



Our Ref: 08/315

The Secretary
Senate Standing Committee on Rural and Regional Affairs and Transport
PO Box 6100
Parliament House
Canberra ACT 2600

29 August 2008

The Committee Secretary

RE: CSIRO's Submission to the Inquiry into Natural Resource Management and Conservation Challenges

We thank you for the opportunity to comment on the natural resource management and conservation challenges facing Australia. Our attached comments are written with an understanding that CSIRO is actively undertaking research on issues of relevance to this inquiry.

In addressing the terms of reference CSIRO draws on its experience of regional delivery through the NHT and NAP programs and identifies the need for improved biophysical understanding and the potential for improving measures of success. CSIRO endorses others' recommendations for increased focus and suggests a mixed model for delivery which capitalises on existing regional networks be analysed for use in the *Caring for our Country* program.

Should you require any further information regarding our submission, please do not hesitate to contact me or Dr Kilian Perrem (the main submission contact).

Yours sincerely

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CSIRO Submission 08/315

Inquiry into Natural Resource Management and Conservation Challenges

Senate Standing Committee on Rural and Regional Affairs and
Transport

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Executive Summary

It is essential that the management of Australia's natural resources is underpinned by the best available science and technology, CSIRO has core strengths in marine, atmospheric, terrestrial and climate science and in the cross-scale, interdisciplinary approaches needed to address natural resource management issues. CSIRO has a proven track record in providing whole-of-system analyses and decision-relevant technologies and information to support Australia's governments, communities, policymakers and regional bodies in managing natural resources.

In addressing the terms of reference CSIRO draws on its experience of regional delivery through the NHT and NAP programs. Experience tells us that an effective framework for biophysical data is critical for measuring returns on investment in NRM, so that management decisions can be evidence based. There is opportunity to measure the effectiveness of NRM investment based on thresholds rather than targets, to better reflect the variability of natural systems and to design monitoring and evaluation which reflects the different scales at which natural variables operate.

Regional delivery has been the vehicle for Australia's recent natural resource management programs and has had varying success depending on the cooperation of private landholders and the local community.

Based on analysis of past programs, CSIRO suggests a mixed model for capitalising on existing regional networks is most likely to succeed. Such a model would combine strengthening the current regional model; centrally run competitive processes, and increased involvement of local government. CSIRO recommends analysis of these three elements, and the combination of the best and the mutually compatible features into Caring for Our Country

Bringing Indigenous peoples more centrally into NRM may also help improve Indigenous socio-economic status, as well as developing sustainable land management systems, including in areas of high conservation significance.

In relative terms Australia's investment in natural resource management is small. CSIRO suggests governments consider whether Australia's level of investment is appropriate to the scale of environmental issues it is trying to address.

Despite recommendations to focus investment in priority areas, in past practice the division of the country into regions probably discouraged such focus, and the total investment was spread too thinly to produce a measurable return. Future funding should be targeted towards the highest priorities and the most critical national assets. In order to target investment, CSIRO suggests more extensive application of methods for appraising and evaluating the cost effectiveness of investments in NRM.

Essential ingredients to a long term strategic approach for Australian NRM are applied research linked to adaptive management, with regional successes and failures being shared at national scale. There is an opportunity to facilitate learning and adaptive management through a national forum on NRM.

It is difficult to provide comment on the capacity to engage and comprehensiveness of the *Caring for our Country* program, given that the business plan and detailed priority framework have yet to be released for public scrutiny. However, CSIRO suggests there are risks of losing momentum associated with the current one year transitional funding arrangement, and in inadvertently removing incentives to cooperate. A competitive premium might be applied to proposals demonstrating partnering

Introduction

Commonwealth natural resource management programs have evolved over the last 25 years from the National Soil Conservation Program in 1983, followed by the National Landcare Program, the Natural Heritage Trust (NHT), and the National Action Plan for Salinity and Water Quality (NAP). Landcare emphasised attitude change, voluntarism and informal networks of landholders operating across farm boundaries. Under the NHT the scale of actions on the ground expanded to catchments, and catchment organisations were formed to link Commonwealth, state and territory funding to those actions. Market based instruments and stewardship payments have been introduced at pilot scales to encourage actions.

Much has been learned from these investments in natural resource management, and some useful social networks have been built. However, reports from the Australian National Audit Office in 1997 and 2008 failed to find measurable improvements in the conditions of our landscapes, rivers and coasts as a result of the investments (ANAO 1997, 2008). In responding to the Inquiry's terms of reference, this submission explores the reasons for the apparent lack of outcomes, summarises the lessons learned, and suggests how we might build on the knowledge and social structures built over the last quarter of a century.

Term of Reference 1 – Lessons learned from the successes and failures of three decades of Commonwealth investment in resource management

Key points

- An effective framework for biophysical data is critical for measuring returns on investment in NRM, so that management decisions can be evidence based.
- NRM investment based on thresholds rather than targets would better reflect the variability of natural systems
- Objectives that leave the biophysical system in better condition than it would have been without an intervention are legitimate
- Monitoring and evaluation frameworks should recognise that different indicators operate at different scales

The need for biophysical understanding

The Australian National Audit Office (2008) attributed its inability to measure returns to investment in NHT and NAP to lack of data. In similar vein the 2006 SOE Report initially used 263 indicators, but found there was useful national data on only 37% of these, some data for 51%, and no data for 12%, making a comprehensive national assessment impossible. There is a clear need for more data (Walker et al. 2006), and lack of data signals a lack of investment in its collection. However, the very large number of indicators used by the SOE, and the targets listed in the National Framework for Natural Resource Management Standards and Targets suggest that the organising frameworks for data collection and monitoring may be unsatisfactory. A satisfactory framework for biophysical data would take account of the factors below:

- Our biophysical systems supply diverse use and non-use, market and non-market values. It is useful to identify which biophysical functions support the generation of which values. Maintaining those processes maintains the flow of values. For example landscape function (the ability of a landscape to retain nutrients, soil and water) underpins both dryland agricultural production and the quality of runoff water, thus the quality of recreational use of the river and the conservation of its biodiversity;

- Trade-offs are often needed when realising values. For example, planting to benefit biodiversity conservation will commonly be in a different location and require different plant species if the primary goal is to control the rise of a water table. That said, there are many opportunities for realising multiple benefits from a single investment, but spatial and temporal understanding of biophysical processes is fundamental to investment decisions involving trade offs and multiple benefits;
- It is generally a small number of slowly-changing biophysical variables that control the ability of a system to continue delivering values to humans. Groundwater levels, soil depth and pH, perennial vegetation cover, and the area of breeding habitat for fish are examples. It is these variables that should be monitored, and it is not worthwhile to measure those variables that fluctuate rapidly;

It is useful to think of our country as a set of nested spatial hierarchies – landscape, catchment, basin, for a terrestrial example, or a catchment-to-coast hierarchy around our shores. Different variables and thresholds are important at each scale. It is necessary to specify and monitor at each scale.

The usefulness of targets

The concept of a target, as used in regional strategic plans, implies that the Regional Body has a duty to make the system better. That is often unrealistic, given the available resources. There is value in reducing projected losses, whether this means keeping the system in its current condition, or reducing the magnitude of projected losses. It is useful to think in terms of an acceptable range of change.

Objectives of reducing losses below those that would occur without an intervention, or of maintaining a system in a better condition than it might otherwise have been in, are valid reasons for investment, and far more realistic than targeting large improvements in response to small investments. Walker et al. (2006b) recognised this and therefore developed and applied a system for prioritising adaptation of irrigation regions in South Australia to rising water tables and salinisation under various scenarios of climatic change and water allocation.

It is important to acknowledge that many of our systems are highly variable, and that fluctuations are in many cases necessary for the maintenance of system resilience (Walker and Salt 2006). However, crossing thresholds can result in large and often irreversible losses in the values enjoyed by people. Examples are thresholds of water table depth, soil depth, and the cover of remnant native vegetation. Rather than setting targets, it is more useful to specify the thresholds within which we prefer a system to remain (Kinzig et al. 2006), and invest accordingly;

Term of Reference 2 - Building on the knowledge and experience gained to capitalise on existing networks and projects, and maintain commitment and momentum among land-holders

Key points

- Regional delivery has had varying success in building networks depending on the cooperation of private landholders and the local community for plan implementation
- A mixed model for capitalising on existing regional networks is most likely to succeed and would combine strengthening the current regional model, centrally run competitive processes, and increased involvement of local government. CSIRO recommends analysis of these three elements, and the combination of the best and the mutually compatible features into *Caring for Our Country*
- Bringing Indigenous peoples more centrally into NRM may help address the intractable issue of uplifting Indigenous socio-economic status, as well as developing sustainable land management systems, including in areas of high conservation significance

The networks and projects developed in previous natural resource management programs are based on a regional model of delivery and so CSIRO has reflected on this model in addressing how Australia might build on the knowledge and experience gained to date.

Our views are based on the premise that the extent, magnitude and duration of the NRM problems regional bodies have been expected to address are too large for the resources and time available. When the current version of the regional bodies was established this was recognised, but the current reduction in direct funding to the regional bodies may presage abandonment of this model. A national discussion paper, *Managing natural resources in rural Australia for a sustainable future* (National Natural Resource Management Task Force 1999) outlined the then proposed regional approach that was to form the foundations of the Natural Heritage Trust and National Action Plan for Salinity and Water Quality. This discussion paper noted that:

“In the next 10 to 15 years it is expected that with the assistance of governments, regions will build their capacity...to assist in developing and implementing strategies for sustainable natural resource management” (NNRMTE, 1999:35)

In 2008, the regional model of NRM delivery has only just reached the time anticipated to become established. These anticipated timeframes are important in evaluating the performance of the current model and the strategies presented below.

Volunteers

The National Landcare Program that preceded NHT1 assumed that engagement with farmers who volunteered to participate in NRM projects would generate the social networks and realise the motivation necessary to address NRM problems on and off-farm. Though participation rates by farmers reached about 30% (Curtis 1998), there was no measurable improvement in bio-physical systems. Nor were Curtis and de Lacy (1996) able to detect a difference in the stewardship ethic of Landcare participants in Victoria compared with non-participants. ‘Burnout’ of volunteers was a problem (Byron and Curtis 2002), but Curtis and de Lacy also noted the low levels of farm profitability, the vast scale and intractability of the problems, and that if programs were successful, large benefits from action would accrue off-farm, thus not providing any direct reward to the farmer.

These findings remain pertinent for NHT and *Caring for Our Country*. Equally pertinent is that failure of farmers to respond may reflect a lack of technologies or alternative management practises rather than insufficient incentives (Pannell 2001). Based on survey results, Marshall (2008) proposes that

better engagement of farmers in on-ground actions for the public good could nevertheless be secured through sub-regional bodies. He therefore advocates nesting sub regional bodies within the regional bodies and devolving resources and responsibilities accordingly.

The regional model of delivery

The regional model for NHT 2 was adopted because of strong support from a wide range of stakeholders, and acceptance of the need for a more strategic, collaborative, and devolved approach than had been followed under NHT 1 (ANAO 2008). Regional bodies were established in each of the 56 NRM regions because of their potential to integrate production, NRM and conservation, an intent favoured by the mix of targets required by the Commonwealth's 2008 National Framework for Natural Resource Management Standards and Targets.

(<http://www.nrm.gov.au/publications/frameworks/standards-targets-framework.html>). All sought a whole-of-system approach to NRM (Bellamy et al. 2002).

Specific catchment management legislation exists in Victoria, NSW and South Australia. In these three states legislation has devolved powers for planning and management directly to the catchment/regional level. Other states have policy commitments to catchment NRM and have made organisational changes to implement catchment management. Catchment Management Authorities in Victoria enjoy formal structures, power and funding. NSW Catchment Management Boards have no formal powers and limited capacity to raise and manage funds. Catchment Water Management Boards in SA are also established under legislation and have the capacity to raise funds but implement their strategies through other local bodies (such as local government and Local Action Planning Groups). In Queensland, Tasmania and WA, catchment authorities have no formal powers (eg. to implement catchment strategies) and limited capacity to raise funds (Bellamy et al. 2002).

Representativeness and Legitimacy

Instead of constitutional authority, the legitimacy of NRM arrangements depends on judgments about the process and outcomes of regional planning. It was envisaged that the independent, non-governmental status of regional bodies would facilitate planning processes inclusive of the range of stakeholders and community interests which, along with the diverse representation of regional body members, would provide the basis of their community support. This is reflected in the requirement that regional bodies should be representative of and accountable to the community (Commonwealth of Australia 2004). However, experience to date indicates that the membership of regional bodies favours particular interests, while less powerful interests are under-represented (Whelan & Oliver, 2005; Moore & Rockloff 2006). The legitimacy of regional NRM arrangements may ultimately depend on whether the national priorities are acceptable to stakeholders and the wider public (Wallington et al. 2008).

Although national priorities are presented as guidance for regional planning, regional bodies have been required to revise priorities developed through community engagement processes because they did not meet government criteria for accreditation (Paton et al., 2004). The practical result is considerable ambiguity with respect to the ownership of plans, and an associated loss of community ownership (Paton et al., 2004). If the targets and associated actions embodied in the regional NRM plan are seen as unacceptable, particularly by non-participants who did not view the process as legitimate, the implementation process may be challenged. This is a problem when Regional Bodies are highly dependent on the cooperation of private landholders and the local community for plan implementation. Where community members do not agree with the prescribed definition of the problem, and particularly when regional bodies are perceived by community groups as 'creatures of government' (Whelan & Oliver, 2005: 28), the legitimacy of community-based governance arrangements is undermined.

Regional Bodies and State and Territory Agencies

In practice, there is overlap of roles between regional bodies, and state and territory NRM agencies. This is increasingly managed by assigning agency staff to NRM committees and boards (Lockwood et al 2005). The regional bodies in every state and territory also depend on state/territory jurisdictional agencies for technical support, including data. These relationships carry transaction costs, but the regional bodies perform a valuable role as ‘bridging organisations’ (Olsson et al. 2006). Without them some other bridging arrangement would be needed, otherwise NRM could become an ineffective collection of uncoordinated interventions by different agencies. That was the prevailing situation that the regional model was intended to address (National Natural Resource Management Task Force 1999).

Regional Bodies and Local Government

The strength and effectiveness of linkages between regional bodies and local government are highly variable, and less strong than one would expect, given the seeming complementarity of their roles, and of the spatial and social scales at which they operate. Local government’s role in NRM is primarily established through its mandated functions in statutory land use planning and its direct management of environmental reserves and assets (SGS Economics and Planning 2005; McDonald and Weston 2004; Binning et al. 1999). Local governments are critical players in NRM and sustainability because they are the sphere of government closest to the community and the environment (Wild River 2005, 2006; Pini et al. 2007; ALGA 2007; Bates 1995; Adams and Hine 1999). As community leaders with a broad understanding of the issues within their municipality, local governments are well positioned to promote and integrate NRM.

The mechanisms available to local governments to assess and deliver NRM include plans, development incentives and strategic partnerships (McDonald and Weston 2004). Local governments have an opportunity to align their activities with regional NRM processes, priorities and actions (McDonald et al. 2005), but while regional funding programs form the largest share of NRM funds, local government has not previously been included as a participant in formal funding negotiations with the other levels of government. However, under *Caring for Our Country* there will be increased opportunity for local government participation in regional NRM delivery (Australian Government 2008).

Regional Bodies and Indigenous NRM

Indigenous interests have not fared well under NHT. Many regional bodies have Indigenous ‘representatives’, but very often such arrangements do not reflect the customary law systems of Indigenous authority over land, and are therefore not able to integrate the variety of Indigenous systems based on accumulated traditional ecological and management knowledge (Smyth et al. 2004, Hill et al. 2008) nor do they have authority to represent all, or perhaps any of the clans and tribes in a catchment. Some regional bodies were established within Indigenous land, but these organisations received less than 3% of NHT funds allocated between 1996 and 2005 (Hill et al. 2008). Nevertheless, Indigenous people continue exercising their responsibilities for environmental management through highly innovative projects, such as fire management for carbon abatement (http://savanna.ntu.edu.au/information/arnhem_fire_project.html).

NHT delivered less than 3% of total funds to Indigenous organisations. *Caring for Our Country* will provide from its budgeted \$2.25 billion over five years - \$90 million to employ additional Indigenous Rangers; \$50 million to expand the Indigenous Protected Area network; and \$10 million to assist Indigenous people enter the carbon trading market. While a welcome initiative, this total allocation of specific Indigenous NRM funding amounts to 6.7% of the whole, while 20% of Australia is Indigenous estate (Lane and Williams, 2008).

Of course, area is not the only consideration in prioritising funds for NRM. Severity of NRM problems, likelihood of repair, and value of the asset should all be considered (Hajkowicz and McDonald 2006; Hajkowicz 2007a; Pannell and Roberts 2008). Recent analysis shows that much of the Indigenous estate is of high conservation significance (Altman et al. 2007). Another major consideration is the emerging evidence that engagement in NRM can improve Indigenous socio-

economic status. Garnett and Sithole (2007) found that Indigenous people taking part in contemporary NRM, particularly those living on their traditional lands, exhibited lower rates of diabetes and lower levels of cardio-vascular disease, and that there was a significant inverse association between these health risks and levels of NRM participation. Bringing Indigenous peoples more centrally into NRM therefore may help address the intractable issue of uplifting Indigenous socio-economic status, as well as developing sustainable land management systems, including in areas of high conservation significance (Hill and Williams 2008).

High quality engagement processes can overcome Indigenous marginality to some extent. However, structural factors critical to building national-level policy responses to overcome Indigenous marginalisation in NRM require attention. Hill and Williams (2008) recommend:

- recognition of the significance of Indigenous NRM in the Australian landscape;
- recognition of the role of Indigenous NGOs with a focus on environmental management as critical agents for success within this polity;
- linking of the NRM processes to Native Title processes
- recognition of the role of brokering organisations who can partner with Indigenous NGOs.

Options for capitalising on existing regional networks

The options discussed below are simplified to bring out the advantages and disadvantages of ‘pure’ strategies. In practice we expect elements would be drawn from each of the strategies in a ‘mixed model’. Some improvements as outlined in other sections of this submission would be relevant in any of the models.

Option 1 - Strengthening the current model

The option of strengthening the regional model builds on the experiences of regional-scale NRM, associated social networks and local knowledge, and enables the regional bodies to achieve specified outcomes by increasing their resources, and promoting the generic changes to NRM outlined elsewhere in this submission.

Under this option the motivation, planning, social networks, skills, knowledge and experience accumulated under NHT 2 are deployed in *Caring for Our Country*. The set up costs have already been paid, and because of the social networks, transaction costs are expected to be less (Marshall 2005), leaving a higher proportion of resources for on-ground actions, monitoring and learning. The regional body would continue to be a bridge across the various government portfolios, and between resource production and other values. Most importantly, the regional bodies would enable investment within catchments (and potentially across bioregions – Brunckhorst 2000). Set against this are questions about the legitimacy and representativeness of the regional bodies that we discussed in section 2.

Based on assessment of the past experience, CSIRO suggests that three key strategies would contribute to a strengthening of the current model:

(i) A tighter scope

Earlier arrangements required regional bodies to plan for multiple targets and coordinate resource management activities across multiple interests and agencies at different scales. Experience from the last decade suggests that the more successful regions have been those with tighter focus on fewer issues.

(ii) Cross regional cooperation

Regional bodies in Queensland, Western Australia and the Northern Territory have been increasing the level of cooperation between neighbouring regional bodies – for example the Wet Tropics Region in

far North Queensland has provided technical and administrative support to neighbouring regions through its funds, management and contracting capabilities.

This cross-regional cooperation or alliances between regional bodies has also allowed major landscape scale issues such as pest animal and weed management, fire and diffuse water quality pollution to be addressed more effectively, unrestricted by regional boundaries.

(iii) Devolving resources and authority to the requisite level

International and Australian studies provide evidence that devolving authority and resources to lower levels increases their effectiveness without necessarily increasing transaction costs (Marshall 2005). Levels of authority and funding for regional and sub-regional bodies should all be reconsidered in any strategy for strengthening the regional model.

(iv) Maintaining involvement from the States and Territories

Regional bodies and their networks are not a cure-all for NRM and biodiversity conservation problems (Lane et al. 2004). States and territories still fund a high proportion of public expenditure on NRM and most expenditure on environmental management in general. The major gains from regional NRM will require the maintenance of State involvement and contribution, as the voluntary, incentivised and partnership modes of NRM delivery work most effectively when in concert with the state agencies. Caring for our Country will achieve its full potential only by maintaining and building on these links.

Option 2 - A Centrally-run Competitive Model

Under the 'pure' version of this option the regional bodies are phased out, and the Commonwealth operates a competitive system. Regional objectives, outcomes and priorities would be set by the Commonwealth in negotiation with state/territory governments. The current regions could be used. New bilateral cost-sharing agreements might be negotiated between the Commonwealth Government and the state/territory governments. Funds currently used to cover the fixed costs of the regional bodies are used instead to cover any increase in the fixed costs of administering the program centrally, but there are likely to be economies of scale which could be used for on-ground actions. Actions would be carried out by NGOs or landholders competing to take up MBIs, with the advantages for innovation and efficiency that we discussed in section 2.

It may be effective at the property scale. However, many of the NRM problems at property scale, such as soil acidity and soil structural decline, should fall under the duty of care obligations of the landholder. Addressing off-farm problems such as broad scale salinisation and biodiversity decline contributes to the public good, and requires solutions at scales of the river basin, catchment or bio-region, because solutions require on-ground works to be in the right location, well-functioning social networks, and sharing of local and scientific knowledge.

A more centralist approach may increase transaction costs, and it would fragment planning and management, and may erode trust and cooperation between catchment groups and industry sectors that have for example resulted recently in major joint proposals under the Commonwealth Government's \$200m Reef Rescue package (see <http://www.nrm.gov.au>).

Option 3 – A Local Government Model

In the pure version of this option local governments take over NRM and conservation from the regional bodies. Local governments are already part of local social networks, they are legitimated by elections, their control over land use and the environment are supported by laws, and they have local knowledge. Their scale of operation is suitable for landscape management (except that shire boundaries cut through landscapes) but may be too local for catchment management. However, shires already amalgamate voluntarily to form regional groups for addressing issues at a broader scale, and

this could also apply to NRM. Substantial increases would be needed in financial and human resources, and the ‘roads, rates and rubbish’ mind set would need to change.

Research into the role and contribution of local governments as natural resource and environmental managers (Pini et al. 2007) identifies three constraints:

- the disparity between metropolitan, near-metropolitan and rural and remote councils in their financial and human capability to engage effectively in the NRM agenda;
- the tensions between local, regional and national level priorities; and
- lack of acceptance by many local councils that natural resource management constitutes core business and requires a greater emphasis on local sustainable development.

Particularly amongst rural and remote councils there are also perceptions that national and state governments shift responsibilities for NRM to local government without offering requisite resources.

There are however many positive signs and opportunities. Where amalgamation of local councils has been undertaken or is planned there is opportunity to consider the means and resources by which newer, larger councils may improve their contribution.

Local Government Associations at State and national levels are playing an increasingly important role in policy formation, training, coordination and capacity building of individual local councils to be effective natural resource managers. The Associations have also adopted in recent years a strongly collaborative approach, participating on joint steering committees at state level and in national level fora.

Option 4 - A mixed model

A model that mixes the strategies is likely to be more feasible and more useful than any one of the pure models. There may be potential to examine the effectiveness of council amalgamations which have taken place recently in Queensland, in terms of their effectiveness in this regard. It may be an advantage to bring the contradictory imperatives of NRM and conservation together with regional and local development needs. Development control and environmental legislation now administered by local governments would be applied by the new regional councils. The current advantages of the regional bodies would be enhanced by this, and they would gain legitimacy and the opportunity to become representative.

CSIRO recommends analysis of the three pure options, and the combination of the best and the mutually compatible features into Caring for Our Country. In a more radical extension, much could be learned by implementing variants in different states then comparing and contrasting the consequences. This experiment would be well suited to the environmental and economic uncertainties we face, because lessons from the experiment could be used to improve policy design. We envisage a new approach to policy-making that incorporates experimentation, and in which monitoring and evaluation are built into an adaptive policy making system.

Term of Reference 3 - The overall costs and benefits of a regional approach to planning and management

Key points

- In relative terms Australia's investment in natural resource management is small. CSIRO suggests governments consider whether Australia's level of investment is appropriate to the scale of environmental issues it is trying to address.
- Despite recommendations to focus investment in priority areas, in past practice the division of the country into regions probably discouraged such focus, and the total investment was spread too thinly to produce a measurable return.
- CSIRO concurs with ANAO that because of the lack of apparent returns to previous investments in NRM, future funding should be targeted towards the highest priorities and the most critical national assets. In order to target investment, CSIRO suggests more extensive application of methods for appraising and evaluating the cost effectiveness of investments in NRM
- Measuring the benefits of a regional approach is difficult, given the lack of capability to link expenditure to outcomes, and a standardised system for measuring and valuing outcomes

Since 1996/97 \$2.8 billion has been allocated to NHT, which was established to 'conserve, repair and replenish Australia's natural capital infrastructure' (Natural Heritage Trust of Australia Act 1997, s.3, p.3.). The aim of the NAP was to address dryland salinity and improve water quality, for which \$700m was allocated over eight years.

The Commonwealth's investment in NHT and NAP equates to about 0.8 % of the gross value of production (Hajkowicz 2008). To the NHT and NAP investment must be added expenditure by states and territories. State funding matched the Commonwealth contribution to the NAP. Comparable figures are not available for NHT but if state funding matched Commonwealth contributions this would bring the investment in these two programs to about 1.6% of the gross value of agricultural production. The amount spent per hectare of rangeland and cropland in Australia is low because of the large area of the rangelands.

The Commonwealth's contribution is about \$0.63/ha/y, or nearly double that if state contributions to NAP and NHT are included. For cropland alone it is around \$11.60/ha/y for the Commonwealth component, which might reach twice that amount with state contributions. Agri-environmental expenditure in the European Community is about A\$16.90/ha/y, and for the USA A\$15.39/ha/y (Hajkowicz 2008). There is little evidence from the USA and Europe that the states of their environments are responding adequately to these levels of funding, and are becoming better prepared for climatic change.

Caring for Our Country currently projects a 54% increase in the Commonwealth's investment. While welcome, this remains relatively small given the scale of issues to be addressed. CSIRO suggests that governments consider whether Australia's level of investment is appropriate to the scale of environmental issues it is trying to address, given the level of dependence on them for wellbeing and wealth, the severity of degradation, the degradation processes that are in train but yet to be expressed, the growing impacts from development and climatic change, and the continuing downward trend in condition that is predicted for many resources.

In recognising the extent and magnitude of Australia's natural resource management problems, the National Natural Resource Management Task Force (1999, p7) :

"On the basis of current knowledge and management techniques, however, it will not be economically or technically possible to rehabilitate all affected areas. There will be areas that we cannot prevent from becoming irretrievably degraded."

The Task Force report then stresses the need to focus on priority areas. In practice, the division of the country into 56 regions, each with a regional body requiring some level of funding probably discouraged focus on particular regions, and the small total investment was spread too thinly to produce a measurable return even had the measurements been more effective. IRO recommends more extensive application of methods for appraising and evaluating the cost effectiveness of investments in NRM (Hajkowicz 2007a, and Pannell and Roberts 2008).

Establishing regional bodies costs money. Around 51 % of NHT expenditure between 2002 and 2006 was for on-ground actions. The other 49% was spent on resource assessment, planning, capacity building and administration (Australian Government 2007). There has been significant progress in planning and partnership capability at the regional level. However, this is not distributed uniformly across the country nor within society (Robins and Dovers 2007; McDonald et al. 2005; Taylor et al. 2006).

CSIRO concurs with ANAO (2008) that because of the lack of apparent returns to previous investments in NRM, future funding should be targeted towards the highest priorities and the most critical national assets. Similar views are forming in the USA and the European Community.

Measuring benefits

Measuring the benefits of the regional approach is difficult, given the lack of capability to link expenditure to outcomes, and a standardised system for measuring and valuing outcomes (Hajkowicz 2008). Their lack makes the allocation of funds and learning from the outcomes difficult. CSIRO has developed multi-criteria methods to address this lack (Hajkowicz et al. 2007 a, b), and Pannell (2008) has developed the Investment Framework for Environmental Resources and Management Strategy Evaluation methods. Meanwhile, as reported above, the investment in MBIs has promoted the design of metrics for appraisal of investments and evaluation of outcomes (Gibbons et al. 2005; DSE 2004; Oliver and Peterson 2003). CSIRO is also developing metrics for application at the national, and at the local scales

Term of Reference 4 - The need for a long-term strategic approach to natural resource management (NRM) at the national level

Key points

- Essential ingredients to a long term strategic approach are applied research linked to adaptive management, with regional successes and failures being shared at national scale
- There is an opportunity to facilitate learning and adaptive management through a national forum on NRM.

As discussed previously, the timeframe for effective regional delivery is just now being reached, although delivery programs have changed on a shorter timeframe.

The importance of monitoring, evaluation, learning and knowledge, all of which contribute to developing a long term strategic approach to NRM, are already recognised in NHT and NAP. Essential ingredients to this approach are applied research linked to adaptive management, with successes and failures from the NRM regions being shared at national scale.

Walker et al. 2006 advocated key principles for linking applied research and NRM, which remain relevant to the implementation of the *Caring for Country Program*. These principles suggest the need to:

- establish a common reporting framework on resource condition and management outcomes
- capture information through regional monitoring and evaluation within an adaptive management cycle;
- develop conceptual frameworks, predictive models and tools, and to support training in their use by regional bodies;
- support partnerships between users and research providers and knowledge brokering to translate science into practical terms, and extension activities to increase adoption and application;
- build networks of knowledge brokers to have formal linkage to research providers;
- find common needs among the regions, develop collaborations and realise economies of scale;
- pool funds so science can be resourced in a strategic way to meet regional needs;
- use adaptive management to highlight and share lessons learned, discourage duplication, encourage effective use of funding, and as a means to feed information to research organisations;
- plan and implement research to meet both operational management needs and provide research continuity necessary to understand long term progress and test conceptual frameworks.

There is an opportunity to facilitate learning, and a long term national approach through an annual national forum for NRM. The International Rivers Symposium, held annually in Brisbane is an example of such an event. Currently there is no national event where practitioners, researchers and policy makers can regularly meet and exchange experiences and information. This kind of knowledge exchange is critical to identify successes and failures and learn in the longer term.

Terms of Reference 5 and 6 - Capacity to engage land managers, resource users and the wider community to deliver on-the-ground NRM outcomes as a result of the recent changes under the Caring for our Country program, and the extent to which the program represents a comprehensive approach to meeting Australia's future NRM needs

Key points

- It is difficult to provide comment, given that when the business plan and detailed priority framework for *Caring for Our Country* have yet to be released for public scrutiny.
- There are risks of losing momentum associated with the current one year transitional funding arrangement, and in inadvertently removing incentives to cooperate. A competitive premium might be applied to proposals demonstrating partnering

There are two key risks associated with the *Caring for Our Country* program. The first is the potential loss of momentum, strategic focus and continuity associated with a transitional, one year funding arrangement. The transition from the first to the second phase of NHT resulted in the marginalisation of individual land managers and local communities through the suspension of funding for local action (McDonald et al. 2005; Whelan and Oliver 2005). The transitional funding arrangements for *Caring for Our Country* risk disrupting or impeding current efforts in regional delivery by seeking relatively short term, small-scale projects, the development of which requires similar transaction costs in stakeholder discussion and coordination as would larger, more strategic, longer term investments.

The second risk the current program arrangements present is the unwinding of hard-won alliances, coalitions or partnerships between resource managers and users from regional body, state and industry sectors due to perceived shifts in funding from collaborative to more competitive modes. It is not the competition for funds as such that presents the risk. It is the possibility of that mode removing the incentive to cooperate. Instead a competitive premium might be applied to investment proposals that demonstrate greater levels of partnering.

In some instances, the *Caring for our Country* program has been presented as a one-stop-shop for NRM funding in Australia. This is not the case, nor can it be under existing frameworks. It represents a step in the right direction for comprehensive federal funding, but there remains a complicated and highly fragmented structure for NRM funding when one looks across all NRM industry sectors. There are still many organisations handing out small amounts of money for short-term projects without a monitoring component or measures of success.

The strengths of the new program design lie in clearly articulating outcomes which the Australian government is looking to address. This greater problem-based and geographical focus presents a genuine opportunity to limit the transaction cost of regional bodies and their partners seeking to engage in a diverse range of issues across large areas with multiple partners.

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Appendix 1 Terms of Reference

the lessons learned from the successes and failures of three decades of Commonwealth investment in resource management including Landcare, the National Heritage Trust, The National Action Plan on Salinity and Water Quality, and other national programs, x

how we can best build on the knowledge and experience gained from these programs to capitalise on existing networks and projects, and maintain commitment and momentum among land-holders, x

the overall costs and benefits of a regional approach to planning and management of Australia's catchments, coasts and other natural resources,

the need for a long-term strategic approach to natural resource management (NRM) at the national level, x

the capacity of regional NRM groups, catchment management organisations and other national conservation networks to engage land managers, resource users and the wider community to deliver on-the-ground NRM outcomes as a result of the recent changes to funding arrangements under the Caring for our Country program, and x

the extent to which the Caring for our Country program represents a comprehensive approach to meeting Australia's future NRM needs

Appendix 2 CSIRO's relevant expertise

It is essential that the management of Australia's natural resources is based on the best available science and technology. CSIRO has core strengths in marine, atmospheric, terrestrial and climate science and in the cross-scale, interdisciplinary approaches needed to address natural resource management issues. CSIRO has a proven track record in providing whole-of-system analyses and decision-relevant technologies and information to support Australia's governments, communities, policymakers and regional bodies in managing natural resources.

Our strengths include:

- National coverage, capacity to undertake interdisciplinary science and to transfer and apply knowledge developed in different contexts,;
- Strong linkages to industry practitioners, policymakers, community leaders and the general research community and our commitment to undertaking relevant, credible and legitimate science enhancing prospects for achieving impact;
- Whole-of-system analysis capability, including climate science, biophysical, economic and social impacts and the likely responses of resource users to policy changes.
- CSIRO does not have the vested interests of a particular jurisdiction or industry. Its ability to connect terrestrial, marine, agricultural, social and economics sciences, ICT, mining, energy and water R&D release it from the narrowness of analysis imposed by use of a single discipline;
- A long history of participative research with governments and communities undergoing or preparing for social and environmental changes.

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