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Main Article:

Integration Research for Shaping Sustainable Regional Landscapes

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Abstract

Ecological and social systems are complex and entwined. Complex social-ecological systems interact in a multitude of ways at many spatial scales across time. Their interactions can contribute both positive and negative consequences in terms of sustainability and the context in which they exist affecting future landscape change. Non-metropolitan landscapes are the major theatre of interactions where large-scale alteration occurs precipitated by local to global forces of economic, social, and environmental change. Such regional landscape effects are critical also to local natural resource and social sustainability. The institutions contributing pressures and responses consequently shape future landscapes and in turn influence how social systems, resource users, governments, and policy makers perceive those landscapes and their future. Science and policy for "sustainable" futures need to be integrated at the applied "on-ground" level where products and effects of system interactions are fully included, even if unobserved. Government agencies and funding bodies often consider such research as "high-risk." This paper provides some examples of interdisciplinary research that has provided a level of holistic integration through close engagement with landholders and communities or through deliberately implementing integrative and innovative on-ground experimental models. In retrospect, such projects have to some degree integrated through spatial (if not temporal) synthesis, policy analysis, and (new or changed) institutional arrangements that are relevant locally and acceptable in business, as well as at broader levels of government and geography. This has provided transferable outcomes that can contribute real options and adaptive capacity for suitable positive futures.

Keywords: landscape ecology; Turning Points; institutions; integration; social-ecological systems; natural resource policy

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1. Introduction

Interacting social-ecological systems produce choices, tools, and institutions for resource use and, in turn shape the function and patterns of landscapes. Humans continue to effect change in the current and future use, productivity, and sustainability of landscapes and whole regions. Change can have positive, negative, or even relatively neutral effects. Change is generally always happening in some form, in response to subtle or more forceful drivers of change (e.g., fashion trends and urbanisation). Around the world, *resource collapse* leading to considerable social and economic upheaval, particularly in fishing and rural communities appears to be on the increase (e.g., Berkes, Colding, & Folke, 2003; Cairns, 2004a, 2004b; Carpenter & Gunderson, 2001). Australia shares many of these characteristics across its vast non-metropolitan regional areas while also having some unique characteristics in terms of water scarcity, poor soils, and topography, which provide additional challenges (Australian State of the Environment Committee, 2001; Reeve, 1997).

Landscapes are shaped by the interaction of social and ecological systems. Past resources use and interacting social-ecological systems have shaped the function and patterns of landscapes. Humans continue to shape the current and future use, productivity, and patterns of sustainability of landscapes and whole regions (Turner, O'Neill, & Shugart, 2001). Efforts to overcome the degradation of ecological resources supporting society and economies are, however, constrained by a lack of understanding of linked social-ecological systems (Brunckhorst, 2002), and the required eco-ethical change in human values (Cairns, 2003; Legendre, 2004). These complex systems might be viewed as landscape mosaics (after Forman, 1995)--a jigsaw of interacting human and natural systems operating at multiple scales (Brunckhorst, 2000, 2002). Learning and change often appear to be very hard in human society, however it is becoming clearer that cultural values and institutional

arrangements are critically important to bringing about change towards sustainability (Brunckhorst, 2001; Gunderson, Holling, & Light, 1995).

An increasing number of authors are pointing out that, while biophysical scientific understanding has been crucial to the development of improved agricultural production, the first priority is now an improved integration of ecology with the economics, institutional arrangements, and the politics of the transition to a regime of sustainable resource use (see for example the "State of the Planet" issues of *Science,* Volume 302, 14 November and 12 December 2003). Social and policy commentators along with scientists are starting to converge in calls for human society to become more flexible and adaptable to shift towards more sustainable resource use, activity, and governance. An Australian Prime Ministerial working group has argued for "continued and expanded investment in the means of delivering the outcomes of biophysical research. This involves social and economic research on adapting institutional arrangements, socio-economic modelling, and decision support and extension methods" (Prime Minister's Science, Engineering and Innovation Council, 1998, p. 16).

Ecological and economic systems often appear to be at odds. Sustainability, however, requires building compatibility between social-ecological systems to enhance resilience and adaptive capacity. Systems of natural resource use, local government, and regional development need to be compatible with the dynamics of the *ecological services* and resources involved, and with the social and institutional characteristics of the communities to which resource users belong (e.g., Berkes & Folke, 1998; Brunckhorst, Bridgewater, & Parker, 1997; Hanna, Folke, & Mäler, 1996). Examples of incompatibility leading to collapse are prevalent, such as the cod fishery communities of coastal Nova Scotia (Canada) and Maine (USA), in contrast to the lobster fishing communities of Maine which appear to have built social-ecological system cohesion providing resilience (Carpenter & Gunderson, 2001; Woodward, 2004). The ecological sustainability of landscapes and their capacity to support human communities is actually dependent on a range of institutions society uses over time. It will depend less on the ecosystems themselves, though more resilient ones might predominate, leaving fewer options for types of resource use.

The laws that govern the processes of natural systems are fixed; therefore opportunities to significantly improve resource management outcomes will rely on our ability to modify our social systems to better serve our long-term interest in the natural world. An increasing

number of authors are turning their attention to ecological sustainability issues related to community and administrative arrangements for a more integrative understanding of land use, urban infrastructure and services, local planning, and regional development. This timely shift might be seen as consideration of "biocultural appropriateness" for institutional, urban, and rural capacity building for natural resources management (e.g., Berkes & Folke, 1998; Brunckhorst, 1998, 2000, 2001, 2002; Brunckhorst & Mouat, 2000; Cairns, 2003; Forman, 1995; Gunderson, Holling, & Light, 1995; Hanna, Folke, & Mäler, 1996; Holling & Meffe, 1996; Knight & Landres, 1998; Omernik & Bailey, 1997; Reeve, 1998). In practice however, social change can be difficult to achieve--people resist changing their usual ways of doing things. Institutionalised practices of fixed policy and bureaucratic program control can erode efforts towards adaptable systems for sustainability (see Holling & Meffe, 1996; Carpenter & Gunderson, 2001). Herein, a social system refers to any group of people who interact long enough to create a shared set of understandings, norms, or established patterns to integrate activities and make resource allocations. The term *institution* refers to sets of formal and informal rules and norms that shape interactions of humans with others, and with nature. Both society and its institutions may need to become more capable of substantial transitions over shorter time scales to adapt to pressures of change including social ramifications of reduced resource capacity or alternative ecosystem uses and restoration. Such transformations might require novel approaches if humanity is to find realistic solutions to social and environmental sustainability issues providing long-term resilience, because the community can adapt with matching civic skills and knowledge. More effective spatial representation of these features is likely to greatly improve community engagement and participation (Brunckhorst, Coop, & Reeve, 2005). The human dimensions of landscapes must be integrated with policies, administrative frameworks and plans to repair and sustain ecological systems and functions (Brunckhorst, 2000; Forman, 1995; Johnson, Swanson, Herring, & Greene, 1999).

The term *integration* as used in this paper refers to a holistic understanding of complex interacting social-ecological systems, rather than approaches that attempt to reassemble separately studied components to elucidate meaning. A whole view of, and immersion in real, though complex, interacting systems will encompass unique properties that materialise from the interacting systems, and is likely to provide more realistic and practical solutions for natural resource management and human needs (Brunckhorst, 2000, 2002). Landscapes provide both a useful conceptual and spatial context for integration because they display patterns from interacting social-ecological systems.

2. Integrating Science and Policy for Resilient Landscapes

2.1. Landscape Integration

Landscape is a social construct, but it is also inherently diverse and embodies a multitude of values for its inhabitants. Some 70 years ago, Lewis Mumford noted, “The human region... is a complex of geographic, economic and cultural elements. Not found as a finished product in nature, not solely the creation of human will... the region... is a collective work of art” (Mumford, 1938, p. 367). The actions and choices of human communities interacting locally with the ecological systems of a landscape create a “place” and give rise to its social identity (Shannon, 1992, 1998). The most local scale of similar ecological landscape, land use, and concurrent human attachment to place and local social interactions has been referred to as a *bioregion* or *bio-cultural region* (Brunckhorst, 2000, 2001; Johnson et al., 1999; Slocombe, 1993). We need to understand past change to trigger transitions towards resilience. Rural landscapes include people and communities, resource production and related industries, economies and political institutions, biodiversity, and ecological systems (see Figure 1). These components operate at various scales and interact also at a variety of levels. Constant change is normal. However, the pressures of change on economies, ecological services and resources, and towns and communities are increasing. Whether the driving forces of change are potentially positive or negative, the rate of change can cause stress to social and ecological systems as they struggle to find an appropriate response. Single issue or narrow sectoral responses are unlikely to have lasting benefits. Broader, more integrative responses are required. A “suite of tools” for diverse landscape contexts might be useful for better understanding and application to changing course towards a direction that will provide positive outcomes towards resilience and more sustainable future landscapes. Later, I refer to this capacity to develop and apply such tools for institutional innovation, as *reflexive competence* of a regional landscape or bioregional context.

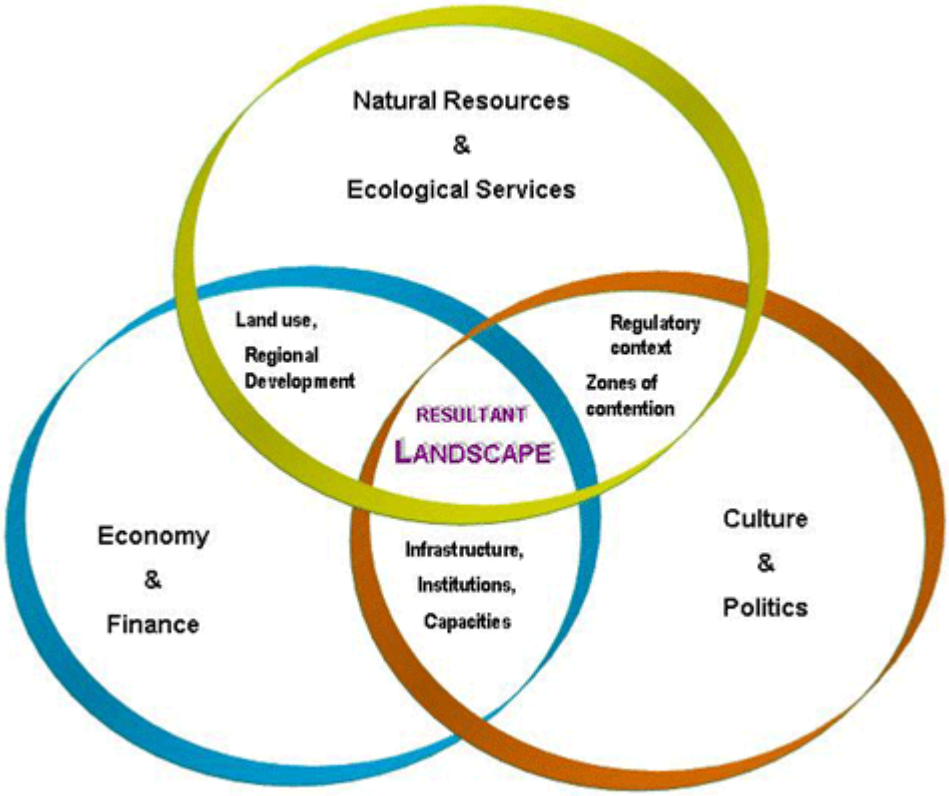

Figure 1. Complex spheres of interaction of cultural, institutional, and physical processes reflecting human values, identity, and activities affecting landscape change (adapted from Brunckhorst, 2002).

Scale is a critical attribute of ecological systems and human interactions with each other and nature (see Norton & Ulanowicz, 1992; Turner, O'Neill, & Shugart, 2001). The landscape scale is the main scale of human interaction with the environment. The landscape-regional context links multiple spatial and temporal scales of biodiversity with human uses and socio-economic imperatives (see Brunckhorst, 2000, 2001; Johnson et al., 1999; Mumford, 1938; Slocombe, 1993). Human systems for environmental management, however, tend to be more narrowly focused and sectorally based (e.g., fisheries, forestry, national parks). The foundation for a sustainable future is the continuance of ecological processes and functions across multiple spatio-temporal scales (Brunckhorst, 1995, 1998; Norton & Ulanowicz, 1992; Noss, 1983). It is also becoming evident that actions to sustain ecological systems, flows and functions must be integrated across regional landscapes. Such regions encompass natural areas, human living places (that include human utilised, natural resource primary production in terrestrial or oceanic systems), and a mosaic of other land uses (Brunckhorst,

2000; Slocombe, 1993). Therefore, actions to sustain ecological systems, flows and function must be integrated across both the human and ecological dimensions of regional landscapes.

There is still too little understanding of the relationship between society and its institutions, including their spatial function, and ecosystems at the scale of regional landscapes (a bioregion, Brunckhorst, 2000). Methods need to be developed that recognise, account for, and integrate the scales of influence that interconnected social and ecosystem functional elements have on one another (Brunckhorst & Rollings, 1999). It will then be possible to demonstrate how ecosystem functional capacity might dictate resource governance (Brunckhorst, 1998, 2001). Applications of such methods and well-grounded approaches would include, for example, resource planning and management, environmental planning and rehabilitation, rural and agricultural planning, urbanisation policies, infrastructure planning, and more thoughtfully integrated development aid programs.

Human activity is a major force shaping landscapes. Past change has provided us with our present starting point--there is no way of "winding back the clock." However, many lessons have been learnt, new information is available, and there is a pressing need to influence change towards future sustainable rural landscapes and compatible industries, in a more "holistic" and sustainable manner. Perhaps this is in part what integration is about--both from applied interdisciplinary research and improved management of complex social-ecological systems. Enduring ecological, social, and economic sustainability requires integrated planning and management of natural resources, ecological functions, and primary production across landscapes. This will require changes to social norms, and new institutions and organisational forms. These issues might best be analysed, and solutions applied, at a regional landscape scale to allow effective integration and redesign of human dominated landscapes (Figure 2).

Social-ecological landscapes can provide an integrative spatial context for applied research, policy analysis, future planning, and importantly, implementation of strategies and actions by communities that have a strong attachment to the place and who may wish to engage in shaping a more sustainable future. Scientists, policy makers, sectoral industries, and government departments often work in compartmentalised subject areas and are often encouraged to remain narrowly focused. While the value of multi-disciplinary teams is now well established, seamless integration and synthesis of their work for practical application

has been much harder to achieve. The next section briefly outlines a view of interdisciplinary integration for systems research and practical application.

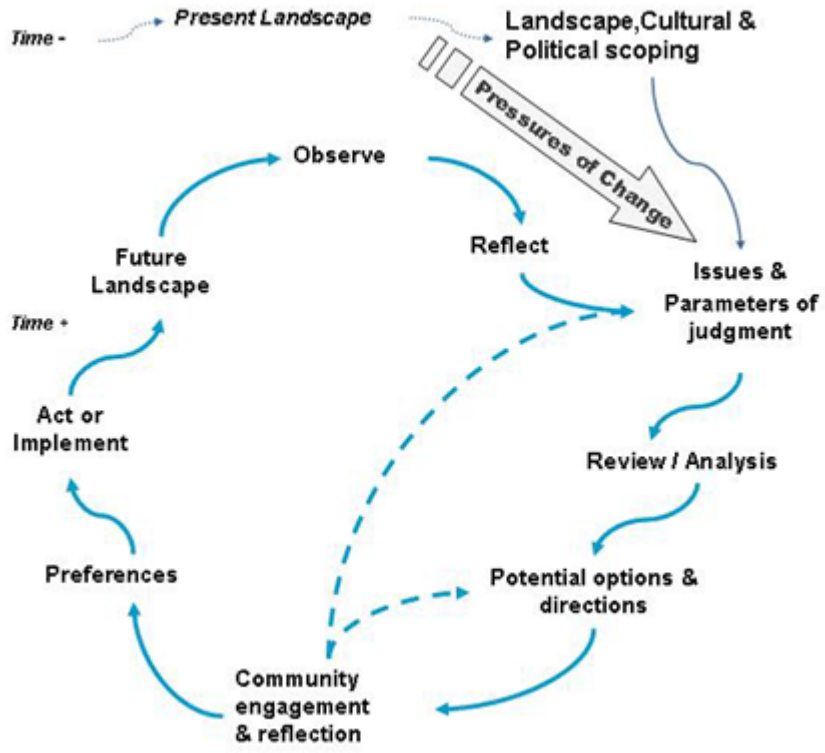

Figure 2. Pathway to shaping future landscapes from a position created by past human interactions with the environment.

2.2. Disciplinary Integration and Innovation

There is a clear need to accelerate research and develop novel technologies to assist adaptive change towards more integrated and reflexively competent (adaptive) land-use planning, management, and regional development in human dominated agri-ecological landscapes (land use, social, economic, institutional planning and management, and community service delivery). Such research is, of necessity, both multidisciplinary and interdisciplinary in nature--as the Australian Prime Ministerial working group reported: “There is a need to provide better connections between the disciplinary experts who tend to operate in disciplinary isolation. Integrated, management-oriented solutions are essential to success,

and we need various scientists to work together, and with the resource managers" (Prime Minister's Science, Engineering and Innovation Council, 1998, p. 16). While attempts at *integration research* have steadily grown over the past decade, there are questions about its effectiveness and future prospects.

Most theories and experimental practice of traditional science describe only subsets of the real world. There has been a tendency in both science and policy to consider integration as reassembling conclusions from individually studied parts. As stated earlier, in this paper, *integrated* means holistic, and it refers to a whole system of interacting elements. Such systems exhibit synergistic properties, produced by interactions and interdependency among the elements. It also works the other way, i.e., higher level properties can trigger and facilitate new interactions among the elements.

A *system* is characterised by strong, usually non-linear interactions and continuous feedback (making it difficult or impossible to establish direct causality). Due to the existence of hierarchies and non-linearity, the whole is simply not a sum of the parts (von Bertalanffy, 1968). Classical (reductionist) science aims to find linear causality and the basic elements which directly add-up. The interaction of ecosystems, social systems, and economic systems of regional landscapes clearly exhibits characteristics of complex, networked, and cross-scale systems (Costanza, 1993). These will not be well understood using the methods of classical science. Nevertheless, some means of at least partly isolating or simplifying the subject of study might be required. In part, this capability can be provided through a landscape approach, grounded in landscape ecology theory which attempts to study this complexity by focusing on landscapes as the object of research (Brunckhorst, 1998, 2000; Forman & Godron, 1986; Kim & Weaver, 1994; Odum, 1998; Platt, 1996; Power, 1996). Case studies of enduring and successful social-ecological systems, as well as unsuccessful examples, are valuable in contributing understanding of characteristics relevant to integration and synthesis (e.g., Berkes & Folke, 1998; Brunckhorst, Bridgewater, & Parker, 1997; Coop & Brunckhorst, 2000; Gunderson & Holling, 2001; Gunderson, Holling, & Light, 1995; Johnson et al., 1999; Ostrom, 1990). There has been much less research focusing on the "on-ground" application of this understanding to help social-ecological systems develop adaptive resilience. For example, efforts to overcome land degradation rarely focus on the emergent properties of systems interactions.

Proponents of any scientific discipline, method, or viewpoint will generally build their arguments on theory. Different approaches and viewpoints, however, are built on different theories, all of which are correct, at least in the sense of being partially tested and credible representations of one part of reality. Therefore, research on social-ecological systems of landscapes requires a multi-theoretical basis (Brunckhorst, 2001; Gunderson & Holling, 2001). Major theoretical concepts, approaches, and methodologies underpinning this research program come from many different fields. A list of such fields would include landscape ecology, landscape design, systems and hierarchy theory, urban and regional planning, sociology, psychology, law, institutional analysis and design, new institutional economics, environmental and resource sciences, and experimental or adaptive management approaches.

The biophysical components of the biosphere occur in various interacting processes and functions creating patterns at scales from nanometres to thousands of kilometres. Landscape ecology provides a grounded approach to study these systems, including the humans (and their institutions) that shape them (Forman, 1995; Forman & Godron, 1986; Urban, O'Neill, & Shugart, 1987). Through development and use of computer based spatial information systems, landscape ecology can be a very powerful tool for integrating and synthesising large amounts of complex data and patterns having explicit contexts and locations on the earth's surface. Design involves courses of action aimed at changing existing situations into preferred ones for humans and their sustainable use of resources (Herbert Simon, in Steinitz, 1993). Landscape design provides a conceptual framework bringing together ecosystems, resource use, and human service and infrastructure needs to examine the arrangement and layout of possible future landscapes (Johnson & Hill, 2001; Lyle, 1985; Steinitz, 1993; Van der Ryn & Cowan, 1996).

As discussed above, systems theory and analysis recognises clusters of interacting and interdependent elements (or sets of elements) linked by complex exchanges. They have influences on each other that need to be studied together as much as possible, so as to help reflect reality (Brunckhorst & Rollings, 1999; Costanza, 1993; von Bertalanffy, 1968). To make scientific research possible, systems researchers look for *boundaries* that enclose relatively stable entities, which can be studied for the interactions within and outside the boundaries. A considerable body of work has developed around hierarchy theory--multiple scales of such boundaries and *nesting* occurring in natural and human systems (Hansen & di

Castri, 1992; Odum, 1998; O'Neill, DeAngelis, Wade, & Allen, 1986; Pattee, 1973; Urban, O'Neill, & Shugart, 1987).

With the recent application of New Institutional approaches in the social sciences (Black, 1997; Challen, 2000; Eggertsson, 1990; North, 1990), derived from various subfields of economics (theory of the firm, industrial organisation), law and political science, the relationships between institutions, collective action, and sustainable resource use are better understood (Berkes & Folke, 1998; Bromley, 1991, 1992; Brunckhorst, 1998; Cortner, Wallace, Burke, & Moote, 1998; Hanna, Folke, & Mäler, 1996; McKean, 1996, 2000; Ostrom, 1990). This body of work is of particular use in approaches to institutional analysis of resource governance (Douglas, 1986; Gunderson, Holling, & Light, 1995; Ostrom, 1990, 1998) and institutional scales and design; for example, design of institutional arrangements for sustainable irrigation, fisheries or grazing systems (Goodin, 1996; Hanna, Folke, & Mäler, 1996; McKean, 1996; Ostrom, Burger, Field, Norgard, & Policansky, 1999; Singleton, 1998; Williamson, Brunckhorst, & Kelly, 2003).

Transforming institutions and practices (as well as research approaches) requires learning and adaptation. The theories and methods of active learning and adaptive management (Gunderson, Holling, & Light, 1995; Holling, 1998; Walker, 1995; Walters, 1986; Walters & Holling, 1990) are useful in designing innovative on-ground experiments.

The notion of *panarchy* refers to evolving hierarchical systems of growth, accumulation, collapse, and reconfiguration (Gunderson & Holling, 2001; Gunderson, Holling, & Light, 1995). The notion is fairly general and requires further development to guide approaches to understand systemic shifts encountered in social-ecological systems. Such approaches might focus on understanding how to trigger positive change and thus shape the evolution of landscape systems. We are beginning to work on more practical approaches towards understanding of such systemic shifts. This *Turning Points* program of research integration aims to understand change pressures and circumstances that allow timely transitions towards sustainability, using interdisciplinary theory, case studies, and analysis of new landscape models. This will augment civil capacity to drive the institutional innovation needed for transformations to sustainability, such as strengthening the feedback from ecological condition to the socio-economic structures that drive resource use, which is required to understand and develop reflexive competence (Figure 3). Research integration is important for understanding such shifts or transformations, identifying leverage points or windows of

opportunity where a system might be influenced and capable of positive change to foster resilience and sustainability, and exploring the related practical on-ground activity, and institutional and policy changes required to make such positive change a reality (Brunckhorst, 2000, 2002, 2003; Brunckhorst & Coop, 2001, 2003; Williamson, Brunckhorst, & Kelly, 2003).

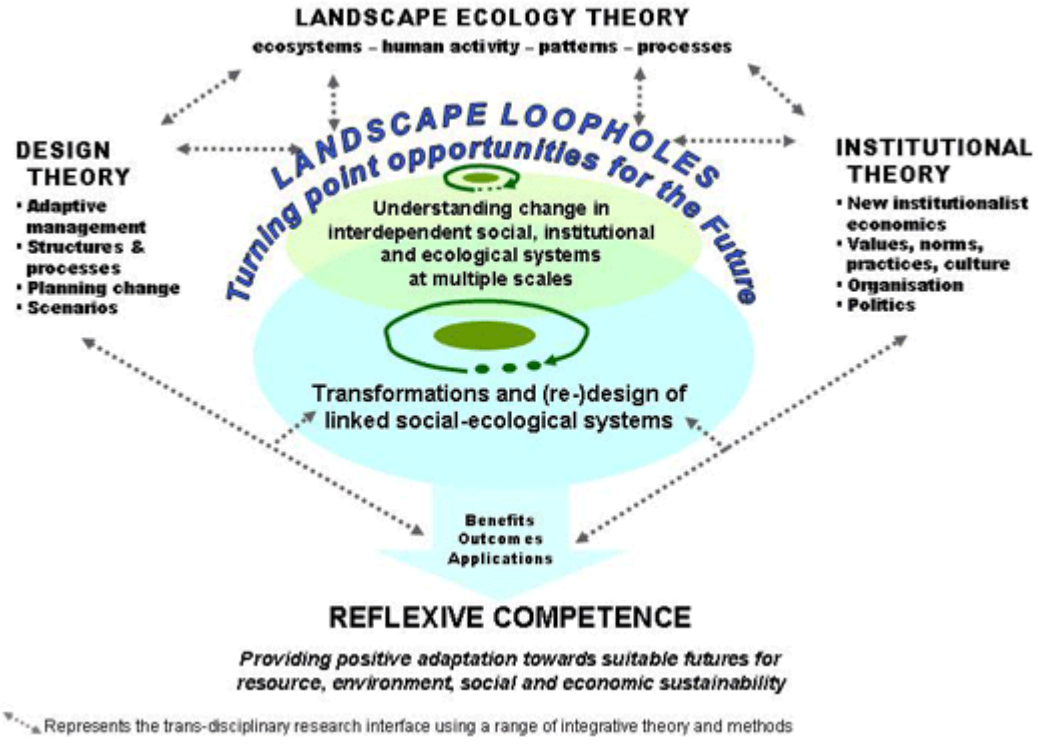

Figure 3. Rationale and linkages for the integrative research on Landscape Loopholes, part of the Turning Points research program to identify windows of opportunity to change direction towards more ecologically sustainable futures.

Much greater facilitation and support for multidisciplinary research is required, particularly across the integrative fields of landscape ecology, systems theory, panarchy theory, new institutional economics, and experimental management approaches must be forged. The combined synergies of these theories and research approaches have the potential for transforming social-ecological systems towards greater reflexive competence, leading to resilient sustainability. Several disciplines such as landscape ecology, design studies, policy analysis and institutional economics might be combined for research integration to distil new

pathways for change, building resilience (Figure 3). Such integrative research is perceived as risky by the government and some funding bodies, despite its positive potential. In contrast, some philanthropic investors appreciate such projects due to the potential benefit of such projects when successful (see Brunckhorst, Bridgewater, & Parker, 1997). Such research needs to occur at multiple scales, across property and jurisdictional boundaries, but sufficiently engaged within social-ecological contexts, to provide options for sustainable landscapes and enterprises in the future--those building reflexive competence in their institutions for resource allocation and use.

2.3. Integration Research: Transformations towards Resilient Landscapes

In the type of integration research reported here, identifying Turning Points is a crucial step. Changing poor resource management practices is often difficult to achieve. A Turning Point refers to a window of opportunity, when it is easier to alter course towards more ecologically sustainable resource use, communities, institutions, and policies.

The Tilbuster Commons project is an example of integration research that interfaces with several theoretical fields and involves medium to long term participation with landholders directly engaged in the project. The project involved four landholder families, who had to contend with a number of issues, such as reduced farm sizes, constraints on family time, increasing average age of farmers, land degradation, and property rights issues. The research identified Turning Point opportunities and demonstrated a transformation towards more sustainable social-ecological systems, which released time and resources for landholders, shared farming risks, improved the environment, water quality, and production, and built resilience against drought (Brunckhorst, 1998, 2000, 2002, 2003; Brunckhorst & Coop, 2003; Coop & Brunckhorst, 1999; Williamson, Brunckhorst, & Kelly, 2003).

Other Turning Point projects, such as New South Wales Eco-Civic Regionalisation, have also been at points of potential change and transformation (Brunckhorst & Coop, 2001; Brunckhorst, Coop, & Reeve, 2002; Brunckhorst, Coop, & Reeve, 2004). The eco-civic regionalisation method applied to New South Wales is contributing to real “whole of government” integration for administration and service delivery in appropriately scaled regional contexts. A holistic integration across resource planning and management, environmental planning and rehabilitation, rural and agricultural planning, catchment management, urbanisation and service delivery policies, infrastructure planning, and local government administration will then become possible. The timing and circumstances to

implement the eco-civic regionalisation of New South Wales is currently a transformative Turning Point opportunity in that it is recognised across many stakeholder groups and the government that issues including failures in catchment management programs, native vegetation protection, drought, and land degradation need to be addressed and there is a political climate in favour of reforms. The project identifies a hierarchy of three nested levels of spatial scales, which seek to capture within their boundaries similar ecological and resource characteristics, local social networks, place identity, and residents' common concerns (Figure 4).

Industry clustering in rural regional development provides the opportunity for experimental design of industry ecosystems such that the waste of one industry is used as a resource by its neighbour, including efficient water re-use. J. McNeill and colleagues at the Institute for Rural Future provide another Turning Point example for transforming rural based processing and manufacturing industries towards environmentally benign yet efficient systems of waste re-use in ways that have economic benefits (McNeill, 2004). The liquid effluent wastes and carbon dioxide emissions of an abattoir for example, might become resources in cyclic use for greenhouse horticulture (such as tomatoes), cropping, cabinet timber plantations, aquaculture, and finally filtered through wetlands.

Projects such as the above three examples integrated the scales of influence that social and ecosystem elements have on one another (Brunckhorst & Rollings, 1999; Lyle, 1985; Ostrom et al., 1999; Steinitz, 1993; Van der Ryn & Cowan, 1996). Such transformative approaches to integrated social-ecological systems research can be developed further. These need to be supported by case studies, on-ground experimental models, active-adaptive learning processes to build relevant understanding, which may be beyond the theoretical (e.g., Brunckhorst & Coop, 2001, 2003; Folke, Berkes, & Colding, 1998; Johnson, et al., 1999).

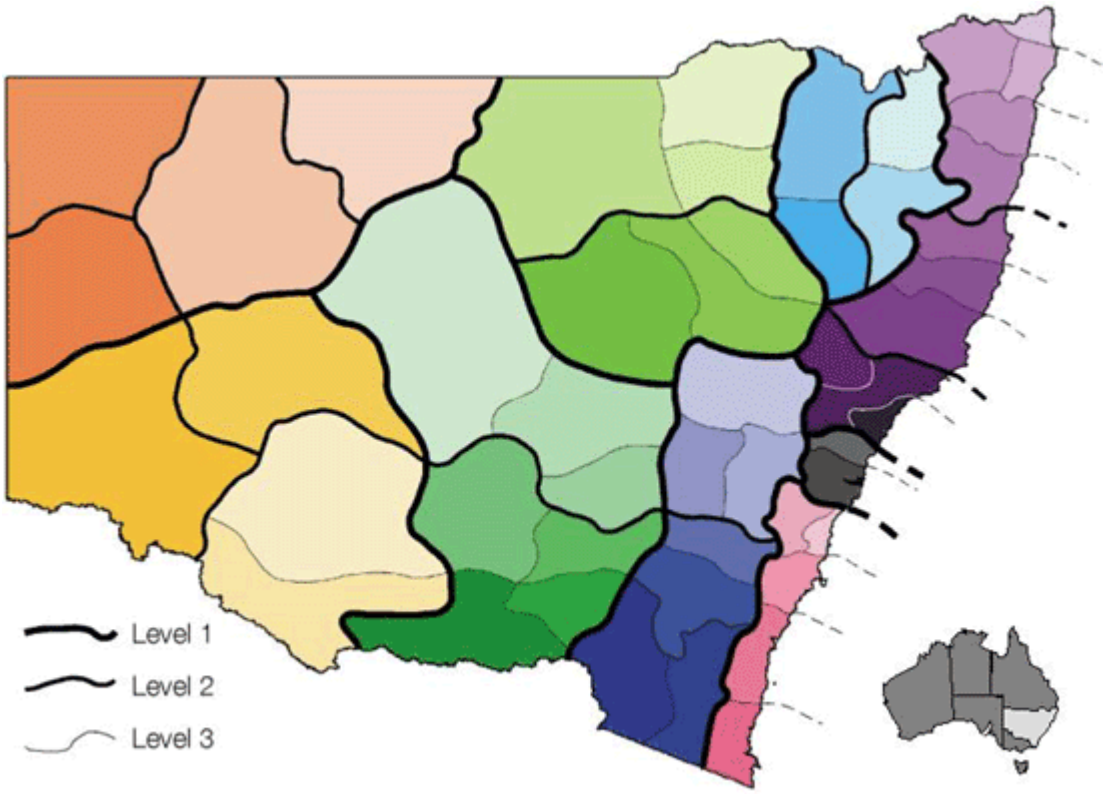

Figure 4. Hierarchy and nesting of eco-civic regions (Levels 1-3) of New South Wales, Australia (adapted from Brunckhorst, Coop, & Reeve, 2004).

3. Conclusion

The interactions of complex social-ecological systems affect future landscape change, contribute both positive and negative consequences for sustainability. Non-metropolitan landscapes are the major theatre of social-ecological interactions where large-scale alteration can occur. Several institutions shape future landscapes by influencing how social systems, resource users, governments, and policy makers perceive regional landscapes and their future. Science and policy for sustainable futures need to be integrated at the applied on-ground level, where products and effects of system interactions are fully included, even if not explicitly recognised or understood.

Integration research addressing sustainability issues of complex social-ecological systems needs to be holistic, set in the right context, and incorporating community knowledge and culture. This should preferably occur through engagement. Integrative research works across

areas of inquiry. It is non-reductionist, often employing systems methodologies to integrate ideas with action, in a process of adaptive learning.

Government agencies and funding bodies often consider such research as high-risk; however, acknowledgement is due to Land & Water Australia who have supported such projects and observed the benefits of doing so. This paper provides examples of multidisciplinary research, which have provided a level of holistic integration through close engagement with landholders and communities. In retrospect, such projects have integrated policy concerns with institutional arrangements, to some degree. This has been achieved through spatial synthesis that is relevant locally as well as at broader levels of government and geography. The projects have provided transformative capacity at opportune moments, i.e., Turning Points, which have provided solutions and further reflexive competence to deal with the pressures within or across landscapes. The projects have also yielded transferable outcomes that can generate new options and adaptive capacity for other people in other places.

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