

## A solution to rigid government NRM planning requirements through adaptive management

Alexandra Murray<sup>1</sup> and Lyndal Hasselman<sup>2</sup>

<sup>1</sup> Grains Research and Development Corporation, 40 Blackall St, Barton ACT

<sup>2</sup> ANZSIG, University of Canberra, ACT 2601

Email: alexandra.murray@grdc.com.au

**Abstract:** A monitoring and adapting framework was developed for the Lachlan River catchment of NSW in conjunction with a strategic catchment plan to drive performance management and guide continual improvement during implementation. The framework guides effective evaluation and incorporates feedback loops to communicate lessons from implementation to policy making. Adaptive management is applied at different levels of management in different contexts, during different phases of the system's adaptive cycle. The plan was structured with desired outcomes and priorities to provide direction whilst limiting constraints to flexible and responsive approaches to achieve the strategy. Collective input on adequate performance will maintain rigor in reporting to government and community. Adaptive management processes have been designed based on triple loop learning. This builds skills, institutional and community capacity in monitoring and evaluation. It enables findings and facilitates adaptive natural resource management and evolution of the strategic plan. Governance requirements for approval of the strategic plan are clarified through the adaptive management framework.

**Keywords:** catchment planning, natural resource management, resilience, systems, adaptive management, evaluation, triple loop learning, performance management

### Background to key concepts

#### *Regional natural resource management and planning*

Regional and natural resource management bodies deliver natural resource management initiatives with local land managers and communities. Their focus is to facilitate a healthier environmental system with greater social, economic and ecological resilience. In NSW, Catchment Action Plans (CAPs) have recently been updated with collective input from State, Federal and local government, researchers, non-government organisations and community groups. These 10 year plans and any subsequent variation, require approval by the NSW Minister for Primary Industries. All investments in natural resource management by the NSW government must be in accordance with the approved regional plan. The approval requirement limits flexibility for adaptive management that is responsive to changing circumstances and knowledge. Underpinning the 10 year plans are annual investment plans and annual project level planning and management.

Natural resources and their management are complex systems, characterised by a large number of continuously interacting and interdependent elements in which there is no central control. Changes are not repeatable and are unpredictable, as the number of variables in the system is large and/or largely unknown. These complex systems have self-organising and emergent behaviours based on sophisticated information processing that generates learning, evolution and development (Patton 2011; Rogers 2011).

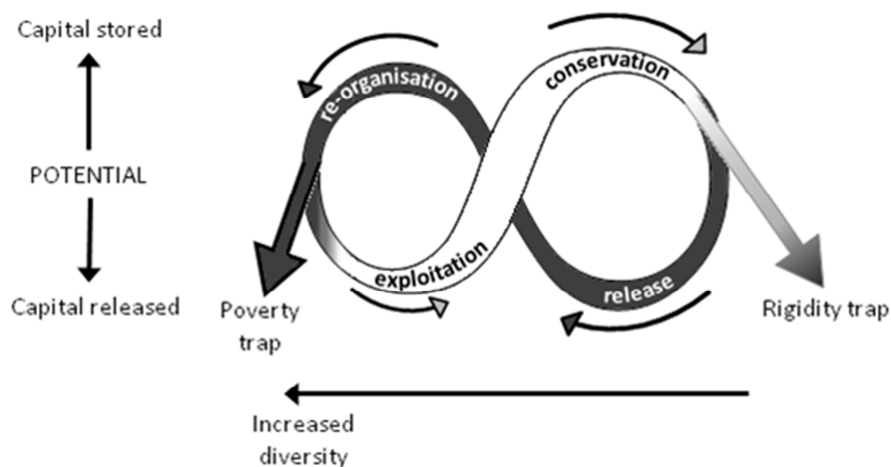
#### *Introducing resilience thinking to catchment planning*

There has been a shift in traditional environmental planning towards resilience thinking in the updated CAPs, as a way of dealing with environmental system complexity. Resilience theory offers a way of understanding how systems (natural or organisational) can experience change, yet reorganise and retain the integrity of their original purpose, function and delivery of societal values (Gunderson and Holling 2002; Walker and Salt 2006). Resilience of an environmental system displays adaptability to changing conditions or context, yet maintains the specific purpose, function and values of that system. Phases of resource and/or diversity build up or release, characterise the adaptive behaviour of resilience in environmental systems.

Figure 1 shows the four phases that make up the recurring resilience adaptive cycle: release, reorganisation, exploitation, and conservation. The cycle represents a heuristic model where the system responds and learns from the response, leading to learning and improvement. This model demonstrates the capacity to adapt to changes while preserving sufficient coherence to maintain purpose, function and values. Once an organisation or system reaches maturity (conservation phase), it needs to release resources to facilitate innovation or change and reorganise its resources for future exploitation in order to retain its overall resilience. The release and reorganisation phase is often termed the 'back loop', where non-routine or unexpected change is introduced. The exploitation and conservation phases are often termed

the 'front loop', where change is slow, incremental, and more deliberate (Peterson, 2009; Walker and Salt 2006).

**Figure 6. Adaptive cycle**



Source: Walker and Salt 2006

**Example 1: Description of the resilience model using an old growth forest system**

**Release:** Old growth forests do not go through this phase. They lack diversity, become overgrown and are unable to self-generate. When a disaster occurs (e.g. disease, or fire), they are easily wiped out. Change is initiated here.

**Reorganise/exploration:** There are finite resources to go around and failure of new species to flourish is at the expense of others. Reorganisation places limits on diversity.

**Exploitation:** Accelerated growth of some species over others occurs in competition of resources. Early colonisers dominate and draw the lion's share of resources.

**Conservation:** Plant diversity is relatively low and the system's resources are stored in the dominating species. A carpet of needles protects the mature forest from competition and smothers other species from establishment. Lack of diversity creates little resilience to shock.

Source: Patton 2011

Resilience determines how vulnerable a system is to unexpected disturbances. Cycling through phases from one stage to another occurs in healthy and resilient systems. If transitions between phases do not occur, the health of the system is threatened through increased exposure to risk or an inability to adapt to changing circumstances that may present opportunity. Components and processes of systems exist at different scales and do not cycle together, increasing resilience of the whole system (Patton 2011). Being resilient means avoiding the poverty and rigidity traps. In the reorganisation phase, the poverty trap occurs when the system is unable to release enough resources to support creative exploration of new possibilities, and in the conservation stage the rigidity trap exists when the dominant system resists change despite changing conditions or contexts. It means that organisations must be willing to set priorities on the one hand, for example the 10 year CAP, whilst not becoming stuck in a constant state of crisis, burnout or use of stop-gap measures. Adherence to redundant strategies ignores feedback, new insights and circumstantial changes (Leap Cooperation, 2009).

**Evaluation to inform adaptive management**

Evaluation of the performance of NRM interventions focuses on whether change has occurred, the nature and degree of change, and the factors that lead to change. Assessing, understanding, and explaining change is at the center of this type of evaluation.

Adaptive management emphasises learning through a structured feedback process for the adjustment of subsequent management actions based on that learning. Adaptive management embedded into implementation processes allows monitoring and evaluation learning to feedback into planning and management of activities. This promotes the uptake of new knowledge and recommendations, and adjustments are made to keep progress on track to achieve goals. Having evaluative coordination in place to inform adaptive management ensures to the management of systems to best utilise resources and avoid the poverty and rigidity traps.

### ***What environmental success looks like in the Lachlan Catchment***

The Lachlan CAP was architecturally structured into a hierarchy of visions, desired outcomes, priorities and performance measures. Collectively these provide strategic direction and, through monitoring against the performance measures, enabled reporting of progress for government accountability at the output and outcome levels. To gain clarity on community and stakeholder perceptions of successful levels of environmental management, an online survey conducted by the Lachlan CMA asked individuals to identify what level of implementation performance is regarded as 'good'. The survey was completed by 350 respondents. Based on the results, an emerging level of performance was established to indicate if progress is on track, and this 'good' level of performance was identified and included into the plan. It is expected that in time, transparent reporting back to the community on performance against their perceptions of 'good' performance will engage the community into discussion on achievements and also provide meaningful government accountability.

### **Approach applied**

After reviewing progress and achievements of the previous Catchment Action Plan it was evident that a process by which to evaluate progress and make changes at the Catchment Action Plan level was required. Past adaptive management of larger programs of work was ad-hoc and based upon sources of evidence that ranged from individual and personal insights of Board members or managers, through to rigorous monitoring and evaluation involving community and stakeholder consultation. Learning gained in one area of operations was not necessarily available or shared with other operational areas or effectively at different levels of management. However at the project level, adaptive management appeared to be working well. A brief review of organisational learning literature was undertaken and the double loop learning processes developed by Chris Argyris and Donald Schön (1978) presented as processes by which evaluation and learning could facilitate adaptive management across the organisation. It enables this through the deeper questioning of assumptions at the different levels of learning.

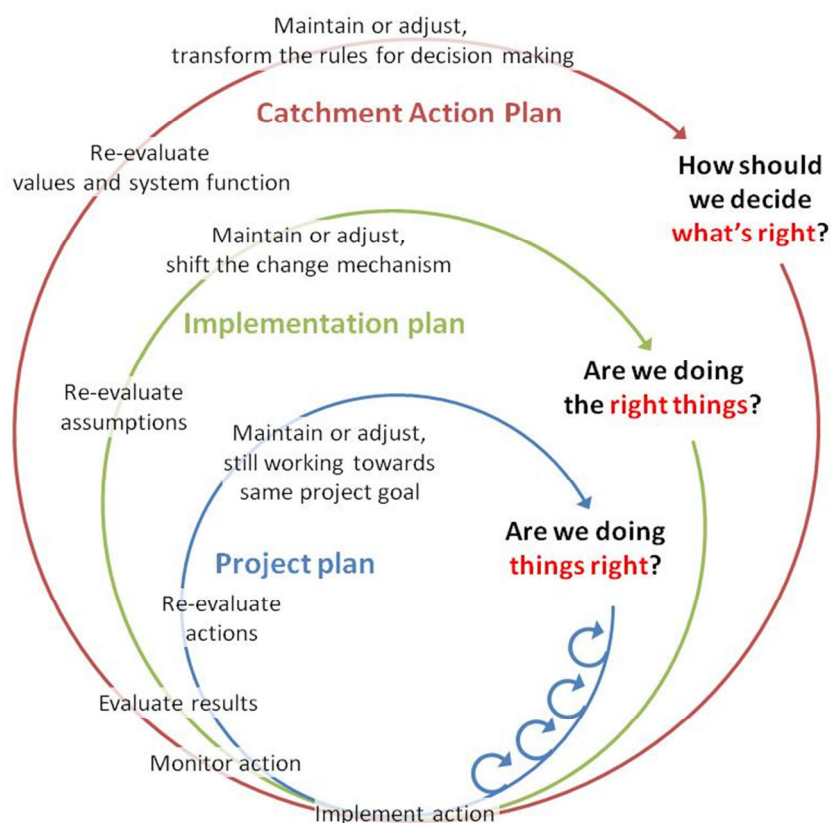
The approach applied to create adaptive management by the Lachlan Catchment Management Authority (CMA) brings together three critical levels of questioning to provide a sound basis for organisational learning, whilst meeting the rigid requirements of government planning, treasury certainty and political promises. It provides a framework for questioning, learning and making informed decisions, facilitating a continuum of improvement and organisational learning. The approach seeks to avoid stagnation in the conservation phase and prevent the organisation from entering into a rigidity trap.

### ***Triple loop learning***

The triple loop learning framework formalises the thinking behind evaluation for learning and decision making for continuous improvement. The process is illustrated in Figure 2 with three continuous 'loops' that move through actions including 'evaluate-plan-act-monitor-evaluate-adjust'. The three loops of questioning and learning have been aligned to the three major levels of planning within the NSW natural resource management bodies; project, annual investment and catchment planning. The first loop questions 'Are we doing things right?' and actions incremental improvements as required for planned outcomes to occur. The second loop requires questioning the assumptions, policies, practices, values and system dynamics through asking 'Are we doing the right things?'. It seeks to find relevant interventions that are appropriate to organisational contexts, changes and the desired function of the system. The third loop involves learning how to make decisions by reflecting on our own and other's beliefs and perceptions through questioning 'How should we decide what's right?'.

### ***Partnership arrangements***

A process was created to enhance partnered and participatory evaluation and planning. A Partnership Planning Forum was designed as a key annual event to bring together partners and others with expertise to review achievements and plan investments. At this forum the evaluation findings gathered throughout the previous year, any new information on the condition of the social-ecological system and current or emerging disturbances, along with project final reports will be presented. This aspect alone is expected to generate dialogue with community, stakeholders and partners and provide significant transparency. Following discussion of the results, the forum will build recommendations for future action. Proposals for future investments will be sought from all participants and a range of potential joint and individual projects will be identified. The proposed projects then become subject to further partnership negotiation following the forum and for those requiring Lachlan CMA input, presentation to the Lachlan CMA Board for approval.

**Figure 7. Triple loop learning applied to planning levels**

The discussions held by the forum will ensure a range of perspectives and values are used in evaluating the results of implementation, share ideas for future projects and identify opportunities for collaboration. The forum process will favour social inclusion, motivate the community and stakeholders, encourage innovation and creative solutions. It will also encourage shared responsibilities across whole of government and whole of community.

The Partnership Planning Forum was designed to link in with the second learning loop and associated processes of developing the government's annual portfolio of investments. The application of triple loop learning assists this forum to consider interventions and making decisions at a strategic level, rather than the operation level of 'are we doing things right'. From an evaluation perspective, the participatory nature of the forum allows mixed views and biases to be considered, enriching the judgement and questioning aspects of evaluation. From a governance perspective it assists with transparency and provides a significant impetus for annual reporting and accountability of results directly with stakeholders and community.

### Discussion

Strategies and plans, to remain current with changing circumstances or systems, require adaptation. The emergent strategy is a combination of the original and new adaptations, making some parts of the initial plan redundant (Mintzberg 2007). The monitoring and adapting framework was developed to drive performance management and guide continual improvement of the catchment plan. The framework guides effective evaluation and feedback loops to communicate lessons from implementation through to policy makers. There are both benefits and barriers to the approach and it is not suited to all contexts.

### Benefits of the approach

The triple loop learning, particularly with the second loop applied through a participatory Partnership Planning Forum, builds skills, and institutional and community capacity in monitoring and evaluation. Linking the adaptive management framework to the overall investment planning, project management and governance framework creates impetus for reflection and learning. This enables integrated implementation of adaptive natural resource management and continuous improvement. The shared reflection on evaluation results assists to overcome learning inabilities, including those created by the rigidity of organisational boundaries such as internal management layers and with external partners (Senge 2006). The

framework designed, in particular the triple loop learning component, necessitates discussion on deeper questioning that challenges assumptions on values and decisions. It also necessitates monitoring of system function and values and the recognition of new knowledge on system function.

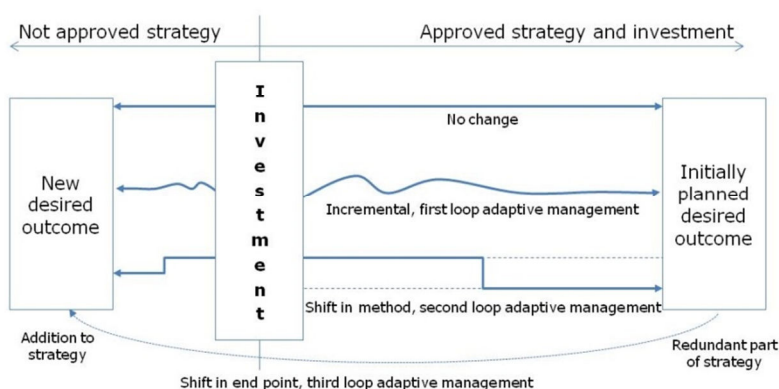
The use of evaluation information and reflexivity for uptake of results is important for incremental improvements in terms of adapting to change at project to program levels. This is the iterative level of adjustment and adaptive management. The questioning and resulting adaptation doesn't challenge the end point goal, or how we decided on the end point goal, but seeks to refine how we are getting there. The approach enables and recognises incremental improvements within the first learning loop; that is, within project planning and implementation. Modifications to approach and method at this level often occur subconsciously or as a result of the self-organising ability of a complex and resilient system. At this level, feed up (feedback upwards) to the second loop is not necessarily required and improvements are firmly in the realm and responsibility of the project manager. Efforts can focus on implementation rather than administrative style approvals for minor modifications. Combined, the outcome orientation and first learning loop mean that this level of incremental improvement to efficiency and effectiveness does not require Ministerial approval. This avoids governance burden or the alternative scenario of an unapproved emergent strategy being implemented.

When it is identified that adjustments to the project are required that shift the method of an intervention, changing its scope, this triggers a push into a higher level of questioning. This occurs in the deliberative phase of adaptive management and prompts the question 'are we doing the right things' with new learnings feeding back to planning and decision making. Feedback here informs the approach or method used to reach the end goal. In program logic approaches to evaluation, this is about checking the causality and assumptions behind how/if our actions will/could result in the desired outcomes. This second learning loop, in combination with an outcome orientated plan, provides flexibility and questioning of the methods used to achieve the plan's visions. The change mechanism or approach used to achieve the visions are not pre-mandated and not approved by the Minister. Choice of the most appropriate change mechanism remains with the Partnership Planning Forum. The flexibility and choice of methodology used to achieve outcomes allows for testing of best fit and leads to innovation and ultimately drives improved performance. In terms of the adaptive cycle, the second learning loop with its deeper questioning of assumptions, should drive change, increase diversity of methods used and avoid the organisation slipping into a rigidity trap.

If evaluation, or third loop questioning, reveals a demand for a shift of system function or values due to change in the natural resource base or social values, then the system has undergone a transformational shift. This is change to the end point. Without altering the strategy and its implementation to an emergent strategy, the system will continue to reorganise in order to deliver the new current function and values, rendering adherence to the original plan inappropriate and ineffective. In this scenario the organisation is at risk of entering either a poverty or rigidity trap, repeatedly doing what's always been done with limited rate of return or success or real benefit to the public. At a significant level of transformational change, the extent of change to the plan may be beyond internal governance and the emergent strategy may require Ministerial approval. This level of change in desired function may require higher level government policies to also be adapted.

Overall the triple loops provide a framework for making decisions and creates a continuum of shared learning across levels within the organisation and externally with key stakeholders and partners. It clearly differentiates levels of responsibility, approvals and accountability across the levels of government. Strategic planning at an outcome level, results in a need for Ministerial approval only if evaluation findings necessitate changes in the direction or end point, not if adaptive management changes how the end point is reached (see Figure 3 below).

The inclusion of measures that have been scaled based on community perceptions of good performance is a key aspect of the monitoring and adapting framework. This exercise in itself provided useful insight to past community judgements on performance. It was found that continuing to repeat past practices, methods and resulting performance will not be capable of delivering good performance. Conservation phase, or continuing to do things because that is how it's always been done, will result in the organisation and its performance to shift into a rigidity trap. In this trap, the organisation will have less resilience, will have less ability to cope with change and will not deliver on system function and value. Achieving the desired level of performance is further limited by restricted funding that prevents expansion of the current practices and methods to meet the necessary landscape level outcome.

**Figure 3. Triple loop learning impacts on strategic directions**

The outcome orientation of the catchment plan is a challenge to the government's need for audit style accountability on investments and actions. The inclusion of performance measures was designed to overcome this challenge. The performance measures have been used to facilitate outcome level monitoring and reporting, that enables transparent reporting of effectiveness as assessed by the communities' views of good performance. Accountability is to outcomes, not to outputs. Accountability at this level also reduces the risk of perverse outcomes that may result from achieving high volumes of low quality outputs. The Partnership Planning Forum that uses mixed values to evaluate these results and transparency generated through open presentation and discussion of results, further complement the governance of the adaptive management framework.

### **Barriers to the approach**

The increase in sophistication required in the management of the plan's implementation, pushes capacity requirements. Understanding and confidence in monitoring, participatory evaluation and reporting underpins the successful implementation of the framework. All levels of the organisation are required to participate in the process to gather information and results spanning from outputs to outcomes, to new insights on values and system behaviour. Skills in both quantitative and qualitative data analysis are required, along with a philosophy that accepts the merits and validity of qualitative data. With the increased participation in judging evaluation results and decision making, comes an increased potential for conflict. Advanced skills in facilitation, relationship management and conflict resolution are also required to facilitate this approach effectively.

Leadership is required to drive the organisational change and paradigm shift needed in order to embed the process and harness the potential performance and governance improvements. Management teams and cultures need to become outcome orientated rather than financial and target oriented cultures with audit style accountability. While net-cost-of-service is critical in government, this aspect of financial management can overshadow outcome performance that delivers on public values. A cohesive management approach that connects monitoring, evaluation, reporting and planning with financial administration is needed. To allow government organisations to shift to performance orientation, a change in culture, as guided by coherent and steady leadership, is required at a Ministerial level.

The use of outcome level reporting for accountability can introduce subjective varying opinions on government performance. The participatory evaluation created by the Partnership Planning Forum and the consultation on what 'good' performance is, are two important methods used to overcome this. However, if the forum participants and the performance survey respondents are not representative of the broader community or population, discord with broader government policy could become evident and work can commence to address the difference. Government reporting at the whole of NSW level may invite differing views from different, non- Lachlan catchment communities. The potential difference in values between local communities and the state wide population is a broader challenge for devolution and localism, as is the loss of centric command and control. Smaller differences may also arise. Performance may be regarded positively within the catchment whilst at the broader NSW level the performance may no longer be regarded as 'good' performance. The potential political ramifications resulting from varied interpretations of results, leads governments to favour objective, output counting, audit friendly measures and rigid planning.

Rigid output and target oriented planning and strict implementation of these plans eliminates the need for political explanation of any changes or adaptive management decisions that may arise between the time of planning and implementation. The absence of adaptive management risks incongruence between current values or circumstances and the actions determined at the time of planning. This leads to the implementation of redundant aspects of the plan and poor investment allocation. Despite this, prescriptive strategies and plans with high certainty and high tick-ability of outputs and targets are preferred for simplistic accountability.

These last barriers are a significant cause of political angst in shifting to an adaptive, resilience framed approach to the management of complex systems. The paradigm shift is difficult at all levels from the general voting public to management capacity, through to politics, leading to resistance to change from the past status quo.

## Conclusion

The adaptive management approach outlined above may not be suitable for all contexts. In simple contexts that consider linear cause-effect relationships, rigid short term target oriented planning with audit style accountability will deliver performance against community values. In complex systems, such as natural resource management, change and the need for adaptation is inevitable. The unpredictability of continuously interacting and interdependent elements, in which there is no central control, limits the lifespan of rigid strategies and plans. There are knowledge gaps in our understanding of such complex systems and their reactions to change that will provide a continuous source of new information.

Creating structures that enable appropriate levels of flexibility and responsiveness to these changes is required to ensure performance and appropriateness of government investments. In the adaptive management framework, as new knowledge is found, it is evaluated and a decision is made whether to adjust current strategy or goals. The combination of triple loop learning, performance measures that are rated by the community, and the outcome orientation is one approach to minimise governance or bureaucratic burden of Ministerial approvals, while maintaining accountability throughout adaptive changes. The clear differentiation between levels of adaptive management provides management and government with role clarity in decision making. Project managers are responsible for changes to the techniques and methods applied that improve efficiency and effectiveness.

Changes in knowledge and values that question why the end point or outcome was selected requires a higher level of management decision making, with participatory processes increasing transparency and reducing individual biases. The third learning loop challenges us to understand and be aware of this level of transformational change in values and system function. It increases understanding of purpose and develops conscious experiential knowledge in how to respond to the social-ecological system. At this level, Ministerial approval is required to ensure investments are working towards broader political goals.

Adaptive management is required at all scales of implementation and planning. It seeks to embed processes that link levels or parts of the organisation and work across boundaries to promote organisational learning. For this approach to be successful, strong leadership from the top is required. Challenges that face devolution and localism may also apply.

## References

- Argyris C and Schön D 1978, *Organizational learning: a theory of action perspective*, McGraw-Hill, New York.
- Gunderson L and Holling C 2002, *Panarchy: Understanding transformations in human and natural systems*, Island Press, Washington, DC.
- Leap Cooperation 2009, Leap Cooperation, Ottawa, Canada, <<http://www.leapcorporation.com/contentfiles/adaptive%20resilience.html>>.
- Mintzberg H 2007, 'Of strategies, deliberate and emergent', in H Mintzberg (e.d.), *Tracking strategies*, Oxford University Press, Oxford, pp. 1-16.
- Patton MQ 2011, *Developmental evaluation*, The Guilford Press, New York.
- Peterson G 2009, *Ten conclusions from the resilience project*, The Resilience Alliance, <<http://www.geog.mcgill.ca/faculty/peterson/susfut/rNetFindings.html>>.
- Rogers PJ 2011, 'Implications of complicated and complex characteristics for key tasks in evaluation', in K Forss, M Marra and R Schwartz (eds), *Evaluating the complex: attribution, contribution, and beyond*, Transaction Publishers, New Jersey, pp. 33-52.
- Senge PM 2006, *The fifth discipline*, 11<sup>th</sup> edn. Random House, London.
- Walker B and Salt D 2006, *Resilience thinking: sustaining ecosystems and people in a changing world*, Island Press, Washington DC.