlds major biomes or ecological units. It's Mission now focuses on the need to reconcile the utilisation of natural resources with long term protection of biodiversity through an interdisciplinary approach to sustaining nature and society. This is the essence of what we now call Ecologically Sustainable Development. An overview of the functions, concepts and misconceptions of Biosphere Reserves is given.

One state-of -the-art model being developed by local communities in the Riverland in South Australia is Bookmark Biosphere Reserve. Operating at a regional landscape (bioregional) scale, it draws together community visions, values and actions dealing with a complex web of environmental and social challenges through a similarly complex network of multiple land tenures, public-private partnerships and resources, and multi-disciplinary professional capacities.

The need to implement and experiment with innovative approaches to sustainability is now more critical than ever. The Biosphere Reserve Program is maturing through better integration of cultural needs and aspirations for quality of life while conserving natural values and ecosystem processes, in particular through bioregional planning and management incorporating a variety of IUCN protected area types with novel, sustainable, resource-use diversification. I wish to encourage more models like the Bookmark experiment to evolve through even greater creativity and engagement with public and private partners. One potential model is developing slowly on the New England Tablelands, but requires serious public and private sector support and cross-institutional flexibility just as the bookmark experience demonstrates. A second, much-needed model, would be an experimental coastal-marine integrated bioregional planning and management framework and implementation. The Mid-north Coast region around

Coffs Harbour has a range of multiple issues which would provide the 'on-ground' setting for an extremely valuable model.

INTRODUCTION

Ultimately an adequate conservation strategy depends on a variety of successful policies applied effectively outside reserves to ensure protection of landscape and seascape scale ecological functions, habitat restoration and ecologically sustainable use. Preserved natural areas and other reserves or protected areas are a necessary but not sufficient condition for long term sustainability. Even a comprehensive protected areas system is not a panacea for sustaining ecological diversity - most biodiversity will always be found outside the reserve system. Therefore, networks of protected areas must also be managed in concert with entire regions (Noss 1983, HoRSCERA 1992, 1993, Brunckhorst & Bridgewater 1994, 1995). Protected areas should also function as reference sites - essentially, measuring sticks for landscape wide conservation and sustainability objectives. They are, or should be, of value to local people who share responsibility for conservation across the landscape, both within and outside protected areas (Saunders 1990, IUCN 1993).

As society struggles to come to grips with increasing degradation of the land, its resources and faltering ecosystems, all governments are realising their limited resource and professional capacities, to assist social change towards a sustainable future. The Landcare movement in Australia, has also contributed to public debate of the appropriate responses of government. Increasingly, authoritative authors from a variety of disciplines (economics, social sciences, biological sciences etc) are also recognising the limited capacities of traditional forms of public sector organisation to deal effectively with the scale, complexity and inter-relatedness of environmental problems for long term sustainability. This recognition challenges the ability of compartmentalised government bureaucracies to adjust to, or engage in more integrated on-ground models.

Australia's Strategy for Ecologically Sustainable Development (agreed by all governments in 1992) recognises that partnerships between government and community at all levels is vital in the quest for integrated sustainable development and conservation. The former Australian Nature Conservation Agency (ANCA) attempted to meet this challenge through a landscape view of the world that moves its functional units beyond a traditional narrow focus for program delivery. Institutional evolution towards a culture that can encourage and partake of integrated models requires a new definition of management - replacing the idea of control by a few people with that of negotiation and organisational learning. Hence, land and sea management is teamwork (by partners) based on a continually evolving consensus on the direction towards sustainable integrated resource management.

This is the background of science and policy that has now catalysed a resurgence of interest in further development, use and demonstration of landscape ecology (Hansen & DiCastri 1992, Noss 1983, Slocombe 1993), bioregional approaches (HoRSCERA 1992,1993, Brunckhorst & Bridgewater 1994, Brunckhorst 1995, Brunckhorst *et al*. 1998), and the UNESCO Biosphere Reserve Program (UNESCO 1995, Brunckhorst & Bridgewater 1995). Such approaches coupled with the biosphere reserve program offer opportunities for diverse and innovative responses because they are: set in the context of

landscape (or regional) scale ecological processes; trans-disciplinary; cross-sectoral and cross-jurisdictional; built on multiple public-private capacities; and, can be owned and driven by local communities.

"Biosphere reserves offer such models. Rather than forming islands in a world increasingly affected by severe human impacts, they can become theatres for reconciling people and nature; They can bring knowledge of the past to the needs of the future; and, they can demonstrate how to overcome the problems of the sectoral nature of our institutions".

("Vision from Seville", UNESCO 1995, p. 4)

The seminal meeting for what would become the 'Man and the Biosphere' (MAB) biosphere reserve program was held at UNESCO House in Paris in 1968. The Biosphere Reserve program began in earnest with the first meeting of the MAB International Co-ordinating Council in 1971.

The international network of biosphere reserves was proposed to protect the worlds major biomes or ecological units. By the time the 'Minsk' Action Plan for Biosphere Reserves (UNESCO 1984) was produced, the program was already visionary; aiming to reconcile utilisation of natural resources with long term protection through an interdisciplinary approach to sustaining nature and society (Batisse 1982, 1993, UNESCO 1984, 1995). Over 200 Biosphere Reserves had been nominated by 1984. There are now more than 330 Biosphere Reserves in 125 participating nations. The international network also provided a unique set of sites and opportunities for long term monitoring, research and communication into the ecological, social and economic aspects of conservation and sustainable development.

BIOSPHERE RESERVE PRINCIPLES

'Biosphere' refers to that part of the earth supporting life. The long term existence of human society on our earth home depends on the value we put on environmental sustenance today, for tomorrow. The biosphere provides our living space and our economy.

Scale is a critical attribute (see Norton & Ulanowicz 1992, Slocombe 1993). The landscape scale is the main scale of human interaction with the environment. The landscape-regional context links multiple spatial and temporal scales of biodiversity with human uses and socio-economic imperatives. Human systems for environmental management, however, tend to be more narrowly focused.

Biosphere reserves are fundamentally concerned with whole of landscape processes, whether inside or outside of protected areas, across a variety of land tenures and uses. They aim to sustain the biodiversity and productive capacity on a regional scale that is appropriate to the ecological processes and human use and cultural identity with that landscape. Hence, they are vehicles for managing the social, cultural and institutional

change and capacity building which is required to deal with the future sustenance of the biosphere and humanity.

The MAB program provides an enabling mechanism and multiple tool box to explore new methods for planning and practising sustainable resource management which is integrated with conservation activities. A Biosphere Reserve gives local communities new responsibilities for their own sustainable future while providing a thread to re-sew peoples identity to the landscape. This contrasts with managing their own 'patch' in isolation and/or being excluded from ownership and responsibility for managing nearby public land in a wider context. The functions of biosphere reserves are implemented across a landscape region (bioregion) of different uses and environmental condition.

Major functions of the UNESCO Biosphere Reserve program were traditionally described as conservation, development and logistic support (research, monitoring, education & training). These functions might be described as:

· conservation of biodiversity;

· increased ecological understanding; and,

· experimentation with, and demonstration of ecologically sustainable development.

These are integrated through a multi-disciplined approach, focusing on 10 major objectives.

1. local community participation.

2. integrated land use management.

3. *in situ* conservation and restoration.

4. research.

5. monitoring.

6. regional planning & development.

7. environmental education & training.

8. ecologically sustainable development.

9. information & communication.

10. developing an international network.

In the 1984 Action Plan these functions became generalised for practical implementation and planning as "core", "buffer" and "transition" zones (UNESCO 1984, 1995, Bridgewater 1994). While generally portrayed as a circular 'target' diagram, the concept refers to the need to manage land uses and functional ecological flows across an entire landscape mosaic which also includes a socio-economic dimension. The so called, "core" areas are priority conservation areas (ie, national park or IUCN category I or III) representing regional biodiversity and, as monitoring or reference sites for adaptive management. "Buffer" zones are really one end of a continuous transition region, extending further into an area of co-operation, where biodiversity threatening influences on the core and the surrounding landscape are minimised (Batisse 1982, 1993, Brunckhorst & Bridgewater 1994, 1995). In addition, biosphere reserves provide for increased community ownership and responsibility of protected areas as well as private lands, environmental restoration, monitoring and experimental ESD projects with public and private partners. A forth zone might therefore be termed a Zone of Co-operation.

Biosphere reserves have been compatible with (and even an operational framework for) the philosophy of sustainable development, well before this concept was promoted through the Brundtland Report (WCED 1987) and more recently through Australia's ESD Strategy (1992).

People are an essential part of the fabric of landscapes. There is probably no ecosystem that remains unaffected in some way by human activity. People and their activities are considered a part of a biosphere reserve and should be encouraged in their participation and ownership of the program at a local level. This not only encourages greater acceptance and understanding of the need to conserve biodiversity but ensures the operation of the biosphere reserve at regional scales, to act as an agent of social transformation of attitudes and values towards common values for a sustainable future.

Sustaining biological diversity will not be achieved in highly protected reserves, nor even along their boundaries. At last, perhaps, the debate is no longer based on viewing conservation reserves (large or small) from their border inwards; it is now focused outwards from the border and, indeed, on whether the borders should exist at all. Conservation reserves will still be important, but must become 'open' reserves in the broader landscape context. It is only by stretching out beyond, truly engaging with local communities in experimenting and demonstrating sustainable development and conservation will there be any hope of maintaining what is contained within, together with the greater stakes, which occur beyond. The core-buffer-transition concept might be better envisaged as 'ripples on a pond' - conservation as an open system - spreading out across a landscape building a sustainable future for people and maintaining ecological functions.

But what policy and practical mechanisms will allow a more integrated cross-jurisdictional mechanism for planning sustainable land use? Biosphere reserves represent a local level of bioregional planning (Noss 1993, Brunckhorst & Bridgewater 1994, 1995, Reid & Murphy 1995) and provide a vehicle for public-private co-operation in achieving

sustainable use, sustainable conservation and quality of life (UNESCO 1984, 1995, Kellert 1986, Ishwaren 1992, Parker 1993).

BIOSPHERE RESERVE PROBLEMS

The concepts and principles of the MAB program were well ahead of their time. Implementation was hampered by the depauperate position of UNESCO internationally in the early 1980s and, by greater attention and understanding being given to more charismatic programs such as World Heritage. In retrospect, it would seem that a complex and innovative idea such as biosphere reserves at a time prior to the Brundtland report (WCED 1987) and before preparations for the UNCED 'Rio' Conference was difficult to enunciate and very hard to 'sell' to science and policy sectors, let alone more generally.

Another hurdle for the program was created in its first decade. Most countries with federal systems of government and many other nations, simply nominated to UNESCO their "special" national parks as biosphere reserves. Accordingly, Australia has 12 biosphere reserves, nominated originally for their high conservation value and for research opportunities. Consequently, most of these have been operational at only one of the functional levels of a biosphere reserve, that corresponding to a 'core' area (i.e., a national park or conservation reserve can only be a core area, although there may be a network of core areas throughout a biosphere reserve). Until recently, all were public lands alone, from which most local people felt excluded, in terms of a sense of ownership and responsibility for its well being. The broad organisational framework required for practical implementation has also been lacking.

This has exacerbated mis-conceptions and hampered implementation. On one hand, extreme green groups have claimed that biosphere reserve status reduced protection to a national park making it 'multiple-use'. Conversely, some industry sectors were concerned that access over large areas would be restricted. Neither are true.

In Australia, two biosphere reserves have become more fully operational. These are Fitzgerald River Biosphere Reserve in south west W.A. and the fledgling Bookmark Biosphere Reserve in South Australia. Originally, only one section of Bookmark - Dangalli Conservation Park was nominated - it is effectively now one of several core areas across a much expanded regional context. Uluru-Kata Juta (the 'Rock') has developed uniquely and is a notable model for partnerships in indigenous cultural and natural heritage management, while Macquarie Island has developed a more specialised role in research and in global climate monitoring across the world network.

Today, there is much greater understanding of ecologically sustainable development and the need for integration and management at the scale of regional landscape ecosystems (10s - 100s km). Support and interest for the UNESCO MAB program is also growing. The increasing credibility and potential of the biosphere reserve network is now recognised in planning the main logistic base and future activities in response to the UNCED process - especially with respect to the 'on-ground' implementation of Agenda

21 which needed to verify its postulates in several areas and chose the MAB program to do so. A valuable, if not crucial, attribute of the biosphere reserve concept is its flexibility and adaptability to a variety of situations. A further advantage of the program is the lack of rigid regulations, it has no legally binding status and is no threat to land holders, rural communities or industry sectors; it encourages and supports those who wish to pursue common values and principles for sustainability. The Bookmark and Fitzgerald River Biosphere Reserves are a testament to the value of such an open, flexible framework which allows it to be interpreted locally and to gather a broader influence through time.

BOOKMARK BIOSPHERE RESERVE

Background

Communities of South Australia, Victoria and New South Wales living along the Murray River are faced with a number of environmental challenges affecting their well being. These include soil loss, landscape degradation and species loss. Together with the infusion of saline ground waters and decreasing water quality, along with disappearing wetlands - the liver and kidneys of the River - these processes are collectively threatening the sustainability of all Riverland communities.

Productivity of this mallee ecosystem is low. The region receives an average of 240 mm of annual rainfall with annual evaporation rates potentially greater than 2,300 mm. Droughts are frequent and are punctuated with erratic floods. Soils are fragile and poor with deficiencies in structure and nitrogen content. The hydrology of the floodplain and wetlands of the Murray River has been altered by a variety of engineering projects designed to support agriculture and irrigation development. Problems of salinity within the ground water has been compounded by other factors including loss of deep rooted vegetation through land clearing for timber and pastoral throughout the past century. .Many of the land degradation problems within the biosphere reserve are replicated on lands scattered throughout the drainage of the Murray River and its tributary, the Darling, which together drain one-seventh of the continent.

A Variety of Partnerships

Bookmark Biosphere Reserve constitutes now more than 6 000 sq. km, which is three times the size of the Australian Capital Territory (Figure 1). It is made up of several different land tenures including conservation reserves, game and forestry reserves, pastoral leases and private land. Some portions of land in the biosphere are the responsibility of the State government through DENR. Another portion is the responsibility of the federal government through ANCA - this is the *Calperum* pastoral lease which was purchased with funds provided jointly by a Chicago benefactor and the federal government. Several other pieces of National Trust and private land also make up the biosphere reserve. In joining this collective together, Governments have vested the community with the ownership and responsibility for selecting goals for management of this entire regional landscape.

Late last year, a contract was signed and implemented, between with the Director, National Parks and Wildlife (under federal and State legislation), for the management of Calperum Pastoral Lease by the Bookmark Biosphere Trust. The contract term of five years will provide stability for many of the long-term Bookmark programs, especially those associated with environmental debt recovery and demonstration of ESD programs. The first of its kind anywhere in Australia, this agreement may have a useful life reaching well beyond Bookmark, as other communities elsewhere may attempt to undertake environmental responsibility for their region.

The flood plains of Bookmark Biosphere Reserve are recognised as internationally significant wetlands for waterfowl and migratory species. Australia is a party to several international conventions for the protection of these areas (e.g., RAMSAR). The 'Calperum' Pastoral Lease which incorporates many of these wetlands of international significance is also the focal point for the community to experiment with novel sustainable industries. However, large scale landscape recovery and species restoration are necessary and integral to the pursuit of ecologically sustainable development initiatives.

The Riverland communities, through nominated representatives, manage the land within the Biosphere Reserve and accomplish required tasks through a citizens committee, the Bookmark Biosphere Trust . The community-based Trust is constituted under the South Australian National Parks Act. The Trust is the formal management body responsible for Bookmark Biosphere Reserve. State (Department of Environment & Natural Resources), Federal (Australian Nature Conservation Agency) and private sector professionals serve the trust in understanding and implementing management options.

In June 1995, Bookmark Biosphere Reserve was officially recognised and listed by UNESCO. In taking its decision, the Director General of UNESCO, Dr Federico Mayor, who had recently visited Bookmark remarked:

"I wish to highlight the innovative mechanisms which have been developed to involve all stake holders in the management of the area and which could serve as an example to other sites in the world network".

While there is strong bi-partisan political commitment to the future of Bookmark, governments do not have sufficient resources in the long term to recover degraded land and carry out the conservation programs that are the basis for the biological and cultural heritage of the Riverland. There are benefits to a lack of resources. If the community feels strongly about a particular course of action, it must share the responsibility for implementing it. In the process the Bookmark Trust comes to understand the program well, develops its own networks and capacity-building partners, and is able to market the program effectively through out the broader community. This, in turn, increases community participation and public-private sector support.

The Bookmark Biosphere Trust is an innovative and far sighted group of citizens concerned with the long term sustainability of the natural environment, social values and

standard of living in the Murray Riverland of South Australia. This is indeed a bold commitment to support a 'bottom-up' culture of capacity to accomplish conservation goals with few resources, political harmony, and new productive and innovative working relationships to leverage available resources, commitment and talent. This synergy, therefore, provides for combinatorial resource and capacity building from 'bottom-up' (community), 'top-down' (government) and 'sideways-in' (private sector).

Such commitment is further demonstrated by the community and the private benefactor who helped with the purchase of Calperum Pastoral Lease. Most recently, Mr Brooks McCormick has contributed a further $1.1M to build an Environment Centre to Show-Case Bookmark Biosphere Reserve programs for innovative land management, conservation, ecologically sustainable development, environmental education and community participation. The Riverland community provided the concept for an Environment Centre assisted by the *pro bono* services of several professionals. The town of Renmark has donated a wetland site for the Centre and will provide service connections.

Sustainability in a low productivity landscape?

The main sources of income in the mallee Riverland are pastoral development and horticultural crops. Pastoralism is not economically viable in the dry rangelands when international wool prices are low. It would also seem ecologically unsustainable during times of drought. Cropping and agriculture is based on the provision of irrigation water from the Murray river. During dry periods, the salinity of the river water is nearing the tolerance limit for citrus, the major crop. Therefore, in addition to land recovery new enterprises for sustainable production will be required to support Riverland communities in the future (see also Freudenberger & Freudenberger 1994, Fitzhardinge 1994, Landsberg *et al*. 1995).

To support land management programs the Bookmark Biosphere Trust is faced with the creative challenge of experimenting with and establishing a suite of novel resource uses compatible with conservation and land recovery. With the support of the Williamson Fellows, a group of citizens grappled with the meaning of ESD to the Riverland. They considered a range of social justice and environmental principles and came up with a provisional list of industries. This left the Bookmark Trust, assisted by its public & private sector partners, with the task of working through the ramifications of developing experimental applications of ESD in the real world - for which there are very few examples to draw upon.

This is complex enough, but is compounded by the limitations of a low productivity system, existing environmental debt, water quality issues, employment and training needs, and economic feasibility. While several potential ESD activities were considered, two, ecotourism and diversified animal products were chosen for initial trials.

The diversified animal products processing operation is based on the possibility of utilising resources that will decrease pressure on plant and aquatic communities to aid environmental recovery while providing some socio-economic benefit.

Feral goats (numbering in excess of 15,000 in the past 2 years) damage vegetation on the biosphere reserve. The goats are costly to remove, but could generate money if the meat and leather could be sold. Eradication is impossible (see Freudenberger ed. 1993). However, if partial eradication caused goat numbers to fall below a density that was economically viable to remove, harvest would become uneconomical and population numbers would rise again within a few months.

Kangaroos also occur in large populations in this altered pastoral landscape, reaching densities in excess of 25 per square kilometre. A diversified meat processing industry, combining sustainable kangaroo harvesting and goat removal might maintain a steady supply of meat to a local abattoir and provide a few jobs (see Caughley *et al*. Eds 1987).

If ESD means that the allowable annual harvest is only the nitrogen and energy fixed by the system in a given year, such a low productivity landscape may not generate enough goats and roos within the biosphere reserve to meet western economic requirements for investment return, and cover costs of interest repayments, depreciation of equipment, insurance, holiday pay etc. Highly productive landscapes are more capable of meeting the needs of investor economics.

However, four other factors may contribute to socio-economic viability. Firstly, if nitrogen and energy fixed are used directly by people living in or around the biosphere, the landscape might support the activity as an ESD. Secondly, the resource pool of goats and kangaroos actually emanates from the biosphere reserve and beyond (a small change in South Australian law has allowed goats to be considered in this way). Hence low productivity is partly compensated by expanding the scale or area from which resources are harvested. Thirdly, if the industry is further augmented with bone discarded by local butchers, and carp are also harvested, a variety of prime cuts, pet food, fish meal, leathers, small goods and blood and bone fertiliser can be produced out of a single facility. Most of these items have existing or developing market opportunities.

A second ESD industry now in development and early implementation stages is native floriculture. - initial planting is expected in August/September following the frosts. Transformation of a degraded area by the Calperum shearing sheds to a fenced and serviced floricultural facility is largely due to the efforts of Roger Fielke, who comes to the project with the experience of growing native bush foods for the Red Ochre Grill Restaurant. Seedlings and cuttings have been propagated by the floriculture professional team in Melbourne from samples and seed gathered across the Bookmark region. Local experts and researchers from Adelaide University and the Adelaide Botanic Gardens have identified more plants in subsequent surveys.

The next challenge before the community and its partners is to communicate values for environmental health, social values such as training, jobs and a local industry that helps recover environmental debt by reducing disturbance and grazing pressure.

Such a novel, 'restorative economic' ESD model is likely to best be understood and appreciated by the foundation community. Philanthropic capital helps secure a debt free industrial basis of support to establish such ESD industries on a solid footing for a sustainable future. Bookmark has indeed been fortunate to gain international philanthropic money as well as the commitment of Melbourne based foundations. This support continues to be gathered and amounts to more than $10M to date. The volunteer hours generated each year in the Riverland has been calculated to match these contributions. This might not be achievable in the other States, which have very little in terms of a philanthropic community with interests in integrated conservation and sustainable resource use - nonetheless we can endeavour to cultivate the development of corporate social responsibility and philanthropy. In the meantime, restoration projects and monitoring programs for land in the biosphere reserve are essential in the development and evaluation of the role ESD might play in funding land management including the recovery of environmental debt in the Bookmark Biosphere Reserve, bioregional project.

LOOKING FORWARD

Biodiversity is under threat, but the interdependence of life, together with the productivity of the land means that the harmony of society is also threatened. Increasingly, it is necessary to entwine strategies for ecologically sustainable development and conservation at appropriate social and ecological scales (Brunckhorst 1998). The nature of the task at hand means that traditional approaches and the already stretched resources of the public sector, while essential, cannot do the job alone. In partnership with government, rural communities must endeavour to assemble a multitude of cross-sectoral resources, professional capacities and volunteer contributions to develop and experiment with creative approaches to conservation and landscape recovery.

The Biosphere Reserve Program facilitates one approach to bioregional planning and integration of cultural needs and aspirations for quality of life with the conservation of biodiversity. It gives local communities new responsibilities for their own sustainable future while providing a thread to re-sew peoples identity to the landscape. A broadly based, 'action centred', network of capacities can greatly contribute to an integrated, multi-disciplinary approach to conservation and sustainable development. Community partnerships and strategic alliances with the private sector as well as government agencies can greatly increase the variety of resources and professional capacities that can be directed towards on-ground solutions.

Bookmark Biosphere Reserve is one developing model in the mallee and Riverland of South Australia. The Riverland community has committed itself to reversing degradation of environmental quality and to maintaining quality of life for their children's children. Novel approaches to integrated land management, restoration, and novel ESD enterprises are being tested by local people with the assistance of public and private sector partners.

There is certainly potential and the need for such models of bioregional management in NSW. Well-managed risks need to be taken if we are to advance novel solutions for the next millennium. Other kinds of Bioregional models need to be experimentally developed and two critical focal areas are rural areas and the land-sea interface. The mid-north coast would be one area of potential for such a model.

On the New England Tablelands of NSW, another innovative model is being developed to deal with rural economic and environmental debt issues of graziers. Landscape scale conservation coupled with strategic resource assessment, ecological restoration and the freeing of labour time and resources to enable diversification are all parts of an integrated 'commons' approach being researched and developed.

An important aspect of the Common Property Resource (CPR) management project on the New England Tablelands is the ability to allocate the available resources more efficiently, but within their functional capacity. The Common Property Resource (CPR) collective provides a unique opportunity for a group of graziers, who together own most of a sub-catchment and have collectively agreed to work and learn together how to operate a CPR system. For example by recognising the distinction between resource utilisation and land tenure these landholders may consolidate their herds and graze them across all the properties involved in the CPR. This would allow the utilisation of grazing techniques such as rotational grazing regimes over a much wider area, offering benefits including improved pasture and weed management, drought management. In addition pest issues such as external and internal parasite control can be managed far more effectively, but with reduced costs in terms of fencing or chemical needs.

At broader and more meaningful ecological scales across the landscape, it also provides opportunities for long-term conservation and maintenance of rare basalt associated ecosystems and the restoration (ie, sub-catchment and riparian vegetation). This necessitates assessing natural capital across an ecological landscape that equates also with the collective of landholders that will learn to share, nurture, conserve, restore and harvest across the entire area. Areas better suited to certain activities allow farming such as cropping and haymaking to be performed on those areas most suited, and resilient, to cultivation and the remaining land may be used for grazing, conservation, restoration or a suitable diversification. This removes the pressure for individual landholders to conduct these activities independently, on largely unsuitable locations and cropping only the most suitable area in the landscape. Collectively these farming enterprises are more efficient and include the potential for scaling-up to more suitable resource use across all properties of the collective.

We also need to encourage a corporate and private philanthropic culture in NSW. I would recommend gathering the momentum and public-private sector support for experimental development of 2 or 3 such on-ground 'bioregional models'. Geographically and socially a coastal project based on the mid-north coast and incorporating communities as well as marine and terrestrial-coastal protected areas, together with the support and development of the New England Tablelands project (perhaps looking towards its expansion) would be an excellent and strategic investment in the future. Both models would have additional

social and ecological 'links' provided by the context of Tablelands to mid-north coast catchments.

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[1] Now the UNESCO Centre for Bioregional Resource Management at the Institute for Rural Futures, UNE