report

NRM Governance for change: Revisiting 'good' governance through an adaptive lens

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Attachment 1
Report to Land and Water Australia as part of the
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Pathways to good practice in Australian NRM governance

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1   Introduction

1.1   Purposes of the paper

This paper is an addendum to the *Pathways to good practice in NRM governance* Phase 1 series of reports and scholarly papers funded by Land & Water Australia from 2005 to 2008 (see Section 1.2). As part of a second phase of the project, we undertook to (i) undertake a comparative analysis of the various natural resource management (NRM) audit and assessment instruments; and (ii) test the applicability of our *Standard and Assessment Framework* in jurisdictions where we had not previously worked (in Phase 1), and where necessary make adjustments to extend the applicability of the instrument.

However, in discussions with the Australian Government NRM team, as well as Land & Water Australia managers and a number of our regional partners, it was evident that, given the changes in NRM governance under *Caring for Our Country* and the dynamic nature of the NRM policy and delivery environment, our two original purposes needed to be adjusted to remain relevant (we say more on this in Section 1.2). In particular, these discussions highlighted a need to explore the notion of adaptive governance in relation to the outcomes from Phase 1, and undertake some exploratory field work around this concept. We therefore re-oriented our thinking from that represented in the original specification of Phase 2 and adjusted the work around two main purposes:

1.   To extend the earlier *Pathways* work by exploring the extent to which the Principles and Standard and Assessment Framework developed in Phase 1 address the need for adaptive governance.

2.   To revisit the various NRM governance and management assessment frameworks, including the one developed in Phase 1 of the *Pathways* project, for fit with adaptive thinking, and reflect on their potential use in assessment of preparedness for change among NRM organisations.

This report details the outcomes from these two explorations. The strands of activity we used to address these purposes included:

- A desktop re-examination of the principles of good governance adopted in earlier *Pathways* reports with the aim of strengthening the adaptive aspects. This involved a brief review of the concept of adaptive governance and related concepts like resilience.
- Discussions about governance for change with three different regional NRM organisations operating in different institutional frameworks (and not partners in the *Pathways* work). As noted above, this exercise was originally intended just to verify the applicability of the *Governance Standard and Assessment Framework* developed in the *Pathways* project to other jurisdictions. However as we started to reframe change as an important context for NRM governance, the purpose of these visits shifted to how these organisations are governing for change in general and in particular responding to current institutional and impending ecological shocks.

- Further development of the relationships between governance and management quality dimensions of effectiveness, including consideration of the roles of various NRM assessment instruments.

Figure 1 shows the connections between these explorations. Through these, we offer reflections on where adaptive thinking is taking us in relation to good NRM governance and what capacity we currently have to evaluate the adaptive dimension of NRM governance.

Figure 1: Some avenues of reflection on governance for change
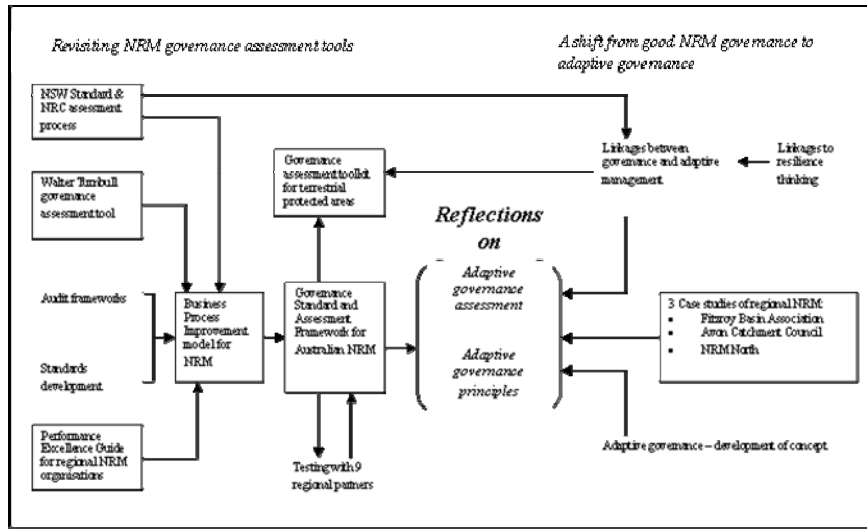
1.2 *Background*

In the first *Pathways* report (Davidson *et al.* 2005), the research team drew on the extensive governance literature and expert opinion to list and evaluate principles of good governance with relevance to NRM and sustainability. They then articulated a core set of eight principles of good governance and their origins in ethical, rationality and normative foundations. The eight principles were:

- legitimacy
- accountability
- transparency
- inclusiveness
- fairness
- integration
- capability
- adaptability.

After describing the NRM governance system and institutional frameworks operating in Australia at the time, the team went on to work with nine regional partners and three State agency partners to tailor the key principles to NRM in practice and to develop a well received *Governance Standard and Assessment Framework* (Lockwood *et al.*, 2007) based on the core set of principles for good regional NRM governance. This framework drew conceptually on a number of pre-existing governance assessment tools and on experience of partners with their application in NRM. Good governance benchmarks for each of the eight principles were framed as desired outcomes typical of non-prescriptive standards and then supported by some indicators of achievement and, to encourage further development and improvement, by signposts to innovation. Field testing of the framework also generated some good practice examples.

In late 2007 a tipping point was reached both in Australia and globally around climate change. It seemed that the general public had become aware of the need to act in some way and was seeking leadership and guidance on how to do so – whether to either mitigate and/or to make new provisions to cope with the impending changes. At the same time, and at least in part connected to that tipping point, a new national government came to power in Australia. It set about making changes to both the NRM program suite previously described (Lockwood *et al.,* 2007) and the institutional arrangements for investment and service delivery under a single new program – *Caring for Our Country* (CfOC). A third big shock, the global financial meltdown, followed over the course of 2008.

As a consequence, natural resource management organisations and particularly regional bodies that had flourished under the previous national system of program delivery were suddenly faced with significant institutional change - as well as ecological, social and economic shocks.

These events led the research team to review whether notions of 'good governance' which had developed under relative stability in social-ecological landscapes were sufficiently robust to provide guidance during periods of more rapid change characterised by complexity, uncertainty and surprise.

In addressing this question, we scope how concepts like adaptive governance might be applied to better fit NRM organisations and NRM meta-governance systems for a changing world. In doing so, we update the normative conditions under which notions of what is meant by 'good' in 'good governance' are decided and make a case for a stronger adaptive component to be recognised and implemented. Thus if good governance is to take more account of change, it will need to place new emphasis on connectivity and resilience including inbuilt adaptability and transformability, while retaining the key attributes of legitimacy, transparency, accountability, inclusiveness and fairness.

1.3   *Data collection*

The data gathering activities for this phase of the *Pathways* project involved discussions with the Australian NRM Team concerning their intentions for governance assessment, visits to three regional NRM organisations that had not previously been involved in the project, and discussion with the Director of the WA

NRM Team. In each case, the three regional visits entailed several hours of discussions with the general manager and a workshop of three to four hours with senior management and board members. Seven board members, the CEO and Mr John Holley, Director of WA NRM, attended the Avon Catchment Council workshop. Eight board members, the CEO and two senior management staff attended the Fitzroy Basin Group workshop while five board members, the CEO and three senior management staff participated in the NRM North workshop.

The research questions formulated for the visits were:

- Did the three new partner regional NRM bodies see a need to rethink governance in the light of institutional changes to NRM in Australia and if so what factors influenced this perception?
- How are these particular regional NRM bodies adjusting to and preparing for change generally and how do these adjustments match to our theoretical adaptive governance attributes?
- Were there any particular examples of adaptive governance that benefit dissemination as either good practice or signposts of innovation?

1.4 Report structure

In **Section 2** the idea of adaptive governance is introduced and its relationship with other contemporary ways of framing sustainability and NRM such as resilience thinking outlined.

The principles of good NRM governance adopted by the *Pathways* team are then revisited through an adaptive lens in **Section 3**.

Section 4 sets out the learning gained from site visits to three additional regional NRM organisations in relation to their response to and readiness for significant institutional and ecological change.

In **Section 5** we discuss opportunities to include an adaptive management quality dimension into governance assessment tools, based on an understanding of the standards and governance assessment models which have informed the *Pathways* project.

Finally, in **Section 6** we consider the implications of the research for regional NRM organisations and the NRM system and we briefly raise some issues for future adaptive governance research.

2 Revisiting 'good governance' with an adaptive lens

2.1 What is adaptive governance?

Rather than start with a single definition of adaptive governance we start here with a diagram (see Figure 2) developed by Louis Lebel and colleagues from the Resilience Alliance. It is useful because it makes four key points that will help structure the discussion:

1. A strong link between sustainability, governance and resilience is recognised and illustrated.
2. Some key attributes of governance are put forward which will provide a starting point for describing principles of adaptive governance.
3. The importance of self organisation and learning in the adaptive thinking/ resilience thinking complex is highlighted.
4. A separation of the notion of capacities to manage from the notion of governance.

Figure 2: The relationship between resilience, the capacity to act and governance as critical factors for sustainability (from Lebel *et al.,* 2006)
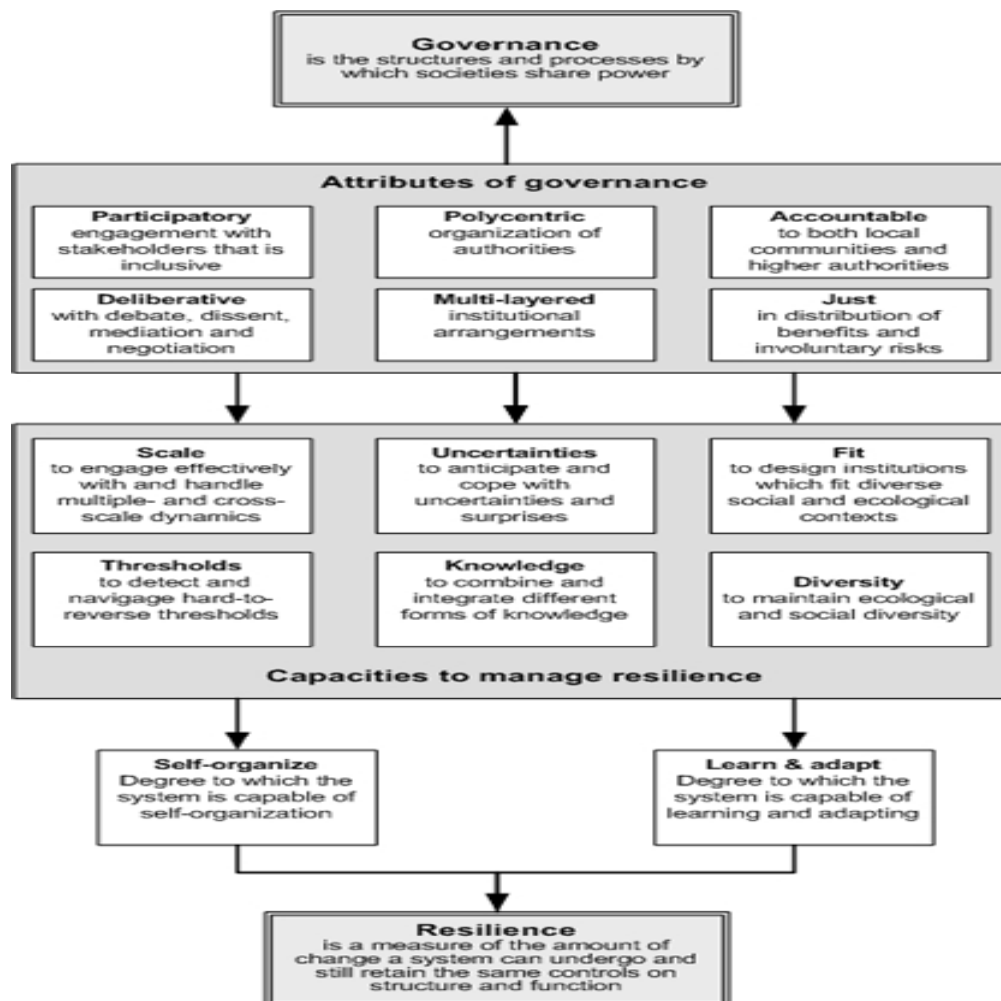
2.1.1   Sustainability, governance and resilience

In a paper to an international sustainable development conference, Griffith (2000)
conceptualised *Our Common Future* – the report of the World Commission on
Environment and Development (1987) as partly a discourse on governance. That
perspective focuses on sustainability as it is now most commonly termed as a process
or more correctly a series of decentred contextual processes. At times the process is
slow and gradual in keeping with relative stability of approach (transactional change)
while at other times turbulence and disorganisation call for abrupt and profound
change (transformational change). In later work Griffith outlined some principles of
governance for sustainability including a principle on adaptiveness (Griffith, 2002)
and highlighted the need for more attention to what is now known as transformability
(Walker *et al.*, 2004) when developing governance arrangements.

This connection between adaptive forms of governance and sustainability has been
reinforced in a number of influential forums such as the National Research Council of
the United States National Academy of Sciences (NRC-NAS, 1999). Commentators
like Backstrand (2003), Waltner-Toews (2005) and Bellamy (2006) have also
emphasised that a new sustainability science is not enough to manage sustainability
and pointed to a clear and essential role for adaptive and deliberative forms of
governance in deciding future development pathways.

Both sustainability and NRM can be conceptualised as 'wicked problems'. These are
problems identified by Rittel & Webber back in 1973 that are socially constructed
within a complex society and cannot be managed with simple solutions. They are
generally persistent, complex, non-linear, cannot be clearly delineated, span scalar
boundaries, have long time horizons and there are often no clear responsibility or
accountability arrangements. By the time the current crop of policy initiatives has
been implemented, the problem has changed as a result of complex interactions
between policy, human action, reflexivity and underlying system dynamics (Griffith,
2002) These wicked problems also matter – that is, they have significant social,
economic and ecological consequences (Bellamy, 2006). Adaptive governance is seen
as a means of dealing with wicked problems in an ongoing way.

Strong links between more adaptive forms of governance and sustainability were
reinforced by the expert panel that assisted in the *Pathways* project (see Davidson,
2006). The influence of big societal change agendas like sustainability and neo-
liberalism on governance and their hybridising effects were explored further by
Davidson *et al.* (2007).

The connection is also well established in the resilience literature (Lebel *et al.,* 2006;
Walker *et al.,* 2004; Folke *et al.,* 2003; Folke *et al.,* 2005). Sustainability is
conceptualised in resilience terms as the likelihood that a particular system of
resource use will persist indefinitely without a decline in the resource base or the
social welfare it delivers (Walker & Salt, 2006). Like sustainability, resilience
thinking is based around the dynamics of linked human and natural systems and has
its origins in complex systems theory and understandings of the dynamics of
ecosystems far from equilibrium (Gunderson & Holling, 2002). While much of the
resource management policy is focused on single issues, a steady state view and only
gradual change, resilience thinking is about system wide processes, the recognition of

feedbacks between the social and ecological dimensions of these systems in cycles of growth and decay, and the interplay between gradual and abrupt change (Folke *et al.*, 2005). Thus resilience is also a discourse and a set of heuristics about change – about the capacity of these linked social-ecological systems to absorb disturbance and still behave in much the same way (Walker & Salt 2006).

While much of the resilience literature is complex systems science based, there is increasing space devoted to exploring the part played by adaptive forms of governance in system resilience and in the adaptability/transformability tension. Carpenter and Brock (2009) have recently suggested that resilience thinking has broadened from earlier definitions and now encapsulates three dimensions:

- the amount of change the system can undergo and still retain the same controls on function and structure (the more well known tenet, eg Walker & Salt, 2006)
- the degree to which the system is capable of self-organisation
- the ability to build and increase the capacity for learning and adaptation.

Having established the role of adaptive governance in pursuing sustainability, its links to resilience thinking and to NRM as both a wicked problem and a sustainability seeking endeavour, we can now try to put some more detail around the concept.

2.1.2 <u>Attributes of adaptive governance</u>

Early in the *Pathways* project we drew on work by Graham *et al.* (2003) to define governance as the interaction of formal and informal structures and processes that influence the way power and authority are exercised, the way decisions are taken, and how citizens have their say. As Figure 3 illustrates, governance can be driven either from left to right or from right to left.

Figure 3: Governance as an explicit/implicit tension

The interactions between:

Structures

Processes

Relationships   Determines, influences or allows

Rules

Systems

Values

Traditions

The way power and authority are exercised or controlled

How decisions are made

How the community and stakeholders have their say
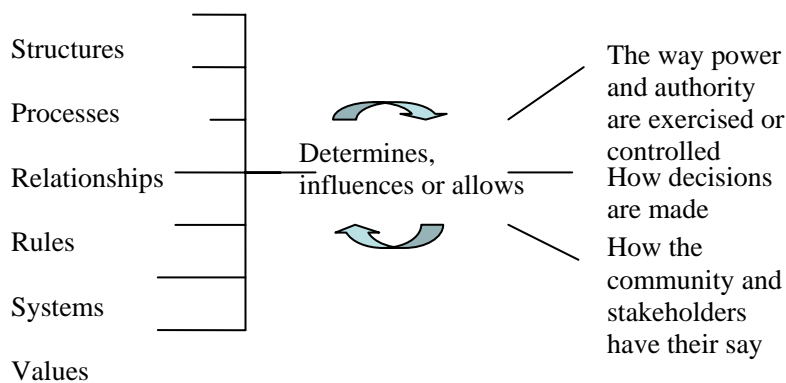
Rigid structures and stable or fixed processes are efficient and predictable and are appropriate for times of stability and slow change. However, dynamism and self-organisation are now widely accepted as characteristic of both social systems (Giddens, 1990) and of ecological systems (Holling, 1973; Capra, 1997). Humans both react to this dynamism and at the same time play a strong role in shaping it.

Adaptive governance is essentially a form of governance that recognises the importance of this engagement and interaction with change, complexity and uncertainty. There are a number of different expressions of the concept in the literature which suggests that the concept is still under development.

According to Lebel *et al.* (2006), this type of governance system must enable the capacity to cope and adapt, the conservation of sources of innovation and renewal and ultimately resilience (see Figure 2). They go on to suggest that:

- **participation** builds trust
- **deliberation** leads to shared understanding needed to mobilise and self organise
- **polycentric** and **multi-layered** institutions improve the fit between knowledge, action and social-ecological contexts in ways that allow societies to respond more adaptively at appropriate levels
- **accountable** authorities that pursue **just** distributions of benefits and involuntary risks enhance adaptive capacity of vulnerable groups and society as a whole.

In what is still perhaps the seminal paper on adaptive governance, Folke *et al.* (2005) refer to adaptive governanace as the social dimension of adaptive co-management of ecosystems and landscapes. They put forward four key attributes that allow human societies to respond to and shape change and build resilience. The authors stress that a strength in any of these attributes for gradual adaptation may be a weakness when it comes to transformation. The attributes are:

- **System dynamics focused knowledge** – as opposed to detailed knowledge of parts of the system;
- **Collective social learning** – because system self-organisation leads to greater uncertainty, understanding of system dynamics has to be tested and continually updated and adjusted while sense making derives from multiple sources and requires deliberative processes;
- **Adaptive co-management** – the above knowledge and learning set in flexible networks of collaboration and nested quasi-autonomous decision-making units operating at multiple scales;
- **Social capital** – consisting of the social relationships and networks (sometimes known as policy communities or epistemic communities) in which social memory and system dynamics knowledge reside and trust which is built through collaboration and adaptation; and
- **Preparation for uncertainty and surprise** – the extension of social capital that is the repository and fertile ground for innovation and renewal including exploration and testing of alternative futures.

While a different language is used and the relative scale of concepts is sometimes reversed, other authors like Bellamy (2006) generally incorporate similar ideas in

their fleshing out of adaptive governance. Both Bellamy and Lebel also add more traditional good governance notions like accountability and justice to the mix.

In many ways adaptive governance is a form of new governance or environmental governance (see Davidson *et al.*, 2006 for explanation of these trends) informed by more focused attention on change and system dynamics.

2.1.3   <u>Operationalising adaptive governance</u>

Adaptive management is an older concept than adaptive governance. Lebel and a number of other authors (Olsson *et al.*, 2006; Waltner-Toews & Kay, 2005; Berkes *et al.*, 2003; Walker *et al.*, 2003) have made the point that adaptive governance and adaptive management or adaptive co-management are two sides of the one coin with both dimensions being necessary to effectively manage a transition to sustainable forms of resource use. Folke *et al.* (2005) have also asserted that adaptive co-management is the way that adaptive governance is operationalised.

It is not intended to delve further into the theoretical nuances of adaptive management here since that has been well covered elsewhere (see Holling, 1978 and Allan & Curtis, 2005 as starting points). What we do want to emphasise is that there is both a distinction between management and governance as well as much overlap in these two concepts and to highlight that the relationship is a topic area that deserves much more attention in NRM. For example, Lebel's illustration (Figure 2) facilitated recognition by the research team of the close similarity between what he describes as capacities for resilience and the components of the *NSW Standard for Quality NRM* (NRC, 2005). This recognition has triggered deeper reflection about the relationship between adaptive governance and adaptive management.

This standard was used as one of the key inputs to the development of a national quality framework for NRM (Griffith *et al.*, 2007) which in turn informed the development of the *Governance Standard and Assessment Framework* in the *Pathways* project. The components of the *NSW Standard for Quality NRM* are:

- use of best available knowledge
- community engagement
- determination of scale
- collaboration
- risk management
- monitoring and evaluation
- information management.

The intention of the NRC is that the standard be applied at all phases of the adaptive cycle of plan-do-audit-adapt (NRC, 2005). In that context the components are quality dimensions of adaptive management.

At the time, there was much discussion among the *Pathways* team around where the components of the NRC-developed framework fitted in relation to the emerging *Pathways* 'good governance' principles. Three options were canvassed:

1. The possibility that the components are an alternative set of principles of good governance was initially canvassed but dismissed. The components certainly relate to many of the second order attributes or dimensions of the *Pathways* principles but are more like quality dimensions of NRM business than governance.
2. A second possibility was that the components were the dimensions of the governance principle capacity. This explanation was feasible however some aspects of capacity like resource quantum and continuity are missing.
3. The third possibility was that each of the components of the *NSW Standard for Quality NRM* can be related to a governance principle. The matter was never satisfactorily resolved.

In his companion paper to this one, Lockwood (2009) draws on earlier work by Hockings *et al.* (2006) on protected area evaluation to put in train some further thinking around the relationship between governance quality and effectiveness and management effectiveness. Lockwood goes back to earlier *Pathways* work (Davidson *et al.*, 2005) to link governance principles which under the notion of 'good governance' are the quality dimension of governance to foundations in ethics, rationality and normative conditions. Via Hockings work he then links governance quality to effectiveness and then management to effectiveness. This development process led Lockwood to reframe the principle of capability from the *Pathways* set as a management response instead of a governance principle and thus capability was excluded from his revised set of governance principles.

In Section 5 this relationship between governance and management is developed further in relation to assessing governance performance in NRM. Before that reflection could be undertaken, it was necessary to revisit the principles of good NRM governance developed in the *Pathways* project accepting Lockwood's deletion of capability as a governance principle and its transference to management.

3   *Applying adaptive thinking to good governance*

In the *Pathways* project both researchers and partner organisations often confused whether the intended subject of the study was regional governance, organisational governance (which partners mostly called corporate governance) or the wider multi-level NRM framework of governance. To avoid that confusion we refer in this report to regional NRM governance as the network of different organisations making decisions at a regional scale. Organisational governance is the governance of a regional NRM body or other organisation managing NRM. The wider NRM framework spanning many institutional scales is now referred to as NRM meta-governance.

From the discussion of adaptive governance in Section 2, for the purposes of this paper, we are assuming that the key attributes of adaptive governance can be applied to all three scales of governance in NRM in Australia. This will require some language adjustment and giving prominence to different attributes and dimensions.

Two different approaches to recasting the *Pathways* principles from an adaptive thinking perspective are explored in Sections 3.2 and 3.3. These approaches are based on very different assumptions about the relationship of good governance to adaptive governance and have different strengths and weaknesses. The perception of the urgency and pervasiveness of the challenge associated with 'our' newly found appreciation of change would most likely guide whether one or the other becomes dominant. A hybrid solution using the attributes of adaptive governance associated with principles developed in option 2 as signposts to innovation in option 1 is offered as a potential way forward.

A brief discussion of how this thinking might apply regionally and to NRM meta-governance systems in the Australian context is undertaken in Section 3.4.

3.1   *Adaptive thinking as just one component of good governance*

The first approach explored essentially retains the basic set of core principles from the *Pathways* project but strengthens and recasts the principle of 'adaptability' to more adequately reflect recent literature on adaptive and resilience thinking. This choice of approach reinforces that 'good governance', while reflecting normative conditions, which can and do change over time, has deep foundations in ethics and rationality, which change much more slowly. Thus there is a strong case for retaining and giving equal prominence to principles such as transparency, inclusiveness and fairness rather than rolling them up as dimensions of other principles while strengthening and relabelling the more adaptive principles.

This approach is consistent with additional work by Lockwood (2009) to translate the *Pathways* principles into a toolkit for protected area management. The set of principles he arrived at are listed below though his description of each principle and the reasoning behind their development are not repeated here:

- legitimacy
- transparency
- accountability
- inclusiveness
- fairness
- connectivity (previously integration)
- resilience (previously adaptability).

There are three changes from the *Pathways* set of principles:

- **capability** has been omitted from the set and reframed as a management response
- **integration** has been relabelled by Lockwood as **connectivity** without making significant changes to the intent of the principle
- **adaptability** has been recast as **resilience** in the protected area context.

This continued experimentation with parcelling and labelling of complex, multi-dimensional principles highlights the importance of language and the semantics that arise in developing and using principles. It was an area that was problematic over the course of the *Pathways* project as the research team sought to manage the tension between maintaining a strong theoretical basis and tailoring for practice. Principles are meant to be foundational, slowly changing ideas and have an element of 'ought to' about them. While adaptive management has been developed conceptually and in use for some time now, adaptive governance is still emerging as a concept. With respect to an 'ought to' dimension, support for adaptive behaviour, and indeed recognition of non-linear science, is not universal either in theory or in practice. Together this means that no single label seems to fully capture the essence of governance for change. For example, adaptability and adaptiveness generate semantic problems when used as designations for principles in conjunction with the higher order term, adaptive governance. Reflexivity is another term that seems to capture a number of aspects of change under dynamic circumstances, including notions of intentional change, the idea that change happens as a result of many social interactions and activities, both planned and unplanned, and that change is recursive. The resilience language of adaptability and transformability can also be rolled up into reflexivity. On the down side, reflectivity is a very esoteric term and not in wide use outside the social sciences.

The term used by Lockwood to capture the essence of adaptive governance is resilience. He lists the important elements of resilient governance for protected areas as:

- finding the right balance between flexibility and security
- incorporating new knowledge and learning into decision making and implementation
- anticipation and management of threats, opportunities and associated risks
- systematic reflection on individual, organisational and system performance.

While these dimensions are getting closer to capturing the notion of adaptive governance as expressed by Folke and others, they could come under criticism for

glossing over the nuances of the resilience literature and for preferring the management-oriented language of change-over ideas such as reflexivity as a societal change process.

Assuming that the attribute of adaptive co-management is covered under the principle of 'connectivity', the remaining attributes put forward by Folke and his colleagues in Section 2 are incorporated below into a reworked version of Lockwood's 'resilience' principle.

Principle 7: Resilience - the ability/readiness to either absorb shocks/disturbance or to transform to a more desirable state.

Resilience is now necessary as a component of good NRM governance to accommodate complexity, uncertainty, surprise and increasing dynamism now associated with managing a transition to sustainable resource use in linked social-ecological systems.

Resilience for NRM regional bodies would be characterised by:

- system focused knowledge and receptiveness to feedback signals particularly ecological feedback in relation to slow variables and key thresholds
- a well-developed culture of deep reflection, collective social learning, respect for social memory and responsiveness to changing internal demands and external circumstances
- high levels of diversity and social capital (including shadow networks) that provide the source of innovation and renewal and the opportunity for self organisation
- readiness for uncertainty and surprise including some redundancy and modularity
- a balance between the flexibility inherent in the above attributes and an enduring sense of purpose or stewardship of the resource base.

3.2 The alternative: Good governance is now adaptive governance

The second option explored was to revisit the expert panel list of principles using the emerging lens of adaptive governance to guide the development of a more adaptive or change-ready set of governance principles. In other words as a response to changing normative conditions and a shift in emphasis on rationality, for the purpose of this exercise, we assumed that adaptive governance is now 'good' governance.

The shift in normative conditions relates to the increased public awareness of change and impending change associated with the tipping point mentioned earlier. The debate over climate change and willingness of voters to engage in the debate during and since the 2007 national election in Australia is an example. The idea of a shift in rationality or the connection between means and ends is a more difficult explanation. The three types of rationality (instrumental, bounded and communicative) described by Davidson (2006) and Lockwood (2009) are still relevant. However, much science and policy is still based on linear understandings of cause and effect. Complex-systems science and post-normal science gives much more recognition to non-linear connectivity between actions and outcomes and places significant emphasis on uncertainty. Adaptive management, adaptive governance and resilience thinking are founded on this type of rationality and construction of knowledge, that is, they recognise social-ecological systems, such as systems of resource use, as complex self-organising systems with inherent levels of uncertainty.

Reconceptualising adaptive governance as good governance is an attempt to bring the importance of governing for change into the public arena rather than to control change more overtly. The argument for this approach is that while bounded rationality suggests consideration of these matters, it may not flow through adequately to policy or decision making in practice.

To that end the research team experimented with a number of different combinations of principles and relabelling options working on the rule of thumb as we did in the *Pathways* project that about seven or eight principles would make for an optimum set. Any smaller number and the necessary diversity would be missed or each consolidated principle would become too dense and complex to articulate properly and apply in practice. Any larger set would become too unwieldy for practical application.

We were able to generate a reasonably tight set of principles and associated attributes of good governance as adaptive governance - heavily influenced across the board by adaptive and resilience thinking. The set of principles listed below include a balance of timeless governance ideals updated with adaptive thinking while incorporating most if not all of the concepts raised as important to good NRM governance by both the expert panel and partner organisations in the *Pathways* project. The characteristics or attributes of each principle are framed so as to guide organisations in implementing the principles and at the same time serve as self or external assessment criteria around which evidence of achievement could be provided.

Principle 1: Legitimacy – the conferred or earned authority and necessary diligence and integrity to make decisions on behalf of others.

Legitimacy is still needed in adaptive governance to establish multi-stakeholder and cross-scale confidence and trust in navigating change.

High levels of legitimacy in regional NRM bodies would be characterised by:

- clear terms of conferred authority and the extent of powers
- reference to the conditions of conferred authority when decisions are being considered
- ongoing community and stakeholder confidence/trust in organisations' exercise of power
- functioning systems and processes for ensuring diligence and integrity of a complexity consistent with the risks associated with the exercise of conferred authority and the level of public and private investment.

Principle 2: Fairness – an ethical basis for the way decisions are made and how communities and stakeholders are involved.

Fairness which incorporates the previous principles of transparency and inclusiveness and fairness is needed more than ever in adaptive governance to reinforce equity and justice in changing conditions and to maintain deliberative processes in which alternative futures can be debated.

High levels of fairness in an NRM context would be characterised by:

- transparency, including visibility and clarity of reasoning in decision-making processes as well as access to decisions
- inclusive and participative engagement of stakeholders and community
- consideration of distributional justice
- deliberative processes accommodating debate, dissent, different forms of knowledge, mediation and negotiation

- intergenerational equity which involves consideration of distributional justice for future generations as stakeholders in decisions.

Principle 3: Accountability – the answerability to those on whose behalf decisions are made.

Accountability is still needed in adaptive governance to ensure answerability for decisions about change. It can also be useful as a formal feedback loop transferring critical information on change between decision making levels in the system.

High levels of accountability in NRM organisations would be characterised by:

- compliance with conditions of conferred authority - this may be upward in the case of statutory authorities or downwards in the case of community associations and usually involves formal reporting
- in cases of non compliance, a transparent explanation of why compliance is not supporting adaptive governance and/or management and is therefore a preferable course of action
- documentation of diligence and integrity in decision making
- transparent recognition and demonstrated acceptance of roles and responsibilities
- upwards, downwards and sideways reporting of effectiveness.

Principle 4: Inter-connectedness or Connectivity - the linkages, networking and knowledge exchange that enables cross-scale and within-scale coordination of effort to occur and feedback loops to operate

Connectivity - which replaces the previous principle integration reflects the need in adaptive governance for co-management, networking to build social capital and collaboration to deal with multi-scalar problems

In NRM connectivity would be characterised by:

- extensive, diverse and nested formal and informal linkages to other NRM organisations that facilitate a coordination of purpose
- well-developed networking and information exchange pathways that allow timely action, feedback and learning
- adequate modularity and overlap of functions to provide options for renewal in the event of system disruption
- collaboration within scale to ensure best outcomes
- collaboration across scales to ensure that multi-scalar problems are addressed in a coordinated way.

Principle 5: Reflexivity – the awareness, deep reflection and recursive responsiveness to changing conditions that enables learning, new knowledge and feedback signals to be incorporated into planning and action.

Reflexivity - which replaces the simpler notion of adaptability - captures the need in adaptive governance to address complexity and uncertainty; awareness of feedback and the often recursive nature of social change.

From a theoretical perspective, a well-developed reflexive culture in regional NRM bodies and other organisations that participate in the polycentric system of NRM decision making would be characterised by:

- awareness of complexity, uncertainty and the tendency for linked social-ecological systems to self-organise
- recognition of sustainable resource use and many NRM problems as 'wicked problems' - those that are created within human society and become intractable with no apparent one-off solution – and therefore require ongoing (experimental) management
- collective social processes that are able to boundary span particularly across different knowledge cultures; pasts, presents and futures; and institutional scales

- scanning, monitoring and evaluating feedback about ecological, social and economic change including deliberate monitoring of the effects of management actions
- leadership that is tuned in to feedback, capable of deep reflection and critical learning, and is willing to experiment and adjust strategies if necessary
- timely public dissemination of information on change so that others may also adjust.

Principle 6: Adaptability - The necessary social capital, system knowledge and flexibility to manage resilience

Adaptability - in a new role in resilience thinking as the ability to manage resilience - the capacity of existing systems to absorb shocks/disturbance while retaining essentially the same structure function and feedbacks.

From theory, the governance capacity in NRM organisations to manage resilience would be characterised by:

- acceptance of diversity and variability
- a system-wide perspective on NRM rather than a focus on managing separate components
- connectivity (to a point) and reflexivity (tuned in to feedback – particularly ecological feedback)
- flexibility of structures to enable self organisation and therefore buffer change
- willingness of leadership to experiment (active adaptive management), innovate, and set aside efficiency and optimising performance for some overlap of function and modularity
- awareness of thresholds (the points at which feedback changes lead to system wide change).

Principle 7: Transformability – the potential to navigate a shift to a whole new system of natural resource use and management when the existing system becomes untenable.

Transformability is a new principle which captures the need in adaptive governance to be ready to shift to a whole new system if and when the existing one becomes untenable as may be forced upon us through climate change and climate variability.

From limited theory, transformability in NRM organisations would be characterised by:

- the assessment of capability to recognise when existing systems of resource use or governance are not tenable even with adaptation and careful threshold management
- the presence of operational shadow networks (ones that work out of the mainstream exploring and assessing alternative futures) that can quickly offer feasible ways forward
- deliberative mechanisms that bring different types of knowledge communities and stakeholders to bear on wicked problems
- leadership that can recognise and create windows of opportunity for change; is willing to tolerate creative improvisation, embrace/foster new social structures and build confidence in significant change
- the institutional space between scales of governance is ready or already populated with strategic collaborations that can coordinate the navigation process at multiple scales.

While the above set of principles more explicitly reflects the emerging concept of adaptive governance than is possible under a single adaptiveness or resilience principle, there are some important concerns around taking this approach that are yet to be fully resolved. The main one is that the approach and the assumption could be criticised for potentially privileging awareness, readiness and responsiveness to change as drivers of governance quality and effectiveness above other more traditional principles of good governance.

3.3   An intermediate position: Signposts to adaptive governance

A compromise option is to regard this collection of attributes as signposts for innovation towards more adaptive forms of governance. As stated earlier in the paper these signposts were established in the *Governance Standard and Assessment Framework* developed in the *Pathways* project. They sit beyond the attainment of good governance and point to innovations that may become the future good governance benchmarks under each principle. This approach is discussed further in Section 4.

3.4   An adaptive lens on NRM meta-governance

The most recent institutional shift in NRM in Australia is the national scale movement away from a regional delivery model to a hybrid regional/competitive model with a foreshadowed further shift to a fully competitive delivery system in future. Here is an example of cross-scale influences on the governance and management of resource systems at other scales. A quick application of the reviewed governance principles over early observations of the CfOC arrangements would suggest that this shift has potential to both enhance adaptive governance and undermine it. Inviting greater participation could be interpreted as enhancing polycentricity whether that was intended or just the result of political preference. While accountability may be enhanced at a national scale driven by critical Audit Office involvement, there are no guarantees that sideways and downwards accountability and the sort of procedural fairness that drives collective social learning will be maintained let alone enhanced. Reducing avenues for coordination, seemingly reverting to a siloed approach to the management of social-ecological systems, threatening the legitimacy of regional NRM bodies as bridging organisations and potentially disrupting the mobilisation of social capital could also significantly reduce adaptive capacity in the system. This latter set of implications and the overall competitive thinking that underpins the model could be interpreted as a return to the paradox of efficiency (Walker & Salt, 2006) – the antithesis of resilience, which is concerned with maintaining future options.

The aim here is not to undertake an evaluation of the CfOC arrangements but to demonstrate that adaptive governance, whether installed in good governance as a single principle or applied across the range of principles, can serve as evaluation or improvement criteria at the meta-governance scale. This issue will be further discussed in Section 5 where we revisit governance assessment tools.

4 How are three regional NRM bodies responding to and preparing for change?

4.1 Why engage additional regional partners?

The research team initially saw some benefit in checking the operability of the *Standard and Governance Assessment Framework* developed in the *Pathways* project in different institutional settings, particularly its applicability to community based rather than the government directed regional bodies that predominated in the original mix of nine regional partners. As the planning evolved and the scale of institutional, ecological and economic change was unfolding and becoming fully apparent, we became more interested in learning about responsiveness and preparedness for change. The planned further testing of the assessment framework was set aside to make way for some deeper reflections about governance as change both generally and in NRM.

Three additional regional NRM bodies were contacted – Fitzroy Basin Association in Queensland, Avon Catchment Council in Western Australia and NRM North in Tasmania. All three Executive Officers of these organisations were known to be interested in change and in making better linkages between governance and management. All three agreed to participate in a brief exploration involving an interview with the Executive Officer and a workshop with the board with a view to more extensive participation if the notion of adaptive governance was to be studied further. The workshops varied from site to site but generally followed a social learning spiral developed by Brown (2008; 2009).

4.2 Observations about governance resilience

Two of the partner regional bodies were established and serving communities well before the regional delivery model for the Natural Heritage Trust (NHT) and National Action Plan (NAP) was institutionalised at the national scale. The other regional body was founded to participate in those national programs. It would be expected that the most recently constituted organisation would be the most vulnerable of the three regional bodies to national institutional change. This is not the case. Avon Catchment Council (ACC), a well established organisation for over a decade, turned out to be particularly vulnerable to institutional change. There appear to be three main factors involved. Firstly, the quest for efficiency of delivery under NHT and NAP institutional arrangements has lowered resilience of the organisation and left it ill-equipped to engage under the CfOC institutional arrangements. This situation is predicted by resilience theory. Secondly, cross-scale influences, in this case the WA government meta-governance response to CfOC, will most likely diminish the funding throughput for ACC (and other WA regional bodies) and direct regional NRM bodies into a new functional role as community-bridging organisations. While many regional bodies throughout Australia will have reduced throughput under the more polycentric and competitive national arrangements, ACC in particular has sacrificed community participation and more deliberative approaches in the quest for delivery efficiency in relation to on-ground works. This leaves the organisation ill-equipped to undertake the envisaged bridging organisation role mooted by the WA

government. This situation is also covered in resilience theory as panarchy. Thirdly, the Avon region is icon poor, meaning that less of the national funding will flow to the region irrespective of the role played by ACC.

Our workshop with the ACC was a particularly valuable learning process for the Executive Officer and Board. Having already assessed the different positions of the state and regional body through interviews, we focused on the question '*How will we govern in the face of significant change*'? The big disparity between ideals and current practice led all involved to choose a transformational pathway of change. In other words, the participants had come to the conclusion that their current system of governance was untenable under the impending changes and that transformation to a whole new system of governance was required.

This transformation will not be easy. ACC have engaged a consultant firm to assist with what they had conceptualised as structural change. By the end of the workshop, participants had realised it may be more about functional, cultural and thinking change – structure really comes after that. The attributes of transformability from Section 2 give some guidance as to the size of the task.

- ACC only gained the capability at the workshop to recognise when existing systems of resource use or governance are not tenable even with adaptation and careful threshold management. There had been discussions and processes going for over 10 months with little progress made.
- There are no operational shadow networks (ones that work in the shadows behind explicit day to day networks exploring and assessing alternative futures) that can quickly offer feasible ways forward. Some clear thinkers on the board are the closest thing to shadow networks that ACC has.
- Deliberative mechanisms that bring different types of knowledge communities and stakeholders to bear on wicked problems have been by-passed over the preceding few years.
- Leadership is undergoing renewal but it may take time to recognise and create new windows of opportunity for change and build willingness to tolerate creative improvisation, embrace/foster new social structures and build confidence in significant change.
- The institutional space between scales of governance is under-developed despite the presence of key regional agency staff on the board. The collaborations in place are 'doing' partnerships not change-enabling collaborations. The fact that the Director of the WA NRM team was present at the workshop may generate new effort in this key direction.

None of the key attributes were in place for transformability prior to our site visit and yet the ACC is an organisation faced with a more or less forced transformation partly of its own doing and partly through the effects of cross-scale thresholds. It would be beneficial for future governance studies to follow ACC through its process.

Both Fitzroy Basin Association (FBA) and NRM North are operating in more stable meta-governance systems at the state scale and in contrast to ACC are relatively icon rich. Both organisations have therefore been able to direct resources towards adjusting to national institutional change rather than survival strategies – at least for the next four years of the CfOC program. FBA, the more mature organisation of the two, even

sought to take a proactive role in influencing the CfOC arrangements. This is consistent with its conceptualisation of national funding programs as a means to an end rather than an end in themselves. FBA business is firmly grounded in its NRM plan and many funding sources and partners are engaged to deliver on the priority actions and outcomes contained in that plan.

This relative stability for both FBA and NRM North means both can choose an adaptation pathway with respect to governance (assessing the resilience of broader systems of land use is a different matter not addressed here) rather than have to consider a transformation pathway. Somewhat paradoxically both boards stated early in the workshop that their governance ideals (actually akin to more traditional principles of good governance like legitimacy, accountability, transparency, and fairness) did not need to change and would stand the test of any changes on the horizon. However, when it came to identifying the five best things they had done over the past year and to exploring new options for governance there was a strong emphasis in both cases on newer adaptive governance principles like connectivity and adaptiveness. Both organisations had been busy preparing for change without equating these preparations to a shift in governance emphasis.

The readiness and preparedness for wider ecological change is covered below.

4.3   How are the three regional NRM bodies developing adaptiveness and connectivity?

During the workshops we ran an informal 'Likert survey' which asked participants to rank performance of the organisation from one to five against a list of 30 outcome statements with one being a disagreement with the statement, two a long way to go, three making progress, four almost there and five 100 per cent agreement. A sixth category, 'gone beyond' the statement, was also offered to pick up signposts to innovation. The aim of the exercise was to provide a rapid assessment of the organisation's status with respect to the modified *Pathways* governance principles and in particular in relation to connectivity and adaptiveness. Along with an exercise that developed a picture of networking undertaken by the three regional NRM bodies and interviews with the Executive Officer of each organisation, this enabled a picture of responsiveness and preparedness for change to emerge.

As outlined in the previous section ACC has not directed sufficient resources and effort towards connectivity and adaptiveness and is now having to transform to survive rather than either adapt or transform deliberately by choice. The most likely model for WA is that government agencies will bid direct for CfOC funds and manage on-ground works. Regional NRM bodies in that state will most likely be contracted in a fee-for-service role to provide community engagement and mobilisation services. ACC will have to rapidly build connectivity to engage in this type of model.

NRM North is already in adaptive mode. Structure, function, culture and thinking are undergoing adaptation driven by the energy of the new Executive Officer. Structurally the organisation runs on a core set of permanent staff supported by a larger pool of experienced and qualified part-time people. Functionally the staff concentrate on

facilitating and brokering outcomes, project management, maintaining core knowledge systems and processes, and on creativity. There is a policy of succession planning and skill building. The technical tasks such as spatial analysis are outsourced to private companies in the region, some of which are on retainer. Outside 'mentors' are used by NRM North to generate rapid assessment of effectiveness and to act as catalysts for improvement. This suite of strategies provides the organisation with the flexibility to scale up or down quickly. The changed structure at the senior level also frees the Executive Officer to focus on strategy and building credibility in the market place.

The subregional structure establishes strong links to local government and provides the region's eyes and ears on the ground and social capital for innovation. Connectivity, including partnerships with other key organisations within the region, is a prime objective and stronger island-wide project links with the other two NRM regions in Tasmania are developing. NRM North tends to take the lead on climate change and tourism projects. On the downside, while general connectivity is growing the relationship with Greening Australia seems to have declined. This trend has also been mentioned by FBA and ACC and may be as a result of a national policy direction by that particular non-government organisation in response to changes in CfOC.

The rapid assessment exercise generated some variable responses. The resilience and connectivity related statements generally drew scores of three or four with only one participant noting a six score for being well tuned in to feedback loops.

Fitzroy Basin Association are also actively shoring up adaptiveness and revisiting connectivity. The board has recognised a potential vulnerability for the organisation under the new CfOC arrangements and is taking steps to adapt. When asked for the five best board achievements in the last year, the following were most commonly cited:

- establishment of a new business development and funding model in an attempt to diversify investment sources
- research into climate change risks for the region
- establishment of an innovation process and fund with projects including the climate change research and carbon farming options
- actively influencing the CfOC agenda – through local member
- proactively retaining staff in the face of potentially severe throughput reduction
- securing Reef Rescue and Trees funding.

These examples can all be related to the attributes of 'resilience' as a governance principle. FBA has also increased the effort on connectivity and is now actively looking for strategic partnerships though mainly within the region. Reef Rescue has enabled some deeper partnership opportunities though the rapid assessment exercise would suggest that the value of more partnerships and collaboration is not fully supported by the board.

All participants scored the climate change research initiative and the innovation fund as 6 - going beyond the use of best available knowledge and into proactively seeking

better than best available knowledge. We did not go back to FBA and check how far this new climate knowledge furthers a system-wide view of the catchment as a social-ecological system.

In general both FBA and NRM North are building adaptiveness. ACC has started the process but has much ground to cover in a short time frame. Connectivity is a more problematic area and much more work than we were able to do in one visit to each of these regional NRM bodies is required.

4.4 Good practice examples and signposts to innovation

One of the key platforms of managing resilience and building the capacity for transformability is thought to be the fostering of shadow networks and what Olsson (2006) calls epistemic communities. These networks are essentially given permission to explore alternative futures through scenario assessment and to come up with potential solutions for change if required. This process in the literature is external to the organisation in the community. The board of the FBA has taken on this role though they did not describe it that way. They have totally restructured the board processes to devolve much of the present work to committees thus freeing the board to take a more strategic futures-orientated role. Innovation is placed high on board agendas when board members are freshest. The innovation fund and new business development model described in the previous section are outputs of this more strategic focus.

In NRM North we want to highlight a non-governance practice that could greatly assist in enhancing connectivity – a principle of adaptive governance. NRM plans throughout the country have been criticised for lack of spatial definition. This makes it very difficult to integrate inputs and outcomes or to make serious links with spatially-based development planning instruments. NRM North is building a bottom up and top down spatial framework. The bottom-up process is built on a base of individual property management plans on a contour/ cadastral layer which are then aggregated to a sub-catchment scale. The top-down process takes readily available satellite imagery and maps assets down to a catchment scale. Together these two processes contribute to a spatial expression of investment in relation to the overall NRM strategy for the region. The key to interpretation is not to expect to bridge the bottom-up scale and the top-down scale. This initiative is worthy of deeper study.

While these three examples are a start, it is recommended that much more work be undertaken with cutting-edge organisations to develop signposts for innovation and identify good-practice examples that may support organisational improvement. A potential avenue for such a study is developed in Section 5.

5   *Lessons for assessing adaptive governance*

As Figure 1 shows, the *Pathways Governance Standard and Assessment Framework Prototype* (Lockwood et al 2008) drew its conceptual foundations from a number of existing governance assessment tools, quality frameworks and standards and its content from the principles of good governance developed in the *Pathways* project.

In this paper so far we have revisited the content dimension by holding an adaptive governance lens over the good governance principles. This new perspective has led to some reconstitution of the principles developed in the *Pathways* project. One option outlined in Section 3.2 simply replaces and relabels two of the original principles to give them an adaptive focus. The second, at this stage, untested option (see Section 3.3) rolls up and gives an adaptive focus to the well-established good governance principles to make room for an expanded suite of principles related to adaptive thinking.

From an assessment perspective it would be a time-consuming but relatively simple matter to return to the *Pathways Governance Standard and Assessment Framework* and substitute either of the above sets of principles or a combination of option 1 with the attributes of option 2 included as signposts to innovation. This would achieve a governance assessment tool which takes account of a new interest in and perceived need for more adaptive approaches to NRM governance.

While we see even wider applicability given the changing role of regional NRM bodies and the emergence of new players in the polycentric system in Australia, we have not taken that step yet. The first reason is that the Australian Government has advised us that it will not be pursuing a national standard or assessment process. It has now finalised its targets under the CfOC business plan which shifts to a best practice focus. While this approach is not inconsistent with the *Pathways* assessment tool, no further detail is available on how assessment against the target will be carried out. The second reason is more conceptual in that the connection between governance and management dimensions of NRM effectiveness commenced by Lockwood (2009) could provide a fresh perspective on and enhance the design of future quality-based assessment frameworks.

By drawing on Lebel's insights from Figure 2 and Lockwood's work we have extended the thinking on governance, management and resilience capacity relationships to develop an expanded adaptive governance/adaptive management quality framework. Figure 4 proposes a conceptual model of good governance and management quality as our contribution to NRM effectiveness. The *Pathways* principles modified through closer association with adaptive governance represent the quality dimension of governance underpinned by ethics, rationality and normative conditions. The *NSW Standard for Quality NRM* components set in the context of an adaptive-management cycle modified to include an option for transformation or step improvement are used directly to represent the quality dimension for management.

It should be noted that there is not a direct one-on-one relationship between the *Pathways* governance principles and these particular management quality components. Substituting other sets of management quality criteria such as those used

by Vogel & Zammit (2004) improves some of the governance/management relationships but makes others more obscure and in the process loses the resilience connection. A possible explanation is that the *NSW Standard for Quality NRM* (NRC, 2005) and the *Performance Excellence Guide for Natural Resource Management Organisations* (Vogel & Zammit, 2004) are explicitly improvement models, that is, they are neither governance nor management specific but aim to improve overall organisational effectiveness. To perform this function they appear to contain elements of governance and elements of management, though both are more focused on business systems and therefore management. The NRC approach is linked to the adaptive cycle of experiential learning, reinforcing its adaptive management origins.

Figure 4: Governance and management quality as contributions to NRM effectiveness
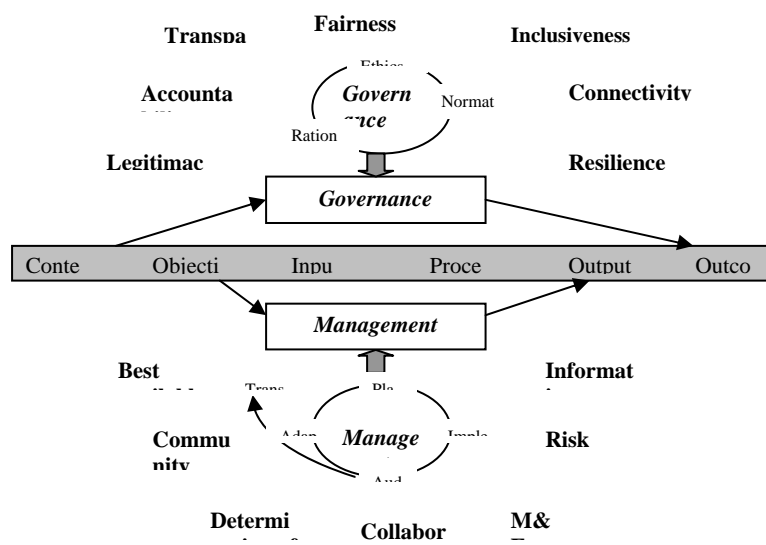
Assuming for the purposes of this paper that a one-to-one logic would assist organisational leaders with integration, we have made an initial attempt here to derive logical management responses to the *Pathways* governance principles while as much as possible retaining the NSW standard components. It must be stressed that our thinking on the relationship between good governance and quality management is emergent and that this relationship requires further development. With further development and testing, there is potential for an assessment framework informed by adaptive thinking to add value in NRM.

6 *Ways forward*

The value of the *Pathways* research is that it has taken an objective look at the prevailing institutional arrangements and drivers of NRM in Australia to build strong theoretical foundations for recognising and assessing good NRM governance while respecting the operating environment of regional NRM bodies. While much of the *Pathways* work will endure, NRM is a wicked problem that will require ongoing research and development. Already we have seen significant institutional change in the operating environment and larger more complex social-ecological challenges are imminent.

There are two general questions about the implications of the findings arising from the work reported here:

- What do these findings mean for the regional NRM groups?

- What do these findings mean for the NRM system?

In relation to regional NRM organisations, this preliminary work indicates that having an adaptive culture, and developing a diverse range of partnerships and strong connections with other scales of governance are important assets in preparing for and being able to cope with change. The work appears to confirm some proposals of resilience theory relating to capacity to recognise and manage thresholds (changes from one state to another), the value of leadership and management for innovation in windows of opportunity, capacity to make a choice between adaptation and transformation, and the importance of being able to tune into feedback loops.

At the system level, the work confirms that meta-governance arrangements have significant implications for adaptive capacity of the system and its components. The availability of various capital assets – human, economic, financial, and social – underpins the capacity to adapt and transform if necessary in times of change. Policy change should aim to avoid undercutting or removing any of these assets from NRM governing bodies.

The findings also suggest that more consideration has to be given to not only building the links between different scales of governance but also strengthening the linking architecture to ensure that decisions at one level do not compromise resilience at other levels.

The FBA example raises the issue of a preoccupation with efficiency at the expense of other values crucial to effectiveness of NRM organisations, including community participation. The quest for efficiency may in fact be counterproductive to the resilience of the NRM system.

Given these findings, we conclude in relation to future research that:

- adaptive governance is a worthwhile concept with which to engage in the context of a changing NRM operating environment and that good practice adaptive governance is an area that requires further development as a practical contribution to building adaptive capacity of NRM organisations

- the relationship between good governance and quality management for adaptation is worth further investigation

- there is scope to document the change occurring around partnership arrangements, investigate the driving factors and explore the associated change occurring around the roles of regional NRM organisations

- it is important to understand how governance arrangements affect the functioning and performance of innovation under conditions of change.

In relation to these conclusions, the reflection we have undertaken above has opened up a number of new questions that require attention:

- What are the key theoretical elements/attributes and motivations/drivers of adaptive governance?

- What can we learn about the key elements, drivers and benefits/pitfalls of adaptive governance from NRM practice in Australia?

- How are 'cutting edge' NRM organisations addressing change and applying adaptive thinking to governance and management?

- How are the structural and functional roles of regional NRM bodies changing (adapting or transforming) and why?

- Is there evidence for self-organisation in the multi-layered and polycentric system of Australian NRM governance?

- What diversity of actors is emerging, for what reasons, what are their roles and connections, and what relationships are dissolving and forming?

- How can we best assess adaptive governance quality and effectiveness?

- What governance improvements might be undertaken to foster resilience and adaptation?

- How resilient/adaptive is Australian NRM governance?

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8   Glossary of abbreviations and acronyms

Abbreviation/acronym	In full
ACC	Avon Catchment Council
CEO	Chief Executive Officer
CfOC	Caring for Our Country
FBA	Fitzroy Basin Association
LWA	Land & Water Australia
NAP	National Action Plan for Salinity and Water Quality
NHT	Natural Heritage Trust
NRC	Natural Resources Commission, New South Wales
NRC-NAS	National Research Council of the National Academy of Sciences, United States
NRM	Natural resource management
NSW	New South Wales
WA	Western Australia