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Six attributes of social resilience

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Six attributes of social resilience

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The concept of resilience has attracted much attention in recent times. However, there remains a distinct knowledge gap with respect to the social aspects of resilience. This paper describes six attributes of social resilience identified through case study research. Research was undertaken by a multi-disciplinary team of researchers who worked in partnership with representatives from five key government and non-government agencies from the Wet Tropics region in North Queensland, Australia. Research findings move understanding of social resilience, which is an emerging area of interest within natural resource management, from a set of assumptions to an evidence base.

Keywords: social resilience; attributes; social ecological systems; northern Australia; natural resource management

1. Introduction

Understanding how individuals and communities can successfully adapt to rapid and oftentimes crises-driven change is increasingly recognised as important both in terms of government policy and management responses. At national or community levels, such changes might relate to factors such as economic decline, natural or man-made disasters or urban migration. At the international level the interrelated issues of geopolitics, global economic markets and climate change add further complexity to decision-making processes. In response to local, national and international challenges, relating to rapid change that has impact on individuals and communities, increasing attention is being paid to the broad concept of social resilience.

‘Resilience’ is still a relatively new concept. As Marshall, Marshall, and Abdulla (2009, 904) described, “Resilience is an important concept that is emerging to guide and support more inclusive approaches to the management of combined social and ecological systems” (following Ludwig, Walker, and Holling 1997; Berkes and Folke 1998). However, there are inherent challenges in bringing together the ‘social’ and the ‘ecological’. In particular, there remains a distinct knowledge gap with respect to the social aspects of resilience (Davidson 2010; Brown and Westaway 2011). Research reported in this paper, conducted in North Queensland, Australia, from 2006–2010, seeks to confront this challenge.

North Queensland is characterised by past and contemporary Aboriginal custodianship and social histories, agricultural and dairying practices, tourism development, as well as social and political battles over areas of environmental significance such as the

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Great Barrier Reef and Wet Tropics World Heritage Areas. The region is not homogenous but comprises various nested social-ecological systems, described in more detail below.

Social-ecological challenges include serious water quality issues for the Great Barrier Reef where the policy imperative is to improve water quality through land management change and new programmes (DSEWPC 2011), as well as increasing urban development, particularly on the coastal plains. Within this dynamic context there is a dire lack of relevant and usable social data for natural resource management agencies to inform their policy and planning, or for monitoring programme outcomes.

Government and non-government natural resource managers, and Aboriginal Traditional Owners, have been seeking to improve their understanding of the social dimensions of resilience in order to enhance their planning and capacity building interventions in the region. This research assists such managers by moving understanding of social resilience, which is an emerging area of interest within natural resource management, from a set of assumptions to an evidence base.

The paper begins with a brief review of the theoretical basis for the research and then describes the research context in North Queensland. A broad overview of the research design and process is followed by description of the six social resilience attributes identified through the research. The paper concludes with discussion of three management options that offer the potential to enhance and build social resilience.

2. A theoretical grounding for exploring social resilience

The research draws on two key bodies of literature to inform the approach to social resilience: first, from literature on the dynamics of complex, adaptive, social-ecological systems (e.g. Holling 1973, 1996, 2001; Gunderson, Holling, and Light 1995; Carpenter *et al.* 2001; Holling and Gunderson 2002; Holling, Gunderson, and Peterson 2002; Janssen 2002; Westley 2002; Walker *et al.* 2004) and second, from the social and health sciences pertaining to the resilience of individuals and communities (e.g. Richardson 2002; Wilkes 2002; Heavyrunner and Marshall 2003; Kulig, Edge, and Guernsey 2005; Lalonde 2006; Manyena 2006; Hegney *et al.* 2007; Maguire and Hagan 2007; Sapountzaki 2007; Buikstra *et al.* 2010). Although these two broad areas of research approach social resilience somewhat differently, they both provide useful information relating to the capacity of communities and individuals to cope with change (Brown and Westaway 2011).

Researchers of complex adaptive systems describe social resilience as the adaptive and learning capacity of individuals, groups and institutions to self-organise in a way that maintains system function in the face of change or in response to a disturbance. They speak about linked 'Social Ecological Systems' (SES), systems that are neither humans embedded in ecological systems nor ecosystems embedded in human systems (Westley *et al.* 2002). Adger (2000) made a clear link between social and ecological resilience, particularly where social groups or communities are dependent on ecosystems and environmental resources for their livelihoods. However, humans are unique within SES because they are able to create novel approaches to change that can transform the future of the system (Gunderson 2000).

Management contributions from this field relate to development of management institutions that recognise that SES are characterised by social and ecological uncertainty (Holling 1996). Scholars advocate management institutions that embrace adaptive management and social learning approaches: where policies are regarded as hypotheses and management actions are regarded as experiments to test these hypotheses. Ongoing learning is fundamental to this approach (Berkes and Turner 2006; Pahl-Wostl *et al.* 2007).

Researchers argue that knowledge of the properties of social resilience can assist managers and resource users to design policies that minimise the impact on people and maximise sustainability of the goods and services derived from the ecosystem (Adger 2000). Examples of the social attributes identified by researchers of complex adaptive systems as important for the resilience of social ecological systems include: vision, leadership and trust (Folke 2003); capacity to monitor and respond to environmental feedback (Folke 2003); development of social networks (Folke 2003; Lebel *et al.* 2006), and the sharing of various sources of information and knowledge through these networks (Folke 2003; Berkes and Turner 2006); governance, including participation, representation, deliberation, accountability, empowerment, social justice (Lebel *et al.* 2006); and arenas of collaborative and social learning (Fazey *et al.* 2007; Pahl-Wostl *et al.* 2007).

Resilience research in the social and health sciences focuses on building strengths to meet adversity, and identifying ‘protective factors’ (Buikstra *et al.* 2010). It has extended from work with individuals, particularly children (Brown and Westaway 2011), to communities. It includes: individual and community resilience in rural areas (Buikstra *et al.* 2010); community resiliency and health (Kulig, Edge, and Guernsey 2005); cultural resilience (Heavyrunner and Marshall 2003; Lalonde 2006); resilience to environmental risks (Sapountzaki 2007); and disaster resilience (Manyena 2006; Maguire and Hagan 2007). These researchers describe social resilience as the capacity of social groups and communities to recover from and/or respond positively to a crisis (Kulig, Edge, and Guernsey 2005; Maguire and Hagan 2007), as well as the elements of the community system that enable this positive adaptation (Manyena 2006). Thus, the social resilience of individuals, communities and wider society are closely related to their adaptive capacity.

Drawing from both bodies of literature we recognise that social resilience, although often treated alone, is an important facet of SES and their resilience, that deserves more attention. It focuses on the attributes and processes that assist people, and the SES they participate in and influence, to manage through crises and to make successful transformations. It is closely related to the concept of adaptive capacity, to the extent that some treat these as synonymous concepts, while others recognise resilience as a process of development that translates adaptive capacity (Brown and Westaway 2011). In responding to this literature review, we defined social resilience as “the way in which individuals, communities and societies adapt, transform, and potentially become stronger when faced with environmental, social, economic or political challenges” (Cuthill *et al.* 2008, 146).

As such, we regard resilience as neither opposite to vulnerable, or as a factor of vulnerability (see Klein, Nicolls, and Thomalla 2003; Manyena, 2006), although that concept is useful for identifying and addressing risk factors and the members of society more at risk. We argue that managers would benefit from knowledge of attributes of the social aspects of resilience which focus upon building strengths (Kretzmann and McKnight 1993) or protective factors (Buikstra *et al.* 2010), rather than vulnerabilities. This strategic approach directs management activity towards building (and building on) existing strengths, in contrast to social policy agendas that have been seen to focus primarily on redressing deficits.

3. Research context

The Wet Tropics region of north Queensland, Australia, consists of the Wet Tropics and Great Barrier Reef World Heritage Areas, comprising a variety of agricultural, natural and urban systems. It covers approximately 2.2 million hectares (Terrain NRM 2011). Topographically (west to east), the region consists of: the Atherton Tablelands, a plateau

from which the main rivers rise; the Great Dividing Range and an escarpment dropping to the coastal plains; coastal plains; and the marine area of the Great Barrier Reef. Eight rivers, flowing west to east and their catchments connect this terrain.

Historically, much of this area was covered by tropical rainforest, with local variations in type. Some 21 Aboriginal Traditional Owner groups have been custodians of this area for over 45,000 years, including now-submerged areas. Their philosophy and livelihood, including strong spiritual affiliations to land, ethics of 'caring for country', and belief that healthy country and healthy people are mutually influencing, continue to provide guidance to contemporary indigenous society in Australia. Aboriginal connection to country and aspirations for social development are asserted strongly through a range of initiatives, including self-organising Traditional Owner groups.

The Atherton Tablelands was originally developed for forestry (selective logging) and small-scale farming, including dairying and grazing. On the Tablelands there is dependence on primary industries, with long-standing settlement on farms and in small servicing towns. Over the past decade or more, new residents have been attracted to the area for lifestyle and climatic reasons. Small-scale tourism has grown as an industry, focused on artificial lakes, the agricultural landscape and the Wet Tropics and Great Barrier Reef World Heritage Areas.

Two significant changes have recently impacted the Tablelands. First, the dairy industry was restructured in 2000. This restructure entailed a reduced milk price which severely affected the income of dairy farmers in the region, so that many dairy farmers left the industry. Second, the declaration of the Wet Tropics World Heritage Area in 1988 altered the demography of various towns in the area. Individuals previously employed in the timber industry left the region, developed new skills or became unemployed during this time of change. What was once an area for timber extraction has transformed into a protected area managed for conservation purposes by the Wet Tropics Management Agency (WTMA), in co-operation with Aboriginal Traditional Owners. Tourism has been promoted as one opportunity to adapt to changing economic circumstance.

Moving down from the Tablelands to the coastal plain, there is a mixed agricultural area (sugar cane, bananas and other fruit crops), with long-term resident farming communities, a string of coastal towns (some of which are also bases for fishing) and the regional centre of Cairns. Sugar cane and its processing industries have suffered a combination of long-term economic decline due to globalisation, explicit industry restructuring and land use competition from urban expansion. The city of Cairns is expanding rapidly and lifestyle residents are also attracted to its hinterland and many of the smaller coastal towns. However, land clearing and residential developments have placed significant pressure on biodiversity.

The Great Barrier Reef inshore and outer reef areas can also be considered as a SES, with a variety of stakeholders using the waters, reefs and islands for commercial and lifestyle purposes. The Great Barrier Reef is managed as a multiple-use area by the Great Barrier Reef Marine Park Authority (GBRMPA). The tourism industry is conscious of its dependence on a high quality attraction, and the synergies between reef and rainforest tourism. It comprises land-based tours, cultural attractions, reef trips and recreational fishing. Tourists require infrastructure such as hotels, transport and catering, and the region has built a strong economic dependence on the tourism industry. The major recent impact on the tourism industry (at the time of writing) was an outbreak of the crown of thorns starfish on the Great Barrier Reef off Cairns (1993–2003). The reef tourism industry and regional economy experienced considerable impact from the outbreak.

4. Research design

Research was undertaken by a multi-disciplinary team of researchers who worked in partnership with representatives from five key government and non-government agencies from the Wet Tropics region in North Queensland, Australia. They include:

- Wet Tropics Management Authority (WTMA) – a federal government authority that manages the Wet Tropics World Heritage Area;
- Great Barrier Reef Marine Park Authority (GBRMPA) – a federal government authority that manages the Great Barrier Reef World Heritage Area;
- Terrain NRM Ltd – a collaborative non-government organisation responsible for integrative natural resource planning and management of the Wet Tropics region;
- Girringun Aboriginal Corporation – the representative body for nine Traditional Owner groups whose country coincides with the southern part of the WTMA;
- Queensland Department of Communities – a state government agency responsible for social management including planning which joined the project in its final year; and
- The Aboriginal Rainforest Council – an organisation representing 18 Traditional Owner groups associated with the Wet Tropics World Heritage Area, participated for the first year of the project before disbanding.

Several of these agencies provided early direction to develop the research focus, facilitated through the Reef and Rainforest Research Centre. Collectively, these agencies manage the social, cultural and environmental values of the region. The research partnership was facilitated through monthly reporting processes, regular research workshops, and one-on-one meetings between field researchers and the agencies.

Primary data collection focused on six in-depth case studies involving 71 semi-structured interviews with a diverse range of public, private and community sector stakeholders from the region. The case studies, collectively identified by the research partners, were spread across the inshore, coastal, middle and Tablelands zones of two river catchments (the Barron and Johnstone) in the region. Five of the case study sites had experienced a major change event during the past 20 years. The sixth was included to explore an indigenous perspective of social resilience. Detailed case study reports are presented in Ross *et al.* (2010) and Maclean *et al.* (2013).

The geographical focus and the identified ‘change’ event for each case study were:

- (1) The upper zone of the Johnstone River catchment and the restructure of the dairy industry;
- (2) The upper zone of the Barron River and a water allocation process;
- (3) The middle zone of the Johnstone River catchment and the declaration of the Wet Tropics World Heritage Area;
- (4) The coastal zone near Cairns (the major regional city) and rapid urban expansion;
- (5) The Great Barrier Reef and the most recent outbreak of the crown of thorns starfish (1993–2003); and
- (6) Girringun Aboriginal Corporation and how an Aboriginal community copes with change.

Interviewees were selected for each case study through a stakeholder analysis conducted with the research partners. They included Aboriginal people, farmers, fishers, foresters,

timber cutters, tour operators, local business owners, environmental groups, representatives from state and federal government agencies and researchers. The interviews enabled people to reflect on what had happened during the identified change event, to describe the impact it had had on them and their community, to explain how they and their community adapted, and to consider the skills needed for the community to be proactive in the future.

Analysis of the case studies identified six social resilience attributes that came out strongly across all case studies: knowledge, skills and learning; community networks; people-place connections; community infrastructure; diverse and innovative economy; and engaged governance. These attributes were validated against a literature review of social reporting frameworks (see Cuthill *et al.* 2008) and were corroborated by results from concurrent research conducted in North Queensland using different case studies, methods and types of community (Gooch *et al.* 2010). A detailed description of each attribute follows, with quotes from interviewees illustrating how each attribute helped build and/or enhance social resilience.

4.1. Knowledge, skills and learning

Knowledge, skills and learning refers broadly to individual and group capacity to respond to local needs and issues (also see Eade 1997; Cuthill and Fien 2005). It includes knowledge partnerships, technology and innovation, and skills development and consolidation.

Knowledge partnerships are fundamental to individual and community ability to cope and adapt to change. Such partnerships have involved scientists, government officers and scuba diving operators working to eradicate the crown of thorns starfish on the Great Barrier Reef. Technology and innovation draws from local, national and international experiences which can then be adapted to local contexts, a process described in one case study as innovative 'tropic proofing'. A need for skills consolidation and development included skills relating to governance, communication, business and financial management, improved water efficiency and on-ground conservation management skills. A diverse skills set, appropriate to local contexts, is seen as essential to successfully negotiate through periods of change.

The dairy industry case study shows how knowledge, skills and learning improved local peoples' ability to cope with and adapt to the changes that followed national restructure of that industry. Participants attributed the success of certain farmers in coping with the reduced income that initially resulted from the deregulation to their ability to develop and maintain good networks, which enabled them to actively seek new knowledge and information (including financial and business skills for farm management), and the propensity to experiment with technology. Externally funded on-farm experimentation was extolled. This enabled the development of locally relevant techniques and technology; the provision of feasible new practices to other farmers who did not have the time or inclination to experiment; and demonstrated that farmers are a learning community who can also develop technological innovations to improve farming practice in the region.

4.2. Community networks

The attribute 'community networks' draws heavily from the concept of social capital and encompasses the social processes and activities that support people and groups in a place (also see Coleman 1990; Putnam 1996). In times of change these networks provide essential support, operationalise community capacity, identify opportunities, and provide a focus for renewed optimism and hope. Local leaders and volunteer workers

facilitate effective community networks. While crises and other change events lead people to draw on existing community networks for support, they also facilitate network building by providing a specific focus for individuals and groups to work together. Networks direct effort to diverse activities such as celebrations, supporting those in need, volunteer workers, and recreation and arts programmes.

Participants commented on the changes that resulted from rapid expansion of the major regional city of Cairns, which has grown from a population of 70,700 in 1981 to 162,740 in 2011, and has a projected population of approximately 222,600 by 2031 (ABS 2008). They saw community networks as important to develop an identity and vision for Cairns. They described how community groups and networks unite communities of practice and connect diverse groups. Support and encouragement for volunteers assisted this process. An active Cairns community member, resident since 1985, expressed how community network building programmes will be essential to enable the Cairns community to adapt to the identity challenges and social disconnection occurring with rapid population growth:

I think most people want to be a part of a team; they want to feel like part of a community; they want to have a chance to be useful, but they don't necessarily get presented with the opportunity. [... if you can] get everyone in the street, to come down for a bit of a street party ... that way they're meeting their neighbours and sharing information and it's just starting to build those little social networks. Then it's the beginning of a dialogue in that street and from that they'll probably start talking to each other about other things so there's a bit of a support network; they know other people in the street who share their value and concerns, or who don't. It's that connectivity which I think is at the heart of this.

4.3. *People-place connections*

This attribute acknowledges human-environment interdependencies and connections (also see Feld and Basso 1996; Dale, Ling, and Newman 2008). It encompasses interrelated concepts such as social-ecological systems, integrated and holistic management approaches, and stewardship. Two main themes emerge from the data analysis: 'connection to place' and 'sustainable livelihood development'.

Connection to place was evident in diverse sectors, such as tourism and dairy, where environmental stewardship was identified as a key component of management philosophies. Indigenous groups described a long held sense of cultural responsibility to country. The case studies suggest that much of the passion and commitment to protect and preserve cultural and natural landscapes emanates from connection to place. Attention to this aspect of social resilience presents opportunities for sustainable livelihood developments, particularly concerning indigenous land and sea management, ecosystem services, rural production and sustainable tourism.

Participants discussed the close connection they have to their biophysical environments. Aboriginal participants from the Girringun Aboriginal Corporation case study observed how the organisation emphasised their philosophy and livelihood focus of maintaining strong spiritual affiliations to land, the ethics of what they call 'caring for country', and the belief that healthy country and healthy people are mutually influencing. Aboriginal kinship systems relate people to tracts of 'country', and Aboriginal people have a responsibility to care for that country, as well as for one another (Maclean et al. 2013). This strong connection drives people to continue to build and enhance their adaptive capacity to cope with change. One participant explained:

Girringun [holds] it all together through strong family connections within the community, and those connections go right into the land and the sea and that's how they survive.

4.4. Community infrastructure

Community infrastructure is required to support community needs and actions. This comprises diverse services and facilities such as medical, dental and human services; community centres and youth recreation facilities; appropriate transport options; and local arts, music and food markets. The importance of these services and facilities is well established in the social science literature and government policy reports (also see Wyeth and Hunter 2009; Prichard, Purdon, and Chaplyn 2010), but is perhaps not as well recognised by or considered relevant within the natural resource management sector. An explicit identification of this component of social resilience would allow natural resource managers to broaden their understanding of contexts beyond their responsibility, which have the potential to affect their operational outcomes.

Participants reflecting on how they coped with the declaration of the Wet Tropics World Heritage Area in 1985, which terminated forestry, explained the importance of community infrastructure for improved local economic development. This included access to services, including: government provided employment services to facilitate job seeking and unemployment payments; health care and other community support services; as well as the provision of good road infrastructure to encourage new industries and business into the area. One local businessman explained that government compensation for a particular township resulted in a Visitor and Information Centre, as it was assumed that the World Heritage declaration would result in increased tourism for the town and the region. He explained that more innovative infrastructure would have responded better to the needs of the community:

... the town itself missed out – a place like Ravenshoe is too small to have a sporting complex [. . . but] if the government had put something like that in [it] would have helped the youth because they are our future. We've had a lot of break-and-enters and delinquency, . . . and if we'd have had something like [a sporting complex], I think the community would have felt that they'd got a better deal out of it.

4.5. Diverse and innovative economy

This attribute stresses the importance of a regional economy which comprises a selection of industries and services, and supports new and exciting opportunities. It acknowledges the need to keep up with the changing demands and interests of consumers, recognising that change can generate new employment opportunities.

A regional economy that is over-reliant on a small number of major industries has an increased risk of impacts from national and global events. Participants observed that the fostering of a diverse and innovative economy helps reduce vulnerability, and noted that a strong local focus and branding is essential to foster social resilience. For example, the Wet Tropics research and education 'economy' already shows much potential, and includes diverse applications such as Aboriginal cultural heritage knowledge, volunteer tourism and rainforest pharmaceuticals.

Many participants regarded the ability to 'do things differently' as an essential aspect of the process of adapting. For example, one government representative interviewed about the water allocation process for the upper Barron River described the agricultural community as well placed to cope with the changes that population growth and climate

change will bring. He linked ecological resilience with social resilience, stating that the landscape and rich soil are able to support many different crops, and equally the agricultural community has a history of adaptability, having grown a diversity of crops over the years. He emphasised diverse economy as essential for community ability to cope with change, and the link between diversity, adaptability and social resilience:

From a community [perspective] it's probably about having a level of diversity to cope; if you have all of your eggs in one basket and find that the climate changes into something that is unpalatable . . . that means that you're suddenly at high risk. You either become adaptable at short notice, or relatively short notice, or you have a level of diversity to be able to cope with the change [. . . this would be] about having an income stream that's not fully focused on long-term outcomes.

4.6. *Engaged governance*

Engaged governance revolves around collaborative approaches to regional decision making (also see Epstein *et al.* 2000; Knight, Chigudu, and Tandon 2002). Of key consideration within such approaches are the people who are potentially interested in or impacted by an issue (stakeholders), the issue of focus, and the processes which facilitate effective and equitable decision making around that issue. Genuine participation from relevant private, public and community sector stakeholders is considered essential for effective problem solving. In particular, development of inter- and intra-sector partnerships, cross-scale networks, and science/government collaboration are identified as crucial to solving local and regional challenges. Such initiatives facilitate the sharing of diverse knowledge and experience. Key mechanisms which support the development of engaged governance responses include inspired leadership, shared vision, appropriate communication, systems thinking, institutional capacity building and institutional learning.

Engaged governance was identified as crucial in dealing with the crown of thorns starfish outbreak. The biophysical changes to the reef had ramifications for the livelihoods of tour operators as well as the management of the Great Barrier Reef. An important element in the eradication programme was a partnership that formed between the GBRMPA and the Association of Marine Park Tourism Operators towards understanding and taking action against the starfish outbreak.

Participants highlighted the vital role of diverse and extensive networks for an engaged approach to governance in natural resource management. These networks may include members of various local industries, representatives of traditional owner groups, individuals from state and federal government, the media, artists and documentary film makers. They may extend within the region, in Queensland, other parts of Australia and even overseas. The power of local and agency leaders was emphasised repeatedly in this context, for example, the crown of thorns starfish eradication programme came into being because of the strong leadership skills and networks of a few representatives from the Association of Marine Park Tourism Operators.

Further, engaged governance includes developing 'ownership' of the Great Barrier Reef to ensure active citizenship. One interviewee explained how reef tour guides, on-boat stewards and concerned community groups have an important role in managing the crown of thorns starfish:

The biggest misconception that people have is [that if you] get the management onside and they decide one thing, [then it will happen]. It doesn't. You've got to involve the ground troops, it involves a bit more efficacy to get them involved in it and . . . they drive it from within.

5. Implications for management

The six attributes of social resilience identified for the Wet Tropics region and its communities provide an evidence-based focus for management action by those seeking to enhance social resilience. Our partner agencies were interested in social resilience, and in ‘investing in capacity’, but they lacked clarity as to how they might manage towards social resilience. To help meet these goals, the research team developed a detailed social resilience reporting framework as a basis for the agencies to orient their management activities towards incorporating and enhancing social resilience, and to enable the partners to monitor and report on the social resilience characteristics across the region and the outcomes of their capacity building interventions (see Ross *et al.* 2010).

Resilience perspectives suggest it is more valuable to think in terms of people and environment as mutually influencing than separate, and hence to manage for the entire SES. In choosing to manage the region in ways that enhance social resilience, organisations need to consider the relationships between people and environments. The six attributes of social resilience identified by this research are not exclusively social: they also connect across the dimensions of sustainability – society, economy and environment. People and place connections, for example, are inherently about the SES. This attribute emphasises people’s sense of connection with and custodianship over natural and built environments. Further, having a diverse and innovative economy ensures continuing opportunities within dynamic systems underpinned by the quality of natural resources. Thus this research advocates that managing for social resilience is an important aspect of managing for the resilience of complex, adaptive, SES.

Recognising that social resilience represents a potential extension rather than current core business for natural resource management and social development agencies, this research suggests these organisations may choose to manage for social resilience by one (or more) of the following: (1) being aware of social resilience context, without intention to intervene (‘acknowledge it’); (2) making constructive use of social resilience characteristics in management actions (‘use it’); or (3) meeting environmental and other mandates in ways that simultaneously enhance social resilience (‘grow it’).

Under the first option, regional organisations might, for example, recognise variations in people-place attachment within their region, and vary their communication strategies accordingly. Under this management role they would use the knowledge to judge their audience and tailor communications strategies.

Under the second option, an organisation might invoke strong people-place connections, recruit and support existing community networks towards stewardship behaviour. Strong pre-existing community networks in places where people have strong people-place connections might offer an excellent opportunity for new landcare or community-based monitoring groups.

The third option, to pursue organisational mandates in a new way that enhances social resilience, would take a step further. It could involve facilitating the formation of and facilitation of actions by stewardship groups more deliberately, so as to enhance social capital. Stewardship groups might be fostered in areas needing stronger people-place connections and/or social capital. This suggests developing new, more engaged, governance forms such as co-management with diverse stakeholders, including Traditional Owners. Another option is to explicitly build governance capacity, for example, by resourcing the formation and activities of indigenous organisations, and conducting projects and research collaborations that enhance governance capacity throughout the community.

6. Conclusion

The concept of resilience in SES is sufficiently accepted to attract the interest of management agencies, who seek assistance to put the concept into practice. Natural resource management and social development agencies in North Queensland's Wet Tropics region are innovative in generating interest in social resilience, and seeking a means to foster, monitor and report on social resilience in adaptive management cycles (Allen and Stankey 2009).

This paper has used a grounded in-depth case study approach to advance the social resilience literature by assisting in the search for the characteristics of social resilience (Magis 2010; Berkes and Ross 2013) and providing an evidence base (cf. Buikstra *et al.* 2010). The research identified six key attributes of social resilience, emerging from six cases studies as having helped the Wet Tropics region and its communities to be resilient in the face of significant changes. These attributes are: knowledge, skills and learning; community networks; people-place connections; community infrastructure; a diverse and innovative economy; and engaged governance. Managers can benefit by integrating the social resilience concept with pursuit of their existing mandates by acknowledging it, using it or growing it, through actions that combine these attributes.

The six attributes match well to both the wider literature on social aspects of development (see Cuthill *et al.* 2008), the emerging literature on community resilience (Norris *et al.* 2008; Magis 2010; Berkes and Ross 2013), and concurrent research (Gooch *et al.* 2010). This provides a basis for ongoing work in this area, and helps move management of social resilience, within natural resource management contexts, from a set of assumptions to an evidence base. The attributes throw a spotlight on the social aspects of SES, but should not be taken as independent concepts. The case studies illustrate how they interacted in assisting each resilience process. A focus on building these six attributes of social resilience will strengthen the ability of individuals, communities and societies to adapt, transform and potentially become stronger when faced with environmental, social, economic or political challenges.

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