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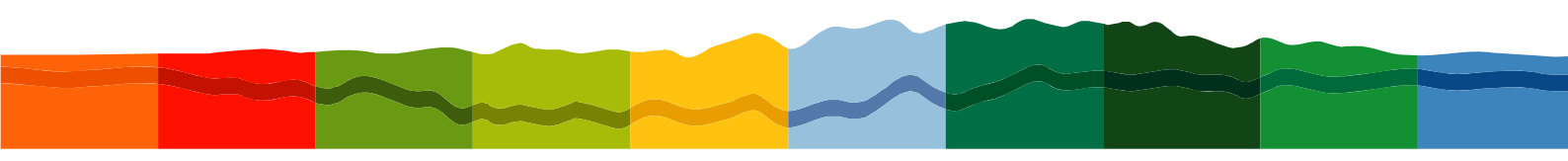

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Governance principles for natural resource management

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Abstract

Sustainable natural resource use and management make novel demands on governance arrangements, the design of which requires normative guidance. Although governance principles have been developed for diverse contexts, their availability for sustainable natural resource governance is so far limited. In response, we present a suite of governance principles for natural resource governance that, while developed in an Australian multi-level context, has general applicability and significance at local, sub-national and national scales. The principles can be used to direct the design of governance institutions that are legitimate, transparent, accountable, inclusive and fair and that also exhibit functional and structural integration, capability and adaptability. Together, they can also serve as a platform for developing governance monitoring and evaluation instruments, crucial for both self-assessment and external audit purposes.

Key words
Natural Resource Management, Governance, Good Practice

Introduction

Most environmental challenges are 'wicked problems' (Rittel and Webber 1973) for which novel policy and institutional responses must be fashioned. Emergence of this class of policy challenge is characterised by complexity and contestation originating from multiple problem causes, divergent problem perspectives and solution strategies, and fragmented institutional settings. It also coincides with a shift from government to governance, which is in part a response to the need for new approaches to address such problems. By *governance* we mean 'the interactions among structures, processes and traditions that determine how power and responsibilities are exercised, how decisions are taken, and how citizens or other stakeholders have their say' (Graham *et al.* 2003, p. ii). The term *new governance* (Howlett and Rayner 2006) has emerged to describe a mode of governing that shows a preference for collaborative approaches among government and non-government actors from the private sector and civil society. Recognition of this new mode of governing confirms that 'dealing with wicked problems is – to a large extent – a problem of interaction' (van Bueren *et al.* 2003, p. 194). These governing arrangements are especially evident in policy areas informed by the discourse of sustainability, which has an explicit ethical foundation in notions of participation, responsibility, stewardship and duty of care, and which makes novel demands on institutions and policy (Dovers 2005).

An important subset of sustainability problems, often described by the term *natural resource management* (NRM), concerns activities such as forestry, agriculture, water allocation and tourism. NRM embraces watershed or catchment and landscape-scale management strategies, and engages with biodiversity conservation, control of pest plants and animals, and maintenance of soil and water quality. The need for greater levels of integration, coordination and attention to multi-scalar (spatial and temporal) phenomena are among the characteristics of environmental and natural resource policy regimes that necessitate the development of new governance arrangements (Lemos and Agrawal 2006). Traditional policy regimes that emerged incrementally over long periods of time to solve largely simple problems are generally unsuited to cross-sectoral and multi-scalar challenges. In Australia, NRM has been a particularly active area for governance innovation and experimentation. Recognition of the declining state of the natural resource base over the past two decades has prompted the development of two major national programs – the National Action Plan on Salinity and Water Quality and the Natural Heritage Trust. These programs are based on collaborative arrangements between the national and eight sub-national governments, with funding delivered into a regional (sub-national) level of governance that was established in 2002. Responsibilities for NRM planning and investments are vested in fifty-six regional organisations that are accredited by the Australian Government.

In order to deliver good governance and achieve their intended outcomes, these organisations and the collaborative and multi-level arrangements within which they work require the guidance of value-based standards in their design and implementation. While new consciously-designed multi-level governance institutions are clearly needed, suitable principles to guide their design are slow to be advanced (Howlett and Rayner 2006).

Responding to this need, we offer a set of principles to guide the design and assessment of NRM governance institutions. These principles are normative statements that make

claims about how governing or steering should happen and in what direction – that is, how governance actors should exercise their powers in meeting their objectives. Our work is limited to multi-level governance contexts in which governments play an important role. In the next section we provide an overview of new governance and its application to NRM. Thereafter, we explain the process used to develop NRM governance principles for thirteen NRM regional organisations in Australia, which are then outlined in detail. We conclude with observations on how the principles might be used to foster good-practice governance for NRM in other Australian and overseas jurisdictions.

New governance and NRM

While familiar means of steering societies – markets and bureaucratic administration – have enabled the generation of material wealth and solutions for straightforward problems, neither mode has demonstrated its capacity to solve complex and persistent problems like environmental degradation. In Australia, for example, it has proved difficult to arrest decline in water quality and availability, soil erosion, and biodiversity and habitat loss, despite considerable community effort and significant government investment. In this section we scrutinise the potential of new governance approaches to address the complex problems of NRM. In particular, we focus on the capacity of new governance to deal with complexity[1] and uncertainty; manage interdependencies among actors; foster connectedness between diverse interests at different scales and across jurisdictions; and galvanise resources, skills and knowledge more effectively than conventional government.

Over recent decades, shifts from government to new governance have become increasingly apparent. These changes have occurred in a climate of:

- increasing complexity, diversity and dynamic change (Kooiman 2000) such that no single actor has the resources or knowledge to respond to the complexity of current problems and/or opportunities
- non-linear or threshold effects that result in instability and unpredictability in global systems, such as that apparently occurring with anthropogenic climate change;
- reduced abilities of central governments to capitalise on opportunities or to solve so-called 'wicked problems' – so called because of their persistence and intractability (Rittel and Webber 1973)
- shifts in power and authority upwards from national to supra-national scales as apparent in the use of international conventions, and downwards to sub-national and local scales via the devolution of central government responsibilities (Pierre 2000)
- simultaneous but contradictory tendencies towards 'integration, centralisation, and globalisation on one hand, and … disintegration, decentralisation and localisation on the other' (Rosenau 2000, p. 177).

[1]The complexity of environmental problems is multi-dimensional, originating in social complexity (from fragmentation of stakeholders), scientific complexity (from the multiplicity of factors at work and gaps in understanding), uncertainty (from the many unknowns), conflicting risks, and system dynamics (social, economic, political, and the state of knowledge and technologies) (Salwasser 2002). Additionally, challenges of scale and cross-scale interaction impose extra levels of complexity to environmental governance.

Governance has assumed particular significance under conditions of uncertainty and open-endedness (Stoker 1998) induced by the trends outlined above, so that the tasks of governing affect and are affected by the distribution of power, public decision-making, and citizen/stakeholder engagement in complex ways. Consequently, governance has taken on a number of features distinct from conventional government. Key among these is an increase in interdependencies among a wide range of actors – particularly evident with environmental problems − necessitating greater interaction among diverse actors from different territories, at multiple governance scales. As well, pressures from an informed citizenry for a greater say in decisions that affect their lives have contributed to the trend to a greater horizontal distribution of power.

To regulate activities among interdependent actors and facilitate decision making and problem solving among them, a range of collaborative governance instruments is being used to integrate and coordinate decision-making, including multi-level, multi-sectoral and multi-organisational partnerships, 'joined up' government and policy networks. Actors engage in cooperation, coordination and communication involving various quasi-legislative and quasi-judicial governance processes, among agencies of public government, private sector businesses and groups in civil society (Bingham *et al.* 2005).

Ecosystems are characterised by dynamism, interpenetration and emergent properties that generate complexity and uncertainty (Dryzek 1987). In relation to sustainable resource use, much uncertainty results from the unintended consequences of past activities, while global climate change is likely to introduce further complexity and uncertainty into ecosystem futures. Inevitably, needs for ongoing change and coevolution with unfamiliar environmental conditions make particular demands on governance institutions. For these, institutions should have qualities of anticipation, an orientation to the long term, a vision of sustainability, and they should foster cultures of learning and experimentation in order to develop adaptive capacities (Kemp *et al.* 2005, Allan and Curtis 2005).With their emphasis on processes of learning and experimentation, new governance approaches signify better ways than other modes of governing to cope with the uncertainties of, for example, climate variability and rural restructuring (Lenton 2002). Developing a NRM governance framework based on learning and experimentation may be especially critical for rural industry sectors whose reliance on natural resources makes them particularly vulnerable to such uncertainties.

Interdependencies in the natural resources sector are salient and compelling – those between watershed health and landholders' management practices, for example, are well-known. These interdependencies have to be managed so that benefits, burdens and responsibilities are unambiguous and negotiated. Participatory governance can provide the cooperation necessary to overcome differences among actors. Interdependency also creates a need for institutional arrangements to coordinate the multiple decisions and activities of diverse actors, thereby fostering consistency of policies and programs across different spatial and jurisdictional domains. Multi-level partnership arrangements are particularly appropriate where consistency and coordination are important to prevent problems being ignored or displaced from one medium to another, from one level of governmental responsibility to another, or from one place to another.

NRM is a collective action problem requiring diverse actors – governments, farmers, business, communities and non-government organisations – to integrate their activities so that improvements in the condition of natural resources can be achieved. Using contemporary approaches to governance, various actors in NRM have the potential to engage with and value a greater variety of knowledge. Inadequate scientific knowledge (Head and Ryan 2004) and a lack of technologies to aid its integration across a range of disciplines (Morrison *et al.* 2004) have been seen as problematic for NRM in Australia. Knowledge is particularly important to NRM because of its significance for supporting learning, adaptive environments (Folke *et al.* 2005) and reducing transaction costs (Heikkila and Gerlak 2005). It is now recognised that sustainable NRM requires inputs of knowledge from the sciences (both social and physical), from local experience, and from Indigenous peoples (Berkes *et al.* 2000). Public involvement can improve the chances that sustainable NRM will be implemented by incorporating local knowledge and ensuring that proposals reflect local conditions and values (Ryan *et al.* 2006, van Driesche and Lane 2002).

New governance modes therefore provide opportunities to address problems characterised by complexity, uncertainty, interdependency, and deficiencies in resources, expertise and knowledge. However, a growing literature on the downsides of new governance – which include erosion of democratic process, entrenchment of local power elites, problems with accountability and legitimacy, and insufficient attention to public good outcomes – indicates that the design of NRM governance arrangements should be alert to these shortcomings (see for example, Gibbs and Jonas 2001, Hirst 2000, Jennings and Moore 2000, Jessop 2000, Jones 2001, Lane 2003, Rhodes 1996).

Effective natural resource governance requires democratic and mutually supportive central and local governance institutions. Decentralisation involves the transfer of powers from the central government to lower level actors and institutions (Agrawal and Ribot 1999), and is democratic only when local-level authorities have formal downward accountability to their constituency (Ribot 2002). Contemporary experience suggests that this is difficult to achieve, and in many parts of the world integrated democratic governance capacity needs to be enhanced at both the national and local levels (Ribot 2002). Case analyses from developing countries show that decentralisation reforms, rather than enhancing equity, enabling greater local participation and empowerment, fostering responsiveness of government to citizens, and furthering conservation, often result in a transfer of power to private bodies, customary authorities and non-government organisations, revealing issues of legitimacy, accountability and inclusiveness (Agrawal and Ribot 1999, Ribot 2007, Taconi 2007). This experience adds weight to the need for normative guidance in the design of decentralised governance systems.

Developing principles for good NRM governance

The process used to develop the governance principles presented in this paper involved three main components: (i) suggestions from an expert panel; (ii) consideration of principles from the literature; and (iii) refining and testing draft sets of principles with the assistance of thirteen Australian NRM governance authorities. We describe each in turn below.

A four-member expert panel was first convened and asked to work using the Delphi method (Linstone and Turoff 1975). In the first of three rounds, panel members were provided with background information on the purpose of the research, given a synopsis of pertinent governance literature, and asked to suggest principles to guide NRM governance. The governance principles arising from the first panel round were summarised by the researchers and sent back to the panel for further consideration. The resulting draft set of principles was then considered by the researchers alongside examples of existing usage of governance principles across a diverse range of scales.

A substantial literature on codes for good governance emerged in the late 1980s with recognition in the corporate sector of a need to improve corporate governance systems following the upheavals engendered by liberalisation and internationalisation of economies, as well as from changes in the ownership structures, increasing shareholder activism, privatisation, and institutional investor growth. Such codes were intended largely to supplement and compensate for deficiencies in established legal systems. In the absence of an active regulatory environment, the corporate sector sought to improve its legitimacy by introducing codes of good practice, particularly for company boards. When enacted, codes contribute to the efficiency and legitimation of private power by improving accountability practices (Aguilera and Cuervo-Cazurra 2004). Often with the encouragement of governments keen to privatise public responsibilities, good governance codes were then extended to the public sphere, particularly in those sectors where efficiencies in service delivery were sought. Private and and non-government organisations also saw the potential of good governance codes to bring civil society into policy-making.

From the international literature, we examined the well-known codes of the World Bank (Kaufmann *et al.* 2003), the United Nations Development Programme (UNDP 1997) and the European Commission (EC 2001), as well as Ostrom's (1990, p. 90) design principles for common property resource institutions and Borrini-Feyerabend *et al.*'s (2006) code for protected area governance which takes the United Nations Development Programme set as its starting point. Another international code we used was the Lisbon Principles which was developed by a group of experts for the sustainable governance of marine and coastal resources (Costanza *et al.* 1999). At the national level, we reviewed a standard developed in the UK for government and non-government bodies using public money (TICGG 2004). From organisational space, we drew on governance principles for sustainability developed by the Government of British Columbia's Ministry for Sustainable Resource Management (MSRM 2004). Finally, we examined a set of corporate governance principles proposed to the Australian Government as part of an evaluation of governance arrangements among Australian regional NRM organisations (Walter Turnbull 2005).

We then redrafted the principles by integrating the work of the expert panel with our consideration of the literature. This draft set was tested in the field at interview with Australian NRM governance authorities across three scales: nine NRM governing bodies operating at a sub-provincial (state) level; three with state-wide authorities; and one with a national-level NRM governance role[2]. A further revision of the principles

[2] Australian NRM governance has a three-tier structure. Under a series of bilateral agreements, the Australian Government provides NRM direction and funding to the six Australian states and two territories. Each state and territory then devolves NRM funds and responsibilities to sub-national regional bodies that have been established within each jurisdiction. In total, fifty-six regional NRM bodies have

was then undertaken by the researchers, and a final set of principles confirmed with the thirteen authorities. The outcomes from this three-part process are presented in the next section.

Eight principles for NRM governance

In this section, we present a set of eight good governance principles that are designed to provide normative guidance for NRM governance. Each of the principles is defined, the normative novelties raised by a multi-level NRM governance system canvassed, and their governance design implications indicated.

Principle 1. Legitimacy

Legitimacy refers to (i) the validity of an organisation's authority to govern that may be (a) conferred by democratic statute; or (b) earned through the acceptance by stakeholders of an organisation's authority to govern; (ii) power being devolved to the lowest level at which it can be effectively exercised; and (iii) the integrity with which this authority is exercised. Legitimacy is 'the acceptance and justification of shared rule by a community … the question of legitimacy concerns who is entitled to make rules and how authority itself is generated' (Bernstein 2005, pp. 142-3) and is therefore a key factor in the effectiveness of governance arrangements.

In liberal democratic systems, legitimacy is conferred by democratic representation - described as conferred or input legitimacy (Boedeltje and Cornips 2004). Governments are typically legitimised through democratic processes, and their decisions given weight by legislation and other forms of regulation and policy. Local governments and statutory authorities may have democratic authority indirectly conferred on them through legislation enacted by higher tiers of government. Legitimacy may also be indirectly conferred if procedures (appointments, decision-making, and financial matters) are regular and encompass aspects of democratic processes such as transparency and financial accountability. The question is whether indirect democratic authority provides sufficient legitimacy for boards of organisations appointed from private as well as public sector interests. That appointees' democratic credentials can be of doubtful legitimacy has led some commentators to suggest that it may be prudent to use existing democratically based institutional arrangements (Dovers 2005; Moore 2005). Moore (2005) argues that governing bodies at the sub-national level should fully represent their 'demos', as determined by Dahl's (1989) seven criteria: persons who comprise the democratic unit can be clearly bounded; people in the domain strongly desire political autonomy; people in the domain want to use democratic processes to govern themselves; it does not violate fundamental rights and values; the interests of those in the unit are significantly affected by decisions; consensus will be higher if this unit of delineation is chosen; and gains will outweigh the costs.

Alternatively, new institutions of governance may acquire legitimacy through their efforts at leadership, through effectiveness at producing outcomes or by generating

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been established. Testing of our principles was undertaken with four regional bodies in the state of New South Wales (Northern Rivers, Central West, Lachlan, Murray); the New South Wales state NRM agency; three regional bodies in the state of Victoria (Goulburn-Broken, North Central, Corangamite); the Victorian state NRM agency; two regional bodies in the state of Tasmania (South, Cradle Coast); the Tasmanian state NRM agency; and the Australian Government NRM agency.

consensus around a vision (Newman *et al.* 2004); this may be termed earned or output legitimacy (Boedeltje and Cornips 2004). Ensuring genuine dialogue between NRM organisations and their stakeholder constituencies, including allowing stakeholders to exert substantive influence on decision-making that affects their welfare, may also foster legitimacy. At issue in the authoritative legitimacy of subsidiary bodies and their partnership arrangements with government is the question of whether real powers are devolved (Paton *et al.* 2004).

In multi-level systems, devolved governance should occur such that tasks can be undertaken at the least centralised level with the (potential) capacity to satisfactorily complete them, as well as represent all actors with an interest at this level. Under this subsidiarity 'sub-principle', the powers devolved to subsidiary bodies should be commensurate with their responsibilities. However, in our view, the power to allocate rights over common property resources, or to apply sanctions for violation of operational rules, should not be assumed by or conferred on bodies that rely exclusively on earned legitimacy – such powers should be restricted to institutions with legal and/or democratically established authorities.

Legitimacy also requires that governing actors exercise their authority with integrity, in that they declare any conflicts of interest, do not seek to manipulate outcomes to their personal advantage, and behave honestly. These integrity conditions provide a platform for governance legitimacy that is consistent with key elements of Habermas' (1981) communicative rationality – a communication modality that makes judgments about the quality of communication using criteria such as honesty, clarity, sincerity, as well as lack of distortion, manipulation and deception. Communicative rationality has particular application; first in policy contexts such as sustainable resource management, where the complexity of problems and the diversity of interests indicate a need for high quality communication among stakeholders; and second in governance contexts where policy effectiveness is dependent on the trust generated by authentic stakeholder participation (Selman 2001, Stratford and Davidson 2002).

Principle 2. Transparency

Transparency refers to (i) the visibility of decision-making processes; (ii) the clarity with which the reasoning behind decisions is communicated; and (iii) the ready availability of relevant information about governance and performance in an organisation. In general, all decisions about NRM priorities and investments should be accessible to stakeholders. Transparency is required in who has made a decision; the means by which it has been reached; and its justification. For example, was the decision made according to the authority conferred on or delegated to an individual or body; according to procedures such as majority-rule voting or consensus; or on the basis of expert opinion, professional judgment, and formal decision aids such as multi-criteria analysis or benefit cost analysis?

For it to be accessible, some stakeholders may require information to be made available in particular forms. For example some stakeholders in predominantly English-speaking countries may require materials to be available in languages other than English; some landholders may attend a field day in preference to reading a publication or accessing the Internet; and some Indigenous community groups may prefer to access information via verbal communication rather than in written form (Davidson and Stratford 2000).

Principle 3. Accountability

Accountability refers to (i) the allocation and acceptance of responsibility for decisions and actions and (ii) the demonstration of whether and how these responsibilities have been met. Accountability is an issue for governance in contexts where the effectiveness of decision-making processes is essential for their authority and credibility. In the context of NRM in Australia, evidence suggests that accountability tends to be a one-way affair, upwards to national and state and territory governments with limited accountability downward to local and regional communities or laterally to partners (Moore and Rockloff 2006). In other words, vertical accountability tends to overshadow horizontal accountability, a situation that has not yet recognised recent tendencies for influence (if not power) to be distributed in horizontal networks and non-governmental collectivities (Rosenau 2000). Where accountability is unrealisable through direct democratic involvement and is more informal, citizens' needs for proper access to information, meaningful consultation, and for enhanced opportunities for active participation become more significant.

Compliance with regulatory requirements is an important component of good governance for a public entity. Compliance means the organisation observes relevant legislation, standards and codes; has a compliance program that is integrated with business, operational and financial plans; systems to monitor conformity, such as internal and external audits; and processes to meet external reporting requirements. Reporting requirements should be the minimum necessary to provide financial, governance and performance accountability.

Principle 4. Inclusiveness

Inclusiveness refers to opportunities available for stakeholders to participate in and influence decision-making processes and actions[3]. Governance is regarded as inclusive when all those with a stake in governance processes can engage with them on a basis equal to that provided to all other stakeholders. As solutions to NRM problems often demand substantial changes in practices, their implementation requires participation of as many of the affected actors as possible. It is important for governance authorities to have access to many different perspectives and kinds of knowledge, because no single actor has the resources to generate solutions to 'wicked problems'. As well as embracing decisions concerning NRM issues and aspirations, inclusiveness should be practised in design of the governance system itself. That is, reform processes seeking to decentralise governance should avoid 'top-down' imposition of institutional structures and instead adopt a collaborative approach that involves mutual engagement of all extant and potential governing actors.

Inclusive governance is about governing actors seeking input from multiple sources; having an awareness of and valuing diversity; and having policies and structures to foster stakeholder contributions and engagement. A potential strength of multi-level systems such as Australian NRM is the opportunities they offer governance authorities to match the scale of their engagement strategies to the scope of their respective

[3] While there is some correspondence here with the first principle, representation and acceptance are the central notions for legitimacy, whereas the key concept for inclusiveness is opportunity.

stakeholders' interests. If coordinated, such system-wide design can provide for inclusion of local, regional, national and international interests at the levels at which they will be most effective. Better solutions to complex problems and increased innovation are the likely outcomes of incorporating diverse perspectives and ideas into decisions.

To assist participation by a diverse range of stakeholders, options for NRM governing bodies include employing a range of participation mechanisms across the continuum from active to passive; providing resources to overcome barriers to participation (such as child-care at meetings); timing consultation to suit stakeholders' needs; and using delivery media appropriate to cultural and learning preferences. To ensure that NRM governing bodies incorporate diverse inputs, values and interests, their composition might best reflect the diversity of their stakeholders.

Inclusiveness also implies that governing NRM bodies actively and effectively engage their key stakeholders through targeted participation processes, and by maintaining ongoing dialogue with them. The effectiveness of engagement could be demonstrated by the uptake or maintenance of management practices outside projects, improving participation in projects, or the number of formalised partnerships with significant key stakeholders.

Principle 5. Fairness

Fairness refers to (i) the respect and attention given to stakeholders' views; (ii) consistency and absence of personal bias in decision making; and (iii) the consideration given to distribution of costs and benefits of decisions. Those charged with advancing NRM arrangements are expected to be fair and equitable in the exercise of the authority conferred on them, particularly in relation to the distribution of power, the treatment of participants, recognition of diverse values, consideration of current and future generations, and the development of mechanisms to share costs, benefits and responsibilities of decision making and action.

Addressing many natural resource use problems is complicated by confusion over who should be responsible (Dovers 2005). Given the cross-cutting nature of such problems, it is especially important to ensure that responsibilities and roles do not fall unfairly on particular actors, such as private interests being expected to shoulder the bulk of the costs for public good outcomes or future generations being burdened with the costs of present generations' actions. Fairness in natural resource use also implies practices founded on stewardship of resources for protection of biodiversity and ecological processes.

To assist fairness, governing NRM bodies can employ a range of participation mechanisms appropriate to stakeholders' specific cultural and communication preferences. Treating stakeholders with respect and supporting their dignity is both a moral obligation and fosters acceptance of outcomes. Fair procedures should guarantee that like cases are treated alike, and that where they are irrelevant, the race, gender, ethnicity and socio-economic status of a person do not determine decision-making processes or outcomes.

Meeting strategic priorities may mean that NRM actions and investments are not evenly distributed across a region. Nonetheless, a governance framework informed by fairness would ensure that decisions and resource allocations were not systematically biased in favor of any particular individual or sector, unless such bias was required to deliver on an agreed strategic plan; priorities were clearly articulated for the benefit of stakeholders who may not be eligible; dispute resolution procedures were readily available; and, given that NRM strategies often involve the significant investment of public money to private assets for both private and public benefits, there would be mechanisms in place to account for the distribution of private and public benefits and costs of programs.

Principle 6. Integration

Integration refers to (i) the connection between, and coordination across, different governance levels; (ii) the connection between, and coordination across, organisations at the same level of governance; and (iii) the alignment of priorities, plans and activities across governance organisations. In recognition of the interconnected nature of sustainability challenges in NRM, instrumentally rational governance requires functional connectivity across different scales of government, different policy sectors, and regions (Dovers 2005). Such connectivity is important in building shared recognition of interdependencies among people and among NRM issues, and in allowing actors to address shared problems. These goals require institutional arrangements that can link separate formal and informal NRM institutional processes both vertically and horizontally.

'Strategic connectivity' has been shown to be an important consideration for sustainability in an environment of multi-level governance and for regional sustainable development (Roberts 2000). To ensure consistency in objectives and implementation of policy and management instruments, governing NRM institutions should have generated a long-term vision with short- to medium-term measurable objectives; strategic direction should be vertically consistent with arrangements at other governmental levels; and policy and management instruments should be horizontally consistent across NRM organisations and sectors. The design and implementation of policy and management instruments also needs to take account of and be suited to the particularities of local conditions.

Integration of policy initiatives is important to avoid duplication and for the efficient deployment of public resources. Integration of policy instruments could include, for example, ensuring consistency of larger policy frameworks that rely on market-based instruments such as water trading with regional processes for securing environmental flows in catchments.

Principle 7. Capability

Capability refers to the systems, plans, resources, skills, leadership, knowledge and experiences that enable organisations, and the individuals who direct, manage and work for them, to effectively deliver on their responsibilities. Effective implementation is influenced by executive skills and leadership; skills and competence of staff – technical, financial and management; availability of training; management systems; knowledge; organisational maturity; funding availability and continuity; and succession

planning. Effective business systems are needed to support the successful delivery of a governing NRM body's obligations: these include systems for financial management, human resource management, information management, project management, as well as NRM planning and implementation, the application of appropriate decision-making methods and procedures, and associated conflict-resolution mechanisms that satisfy the principle of 'fairness'. An outcome of implementing such systems and methods should be the efficient deployment of resources and the direction of investment towards those management actions most likely to satisfy NRM objectives.

Knowledge (and its management) is a key component of developing solutions to complex problems characterised by uncertainty, long time scales, multi-dimensionality, and diverse values. Solutions to such problems have to be informed by a broad range of knowledge sources including scientific research, on-ground experience, and traditional ecological knowledge (Berkes *et al.* 2000, Millar and Curtis 1999, Olsson and Folke 2001). The right kind of freely flowing information, together with effective communication, can stimulate the creativity and flexibility necessary to respond to new situations as they arise (Andersson and Hoskins 2004, Nthunya 2002). At the same time, the limits of knowledge should be recognised by the application of the precautionary principle (Cooney 2004), and safeguards installed to prevent knowledge being abused as a means of control (Andersson and Hoskins 2004).

In a devolved system of environmental governance, there is the risk that responsibilities will be allocated to lower tiers without commensurate resources (Lawrence 2005) so that the capacity of governance bodies to deliver effective outcomes is compromised by insufficient financial autonomy and flexibility. Where public good outcomes are involved, central governments have a role to play in ensuring substantial, long-term investment in addition to resources that the private sector may contribute.

Principle 8. Adaptability

Adaptability refers to (i) the incorporation of new knowledge and learning into decision-making and implementation; (ii) anticipation and management of threats, opportunities and associated risks; and (iii) systematic reflection on individual, organisational and system performance.

Adaptability demands that a governing body is able to rearrange its internal processes and procedures in response to changing internal or external conditions – that is, the body is intentional in its management of change. It has processes to assimilate new information, procedures to learn from experience, and procedures to test the reliability of its assumptions. An organisation that is strategic, anticipatory, forward looking and innovative in approach is in a better position to: read the external environment; reduce unexpectedness and surprises; respond to and cope with change; demonstrate foresight; and adapt to changing community needs. Such an organisation will have procedures to identify, assess, and manage risk; for strategic planning; and for 'what if' thinking. Adaptable NRM organisations take seriously the importance of systematic self-reflection on their procedures, processes and performance through such means as monitoring, evaluation and review. They also have processes for making better decisions and changes as a result of review outcomes and for feeding new information back into their plans and targets.

The various uncertainties and positive feedback effects associated with NRM problems mean that NRM institutions and organisations must be capable of adapting to accelerated change in natural systems. There is a need for systematic approaches to organisational and policy learning through ongoing assessment of performance and processes – that is, self-reflexivity. In light of the uncertainties and complexities generated under such conditions, self-reflexivity, or meta-learning, provides the information for adaptive governance, policy, planning and management. Assessments can help to change perspectives on organisational objectives and the means and methods to be employed (Schleicher-Tappeser and Strati 2004). In an organisation wishing to cultivate adaptive capacities, processes of performance measurement, reporting and review will be standard.

Conclusion and recommendations

Natural resource problems belong to a class of complex environmental policy problems whose remedy necessitates institutional adaptation and innovation. Normative standards are prerequisites essential to the design of effective governance institutions inasmuch as they indicate the ideal types of character, motive, action and consequences to be expected of them. Such guidance is required in response to the novelties of governing in multi-level environmental governance contexts where problems are complex, interests are diverse, and coordination among public, private and voluntary sectors is essential to problem solving. The eight principles developed here – legitimacy, transparency, accountability, inclusiveness, fairness, integration, capability, and adaptability – provide normative guidance for the establishment of good-practice multi-level NRM governance. The following comments explain the connections between the conditions of multi-level environmental/NRM governance and the eight governing norms.

The democratic legitimacy conferred indirectly on non-elected governing bodies may be insufficient for their effective functioning and they will undoubtedly find it necessary to have in place (i) a strategy that enables them to earn legitimacy from their stakeholders; (ii) protocols that ensure the integrity of decision making; and (iii) active trust-building measures.

Similarly, in the context of complexity, diversity and coordination imperatives, the legitimacy of governing institutions will be enhanced by openness of decision making, and clarity of justifications for decisions, while legitimacy and fairness dictate that stakeholders have ready access to information about the governing bodies' performance.

The implications of multi-level environmental governance conditions for accountability are two-fold. First, governing bodies at all levels have to demonstrate that they are meeting their allocated responsibilities; and second, if higher level governing authorities are to have the cooperation of other governing bodies and stakeholder groups, there must be acceptance that accountability also extends downwards and outwards as well as upwards.

Inclusiveness, in the sense of diverse stakeholder input, is an essential guiding value for multi-level NRM governance to ensure better solutions to complex problems, more innovation, and the effectiveness and relevance of decisions. As with accountability,

inclusiveness implies that lower level governing bodies have opportunities for input into higher-level decision making.

Fairness in environmental governance is multi-dimensional and challenging. Guidance is needed to account for (i) the novelty of dealing with overlapping public and private interests; (ii) clear and fair allocation and acceptance of roles and responsibilities by stakeholders; (iii) tensions between strategic priorities and equitable resource allocation; and (iv) the needs of those without a voice, including non-humans and future generations.

The cross-boundary nature of NRM and other environmental challenges necessitates a principle that supports (i) recognition of interdependency among people and issues; (ii) coordination across governance levels, policy sectors and spatial domains; and (iii) vertical and horizontal coherence of such spheres. Such integration is also necessary to avoid duplication and problem displacement and promote efficient resource use.

The principle of capability represents recognition that novel problem challenges usually necessitate attention to the appropriateness of available institutional, organisational and human resources. Among these, key resources include leadership, access to knowledge, organisational systems, and sufficient financial and human resources.

The principle of adaptability is an acknowledgement that the governance of NRM occurs in an environment of uncertainty, unpredictability and complexity and implies that governing authorities should possess capacities to anticipate, manage and respond to threats, opportunities and risks in order to operate effectively in such an environment. Such systematic approaches to organisational and policy learning provide the flexibility and information for adaptive governance necessary under such conditions.

The principles can also serve as a platform for developing governance monitoring and evaluation instruments. They provide the motivation and structure from which outcomes and indicators of good NRM governance can be constructed. Following benchmarking, such indicators can enable NRM authorities to track their own governance performance, identify deficiencies and target areas for improvement. As well as organisational learning, such monitoring and evaluation of performance can in itself promote governance accountability and transparency, especially where it is implemented in the form of an independent audit.

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