Marine and Tropical Sciences Research Facility

Understanding, Enhancing and Managing for Social Resilience at the Regional Scale: Opportunities in North Queensland

Helen Ross, Michael Cuthill, Kirsten Maclean, Danni Jansen and Bradd Witt

Australian Government

Department of the Environment, Water, Heritage and the Arts

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Contents

List of Figures ii
List of Tables iii
Index to Monitoring Criteria and Baseline Data iii
Acronyms Used In This Report iv
Acknowledgements v
Executive Summary vi
Introduction 1
Understanding the Wet Tropics as a Social-Ecological Landscape 4
Methodology 6
Literature Reviews 9
- Social Reporting Approaches 9
- Social Aspects of Resilience 19

Case Studies 25
- Dairy Deregulation 27
- Water Allocation Process in the Upper Zone of the Barron River 37
- Wet Tropics World Heritage Area 48
- Urban Expansion 66
- Most Recent Outbreak of the Crown of Thorns Starfish 80
- Girringun Aboriginal Corporation 89
- Conclusions 104

Social Resilience Monitoring and Reporting Framework 107
Monitoring Criteria and Baseline Data 111
- People-Place Connections 111
- Knowledge, Skills and Learning 114
- Community Networks 120
- Engaged Governance 122
- Diverse and Innovative Economy 122
- Community Infrastructure 127

Management Options to Enhance Social Resilience in Far North Queensland 129
References 141
Appendix Social Resilience Monitoring and Reporting Framework: Data Sources and Baseline Data 151

List of Figures

Figure 1: Social resilience project study area, Far North Queensland 3

Figure 2: Design of the social resilience program 7

Figure 3: Catchment zones for the selection of case studies 7

Figure 4: Spectrum describing operational approaches to social reporting 14

Figure 5: Interrelationship between social, environmental and economic factors in sustainable development 15

Figure 6: Conceptual framework for regional level monitoring and reporting of social resilience 16

Figure 7: Map of the Barron and Johnstone River catchments 25

Figure 8: Girringun Traditional Owner groups and their approximate country locations 89

Figure 9: Resilience attributes of knowledge, communication, awareness, innovation, skills and learning viewed as a continual improvement cycle 104

Figure 10: Proportion of the population, by Local Government Area, whose usual address was in the same statistical local area as five years previously, 2006 113

Figure 11: Proportion of the population, by Local Government Area, that had completed Year 12 or equivalent, 2006 115

Figure 12: Proportion of the population, by Local Government Area, with a post secondary school qualification in ‘agricultural, environmental and related fields of study,’ 2006 117

Figure 13: Proportion of the population, by Local Government Area, with a post graduate degree, 2006 119

Figure 14: Proportion of the population, by Local Government Area, engaged in voluntary work for organisation/s, 2006 121

Figure 15: Proportion of the population, by Local Government Area, employed in ‘information media and telecommunications’ and ‘professional, scientific and technical services’, 2006 124

Figure 16: SEIFA Index of Relative Socio-economic Advantage and Disadvantage quintiles by Local Government Area, 2006 126

Figure 17: Occupied private dwellings by Local Government Area and tenure type, 2006 128

Figure 18: Relationships between well-being, sustainability and resilience thinking in social-ecological systems 130

Figure A1: Study region by Local Government Area, 2006 155

Figure A2: Study region by Local Government Area, 2008 156

List of Tables

Table 1: Case study foci ... 7
Table 2: Examples of diverse social reporting frameworks ... 11
Table 3: Commonly identified purposes for social reporting ... 13
Table 4: Three layers of information underpinning social reporting frameworks ... 14
Table 5: Examples of broad-based social reporting frameworks ... 15
Table 6: Seven domains of social resilience relevant to this project ... 17
Table 7: Verification process for the identification of social resilience indicators ... 107
Table 8: Social resilience monitoring and reporting framework ... 108
Table 9: Options with examples for managing a region to enhance social resilience: 'acknowledge it, use it, grow it' ... 133

Table A1: Study region by Local Government Area and population ... 154
Table A2: Social resilience indicators, monitoring criteria and data sources available ... 157

Index to Monitoring Criteria and Baseline Data

Box 1: Proportion of schools, by Local Government Area, participating in the Reef Guardian Schools program, 2010 ... 111
Box 2: Proportion of the population, by Local Government Area, whose usual address was in the same statistical local area as five years previously, 2006 ... 112
Box 3: Proportion of the population, by Local Government Area, that had completed Year 12 or equivalent, 2006 ... 114
Box 4: Proportion of the population, by Local Government Area, with a post secondary school qualification in 'agricultural, environmental and related fields of study', 2006 ... 116
Box 5: Proportion of the population, by Local Government Area, with a post graduate degree, 2006 ... 118
Box 6: Proportion of the population, by Local Government Area, engaged in voluntary work for organisation/s, 2006 ... 120
Box 7: BITRE Index of Industrial Diversity Deciles by statistical local area, 2006 ... 122
Box 8: Proportion of the population, by Local Government Area, employed in 'information media and telecommunications' and 'professional, scientific and technical services', 2006 ... 123
Box 9: SEIFA Index of Relative Socio-economic Advantage and Disadvantage quintiles by Local Government Area, 2006 ... 125
Box 10: Occupied private dwellings by Local Government Area and tenure type, 2006 ... 127

Acronyms Used In This Report

CSIRO .... Commonwealth Scientific and Industrial Research Organisation
FNQ .... Far North Queensland
GBR .... Great Barrier Reef
GBRMPA ...... Great Barrier Reef Marine Park Authority
GDP .... Gross Domestic Product
GST .... Goods and Services Tax
LGA .... Local Government Area
MTSRF .... Marine and Tropical Sciences Research Facility
NRM .... Natural Resource Management
OECD .... Organisation for Economic Cooperation and Development
RRRC .... Reef & Rainforest Research Centre Ltd
SES .... Social-ecological systems
SLA .... Statistical Local Area
UNCED .... United Nations Conference on Environment and Development
UNISDR .... United Nations International Strategy for Disaster Reduction
WTMA .... Wet Tropics Management Authority

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Team roles

This work reports the combined efforts of the authors. Various team members have contributed to the project at different times according to their areas of expertise. We would like to record the following significant tasks which were largely undertaken by specific team members:

Project Leader and Manager .... Helen Ross

Leadership in development of indicators and monitoring criteria .... Michael Cuthill

Development, conduct and reporting of case studies and on-ground project management........ Kirsten Maclean

Collation and presentation of statistical data .... Danni Jansen

Guidance and expertise in environmental change and resilience .... Bradd Witt

Executive Summary

The concept of resilience in social-ecological systems has attracted considerable recent interest as a foundation for Natural Resource Management (NRM), yet there is a distinct knowledge gap when it comes to the social dimensions of resilience.

This research project focused on developing a regional level social resilience monitoring and reporting framework. Research was undertaken by a team of University of Queensland researchers, working in partnership with key industry partners in North Queensland:

- Wet Tropics Management Authority;
- Terrain NRM Ltd.;
- Aboriginal Rainforest Council;
- Girringun Aboriginal Corporation;
- Great Barrier Reef Marine Park Authority; and
- Queensland Department of Communities.

The framework provides guidance to these agencies for both their planning and reporting processes, and evaluation of progress in implementing actions related to the social aspects of their plans. This research moves the management of social resilience, which is an emerging area of interest for both natural resource managers and other agencies, from a set of assumptions to an evidence base.

Our approach to social resilience is that it relates to how individuals, communities and societies adapt, transform, and potentially become stronger when faced with environmental, social, economic or political challenges. We identified the key attributes of social resilience for Far North Queensland through a comprehensive and systematic literature review, research partner workshops, and six case studies focusing on recovery from major changes, and the building of resilience. The resulting analysis identifies six social resilience indicators:

- People-place connections;
- Knowledge, skills and learning;
- Community networks;
- Engaged governance;
- Diverse and innovative economy; and
- Community infrastructure.

We have identified sets of monitoring criteria which sit under each social resilience indicator and have populated some of these criteria with baseline data. However, there are data shortfalls with other criteria that will require additional primary data collection.

Working from results of our study, we propose that environmental management, and Aboriginal and social development organisations with regional responsibilities can choose to incorporate the social dimensions of resilience thinking in three ways. Their first option is to pursue their existing mandates in consciousness of social resilience characteristics, without trying to intervene. However, social knowledge may prompt some adaptation of existing management strategies. For instance, understanding local variations in people-place connections may influence their choices of communication strategies. A second option is to take advantage of resilience characteristics in management strategies, for instance to invoke strong people-place connections and recruit and support existing community networks

towards stewardship behaviour. The third is to pursue organisational mandates in a new way that enhances social resilience simultaneously, for instance explicitly building a more diverse and innovative economy through new employment and business structures in environmental management.

Introduction

This study was undertaken to develop a framework for regional monitoring and reporting of social resilience for use at regional scale in North Queensland, Australia. It has been conducted with a set of government and non-government environmental and social development managers and Aboriginal Traditional Owners, who seek to improve their understanding of the social dimensions of resilience in order to enhance their planning and capacity building interventions.

While resilience is not a new concept, there is a distinct knowledge gap when it comes to social resilience, and especially so at the regional scale in which we are interested. Until very recently the study of resilience was through separate bodies of scholarship originating in ecology and the social and health sciences, which remained virtually unaware of one another. The social and health sciences literature concentrates particularly on fostering the resilience of individuals, in a strengths-based approach to mental health. Few of the studies in this field have extended to the resilience of communities, or acknowledge relationships with the environments or economies of those communities (exceptions are Buikstra *et al.* 2010; Hegney *et al.* 2007; Kulig, 2000; Kulig *et al.* 2005; Kulig *et al.* 2009; Lalonde, 2005).

Meanwhile, a group of academics focused around a network called 'The Resilience Alliance' has generated a considerable body of work focusing on theory building concerning the nature of social-ecological systems and their resilience. This work remains predominately informed by ecological concepts, with the choice of social concepts (and omissions) informed by an early interest in broad ecological and social scales, particularly regions. Institutional arrangements have been a core focus for their exploration of the social dimensions of resilience (Adger, 2000a; 2000b; Folke *et al.* 2005; Gunderson & Holling, 2002), incorporating recognition of trust and cooperation, knowledge and learning capabilities (Berkes & Turner, 2006; Gunderson & Folke, 2005; Watson, Alessa & Glaspell, 2003). More recently, specialists in disaster management adopted the concept to build capacity to prepare for and cope after major disasters (Manyena, 2006).

Convergence between and mutual learning across these bodies remains limited. As yet there is no comprehensive list of sets of <u>social</u> attributes of resilience. While the social-ecological systems literature promotes the important idea of interactions between scales, there is little work so far on communities and smaller scales. The mental health literature has begun to build up from individuals, to recognise family and community dimensions in resilience. This literature is also beginning to examine sets of attributes of social resilience, based on community case studies, and to recognise nesting between individual and community scales. Literature is indicating some interesting similarities and differences in Australian and Canadian cases (Buikstra *et al.* 2010; Hegney *et al.* 2007, 2008; Kulig, 2000; Kulig *et al.* 2005; Kulig *et al.* 2009).The gaps in the literature, outlined above, presented several opportunities for our Marine and Tropical Sciences Research Facility (MTSRF) funded team to contribute new knowledge of international benefit:

- Integrating between the strengths of the ecologically-based social-ecological systems literature, and the more psychologically-based mental health literature;
- Stretching the exploration of 'nested scales' advocated in the social-ecological systems literature, to recognise relationships between regional and community scales (and recognising individuals) (complementing MTSRF research on social resilience at community scale, by James Cook University); and
- 'Fleshing out' the under-reported social dimensions of resilience within social-ecological systems, and identifying sets of social resilience attributes that may be interdependent.

Perhaps and most importantly of all, it presented opportunity to identify a set of social resilience attributes that apply in North Queensland, making this one of the first regions in the world to position itself to *manage* towards social resilience. Going further, our partners in the region have sought from the beginning to develop a set of indicators of social resilience, with a view to managing towards, monitoring and evaluating progress, and reporting on social resilience.

Our research project is viewing social resilience as a relatively new concept. Our work is seated conceptually across the social-ecological systems and social science bodies of literature, broadening from the interests of the first, and capable of enriching the social dimensions so far addressed within the second. Like the literature on social-ecological systems, we recognise the nested nature of social and social-ecological systems, with mutual influences between systems from individual to global scales. Like the social science and health literature, we view resilience as a powerful concept that focuses attention and action on building the strengths and adaptability of individuals or their society and environment, rather than addressing weaknesses as the main priority.

We view social resilience as how individuals, communities and societies adapt, transform, and potentially become stronger when faced with environmental, social, economic or political challenges. This definition acknowledges the complex interplay between social, cultural, spiritual, economic and environmental systems, and recognises the synergistic relationship between people and the environments in which they live and derive livelihoods.

Our project was one of a set of three MTSRF studies with the similar aim of exploring social resilience, though each project focused on a different geographical scale. A James Cook University team studied social resilience at the community scale, while a CSIRO team focused on the whole-of-Great Barrier Reef region scale. Our study also worked closely with the CSIRO team to develop a State of the Region reporting framework. The boundary for our study area is outlined in Figure 1.

Our study area was the Wet Tropics region of Far North Queensland; chosen by our regional partners to be roughly equivalent to that of a regional body for Natural Resource Management (NRM), to correspond with an important management scale that sat between community and whole-of-Great Barrier Reef scales. Our partners, Terrain NRM Ltd., the Wet Tropics Management Authority, the then Aboriginal Rainforest Council, Girringun Aboriginal Corporation, the Great Barrier Reef Marine Park Authority; and the Queensland Department of Communities, work in much the same geographical area – the Wet Tropics and Terrain NRM area – however each have different boundaries. The maps and data presented in this report include an area reaching southward to Townsville in recognition of James Cook University's concentration of community research there, and the CSIRO State of the Region reporting team's inclusion of that area.

The following sections of the report present:

- An introduction to the region, viewed as a nested set of social-ecological systems;
- Project methodology;
- Reviews of literature relating to (a) social reporting, provided as background to our development of indicators, and (b) social aspects of resilience;
- Reports of six social resilience case studies we conducted in the region;
- A social resilience monitoring and reporting framework: including indicators, monitoring criteria and baseline data; and
- A set of options to assist our partners and others in managing for social resilience.

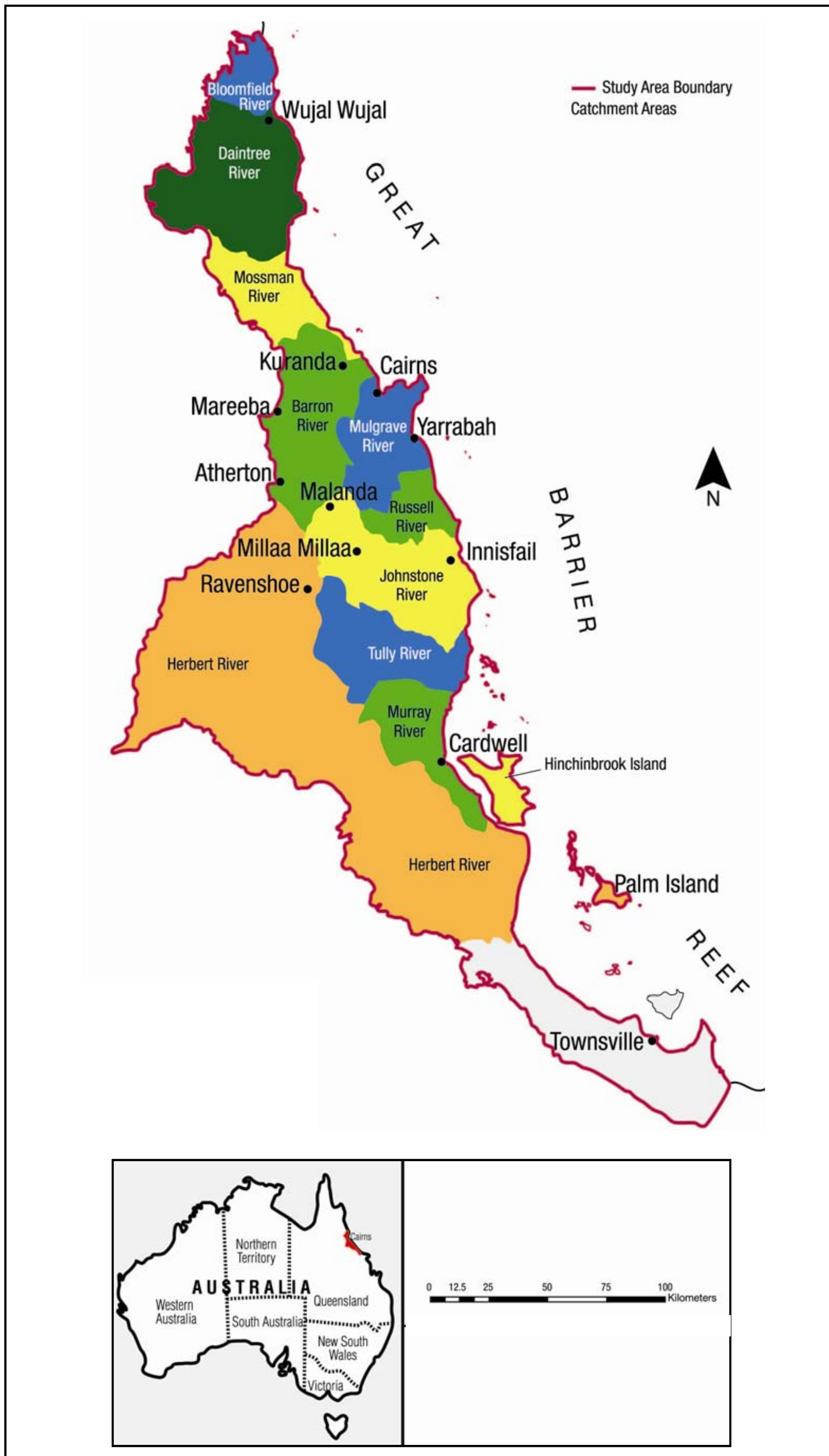

Figure 1. Social resilience project study area, Far North Queensland.

Understanding the Wet Tropics as a Social-Ecological Landscape

The concept of resilience is closely associated (in the ecological literature) with that of social-ecological systems. It is thus appropriate to consider our region of interest as a set of nested social-ecological systems (SES), rather than providing background information on geography and history separately. This region needs no introduction for readers within North Queensland, but is provided for the benefit of a broader readership.

The Far North Queensland (FNQ) region (see Figure 1) consists of a rich set of social-ecological systems, combining the Wet Tropics and Great Barrier Reef World Heritage Areas with a variety of farming and urban systems. We will describe the SES as a set of nested systems (Walker *et al.* 2004), viewing the region as including smaller SES at a variety of other scales, often overlapping. Topographically (viewing from 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 millennia. Their philosophy and livelihood focus on strong spiritual affiliations to land, ethics of 'caring for country', and belief that healthy country and healthy people are mutually influencing, continue to guide their society today and for the future. Their Traditional Owner group boundaries differ markedly from non-Indigenous boundary settings, for instance coastal estates combine land and sea. Aboriginal connection to country and aspirations for social development are asserted strongly through a range of initiatives, including self-organising Traditional Owner groups which coordinate their own decision-making, and working with government agencies, schools and other bodies to achieve mutual aims.

The Atherton Tablelands was originally developed for forestry (selective logging) and small-scale farming including dairying, which focused on cheese products rather than milk at first, due to its remoteness from large urban centres and difficulties in moving produce through difficult terrain (Hanley 2006). The area also features grazing. The SES is thus one of dependence on primary industries, with long-standing residents 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, and an element of knowledge industries with a CSIRO research station based at Atherton. Small-scale tourism has grown as an industry, focused on artificial lakes and the agricultural landscape, routes to the savanna lands to the west, access to the Wet Tropics World Heritage Area, and scenic drives from the coast. Our resilience case studies focus on three major changes in this area: the declaration of the Wet Tropics World Heritage Area in 1985, the restructuring of the dairy industry in 2000 and a water allocation planning process (also in 2000) to resolve competition for water. While the logged areas were mainly on the Great Dividing Range and escarpment, the declaration of the Wet Tropics had profound effects on the three local government areas in which loggers resided and sawmills were based. Efforts to establish plantation forest industries have transformed parts of the landscape, but are yet to regenerate the industry. Restructuring of the dairy industry was a government initiative in the context of sequential national restricting of most primary industries to be more competitive, and remove reliance on subsidies for viability in accordance with international trading agreements. As the government intended, the removal of subsidies forced individual farms to decide whether to leave the industry, or to enlarge, modernise and grow. This occurred cumulatively with long-term national trends of rural decline for a variety of economic and social reasons, which had long been causing drops in the number of dairy (and other) farms, with consequences for servicing businesses and the towns they are located in.

The Great Dividing Range and escarpment has remained forested, largely because of steepness of the terrain. It has been transformed from an area for timber extraction to protected area managed for conservation purposes by a Commonwealth agency, the Wet Tropics Management Agency, in cooperation with Traditional Owners. The human elements of this system are now visitors, tourism businesses depending wholly or partially on bringing visitors to this landscape, and the managers and those employed to manage the protected area. One medium-sized town, Kuranda, is located in the forest and has long been a lifestyle-resident and tourist attraction.

The coastal plain is currently in transformation from a mixed agricultural area, featuring sugar cane, bananas and other fruit crops, with culturally mixed, long-term resident farming communities, served by 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, making sale prices attractive. The city of Cairns, our next case study, is growing rapidly and lifestyle residents are also attracted to its hinterland and many of the smaller coastal towns. The land clearing and new infrastructure places significant pressure on biodiversity.

The Great Barrier Reef (GBR) inshore and outer reef areas can also be considered as a social-ecological system, with a variety of land-based interests using the waters, reefs and islands for commercial and lifestyle purposes. The GBR is managed as a multiple-use area by the Great Barrier Reef Marine Park Authority (GBRMPA). The tourism industry, ranging from tours and dive and recreational fishing access to land-based supports such as hotels, transport and catering, is highly conscious of its dependence on a high quality attraction, and the synergies between reef and rainforest tourism. Commercial fishing is another significant industry, though partially in decline, it affects the economies of many coastal towns (Marshall & Fenton, 2001). Coastal residents and visitors are also keen users of the reef, for recreational purposes: fishing and boating, as well as enjoyment of beaches. Our marine case study is the threat posed by the most recent Crown of Thorns starfish outbreak, which occurred (off Cairns) from about 1993 to 2003, and the way the tourism industry and the GBRMPA handled this threat.

The reef social-ecological system is currently affected by two major threats, coral bleaching, expected to worsen with climate change, and declining water quality posing a range of threats to the reef's natural system through sediments and nutrients caused by land use practices. Coordinated initiatives to curb water quality threats include catchment by catchment water quality improvement planning, a participatory process aimed at securing all stakeholders' cooperation in managing sediment and nutrients. The farming community in particular is solicited to make changes in farming practices to reduce loads, with a range of supports.

Governance is recognised as an important feature of SES when considered at regional scales (Lebel *et al.* 2006, Olsson *et al.* 2007). While governance was considered within all of the case studies, one was chosen specifically to focus on the role of governance in promoting resilience, and to ensure that our study gave due attention to the roles of Indigenous people in the regional SES. Thus the resilience-building role of Girringun Aboriginal Corporation, a collaboration between nine Traditional Owner groups in the southern part of our region of interest, was explored. The corporation functions very effectively as a coordinator of Aboriginal interests, and collaborator with a range of government agencies and private partners in managing their land and sea country. These include social development initiatives through the arts and with schools, and environmental management programs including a co-managed ranger unit, agreement involving management of turtle and dugong under traditional rules in the Marine Park, and work towards declaring Australia's first land-to-sea Indigenous Protected Area (Smyth 2008).

Methodology

This section presents an overview of the research design. Details of the conduct of each research step are provided under the relevant sections.

The research was undertaken by a team of researchers from The University of Queensland working in partnership with key organisations from the region:

- Terrain NRM Ltd – a North Queensland collaborative regional body responsible for integrative natural resource planning and management (acting as 'lead agency' for the set of partners);
- Wet Tropics Management Authority – the statutory authority responsible for management of the Wet Tropics World Heritage Area;
- Aboriginal organisations – initially the Aboriginal Rainforest Council, a network of 18 Traditional Owner groups whose country coincides with the Wet Tropics World Heritage Area, then Girringun Aboriginal Corporation, an association of nine Traditional Owner groups in the southern part of the study region;
- Great Barrier Reef Marine Park Authority – the statutory authority responsible for management of the Great Barrier Reef World Heritage Area; and
- Department of Communities – the Queensland State agency committed to promoting and supporting excellence in the delivery of human services to Queenslanders. The Department joined as a project partner in 2009.

Representatives of these organisations and the research team have collaboratively guided development and implementation of the project. Knowledge to inform development of a framework for regional monitoring and reporting of social resilience was generated through literature reviews, input from partner agencies, and case studies involving local stakeholders (Figure 2).

Given the dearth of social science or interdisciplinary literature on social resilience at both community and regional scales, we recognised a need to draw out current relevant knowledge from a diverse range of cognate literature, disciplinary and cross-disciplinary, in order to inform our research. Concurrent reviews were undertaken focusing on three key areas:

1. Diverse social reporting approaches, focusing on analytical frameworks and indicators of social aspects of development (Cuthill *et al.* 2008);
2. Concepts of resilience, especially the understanding of social aspects of resilience (Maclean *et al.* in prep.); and
3. Agency plans and strategies relating to the study region.

These reviews informed design of the primary data collection and development of a regional level system for reporting of social resilience. Primary data collection focused on six in-depth social resilience case studies in two river catchments of North Queensland, designed to examine significant changes and challenges in order to identify the attributes of social resilience in this region. The case studies were selected in discussion with the regional partners, to cover a wide range of social-ecological issues of interest to the partners. The first five span from upper catchment to near shore locations in the Barron and Johnstone river catchments (Figure 3). The last, designed to ensure a strong institutional analysis and inclusion of Indigenous roles in the region, covers all of these zones.

The six case studies (Table 1) provide a grounded perspective of social resilience, related through the lived experiences of interview participants.

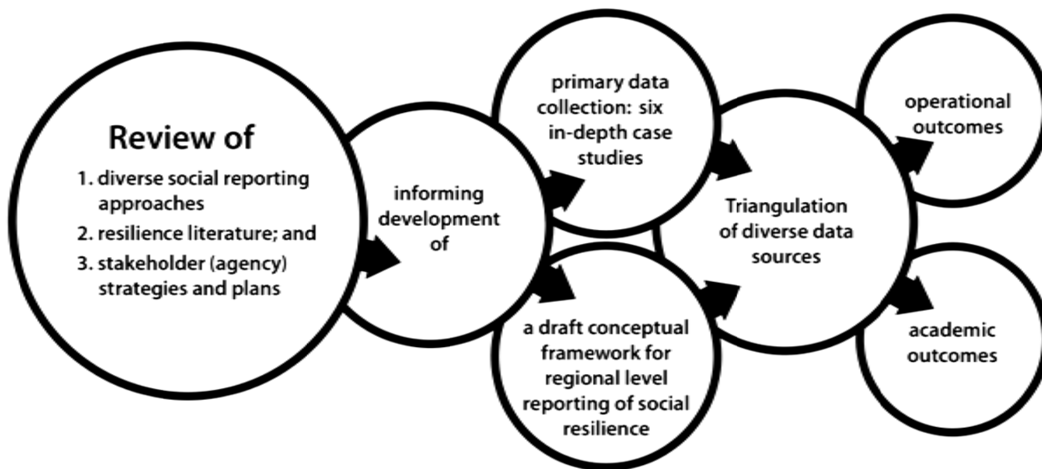

Figure 2. Design of the social resilience project.

Figure 3. Catchment zones for the selection of case studies.

Table 1. Case study foci.

1	Dairy deregulation on the Atherton Tablelands (upper reaches of the Johnstone River)
2	Water allocation process in the upper zone of the Barron River
3	Declaration of the Wet Tropics World Heritage Area (impacts on communities in the Ravenshoe area)
4	Rapid urban expansion in the Cairns coastal zone
5	The third Crown of Thorns starfish outbreak (marine case study, near shore area off Cairns)
6	The institutional role of Girringun Aboriginal Corporation in enhancing social resilience

The case study methodology is expanded at the beginning of the set of case study reports (see ‘Case Studies’, page 25), and details of those interviewed are given in each case study.

The task of developing a social resilience monitoring and reporting framework with both strong conceptual and practical validity relied on triangulation across all components of the project:

- Partner needs, identified through regular discussions with partners, familiarisation with their management roles and reference to their planning documents;
- Literature reviews;
- Case studies to provide direct information on the social resilience attributes that have enabled this region to meet past challenges; and
- Examination of existing and possible data sources to enable effective monitoring and evaluation.

In summary, literature reviews informed our conceptual understandings of social resilience, while case studies allowed us to explore the particular attributes of social resilience that have assisted North Queensland communities. The social resilience monitoring and reporting framework draws on all components of the project.

Literature Reviews

Social Reporting Approaches[1]

Review strategy

Since social resilience is a very new theoretical concept, we looked to literature on related concepts to examine how indicators have been developed and used within monitoring, evaluation and social reporting approaches.

The search strategy used in this review was designed to identify a diverse range of social reporting approaches published within a broad range of literature. Eleven academic databases[2] and Google were searched using 44 keywords covering a range of fields where research and practice have been undertaken (see Cuthill *et al.* 2008 for keywords used and details of the search and analytical strategy).

Situating social resilience reporting within the broader social reporting literature

A key concept within development discourse has been the desire to create a better world for all people (Daly & Cobb, 1994; Galbraith, 1984; Shiva, 1988; UNCED, 1993). However, in order to achieve systematic, sustained and equitable progress, there is a need to understand what factors enhance and detract from well-being. Building on initial work by Bauer (1966), a formal and ongoing focus on social reporting has provided one avenue for enhancing that understanding. As such, social reporting can be seen as "… a necessary part of the stream of information we use to understand the world, make decisions and plan our actions" (Meadows, 1998:1). However, the search for effective approaches to monitor and report the social outcomes of development is ongoing.

Contemporary social reporting approaches have been evolving since the mid 1960s. These diverse bodies of literature have been comprehensively reviewed and reported elsewhere (e.g. Cobb & Rixford, 1998; Gasteyer & Flora, 1999; Sharpe, 2004; Sirgy *et al.* 2006). Although it is not the intention of this to document these reviews, a brief visit to the social reporting literature is required to help readers situate this current research among the diverse conceptual and operational approaches that precede it.

Gross Domestic Product (GDP) and related economic measures have long been the first point of call for assessing social conditions across the world. However, recent research and policy recognises that social well-being is a much more complex issue than can be conveyed through a sole focus on conventional economic measures (Manderson, 2005; OECD, 2007). This argument was succinctly articulated by Cobb, Halstead, & Rowe (1995:59) when they asked, "If GDP is Up, Why is America Down?" Clearly, while effective contemporary

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[2] JSTOR, Blackwell Synergy, Springerlink, CSA, ASAP, Proquest, Science Direct, SSCI, Current Content Connect, Project Muse and Web of Science.

governance requires a good understanding of the status of the economy; there is also a need for a good understanding of the social situation. Social reporting, in its many diverse forms, has been used to provide a basis for that informed understanding.

Bauer's (1966:1) initial approach to social reporting broadly encompassed "statistics, statistical series, and all other forms of evidence that enable us to assess where we stand and are going with respect to our values and goals". While such a description has been supplemented with perhaps hundreds of subsequent definitions, it still provides a sound foundation for understanding the concept of social reporting. In particular, the inclusion of 'all other forms of evidence' provides an early platform for consideration of different types of information relating to social conditions. However, despite Bauer's initial direction in advocating for a broad understanding of evidence, much social reporting subsequently focused primarily on what has been termed 'objective' data.

As Cobb and Rixford (1998:31) explain, "Unfortunately, the indicators movement has been heavily influenced by its association with a school of academic sociology that emphasised the seemingly endless collection of numbers and resulted in provisional conclusions at least". This approach provides a relatively simple pathway for reporting basic social conditions. It also has the potential to describe a comprehensive range of these conditions for a relatively low cost factor. For example, in Australia this approach has been used by government agencies to report quantifiable outcomes from service delivery programs (Armstrong & Francis, 2003).

Such statistics-dominated approaches ignore the potential of social reporting to fill multiple purposes. Indeed, Ekos Research Associates argue (1998:5) that "… the simple presentation of large numbers of social statistics" is the least sophisticated of social reporting approaches. Such approaches inherently involve a degree of arbitrariness in deciding what is, or is not incorporated, and neglect the reality of individual attitudes, values, and perceptions. Importantly, this approach neither identifies nor works toward socially desirable goals; it merely reports the status of a social condition at a point in time.

Broader consideration of different types of evidence, as suggested by Bauer, is useful in building a deeper understanding of the complex interrelationships which underpin social conditions (Cobb & Rixford, 1998; Swain & Holler, 2003). For example, Sirgy *et al.* (2006:344) describe 'subjective' social reporting, which relates to an individual's "… personal feelings, attitudes, preferences, opinions, judgements or beliefs …" This rich data complements objective data by providing a direct connection to a individual's perception of life, based on their values, knowledge and lived experiences.

The move, towards incorporating broader types of evidence into social reporting, has coincided with action orientated processes based on vision statements and clearly articulated goals. For example, the Board of Sustainable Seattle (a program recognised for its innovative and inclusive approach to use of indicators to guide sustainable development of its metropolitan region) was concerned that merely publishing their results in 1993, 1995 and 1998, "… was not sufficient and that a successful program should include programs which support actions by citizens, businesses and policy makers to affect the trends documented by the indicators" (Sustainable Seattle, 2008:1). Subsequent work by this group has focused on a more action focused agenda driven by its sustainability reporting processes.

It is now evident that specific agency or operational requirements, what we have termed the 'purpose' of the reporting process, has driven the development of a diverse set of social reporting frameworks over the past forty years. These frameworks range from those that focus solely on quantitatively reporting the 'status' of one or more social conditions, through to broad-based frameworks that adopt action orientated participatory processes focusing on 'vision' or 'goal' attainment (Table 2).

Table 2. Examples of diverse social reporting frameworks.

Quality of life	Social indicators
State of the environment	Social determinants of health
Gross domestic product	Human scale development
Human development index	Sustainability reporting
Assets based management	National census reporting
Sustainable communities	Triple bottom line
Community well-being	Gross national happiness
Social infrastructure benchmarking	Social justice

It is evident that a clear understanding of the purpose of social reporting is required to guide development of frameworks so they can achieve maximum potential from the reporting process. For example, the articulated 'purpose' behind the:

- 'Social determinants of health' is to "… advance health equity, driving action to reduce health differences among social groups, within and between countries" (Commission on Social Determinants of Health, 2007:4);
- 'Social indicators' is to determine "What progress OECD countries have achieved in terms of their social development?" and "How effective have been the actions of society in furthering social development?" (OECD, 2007:10); and
- 'Community well-being' framework "… is a tool for local government to progress and measure community well-being within the parameters of its roles and responsibilities" (Wills, 2001:4).

These frameworks provide a strong foundation from which social reporting can continue to evolve. The realistic expectation, underpinning all reviewed frameworks, is that implementation of social reporting will enable governments and communities to better understand and respond to their social conditions effectively (Cobb & Rixford, 1998). As such, a successful framework might ultimately be judged on its effectiveness in facilitating decision making and informed action that results in positive community outcomes (Cuthill, 2002).

One incidental outcome relating to these diverse frameworks has been the development of different language used within each framework. For example, 'social indicator' is used both to signify a conceptual framework (OECD, 2007), and in a much more defined context as information that summarises the broad characteristics of systems. Terms such as 'domains', 'indicators', 'criteria', 'data' and 'status' lack generally accepted definitions across different frameworks. This language issue means it is difficult for different approaches to 'talk' to each other across spatial, sectoral and conceptual boundaries. As a result, agencies and researchers have generally failed to move past their disciplinary perspective or operational purpose towards social reporting processes that fulfil multiple outcomes across these boundaries.

Smith (1991) suggests this internal focus dates back to initial reporting work undertaken in 1910, where 'status' reporting generally involved delivery of results from technical experts to agencies. This approach is primarily directed towards fulfilling agency needs, for example, by providing information to guide planning and decision making, or to meet accountability requirements. As noted previously, some recent social reporting processes have moved towards increased participation by diverse stakeholders in 'vision' or 'goal' focused

processes (e.g. Ames, 1997; Cuthill, 2004; Jacksonville Community Council Inc., 2000; Sustainable Seattle, 2008). However, the expert delivery system still appears to be predominant in contemporary social reporting processes. It is apparent this approach constrains the crossing of the aforementioned boundaries and achievement of multiple outcomes from social reporting processes.

Increasingly, there are calls for participatory processes to help narrow the differences between diverse stakeholders, forming a bridge across these spatial, sectoral and conceptual boundaries (Meadows, 1998; see also Guijt, 1998). Such processes can be built into, and enhance existing implementation strategies. For example, Meadows (1998:26) presents a broad outline of such a process which entails:

1. Establishing a small working group with overall responsibility for success of the entire venture;
2. Clarifying the purpose of the indicator set;
3. Identifying the community shared values and vision;
4. Reviewing existing models, indicators and data;
5. Drafting a set of proposed indicators;
6. Convening a participatory selection process;
7. Performing a technical review;
8. Researching the data;
9. Publishing and promoting the indicators; and
10. Regular updating of the report.

A process structured along these lines would allow involvement of a diverse range of stakeholders. It would also facilitate accountability requirements and additional outcomes including increased social and organisational learning, broad ownership of results, and a willingness to support collaborative local action (Cuthill & Fien, 2005; Pretty, 1999).

Implications for the social resilience project

This section provides detailed discussion on how results from the review relate to our social resilience project. This discussion falls under two key theme areas, ‘crossing the boundaries’ and ‘towards a shared language’.

Crossing the boundaries: moving from meeting accountability requirements to achieving multiple purposes

While ‘meeting accountability requirements’ appears to remain the driving purpose for many social reporting frameworks, there is evidence of increasing attention being directed towards achieving multiple purposes. There is much untapped potential here, in terms of what outcomes a social reporting process can achieve, as the suite of purposes identified through this review illustrates (Table 3).

However, moves towards achieving multiple purposes continue to be constrained through a lack of integration across the three previously identified boundaries (spatial, sectoral and conceptual). For example, there was no indication in any of the literature reviewed, of national guidelines that might help link social reporting across different spatial units. This lack of integration applies both vertically across community or town, region, state and national reporting levels, and horizontally within each of these levels. For example, multiple agencies might be seen developing social monitoring and reporting to meet their own operational requirements at the regional level. This lack of integration results in a duplication of effort, wasted resources and incompatible data sets.

Table 3. Commonly identified purposes for social reporting.

- Monitor service delivery
- Guide funding decisions and prioritise actions
- Facilitate social learning outcomes
- Inform advocacy/debate around specific issues
- Meet accountability requirements
- Inform institutional learning
- Assess progress towards local visions and goals
- Inform planning and policy development

With regards to sectoral boundaries, there is increased demand for environmental, agricultural and natural resource management agencies to incorporate social criteria in their reporting frameworks. This is in recognition that social and natural systems are linked, and that the social has a pronounced influence on the natural. Despite this recognition, reporting continues to focus primarily on the status of the natural environment (with some exceptions in Scandinavia and developing countries). Agencies are looking to improve the quality of social reporting but are constrained through disciplinary groundings. There is also some question whether this recent move towards including reporting of social conditions, by these agricultural and natural resource management agencies, is in fact duplicating existing socio-economic reporting already being undertaken by social agencies. An increased multidisciplinary and cross-sectoral effort is required to enhance and integrate this social reporting for the benefit of all sectors.

Conceptual boundaries relate to the various social reporting approaches outlined previously in Table 2. Some social reporting approaches have developed a high profile over extended periods of time, and are now part of everyday language (e.g. Gross Domestic Product). Others, such as ‘state of the environment’, ‘quality of life’ and ‘community well-being’ have become more common place in recent years, particularly through their application at the community level. Broad based ‘sustainability’ frameworks that attempt to link across social, economic, cultural and environmental factors are still in various stages of development (Pretty, 1999; URS Sustainable Development, 2004). The benefits and constraints of maintaining diverse conceptual approaches for social reporting are not clear, and further study in this area is required. Traditions of academic autonomy in the disciplines suggest that finding some commonality here would be a challenge.

With the relatively recent proliferation of social reporting initiatives, at least in Australia, there is some informal discussion taking place around how social reporting can be rationalised to serve multiple purposes across social, economic, cultural and environmental interests. A move past a sole focus on accountability for the operational requirements of individual agencies, towards achieving multiple purposes, will undoubtedly challenge the capacity of many agencies. Issues such as working collaboratively, resource sharing and governance arrangements must be addressed in order to achieve effective, efficient and reliable social reporting across spatial, sectoral and conceptual boundaries. Moves towards more collaborative processes offer potential for achieving multiple outcomes, but do challenge ‘expert’ driven approaches that currently dominate social reporting processes in Australia.

In simple terms, processes for social reporting can be viewed on a spectrum that works from expert driven at one extreme, to a fully participatory approach at the other (see Figure 4).

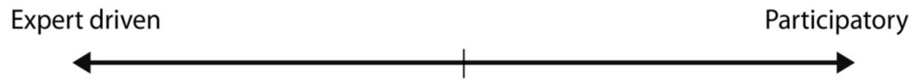

Figure 4. Spectrum describing operational approaches to social reporting.

This is not to say that any one process is ‘right’, or ‘better’ than any other. All have strengths and weaknesses. Most importantly, the selected process must be appropriately aligned to deliver the stated purpose of the reporting. For example, a singular accountability requirement (Table 3) might dictate use of an expert process: an agency hires consultants with knowledge of relevant and required data collection processes, later delivered to the agency in the form of an evidence-based report. Clearly this is an important requirement, especially for agencies resourced through public funds. However, this approach can also be broadened to achieve additional outcomes that can value-add to agency operations. For example, working towards social or institutional learning outcomes could still achieve accountability requirements, but this would clearly require the participation of diverse stakeholder groups (Freebairn & King, 2003).

Expanding the process to involve community groups, local businesses, Indigenous groups and other agencies facilitates informed dialogue among diverse stakeholders. Open dialogue enhances social and institutional learning and promotes strong commitment to actions by participants (Cuthill, 2003). As such processes are usually conducted in the public arena, this focuses community, media and political attention on the issues identified, giving them legitimacy, and thereby offering a greater claim to accountability. However, to achieve multiple purposes from social reporting will require greater collaboration across spatial, sectoral and conceptual boundaries. A key consideration is that this will require some shared understanding of social reporting language.

Towards a shared language for social reporting

The reviewed literature suggests there are three distinct layers of information underpinning social reporting (Table 4). Each of the three layers plays a specific role in the social reporting framework.

Table 4. Three layers of information underpinning social reporting frameworks.

First layer:	Domains
Second layer:	Monitoring criteria
Third layer:	Indicators

The first layer of reporting focuses on a small set of overarching ‘domains’, also variously called for example themes, factors, dimensions or components. These domains provide a conceptual foundation identifying the key areas of interest within a specific social reporting framework. For example, Gross Domestic Product looks towards a primarily economic domain in reporting social conditions. The more recent, broad-based frameworks (Table 5) draw on the concept of sustainable development (UNCED, 1993) as a starting point for their domains. Sustainability is said to be attained through consideration of and balance between social, environmental and economic factors in development (Figure 5).

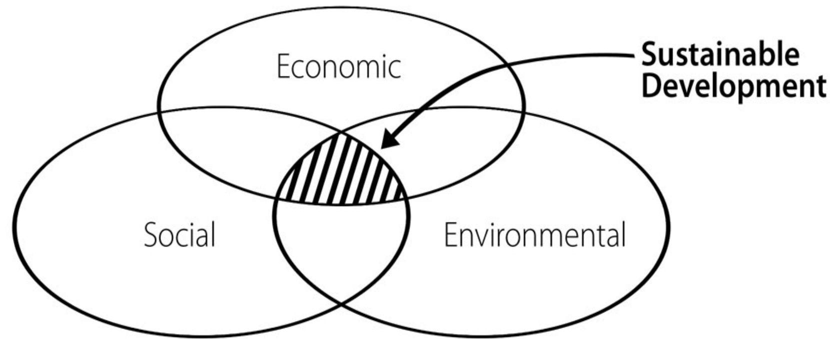

Figure 5. Interrelationship between social, environmental and economic factors in sustainaible development.

These three sustainability factors have provided a starting point for identifying domains in subsequent broad-based social reporting frameworks (Table 5).

Table 5. Examples of broad-based social reporting frameworks.

Framework	Domains
URS Sustainable Development (2004)	Three dimensions: environmental protection, social advancement and economic prosperity
Hawkes (2001)	Four pillars: social, environmental, economic and cultural
Pretty (1999)	Five capital assets: human, social, financial, physical and natural
Flora *et al.* 2004	Capitals framework: human, social, financial, built, natural, political and cultural

The second layer of reporting involves ‘monitoring criteria’, also variously called for example data, indicators and information. Monitoring provides detailed, accurate data as the bedrock for social reporting. This detailed data is collected at regular intervals depending on the reporting requirements (e.g. every one, two or four years). The purpose of the reporting dictates the number and type of monitoring criteria (for instance, levels of education). For example, the purpose of the Australian Census is to provide a profile of the Australian population every five years. As such, the Census involves many hundreds of criteria (ABS, 2006).

The third layer of reporting involves ‘indicators’. The term ‘indicator’ is perhaps the most mis-used term within the diverse body of social reporting literature. In the various literature it has been used to describe all or any information relating to social reporting. For the purpose of this publication and our ongoing research, indicators will be viewed as a relatively small group of items informed by a more comprehensive set of monitoring criteria (King & MacGregor, 2000).

An example of such an indicator is that of a group of children catching fish from the river on a Saturday afternoon. This indicator tells us many things:

- The families have discretionary income to buy the children fishing equipment;
- It is considered safe for the children to be out by themselves at the river;
- The water is clean enough to support fish stocks;

- There are ample fish in the river, suggesting fish stocks are well managed; and
- The children are socialising together, indicating good levels of social capital.

Indicators such as this example help us to highlight social conditions, rather than providing detailed description of the situation. They are the highly visible, easily understood, front end of the reporting framework. They relate as much to communication and education purposes, as to accountability. While monitoring relies largely on experts and on formal and standardised measurement to deliver valid and reliable data to inform social reporting, indicator development opens opportunities for participatory processes involving diverse stakeholders. However, it is useful to note that not all reporting frameworks utilise participatory indicator development processes.

The next section of this review applies the learning from the review to develop a conceptual framework for regional monitoring and reporting of social resilience.

Developing a draft conceptual framework for regional level monitoring and reporting of social reilience

Based on outcomes from this review, a draft conceptual framework for regional level monitoring and reporting of social resilience was developed to help guide ongoing research (Figure 6).

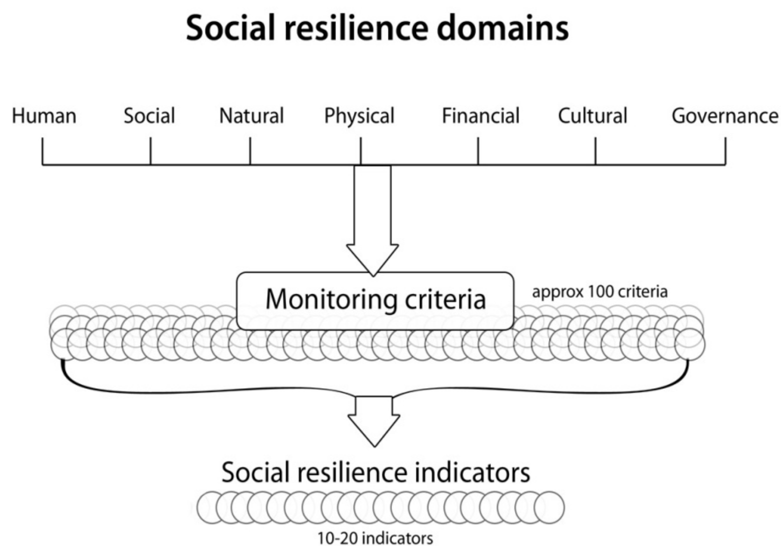

Figure 6. Conceptual framework for regional level monitoring and reporting of social resilience.

Working from this framework, three key questions were considered when translating findings from this review to our social resilience project requirements:

1. Which domains are relevant to our multi-agency reporting requirements in North Queensland?
2. Which monitoring criteria among those identified are appropriate for measuring social resilience?
3. What processes are most suitable for indicator development?

1. Which domains are relevant to our multi-agency reporting requirements in North Queensland?

A series of three research team workshops and a workshop with our project partners identified seven domains of relevance for this project (Table 6). We hypothesise that each of these seven domains has the potential to contribute to or detract from social resilience, usually both. For example, a lack of social infrastructure such as health or education facilities will detract from social resilience, while the maintenance of strong Indigenous culture will enhance social resilience (Freebairn & King, 2003).

Table 6. Seven domains of social resilience relevant to this project.

Domain	Description
Human	**The status of individuals**, including investment and attainment in education and training evidenced through skills, knowledge, life experience, values, leadership, active citizenship (rights and responsibilities).
Social	**The fabric of society**, including societal strength, cohesion, social inclusion, trust, networks, equity, safety, sense of place, creativity.
Natural	**The resource condition**, including waste generation, consumptive and non-consumptive values, conservation, biodiversity and natural habitat, climate change.
Physical	**The provision of infrastructure to support human needs**, including transport, health and education facilities, human services, housing, communications.
Financial	**The stocks and flows of money, savings and pensions**, including income generation and distribution, un/employment, economic costs of social and environmental impact and resulting dysfunction, savings and investments.
Cultural	**The shared characteristics and bonds of Indigenous and other culturally and linguistically diverse groups**, including history, traditions, stories, place attachment, integration, diversity and heritage.
Governance	**Access to and participation in decision making processes**, including recognition of social equity/justice requirements, collaborative approaches, integrated services, engaged governance.

2. Which monitoring criteria among those identified are appropriate for measuring social resilience?

In the next stages of research, the 90 pages of specific monitoring criteria recorded during the review of social reporting were considered in terms of their relevance to the concept of social resilience. Those selected were thematically coded to provide a broad set of potential monitoring criteria for the project, and reviewed in a series of workshops with our project partners to identify a set of the most promising criteria. The candidate monitoring criteria were reviewed using a SMARTT framework (adapted from Doran, 1981, McDonald & Roberts, 2006) to be specific, measurable, achievable, relevant, time lined and talk with and across horizontal and vertical reporting processes. The last element 'talk' is specifically relevant within the regional governance landscape in particular in relation to integrated planning across government agencies.

3. What processes are most suitable for indicator development?

The final stage of reporting, the development of social resilience indicators, was also discussed with our project partners to determine what process would be most appropriate for their combined reporting requirements. The strategy and outcome are documented in the 'Social Resilience Monitoring and Reporting Framework' section of this report (page 107).

Conclusion

Social monitoring and reporting, evidenced through a diverse range of disciplinary and operational guises, plays an important role in helping to understand our world. However, it appears that a lack of consistency in the use of language, incompatible data sets, diverse operational requirements, and lack of disciplinary connectedness limits social reporting to achieve its maximum potential. There is clearly an opportunity for better collaboration to link the operational requirements of agencies and to cross the sectoral, spatial and disciplinary boundaries. The draft conceptual framework presented in this publication for monitoring and reporting regional social resilience provides an opportunity to explore application of an ‘umbrella’ social reporting process that caters to diverse agency requirements.

This review, conducted to bring lessons from past work in cognate fields to address a knowledge gap with respect to social resilience, has found major differences in the purposes of social reporting, the disciplinary and operational approaches used, and the social reporting language. Our analysis identifies value in rationalising social reporting to address multiple purposes, in making informed choices across expert-driven and participatory approaches, and in ensuring shared understanding of social reporting language. We have offered a conceptual framework for regional level monitoring and reporting of social resilience, and language to clarify the functions of different aspects of social reporting. Our partnership is already working towards a common reporting framework tailored to the needs of the North Queensland region and the shared operational requirements of four partners.

Social Aspects of Resilience[3]

Introduction

This section presents a review and analysis of two bodies of literature which focus on the concept of 'resilience': the resilience of social-ecological systems and the literature published principally within the social and health sciences on the resilience of individuals. Both sets of literature offer opportunities to consider the nature of social dimensions of resilience, at our regional scale of interest.

Methods

A systematic literature search was conducted towards identification of theory and conceptual frameworks to help understand resilience. Eleven academic databases (JSTOR, Blackwell Synergy, Springerlink, CSA, ASAP, Proquest, Science Direct, SSCI, Current Content Connect, Project Muse and Web of Science) were searched using the keywords of 'social resilience', 'cultural resilience' and 'social ecological system resilience'. Themes used to identify and review individual papers included discussion surrounding the historical origin and disciplinary evolution of the research field; theory and related terminology used to explain phenomena within the field; the management application of these approaches; the scale at which these management applications were advocated and whether there was evidence of communication between the two main research fields of interest.

Social science perspectives on resilience

There is much contention regarding resilience and the scientific value of research into the nature of resilience. The concept of resilience evolved from the disciplines of psychology and psychiatry in the 1940s and, within these disciplines, is mainly accredited to Norman Garmezy, Emmy Werner and Ruth Smith (Manyena, 2006). Resilience was originally used to describe a personality trait and the related protective factors. Early research included studies of children with schizophrenic mothers as well as the personal qualities of resilient children including autonomy and high self-esteem (Garmezy, 1974; Masten & Garmezy, 1985). It is now used to describe a dynamic process. The focus is upon protective processes and how certain factors may contribute to positive outcomes. Protective factors are defined as the specific attributes or situations necessary for resilience to develop. These include personality traits, aspects of family life, and characteristics of wider social environments (Masten & Garmezy, 1985). Debate continues regarding the definition of the concept of resilience within social research areas. For example, the psychologist Kaplan (2005) questions whether resilience is the opposite of non-resilience or vulnerability; and questions the relationship between resilience and the experience of distressful life experiences.

Contemporary concepts of resilience include the design of appropriate prevention and intervention strategies for individuals facing adversity (Richardson, 2002; Wilkes, 2002). Published research includes: individual and community resilience in rural areas (Hegney *et al.* 2007); community resiliency and health (Kulig *et al.* 2005); cultural resilience (HeavyRunner & Marshall, 2003; Lalonde, 2006); resilience to environmental risks (Sapountzaki, 2007); and disaster resilience (Manyena, 2006; Maguire & Hagan, 2007). International research centres have been set up to build upon resilience research. For example, the Resilience Research Centre based at Dalhousie University, Canada, conducts projects entitled, 'Negotiating Resilience' and 'Pathways to Resilience' (Resilience Project, 2009). There has been a parallel transition from focus exclusively on individuals (within their

[3] An extended version of this chapter is being prepared for submission for journal publication.

social environments) to interest in the resilience of communities. The aim is to investigate practical approaches to build and enhance resilience at the individual and community scales. (Norris *et al.* 2008) for example extend the notion of psychological wellness that they argue is a viable indicator of individual adaptation, to the community scale by suggesting that community level adaptation can be understood as population wellness. Also, the work of the United Nations International Strategy for Disaster Reduction and the Hyogo Framework for Action 2005-2015 (both declared at the World Conference on Disaster Reduction in 2005) acknowledge the importance of 'the resilience paradigm' (Manyena, 2006) to disaster management.

The psychology and health focussed social research into resilience pays scant attention to the role of the natural environment in relation to individual, community and society resilience. For example, Norris *et al.* (2008) argue, in the context of building community resilience for disaster readiness, community resilience emerges from four primary sets of adaptive capacities that include economic development, social capital, information and communication and community competence, with no mention of the role of the natural environment. Where 'environment' *is* mentioned, often ambiguously, it refers mainly to the social environment. Research does sometimes include, however, the role of the physical environment and infrastructure to resilience (Hegney *et al.* 2008). Some researchers, for example Adger (2000a), Sapountzaki (2007) and Glavovic *et al.* (2003) question how social and ecological resilience as well as sustainable livelihood development are related (see below). Contributions from the social sciences relate to: theoretical notions of individual, community and wider societal scale; the notion of resilience as linked to adaptive capacity to cope with particular external occurrences; and a call for a refocus of resilience as a deliberative (and potentially transformative) process (rather than relating to specific personality traits). These contributions are presented in the discussion that follows.

Social researchers investigate resilience at a variety of scales. For example, the work of Hegney *et al.* (2007) explores how individuals in rural Queensland, Australia, describe resilience as being like a 'bouncing ball' in the face of adversity. Maguire and Hagan (2007) discuss resilience at the community scale, they describe social resilience as the capacity of social groups and communities to recover from or respond positively to crises. Kulig *et al.* (2005) in their study into community resilience and health status in Canada also described 'resiliency' as the ability of a community to deal with adversity and in doing so to reach a high level of functioning. In relation to disaster management the United Nations International Strategy for Disaster Reduction (UNISDR) (2005) takes the notion of resilience to the scale of society. It states that resilience is "determined by the degree to which the social system is capable of organising itself to increase this capacity for learning from past disasters for pressure future protection and to improve risk reduction measures" (UNISDR, 2005 p.49). In this context, Manyena (2006) argues that resilience is not just about the ability of a community to absorb shock but the concept should relate to the elements of community systems that result in communities and individuals better able to adapt and survive the shocks. Some scholars (see for example Adger (2000a); Glavovic *et al.* (2003), Sapountzaki (2007)) draw upon the social-ecological systems approach to discuss how any given social system is interconnected with other social and environmental systems that operate and exist at different scales. Sapountzaki (2007) draws upon the work of the resilience alliance to show that the new system that results from a change or an external 'risk' factor may not be more desirable than the original one. Indeed adaptability may be both positive and negative. He argues (2007: 293) that alleviating exposure and vulnerability to one risk may in fact cause the increase of vulnerability to another and indeed the development of resilience for one individual may undermine the resilience of another. Glavovic *et al.* (2003) recognise that resilience may be socially differentiated which means resilience at one scale of a livelihood system may not necessarily improve the robustness of strategies at other scales.

Central to the concept of resilience in the social literature, are these notions of risk, adversity and vulnerability. Risks may include social, economic, political and environmental factors or a combination. For example, at the individual scale an external risk factor may be being reared by schizophrenic parents (see Luthar *et al.* 2000); at the community scale, the external risk factor may be a natural disaster (see Manyena, 2006); and at the societal scale the risk factor loss of resilience of natural ecosystem (Adger, 2000a). Many researchers argue for a process understanding of resilience. For example, the extent to which an individual, community or society is able to adapt to the changes brought about by the external risk factor(s) will determine how resilient they are to that particular adversity.

Glavovic *et al.* (2003) argue, in the context of sustainable livelihoods in developing countries, that people can be exposed to a variety of social, economic, political and ecological disturbances that vary in intensity. When adaptive capacity is reduced, as may be the case with poverty, these changing circumstances can be experienced as 'waves of adversity'. In this example, these communities may be very vulnerable because they may be characterised by a lack of access to resources including information and knowledge; have limited access to political power and representation; and hold certain beliefs and customs (Cutter *et al.* 2000). Glavovic *et al.* (2003) advocate for the development of 'layers of resilience', this is the development of programs and livelihood systems that retain ecological resilience, build social capital and reinforce cultural capital. Such livelihood systems will enable people to pursue a variety of strategies that will facilitate their ability to cope with change and create the potential to translate adversity into opportunity. In this context, Glavovic *et al.* (2003) regard vulnerability as an antonym for resilience. Such an understanding of vulnerability is not supported by all resilience researchers. Manyena (2006) refutes this idea. He argues that whether resilience and vulnerability are positive and negative poles on a continuum depends upon how the two terms are defined. From within the psychology literature, Kaplan (2005) further problematises this discussion. He points out that if an individual is described as resilient because they can bounce back from adversity this suggests a person cannot be described as resilient in the absence of pre-existing experiences of adversity. He questions what this means for "well functioning/low risk individuals" (p. 42). Sapountzaki (2007) points out that the construct of resilience may not be a panacea for social vulnerability. Vulnerability is considered to be a state whereas resilience is argued to be a process. The accepted assumption is that resilience will have a decreasing impact on vulnerability, however this assumes resilience is always a positive attribute.

Social research into resilience calls for the creation of management institutions that work to foster processes to enhance the social resilience of society. Across the various critiques and definitions of resilience in social research areas there is consistency: resilience is defined as either a desired outcome or as a process leading to a desired outcome (Kaplan, 1999). For example, Manyena (2006) argues that over time the gradual refinement of the concept of resilience in disaster management has gone from being outcome oriented to more process orientated. This holds true in other research areas. For example, in relation to cultural resilience in Aboriginal communities in Canada, Lalonde (2006) asserts that cultural resilience is the ability of whole cultural groups to foster healthy youth development. He states that "when communities succeed in promoting their cultural heritage and in securing control of their own collective future – in claiming ownership over their past and future – the positive effects reverberate across many measures of youth health and well-being" (p. 23). HeavyRunner and Marshall (2003) also argue that resilience can be fostered by cultural factors that nurture the natural human capacity to thrive and survive. Participants in the community resiliency and health status study by Kulig *et al.* (2005: 90) perceived community resiliency "as a proactive process that could only occur with the right combination of visionary leaders and other community members who were willing to implement the vision".

In summary, contributions from social science perspectives on social resilience include theoretical notions of individual, community and wider societal scale; and the idea of

resilience as linked to adaptive capacity to cope with particular external occurrences. A call for a refocus of resilience as a deliberative process has implications for management institutions that foster programs for processes to enhance the social resilience of individuals, communities and society as a whole. These contributions and related weaknesses are analysed further in the discussion.

Resilience within linked social-ecological systems

Ecologists have been grappling with the concepts of change for over a century. Conceptualisations have changed from ones of relative stability and predictability (in the sense of 'Clementsian' succession and climax concepts (see Grime, 1979) through to much more dynamic and even chaotic ideas. The inherent dynamics of 'natural' systems and the issues of natural variability led to new ideas like 'state and transition models' to explain how natural systems can exist in multiple apparently stable states. In exploring these concepts ideas such as resilience, resistance, stability and buffering capacity emerged (cf. May (1977); McIntosh (1987); Aronson *et al.* 1993). It is interesting that the dynamics of natural systems and the demise of the 'balance of nature' paradigm and the acceptance of the 'flux of nature' (Pickett *et al.* 1992) still remain problematic for the human management of natural systems (Holling & Meffe, 1996; Briggs, 2003). Ecological resilience is a key feature of more contemporary thinking about ecosystems and is central to any issue associated with managing (or detecting) natural versus natural system trends and variability. Many of the key papers contributing to theoretical development in ecological resilience have been republished, with commentary, in Gunderson *et al.* (2010).

Ecological resilience was formally discussed by Holling in 1973. Since this time an extensive theoretical and empirical literature has evolved towards understanding the resilience of social ecological systems. Scholarship by a group of researchers has focused upon ecological aspects of the resilience of social ecological systems. More recently, they have turned their focus to the social aspects of the resilience of social ecological systems. This work is a reaction to what is termed 'engineering resilience' a management approach to ecosystems that relates to designing management systems to return the ecological system to an expected equilibrium. Instead, researchers propose the concept of ecological resilience. This is based on the idea that ecosystems are characterised by interacting, self organised sets of processes and structures that vary across scales (Peterson *et al.* 1998). It recognizes that scientists and natural resource managers do not hold all the knowledge to be able to predict how an ecosystem will respond to a change: it acknowledges that future events will be unexpected. Scholars in this field argue that a better understanding of how linked social ecological systems cope and adapt with change will provide scientists, natural resource managers and decision-makers with the tools to manage for resilience into the future.

In this research area the term resilience refers to "the measure of the persistence of systems and their ability to absorb change in disturbance and still maintain the same relationship between populations or state variables" (Holling, 1973). Researchers speak of the adaptive cycle as a way to describe the phases of an ecosystem. This concept refutes the notion that ecosystems have a single stable equilibrium, as advocated by the engineering resilience approach. The adaptive cycle is comprised of four phases (Holling, 1996; 2001). The fore loop (growth and conservation phases) corresponds to ecological succession in ecosystems. The back loop is comprised of the creative destruction phase and a phase of reorganisation (Holling, 1996; 2001).

These researchers suggest that many systems appear to move through these four phases. The systems include ecosystems (e.g. Holling, 1996), social systems (e.g. Westley, 2002), institutional change (e.g. Janssen, 2002) and social ecological systems (e.g. Gunderson *et al.* 1995; Holling *et al.* 2002). This body of literature states that social ecological systems are

comprised of structures and functions that may exist over spatial and temporal scales and each exist as a function of the adaptive cycle. Systems at these temporal and spatial scales influence structures and processes of systems at other temporal and spatial scales. So, the dynamics of a particular system cannot be understood without considering the dynamics and influences of processes from scales above and below it (Walker *et al.* 2004). Indeed Carpenter *et al.* (2001) argue that the history of human cultural evolution has been a story of cross scale subsidies. The concept of panarchy describes the nested nature of these social ecological systems (Holling & Gunderson, 2002). Theoretical contributions from this body of literature relate to notions of linked social-ecological systems; the adaptive cycle and what this means for institution building for social ecological resilience.

This literature broadly describes 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 argue that to evaluate, understand and manage complexity and change we must understand what constitutes ecological and social resilience, how they are interconnected and what the potential thresholds are that may flip a system into a new state or phase of the adaptive cycle (Westley *et al.* 2002). This is particularly important in the instance that the new phase is not optimal for societal evolution. Researchers speak about linked social ecological systems – systems that are neither humans embedded in ecological systems nor ecosystems embedded in human systems (Westley *et al.* 2002). Rather they are something quite different. Management pathologies occur when there is a loss of ecological resilience through stabilisation of key ecological processes for economic and social goals. The loss of ecological resilience tests the adaptive capacity of the human dimensions of the system (Walker *et al.* 2006). Adger (2000a) states a clear link between social and ecological resilience particularly social groups or communities dependent on ecosystems and environmental resources for their livelihoods. However what is not clear is whether the social resilience of groups dependent upon these resources is directly connected to the ecological resilience of the system. An additional dimension is that of resource dependency. This describes the unique relationship between resource users and a particular resource, communities that are predominantly farming, mining and fishing are examples of resource dependent communities (Marshall *et al.* 2007). Gunderson (2000) states that humans are unique within social ecological systems because they are able to create novel approaches to change that can transform the future of the system.

Management contributions from this field relate to the movement away from management institutions based upon reductionist science whose mandate is to “command and control” the ecosystem in question (Holling, 1996). Such institutions manage ecosystems to be as productive as possible and work to maintain them at an optimal equilibrium productive for the economic needs of society. These institutions are ill-equipped to cope with the socially driven ecological changes that society will continue to face into the future because they do not embrace adaptive management and social learning. These latter approaches and skills are considered as “at the heart of sustainable development – the release of human opportunity” (Holling, 1995: 32). Rather, institutions should use adaptive approaches because knowledge of any system will always be incomplete. This is because ecosystems are unpredictable and complex; processes and functions often cross multiple spatial and temporal scales and ecosystems are constantly impacted by management decisions and progressive expansion of the scale of human influences (Holling, 1996). As such, these systems are characterised by social and ecological uncertainty. Policies are regarded as hypotheses and management implementations are regarded as experiments to test these hypotheses. Fundamental to this approach is ongoing learning (Berkes & Turner, 2006; Pahl-Wostl *et al.* 2007). 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, 2000a).

Adger (2000a) and other researchers argue that institutional structures (that include behaviour, rules, norms are governed society as well as formal institutions) are a central component that links social and ecological resilience. This is because institutional structures such as property rights or regional governance agencies create incentives, disincentives and may result in unforeseen outcomes for the sustainable use of natural resources. He argues that social resilience is institutionally determined because it permeates all social systems (Adger, 2000a). Social features important for resilience of social ecological systems identified by researchers include: vision, leadership and trust; enabling legislation; funds to respond to environmental change; capacity to monitor and respond to environmental feedback; information and knowledge through flow through social networks and the: combination of various sources of information and knowledge; and sense making and arenas of collaborative learning (Folke, 2003).

In summary, contributions from this body of literature relate to theoretical notions of linked social-ecological systems; the adaptive cycle and what this means for institution building for social ecological resilience. In particular, the focus is upon institutions and governance systems that practice adaptive management as the best way to manage for resilience within the context of unpredictable complex social ecological systems (Lebel *et al.* 2006; Olsson *et al.* 2007; Ostrom, 2009), and learning (Berkes & Turner, 2006). Certain core social and institutional concepts are recognised in this literature, e.g. culture (e.g. Davidson-Hunt & Berkes, 2003), political discourse (Pritchard & Sanderson, 2002) but the scope still underplays that available in the broad repertoire of the social science disciplines, with selective rather than comprehensive examination of key social science concepts such power, a staple concept in sociology.

Conclusion

Synthesising across these bodies of literature, we consider resilience as an attribute of complex and adaptive systems, involving interactions across nested scales. We recognise resilience as a process rather than an outcome, and not stable. This does not assume however that the panarchy hypothesis of cycles of growth, conservation, destruction and reorganisation, inspired by observation of natural ecosystems (Walker *et al.* 2006), necessarily fits all social-ecological systems, or their social dimensions. We expect that relevant social attributes of resilience will differ between scales: some may be specific to one scale but others (such as leadership) may apply across several scales. This suggests one should recognise the nesting of social-ecological scales more explicitly in designing policy interventions, helping to shape the 'source' scale for a policy intervention as much as the 'subject' scale.

Resilience theory and the practice it informs has been closely associated with extreme events and disturbances, both for social-ecological systems, and the impacts on individuals. We suggest that resilience theory has a broader potential, of great value to the Great Barrier Reef and Wet Tropics regions. It can be highly proactive, focusing on building a society's and individuals' strengths to manage its social-ecological systems in the face of climate change and other forms of global change, but also for general benefits. The attributes of building strengths, thriving and innovation suggested in resilience thinking are worth fostering irrespective of the occurrence of disasters.

Case Studies

The case studies provide the vital, intensive primary research to identify attributes of social resilience that pertain in Far North Queensland, and to derive indicators. The case studies were chosen with our regional partners, to represent change processes and coping or resilience to those changes over the past two decades. All were at sub-regional scales, chosen to encompass the Atherton Tablelands, Wet Tropics and Great Dividing Range escarpment, coastal plain and marine area. The case studies focused on two catchments, the Barron and Johnstone catchments (Figure 7).

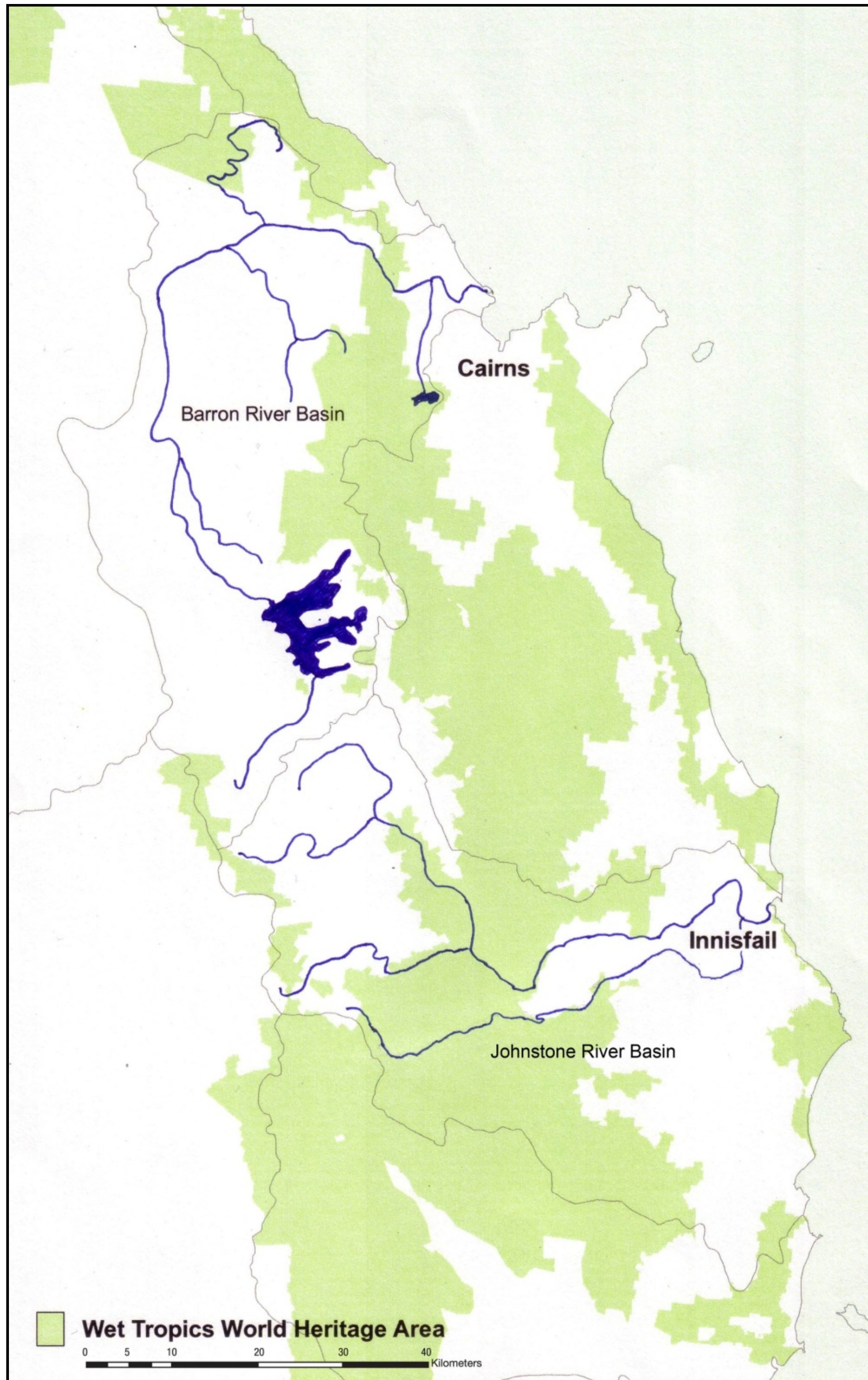

Figure 7. Map of the Barron and Johnstone River catchments.

The case studies were:

- Dairy deregulation on the Atherton Tablelands (upper reaches of Johnstone River);
- Water allocation process in the upper zone of the Barron River;
- Declaration of the Wet Tropics World Heritage Area (impacts on communities in the Ravenshoe area);
- Rapid urban expansion in the Cairns coastal zone;
- The third Crown of Thorns starfish outbreak (marine case study, near shore area off Cairns); and
- The institutional role of Girringun Aboriginal Corporation in enhancing social resilience.

Each case study commenced with a stakeholder analysis, assisted by the relevant regional partners. One or more individuals considered to be excellent key informants for each stakeholder group were suggested by the regional partners, and contacted. Some key informants were asked for further contacts, to extend the range of those interviewed. A total of 71 individuals were interviewed, using semi-structured in-depth interviews. These took between thirty minutes to 1½ hours, with one interview taking two hours. All interviews were tape-recorded, with permission, and transcribed for content analysis. The procedures followed the ethical standards of The University of Queensland, including voluntary participation, privacy and confidentiality, and rights to withdraw during the process should any participant so choose. Details on the number of participants in each case study, and the stakeholder groups they were chosen to represent, are included in the introduction to each case study.

Following introductions, the University's ethics procedure and an opportunity to ask questions, participants were asked a series of questions about:

- The area of interest, its important features, and their industry or organisation's (or their own) interest in it, and why. Participants were invited to draw sketch maps or diagrams if they wished;
- What happened during the change period that was the focus of the case study (with opportunity to draw a timeline); focusing on their own sector, then the wider community;
- What helped their industry, organisation or group to 'get through the change period', and anything that was unhelpful during this time;
- What 'skills' they thought the community would need to be proactive in the face of change into the future; and
- Given their knowledge of the region, what further kinds of changes they predicted.

The content analysis process focused on:

(a) Participants' general accounts of the change process;
(b) Recurrent themes that reflected attributes and processes that participants identified as having helped the people of their area to manage the change process; and
(c) Future changes predicted by participants, and attributes or processes the participants believed would assist them with future changes.

The following sections give background on each case study, then report the resilience themes identified by the participants. Since the themes were identified case by case, the headings are slightly different in each chapter.

Dairy Deregulation

Introduction

This case study explores how the national restructure of the dairy industry in 2000 affected those living in the Atherton Tablelands, and how they adjusted. It focuses particularly on an area near the upper reaches of the North and South Johnstone Rivers. This focus was chosen by the regional partners for a variety of reasons. Dairy farms are an integral part of the region and they have dominated the upper reaches of the Johnstone Rivers since 1913. With forestry, dairying was responsible for initial land clearing in the region, and has continued to drive alterations to the social-ecological system.

The eight year time lapse since deregulation allowed interviewees to reflect upon the ways the period of intense change affected the region, the industry and themselves, and how they coped during this period. Before deregulation, the Atherton Tablelands dairy industry was considered technologically progressive and financially stable, and it facilitated much income generation in the region. It was anticipated that the majority of the population from the area would have been influenced in some way by deregulation. Water and water quality are pertinent issues for those involved with the dairy industry. Many farmers describe the North and South Johnstone (and the Barron) Rivers and tributaries as 'lifelines' as water is essential for the successful running of a dairy enterprise. These rivers connect those who live and manage land on the Atherton Tablelands with the rest of the catchment and the Great Barrier Reef.

Since deregulation individuals engaged in the dairy industry have also faced the introduction of the Goods and Services Tax (GST) in 2001, a drought that began in 2005, and Tropical Cyclone *Larry* in March 2006. Although the dairy industry remains one of the most significant industries in this part of the Tablelands, and has experienced major changes before, it has been severely impacted by deregulation. The case study illustrates the interdependencies between community, industry, local enterprise, environmental sustainability and regional identity. It shows how individuals and communities from the region coped with the large drop in income that resulted from deregulation. The analysis sheds light on the strengths of the dairy community as well as the important connection between people, the land and water they manage and the wider community. Business knowledge, community networks and enterprise innovation are discussed as key attributes of social resilience in this part of the project region.

Interviewees

Fifteen individuals from the Upper Johnstone Rivers catchment area were interviewed for this case study, including current and previous dairy and potato farmers, dairy processors, community liaison officers, individuals involved with community groups including the Chamber of Commerce and local landcare groups, and Traditional Owners from the region. In the first instance, interviewees were identified by the regional partners through a stakeholder analysis. Further interviewees were suggested by case study participants.

Context

The Atherton Tablelands dairy industry was established in the 1880s. It extended to Millaa Millaa after 1910 when the area was opened to selectors (Hanley, 2006). The *Queensland Lands Act 1897* stipulated that the selectors had to clear their land for cropping or grazing within a specified period. This resulted in extensive clearing of the forests (WTMA, 1996). Small settlements grew at Millaa Millaa and Yungaburra. The Cairns railway, which reached

Atherton in 1903, the North Johnstone River lands after 1907 (Johnston, 1988) and Millaa Millaa in 1921 (Frawley, 2000) proved a catalyst in the development of the tableland: bringing in new settlers and providing safe and reliable carriage for produce from farms and dairies. The region was made further accessible with the opening of the Gillies Highway in 1925.

Successful dairying in the northern part of the Tablelands was encouraged with the introduction of paspalum grass from the Richmond River district of New South Wales. By 1913 the area sown under pasture exceeded for the first time the maize acreage and the dairy industry became established (Frawley, 2000). The Golden Grove butter factory was built in Atherton in 1909; the Malanda branch was opened in 1919 (Hanley, 2006). Farmers from Millaa Millaa opened the Millaa Millaa Central Tablelands Cooperative Butter Association in 1929 (Hanley, 2006).

The rainforest environment inhibited the dairy and forest industries in the early years. The slowness of horse-drawn transport through forest trails, often boggy, limited the extent of logging possible and access to dairy markets. The early dairy industry thus relied on cheese rather than fresh milk products. The extension of railway into the case study region in 1921 changed the system markedly. Improved transport opened access to more distant markets for dairy, including Cairns. Further major changes occurred with World War II.

The rainforest around Millaa Millaa provided an ideal training ground for troops on their way to fight in New Guinea during World War II. During the war period the Atherton Tablelands thus had a major military presence, with 80,000 troops camped there at one stage (Cook, 2007). In the 1944 peak period over 3,000 gallons of milk were processed daily. The milk was delivered to the supply depot at Atherton. During this time no butter was produced (Hanley, 2006). The end of the war brought drastic changes to the Atherton tablelands dairy industry as demand from the defence forces dwindled, but demand for whole milk from the civilian population increased. By 1970 pasteurised milk from the Atherton Tablelands travelled as far as Darwin in the Northern Territory giving it the title of "the longest milk run in the world" (Hanley, 2006). Malanda Milk was set up as a farmer's cooperative, absorbed into another cooperative, Dairy Farmers, in the late 1990s, and taken over by the Japanese owned company National Food in late 2008.

Between the early 1960s and present times there was a decline in the number of dairy farmers in the region. For example, the number of farmers in the Millaa Millaa region fell from 164 in 1939 to 58 in 1973. This decrease in farmers was offset by increased production from pasture improvement facilitated by the Queensland Government's pasture subsidy scheme in 1966. Improved production also resulted from the increased use of artificial insemination from 1958 as well as the growing dominance of Friesian cattle (Hanley, 2006). Prior to deregulation there were 186 dairy farmers on the Atherton Tablelands. Eighty dairy farms remained at the time of study, in 2008.

Deregulation

Deregulation facilitated a transition from the dairy industry being regionally based, supplying local markets and local consumers, to being nationally based with an increasing export focus. Prior to July 2000, State and Federal governments used various schemes to regulate domestic market prices for fresh milk (Equalisation, 1934 to 1985; The Kerin/Crean Plans 1986 to 1995; The Domestic Market Support Scheme 1995 to 2000, see Dairy Australia, 2008). Products from the dairy industry were divided into two sectors: the regulated fresh milk sector was the responsibility of state governments; and the non-regulated manufactured milk sector was supported by the federal government (ABS, 2004). The Victorian, Tasmanian and to a lesser extent South Australian industries export a significant amount of their milk production as manufactured products. In contrast the industries in New South Wales, Queensland and Western Australia are focused on drinking milk and fresh products for the

domestic market (Dairy Australia, 2008). The fresh milk sector received a substantially higher farm gate price than the average price paid for the manufactured milk sector (ABS, 2004). The manufactured milk sector was characterised by open markets access with products being treated within and between states. The fresh milk sector was regulated and administered by state marketing authorities such as the Queensland Dairy Organisation. State government legislation regulated interstate access to state markets (ABS, 2004).

In the early 1990s the Keating Labor Government introduced the National Competition Policy (NCP). This was designed to remove government regulations on commodity prices and market access wherever it was shown that this removal was in the 'public interest' (Anderson, 2004). The argument was that unregulated markets will be fair to competitors and will result in cheaper commodities for consumers. The Australian Dairy Industry Council approached the Federal Government in 1999 with a plan for a national approach to the deregulation of the drinking milk sector and the end of the manufactured milk price support. Later that year the Federal government announced the Dairy Structural Adjustment Program (DSAP) (Dairy Australia, 2008). This program included the allocation of $1.63 billion in payments over eight years for eligible dairy producers, to assist farmers to cope with abrupt losses of income. These funds were raised via a Dairy Adjustment Levy of $11 per litre on retail sales of drinking milk (Dairy Adjustment Authority, 2006).

The following analysis provides insights into the perceived impacts of deregulation and how the case study interviewees coped with the sudden drop of income to the region that resulted. These changes and coping strategies are considered in the context of the cumulative effects arising from the further effects of the introduction of the GST, a drought beginning in 2005 and Tropical Cyclone *Larry* in 2006.

Analysis

Participants' perspectives on the change period

The following section gives an overview of the wider regional impacts that resulted from the deregulation of the dairy industry in 2000, as identified by the case study participants. They touch upon social, economic and environmental impacts as well as the loss of what is described by interviewees as some of the essential assets of the dairy industry.

Deregulation facilitated the departure of 103 dairy farmers from the industry (at the time of deregulation there were 183 dairy farmers, in 2008 there were 80 dairy farmers). These farmers either chose to leave because they could afford to leave the industry or they had no other option. Some farmers refute the idea that the restructure of an industry will force less competitive small operators out and encourage more competitive large operators to remain and become larger. One interviewee explains:

> "The businessmen amongst us in the first three years (and maybe stretching it to four) of deregulation just looked at [the] numbers and said 'No, this isn't any good, see you later'. Whereas everyone said the small farmers would leave and it was never ever going to be the small boys it was always going to be the bigger boys that are carrying more debt, employing labour, high overheads; it was always those blokes that were going to be cash strapped and always those blokes that were going to leave." (Dairy 11)

A loss of farmers equates to a loss of a certain percentage of the essential assets of the dairy industry. These assets include farming expertise, local knowledge, passion as well as many hundreds of high producing dairy cows and dairy infrastructure. Farmers discuss how

the loss of assets will have a severe impact on the milk supplies for Queensland. A farming couple explains:

> "Queensland needs more milk and North Queensland has been identified as the only area that is green enough and wet enough for the extra production so we've been told that we need to bring that production right back and possibly more than what we were doing eight years ago. [...but] land has been sold off and it's gone into beef or lifestyle people. [...] assets have gone out of the dairy industry. People with expertise and their passion has gone out the industry; the cows have gone out of the industry and [...it will take] another ten years to get back up [...] It's no good saying, 'Oh yeah, we'll set up a 10,000 cow dairy' [because] where are you going to get the cows from? They're not here and they're not in Victoria; they're nowhere." (Dairy 6)

Most dairy farmers suffered a severe loss of income following deregulation; however farm maintenance and running costs remained the same or increased due to inflation and other market forces. As a result farm maintenance suffered, farmers had to push the environment harder to be able to make a profit and some farmers chose to cut back on their use of artificial insemination. One farmer explains:

> "The Artificial Insemination Board fell away and a lot of people used beef. The ramification of that is that now milk prices have picked up, there is a shortage of heifers." (Dairy 2).

Many of the former dairy properties were bought by wealthy business people who used the land to farm beef cattle. Some smaller blocks were bought by newcomers who came to the region for improved lifestyle. Case study participants do not begrudge these newcomers but they do comment on their lack of investment in the local community. One interviewee expressed that:

> "There's a house across here and I've got no idea who owns it now. [...You] go into town to the pub now and there might be twenty people in the pub and you'll know three or four of them (Dairy 11). Another person comments that typically beef farmers do not invest in the local community in the same way that dairy farmers do most probably because many beef farmers don't even live on their farms." (Dairy 10)

Deregulation also had social impacts. The decrease in availability of full-time employment resulted in a relatively high turnover of people through the local communities. This was noticed in the local schools with an increase in the number of children coming and going at different times of the school year. Individuals commented that this must be unsettling for the young scholars and for the children who remain. A noticeable drop in income also put strain on marriages which in turn would have had an impact on children. The words of one interviewee highlight the personal emotional toll deregulation had on farmers:

> "I think they became negative real quick. I wasn't game to go to a Dairy Farmer's meeting because the couple of times I went I came out that worried and ... questioned, 'Am I doing the wrong thing here?'. In your heart you knew you weren't. Nothing agricultural stays up forever; nothing agricultural stays down forever. Everything is a cycle. I decided I'd stay away from those meetings. Now, other farmers who attended the meetings and mixed with a bunch of farmers who were all negative, they'd come home and quickly dump everything." (Dairy 6)

Much was said about the economic impacts of deregulation. Many interviewees spoke about the chain of spending beyond the farm gate and the multiplier effect of the dairy industry dollar. One interviewee explains:

> "There's a multiplier effect that we work on with the dairy industry. It's quite significant, for every dollar that's earned on-farm there's a massive multiple about how it rolls out across the wider community. [For example] there's 100 employees over in the milk factory, so there's 100 families; there are cartage contractors that pick up milk on-farm; there are cartage contractors that take product away; there are local vendors and franchise owners; there are depots down in Cairns and everything associated with that. Milk is going out to Darwin and down to Mackay so it's significant." (Dairy 8)

During the height of deregulation there was uncertainty about local markets and many local businesses chose to shut or to diversify their core business away from dairy. One interviewee explains:

> "… because a lot of [local people] weren't employed they would have to go with the cheapest milk possible, and I don't blame them for that." (Dairy1)

Deregulation and the following drought also forced many dairy farmers to cut into their financial savings, which meant that when Tropical Cyclone *Larry* passed over North Queensland, many people were without financial reserves. At the same time many young people decided to leave the region due to lack of employment opportunities. At a time when the dairy industry had to cut back on labour, the mining industry was attracting labour. It is now difficult for the younger generation to get into the dairy industry because of the increased price of land, the costs of setting up the dairy and purchasing the herd.

Some individuals highlighted the unexpected spin-offs of deregulation. For example, some people started to develop a better understanding of the capacity of the individual to cope in such situations. Workshops were held in the community by a local psychologist who facilitated an understanding about the various stages of grief and a variety of coping strategies. A response group based itself at the Dairy Farmers Co-operative offices: this network provided a 'go to' location to assist people in need. A joint initiative between the Federal Government's Sustainable Regions Program, Dairy Farmers, the Department of Primary Industries (DPI) and Dairy Australia was developed. The $10 million project, called 'Grow Malanda', engaged the community, worked to improve farmer morale and returned the focus of farmers to the act of farming.

New employment opportunities were sought by the local council and a new retirement village was opened outside Malanda. Many individuals stated that they would not have been able to survive without the dairy adjustment package funding from the government. One individual proclaimed that he was able to set up a new dairy factory because of this money.

The resilience themes

This section summarises the main social resilience themes from this case study. Most of these themes reflect the close connection that dairy farmers have with the country they manage. It is very clear that they depend upon all aspects of the natural environment to sustain their livelihoods and way of life. Indeed some describe themselves as stewards of the country that they manage. They speak in particular of their dependence upon water and soil. One farmer is so passionate about the health of the natural environment that he, along with his network, conducts research into improved water and fertiliser efficiency. Another farmer expresses a similar environmental consciousness, lamenting the reality that the loss of income that resulted from deregulation meant that he:

> "Pushed the land harder trying to produce more for the same price […it puts] pressure on everything and on the land as well and on the environment, because you use more fertilizer and you want to run more cows and that's the only way you can do it […] it's probably fair to say that it would impact on the Reef and so on, because if you're grazing the land harder, then there's a little bit more sediment in your run off." (Dairy 5)

Knowledge, technology and education

Knowledge, technology development and education are regarded as essential to the ability of land managers in this region to cope with and adapt to change. Many interviewees stressed the importance of financial knowledge and business skills for successful farm management in times of income instability. Dairy farmers described the difference between 'businessmen farmers' and other farmers. One individual explains that businessman farmers also have good networks and actively seek new knowledge and information:

> "There's a difference between the farmers who are running a business and the businessman who are running a farm. Certain people milk cows because they make money at milking cows, and it's always those people who are at the field days, who attend working bees, who are invited to industry meetings." (Dairy 11)

Many farmers regard environmental management courses as essential to improved management practice. They lack the time to experiment with new management approaches and technology. In the past, government advisers and extension officers provided an invaluable service to farmers, sharing new knowledge and providing leadership. They also encouraged farmer experimentation and disseminated insights that evolved from on-farm experimentation to other farmers in the region. The role of government advisers and officers to promote best practice environmental management was essential to farmers because, as one businessman farmer explains:

> "That bit of help can keep things at a higher level of performance." (Dairy 6)

Many interviewees lamented government cutbacks that have reduced the number of extension officers. One individual who was a dairy extension officer in a previous career condemned the potential closure of the primary industries research stations because it could have ramifications for Australian food production and security. He argues that:

> "Now is the time that agriculture really needs these [research stations]. We've got a situation where there are less people producing the food that more people require with a greater necessity to do it in an environmentally sustainable way and absolutely no resources to help [farmers] to do that!" (Dairy 8)

Farmer experimentation was highlighted as pivotal to facilitating and embracing change into the future. A further impact of decreased government funding for agricultural research is the import of farming techniques and technology from other parts of Australia. A well networked farmer argues that experience shows these practices must be:

> "Tropical proofed [because], you can have a great idea about '*x*', but show me how it's done in the tropics; show me its environmental outcomes in the tropics; show me its economical benefits in the tropics; [its] production benefits in the tropics." (Dairy 9)

Farmer experimentation provides for the development of locally relevant techniques and technology. It also demonstrates that farmers are innovators, who deserve funding to improve their practices and develop locally relevant technology. However, such

experimentation must be closely monitored. For example, one farmer explains how the increased price of fertilizer encourages experimentation. She comments that resultant practices:

> "… need to be carefully assessed and validated otherwise we may end up with more exposed paddocks and worse environmental outcomes." (Dairy 9)

Many interviewees advocated the development of a wider technical and vocational skill base in the region as fundamental for adapting to and embracing change into the future, as it would provide for a stronger regional economic base. In addition, individuals who are multi-skilled have a better chance to find alternative employment if their main source of income is reduced. Raising the wider community's awareness of the actual lived experience and practices of dairy farmers (as opposed to commonly accepted stereotypes) was considered a way forward to protect the Great Barrier Reef from continued run-off. The breakdown of stereotypes such as "the farmers are to blame" and awareness raising that highlights the role of each individual in the use of products that may affect the reef was regarded as important.

In addition to raising awareness, one individual spoke about the need for the industry to educate government. She explains:

> "[Some government agencies are not] aware of the changes in agriculture policy for example we don't do land clearing any more […industry] needs to educate [government agencies] that things have changed." (Dairy 9)

Communication, collaboration, partnerships, networks and leadership

Community support networks were listed as essential during deregulation. Dairy Farmers became a hub for social support processes and interaction, enabling the farmers to put explicit effort into supporting one another. One particular individual was named as a driver of this process. At least one workshop was held to help farmers look after themselves: to recognise the process they were going through and typical responses, and to try specific techniques for looking after themselves. They were offered a personal way to approach change: coaching was given to people to avoid comments such as "Well, it's worse for me" (Dairy 9). This process was conducted with respect and trust. Dairy Farmers during this period was described as a place where:

> "The kettle is always on, people can come in ... People can walk in at the right time and happen to meet a certain person that they need to speak with about a certain thing. [There was] ... an open door policy at Dairy Farmers: maintaining discussion, [to] tell us what's going on. We may not be able to do anything about it, but don't whinge, tell us, as we may [be able to] assist." (Dairy 9)

Much of the interviewees' comments, however, were about the long-term benefits of cross agency and cross industry networks and partnerships, and their relevance in the present. These networks provide excellent opportunities to approach problems in a variety of ways. They also provide the potential to progress with work that has already begun rather than reinventing the wheel. One interviewee commented that it would be beneficial if government agencies approached industry groups with any ideas they had in relation to that particular industry, because more often than not the interest group has already pursued similar ideas. It would be more beneficial for the groups to work together than to work separately on similar projects. In addition there are many champions and local leaders within industry groups and community networks who already have good relationships with the land managers in question. Often, these land managers prefer to work with fellow farmers and familiar industry staff because they understand the importance of appropriate language and appropriate communication. They recognise the importance of emphasising that sustainable practice:

> "[Is] not about just being environmentally aware and sensitive and making sure you're not harming the environment, but also there's money to be made." (Dairy 3)

One interviewee pointed out the important role that these local leaders provide in the wider community. He explains their local landcare facilitator was able to navigate government structures:

> "To access some grants/money and [thus we were] able to get onto these [research] projects." (Dairy 5)

> "The work of the local landcare group is essential because there's nobody else doing any [research] work; we never hear what comes out of the DPI Research Station as far as dairying goes." (Dairy 5)

Partnerships, collaboration, networks, leaderships and appropriate forms of communication were seen as crucial to solving the challenges of natural resource management in the region because they facilitate the sharing of knowledge and in situ experience between the various interest groups. Interviewees from different interest groups (dairy farmers and Traditional Owners) noted that the government needs to spend time to develop genuine and transparent relationships with all natural resource managers and users, in particular, with groups in conflict. For example one interviewee commented that certain government departments persist with the notion that farming practices on the Atherton Tablelands and farmers themselves are detrimental for the Great Barrier Reef. She states that agencies need to stop singling out agriculture without acknowledging the role of other industries, for example mining. She also suggests recognising agriculture as part of the Great Barrier Reef system. By taking the time to build relationships, to create non-threatening situations where "nobody is put in a defensive position […] we can accept a future where we are [all] responsible" (Dairy 9). She advocates communication and dialogue between sectors. This is not easily achievable and it "can only be done in a quiet environment not via the media, it must be done through informal meetings and networks" (Dairy 9). Another interviewee stresses the importance of including the spiritual in relationship building as well as the importance of it in management decisions, evaluation and monitoring.

Economy and infrastructure

The strengthening of the local economy and the development of and access to infrastructure were emphasised as critical to maintaining and building the strengths of the region. In particular, the promotion of diverse enterprises, the maintenance of the economic base and the enhancement of economic opportunities were designated essential. Many interviewees spoke of the value of agriculture and the multiplier effect of the dairy industry on the local economic base. As discussed above, deregulation severely reduced the spending capacity of dairy farmers, which reduced the flow of money within the local economy. One businessman farmer expressed deep concern about the erosion of the local asset base. He explains that:

> "Millions and millions of dollars worth of assets [have left the region], people's expertise; people who are passionate moved out and the dairy herd size is down. It doesn't matter whether it's dairy herd size or beef herd, or sheep herd, once it's down it's a long way to get it back. It just doesn't happen overnight. It's going to be a long haul back." (Dairy 6)

The loss of expertise, local knowledge, passion, infrastructure and good productive stock has had an immeasurable impact upon the local economy. This farmer and others like him hope the government will learn from the experience of deregulation and cushion other industries from suffering in the same way in the future.

Some regarded the encouragement of diverse enterprises as crucial to the maintenance of a strong local economic base in times of change. The ability to adapt with the changing market and to create new employment opportunities in the face of change was highlighted. For example, one individual envisages employment diversification into the future. He hopes:

> "To see more of those knowledge-type workers here – professionals coming here; they've got good IT connections; they've got an international airport which is only an hour and a half away. It's a good lifestyle and there are a lot of people coming here because of that." (Dairy 3)

He also stresses the strength of local branding, local markets and support for and loyalty to local enterprises. Another individual discusses the fact that a percentage of the wider Australian community wants to know where their food has come from and that it has been produced in a sustainable manner. He explains that:

> "The great thing with a niche market is that you are not just producing a commodity such as milk where people choose the product according to price; rather they want to buy a lifestyle, many are concerned with reducing their ecological footprint." (Dairy 10)

The development of and access to infrastructure in relation to the FNQ2031 Regional Plan was discussed. For example one individual highlighted the fact that "the plan talks of locking up agricultural land on the Tablelands, which is OK but there is no talk of water and infrastructure" (Dairy 9). Access to water was considered essential for the future development of dairy on the Atherton Tablelands, particularly in relation to irrigation.

> "Dairying now is moving into a much more hi-tech production system and that involves irrigation in most cases like irrigation of rye grass during the winter months and during the dryer spring months as well up towards December." (Dairy 3)

The role of government and future planning

The important role the government does and can play in ensuring the adaptive capacity of the region has been elucidated in the discussion so far. Individuals and groups from government have been described as potential leaders and knowledge facilitators (in relation to DPI extension offices); as having an important role to play in problem solving for the challenges of regional natural resource management via partnerships, networks and collaboration with industry and community groups; and it has been suggested that government needs to spend more time developing genuine relationships with natural resource managers and users.

Government assistance in the form of funding (including the dairy structural adjustment package), as advisers and as funders of experimental research stations were also acknowledged as crucial to adaptive social, ecological and economic capacity in the region. As mentioned previously, the reduction of government funding into experimentation stations and extension offices was considered a great loss. One individual explains that:

> "It's no good Government just being regulators. They need to be regulators and advisors. The reason why they also need to be advisors is because farmers are so busy working and looking after the animals and so on they need somebody there advising them on all these issues and there's a whole raft of them." (Dairy 6)

Government processes were also highlighted as needing improvement: there was a feeling that they were not inclusive of local and regional issues, and that it was important for politicians to admit their mistakes and learn from them and then improve processes and get it right the next time round. As one farmer articulates:

> "I think that was a big lesson in structural change – you might not be able to stop the change but at least you can get the systems right […and] that's what we have to do as leaders and as Government [is] to make sure whatever intervention we put in place we actually take the time to get it right." (Dairy 9)

Planning for the future was viewed as vital. Local actions must be regarded by all actors as part of the bigger picture and decisions must be made accordingly. Planning for sustainable industry is imperative to maintain food production and food security for all Australians. One farmer believes that "biodynamic farming, organic or sustainable farming is the way of the future" (Dairy 10). He foresees that the price of artificial fertilisers will only continue to increase, consumer markets will begin to demand food that has been produced sustainably and those individuals in the agricultural industry who are prepared to change their practices will benefit from new opportunities into the future. Farmer attrition and the expense of entering the dairy industry on the Atherton Tablelands were highlighted as important issues that need to be addressed. New technology, including robotic dairies, will need to be considered as vital to ensuring a sustainable system into the future.

Water Allocation Process in the Upper Zone of the Barron River

Introduction

The focus of this case study is community participation in and adaptation to water resource planning in the upper zone of the Barron River (upstream from Lake Tinaroo), particularly during the consultation process (DERM, 2009) conducted towards amendment of the original Water Resource Allocation Plan for the Barron River (Queensland Government, 2009). This process was intended to resolve issues from earlier water resource planning processes in the Barron River, which the community had brought to government attention. The case study focuses specifically upon the consultation process in the upper zone of the Barron River, upstream from Lake Tinaroo. This case study was selected by the regional partners because management and allocation of freshwater from tropical rivers is fundamental to the development of the Wet Tropics region. This has clear ramifications for management of the social ecological systems of the Wet Tropics as well as social resilience. It has particular importance given the context of population growth and resultant increased pressure upon natural resources and their management. From the local perspective, the case study explores the adaptation strategies used by people of the area in facing a major change in water availability and administration of their access to water.

Context

The original draft Barron River Water Resource Plan (WRP) was prepared under processes of the *Water Act 2000*, released in December 2001 and approved in December 2002. The draft Resource Operational Plan (ROP), the Water Resource (Barron) Plan 2002, was released in August 2004 and approved in June 2005 (see Queensland's National Water Initiative State Implementation Plan, 2006: 154). The process was subsequently brought under the terms of the National Water Initiative (NWI), agreed by the Council of Australian Governments in 2004 (National Water Commission, 2010), The overall objective of the National Water Initiative is to achieve a nationally compatible market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes (National Water Commission, 2010:1). Under the NWI, governments have made commitments to:

- Prepare water plans with provision for the environment;
- Deal with over-allocated or stressed water systems;
- Introduce registers of water rights and standards for water accounting;
- Expand the trade in water;
- Improve pricing for water storage and delivery; and
- Meet and manage urban water demands.

State and Territory Governments must prepare a NWI Implementation Plan. The Queensland Implementation Plan, approved in January 2006 (see Queensland's National Water Initiative State Implementation Plan, 2006), continues to be administered under the *Queensland Water Act 2000*. Under this Plan, WRP as well as ROP are developed for each designated catchment area. The aim of WRPs is to achieve a sustained balance between human and environmental water needs; while ROPs define the practical day to day business of meeting the WRP objectives (see Queensland Government Department of Natural Resources and Mines, 2005: 2).

Under the WRP, the Barron River is divided into zones for the purpose of water allocation. (The number of zones and their labeling changed between the 2005 and 2009 versions).

The Tableland Irrigators Action group (from the upper zone of the Barron River) was a community group that evolved in response to the proposed water allocations in the first ROP. The group raised issues that challenged the first ROP that led to a new consultation process (DERM, 2009) which resulted in the Water Resource (Barron) Amendment Plan (No. 1) 2009 (Queensland Government, 2009).

The Upper Barron Water Advisory Group, comprising nominated stakeholder representatives (including individuals from the Tableland Irrigators Action group), was formed to facilitate effective communications with the water-using community during draft plan development and to:

- Encourage a sense of ownership among stakeholders for the strategies that would underpin outcomes of the amendment plan;
- Comment on information provided by the department;
- Represent water-user interests;
- Provide feedback on possible management approaches; and
- Comment on programs for water metering and monitoring (DERM, 2009).

Note that at the time of the interviews (February 2009), the water allocation of the upper zone of the Barron River was yet to be finalised. In November 2009 the State Government released the Water Resource (Barron) Amendment Plan (No. 1). 2009 (Queensland Government, 2009) and the Barron Water Resource Amendment Plan – Consultation Report (DERM, 2009). The case study presents the perspectives and stories shared by the case study participants, prior to the release of the Plan and the Consultation Report. It does not include any reflections upon the Water Resource (Barron) Amendment Plan (No. 1) 2009.

Interviewees

Fourteen individuals were interviewed for this case study. The first interviewees were identified from a stakeholder analysis that was conducted with regional partners; others were recommended by the initial interviewees. Interviewees included representatives from the then Queensland Government Department of Natural Resources and Water (now Department of Environment and Resource Management, DERM), Queensland Parks and Wildlife Service, farmers from the Tableland Irrigators Action Group, the Barron River Catchment Management Authority and Terrain NRM Ltd, the local Tablelands Regional Council, Sun Water, Stanwell Barron River Power Station, a local Traditional Owner, and a farming family that was not allocated any water. All interviewees were able to speak about the water allocation process of the upper zone of the Barron River.

Analysis

Background

The upper zone of the Barron River is described by one case study participant (who used to work for a local government funded management authority) as having the highest rainfall in the Barron catchment. She goes on to describe how changes in land use have resulted in a gradual depletion of the water system in the area. She explains how:

> “The red soil up there is very porous so it needs time for [water] to sit there [and] it just gradually goes, it just disappears, it’s quite magic and that is what keeps

> the whole system flowing because it's all spring fed and that feeds the springs for the rest of the year. But because we've taken all the [tree] cover off the top and now we've taken away all the stabilising effects of the little trees on the little gullies and creeks. Gradually, the system just depletes." (Water Allocation 1)

Not surprisingly, all of the case study participants spoke about the importance of water to them, their livelihoods and to the landscape in the upper zone of the Barron River catchment area. For example, many of the farmers who were also members of the Tableland Irrigators Action Group spoke about the fact that they source their house and stock water, and their irrigation waters (where they have a license) from groundwater. One farmer described the location of his property along a creek that feeds into the Barron River and explained how he has "a kilometre and a half of frontage to the creek, which was really handy for irrigation because you could just leave your irrigator around the creek" (Water Allocation 2). He no longer has an irrigation license for the creek because his family rented out their farm for a period of time and the license was taken away due to lack of use. Once his family moved back onto the farm, they had to apply for a bore license for irrigation purposes. Another farmer describes his irrigation license, whereby he uses water from a spring that starts on his property and runs into the Barron River. He explains how the governance system has changed since he first started irrigating his property:

> "I have a bore for the house. Cattle and the house. The rest is out of a little spring that starts on my property and runs into the Barron [River] and I've got a couple of catchments on there with two pumps on there […] I put those in fifty years ago. If you went to put them in now, there'd be rules and regulations – you've got to do this, do that." (Water Allocation 8)

The Social Resilience Themes

Knowledge, skills and innovation

Many case study participants spoke about the importance of knowledge, specific skills and innovation to facilitate adaptation to change. The particular example of the formation of the Tablelands Irrigators Action Group was given. This group developed from a group of farmers who were concerned about the figures given in the Water Resource Plan regarding the sustainability of water usage in the system. They decided to hire their own consultant to consider whether the government argument about water sustainability was correct. Personal donations were collected to hire the best technical advice they could afford. Farmers highlighted the ability to question the government and the knowledge of where to source information as important factors enabling them to embrace the water allocation consultation process in a way that empowered them.

One interviewee spoke about the importance of individuals and the wider community acknowledging that farming is a science. Indeed, future efficiency (in the context of social, environmental and political change) will depend upon the science of farming and local innovation. For example, farmers will need to be more water efficient, and will be confronted with new diseases, pests and weeds. This farmer explains that:

> "Farming has become very much more scientific and I think it's going to continue that way. I see more and more farmers are going to have to take courses in a whole range of things. A lot of the manual skills they [already] have, i.e. welding or mechanics, they tend to just learn on the farm, but I know with things like dealing with water efficiency [and herbicides, pesticides], they're going to have to do courses in that […it's] becoming more and more complex and expensive, if you don't do it right it can cost you a lot of money. I think that one of the biggest

> tragedies is that the Government has done away with the Primary Industries to have extension services […] There's very little agricultural research going on up here. I just don't know how that void is going to be filled." (Water Allocation 2)

Skills were also discussed as important for coping with changes that will happen into the future in the farming industry. Individuals spoke about water trading skills, business knowledge and skills, emotional skills and general survival skills, and knowledge of how to benefit from the land in the context of worst case scenarios. One intervieweee spoke about the new skills farmers learnt from the water allocation consultation process, including "general sustainability skills, […and] maybe a big reality check that the resource [water] is not infinite" (Water Allocation 1).

Water trading skills were highlighted as important for farmers to be able to cope with change into the future. This included the ability to be more water efficient and learning how to trade water with others. One farming family discussed the importance of farm accounting, particularly in the instance of having no water allocation. Another interviewee spoke of the importance of emotional skills and the ability to be able to communicate in an emotionally intelligent way, in enabling individuals and communities to cope with the changes that will come. She states that:

> "The environment is like an emotional bank […] resilience is being able to deal with the emotional grief (of life) and working a way to still find some economic stability, social stability by looking after the environment." (Water Allocation 1).

Other interviewees observe that the farmers, who at first fought the changes in water management, have learnt much from the consultation process itself. One states:

> "I would think they're probably more skilled in departmental processes. [For example, they have developed the skills to] grasp where the department is coming from in that national context and how that applies to the end user through these processes […] and where they have put their views forward on [government] proposals has been really good, because without their input [the department...] wouldn't get the best outcomes for how we manage this catchment and into the future." (Water Allocation 9)

A government employee raises the question about how the wider Tablelands community is going to cope with the peaks and troughs of climate change. He suggests:

> "The difficulty […will be] dealing with those peaks and troughs – floods cause impact and damage, etc., but dry periods are probably worse and actually probably more damaging it's just that they're a bit more insidious – they creep along and it's not until things get really bad that people start to realise that hey, this is what's now going on. By the time you've got to that point of realisation if you're not in a sustainable position, then you can quickly find yourself in a very difficult set of circumstances and if have to put up with them for many more years to come, then it's very damaging. I think the resilience is somehow trying to build in a buffer and perhaps that's where dams if they have to exist have their place, because they do provide a level of buffer." (Water Allocation 5)

Innovation is perhaps the key. One individual spoke about the important role that change can have in fostering innovative. She explains:

> "Farmers are people who need a challenge and if the challenge can be one that excites them a bit, and by exciting I mean if they can see a way to do something

> better, and they really are quick to catch on. If they see a better way of doing it, or a cheaper way they are often the first ones to learn." (Water Allocation 1)

She adds that she believes the future of water management and allocation will bring waves of innovation into farming practices on the Tablelands. She explains that:

> "You will always get innovative people, you'll have people working around [a reduced water allocation…] by using different methods like organics and permaculture. There's a lot of technology that isn't fully utilised, hardly utilised at all. So, you'll get those people who will come in and they've come from a different philosophy. It might not be the farmers, who are there now, but a lot of them are getting older and they'll be selling farms, but you can get the wave on innovators coming and that's just the process that happens." (Water Allocation 1)

Interviewees spoke about the importance of genuine and engaged governance in relation to planning for the future. Local leadership was raised by many as integral to community engagement. One individual in particular who had the knowledge and skills regarding how to engage with government processes "was very instrumental in leading the group through to get a proper outcome, a fair and equitable outcome" (Water Allocation 1).

Engaged governance

One interviewee describes the process whereby the Water Advisory Group for the upper zone of the Barron River was set up:

> "They were bringing in a plan and they wanted to transfer area-based licenses to megalitres […] So, we formed an association and they got about 70-80 signatures and got a couple of guys to see if they could get a deputation to the Minister. They sent these signatures down and with that amount it made them sit up and take a bit of notice. So, a couple of guys got a deputation with the Minister and they said, 'We'll give you twenty minutes' and they said 'Not a problem, we'll be there'. So, they were there and I think they got an hour and a half. About a fortnight after that, the Minister came up to open something so they rang these fellows up and said 'Look, the Minister will be up here and he'll have a couple of hours between finishing that and going back to the plane, can you meet with him?' They said, 'Not a problem'. So, they took him around and showed him some of the things they were talking about. Then the Minister said, 'You form a group and you are to meet monthly with the Water Resources to iron this thing out'." (Water Allocation 8)

This grass-roots level of engagement facilitated the formation of the Water Advisory Group, a forum for discussion between representative farmers and government representatives regarding water allocation of the upper zone of the Barron River. As this interviewee states, this process provided important learning for all involved in relation to the negotiation process – it can be difficult and it does take time.

> "[The water allocation process has] really raised all levels of understanding. [For example, at] the earliest meetings the farmers stood up and shook their fists and [said] they would not be changing and the Government wasn't going to make them do this, […] but I would imagine that there's been a lot of illumination in the meantime and that's how it comes. You just have to work through the process. But what happens, though, is the Government wants to make the process happen very quickly. They think there'll be a three-year timeframe, whereas this it's been going for a while – five years, 2003 to 2008 – and it's still not done; still talking about things. They do know that they now have a system in place where they can reasonably negotiate and that's good." (Water Allocation 1)

This farmer representative explained how it is essential to have the right government people at the negotiation table, including individuals with decision-making powers and good communication skills. Engaged governance involves open dialogue, trust and respect. This will often develop during a process.

> "The process was conducted in very amenable terms. The farmers were all very cooperative and had a real interest in trying to resolve things. The [departmental] people were gentlemen. There was one [departmental] officer who had a happy knack of being able to upset plans; he was involved throughout the process. The Department had a lady who managed the model of the process and she did quite a good job I think. From my point of view she managed that process well. Part of the problem was that the people from the Department were not really the decision makers, so quite often you got to [the] situation [where they said,] 'Well, we'll take that away and put it higher up in the Department and let you know later about it', and because you weren't able to get answers from the people who had the authority to get the reply, it [hindered] the process a bit. I felt the Department was rigid to start with. They were convinced that they were right and noone could prevail, but as time went by they accepted that farmers weren't all just country hicks who didn't know what they were doing. Over time there was a reasonable amount of mutual respect and the fact that we'd get resolution on most of the issues shows that the process went all right." (Water Allocation 2)

This interviewee also points out that it is important to have the right farmers at the table, because some individuals can be focused upon their farm, rather than the region as a whole. "From the farmers' point of view – we've got a lot of variation in farmers. Some of the farmers were a bit limited in their scope and vision, but the fact we had a committee of nine [helped to] overcome any one person's moans, if you like" (Water Allocation 2). He also describes the importance of the meeting location to facilitate discussion. He tells how farmers who are reticent to speak when seated around a table "will not stop talking once in their own paddock" (Water Allocation 2).

Some interviewees who were not allocated water for their land spoke passionately about the importance of governments consulting with the community: "[The government needs to] make sure that everyone who is affected is involved [in the consultation process]. Let's begin from the beginning" (Water Allocation 3).

Planning

The planning process and the development of a water management plan were advocated by government and some community representatives as essential for coping with changes into the future. The plan itself is described as innovative in the fact that it is "probably the first plan to tackle the dam water issues in this State" (Water Allocation 9). One interviewee reinforced the importance of planning for the future particularly in the context of population growth. She explained:

> "[They need to] look ahead. They've got to stop and think that the people here now have families. Those kids are going to grow up whether they leave here or not, but they will marry and they will have children, so that's where the population will grow as well. And if they're letting other people come into the area to live, it's going to double [or] treble." (Water Allocation 6)

In relation to water management in general, one interviewee points out the need for adaptive planning and management as better understanding and new knowledge evolves. He states, "change may possibly come with better understanding and better scientific knowledge on environmental flows and aquatic ecology" (Water Allocation 7). An interesting aspect of the

water allocation process is the separation of the Barron River into different management zones. This interviewee explains that into the future:

> "The community groups will need to look at the river as a whole – currently, it's cut up into an upper zone, middle zone and lower zone – I don't think that really promotes looking at the benefit of the river as a whole because it compartmentalises those things – the lower zone is only interested in the lower zone stuff and those upper/middle zone people are doing all this for us and it causes us these headaches [for example in relation to the management of] weeds." (Water Allocation 7)

The importance of thinking of and managing for the system as a whole is echoed by a community interviewee who stated that the planning process has taught farmers "general sustainability skills. To consider all things; to consider themselves as living within the environment that they live and within their community […and] maybe a big reality check that the resource is not infinite" (Water Allocation 1).

Networks and partnerships

Networks and partnerships were identified by interviewees as important to their coping with the changes brought about by the water allocation process. For example, members of the Water Advisory Group were able to draw on farming networks to raise funds to employ a consultant to investigate the government's calculation of water availability in the upper zone of the Barron River. They also used their networks to source the consultant. Individuals also spoke about the importance of their developing networks with government. This interviewee explains the importance of farming networks, being able to source knowledge and forming new networks with government:

> "When they brought out the Water Resource Plan and I got involved we had a meeting of a lot of farmers and we formed an organisation called Tableland Irrigators. Tableland Irrigators decided we'd better hire some consultants of our own to give us some idea about this government argument about this level of sustainability; get some water experts on board. There was a bit of a collection taken up and we hired at the time the best available technical expertise we could get. They put in a report which virtually said 'yes, there is more water available' and we sent that to the Minister and I went down with another chap and got an interview with the Minister at the time." (Water Allocation 2)

Within the context of biophysical and social change, a government employee discussed the importance of partnerships to inform current management decisions and decision-making into the future. He commented:

> "What we probably need to understand is nature's ability to adapt or react to that level of change, and it's something we ultimately look to the scientific/research community or work with them in partnership because in effect what we're trying to do is manage a landscape for what it is now, to carry that forward. If, in fact, the landscape is going to change as a consequence of the climatic condition it is subject to and the impacts that creates, then it raises a whole series of questions of what do we manage for now to maximise that integrity into the future and that creates a whole host of questions." (Water Allocation 5)

Economy

Some interviewees highlighted a diverse and innovative economic base as central to the community being able to cope with changes that population growth and climate change will bring into the future. This interviewee articulates his belief in the connection between diversity, adaptability and resilience:

> "From a community [perspective] it's probably about having a level of diversity to cope; having all of your eggs in one basket and finding 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. In other words, if you set up a company now that's not going to yield a result for twenty years because it takes that long to actually grow your product, then I think you're in a high risk area. If you build a product that's going to yield a return in five years' time, then there's a level of greater resilience in that and it means that if in five years' time you're not really making a big profit, then switching to something else is not such a difficult thing to do." (Water Allocation 5)

Further, he believes that the Tablelands economy:

> "reflects that ability; they are adaptable and they are diversified […] not only is the landscape conducive to that level of adaptability that it can grow a lot of different things and can produce a lot of different types of products, but also the people who are utilising that land have been able to do that and they're not hooked into a single type of crop or a very narrow suite of crops or agricultural produce. They can adapt and have done. So, in that regard, they are probably very well positioned." (Water Allocation 5)

Another interviewee discusses the potential of doing things differently, of having a focus upon the community and the local economy. She believes the slow food movement makes sense. Given the current economic situation, she believes:

> "The community is getting back to a more community-based situation and it's hard to think of going back, but […] it's not the end of the world, it's just [that] you do it differently. We'll learn to do things differently and that's not a bad thing." (Water Allocation 1)

People-place relationships

All interviewees spoke of the importance of social-ecological connections in the Tablelands landscape to their livelihoods and lifestyle. Individuals spoke about the new housing development, the history of the Tinaroo dam, their love of the Barron River, and their reliance upon ground and surface water. One Aboriginal participant described the special healing properties of the clean waters of the Barron River. She explains:

> "That has always been claimed as our river, the Barron River. Our people lived along the river; they hunted and gathered from the river. To them, they believed in clean water because water to them is used in many areas. For health, drinking, but it also has significant purposes as healing and that's why their water has always got to be clean. Not like it is now. When I was a young kid we could drink from the river. You could see the sand on the bottom and the water was clean." (Water Allocation 6)

Her words elucidate the strong connection she has to the river, and how access to the river has changed over time:

> "Everything was there for a purpose – to shade the water (there are fish there), to keep the water cool – and also for food for the fish and it helped keep the banks strong. Without the trees when you get flooding it's just…it'll still wash through the trees but there's more support. Without the trees the water just takes all the banks away […] The Barron used to be full of our people fishing week in and week out. You rarely see people there now. Of course, there are all these restrictions from farmers – they fence off the properties and you can't get through to where we used to go. We always used the Barron River, that was our hunting place. Now, what they've put into the Barron and the dam, there's only the eel, the turtle, the catfish (the dew fish we call it) and shrimps and small fish. Now we've got barramundi, sooty grunters, keridge, mouth almighties – we call them big dog – all sorts of different fish in there." (Water Allocation 6)

Interviewees detailed a variety of issues that have resulted from the water allocation process or that will occur into the future with the prospect of climate change. This case study participant believes that farmers have developed an understanding of water as a commodity, not to be taken for granted as it was in the past:

> "That's a good outcome from the environmental and land management perspective and hopefully that translates to people using [water] wisely … I think there are those people who would still prefer that it be an 'as of right' take, but I think those with business savvy would understand that […] this is the way of the future and they need to adapt to that. They have to buy the fertilisers, the fuel to run the tractors, so why not buy the stuff that actually causes the plants to grow, to feed and water the stock, to clean the dairy sheds down, and so on?" (Water Allocation 5)

Case study participants discussed how access to water not only increases opportunity but also:

> "… creates surety for opportunity. There are plenty of times in the year when people grow so-called dryland crops that aren't virtually reliant on water because there's enough falls from the sky, etc., so their crops can survive quite happily without some additional application of water. But if it doesn't rain and you need to supplement, then you can incur a big loss." (Water Allocation 5)

A farmer predicts that water will become increasingly important, in particular for irrigation, as the demand for agricultural production increases. This will facilitate water efficient practices and trading. He explains:

> "Irrigation is really important up here. I see agricultural production from the Tableland will increase – people say it's pretty productive now. It really is one of the very fertile parts of Australia and it certainly has got potential to be too small when it is producing. I think things like markets and all those sorts of things have got a bit of a hold at the moment and if it is going to produce more, water is certainly going to be a factor. When water trading comes in, I think you'll see water fairly actively traded up here and it will be traded mostly on a seasonal basis, like leased rather than permanently selling it. I see where there is irrigation those farmers are going to be more prosperous than the ones that haven't got irrigation." (Water Allocation 2)

He goes on to argue that the practices of past governments that failed to regulate water use, followed by the moratorium on surface water and ground water allocation in 1996 and 2002 respectively, will have substantial impacts upon farmers who do not have any allocation:

> "The problem that occurred is that, the [governance] system had been so slack prior to [the advent of the Water Resource Plan in 2002] … As a forester (working with the Government) I know about allocation of resources and sustainable takes – it always used to amaze me how, with water, no one seemed worried.
>
> If you talk to enough people up here you'll hear any number of people say, 'I did speak to them down there in Mareeba about getting an increase in my water license but they said, 'Oh don't worry, we don't check these things, as long as you've got a license that's OK''. I can't say that happened to me, but a large number of people have said that to me. They were virtually encouraged by the government laxity […] as long as they had a license they'd just go ahead and pump. No one actually knew how much they were pumping. If you [asked any farmer] how much water is in a megalitre, they wouldn't have known and noone cared, because the government didn't care.
>
> Then all of a sudden there was a rapid turnaround and without any notification of their impending moratorium, the government just said, 'OK, no more water licenses' […] The part that I found [to be] particularly bad management by the Government was the rapid change without opportunity for people to get their house in order in terms of what their license actually was. All of a sudden we've got people who have fairly nominal small allocations who had traditionally [been] pumping heaps, and all of sudden finding out they didn't have anywhere near enough water. That was a real issue." (Water Allocation 6)

Case study participants who do not have a water allocation discussed the impacts of not having access to irrigation water. These interviewees reiterated what has been said already; they believe that all future options for farming are connected to water access or lack thereof. One farmer explains his situation:

> "The way things are going now with economics, and so on, just relying on the crops we used to do is just not enough. We've got to put other crops in the ground – potatoes, wheat, corn, but you've got to have the water. If you've got no water you can't." (Water Allocation 3)

The provision for water trading enables the purchasing of water from farmers who have allocation that they are happy to sell permanently or to lease temporarily. The same farmer explains what he believes represents unfair advantage: "The [farms] that were allocated [water] free of charge […] can just sell it to people who haven't got enough" (Water Allocation 3).

Within this context there are evolving notions of water ownership and price, as well as questions regarding who sets the price. One farmer who has been allocated water for his property believes there will soon be a charge on water (for those with allocations). His words suggest that he is quite philosophical about this evolving notion of who owns the water:

> "My belief is [the government] will put some charge on water [as they will need to employ people to read meters]. That's my thinking. One chap said, 'You're going to have to pay for water that comes out of the sky eventually', and I said 'well, be careful […] if you send us too much and it does damage we'll sue you – it's your water!" (Water Allocation 8)

In relation to climate change, some individuals speak about the building of social ecological resilience. One individual believes the Tablelands represent a resilient landscape, one where both the people and the land reflect the ability to be able to adapt to change. He also believes that climate change will be characterised by peaks and troughs. In relation to managing for resilience in times of change, he suggests that:

> "The difficulty for [government managers] and probably the community as well is dealing with those peaks and troughs – floods cause impact and damage, but dry periods are probably worse and actually probably more damaging. It's just that they're a bit more insidious […] if you're not in a sustainable position, then you can quickly find yourself in a very difficult set of circumstances and if have to put up with them for many more years to come, then it's very damaging. I think the resilience is somehow trying to build in a buffer and perhaps that's where dams if they have to exist have their place, because they do provide a level of buffer." (Water Allocation 5)

Wet Tropics World Heritage Area

Introduction

Background

This case study investigates how the community in and around Ravenshoe – an area particularly dependent upon the timber industry for livelihoods – responded to the declaration of the Wet Tropics World Heritage Area in 1988. This case study was chosen by the regional partners because the Area is iconic to the region and represents a multi layered and important social-ecological system.

Interviewees reflected on changes in the region and their communities since the declaration of the World Heritage Area over twenty years ago, and how they had coped with the changes.

Those interviewed still feel very passionate about the declaration, from both sides of the argument. In retrospect, most individuals stated that the existence of the Wet Tropics World Heritage Area is a good thing, but the political battle leading up to the declaration, the transition period and the resulting community upheaval could have been handled in much better ways. This case study provides learning as to how government processes such as structural adjustment and compensation could be better designed and managed, and how a community such as Ravenshoe could have benefited from better preparation for change, transition and visioning for the future. It is essential that regional managers understand these dynamics, the history of passion and local leadership and are able to draw upon resulting insights to inform management decisions into the future. This is a particularly timely case study given the advent of discussions surrounding the potential listing of Cape York as a World Heritage Area.

Prior to 1988 the Wet Tropics region was closely connected to forestry. Subsequently conservation and tourism became the focus for this part of the region. The Wet Tropics Management Authority (WTMA) was created in 1990 under *Wet Tropics World Heritage Protection and Management Act 1993* to oversee the strategic management of the World Heritage Area for the purposes of conservation, tourism and to facilitate involvement of local Traditional Owners.

This case study was chosen as being of particular interest to the WTMA and its companion World Heritage Area manager, the Great Barrier Reef Marine Park Authority, as well as Terrain NRM Ltd and Girringun Aboriginal Corporation. All of these organisations are working to manage the dynamic, complex and rich social ecological systems of the Wet Tropics region.

Interviewees

Twelve individuals residing in Ravenshoe, Herberton, Atherton and Cairns were interviewed for this case study. Each person was able to reflect upon how the region was impacted by the declaration of Wet Tropics World Heritage Area in 1988. Most individuals focused on the community of Ravenshoe, however they also reflected on the impacts of the declaration on the region as a whole. Participants were individuals involved with the timber industry leading up to, during and immediately after the declaration of the Wet Tropics World Heritage Area. Their involvement with the industry was either directly as foresters, timber cutters, local business owners, Jirrabal Traditional Owners, or indirectly as representatives from different government agencies at the time (including the Wet Tropics Management Authority, the

Cairns and Far North Environment Centre (CAFNEC), the Queensland Forestry Department, and local government). Three participants became involved in the region after the declaration. Although their comments and perspectives are somewhat removed because they were not directly impacted by the declaration, each of these participants was closely involved in encouraging and facilitating the social development of the region after 1988. Thus, they share valuable insights into factors that enabled the community to cope with this change, and what could have been done better.

Analysis

Participants' perspectives on the change process

This section gives an overview of the lead up to the declaration of the Wet Tropics World Heritage Area, and the impacts upon the community and the region, from the perspectives of the case study participants. Some of them were residing in Ravenshoe at the time, and continue to live in that town.

There are a variety of opinions and perspectives on what happened prior to the declaration of the world heritage area. These are related to the sustainability of the timber industry, the government process that resulted in the declaration, the role of the media in the declaration process, the role of the United Nations in assessing the World Heritage application, and the role of local advocacy groups.

Some case study participants explained that the timber industry in Far North Queensland was reaching a point where it would not have been viable as a sustainable industry if it was to continue. They believed it had been a sustainable industry for a number of years, but the Bjelke Petersen Government (1968-1987) allowed large sawmill companies into area. As a former government employee explains:

> "There were sustainable yields in terms of driving the needs of Far North Queensland for many, many years, but then it started becoming a more extractive industry that wasn't sustainable and a lot of the forestry people were starting to at least privately acknowledge that. In a sense, I think, the World Heritage listing thus foreshortened the life of the logging industry; it might have failed in 20-30 years' time anyway under the weight of its own overharvesting." (WTWHA 3)

Another interviewee describes how:

> "The returns from logging were just declining dramatically. A few years before that they were cutting 200,000 cubic metres and by the time they closed it was down to 60,000, and that's a tiny operation for a logging industry, that's minute. They were going into the last untouched areas and taking out the big logs so it was still terribly destructive even though it was so small." (WTWHA 12)

The perspectives from individuals involved at the operational levels in the timber industry are different. A former forestry manager queries how the region was able to be listed for all four natural criteria under the *Convention Concerning the Protection of the World Cultural and Natural Heritage 1972* (the Convention) given the industry was using such unsustainable practices. He emphasises that he is not bitter about the declaration, but angry at inherent contradictions in the listing process that have never been acknowledged. He states:

> "So, here we are after [one hundred] years of selective logging, we've got the 'Nobel Prize of National Parks', the best of the best. There's got to be some

contradictions in there somewhere, whichever side you decide to take, it just doesn't add up, it doesn't make sense. That's more or less where I'm coming from; I'm not bitter about anything, I love the rainforest, I think it's a wonderful place. You don't spend a lifetime around these areas and not have a feel for the place." (WTWHA 11)

Individuals who were directly involved in the timber industry spoke about the declaration process as part of a political game to win the Federal Election[4]. As this person explains:

"Graham Richardson [Federal Environment Minister at the time] was a numbers man for the Labor Party and a very good one at that. He knew where the votes lay in regard to the next election; he knew that idealists in the city, once they were told that the Daintree was at risk of being overrun by the sawmilling industry, that it had to be saved." (WTWHA 11)

This 'race to the election' needs to be contextualised in relation to the tensions between the Queensland Government and Federal Government at the time. After the Federal Government won the election they proceeded with the nomination despite objections from the Queensland Government that it was an infringement of State rights (WTMA 2010). Some case study participants spoke of these tensions. At the time, the Queensland Government was corrupt, and the Premier:

"… made a deliberate attempt to polarise [the debate between the 'Greens' and the 'loggers' … and] it came through a lot of people having a vested interest ... that were being threatened by a change in public policy." (WTWHA 5)

Another interviewee supports this comment and explains:

"[The] governments were generally happy if the issue became polarised, then they didn't have to deal with a well-argued case from the community." (WTWHA 3)

There was also direct conflict within the Queensland Government, which did not want to appear to 'buckle to the green vote', as they argued the Federal Government had. The following interviewee suggests that this approach resulted in government policy and practice that was unsustainable and corrupt:

"The Queensland Government [Bjelke Petersen Government] became quite eager to show the world that unlike the Commonwealth Government they weren't going to buckle under to the 'greenies', and they became more rapacious in their outlook; they did everything possible to blight the [proposed Wet Tropics World Heritage] area – one Minister at the time said to me, 'We're going to push this Bloomfield Road and make such a mess in doing it that no one will ever want to look at the Wet Tropics for World Heritage again'. The attitude was, 'do as much destruction as you can, destroy any potential World Heritage values and we'll show the Government how strong … we'll show the world that we're strong." (WTWHA 6)

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[4] The WTMA website provides a chronology beginning in 1966, of scientific research and other events leading up to the 1987 Federal election (see http://www.wettropics.gov.au/mwha/m-wha_history.html). It states that *in 1987, the Commonwealth Government goes to election with a policy to list the Wet Tropics as a World Heritage site and halt logging - sparking controversy in north Queensland. After winning the election, the Government proceeds with the World Heritage nomination despite objections from the Queensland Government that it is an infringement of state rights. The Queensland Government begins proceedings in the High Court of Australia* (WTMA, 2006).

In such a political landscape, as this individual who was involved with the listing process articulates, the decision on how best to protect the conservation values of the tropical rainforests depended upon the:

> "Question of what was the best mechanism to protect it, and because of the nature of the Government, with Joh [Bjelke Peterson] in power, we weren't going to do any good in Queensland. So, we thought, 'Well, if the Feds can take it over, that's the solution'. So, we pushed for World Heritage listing." (WTWHA 12)

One interviewee comments on the power of the 'green vote'. He makes the observation that green voters in the bigger cities would be:

> "Horrified to see that in some cases their advocacy has put a dagger through local communities. You fully support the conservation ethos and their thinking there, but if you talk to those people long enough they say, 'Well, yes, we should be able to achieve it without disrupting these communities/families/individuals', but again, going back to the savvy in the debate, that point of view isn't pushed." (WTWHA 3)

One interviewee commented how the community had no knowledge of World Heritage or the listing process. He explains that, "[the listing process] came out of the blue; none of us knew what it was! In fact 90% of the people in the Tablelands region at that time had never heard of World Heritage listing and had no understanding of what it meant" (WTWHA 10). Another case study participant described how, in 1983, she was involved in:

> "… a committee to look at alternatives to the rainforest logging and our Settlement Committee which had Union sawmiller representatives on it [and tried …] to grapple with the transition for the Ravenshoe Mill. In 1981 the Cairns and Far North Environment Centre commissioned a study by Griffith University, which was done by the School of Social Economic Research […] looking at how we could phase out logging using alternative employment creation schemes. So, from 1981 onwards, we worked quite hard on employment schemes for Ravenshoe […] the most frustrating thing I found, in terms of the work we did on alternatives [... was that] it was impossible to get any engagement from the sawmilling/logging [industries], or the unions, to the idea that policy change was on the horizon; it had already occurred in other places [including New South Wales]; the science was there to show that this industry wasn't sustainable; people had already lost jobs […] I really felt that the Union leadership had really let their people down by failing to engage with that." (WTWHA 5)

One interviewee believed that this attitude meant that when listing went through, "the timber industry wasn't equipped for change" (WTWHA 12).

All interviewees spoke about the power of the media, in particular, to misrepresent the many stories of the region, which resulted in polarised debate surrounding the listing of the Wet Tropics World Heritage Area. One interviewee explains that, "everyone comes from a different perspective, but once you polarise the debate you're never going to get anywhere" (WTWHA 11). It has already been suggested by some interviewees that governments did little to discourage this polarisation of opinions. Perhaps this was facilitated by an unprepared community with no experience in community development strategy. One interviewee states that, "sometimes I feel the communities took the wrong approach in the debate and instead of, say, opposing the listing, they should have said, 'Well, let's accept it but let's accept it by getting the best out of it for our community that we possibly can'" (WTWHA 3). This same interviewee spoke about the power of the 'Richardson incident' when the then Federal Minister for the Environment visited Ravenshoe. The event, which embarrassed many

Ravenshoe community members, was used by the media to perpetuate the myth of 'redneck loggers'. He explains:

> "[All that the green voters in the bigger cities] saw of the Ravenshoe community was Graham Richardson being manhandled and jostled by the local community and all these really loud-mouthed, yobbish guys that had just come out of the pub saying all these ridiculous things, [if the community had been more savvy, and wanted] to appeal to the people in Sydney and Melbourne, [… and instead] had a logger in his kitchen with a cup of tea and his wife and kids talking about their future, then you've got something." (WTWHA 3)

Another interviewee explained the hypocrisy of media misrepresentation.

> "There [was] just so much hypocrisy and nonsense that came out and even some of the stuff you saw on TV, they'd show hardwood logging – which I've done also in [Western Australia] – where you go through and you fell every single tree and everything is cleared […] they were putting that across as being rainforest logging, whereas in actual fact [in rainforest logging] you go through and you take out a tree here that's defective; then there could be two mature trees side by side perhaps, and you'd take out that mature tree so the other one could grow bigger." (WTWHA 7)

The Wet Tropics Management Authority (WTMA, 2010) documents that the World Conservation Union (IUCN) General Assembly passed a resolution in 1984 that recognised the value of the Wet Tropics region, and in December 1988, the Wet Tropics World Heritage Area was declared. During this period there was opposition from different community advocacy groups, as well as the Queensland State Government. For example, this interviewee explains how two Traditional Owners from the region went as representatives from the then fledgling Rainforest Trust Aboriginal Network (a network of like minded Aboriginal leaders who subsequently advocated for the government to fulfil the promises made for equitable Aboriginal engagement and participation in the management of the Wet Tropics World Heritage Area) to petition the IUCN in Paris. He states that they:

> "Went to Paris around the same time as the Queensland State Government delegation went to protest against the listing. [They didn't protest] on the same grounds that the State did, not that it wasn't worthwhile listing, but it was being listed not for its full values and that they would be further disadvantaged by that." (WTWHA 4)

Other advocates included individuals from the Ravenshoe community. This interviewee explains his experience:

> "We went independently. There was a Government group from Brisbane who travelled to Paris and we were there before them […] we were looking for a deferment of the listing for one year until something could be sorted out with regard to compensation. The World Heritage Conservation Act makes no provision for compensation. If you happen to be one of the poor beggars who gets in the road, you lose out and there's no reason why they should do anything at all […] it's not as if we were asking for the world." (WTWHA 11)

In Ravenshoe, a local action group formed called CLAG, or the Concerned Ladies Action Group. One interviewee explains how local leaders blossomed:

> "The ladies here formed a group – a ladies action group who called themselves CLAG … they were very strong and they kept stirring things up and getting

> politicians to town; having public meetings and bussing off to Cairns." (WTWHA 8)

Case study participants discussed what they viewed as the many impacts of the listing of the Wet Tropics World Heritage Area, at the time and in the years following the listing. These relate generally to government process, and the structural adjustment process, impacts upon local livelihoods, change in landscape use and the tensions and conflicts that resulted from the creation of a new agency, the Wet Tropics Management Authority. Many of these impacts tie in closely with the identified resilience themes discussed in detail in the next section, so only a short description is provided here.

Many of the case study participants lost faith in the Federal Government during the listing process. This individual explains how a culture of suspicion and perceived conspiracy in the government evolved on the Tablelands:

> "[There was a perceived] international conspiracy – the one world order, taking over the world, etc., and our seeding sovereignty over our rainforest areas to a group of people who resided in Paris who thereafter would have a total say about the how, what, where and why-fors of our rainforest and how they might be managed. None of that, of course, has been proven to be true. It wasn't true, never was true, but because of the process that was put in place and allowed that perception and fostered that perception because of the lies." (WTWHA 10)

Another interviewee spoke of how mistrust in the Federal Government was perpetuated by attitudes and practices towards the sourcing and use of rainforest timbers:

> "[The Federal Government was] saying, 'We want you out of the rainforest; you're destroying the rainforest', [and] at the same time they're taking rainforest timbers and putting them in Parliament House. So, all of those things just stir you up." (WTWHA 7)

There was much critique from all case study participants of the poorly managed structural adjustment process. This impacted on the local economy, morale, and again, trust in government. The Wet Tropics Management Authority (WTMA 2010) states that the Federal Government pledged $73.5 million to be spent on job creation and business compensation for the region following the World Heritage listing in 1988. Individuals spoke about the loss of money, for example, as this individual states: "I don't think the full amounts were ever spent and that's also a bone of contention with a lot of those communities and it wasn't sustained" (WTWHA 3). For example, one interviewee reported that there was a lack of direct compensation for people who had been involved in the timber industry but were under the age of 55, as this interviewee explains:

> "[The government said that] anyone who has been in the timber industry for twelve months or more, [were] 55 years or older, [would] receive $30,000. Big deal. There are a few married women who just worked twelve months of the … and then just went and got a part-time job, they got $30,000. There are fellows who left school at 14 who were 54 ... and they got nothing." (WTWHA 11)

A local Ravenshoe business owner spoke about the lack of compensation for those regarded as not connected to the timber industry, although part of timber industry supply chains. He explains how he "put in a compensation claim hoping that [his family] would get something for [their] loss of sales in ... [product] ... but […] they just wrote back and said, 'No, you're not in this'." (WTWHA 8)

Other interviewees spoke about the employment options offered. Alternatives included tree planting: "… these displaced timber workers, who had been the proudest of people, who all of a sudden were reduced to planting trees on creek banks" (WTWHA 10) and "… being retrained for the tourism industry. The latter was regarded as a joke amongst all the timber cutters/workers [because …] they'd all been barmen/waiters and all the [undesriable] jobs you could ever imagine" (WTWHA 7).

Another interviewee spoke about the lack of long-term planning to provide genuine and strategic options for individuals affected by the listing. He explains there were many projects that were possibly "short-term, knee-jerk political stuff […] maybe that was to assuage the people in Sydney and Melbourne" (WTWHA 3), however what was really needed was sustained and later funding when people were ready to conceive new ways forward. He tells how:

> "… the time when the communities had a better understanding of where they could be going and what they could do – it might have been seven or eight years later – […] then the community was starting to think […] about how the community might develop […] but you'd look around and there weren't the resources to help them on their way." (WTWHA 3)

Some individuals found employment in other industries, in particular, those that required a skilled labour force. For individuals who were not able to find alternative forms of employment, the loss of income had impacts upon their way of life and their emotional and social wellbeing. For timber cutters, "the World Heritage issue was pretty devastating for a lot of people, including myself, and put a lot of pressure on marriages" (WTWHA 7), and "the emotional cost was just enormous" (WTWHA 10). Another interviewee spoke about the loss of medical benefits and superannuation when a company went into receivership:

> "Not everyone with the World Heritage listing were affected to the same degree as those involved in the timber industry, because they lost their jobs; they lost their medical benefits." (WTWHA 11)

Other interviews speak about the strong connection to place inherent to the Wet Tropics communities. The listing resulted in a single use landscape.

> "When they folded the Forestry in under National Parks, […] freedom to use the rainforest disappeared. You couldn't go in shooting pigs anymore; you couldn't ride your horse; you can't take your dog into it – so, what used to be a mosaic of different abilities/different tenures, now increasingly becomes one tenure and so these people here that used to have access to the rainforest for commercial purposes, not only did they lose it from an economic point of view, but they've also lost the use of it as well from a recreational point of view, which is a big shame." (WTWHA 9)

Interestingly, although some interviewees argued that the most severely impacted group from the listing were the local Aboriginal Traditional Owners ("… more than anyone [they] really didn't get anything out of it […] It was seen by [many of] them as a big dispossession", WTWHA 12), Aboriginal people and those who work closely with them have a slightly different point of view. An Aboriginal elder spoke of the reality that the listing resulted in some job losses and loss of access to certain parts of country. However, she welcomed the recognition that evolved from the listing (and is a mandate of the Wet Tropics Management Authority), "… recognition that we [traditional owners] have a role to play [… and in current times it is the] creative relationships with agencies [such as the WTMA and Girringun Aboriginal Corporation that make it possible to be] part of the management process" (WTWHA 2). Another interviewee added:

> "In terms of their recognition as Traditional Owners and rights on country I don't believe there was a negative impact, because the place was only listed for its natural value and it didn't take people back further than where they were […] in terms of politics, it was positive in that sense of being able to raise these issues to a higher level." (WTWHA 4)

Another case study participant reflects that, in his experience:

> "[The] listing of protected areas often has a negative impact on rural communities adjoining it and I have seen that in the Pacific North West, in the USA, the old logging communities there which were destroyed by the conservation listing and elsewhere in Southeast Asia and Africa. If you declare a National Park and push the people out of it and the people had depended upon it for hunting and agriculture, etc., then they invariably lost out as a result of the decision. When you talk about a community like Ravenshoe and you know that a lot of people earned their income from logging and there was an attachment to the land […] and they saw a way of life being threatened by what was happening […] I think what we had with the Wet Tropics listing was this emerging ecological view of how the rainforest should be managed but it was conflicting in that community in particular, because they had a practical wise use approach to the rainforest – they wanted to conserve it, but conserve it in a way that they could continue to use it and provide benefits for their families, and so on." (WTWHA 3)

The Wet Tropics Management Authority was established in 1990 to 'provide for the implementation of Australia's international duty to protect, conserve, present, rehabilitate and transmit to future generations the Wet Tropics of Queensland World Heritage Area, within the meaning of the World Heritage Convention' (WTMA, 2010). An interviewee described how this new governance framework affected many individuals working for the Queensland Forestry Department and resulted in the loss of valuable expertise, people and knowledge from the region. He explains:

> "I think that was the organisation that felt itself most disadvantaged and felt most bitterness about World Heritage listing, not only from an ideological point of view […] but also the fact that an awful lot of them lost jobs. It's not generally realised just how many good people were lost to the system at the time, because a large number of the people who knew most about the World Heritage Area on the ground were retained in organisations such as Natural Resources and Mining; they were retained in Departments that had nothing to do with World Heritage management until later on. Some of them really got sick of it and got jobs further south; some retired and some of them were just never used for advice and it's quite sad to see that the management was then put in the hands of the organisation that [at the time] had the least on-ground knowledge of the World Heritage Area [. There were] interdepartmental rivalries, jealousies, and the fact that the public saw Forestry as the enemy and made sure that any Forestry organisation was marginalised in other government departments. And in doing so, of course, we lost a lot of resources that should have been available to the World Heritage Area. Forestry had all the machinery of building roads, the money for expertise to maintain roads. They knew the area on the ground, but there was an awful lot of money tied up in machinery and resources that could have been made available for management of the parks at least within the World Heritage Area; that then became unavailable." (WTWHA 6)

The Listing of the Wet Tropics World Heritage Area has clearly had varied impacts upon the region, the communities and specific individuals. The interviews provide an insight into the different perspectives held by individuals from the region. The next section provides an

overview of the resilience themes that evolved from the case study participant interviews, including suggestions as to what could have been done better to facilitate community development and adaptation during this time; and what will need to be done to embrace the challenges of the management of the Wet Tropics World Heritage Area into the future.

The Resilience Themes

This section describes the main social resilience themes that evolved from the case study. The majority of these themes detail the close connection that individuals have with the forest landscapes of what is now the Wet Tropics World Heritage Area.

Knowledge, skills and innovation

Knowledge, skills and innovation were key themes arising from the case study interviews as factors enabling coping with change. Some interviewees spoke about the important role of different kinds of knowledge and knowledge partnerships in facilitating problem solving in the region. For example, an Aboriginal elder spoke of the importance of building knowledge partnerships to solve the ongoing challenges of managing the Wet Tropics World Heritage Area:

> "I personally embrace science and research and how it works and how we can work together to solve some of the common problems that we may not have to face but our future generation is going to have to face." (WTWHA 2)

Another individual who was passionate about the on-ground management of the World Heritage Area insists on a refocus and reemphasis on the development of on-ground knowledge and related practical skills for future management. He laments what he calls 'virtual management' whereby:

> "There is little understanding of the things that have to be done on the ground to manage the area for survival of its communities in the long run […] I see no evidence that there is any effort to develop staff and people who will get out in the area and learn about it, see the changes that are happening." (WTWHA 6)

Interviewees discussed a variety of skills necessary to assist communities to cope with change into the future. An Aboriginal elder and a government employee who works closely with Traditional Owners from the region listed a variety of governance skills that some Traditional Owners have learnt as a result of World Heritage listing. These include negotiation skills, organisational development skills, knowledge of how governments work, how to write management plans, skills in representation and advocacy, as well as knowledge of World Heritage legislation and policy. These skills and roles are associated with the various Aboriginal organisations that have evolved and developed in close connection with Wet Tropics Management Authority. The mandate of these groups has been to keep the Authority and the Federal and Queensland governments accountable to their promises of Aboriginal engagement and participation in the governance process.

As described earlier, some interviewees felt the timber cutters were not prepared for the change that confronted them. In this context, interviewees suggested a variety of skills essential for communities to cope with change into the future. These include preparedness for change, as this individual explains:

> "I have observed in my lifetime that change can come quite dramatically when conditions arrive and unless you've done the groundwork and promoted the

> knowledge that allows you to take advantage of opportunities when they arise and seize the moment, nothing is going to happen." (WTWHA 6)

Participants claim that "… governments need to invest in skills for regional development, but governments have no idea about the sorts of skills that you need to develop in people. [Governments need to invest in funding] specialists to help develop small regional communities like [Ravenshoe]" (WTWHA 9). This was not done in the lead up to, or during the listing process. Other skills identified include good business skills because local businesses rely on the local economy, and what is termed by an interviewee as 'wellbeing skills', whereby it is important to recognise the different skills in a community and play to those strengths.

Some interviewees discussed the importance of a community being innovative in the face of change, indeed "necessity is the mother of invention – when you're put in a situation you have to find new ways of earning an income […] it's a philosophical thing" (WTWHA 11). From lessons learnt from the declaration of the World Heritage Area, individuals highlighted the following points. Following the declaration, there was a disappearance of the traditional means of employment, and "there was nothing to take its place and [... also] a lack of imagination as to what [they] might do" (WTWHA 9). Related to this is the fact that, "from the tourism industry's point of view, [there's] a huge opportunity [… but] this community has not really learnt how to harness it; and for that matter, I don't think the bureaucrats have learnt how to harness it either" (WTWHA 9). This individual pointed out that there is great economic potential with the iconic World Heritage Area, yet the community approach remains relatively unsophisticated. Also, in continuation of this point, another interview explained how:

> "One of the things [that] drives communities to be more successful is to have a good percentage of the people who get out and look around. They don't allow themselves to become insular. They don't think of solutions just within the framework of their own current existence, they'll look elsewhere for ideas." (WTWHA 3)

The same individual spoke about the importance of risk taking for community advancement and innovation to challenges. However, he points out that when a community has many residents on unemployment benefits, risk taking becomes too dangerous. He suggests that such a community needs either "new people to come into an area to accept that level of risk […] or a Government agency [that is] prepared to accept the risk of pouring money into these facilities in the hope [that it will] create something for the community" (WTWHA 3).

Engaged governance, planning and leadership

Some interviewees spoke about the creative institutions arising in response to the Wet Tropics World Heritage Area declaration. These institutions are important for the building of open dialogue and empowered co-management between different agencies, local communities and traditional owners. For example:

> "The economic benefits that have come from our World Heritage listing [and …] having a properly managed World Heritage site [include …] the effective institutional agents, an NRM body, the Reef and Rainforest Research Centre, a proliferation of restoration works and companies involved in all sorts of business associated with that […] the Australian Tropical Forest Institute [… so there's been] a huge impact in terms of putting in place an effective institutional arrangement from which flows a whole lot more […] the Wet Tropics Management Authority now has relationships with the neighbourhood landholders, with the tourism industry. We now have Aboriginal cultural values being brought forward; there's been enormous flow-on effect in terms of

> Traditional Owner rights and interest of knowledge through the Regional Agreement. So, in effect, the whole process was enormously influential in transforming something that was very narrowly dependent on a [single] resource […] to something which is now much more a sustainable region with a very diverse economy, which includes a knowledge economy; includes a management economy." (WTWHA 5)

This individual suggests that the region needs improved, equitable, supported, transformative governance:

> "To encourage open debate in society; to encourage young people with different ideas to come forward, that's the key issues around transformability […] the fourth sector [such as Terrain NRM] agenda is critically important to this whole question of transformability – giving people the space [… and practising] this concept of multiple rationalities." (WTWHA 5)

Continuing processes for Aboriginal empowerment were also highlighted as important for the building of adaptive capacity to cope with change in the region. The Rainforest Aboriginal Network evolved from the declaration process, and continued as the Aboriginal Rainforest Council. This continues to evolve in a different incarnation as the North Queensland Traditional Owner Land and Sea Management Alliance (NQTOLSMA).

> "One of the intentions of [the] NQTOLSMA as a regional organisation is to not just be a representative negotiation advocacy but to be a service delivery organisation […] to help build capacity [of local groups] to be self sufficient." (WTWHA 4)

The Wet Tropics of Queensland World Heritage Area Regional Agreement for the involvement of Rainforest Aboriginal people in the management of the Wet Tropics of Queensland World Heritage Area (WTMA 2005) evolved from the declaration process, however it remains as only a goodwill document with limited government willingness to fund recommendations. This attitude leaves Traditional Owners feeling despondent about whether the government actually wants to work with them.

With the declaration of the World Heritage Area, tourism became a potential focal industry for the region. Tourism has not really taken off in Ravenshoe, and interviewees spoke of the importance of planning for tourism business. In particular, they noted the need for business plans and listening to customer feedback: some ventures have failed because they do not do this. There is a potential niche market for Indigenous tourism, however, "an important aspect in tourism [is to not] be a revolving door; if your doors are open they've got to stay open" (WTWHA 1).

Interviewees speaking from an Indigenous perspective noted the importance of planning for the future, looking at different opportunities and considering what needs to be done to make them happen. An Aboriginal elder spoke about the importance of planners and managers taking the time to build trust with Traditional Owners, especially having face-to-face meetings with them.

Case study participants highlight the important role of local leaders. For example, they spoke about the passion of local leaders, advocating for and also against the listing.

> "Where you get people who are willing to try and go the distance with transformation and try and move onto something better, they can't act as agents of change unless they've got networks; unless they've got information; unless they've got encouragement." (WTWHA 5)

Communication and awareness raising

Most case study participants spoke about the powerful role of the media in creating stereotypes, which encouraged a polarised debate. This was discussed as closely related to local identities. Some interviewees claimed the media could be a powerful awareness raising tool if used correctly, for instance in the example given previously about how the media could have been used to present timber cutters as family people rather than 'rednecks'.

Polarised debate and stereotypes are not helpful in enabling communities to cope with changes in their way of life because "everyone comes from a different perspective, but once you polarise the debate you're never going to get anywhere" (WTWHA 11), and there is no possibility for an informed debate. As this interviewee explains:

> "[T]he other difficulty was that these people reacted violently towards World Heritage and because they reacted violently they were seen by bureaucrats as being hillbillies, rednecks. I had my own opinion on that; I don't think they were rednecks. I think they were really pushed to the edge. The difficulty with bureaucracy is [that] they then viewed [and continued to view] Ravenshoe as being a redneck settlement, which is something less than desirable and so decision-making has always been tainted by that." (WTWHA 9)

Learning from the listing process, interviewees spoke of the importance of trust and relationship building between government and community. For example, one highlighted the importance of using communication approaches to get people genuinely engaged in the process and feeling they have the opportunity to influence decisions. He explains:

> "We are Australians so we tend to believe that the Government [isn't] here to help. So, I think there's got to be a more personal way to do it [...]. So, when change has to happen it has to be a consultative thing and [... Government should] talk to people like [they are] people, not as victims." (WTWHA 1)

Another individual who works for local government argued that communication and trust building are essential to any government process: while people won't always agree with the decision that has been made, they will feel empowered. He states, "You've got to build that trust and then you've got to foster it and then you must never, ever fail in that trust" (WTWHA 10). In addition, given the reality of multiple attitudes, perspectives and opinions on any one issue, it is essential to create the opportunity for open dialogue, emotional space for groups in conflict to hear each other, and open and transparent communication between groups that may be in conflict.

Social fabric

Interviewees related the personal pain and loss suffered by individuals from both sides of the debate. For example, advocates for the listing "[...] became the scapegoat for the decline of rural and regional Australia" (WTWHA 5). The loss of income resulted in marriage break-ups for some timber cutters, also an increased drinking culture. One individual pointed out that, even in contemporary times, rural men are "not getting the emotional support they need" (WTWHA 10).

On a positive note, another interview spoke of the role of the arts, and activities such as ballroom dancing, as a means to break the negative thought cycle that comes after such a change because it brings people together to socialise. He explains:

> "It's the best therapy they'll ever get, because it takes their mind off all the [bad things that are] going on in life [... because in order] to dance, your mind has got

> to be on the job. So, it just breaks that cycle of thought, negative thought. It's a different type of spirit to the alcohol. It's good for people to have that physical contact." (WTWHA 7)

Economy and infrastructure

As a result of the World Heritage declaration, the local mill declared bankruptcy and was not able to pay what it owed local businesses. This had impacts on the wider community as people spent less. One interviewee spoke of the need to recognise the connected economy of the region. On the positive side, government compensation "generally goes back into the local community anyway" (WTWHA 7). Some interviewees spoke of the value of possessing transferable skills during a time of change. This is because manual labour skills helped people cope with job loss as often they could move to another labour-based type of job.

Several interviewees suggested future investment ideas and opportunities for local economic development. These included the importance of planning and follow-through. An interviewee cited several projects that were not followed through: "Things are great while you're thinking about them, or even after they go onto paper, but to get them past that there always seems to be bureaucratic hurdles" (WTWHA 11). Another interviewee suggested it is time:

> "… to start a discussion beyond tourism about what else can be done. One of the outcomes was ultimately turned into the ATFI [Australian Tropical Forest Institute] at JCU [James Cook University]. You start getting agencies together and looking at management of tropical rainforest here as a resource that other people in the world could benefit from and our community could benefit from in terms of technology transfer, etc., aid programs and things like that. So, it's sort of seeing the benefits of the World Heritage Area in terms of education, research and management and possible pharmaceutical cures." (WTWHA 3)

One such example advocated by three interviewees is an economy with a local focus. Suggestions included a focus on local and unique industry, growing local and buying local, and food tourism. In common with other case studies across the region was the notion of developing a World Heritage brand as a means of enhancing the marketability of local products.

Infrastructure was also discussed by case study participants as important for a community's ability to cope with change. This includes access to services and ideas for innovative infrastructure. For example, one interviewee discussed how after the declaration:

> "… one of the biggest employers in Ravenshoe [was] Centrelink […but] it took a while before we could convince Centrelink that they should have someone come [to Ravenshoe] once a week, because [they had a] city mentality: 'Oh, they can go to Atherton'. Well, when you've put me out of a job and it's fifty kilometres to Atherton and it's really too far to walk and I don't have any money to buy petrol […] So, [Centrelink] started [sending] someone come here." (WTWHA 1)

Some Ravenshoe residents explained that compensation for the town as a whole was provided in the form of a Visitor and Information Centre. Despite this, as he explains, he still feels:

> "… like the town itself missed out – a place like Ravenshoe is too small to have a sporting complex […] if they'd have 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, etc. […] and if we'd have had something like [a sporting

> complex], I think the community would have felt that they'd got a bit [of a] better deal out of it." (WTWHA 8)

Interviewees described the important role that innovative infrastructure has played in recent times for the morale of the community of Ravenshoe. For example:

> "[W]e felt we didn't really get over World Heritage until they put the windmills up there on the hill. That weight had been lifted off the town [… because] people were saying, 'At last Ravenshoe is the first cab off the rank with something that's going to help them', and that brought a lot of people in." (WTWHA 8)

For the future, these residents would like to see Ravenshoe embracing similar innovations however this requires winning government funding assistance. For example:

> "The [Ravenshoe high] school would like to be the school par excellence in agriculture. They have [an operating] dairy, and they've had a few grants to get things for the school, but in the last session for getting grant money they put in [that] they would like to get a new dairy, a robotic dairy, and they were knocked back […] in favour of [schools] mostly down around the Great South East […] They don't look at schools like this that [have …] an interest in something that could be beneficial to the country, because where else are you going to get your future agricultural people that will be the beef industry or pasture industry?" (WTWHA 8)

These kinds of innovative infrastructure are clearly linked to local economic development, which is seen as essential to enabling a community to cope with change. For example, after the declaration, new land was opened up for residential lots and the Council 'eased up' on planning approvals to ensure that new residents remained in the community. Another individual spoke about the importance of good road infrastructure to encourage industry and business into the area, suggesting that the lack of such infrastructure is why "we find ourselves in a backwater" (WTWHA 11).

People-place relationships

The connection of all case study participants to the rainforests and surrounds that comprise the WTWHA is undisputed. Most individuals highlighted the beauty of the rainforests. A former timber cutter explains how he:

> "… really enjoyed [being alone…] at Mt. Windsor. Everybody would be going home at 12 o'clock on a Friday, I'd [still] be there at 2:00 pm, and I'd be thinking to myself, 'I'm the only person on Mt. Windsor, [alone with] just the birds, trees, environment'. There's a difference between being alone and [being] lonely. [I really loved being] up there on [my] own with nobody else around … just [me] and [my] chainsaw [and] a few trees." (WTWHA 7)

A local Jirrabal Traditional Owner described what the rainforests meant to her:

> "I just think it's beautiful country. I personally love being out in the rainforest and being able to go out on country and to be able to fish and hunt or just take an elder out and walk around and hear stories from their days." (WTWHA 2)

One interviewee lamented the fact that much of the management agency work focuses upon Aboriginal involvement, which is positive, however does not acknowledge the contemporary landscape as the result of mixed cultural use and that a way of life was threatened by the World Heritage listing. He explained:

> "[The management authority] never took into consideration that there was a logging culture here that actually sustained itself from that area which is now World Heritage; they never took into consideration that there was actually a dairy industry here, [which was] responsible probably for the abolition of most of that rainforest [on the Tablelands]. Now, whether that's good or bad is quite irrelevant, because they were people of their time, and indeed part of the conditions of owning land here in the early days was that you felled it […] The young people today have no connection […] unless they are conservation minded. Many of them say they are, but their idea of conservation is to take a few dogs into the scrub and kill pigs." (WTWHA 9)

Other interviewees commented on the role of the WTWHA in the broader local, national and global spheres. For example, locally, the declaration "[pushed] timber harvesting into areas [freehold lands] that might not have been harvested for a long time, if at all, and also to take timber in greater volumes than ever would have been considered" (WTWHA 6). Globally, the price of rainforest timber is connected to how and where it is sourced.

> "So, all we're really doing is [moving the] destruction of one bit of rainforest to the destruction of another piece of rainforest. I've worked in New Guinea and I can tell you that the destruction level up there is far superior to the destruction level here, in fact it's terrifying." (WTWHA 9)

The impact of the declaration, the ongoing desire for rainforest timbers and market forces must be acknowledged as part of the same system that informs management decision making.

In relation to developing sustainable livelihoods for the future, individuals spoke of the complexity of human and environment interactions. For example a Jirrabal woman spoke about the fact that getting back on to country is connected to the Aboriginal healing process and, in particular for younger people, learning about personal histories and heritage. Programs that allow elders to share cultural stories with younger people are regarded as being closely connect to socio-economic well-being.

A former forester spoke about the complexity of managing forests as ecosystems but also to meet human landscape desires. Another interviewee discussed the important role that park rangers play in the community's perception of management approaches. He explained:

> "If a ranger was to stay in one place in one national park for twenty years and really got to know the community and was skilled enough to see ways that [the National Park] could benefit the community, then you'd get better outcomes." (WTWHA 3)

Another interviewee stressed the need for managers and the community to consider how the landscape can be thought of as a productive landscape: "… ecosystem services and trading, valuing and paying for the environment and having it right across the whole landscape, not just looking at icons in national parks" (WTWHA 12).

The role of government

Given the focus of this case study on how people coped with the declaration of the WTWHA, it comes as no surprise that many interviewees commented on the 'role of government' in enabling coping mechanisms. They suggested ways to improve government processes during a period of structural adjustment: what it means to evolve a local economy; the importance of appropriate employment options in the aftermath of a major structural

adjustment; and the overarching importance of individuals being able to trust government process.

One interviewee spoke at length on the time and vision it takes to evolve a new local economy. Community development takes time:

> "It's fair enough to keep those communities going [financially following a structural change], but [they] also need an extra [large] bucket of structural adjustment money seven or eight years later when the community [is] starting to think, 'Well, let's live with this now, let's think about how the community might develop', whether it was an education facility or a conference facility, or some sort of tourism thing, or some value added agriculture, something like that […] Those ideas were starting to come into play then, but you'd look around and there [were no] resources to help them on their way." (WTWHA 3)

Another interviewee discussed the importance of having exciting and innovative visions for the future. He felt that at a Federal government level, there was a real lack of these for genuinely doing something constructive. He explored the idea of developing appropriate local industries:

> "I doubt [the local timber industry workers] got much out of tourism at all. One thing we were pushing very hard was the timber industry, 'Why don't you re-establish another one?' and we were very keen to see it and we did a lot of work on that. We established 'Queensland Forestation'. But back in those days all the forestry experts said you [couldn't] grow rainforest trees outside of the rainforest, it's [wasn't] possible, [the trees] wouldn't grow […] A few of us had been planting rainforest trees in our back yards and we thought, 'That's funny, when we plant them they grow just fine, and some of them very fast!'. But they wouldn't fund it in Canberra because all [of] the advice [they received indicated that it wouldn't work]. We knew there [were] about 30,000 to 60,000 hectares of land which was suitable for productive land; we were focusing on non-agricultural land. We wanted an industry of mixed rainforest species and I think that would have worked extremely well. They started this thing called [the] CRRP [Community Rainforest Reforestation Program] but it was a bit of a tin pot thing that did a few trials; it wasn't […] serious […]. The Queensland Government started that – [it had] intentions but it started and stopped and it wasn't a serious timber industry […] a bunch of trial plots really, which was good." (WTWHA 12)

Others raised the importance of creating and developing appropriate employment options. One interviewee explained his work in the timber industry as, "… a highly skilled job, especially in rainforest. It's a dangerous lifestyle but we enjoyed what we did" (WTWHA 7). Thus, although jobs were offered in tourism and through the community rainforest reforestation program, people felt these were inappropriate for the kinds of skills they had as well as the lifestyle they were accustomed to. As one interviewee explained of a relative:

> "Her husband was working in the timber industry and they said, 'We'll retrain you'. So, they put him in a restaurant! He was using a chainsaw and an axe all his life – we went into this café one night for dinner and [he] came out and [we said,] 'What are you doing here?' He said, 'Well, it's a job. They found it for me, I've got to do something. They're retraining me!' And he came out [into the café] and he was all bumble-fingered and he had the serviette over his arm and he said, 'Did you enjoy that meal, was the food good?' etc." (WTWHA 8)

Interviewees spoke of the importance of good cross jurisdictional governance. This was not evident at the time of World Heritage listing. Too many resources, both time and money, were wasted on 'turf wars':

> "One of the untold stories [of the listing] is the bickering [in the background] between the State and the Commonwealth that too much energy and time was taken up in arguments about resources and responsibilities, and so on. There were similar arguments between State agencies –National Parks, State Forest and the [Wet Tropics Management Authority] – and there were always turf wars between these agencies about who was responsible for what and who should get what resources, etc. […] In the end I don't think they served the needs of the community all that well. There could have been some better outcomes, but it just took too much time and wasted too many resources." (WTWHA 3)

These 'turf wars' and disagreements fostered wasteful rivalries. One interviewee spoke of the impacts of marginalising the forestry department during the process:

> "It was politics of government departments and the way it was organised – interdepartmental rivalries, jealousies, and the fact that the public saw Forestry as the enemy and made sure that any Forestry organisation was marginalised in other government departments. And in doing so, of course, we lost a lot of resources that should have been available to the World Heritage Area. Forestry had all the machinery [for] building roads, the money for expertise to maintain roads. They knew the area on the ground, but there was an awful lot of money tied up in machinery and resources that could have been made available for management of the parks at least within the World Heritage Area; that then [were] unavailable." (WTWHA 6)

He also felt that much local expertise and knowledge had been lost to the system because of the way the World Heritage Area was set up. He explained his point of view:

> "I still think to this day that [because of] the way the [Wet Tropics Management Authority] was set up as an organisation, that wasted a lot of opportunities [due to its] inability to tap into local knowledge, local expertise, and the people who should have been advising them [who] were never asked to, and yet the people who were called in as consultants to develop the management plan for the area came from New South Wales and Victoria. They'd fly in at great expense. It set itself up as a First World organisation in the middle of what was still largely a Third World management situation and it never quite climbed down from that. I guess it's come down a lot now, but it took a long time to climb down to the level that was most appropriate for management of the area and for dealing with local people. I think, at the moment, of all the government agencies around, [the WTMA is] probably one of the most functional […] and it's got some of the most dedicated people [when compared to] the demoralisation of other government departments in the area." (WTWHA 6)

He also spoke about the importance of institutional learning into the future:

> "I think […] what we've got to do is ensure that, having won the war to that point, we […] don't lose it by a process of attrition because of the self interest of bureaucracies and the petty jealousies that arise within local Councils; between various community groups and within organisations. I think we run a very grave risk of fractioning into small discordant groups that can't mobilise for the common good." (WTWHA 6)

Case study participants spoke about the importance of government investing in the building of trust in government processes. They also raised the great importance of government managing compensation funds in a transparent and effective manner. For example, interviewees explained how the full amount of allocated funds was never spent; funding was allocated to a saw mill whose main concern was based in New South Wales. The mill declared bankruptcy and left Ravenshoe, taking its allocated funding with it, back to New South Wales. As discussed earlier, there was an inequitable compensation process, with certain individuals receiving more compensation because they satisfied the compensation equation.

> "They called it a 'structural adjustment package', $2,500 for a dislocation allowance, that's all it was. We spent four years trying to get some sensible compensation. Then what did they do in the end? They said, 'All right, anyone who has been in the timber industry for twelve months or more, [and who is] 55 years or older, will receive $30,000'. Big deal. There [were] a few married women who just worked twelve months […] and then just went and got a part time job. They got $30,000. There are fellows who left school at 14 and who were 54 [at the time], and I was 53, and they [received] nothing. Why [wasn't] it based on a yearly thing[?] […] Some bureaucrat thought, 'Well, this is it, here are the figures, here's the bottom line, here's what we start with. We've got all the stats on these people, we know their ages, we don't have to ring them up and ask them how old they are.' That [was] all on the computer in front of them. So [they] just [ran] that through, [it took] about ten minutes' work if you weren't making a career out of it, and they decide[d] something as arbitrarily as that." (WTWHA 11)

Further, the same interviewee explained how he was not compensated for the resources he spent, and advocated for what he called 'sensible compensation'. He explained:

> "[F]or about four years we had meetings every day of the week; seven meetings a week. We travelled from the Daintree up in the North, here, right through to Ingham and I think I [drove] 75,000 kilometres in the vehicle. I spent $12,000, all of that on paper and telephone. Fuel, vehicle and everything else that was besides, that just came out, and we [received] no assistance. [The] World Heritage Conservation Act does not provide anything for compensation; they're not liable for that." (WTWHA 11)

Many case study participants called for government to offer more innovative, stable and timely assistance, including rewarding public servants for staying in their positions and building trusting and effective relationships with communities. They also called for government to fund risk-taking, because risk-takers are necessary in order for a community to evolve.

Urban Expansion

Introduction

This case study identifies how individuals and groups living in and around Cairns have coped with urban development and growth. This is of interest as a continuing process. Study participants reflected upon their experiences to date as well as implications for the future of Cairns and the region.

The regional partners chose the focus of this case study because Cairns is the major urban centre for the Wet Tropics region. Past, present and future growth places pressure on the natural, social, economic and infrastructure resources, and have social and environmental impacts. Thus, it is important for the regional partners to have an understanding of social resilience factors related to urban expansion.

James Cook anchored the Endeavour in a bay he later named named Trinity Bay, just east of the location of modern day Cairns, on 10 July 1770. The area was home to the Irukandjii people, north of the inlet, and Indindji, south of the inlet. In 1876 a port and settlement were founded to serve the Hodgkinson goldfields, 150 kilometres to the west, and named after the then Governor of Queensland, William Wellington Cairns. Cairns was declared a township in 1903 and a city in 1923 (Cairns Regional Council, 2009). The city is presently experiencing high levels of growth: between the 2001 and 2006 censuses Far North Queensland had the third highest growth rate in Queensland, with Cairns comprising about two-thirds of the region's population (Queensland Government Department of Infrastructure and Planning, 2009).

The Office of Economic and Statistical Research (OESR, 2010) estimates the June 2009 population of the Cairns Regional Council Local Government Area (LGA) as 164,356 persons, or 3.7 percent of the population f the State of Queensland. By the year 2026, the population is projected to reach 208,532, an increase of 27% in seventeen years. The average annual growth rate in the Cairns regional LGA between 2004 and 2009 was 3.6%, compared with 2.6% for the State of Queensland. At the time of the 2006 census, 7.8% of the region's population was recorded as being of Aboriginal or Torres Strait Islander descent (10,738 people). Just over 18% were born overseas.

Interviewees

Thirteen people who were able to speak about the impacts and responses to urban expansion in the Cairns region were interviewed for this case study. Interviewees included representatives from the Queensland Department of Communities, Queensland Department of Infrastructure and Planning, Wet Tropics Management Authority, Terrain NRM Ltd., Cairns Chamber of Commerce, Cairns Sustainability Group, the Alliance (a stakeholder group for tourism in Far North Queensland), TreeForce, Cairns Action Group for Sustainable Transport, Cairns Urban Landcare group, Cairns and Far North Queensland Environment Centre, and a local cane farmer.

Analysis

Participants' perspectives on the change process

Case study participants described the important physical and social features of the greater Cairns region in a variety of ways. They talked about what attracted them to the region (or back to the region) and what keeps them there. This includes the visual beauty of the tropical

landscape, both terrestrial and marine; the attraction of the tropical lifestyle which includes the tropical climate and the reality that they are closely connected to and reliant upon the land- and sea-scape for their livelihoods; the varied history connected to environmental battles; infrastructure including The Esplanade infrastructure development and the local markets; the unique social characteristics of the region, and the potential for self-expression; the culturally diverse population which brings a cosmopolitan feel to the city; strong Indigenous culture; and close knit social networks.

Participants spoke about the various changes that had occurred throughout the time they had lived in Cairns (this varied for each participant), including the growth of the suburbs, changes in the planning landscape, infrastructure developments, an international airport link, and changes to understanding regarding sense of place. These changes have been driven by population growth, which has occurred concurrently with the development of the tourism industry in the region.

Interviewees reported that growth has resulted, in the first instance, in increased development and traffic, and an increased impact on the natural resources that every city requires. A clear example of this is the impact that urban development is having upon the hill slopes that are iconic to the region. One interviewee described how development is:

> "… changing the amenity of the suburbs, i.e. [in the past, suburbs] would have been surrounded by cane fields and farm equipment, and [that has now changed] into this [cheap urban] housing. I think that is impacting on people's perceptions of place [… and has impacted] on peoples' perceptions of hill slopes. There's a big push to maintain hill slopes, the 'green view' ... that is Cairns. When you look up [towards] Brinsmead and there are houses up those slopes it changes the layout of the land." (Urban 7)

Individuals spoke about other impacts of such urban expansion, including the historical lack of integrated planning, although planning is gaining greater currency with the advent of new housing developments such as the Mt. Peter development process and the FNQ2031 Regional Plan (discussed in more detail below). Opportunities and benefits of urban development include increases in infrastructure and the potential for mixed housing developments that may facilitate the building of new and different communities. One interviewee explained:

> "I think that one of the balancing acts with urban growth is still [being able to maintin] a lifestyle outside of the front door of the house, particularly when you're getting into higher density accommodation […] In terms of high density [living in Cairns], you might have a set of flats with twenty or thirty flats in it and that's about as close as you get to high density, lower-end living […] We still have open spaces that people can access at no charge. While you may not have all the money in the world, you've still got access to a lot of facilities. The lagoon and Esplanade is a really a good example [of that…] It doesn't matter if you're the lowest income earner in the city or [the] highest, you can still access [these facilities free of] charge. I think it's important that communities have those sorts of common facilities and are able to use [them] to express themselves. Sometimes it actually reflects the lifestyle and sometimes it actually creates a new lifestyle – being outdoors, exercising, family groups and barbecues and that type of thing." (Urban 8)

As will be discussed later, developments also afford the great potential to set Cairns up as a sustainable region. As this individual explained:

> "[Sustainability] becomes the set of principles that we aspire to as a community […] an opportunity for this region to do it right and to be honest […] A big frustration up here is [that] the broader community and Government is to some degree still in the dark ages around what's possible. We keep trying to say we can actually do all these great things and we know we can do it […] I could point you to fifty cities or regions around the world that are doing it right now – every day there's a growing number – and I'm constantly looking at other examples to say to people, 'Look what you can do'. It really comes down to good leadership in the community." (Urban 6)

One individual explained the start of the tourist boom:

> "When I first came here the population was heavily influenced by the old families. They were the people [who] had been here for generations and generations. It was around about the 1980s, probably the late 70s, [when] tourism started to become a true industry here, but it was vehicle-bound. As the roads improved people drove up from the south and they'd come to Cairns and say, 'Wow!'" (Urban 5)

He goes on to explain how Cairns became an international destination:

> "[New business owners] came here for lifestyle and they synthesised the industry by closing down around Christmas time. So, they shut down in November and they'd come back again in March, and they'd go and live in Bali for three months over the Christmas period […] the industry would have a big drop off there […] They were the first foundations of the industry and then the airport became an International airport and [jumbo aeroplanes] could arrive, then Hilton built an […] accommodation facility that could actually house the jumbo [load] of people […] As soon as that happened […] the impact of other investors started to happen and people started to invest in Cairns as a new national destination." (Urban 5)

Participants reported on the complicated relationship between local Cairns residents and the tourism industry. Despite, or in spite, of the income and resources generated by an increase in tourist visitation, many locals were resentful of the industry when it began to grow exponentially in the mid to late 1980s. As this interviewee explained:

> "[The locals] loved [the tourism surge] because of jobs and opportunities, but they resented the fact that there were so many new people coming. I worked in [a government department] for about three years before I met a local from Cairns – nobody was from Cairns itself because there was such an influx of people. So, all the people had come to work and that also brought the tourists. Because there was such a reliance on Japanese tourism, the Esplanade was just full of Japanese shop signs, so there was quite a degree of resentment – not against the Japanese themselves, but against the fact that it wasn't part of Australia anymore – you couldn't go down and read any of the signs. If you went to Fitzroy Island you couldn't use Australian currency. You had to buy 'funny money' and use that to buy stuff." (Urban 1)

Resentment of tourism-induced development has also occurred because many people chose to live in the region because of its less developed attributes. For example:

> "When I got here, I remember it was New Year's Eve, there was nowhere to go! There was one place, a house on the hill, that was the only place that was open on New Year's Eve and when you compare that to now it's amazing, the

> difference. It was just like a little outback town. It grew and it grew quicker than what Cairns was actually ready for." (Urban 3)

Given that all case study participants spoke about the great value they and their networks place on the natural environment for both visual amenity and livelihood connections, it is no surprise that many spoke about the tenuous and sometimes detrimental connection between development and conservation. One interviewee articulates the multi-faceted discourse that surrounds these issues by providing the example of the Skyrail Rainforest Cableway. He explained:

> "[The developers] did a good job, because you go to Skyrail now and they'll tell you all the wonderful things they've done to look after the bush, but they weren't necessarily going to do it that way until somebody made them. So, the Greens – being the opposition – made them do it better than they ever would have [...] overall I think it's good for Cairns." (Urban 2)

Not all developers are mindful of conservation and ecologically sustainable practices, as will be discussed in further detail later. The following interviewee set the scene for this discussion by explaining the origin of Cairns building codes:

> "At one point in the past Cairns suffered very badly from a particular cyclone and it was [because of this] that the Insurance Council and the Government sat down and established a certain building code. The building code is very difficult since what you end up with is besser block, so the besser block and the reinforcing rods became the method of construction, but here probably we ought to have more of a Balinese attitude about building. We live outside all the time anyway and so our living areas probably should be very open. So, there's an opportunity – there's always been this opportunity here for us to look at different building styles [suited to] this environment." (Urban 5)

Interviewees identified a variety of impacts, both positive and negative, of urban expansion in the region. One is having greater housing options:

> "I don't necessarily agree with the term 'urban sprawl' because I [don't think it's that] bad. […] We say, 'Let the market decide what it wants'. People want different lifestyle choices; if [everyone had to] to live in a multi-storey unit, then what [would differentiate] us from the Gold Coast [or] Brisbane or anywhere else?" (Urban 8)

Other impacts include an increase in traffic (and the need for a better public transport system), changes in the quality of country life (parking charges are being introduced in the CBD area) as urban development spreads up and down the coast, a reduction in the 'connectiveness' of the city, increased social challenges, e.g. the impression of an increase in street gang violence, and an increase in poor parts of the city, changes in social make up.

> "There [were] Aboriginal people all around the street; they've all gone. I don't know where they've gone, they [were] moved because there [was] nowhere for them to hang around […] anymore. And there were stories, when I came they were getting bus loads of people and driving them off and dumping them somewhere. That whole 'cleaning up the towns' sort of thing that used to go on in Darwin and Alice Springs as well." (Urban 2)

Increased pressure on natural resources (e.g. competition for water, clearing of native vegetation) throughout coastal developments have potential impacts upon the reef, as do changes in landuse that result in changes in water quality. As this cane famer explained:

> "[An] impact is velocity of water run off. Centenary Road used to be all cane farms and after a heavy rain event the water travelled from the hills through the cane fields to the inlet, which took a total of three days. Now with the urbanisation of roofs and lawns, it takes twenty minutes. The rain hits the hills, [and in] twenty minutes the red soil is in the inlet." (Urban 4)

There are impacts upon wildlife:

> "It's a really good example of [the impacts of] urban expansion here because it has happened out near Trinity Beach[. W]hen they put the Bluewater canal in, all the wallabies had nowhere to go and it was just horrific. They were being flattened on the roads and it was horrible to see that. The same thing […] is happening [now] at White Rock and wallabies are starting to attack people. It's not their fault! People are feeding them. The same thing will happen in the Mt. Peter area. A lot of the wildlife is getting squeezed out […] Years ago it happened to curlews around here. Sometimes if you walk on the Esplanade you see the curlews and they sort of cohabit in between the buildings because that's where they were originally, and it's sad to see them amongst the buildings. They've adapted in a way and it's amazing that they do because they're not flyers." (Urban 3)

A cane farmer explains that urbanisation "makes adjacent farmlands too expensive to purchase for farming, [also…] people move out into the rural setting with hobby farms and […] then want to place conditions on existing landholders" (Urban 4). Increased urban rental prices also lead to the potential of increased homelessness, especially given the current economic crisis.

There are changes in culture, including rural culture, as this interviewee explained:

> "I believe we're losing the richness of our rural culture […] we're becoming more urbanised and more city-minded and self-serving, rather than serving for the better good." (Urban 4)

There are also changes in sense of place and history, with a developing population that has no connection, understanding or sense of continuity with the past. As a result, individuals do not feel proud of the history of a place, and thus take no ownership in maintaining the local culture. As this interviewee explained:

> "[What] rapid urbanisation does is make things pretty bland in a lot of ways […] There's a bit of a culture [in that] somebody [will] look after things for us; it's not our responsibility to do anything so it's a pretty significant shift culturally to a very urban – 'It's the Council's responsibility; State Government's responsibility – I just live here'." (Urban 10)

In pondering futures for Cairns, one interviewee forecast a range of factors influencing the growth and fluctuations likely for Cairns:

> "It's hard to know what the long-term future of Cairns is, given that on the plus side its likely to remain a green place that has water supplies compared to other parts of Australia that are suffering droughts. On the downside, we're likely to see [an] expansion of things like dengue and other tropical diseases, and what impact that has on local community and tourism. Things with peak oil – the community is very vulnerable to oil prices because we're dependent upon one big industry, which is very reliant on fuel prices. So, economically the region is very exposed.

> Over time we could see people moving here, but we may also see a decline in the economic base if it's gone from the current economy." (Urban 6)

The Resilience Themes

This section describes the main social resilience themes that emerged from the case study.

Knowledge, skills and innovation

Case study participants highlighted important knowledge attributes, skills and notions of innovation as enabling the community to cope with urban expansion into the future. With respect to decision making about urban developments, one interviewee spoke of the importance of the general community being able to better access the local Council and having a better knowledge of how to fight Council decisions. She argued:

> "Normal people don't get to speak to [councillors] unless it's before an election. It would be nice to have the opportunity to speak to councillors more [often] about what's happening locally. Mainly the consultations [and] more knowledge getting out there on what is actually going on, because it's not in your face, it's not in the papers, you really have to [probe] to find out what's going on. Information is not readily available." (Urban 3)

Further to this, it is essential that community groups develop their knowledge of appropriate language. For example, in order to make submissions to Council regarding town development planning, the public must educate themselves in the appropriate language to use in order to have a voice. The example of the Cairns and Far North Environment Centre is testament to the success of this approach. This advocacy group evolved from having held Council to account for allowing inappropriate (environmentally detrimental) developments to go ahead. They learnt the strategic way to lobby Council using appropriate language.

Another interviewee spoke about the important role of urban landcare groups in raising the awareness of local residents of new housing developments about the importance of looking after their local environment. For example, in her experience, residents learn by example of other residents' revegetation projects and take ownership of the revegetation. She spoke about how residents learn that revegetation along river banks adds value to their property. Successful urban landcare relies on keeping up with urban development and raising awareness with residents about the damage that planting of exotic species can have along river banks.

Other case study participants spoke about the need to develop a specific 'tropical skills' set – skill sets that focus specifically upon the kind of education that should be grown in tropical areas, and the kind of building skills that are relevant for tropical areas. It is thus important that Cairns develops a vision and learns from others about sustainable cities and processes. One individual argued that Cairns requires good leadership towards becoming a sustainable city. He spoke of examples in other countries that could provide 'good learning' for Cairns and other regional cities.

> "The costs of not [becoming sustainable] are far greater than [actually] doing it, but who bears the costs? […] that's a feature [that] Governments [need] to work through. In Germany there are some fantastic communities where the homes and commercial buildings are not only 'zero neutral' in terms of greenhouse gases, but they're actually *creating* energy. They're a net exporter of green energy, because they've been so well designed that they don't require a lot of energy to run […] and they've got enough energy production in them that they're exporting

> energy. […] If we can't [run on solar] in Australia there's something wrong with us. Coal is fundamentally our biggest enemy, because it's a big revenue source for Government and [they are] reluctant to move […] to new energy sources." (Urban 6)

Engaged governance, planning and leadership

Given the ongoing tension between development and preservation of Cairns' natural environment, it is not surprising that many case study participants spoke about the importance of engaged governance, community engagement, planning and leadership in enabling the wider community to cope with the changes urban expansion will bring in the future.

As discussed in the previous section, local community group advocacy was regarded as important to social resilience. For example, the Cairns and Far North Environment Centre (CAFNEC) evolved from the need to hold the local Council, at the time, accountable for inappropriate and environmentally detrimental developments in the region.

The collaboration of potential leaders was also regarded as beneficial for the community to cope with change. The Cairns based Sustainability Group that has evolved in response to urban expansion was given as an example of the power of local leaders collaborating. Local leaders include the Mayor, local and federal MPs, members of the Cairns Chamber of Commerce, CAFNEC, architects and town planners amongst others. One interviewee explained:

> "We've pulled together a broad section of the community in terms of leadership to get past that first hurdle of saying, 'Well, unless we get these guys on board it's going to be hard to make it fly'. The next challenge is adding some real capacity to it and then engaging with the community and then basically saying, 'What are the key things that we need to focus on that will give us the best results in terms of reducing our footprints and involving the community and building economic resilience?'" (Urban 6)

Promoting a culture of debate was identified as essential. The absence of such a culture unhelpful, as this individual explained:

> "[For example,] the whole Reef debate; the State's approach to saying it's all the farmers' fault and what they've done is completely useless and 'thanks for trying', but we're actually just going to regulate it now [… is] unhelpful because it basically […] continues to polarise people and [provides no process to build…] consensus about where we're going." (Urban 10)

Interviewees described resilience in terms of proactive adaptive management, reinforced through investment in social process. They explained this in relation to getting together to work through issues. One person also argued that current government project approaches result in a lack of support for activities that fall outside the projects.

> "There are simple things that you can do where people go out and talk with the farmer, have a day out on the farm, little things, but they all start to break down on the barriers that exist." (Urban 6)

Government approaches to community engagement were also critiqued. A need was identified for increased resourcing for genuine community engagement and meaningful follow-up. Participants also highlighted the need to recognise the role that community groups play. One interviewee explained:

> "To keep community groups alive they definitely need more support because they do look after people in the community and provide a good service, but they're often under nourished. I'd hope that would come out of it. Because we are going to have a bigger community; it would be good to have more community network and outlets for the community; more groups." (Urban 3)

Given comments on the lack of past integrated planning for urban expansion, contemporary planning activities were welcomed as essential for enhancing and building strong communities into the future. The relatively recent *Far North Queensland Regional Plan 2009-2031* (known as the FNQ2031 Plan, see DIP, 2009) was discussed by a few participants as a step in the right direction. Interviewees claimed one benefit of the planning process was that it enabled planners from different government agencies to work together.

> "I think FNQ2031 was the first time that there was a really coordinated effort towards planning. Agencies had been doing their plans […] the whole process was really the forwarding stages of getting much better coordination together between state and local government to form a network with all the different planners; different offices in local government." (Urban1)

As with any process there were limitations, including the fact that the planning timeframe was tight, so there was insufficient opportunity to engage with community, especially the Indigenous community.

> "Everyone knows you need so much time to do good and useful engagement with people and it didn't happen […] If we'd had more time we could have done that side of the planning a lot better." (Urban 1)

New town developments, such as Mt. Peter, now require planning and there are specific plans that direct and regulate urban developments, for example kinds of development, building materials and so on. Although these receive much criticism from a variety of people, they are also regarded as heading in the right direction. Interviewees spoke about the lack of disaster management planning for the region and felt this was problematic. One individual spoke about the urgent need to plan smarter ways of living in the region, given what he calls the advent of 'the perfect storm'. He explained:

> "The community is now at least [starting to understand] things like climate change; some of them are starting to get things like peak oil. You often read about the perfect storm […] where all these things have been left where [there are] economic issues to deal with; there [are] health issues to deal with; Indigenous issues to deal with and climate change on top of those. All of these things are just lining up and we have to say, 'Well, business as usual is not an adequate response', so what we're trying to do is say, 'What can we do as a region to get on with the job of balling our community resilience and reducing our impact on the environment, and in the process find smarter ways of living that still allow people to have a rich, meaningful life?'" (Urban 6)

Another interviewee calls for a vision, saying:

> "[Cairns] is of a size where it is not too late to [... question], 'If Cairns ever gets to half a million people, how do we want it to be?' People have the knowledge and foresight to do that right now and it's an opportunity to do it now instead of just letting it grow." (Urban 2)

Strong leadership is essential for developing a vision for the future, and hence for the future resilience of the region. Local attitudes towards environmental issues and challenges were given as an example. One interviewee argued that leadership from environmental advocacy groups, including CAFNEC, has changed the way many people regard 'green issues'. She continued:

> "[In the past] the hill slopes were starting to be cleared and [there was the start of] really inappropriate development of beautiful natural areas around here […] It was all happening so quickly. The Council was doing all sorts of things which were a threat to our natural environment and I don't think a lot of people had the knowhow of how to deal with [council support of inappropriate development …] Now, I think, there's been a bit of a change, change in council with the mayor, so [CAFNEC] are now being respected for what they know, their views, etc. With global warming, the good thing that has come out of that is that if you think like this (you have that 'Green thinking') you're not one of those outsiders anymore." (Urban 3)

Another interviewee spoke of the need to invest in building confidence in personal leadership for the benefit of all society. He argued:

> "[It's rare that] people have confidence in their own leadership […] I see the need for investing in that [and…] getting out there and promoting the role of volunteering, exploiting that more clearly; to being much more support with training and development for people and those sorts of issues" (Urban 10)

Case study participants spoke of the powerful role that government has to influence urban expansion. The example of the recent change in local government was cited as evidence. The new mayor has influenced a change in the economic development culture of the council, which now accepts environment and social dimensions of development as essential parts of the urban expansion equation. One interviewee articulates the development challenges facing the region and the important role of government in taking the lead on deciding what constitutes appropriate and sustainable development.

> "The challenge is from a commercial point of view, developers are business people; they're not social planners; they're not environmental engineers and they might employ a few people occasionally to give them advice, but fundamentally they are business people and they do what they normally do […] If you want to get a new kind of development happening that's where governments really have to take a lead and sit down and work with these guys – we've got the right incentives in place, or the right penalties in place to drive the kind of development we want – do the local governments have in place the right planning frameworks and bylaws and codes? Unless all of that is in place, developers will just carry on with what they've done in the past and a lot of what happened in places like this is driven by developers. They buy a lot of land, subdivide it and put a bunch of houses on it. There is nothing in there to tell them that this has to have a net carbon footprint of 'X', or how [it needs] to be orientated […] If you don't change what you're doing, you'll just get the same result tomorrow. [Developers have] to be a core part [in] how we deal with the urban problem, because they're going to actually build these things. Some of these things are going to add a cost to the community […but] it's really critical that those pricings of it are put there to drive the good behaviour and not reward the bad behaviour […] at the moment there's not much there to pin a lot of bad behaviour." (Urban 6)

One interviewee spoke about the need for government agencies to develop a better understanding of the important role of urban landcare in ensuring riparian areas remain

healthy, and in educating the wider community on the importance of river health, water quality and planting native vegetation instead of exotic plants.

Institutional integration, as opposed to government agencies and departments working in isolation and in silos, was advocated. The main issue is to locate an individual or an agency that would become responsible for driving this integration. This connects with the notion that agencies need to 'get institutional arrangements right'. Also, there needs to be increased investment in social institutional capacity building, for example, the current government funding structure and program approaches fragment and undermine efforts because they are based on annual cycles and confined within specific agendas and, "it doesn't allow for support for stuff in between, and that's what we're really missing" (Urban 6).

Social fabric, networks and partnerships

Social fabric, networks and partnerships were highlighted as essential for the future ability of the Cains community to cope with changes. Cairns was described as a transient community and interviewees identified the need to focus upon how to draw skills back to the region. They also sought recognition that amongst this transiency, "the Aboriginal [and to a certain extent the Torres Strait Islander] communities are here for the long-term" (Urban 10).

Individuals spoke about the need to focus upon building community cohesion. For example, there is a need to re-develop a sense of community, find ways of adapting to challenges ahead, to put in measures to build resilience, and to think about one's neighbourhood. This assumes that when people feel more a part of the community, they want to protect it. One interviewee suggested that neighbourhood building could be facilitated through:

> "Neighbourhood fiestas, so people get outside a bit more; get out their front door […] A lot of people don't even know the name of their neighbour. So, something that would draw the community together, or even people from different groups together. There are a lot of groups that work separately; something that could draw the main people from different groups together." (Urban 3)

Participants spoke of the importance of re-building an identity for Cairns, such as the need to develop a cultural vision, given that Cairns is going through a transitional period. Further, the tourism industry needs to "be looking for a vision and that vision should take into consideration architectural styles, landscaping; the way in which we present the town or new subdivisions, or new towns" (Urban 5). On the other hand, as one interviewee states, there is a need for Cairns to look beyond tourism for its future identity: "tourism is a little bit bleak […] I think Cairns needs to be reinventing itself" (Urban 2). This is within the context where:

> "[There are only a few] locals who really know history and all the depth, virtually everybody else is from somewhere else. It's very interesting and it's a community [that was] created 'on the run' and that's interesting in its own right, but [at the same time, a sense of heritage is important to a community's identity]." (Urban 10)

Another interviewee speaks of the importance of any such identity and vision to be optimistic:

> "One of my frustrations […] is when you say to people, 'This is what we should be doing; this is where we can go', and people will come up with five hundred reasons why you can't do it […] If we just say, 'We're going to get there; we'll find a way to get there', then we'll get there. It's important to be a realist and understand there are real issues and obstacles, but at the same time […] we can do it. It's not rocket science." (Urban 6)

Networks are important for an evolving identity and vision for Cairns. Participants spoke of the valuable and important work that community groups and community networks do to unite a community. It is important to facilitate projects and programs to build networks and connectivity across diverse groups.

> "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 values/concerns, or who don't. It's that connectivity which I think is at the heart of this." (Urban 6)

Volunteering, and support for volunteers, is an important ingredient in this process, and needs to be encouraged. One interviewee lamented what he believes is a lack of volunteers and local leaders in the community:

> "[There is now a] lack of people [who are] prepared to volunteer. [In the past] we had [a] very strong community where people did a lot of voluntary […] Now, everyone's so busy chasing a buck that other than the elderly and the 'grey nomads', they're the ones doing all the work [… in the past] the strength of the community was that everyone knew everyone and everyone helped everyone, [but] that doesn't happen now." (Urban 4)

Economy and infrastructure

A sustainable, diversified economy with a local focus was highlighted as essential for the resilience of the region. Case study participants spoke of various attributes that would be desirable to foster, such as an economy based upon a limits-to-growth philosophy that creates a sustainable cohesive culture and protects the natural environment. As one interviewee articulated:

> "It's almost like trying to get the best of both [development and environment] and not get the worst of them, so the best opportunities are actually designed in the most sustainable way possible. […] In a way that doesn't trash the values you're actually trying to live with. The growth gives you an opportunity to get that right and it gives you the opportunity to actually replace that loss and all those things we talked about. It's not the growth *per se*; I think the problem is really the way it happens, although there is a limit to what is sustainable in terms of future growth as well." (Urban 10)

A diverse economy was highlighted by many as important. This is based upon the notion that Cairns' degree of dependence upon tourism is unhelpful. Despite a contemporary shift in focus by some businesses to ecotourism, where "there's a threat to the economy, there's often a go-ahead-at-all-costs [approach]" (Urban 2). By fostering other economic opportunities, Cairns would become less vulnerable to impacts on the tourism industry. Given city-region interdependence – "I never think of Cairns without thinking of the region because they are quite intimately connected" (Urban 2) – the need to foster a diverse economy includes the Atherton Tablelands. As this interviewee explained:

> "The FNQ2031 Plan says we need to focus on getting more people up on the Tablelands where [there's] a better climate, less constrained, but that won't happen unless we can get employment up there and so we've got to get people

> to invest and create employment opportunities [including…] value adding to the agricultural opportunities there; the slow food [movement] and diversification of the agricultural product. There are fabulous soils up there on the Tablelands. […] the diversification and having less reliance on the vagaries of one crop […] if there was more scope to change and change their product overtime and then they're more in tune with nature of that industry." (Urban 1)

Many interviewees advocated the building of Cairns as a sustainable city. This included a focus upon the local produce and the creation of a locally sourced economy. This is a particular imperative given the potential impacts of climate change. Within that context is the idea of developing the:

> "Slow food movement; the potential of the Tablelands. With everywhere else in Australia getting dryer and dryer and we still have water and some of the best quality soils in Australia, there was a huge potential for this region to become the food bowl and provide enough food for the whole local community. The cost of transporting all our food to Brisbane or Melbourne, etc., it's just an absolute nonsense, but we do it because that's the way the system is. We should really be thinking about the way we do things anyway; the motivation of climate change pushed a few buttons and maybe we would have to move towards that more quickly." (Urban 1)

Creating a sustainable city and local economy also related to social connections. One interviewee recommended putting a focus on actions to build resilience, such as building stronger connections between producers and urban communities, recognising food miles and creating mechanisms to allow farmers to take food directly to local consumers.

Many participants described built and social infrastructure as central to building Cairns as a sustainable city. This includes the idea of Cairns as a tropical city with unique tropical architecture. One interviewee discussed the need for an appropriate tropical building code that is compatible with the region, instead of one that encourages the building of besser block houses that require air-conditioning in most rooms to keep cool. Interviewees discussed how the main driver for planned communities is affordable housing, which comes "down to cost. There are the materials that people are using; it won't be sustainable housing" (Urban 7). Others spoke about the importance of learning from other cities around the world about their experiences of creating sustainable high density living. One interviewee discussed the complexity inherent to this:

> "I like the European models of high density living [in] communities with lots of open space around them, rather than the urban sprawl model that we follow at the moment, which is very unsustainable on many fronts. But when you talk to people about high density [they think about] all those horrible units in the city; so we really have to come up with some examples of high density urban living that delivers what people want that are not just turning into urban slums, or another way of isolating people in a box somewhere." (Urban 6)

Given the rapid growth of Cairns, many interviewees spoke about the essential role that planning can have to drive the creation of sustainable new urban centres. This in the context of:

> "Cairns' geography, it's sandwiched between the mountains and the coast, it has limited opportunities for urban expansion. So, in a way it's kind of testing the limits to growth. Of course, there are the Tablelands that people can spill onto but for most people it's almost like another country." (Urban 6)

Case study participants spoke of the potential these new developments could have, if done sustainability, for creating liveable communities and as exemplars for the rest of Australia. For example:

> "We have an opportunity here to say, 'OK, how do we design buildings that are actually suitable for this climate and how do we design buildings knowing that they have to have a low environmental greenhouse footprint?' There are a lot of great technologies out there but often getting access to some of that stuff is difficult, being a regional community." (Urban 6)

To be sustainable, urban centres need to integrate housing, employment, shopping and local transport, so as to reduce the pressure on Cairns.

Funding for social infrastructure was also considered essential for the development of a strong community that is able to cope with change. This includes improved medical and dental services, although "some services have improved, but all medical, dental and other services are fully stretched. So, if you get sick in rural areas, then get yourself to Brisbane or Sydney immediately, don't even muck around here" (Urban 4). Further, there is need for the relevant government department to focus upon prevention rather than cure, when it comes to youth justice. As one interviewee argued:

> "[The department] focuses on youth and crime prevention [but] what does that mean? […] So, there are those young people who aren't maybe at risk of entering the juvenile justice system and there's no money being spent on them." (Urban 7)

Community engagement and consultation were also considered important with respect to infrastructure development. However, one interviewee felt there was very little follow up, "even with Mt. Peter, all the community input that was put in earlier, it's not actually recorded and followed up on. Everybody talks about consultation, but to actually make it work somehow" (Urban 3). Genuine community consultation might result in increased funding to develop things that the community has said they want, for example better bike paths, improved public transport and community facilities and centres.

People-place relationships

The close connection of participants to their 'natural environment' is clear throughout the interviews. People enthused about the natural beauty of the region and the importance of a history built upon environmental battles. Several themes were discussed in relation to the importance of people-environment connections and what this means in the context of urban expansion. Interviewing for this case study coincided with severe flooding in Far North Queensland (Ingham and surrounds), in February 2009. Participants spoke of what this meant to the region, for example how such events provided awareness in relation to the very real need to change practices because the flooding may have been connected to climate change. Such events provide an indication of what may occur more frequently into the future.

Other interviewees spoke about the pressure that urban expansion puts on the native bush:

> "I see [Cairns] growing and growing and putting more and more pressure on the bush […] not only is it just the spread of [the] concrete jungle, its everything that we take with us – diseases and weeds and fowls and the whole fragmentation [of native bush, there will be increased] resource use and there will be pressure for more dams and bigger roads and its inevitable, it just happens." (Urban 2)

The same participant also spoke about the importance of protecting the rich agricultural land on the Tablelands from extensive urban expansion.

> "I'm a huge supporter of maintaining good quality agricultural land. I don't mind if it gets rainforest on it, but I don't want houses on it. For me, that urban jungle is the last thing you want on good agricultural land. You [can] never recover [it]. You can grow trees and you can chop them down, that's fine." (Urban 2)

Other participants claimed that rural producers need more support. This cane farmer spoke about increased restrictions placed upon rural producers:

> "Urban expectations have made us violently change our practices in a time of hard economic times. We were saying, 'It's hard to be green when you're in the red!' However, governments, bureaucracy and urban people are wishing to put more and more restrictive conditions on rural producers that will in the end make them unviable. Every condition increases our costs." (Urban 4)

Another individual spoke about the dependency that the Cairns economy, based mainly on tourism, has upon oil. He contextualised the region within global markets by explaining, "The community is very vulnerable to oil prices because we're dependent upon one big industry, which is very reliant on fuel prices. So, economically the region is very exposed" (Urban 6).

Most Recent Outbreak of the Crown of Thorns Starfish

Introduction

This case study explores how people who have a close connection with and dependence upon the Great Barrier Reef, in particular the inshore and reef area off the coast of Cairns, were affected by and responded to the most recent outbreak of the Crown of Thorns starfish (COTS), which occurred off the coast of Cairns between 1993 and roughly 2003. The focus was chosen by the regional partners as an example of resilience, because biophysical changes due to the outbreak have important ramifications for sustainable livelihoods and management of the Great Barrier Reef Marine Park. Further, the Great Barrier Reef Marine Park Authority (GBRMPA) and Association of Marine Park Tourism Operators (AMPTO) formed a valuable partnership in the COTS eradication program. Most individuals have commented – and monitoring by the Australian Institute of Marine Science (AIMS) verifies – that the outbreak off Cairns had passed by 2008, and although the Whitsunday region still has some reports of COTS outbreaks, they have almost returned to normal levels. The causes are not well known. Water quality has been considered among the factors, and recent research suggests a relationship with fishing (Sweatman, 2008).

This case study illustrates the dependency of the community, the tourism industry and local enterprise on the Great Barrier Reef system. It shows how tour operators in particular coped with the COTS outbreak, with the support of other parties. The analysis sheds light on the strengths of the tour operator community as well as the important connection between the tourism industry, the health of the Reef, and the economy of the wider Cairns community. The development of new technical knowledge, partnerships between industry, government and scientists as well as the role of local leaders and champions are discussed as key attributes of social resilience in this region.

Interviewees

Eleven individuals who were able to speak about the inshore and near-reef area off Cairns were interviewed for this case study. In the first instance, participants were identified by the regional partners through a stakeholder analysis, and further interviewees were suggested by the case study participants. These comprised people from the Cairns and Port Douglas areas as well as two people residing in Townsville. Interviewees included representatives from the GBRMPA, the Environmental Protection Agency (now incorporated in the Queensland Department of Environment and Resource Management), AMPTO and AIMS, as well as diving and snorkeling tour operators, a local scientist, a local fisherman and Traditional Owners from the region.

Context

Outbreaks of COTS, known scientifically as *Acanthaster planci,* are a threat to coral, and hence to tourism livelihoods. The starfish is a widespread marine species that is present on reefs throughout the Indo-Pacific, from East Africa to the west coast of the Americas (GBRMPA, 2006). It also occurs naturally on the Great Barrier Reef. Adult COTS grow to approximately 25-35 cm diameter, although individuals have been recorded up to 80 cm diameter. Female COTS can release more than 15-20 million eggs during a single spawning event and they may spawn many times during one breeding season (Aiello, 2006). Larvae float in the plankton for 10-28 days before they sink to the sea floor and settle on the reef. They cluster together in nurseries at the base of staghorn coral colonies and remain in these clusters until they reach sexual maturity (approximately three years of age) (Aiello, 2006). It has been estimated that an individual adult starfish can consume five to six square metres of

coral tissue a year; however it may survive without feeding for up to nine months (GBRMPA, 2006). COTS digest coral tissue and leave behind the white calcium carbonate skeleton. COTS eventually die of starvation once their food source has run out.

When conditions suit, COTS multiply to plague proportions and destroy much of the hard coral on the affected reefs (AIMS, 2007). COTS outbreaks are responsible for a greater decline in coral cover than any other threat to the Great Barrier Reef (AIMS, 2007). The first documented case of a COTS outbreak on the Great Barrier Reef was at Green Island in 1962: during this outbreak only a few reefs were affected. This outbreak ended in 1974 on reefs just north of the Whitsundays and confirmed the hypothesis that larvae are carried with the southerly travelling ocean currents (CRC Reef, 2003). Another outbreak was recorded in 1979, again at Green Island. That outbreak took approximately ten years to move southwards to the Swains Reefs; during this time approximately seventeen percent of reefs were affected. A further outbreak was recorded in the Cooktown region in 1994, with the highest density of starfish recorded north east of Townsville in 2003 (CRC Reef, 2003).

The cause of COTS outbreaks is unknown; however three theories are supported by scientists:

- Fluctuations in COTS populations are a natural phenomenon;
- The removal of natural predators of the starfish has allowed populations to expand (see Sweatman, 2008); and
- An increase in plankton resulting from increased nutrient runoff from the land improves the survival rate of COTS larvae (CRC Reef, 2003).

Many scientific studies have been conducted, with subjects ranging from the causes of outbreaks to best control strategies (see for example, Keesing *et al.* 1992; Sweatman, 1995; Fisk & Power, 1999; Engelhardt *et al.* 1999). A MTSRF study aims to develop indicators and thresholds of concern to provide for early warnings of further outbreaks (see MTSRF, 2008).

There are currently no control methods suitable for intense starfish populations affecting large areas of the Reef, but tactical controls can reduce the impacts of outbreaks at important sites for tourism and recreation (Fisk & Power, 1999). These control actions are important for tour operators in affected regions. The most recent management activity was carried out by the AMPTO between 2002 and 2004, the result of their submission to the Queensland and Federal governments requesting financial support to control COTS on important reef tourism destinations. The aim of the project was to supplement efforts already made by the marine tourism operators. The Queensland Government allocated $300,000 to fund a pilot study in 2001, and to set up a COTS steering committee to oversee the most cost-effective methods of control (Aiello, 2006). The Queensland Government committed a further $700,000 once the pilot study proved effective and the Federal Government also committed $700,000 to support the COTS eradication program over two years. The money was administered by the GBRMPA and the program was coordinated by the AMPTO (Aiello, 2006). A full-time vessel and team of eight divers visited over 180 key tourism reef sites from Port Douglas to the Whitsundays between 2004 and 2008. Certain requirements were put in place. Sites had to meet strict conditions before the AMPTO vessel would visit. The tourism operator had to be carrying out in-house COTS control, prove the site was of economic value to their operation, and visit the site regularly. There had to be a high number of COTS on the site and an application had to be submitted and accepted by the independent COTS Site Selection Committee (Aiello, 2006).

Participants' perspectives on the change process

Participants discussed the ecological, economic and governance impacts as well as the role of the media and word-of-mouth in reducing tourist numbers. Although the trigger for COTS outbreaks remains undetermined, some scientists believe it is part of the natural system, while others talk about the impacts of poor water quality on larvae survival rates and relationships with fishing rates. There is no doubt, however of the ecological impacts of outbreaks of COTS on the Great Barrier Reef.

> "The reef is still not in good condition [and] you're certainly still getting ongoing word of mouth that the reef is not good, but then the reefs are not particularly good anywhere in the world right now [… because of] coral bleaching, over fishing […] generally reef health is […] on the decline globally, not just here." (COTS 8)

This in turn impacts upon the tourism industry and the local economy. For example one interviewee discussed the connection between marine and terrestrial business: "… in the last couple of years, two big dive shops [have disappeared from] Cairns [...] they've just simply gone" (COTS 7).

The close connection between marine tour operators and the health of the Reef is very clear. The creation of the AMPTO COTS eradication program is evidence of this. Many tour operators were severely impacted by the outbreak, particularly smaller operators. Many of these operators could not afford staff time to eradicate COTS on the reefs they visited. These areas were more likely to become infested with COTS, and their lack of activity meant the AMPTO COTS eradication vessel was not able to assist them. This lack of activity had added ramifications for other operators who visited dive sites nearby. One interviewee explained the difficult situation faced by operators:

> "The [COTS] program didn't work as well as it could have. The classic [example] would probably be Michaelmas Cay. The [tour operator], being a reasonable sized operator, was taking a couple of divers out every day and cleaning the COTS off their sites and they were doing that every single day, but everybody around them, all the small operators [...] that take 20 to 25 people out, if they put a couple of divers on, and that's two less paying passengers they can carry, and when you're only carrying small numbers, it seems to be almost ten percent of your carrying capacity is lost by carrying a couple of divers. So, they just couldn't afford it [... and the dive sites] were destroyed [by COTS]". (COTS 7)

Many tourists who come to the region to dive and snorkel expect to see a 'pristine reef' that matches images seen in tourist brochures, magazines and marine documentaries. Professional photographers spend hours trying to capture the 'perfect' images. The reality is that most divers and people who snorkel are not likely to see the Reef in the way captured in such images. However, the COTS outbreak did leave some tourist dive sites devoid of healthy coral. Many interviewees discussed the impacts this had on the tourism market. They explained that word of mouth as well as sensationalised media stories that described the Reef as 'dying' had impacts on tourist numbers. One individual also highlighted the role that the tourism industry, as well as government agencies, has to educate people about Reef health, and that the Great Barrier Reef is a system that is always in flux, as well as the need to be proactive in raising community awareness. He explained:

> "The media loves very emotive terms [such as] 'Great Barrier Reef being destroyed' […] of course when you start using headlines like that and they go international […] it's a pretty strong disincentive to [visit] the Great Barrier Reef. That is the largest impact on the community. It doesn't just affect those

> operations that physically take people out to the Reef. It affects the hotels [and] restaurants and all the support industries. So, when you have a downturn in tourism that affects the community and so it comes back to how it is reported. The truth is somewhere in between the tourist industry wanting to say, ‘Everything is fine’, […] and the media wanting to say, ‘It’s a disaster and the sky is going to fall in!’ But the truth is, there is still plenty of beautiful coral to come and see and the tourists don’t need to stay away. In fact, you can turn it around and see it as an educational experience […in the past it has been] very interesting to see [the] GBRMPA mounting a campaign to engage the media, to not just say, ‘Don’t say those things’, but to provide them with the information and the footage and the stories, [to] be on the front foot. Every few years we get a cyclone (Larry, for example), same thing, where the tourism industry just cringes because of course all the media goes out all over the world saying, ‘Cairns has been destroyed’. The tourism industry is getting better at taking some responsibility for putting out the right messages, not just saying, ‘Everything’s fine’.” (COTS 1)

A researcher explained that people have been speaking about the ‘death of the Reef’ since the 1960s, and that in the 1980s significant funding was invested in reef research. The most recent wave of COTS has coincided with a time of donor fatigue and this has affected research budgets. Another individual who works for a tourism operator and was involved with the AMPTO COTS eradication program explained that there were some ‘institutional hiccups’ that affected the ability of tour operators to begin to eradicate COTS at their dive sites. He expained how certain government agencies were slow to issue permits:

> “It’s very difficult for anyone who doesn’t have an existing Marine Parks Permit to get a permit to remove [or] kill things on the reef. […] unfortunately what happened was – within the [government agency] there was a permit section – the applications were going there and instead of being assessed [for example,] ‘OK, this person is an accredited operator applying for a permit’, [the agency was] approaching them as if it was a completely new permit application and that was taking too long to come through so we had to do a bit of lobbying at a higher level and then everything seemed to kick in after that.” (COTS 3)

The COTS outbreak in this region also generated some new opportunities and resulted in some new knowledge (as discussed in the following section). The AMPTO COTS eradication programme created:

> “Alternative employment, or a different type of employment [...] it was an opportunity for people to become involved and in association with the tourist industry who hadn’t been before, for example, these Beche De Mer guys, [individuals involved with] tuna fishing and some commercial divers.” (COTS 3)

New collaborative partnerships were developed between different tour operators, and networks were also developed between the tourism industry and government agencies (see below).

The resilience themes

The following section summarises the main social resilience concepts derived from the COTS case study. Most of these concepts reflect the reliance that individuals from the region have upon the health of the Great Barrier Reef. It is very clear that participants depend upon the natural environment to sustain their livelihoods and way of life. Many individuals spoke of the stewardship role they feel they have with the inshore waters, reefs and islands of the Great Barrier Reef region. The role of tour operators in providing anecdotal

information and early warnings to scientists was articulated by many interviewees. Local knowledge, local networks and partnership were highlighted as the essential factors for coping with the latest COTS outbreak, and more generally for managing change in the case study area.

Knowledge, technology and education

COTS case study participants discussed the importance of knowledge, technology, education and awareness raising in their ability to cope with the changes brought about by the COTS outbreak. Several emphasised the importance of local knowledge for successful natural resource management. They discussed the intimate knowledge that fishermen, traditional owners and tour operators have of the Great Barrier Reef region. One interviewee explained that individuals who are out on and under the water probably "know more about what's going on out there in the ocean [than scientists and managers]; that's our back yard. I've spent forty years out there […] I've seen [what has] happened" (COTS 5). Another person highlighted the importance of partnerships and collaboration between scientists, managers, fishermen, tour operators and so on. She articulated that such people "can visually see changes before science will pick it up as a statistically important change" (COTS 8).

Participants also spoke about the importance of research collaboration and partnerships, in particular with fishermen and farmers. One individual told about the important role he has played for researchers over the years, including provision of access to the reef, accommodation while at the reef and, during subsequent trips, collecting specimens on behalf of scientists. He lamented the fact that he had never been acknowledged for his assistance and pointed out that the research could not have been conducted if he (and others like him) had not agreed to be involved. He also commented on the great research potential of developing partnerships between scientists and local resource users. He questioned how society values knowledge: "there's a lot of knowledge [that] doesn't get used. Apparently, you've got to go to The University of Queensland before anyone takes any notice of you" (COTS 5).

Changes and impacts to the Great Barrier Reef can create opportunities for research and the development of new knowledge. A scientist explained, "If there's a problem then you've got an initiative to work on" (COTS 9). Indeed the ongoing AIMS Long Term Monitoring Program began in 1985 as a result of the COTS outbreak. However, research requires funding. Significant resources were invested in COTS research in the late 1980s but have waned. The scientist further explained, "Funding for research is such a political issue, it's not an environmental issue. It's not driven by the environment; it's driven by marginal seats, which there used to be lots of along the Barrier Reef" (COTS 9).

A tour operator explained that the most recent COTS outbreak facilitated the development of new technical knowledge in relation to night diving and innovative technology to capture individual starfish without the diver being harmed. This new knowledge and technology could have ramifications for other countries also suffering from COTS outbreaks. As well as providing assistance, this could lead to economic benefits for the Marine Park tourism industry. He enthused that "there are other countries that have the same problems that might not have the same levels of expertise to call on, whereas this industry could export that [knowledge]" (COTS 3). Indeed, one individual spoke about the networks that she had developed in countries including Fiji, the Maldives, the Philippines and Malaysia via the Internet. She shared her COTS eradication training package with them and has "actually developed a system that they can fill in the necessary questions [whereby she] can deduce whether they're in an outbreak or not and give them an action plan" (COTS 8).

Farmers who manage coastal land were acknowledged as a part of the Great Barrier Reef region, whose practices influence the Reef. One interviewee who has worked with farmers for many years argued for recognition of cane farmer innovation. He argued:

> "[Cane farmers] are really well ahead of the pack in rehabilitation, wetlands and revegetation of creek banks and stuff like that. They've gone above and beyond the call of duty, I suppose. Well, it's the innovators again, that 10-15% that really [picks] up on research and other findings and [does] something about it […] A lot of the farmers look over the fence and watch those guys. The first reaction is, 'Oh, that'll never work, the buggers will go broke!' Then, five years later, 'that wasn't too bad; he's still there, so it worked!'" (COTS 2).

He argued that individuals must see that there is a win-win to change, they must develop capacity to be able to analyse the information they are provided with and consider how this new knowledge may be adapted to their situation. A local leader to facilitate the learning process is equally important. He explained that some issues go 'beyond the farm gate', and in this instance change may be required "in the system, like a cane payment system that applies across a mill area" (COTS 2). In such a circumstance:

> "It's the capacity of the group to manage change and identify the benefits/costs of applying the change, which is pretty critical and pretty hard in most cases to bring about. The underpinning thing is knowledge and information, and the overriding thing is just giving people some processes to manage change […] you can often do that through workshop facilitation. [You] can get some good people that have got credibility in the area – that would often be a farmer or a businessman or someone else – who can help a group identify the need for change; identify the options for the change and then what are we going to do about it; what's it going to cost." (COTS 2)

The need for greater awareness raising about COTS outbreaks and the fact that the Reef is a multiple use area were highlighted by many interviewees. They noted in particular the need to break down stereotypes, for example that farmers are to blame for poor water quality, that cane farmers are stuck in tradition and that tour operators only care about the economic value they derive from the Reef. Much scientific research has been conducted into COTS, outbreaks and other issues relating to the health of the Great Barrier Reef. Some interviewees argued that the scientific community must take more responsibility to communicate their research to the wider public in a way that is accessible.

Collaboration, partnerships and networks

Collaboration, partnerships and networks were identified by all study participants as integral to resilience in relation to the occurrence of COTS in their region. Collaboration within the tourism industry was described as essential for development of the COTS eradication program as well as the successful eradication of COTS on selected tourism sites. One tour operator explained:

> "In the early days there wasn't that much collaboration between the different operators. Everybody thought, 'Well, we're in this on our own'. It was only when we started to lobby for government assistance that it tended to draw the industry together. There was a common enemy." (COTS 3)

Increased cross-agency collaboration between the then Environmental Protection Agency and GBRMPA were seen as necessary. Collaboration and networks between government, industry and community were equally highlighted as vital to the successful work of natural resource managers. For example, a representative from the AMPTO pointed out the

complex relationship between the GBRMPA and tour operators. He explained that tour operators are "the ones who are underpinning what's happening out there [on the reef] and we're helping the Federal Government fulfil its international legislative obligation to showcase the World Heritage Area. Certainly, my way of looking at it is the Government doesn't do badly out of it anyway" (COTS 7).

The importance of partnership development between natural resource managers was highlighted, in particular the importance of government agencies taking time to develop genuine and transparent relationships with all managers and users. One individual explored the idea of knowledge partnerships, suggesting that challenges could be addressed better if one put:

> "… scientific and cultural knowledge together [...] it's just value adding to people's experiences; people's processes. Opening up doors for both Western science and traditional science, they have a place in today's society." (COTS 6)

He added that such knowledge partnerships could include two-way "training and all aspects of Caring for Country (including Sea Country); both the 'National Parks way' and the cultural way, kind of [like] 'walking the path together'. You cannot have one and not the other" (COTS 6).

He explained that partnerships of this kind did not yet exist. The current situation was that:

> "There [are] no partnerships, nothing whatsoever. These fellows are not even in the picture [...] every once in a while if you're lucky, things may trickle down to here for consultation. [...] the mob, they get consulted and their part of their community plan is attached onto [the broader plan], whereas I'm saying [...] part of the community is Indigenous people, [they should be included from the very start]." (COTS 6)

One interviewee highlighted the importance of changing the research culture from one of competition to one of collaboration. Another individual pointed out that researchers working on Aboriginal land must enter into partnerships with the traditional owners of that land:

> "The mob coming on board through some partnership or capacity building around us where they can actually go out on these particular countries again, with Western science, and work together and research […] it would be of benefit not only to Western science, but that filters down socially. So, if you've got jobs, aspirations, motivation, that's getting them out of bed everyday, that breaks the welfare cycle." (COTS 6)

Interviewees spoke about the important role the media had and could have into the future in influencing the response of the wider public to changes in the health of the Reef. For example, several individuals spoke about the detrimental impact of sensational media coverage. They believed that a decrease in tourist numbers could partly be attributed to this. One person discussed the importance of a strategic media engagement plan. A GBRMPA representative highlighted that the Authority "[does] a lot of proactive media releases, talking about the programs [...] but the media just doesn't want to listen" (COTS 10). Another individual highlighted the importance of having a collaborative working relationship with the media. He articulated:

> "This time round with Crown of Thorns [starfish, the media] was helpful. Helpful from the point of view they kept the pressure on politicians, which I needed. I had to create enough awareness in the media to let the politicians know that we had to do something about it, but at the same time we didn't need it to be portrayed

> as the End of the World [...] You've got to develop a relationship with them and I've made it very clear. When I was dealing with the media I'd say it to the Channel 7 crew, 'Guys, look, while I'm happy to give you all this information, my aim of getting this out is to get in front of the Minister so that when I see the Minister in three or four days' time this will be fresh in his mind as having come across his media monitor'. OK, [there] might be a problem here – and then I can try to produce solutions. The media accepted that." (COTS 7)

This individual also spoke about the vital role of diverse and extensive networks for the successful work of natural resource managers. These networks may include individuals from state and federal government, the media, artists, documentary film makers, members of various local industries, representatives of traditional owners groups and so on. They may extend within the region, in Queensland, other parts of Australia and even overseas.

Capacity building and leadership

Capacity building was discussed as a high priority in being able to cope with change. As has already been raised in relation to knowledge, the ability to access, understand, analyse, adapt and use information is essential for change management because change will not happen until an individual or group takes ownership of it. It is also important to build the capacity of the youth. One Traditional Owner discussed the fact that "to become an old person you were once upon a time young. We must care for the young as much as we care for the old" (COTS 6). This person pointed out that young and old people do not always agree on the appropriate route to solve a problem. Therefore it is important to assist young people to solve problems in a way that will not be detrimental to the wider community.

Developing ownership of the Great Barrier Reef was identified as important to ensuring active citizenship. The building of ownership is currently occurring via the GBRMPA Reef Guardian programs. Traditional Owners also spoke about the importance of creating opportunities using local skills and 'bigger picture' thinking within their communities. Tour guides and on-boat stewards have an important role in managing COTS. One individual explained:

> "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." (COTS 8)

The power of local and agency leaders cannot be over-emphasised. The COTS eradication program came into being because of the strong leadership skills and networks of a few representatives from the AMPTO. An important aspect was "their ability to bring people together" (COTS 8). Further, leaders within government agencies are integral for the success of collaboration, partnership development and functioning networks across government, industry and community. One individual explained how one person in an agency or organisation can change relationships for the better or worse. She elucidated that "it comes down to individuals […] and their skills […] the whole flavour of an organisation comes from who is guiding it" (COTS 8).

The economy

Economic opportunities often arise from change. Individuals discussed the changing aspect of the tourism market on the Great Barrier Reef, with tourist numbers showing a decrease in individuals coming to Australia to learn how to dive. The new market seems to be more experienced divers diving on remote locations that are more expensive to reach. One

individual explained how the operators who change with the market demand are more successful than those who do not. He described the work of one tour operator in particular:

> "They make more money on their boat doing certified dives than doing the [learn to dive] education […] they've had to gear that up – change their marketing; change how they promote their business here in Cairns and also internationally. Probably, the best running operation in Cairns at the moment would be [name of company] and they're getting something like eighty percent of their tourists coming from overseas pre-booked. So, they're doing an enormous amount of promotions within Europe and [the] UK and they concentrate very much on that part of the market [certified divers] and they get cream from it." (COTS 7)

One individual spoke about the lack of Indigenous involvement in the tourism industry. He argued there is much potential in this multi-million-dollar tourism industry for Indigenous engagement and Indigenous tourism.

The role of government, and planning for the future

Government funding is essential for the development of collaborative problem-solving and innovative on ground actions. The COTS eradication program was given as an example of an innovative funding decision whereby local tourism operators took ownership of eradicating COTS on selected sites. This facilitated cross-industry partnership building, the development of new technical knowledge and technology as well as the development of new strategic knowledge. Certain interview participants felt that throughout this process the government had started to use social research as well as scientific research to make management decisions. This was regarded as essential for coping with change in the region. A whole-of-system approach was seen as critical to solving the problems and challenges of managing natural resources. The importance of partnership development between natural resource managers was highlighted, in particular that management agencies need to take time to develop genuine and transparent relationships with others who use and influence the environment.

One individual spoke specifically about the importance of Indigenous communities developing their own future planning that would include management plans. He envisaged such plans including a toolkit of management programs and approaches, encompassing "programs and all these activities carried out on country that are going to make the mob improve their social wellbeing; get that motivation; building that culture and get the identity strong again" (COTS 6).

Girringun Aboriginal Corporation[5]

Introduction

This case study was selected to ensure an explicit Aboriginal focus was included in the set of case studies. The five other case studies have included interviewees from the relevant Traditional Owner groups for each area but none has specifically investigated what social resilience means to the Aboriginal people from the region, and in particular, how they cope with change. The regional partners therefore advised the researchers to conduct one case study that focused specifically upon Aboriginal experiences, recognising that Aboriginal people from the region have been confronted with extreme change since colonisation. The researchers and regional partners decided to focus upon Girringun Aboriginal Corporation (hereafter referred to as 'Girringun') as an institution that enables people to cope with change, rather than a specific change event. It identifies the characteristics of Girringun that enable its members and partners to contend with change and proactively seek out and grasp new opportunities.

Girringun is an association of nine Traditional Owner groups from the southern part of the Wet Tropics region, namely Bandjin, Djiru, Girramay, Gugu Badhun, Gulnay, Jirrbal, Nywaigi, Warrgamay and Warungnu (see Figure 8). Girringun Aboriginal Corporation (2010a) describes the traditional country of these groups as encompassing land around North Maria Creek to El Arish and south west to the Tully River, north to Ravenshoe and Herberton, south to include country to the east of Einsleigh, south west of Greenvale and south to Rollingstone on the coast. The offshore islands and waters surrounding Hinchinbrook, Gould, Brooke, Family and the Dunk Islands are also included in this area. The nine Traditional Owner groups are an integral part of the Wet Tropics region. They have been interacting with this country, their country, for millennia. These interactions are described in contemporary times as 'caring for country' and include land and sea management based upon cultural protocol and practice.

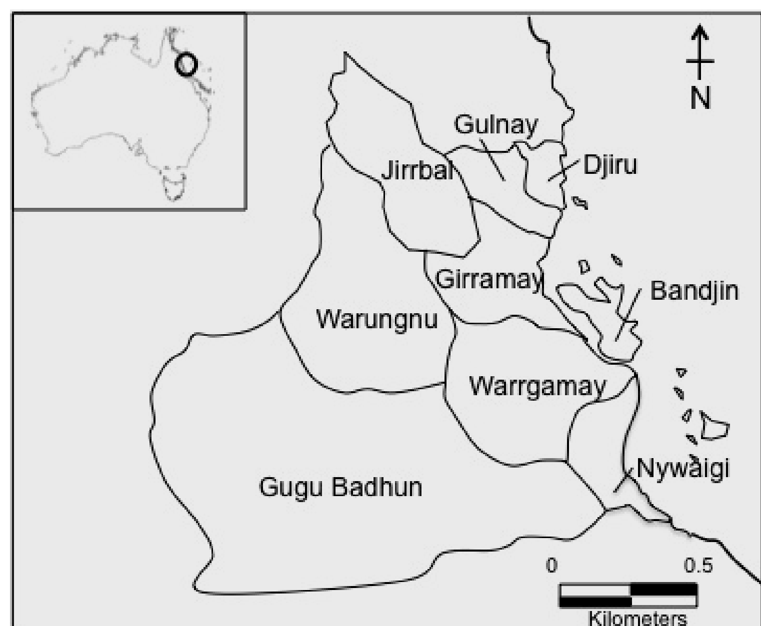

Figure 8: Girringun Traditional Owner groups and their approximate country locations. Boundaries are indicative only. (Redrawn from Girringun Aboriginal Corporation source by Melanie Zurba.)

[5] This chapter prepared by Dr Kirsten Maclean (CSIRO) and Mr Phil Rist (Girringun Aboriginal Corporation).

This case study also provides an institutional focus, on Girringun as well as the organisations it partners with, to ensure that institutional dimensions in resilience are given sufficient consideration. The regional partners (Girringun is one) identify Girringun as an essential part of the regional governance landscape. Each agency works closely with Girringun as a means to engage the Traditional Owners of that part of the Wet Tropics region in planning and management activities. For example, the Great Barrier Reef Marine Park Authority (GBRMPA) works in partnership with Queensland Parks and Wildlife Service (QPWS, in the Department of Environment and Resource Management) and Girringun towards fulfilment of Girringun's Traditional Use of Marine Resources Agreement (TUMRA). The Natural Resource Management (NRM) Board for the Wet Tropics, Terrain NRM Ltd., has engaged with Traditional Owners, through Girringun, in a country-based planning initiative and towards the region's NRM plan, and the Wet Tropics Management Authority (WTMA) collaborates with Girringun, as a representative voice for its members in much of the strategic planning and management work for the Wet Tropics World Heritage Area. Girringun is thus integral to the governance and management of the southern part of the Wet Tropics region, and as discussed in this case study, provides an excellent model for other Indigenous groups around Australia. As the case study shows, Girringun also engages with social development agencies and schools towards the social aspects of its agenda.

Interviewees

Sixteen people were interviewed for this case study. Each of these individuals engages with Girringun to implement social or environmental management programs and projects, including cultural heritage mapping and management, Girringun Arts, the Wishbone education project, the TUMRA, Cardwell Indigenous Ranger Unit and Mungulla cattle station and tourism venture. All participants were able to speak about the characteristics of Girringun that enable its community to cope with change and to proactively seek and grasp new opportunities. Participants included representatives from Girringun, Tully State High School, Echo Adventure and Cultural Centre, the GBRMPA, QPWS and NQ Dry Tropics. Interviewees were identified by staff members of Girringun through a stakeholder analysis and further interviewees were suggested by case study participants. The interviews ran between 25 and 90 minutes.

Analysis

Girringun as an enabling institution: Participants' perspectives

This section details some of the projects and programs that Girringun has been instrumental in facilitating. Some of these include projects and programs external to Girringun: the Wishbone project and Mungulla cattle station, as well as those that have evolved from partnerships based either at Girringun or in Cardwell: the TUMRA, Girringun Arts and the Cultural Heritage Mapping Database.

Wishbone Project

The Wishbone Project evolved from a partnership between Girringun and Tully State High School to address the issue of Indigenous student retention beyond Year 10. It was named after a wishbone association linked to the time of Girringun's genesis as an organisation. Conception of the project began at the end of 2005 and the project continued until December 2008. Initial funding ($30,000) was awarded from the then Commonwealth Department of Education, Employment and Workplace Relations and matched by the school. The funding was used to appoint two project employees to facilitate a series of workshops with local Aboriginal elders and teachers from the school to investigate what was required to keep

Indigenous students at school beyond Year 10. The process was facilitated by individuals at Girringun and the school as well as two project employees.

> "The elders were really worried about what was happening with the youth within the community. Most of the youth were at school and they were disengaging, they were truanting, the absenteeism was higher than any other [school]." (Girringun 3)

The workshops and discussions led to development of a cultural awareness program that focussed on the teaching of seven activities to re-engage students with their potential and interest to learn. The aim was to introduce culture into the school curriculum. The partners identified early on that Indigenous learning occurred best outside of the classroom and in situ, because "if you start taking [kids] out in the bush or nature, and you relate your topic to something that has to do with Indigenous culture or with an environmental topic, then kids come alive" (Girringun 3).

The second stage of the Wishbone Project involved a cultural curriculum. Education Queensland provided $200,000 to fund the two project officers, cultural teachers and operational costs. The project officers sourced local Aboriginal instructors to come together and teach basket weaving, Aboriginal and Torres Strait Islander dance, traditional and contemporary painting, cultural environmental walks, language and Islander coconut leaf weaving to students at Echo Creek Adventure and Cultural Camp. Some 76 students, mainly from Tully State High School participated in the program over a period of four to five months. Groups of students in mixed year groups (Years 6 to 12) visited Echo Creek one day every fortnight to learn from their elders (a total of four groups per fortnight).

The main outcomes of the Wishbone Project included improved literacy and numeracy, improved pride and confidence in personal Indigenous cultural status, improved self esteem, new knowledge of cultural practices, reconciliation between Indigenous and non-Indigenous youth from Tully State High School, improved relationships between 'trouble students' and their teachers (who chose to become involved as onlookers in the running of the project). Students also participated in a Wishbone Promotional Day, where they showcased their art and dance. Later, dancers were asked to perform at the Cairns Convention Centre in front of the visiting State Parliament. Ultimately the project 'built bridges' and resulted in relationship building.

> "[The non-Indigenous young people] came out and joked with their peers, […] and they all saw one another in a different light. These are kids that would never ever associate at school […] it just brought them together." (Girrigun 3)

> "[The project] really strengthened the relationship between teachers [from Tully State High School] and those ['at risk'] students, and that is what makes teaching important for kids. My father has a saying: 'If you do what you always did, you'll get what you always got'." (Girringun 3)

Mungulla cattle station

The Nywaigi people acquired the Mungulla pastoral property with assistance from the Indigenous Land Corporation (ILC) in 1999-2000. The aim was to secure land tenure over an area of Nywaigi Traditional Country "to provide that cultural link back to country [and] to also provide enterprises" (Girringun 2). They set up the Mungulla Business Corporation and "learned very quickly that the cattle industry alone wasn't going to provide a lot of jobs, [so we expanded] into tourism, land management and to training and education as well" (Girringun 2).

The manager of Mungulla explained that Girringun was instrumental in the purchase of Mungulla and assisted the Nywaigi people to compile their submission to the ILC for the property.

> "They had access to all the administration stuff required; they had people who knew how these processes worked. So if it wasn't for Girringun we'd be really behind the eight-ball and we probably wouldn't have got this place back." (Girringun 2)

He explained that Girringun acted as a reference point for the new corporation. It worked as a knowledge facilitator and "the 'middle man' between natural resource management groups, government departments, so it filtered out information to us […] as part of the Girringun group" (Girringun 2).

Mungulla station now works closely with scientists from the Queensland Department of Planning and Infrastructure as well as the CSIRO to document a wetlands management strategy. They also provide training and wish to set themselves up as a venue for training and employment, to provide training in transferable skills in relation to cattle, tourism and land management. They operate "a fledgling tourist operation which won [the Best Indigenous Product for North Queensland] tourism award in the first year" (Girringun 2).

Traditional Use of Marine Resources Agreement (TUMRA)

Traditional Use of Marine Resources Agreements (TUMRAs) with the Great Barrier Reef Marine Park Authority (GBRMPA) provide a new way for Traditional Owner groups along the Great Barrier Reef (who have traditionally managed areas of sea country) "to manage the take of turtle and dugong as a traditional hunting practice. [Girringun's TUMRA] allows them to practice their traditions in a sustainable [and] managed way" (Girringun 9).

There are currently four TUMRAs in place along the Great Barrier Reef (see GBRMPA, 2009). The Girringun TUMRA commenced in 2005 following two years' consideration and negotiation; it was the first for the Great Barrier Reef and evolved between the GBRMPA, who "were looking for a mechanism for a system that wasn't working very well in relation to some things, [and the Girringun] Traditional Owners, [who] were looking for a mechanism to get recognition" (Girringun 7). A TUMRA can provide recognition of the traditional practices and histories of Traditional Owners, including "the ability to manage other people and traditional activities in their area" (Girringun 7). The Girringun Board determines the hunting quotas for their respective sea country estates (six of the nine groups have sea country estates). Individual hunters' applications are considered on a case by case basis. To date only four turtles have been taken in the four years since the establishment of the TUMRA. A GBRMPA manager explained:

> "The first purpose [of the TUMRA] was to care for country; the second purpose was to conserve the species through sustainable hunting practices [… Girringun are] quite amenable to sustaining the number for good reason because they want to make sure the numbers are there." (Girringun 9)

The TUMRA is currently under re-negotiation for a new five-year agreement (see Zurba, 2009). Staff members of the GBRMPA regard the Girringun TUMRA as an example of a TUMRA that works well. QPWS Marine staff work with the Girringun Indigenous rangers (Cardwell Indigenous Rangers Unit – part of QPWS) to patrol the TUMRA area. A QPWS staff member noted that there is a funding provision for monitoring. "Under the TUMRA […] there's money for monitoring; it gets [Indigenous rangers] involved in modern conservation techniques" (Girringun 8).

Girringun Arts

Girringun Arts began as an art project with a grant from the Indigenous Coordination Centre[6] six years ago, which aimed to revive cultural arts that had been lost. A Girringun staff member describes this as "a traditional knowledge recording project, getting people back into the arts and back into their culture" (Girringun 1). Workshops taught weaving and shield making. The driving force for the art project was the loss of elders and traditional knowledge. Girringun had been active in ecological research and audio recordings.

> "[The art project was] the progression of actually physically making them instead of just talking about them; to actually get them back out there, 'hands on', to do it." (Girringun 1)

> "The Project started out finding people who had the knowledge and branching out from there, and working out ways to communicate that to other people […] it's an Arts project now, and not so much a cultural knowledge project." (Girringun 1)

At present the Girringun Arts Centre receives funding from Arts Queensland and the Indigenous Coordination Centre to develop an arts program. The focus is less specifically about culture and more overtly about 'fine art products', as this Girringun staff member explained, "They're looking at their bottom line and our continued funding is dependent upon our performance" (Girringun 1).

There are many spin-offs from the art workshops. Although they focus on skill development and potential income raising opportunities, they also build artists' self esteem and confidence. This is obvious when artists extend their comfort zones by speaking at conferences and art gallery openings in Canberra and Melbourne, or when their picture and story appears in the newspaper. The latter builds their profiles and also captures the younger generation, as they perceive this public attention as confirmation that the elders are doing something of value. A Girringun staff member explained, "I had a really hard time […] getting the kids interested in the weaving […] but once Grandmother ended up in the paper, now some of the kids are weaving and exhibiting" (Girringun 1). Also, it is not possible to separate culture, the sharing of knowledge, and art, as a staff member explained, "It is just getting people together again and hearing stories, […] getting them back out there on country with younger people and passing it all on" (Girringun 1).

Cultural Heritage Mapping Database

The Cultural Heritage Mapping Database was set up in 2000. Two local researchers working in the area (also closely affiliated with Girringun) realised they possessed a large collection of archaeological and heritage data sourced from Australian researchers which needed to be put in a safe place under the control of the Traditional Owners. One of the researchers explained:

> "It started out just as simply as that – a place for us to store our own data and also what we'd collected from everybody else over the last forty years [..] it's archaeological data, it's ethnographical, it's botanical, it's cultural and natural […] a lot of the history is the people and how it intercepts with the early settlers, relationships between them. A lot of that data was given for their Native Title […] the elders wanted their information in a format; data that was compatible with government so they could then sell services." (Girringun 10)

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[6] Commonwealth Government centres housing staff from the range of departments providing services to Aboriginal and Torres Strait Islander people.

The database enables self determination, as this Girringun employee stated:

> "The elders are actively looking after their cultural heritage […] it's very much self determination and they're doing exactly what they need to do […] they have to look after their heritage and they're actually doing it." (Girringun 10)

The *Aboriginal Cultural Heritage Act 2003* stipulates that all people have a duty of care to Aboriginal cultural heritage. The Act (Section 6) stipulates that Aboriginal and Torres Strait Islanders are the primary custodians of cultural knowledge and should be consulted about cultural heritage issues. It is the responsibility of any agency or organisation wishing to develop land to make themselves aware of cultural heritage sites. The cultural heritage database at Girringun is of great importance to this process. A Girringun staff member explained how, for example:

> "National Parks give us their areas for site burning and I can sit down in front of a computer and digitise those areas and then analyse those against the sites in the database and work out if there is anything that is going to be adversely affected [and we can work out a better approach]." (Girrringun 10)

The resilience themes

This section describes the main social resilience themes that emerged from the interviews. Many of these themes reflect the important role that Girringun has in facilitating 'caring for country'. This important work includes improvements in the social and economic well-being of the wider Girringun community, keeping culture alive through the arts, storytelling, cultural camps, and the mapping of cultural sites across the landscape. 'Caring for country' and 'healthy people, healthy country' are terms used by Indigenous Australians to describe the close link between culture, land and sea country, sustainable livelihoods and well-being. This case study shows the essential link between Indigenous people, culture, country, heritage, and visions and aspirations for the future.

Knowledge, skills and education

Knowledge, skills and education are important aspects of Girringun's role which enable their community to cope with change and grasp new opportunities. Interviewees spoke about the various skills that Girringun fosters both within the organisation and within their community. A government manager explained how Girringun has excellent governance skills, incorporating communication strategies, negotiation techniques and leadership approaches. As an organisation they will need to maintain these skills to be able to grasp any opportunities that open up. A government manager recognised that "with change comes opportunities. I don't know what they are for Girringun but I think by being well organised and [by thinking ahead] they will be well placed to take whatever opportunities that may arise" (Girringun 7). There is a need for recognition of the current and future potential of these skills. Funding is an important aspect of this recognition. As another government employee stated:

> "If Girringun had the funding, [they] would be very much at the forefront of pushing through the recognition of Traditional Owner knowledge, whether it's cultural knowledge or environmental knowledge." (Girringun 11)

Acknowledgement and recognition goes two ways. One interviewee explained that Girringun is not a self-aggrandising organisation, but goes about its work rather quietly. Girringun would benefit from raising awareness of the variety of roles they perform, and particularly to inform government and other organisations of their innovative work. For example, as three staff members explained in relation to the cultural heritage database:

> Staff Member 1: "[…] when you're talking to government, it's not good them just sitting in their offices ticking boxes, they need to come out and have a look at what we do; come down here and have a look; see what it is that we do [...]"
>
> Staff Member 2: "We had some government people here just recently, a couple of weeks ago, and when we actually start[ed] showing them what the capacity of Girringun is, their jaws [were] sitting on the floor, [they were] quite amazed that we've got computer systems in place, [we can] pull the stuff up, do an analysis."
>
> Staff Member 3: "There's no Mickey Mouse stuff here. No, we'd never allow that." (Girringun 12)

The possession of a diverse skill set by staff members was highlighted by a Girrigun employee as essential for the successful operation of the organisation. For example, an individual who works for Girringun Arts explained the multi-faceted roles that Girringun staff members perform on any given day:

> "We go from being on the ground, out collecting grass or teaching a workshop, to writing out applications and budgets. [So] you've got to be able to do both, [it's] like living in two worlds and then you're on the ground with the artist and then you're in the gallery with people who are totally different." (Girringun 1)

An important role that Girringun plays is developing the potential of younger staff members and trainees, to develop transferrable skills. One of the aims of Girringun Arts, for example, is to:

> "[…] employ more Aboriginal staff here in the Arts Centre […] we managed to get [name of employee] on as art administration training and that's independent funding. So […] we really need to be able to employ someone to follow in our footsteps, or walk beside us." (Girringun 1)

A main focus of Girringun is to ensure sustainable futures for the younger generation, that enable them to live in both worlds, to practice culture but also live in mainstream contemporary Australian society. A government employee explained:

> "Their common desire is that they want their kids to grow up safe, healthy, and they want them to access school; they want them to do well when they've left school. It's a common desire for all of them. It's like they all benefit from this child being healthy, getting selected for sports, they all benefit from that, even though he [or] she belongs to that one family, as a [Traditional Owner] group." (Girringun 10)

The Wishbone Project provided a vehicle for the practice of this philosophy, by working in partnership with teachers from Tully State High School, and showcasing the importance of innovative and culturally appropriate approaches to education for the retention of Indigenous students beyond Year 10. The Wishbone program provided Indigenous students with the chance to learn in more traditional ways. It also provided an example of new approaches to teaching culture in schools, bringing elders and younger people together on country.

Many interviewees from within Girringun and other organisations lamented the reality that Girringun relies heavily on government funding to do their important work (discussed in more detail below). Some interviewees suggested that to become more resilient and robust into the future, Girringun needs to focus on the development of organisational business skills. Such skills would transition Girringun from an Indigenous organisation (reliant upon government funding) into a business.

Engaged governance and leadership

Engaged governance

Girringun has strength as an organisation to facilitate change in its community. Interviewees identified this strength as being closely linked to specific qualities and practices of engaged governance and leadership. They discussed "the commitment of the [Girringun] staff and the people who go way over and beyond what's required of them" (Girringun 1). The Girringun staff, in turn, explained their commitment as inspired by those they represent, who they acknowledge as the driving force behind the organisation. As one staff member pointed out, "We look after the interests of nine Traditional Owner groups and we've got to get out to each and every one of them, because that's what we're here for. Girringun wouldn't be here if we didn't have the members" (Girringun 6).

Individuals spoke about the Girringun Board. It shows excellent leadership and practises exceptional governance, but, as this staff member explained:

> "We're just so proud of all of them and this is us, the younger generation. I love being involved in those Board meetings because I look around the table to all my Elders sitting around me and I'm so proud that I'm thinking to myself that I'm going to be sitting here one day like the old people, and that makes me proud. So, they're leaving behind that legacy, as old as they are, they're sitting up there and discussing business and talking to Government, etc." (Girringun 12)

Interviewees spoke about the innovative governance approaches practised by Girringun that enable the wider community to grasp new opportunities. For example, Girringun was instrumental in facilitating the evolution of Indigenous business enterprises such as Mungulla cattle station. Girringun provided the diverse skills and know-how of their staff to assist with the initial negotiations. Later, Girringun facilitated useful connections and worked as somewhat of a 'gate-keeper' until the fledgling Mungulla business was ready to work directly with government agencies and research providers.

Girringun engages innovatively with a variety of organisations, including the Tully State High School, NRM agencies including the GBRMPA, the Wet Tropics Management Authority and QPWS, as well as universities and research agencies, to practise and fulfil their vision:

> 'to provide leadership, direction and assistance in the provision of sustainable outcomes for the improvement and positive development of the social, cultural, spiritual, environmental and economic well-being of Aboriginal traditional owners and community members of Girringun for the benefit of the region' (Girringun Aboriginal Corporation, 2010b).

Girringun works to facilitate projects and programs that support this vision, and is strategic in its choices. One government employee explained that Girringun "[has] a good capacity and formula with people power and that's the centre of the model that they have. It's the ability for those people to have vision and to facilitate that vision, that's 'people power'" (Girringun 9). For example, despite lack of fee for service, Girringun continues to act as the first port of call for government agencies and organisations whose mandate is infrastructure development. It provides these agencies with cultural heritage information and creates linkages between agencies and community members. It does this as a means of empowering the community to protect cultural heritage. Despite the setbacks of the past, it continues to work with a variety of people towards these ends. As a cultural advisor from the Queensland Department of Environment and Resource Management (DERM) stated, "the strength of Girringun is losing the fight but still holding 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" (Girringun 11).

Girringun has a strong reputation as a 'can-do' organisation. A staff member explained, "Girringun is pretty diverse, if we can do it, we'll do it from here" (Girringun 6). This attitude is driven by the passion to deliver their vision. Girringun is also regarded as easy to work with. Another government employee commented:

> "You can work with [Girringun] without even knowing you're working with the group and I think that's a pleasant way to work and it's not a strain to work with the group. They know where they want to go and they just [take] everyone along for the journey, nothing wrong with that." (Girringun 9)

The same individual speaks of Girringun as innovators, and "government [is] basically following their lead, so we [a particular government agency] need them to keep themselves out in front" (Girringun 9). Many of the programs that Girringun has either initiated or worked in partnership to develop, such as the Wishbone Project, the Cardwell Indigenous Ranger Unit (now Girringun Ranger Unit) and the Cultural Heritage Mapping Database are considered exemplary for other Indigenous groups across Australia. Girringun is regarded by many external agencies and individuals as humble. As the same government representative stated:

> "They do [their work] without steer, we're the only ones spruiking how good they are, they don't ever say that and they're humble in that regard. We're the one out there saying, 'Girringun this, Girringun that', because we see the good results; they are humble to themselves. We appreciate all their stuff because it's making government look good." (Girringun 9)

Interview participants also discussed the strength of the internal governance arrangements of Girringun. Until recently when government funding cuts forced a reduction, the Girringun Board comprised eighteen members, two from each of the nine language groups from the southern part of the Wet Tropics region. The Board is consistent and has a great breadth of experience in leadership and governance, but acts in a way that is not intimidating. It always presents a unified face to the community, even though Elders on the Board may have differences of opinion. Girringun is very transparent about the reality that the Board does not always get it right the first time, but is willing to learn and try again. As a cultural heritage advisor from the DERM relays in relation to past lost battles relating to important cultural heritage sites on land under development, "[Girringun states,] 'Let's get ahead of the game so the next one doesn't happen'" (Girringun 11).

Strong and inspiring leadership were very strong messages that came through from all the interviewees. Girringun are experts in their culture, and the community will not work with agencies or projects unless Girringun has given the go-head. The elders trust Girringun, and have faith in the organisation and the staff as a keeping place for their cultural stories. As this archaeologist explained:

> "When [some Elders] knew it was time […] to transfer this knowledge, they trust[ed] Girringun. I don't think they would give it to anyone else. They'll give it to their nieces and nephews if there is one of their family that they believe should have it, but as they don't have kids, usually it goes from grandparents to children, but they trust Girringun." (Girringun 12)

The leadership approach of Girringun is described by this manager from government as "level-headed, and they know not to press too hard, they're patient, not radical, or not seen to be radical but seen to be willing to work with the community and work through issues with the

community" (Girringun 7). In addition, Girringun works with different government agencies in a strategic way. As this government manager explained in relation to the TUMRA:

> "I think Girringun's view of the TUMRA is a step in a process rather than something in its own right; they're keen to be first; keen to get that recognition and they were keen to use it […] – in lieu of having Native Title rights, it gives them a right and recognition for their responsibility for their country. I get the sense that they were disappointed in how it ended up, […] their aim is now to develop a TUMRA that is more comprehensive [… for example, they wanted] the right to fish in green zones and the areas that are closed to fishing. That was seen as a step too far by the Executive of this agency at that particular time as the plan had only just [been introduced]. But as a result of [Girringun's expressions of interest at the time], I'm hopeful we will get that included in the next TUMRA in the next few months." (Girringun 7)

Specific individuals within Girringun are described as easy to work with, as optimistic and being able to see things that other people cannot. As a government representative explained:

> "[Girringun] take their work seriously; they have a very capable executive officer who sees things that no one else can see and is quite willing to get engaged with people. They're not a 'let's stop and think about it', they say, 'Well, let's go and have a look at it', very optimistic. So, their optimism is always going to get them to where they need to go." (Girringun 9)

Within the organisation, staff members described how effective functioning of their organisation can often come down to specific personalities being able to work together, to people power and to passion (although this passion is not unending and they are concerned about 'burn out'). As this Girringun staff member explained:

> "We look after the interests of nine Traditional Owner groups and we've got to get out to each and every one of them, because that's what we're here for. Girringun wouldn't be here if we didn't have the members. We're such a close-knit group here, pretty much family here. Its best working in a corporation where you've got the whole of the staff getting on well together and [who] are willing to go out there and to step past what their job entails; just to do that little bit more for the community." (Girringun 6)

Perhaps a strong indicator of Girringun's capacity to enable change within their community is their attitude towards reconciliation. As a staff member enthused:

> "So, we didn't want it to be another black organisation that just employed black people, we wanted to have an array of people working in the office [… we are] setting another example to the outside world that we're all about reconciliation; we're not here just to employ black people, even though that's one of our goals to find work for our Traditional Owners, but we still employ from the white community, which I think is absolutely fabulous. […] when [my Nanna] started to teach me culture, […] she'd say to me all the time, 'I'm going to teach you everything I know, you partly mine now; all the (name) children; all the Waibulla children; no matter what colour, them days finished where black fella one side, white people another side. You got to bring them together now'. So, from that, this is what Girringun does and I'm so proud that we do that because we can't live without each other, we know that, a lot of people don't know that, but at least we're trying to pave the way for that." (Girringun 12)

Communications and awareness raising

Interviewees highlighted appropriate and inclusive communication techniques, and use of the media, as effective strategies that Girringun uses to assist its community to grasp new opportunities. Communication approaches both within Girringun and with partner organisations were seen as important. For example, Girringun Arts is successful because it respects cultural practice and communication approaches (cultural protocol and respectful communication). An employee explained that the way they approach the community is paramount to the success of community engagement.

> "It's a cultural thing […] it's a respect thing, that you actually go and ask that person [to come to a workshop […] We spend a long time talking to the Traditional Owners, a lot of time." (Girringun 1)

Girringun practises inclusive communication techniques with anyone who wishes to be involved with the organisation.

> "Girringun listens, shares, brings everybody in to talk and discuss, 'Where do we go from here?' [The Executive Officer] is strategic, open-minded, articulate, has a good way of expressing issues without offending." (Girringun 10)

In relation to Girringun Arts, interviewees discussed how both local and national media attention is important for artists to build their profiles. Local media is regarded as important to build local profiles and raise awareness in the local community; and national media provides a way to capture the imagination of the younger generation. The Internet is another medium that Girringun uses effectively.

Social fabric and community engagement

Strong social cohesion and successful community engagement were identified as essential in Girringun's success in assisting its community to cope with change and grasp new opportunities. Girringun must 'get mandate from the mob', the nine Traditional Owner groups it serves. This is evidence of its successful community engagement and the emphasis it places upon social cohesion as central to its work. Individuals from Girringun explain that Girringun would not exist without the Traditional Owners and members.

Girringun's reputation in the community is built upon hard work, particularly in relation to their elders who they look after well. Girringun works hard to engage its community in cultural activities as well as education and training programs. The arts programme, the cultural camps and the Wishbone Project are excellent examples of community engagement. Each of these has resulted in improved self-esteem, pride, confidence building, and new skills. An employee of Girringun Arts explains how events such as cultural camps:

> "[Get] people together again, hearing stories and now people are talking about the stories, the places. Getting them back out there on country with younger people and passing it all on. To see them going out and planting grass and all the stories that comes out just from that." (Girringun 1)

Networks and partnerships

Girringun plays an important role in both developing and maintaining networks and partnerships on behalf of their community. These networks and partnerships are essential in facilitating opportunities for the community to grasp the opportunities that arise with change. For example, Girringun Arts works with its artists to show art in interstate cities such as

Melbourne and Canberra. They build networks from these experiences that in turn create new and exciting opportunities.

Government representatives spoke about the fact that Girringun builds its capacity through partnerships. As one explained:

> "They've got good partnerships outside, i.e. with local council, with State Government, [with the] Australian Government, and I think that's probably contributed to them being able to have the capacity that they have. They have good networks with university; they tap into philanthropic opportunities and I think they just open themselves up to more opportunities to grow." (Girringun 10)

Girringun is described as well organised and an organisation that is 'thinking ahead'. The GBRMPA often turns to Girringun to assist other coastal communities. Girringun is also described as being successful with partnerships, particularly because of its innovative approach and willingness to achieve aims in different ways. One government employee explained:

> "They keep me thinking all the time. I'm always pleasantly surprised by the moves they make. They, and their leadership, are very advanced in their thinking so I'm waiting to see what they come up with next, because they've gone to the edge with everything – rainforest agreements, sea country business that we do through the TUMRAs, and now they're taking it one step further and developing an Indigenous Protected Area over the sea, which fits in nicely with their visions." (Girringun 9)

Agencies will often approach Girringun to provide networks and introductions to the community. For example, Tully State High School worked in partnership with Girringun to engage the wider community in designing the Wishbone Project:

> "[The Girringun] team helped us to ease the barriers […] and that gave us the introduction to the different communities that exist – the Tully community, the Jubin community, the Kennedy-Cardwell community. They all have individual and unique needs and differences that you have to adhere to as well. So, [Girringun] was able to ease those introductions for us." (Girringun 4)

Economy and infrastructure

A Girringun staff member downplayed the importance of infrastructure:

> "It's people who make [Girringun] a success, rather than the infrastructure. I've seen other organisations that had beautiful stuff but they're constantly fighting and carrying on and here we're relatively primitive, but the people side of it is really working well and hopefully the rest will fall into place." (Girringun 5)

Despite this comment, Girringun staff members do identify the reality that the infrastructure of Girringun is very helpful in providing a space for the community. As one argued:

> "One of the benefits is that we're really quite visible. There's no denying that there's an Aboriginal organisation in Cardwell and I think there'd be a lot of people who would like to deny that [so] just the fact that people are driving past [the building] on their way is an advantage." (Girringun 1)

The building in which the organisation resides provides an important place for the Girringun community to come together in space that offers multiple enabling factors:

> "The community benefits as a whole. One of the things we find is that [the artists] actually enjoy [visiting Girringun] because I think there's a bit of politics that goes on down there and coming here is like a place that's non-political." (Girringun 1)

Girringun also provides a convenient meeting place for government agencies, researchers and others who are working in the area. Maintenance of this infrastructure is an important part of Girringun's role in the community, however, there is little funding available for this purpose. The availability of vehicles is central to the success of Girringun's role to engage the community in new opportunities and programs, but at present this stock is limited.

As reflected in Girringun's vision (Girringun Aboriginal Corporation, 2010b), a main aim of the organisation is to develop and build upon a black economy for the region. A staff member explained, "One of the overarching things is the economic independence, and from that flows a lot of this other stuff" (Girringun 5). As has already been stated, Girringun has facilitated the development of local Indigenous enterprises such as Mungulla cattle station. Many interviewees expressed concern that Girringun was not being paid for the valuable services it provides the government and wider community, although its capacity is stretched. As this staff member articulated:

> "The service we provide [government agencies], they – for some reason – think it should be a free service and as far as I'm concerned they should pay for that service. Girringun is the link. You could ask a man on the street and he couldn't tell you anything; you ring Girringun and they'll tell you what you want to know if it's to do with our area." (Girringun 12)

Other interviewees suggested that Girringun must start to operate as an Indigenous enterprise rather than being reliant upon government funding for annual projects. In particular, as this interviewee expressed:

> "What Girringun needs to focus on is being a business; being in the business of land management and cultural heritage and being in the business of natural resource management […] start looking at ways to make money and stop being dependent upon welfare." (Girringun 2)

One Girringun staff member forecasted the role that Girringun could have in the future. It could provide a local and Indigenous governance role to all number of government departments, and be paid for these services. Such an arrangement would ensure governance approaches that were coordinated, culturally appropriate and enabling of community capacity building for social resilience. An interviewee argued:

> "I would like to see Girringun [with] different sections to the organisation. […] a number of staff positions [including education, health, justice …] not to implement, but to negotiate better programs and support implementation of those programs [with relevant State Government departments]." (Girringun 5)

People-place relationships

The importance of the notions 'healthy people, healthy country' and 'caring for country' was emphasised earlier in this report. All interview participants, both from within Girringun and those working with Girringun, described the essential connection that Girringun and its community have to their country. Indeed, the origins of Girringun date back to the mid 1990s when a group of concerned Traditional Owners came together to lobby the Queensland Government for a name change of the Lumholtz National Park. Girringun Aboriginal Corporation (2010c) explains:

> 'From its beginnings in the mid 1990s, one of the major aims of Girringun Aboriginal Corporation has been the renaming of this national park. All of the nine Traditional Owner groups of Girringun have traditional lands within the park, which is a valuable source of cultural and natural resources for the people' (Girringun Aboriginal Corporation, 2010c).

Lumholtz National Park was renamed Girringun National Park in 2003 by the Queensland Government in recognition of the connection held by the nine Traditional Owner groups of the region. As a Girringun employee explained:

> "Girringun was born out of adversity and a problem. That problem was the naming of the national parks. It was declared by David Attenborough to be Lumholtz National Park, named after a Norwegian explorer who was over here looking for a tree-climbing kangaroo, and he spent some time (four years) mainly with the Warrgamay people and the people in the Herbert Gorge country looking for this tree-climbing kangaroo. He wrote a book called *Amongst Cannibals* and in there were a lot of derogatory comments about all us mob up this way – things like, 'we're the lowest form of humans beings on the planet; we're not much more than monkeys, etc.' The people didn't like that and we all said, 'No, we don't want this place named after him'. Understandably, that was fair that they talked like that, but that's just not the norm now so you didn't want that to happen, so all the Elders got together (about two hundred) and they came back with the name *Girringun*. Out of that they formed a working group to keep pushing that name to the Government […] that process took ten to eleven years until we finally got it declared Girringun with the National Parks, and in that time the working group kept pushing the idea and eventually the work group became known as Girringun. That working group evolved into the Girringun Aboriginal Corporation." (Girringun 5)

The use of local languages in cultural centres and at schools is also important acknowledgement of the local Traditional Owners. One staff member explained:

> "If you go into that Tyto Wetlands office (in Ingham) […and] you push a button and it has the welcome there by Nywaigi and Warrgamay in language […]. We are working in partnership now with Catholic Education to have a welcome message board and a welcome plaque [in] Warrgamay, Nywaigi and Bandjin at the Catholic Ed School […]. It helps to acknowledge the Traditional Owners for the area." (Girringun 6)

The strong social and family connection to the land and sea is what drives people to continue. As a government manager states in relation to the fight to save cultural heritage, "Girringun is losing the fight but still holding 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" (Girringun 11). This passion is reflected in the work of Girringun and, for example, in the Cultural Heritage Database. A staff member explained that the database holds great significance for many of the elders:

> "[The Elders] have such a faith in Girringun and what Girringun does, it's done a lot for them personally too. For a place like this to keep all their cultural stuff together for them, I think it eases their minds, at least they've got it all documented now for the children coming through because when they've gone they've got no one left to teach them." (Girringun 12)

Individuals from government agencies also recognise the strength of Girringun's connection to their land and sea country. Indeed, as one individual stated, Girringun's passion, networks,

experience, knowledge and capacity in land and sea management mean that, "Girringun, being Girringun, could also take the lead in some of this [Reef Rescue project work]" (Girringun 9). Another government representative discussed the potential role that Girringun may take in the future as a regional body:

> "[Currently] their organisation is very much grassroots driven by the Traditional Owners. In the future what will happen is that those Traditional Owner organisations will [do] their own stuff, but still be supported by Girringun [as …] a support organisation [that will work to] build the capacity up of those groups." (Girringun 10)

Role of government

Participants discussed the important role that Girringun has at the community interface. A community member and business manager stated, "[Girringun's] strength is their grassroots based organisation. So, it's much in touch with its members and with its Traditional Owner Groups and [is] very accessible. They're only a phone call away, willing to help" (Girringun 2). They also have a very close relationship with government agencies, as has already been noted. This relationship is essential both for the work of Girringun (assistance from government in the guise of funding, knowledge, engagement) and the work of a variety of government agencies. A Girringun employee explained:

> "Our mob sees Girringun as the organisation to get things done for them. That's for businesses [and Government agencies] as well – if they want information from us they call us and want this information and that information, but they're not willing to assist Girringun funding wise, but we're the first ones they contact when they need things. I want to see that changed in a fashion. People mention fee for service and that'd work if their organisations are willing to pay for what information they gather, because they're gathering knowledge from our Elders, not just us at Girringun, but they want the [Traditional Owners] to come and do work with them but they're not willing to pay them for their time, because they've given up their time and their knowledge. We want to see them get recognition and paid for their services." (Girringun 6)

A government employee who works closely with Girringun in relation to natural resource management suggested ways to overcome the low funding of important organisations such as Girringun. She argued:

> "Sometimes there are other Aboriginal bodies that pop up and sometimes these groups or committees are supported by different agencies. I think one of the constraints is that [the] State and Commonwealth [need] to recognise that there is already an existing mechanism and they need to utilise, support that well, instead of developing another one over here. [For example], if it's a particular health issue, don't develop a Traditional Owner Health Committee, why would you? There's already a mechanism there. That is a big constraint with Government, because they work in silos." (Girringun 10)

Government agencies have an important role to play in supporting Girringun in a variety of ways. They also benefit from Girringun's innovative approaches to governance and engagement. As this government employee enthused, "[Girringun's] constraints are certainly tied with Government [capacity] to engage" (Girringun 9).

Conclusions

All of the case studies demonstrate resilience to be a *process* of system adjustment, rather than a state. Participants explained how particular factors helped their region and individuals to anticipate aspects of each change (in some instances), act proactively, or manage through the period of most intense change. These fall into some clear groups.

Knowledge, skills and learning

Here participants referred to the creation of new knowledge, drawing on existing knowledge, and connecting people's knowledge for new benefits. They linked knowledge with technology and innovation, and with skills. Knowledge was also discussed in combination with communication and awareness raising. Social processes of knowledge creation and dissemination were important, including distribution of knowledge through social and professional networks, and creation of new knowledge through cross-sector and government-industry partnerships.

Capacity for social learning is clearly an important attribute of social resilience, at all scales from collective to individual. The roles of knowledge, skills and learning raised throughout the case studies can be viewed as a cycle. Existing knowledge is used and found valuable, and new knowledge created (or the need for new knowledge recognised). Knowledge needs to be disseminated through effective communication, and awareness is built. If suited to people's needs, the knowledge is adopted and used, and in many cases innovations are made through thoughtful practical application. People draw upon and improve their skills in the application process. Review and learning, and investment in new research, lead to continual improvement of the knowledge base (see Figure 9), assisted by networks and social processes embedded in people-place relationships.

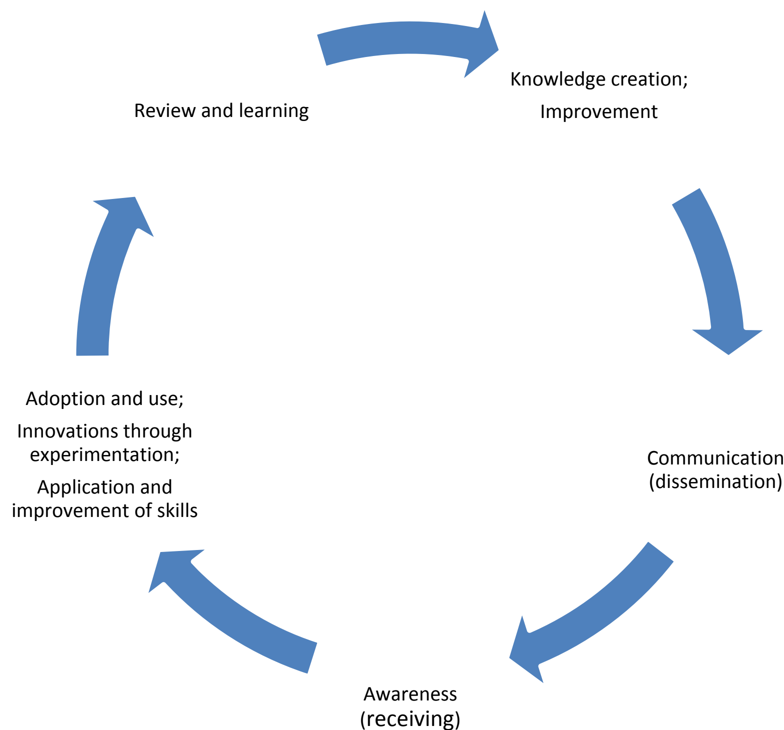


Figure 9: Resilience attributes of knowledge, communication, awareness, innovation, skills and learning viewed as a continual improvement cycle.

Networks, partnerships and leadership

A variety of ideas were linked in various ways within the case studies, to highlight a process of people working together to solve problems. Communication underpinned a process of drawing on community or professional networks or building new ones (sometimes across sectors), to form innovative and effective partnerships and collaborations. Sometimes this connected with the social fabric, emphasised in the dairy, Wet Tropics, urban and Girringun case studies. In other instances it focused on government, non-government or industry relationships (COTS, Girringun).

People-place relationships

A number of the case studies brought out strong systems linkages between people and their environments, with the environment, or aspects of it (such as water) underpinning livelihoods, lifestyles, and sense of well-being. This is inherent to the Aboriginal way of thinking about 'healthy country, healthy people', and the cultural imperative to care for country. Participants talked of the importance of managing for the whole system, recognising the interdependencies and environment, and not taking the environment for granted. Others emphasised natural beauty, an appreciation of the beauty in productive landscapes, and a sense of history. Attachment to particular landscapes was also clear, and derived from long working and lifestyle associations in forest, agricultural and also marine environments.

The economy and infrastructure

Participants in all of the case studies recognised the importance of a diverse economy, providing alternate opportunities within and between sectors. In agriculture, a diverse array of primary products and value-adding opportunities helped resilience. Within tourism, serving diverse market segments and anticipating and adapting to new market trends was important. Diversity across sectors was most important, however, to avoid dependency on any particular sector, and to have new opportunities should one sector be in decline or deliberately restructured. Participants emphasised innovation repeatedly, and linked this to visions for new economic directions, and catalysing new opportunities. They also emphasised sustainability, including sustainable agricultural production and meeting consumer demands for this, and the importance of local loyalties, linked to local 'branding'. They also suggested building stronger connections between urban and rural producers and consumers in the region. Participants were highly conscious of economic linkages, and the flow-on opportunities that arose with innovation – and the consequences throughout supply chains where a major industry was restructured. Participants have had opportunity to observe this closely with the cessation of logging in the Wet Tropics World Heritage Area, and restructuring of the dairy industry.

A variety of forms of infrastructure were raised in connection with the economy, but sometimes independently. Water infrastructure is vital to agriculture, and roads to rural areas. The urban case study raised sustainable tropical architecture and building codes. Educational and medical infrastructure was also emphasised and social infrastructure such as meeting places that enable people to come together.

Role of government and engaged governance

Unsurprisingly, the role of government was brought up frequently in relation to the change stories, and in identification of a particular style of governance which participants believed assisted resilience. We have termed this 'engaged governance'. Participants described ideals for a resilience-building form of governance in which government agencies collaborate with others, building genuine, trusting and respectful relationships with resource users;

achieve effective cross-jurisdictional arrangements without 'turf wars'; and foster their partners' abilities to organise, for instance through the support of Aboriginal organisations. This form of governance would feature genuine community engagement, empower partners, and draw on local expertise and knowledge. It may involve creative new institutions. It would involve integrated planning, for example for sustainable industry. It would offer strong collective leadership, and feature institutional learning.

Most importantly, interview participants' accounts show how the resilience factors *combined* to assist them. To varying degrees, the building and use of knowledge and skills by all parties; collaboration and networks, often across atypical partners; the roles of government, planning and leadership; drawing on the existing social fabric and building further social and professional networks; have contributed to resilience. These are coupled with the nature of the people's interdependencies with and affections for their environments, the nature of their local and regional economy, and the availability of infrastructure. Capacity building, communications and awareness raising are also recurrent themes. (The following chapter explains how the resilience attributes derived from each case study were synthesised, with other source of information, into a set of key resilience-building attributes).

In all of the case studies, participants combined the issues promoting resilience so seamlessly that it would be artificial to try to separate these into regional versus community or individual scales. The important point perhaps is that each resilience factor should have sufficient presence and dynamism to play an important role. A region lacking in such attributes could struggle to adjust effectively in times of duress.

Social Resilience Monitoring and Reporting Framework

The literature reviews and case studies explore diverse knowledge sets, including theoretical and strategic knowledge, and local knowledge from interview participants (including Indigenous understandings of social resilience). Triangulation of data from these diverse knowledge sets enabled a cross check of results from different data sources, looking for similarities and differences.

The process for verifying the 'final' six social resilience indicators drew on three data sources (Table 7). First, a set of seven social resilience domains were identified through the social reporting literature review (Cuthill *et. al.* 2008). At that early stage of research we hypothesised "… that each of these seven domains has the potential to contribute to or detract from social resilience, usually both" (2008:17). Second, analysis of six regional case studies suggests six social resilience themes. Third, emerging themes from our regional focus were compared against results from a concurrent project focusing on indicators of social resilience at the community level (Gooch *et. al.* 2010).

Table 7. Verification process for the identification of social resilience indicators.

Social resilience domains Literature Review	**'Draft' regional level indicators of social resilience** **Six regional case studies**	**'Draft' community level social resilience concepts** **One community case study**	**X-scale synthesis 'Final' regional and community level indicators of social resilience**
Human	Knowledge and skills	Knowledge and learning	Knowledge, skills and learning
Social	Social networks and community building	Social networks and collaboration	Community networks
Natural	People-landscape connection (social-ecological thinking)	People-place connections	People-place connections
Cultural		Futures thinking	
Physical	Community infrastructure and services	Community infrastructure and services	Community infrastructure (services and facilities)
Financial	Diverse and innovative economy	Diverse and innovative economy	Diverse and innovative economy
Governance	Engaged governance	Empowering governance	Engaged governance

The verification process across multiple data sources ensures a high level of confidence in the final indicator set. As such, these six indicators provide a theoretically and operationally valid foundation for monitoring and reporting social resilience outcomes at a regional level. They are intended as a broad set of indicators that are of relevance across diverse sectors and different levels of government. Information within the framework paints a broad regional picture of social resilience which should be of use to NRM managers. A set of five to ten monitoring criteria sit under each of the six social resilience indicators (Table 8).

Initially some 2,500 individual monitoring criteria were identified during the social reporting literature review. These criteria were grouped into similar theme areas, scanned for overlaps and eventually trimmed down to a core group of 300 criteria of potential interest to the project. Results from the case study field work allowed us to further narrow these down to the

final 45 criteria which inform the social resilience monitoring and reporting framework. These criteria will enable NRM agencies to review and track outcomes of their management decisions and interventions through a social resilience lens.

Monitoring criteria were assessed and selected using a SMARTT framework (adapted from Doran (1981) and McDonald & Roberts, 2006). As such, criteria must be **specific**, **measurable**, **achievable**, **relevant** and **time lined** and must **talk** with and across horizontal and vertical reporting processes. The last element, 'talk', is specifically relevant within the regional governance landscape, and particularly regards integrated planning across government agencies. A necessary limitation of the framework is that not all of the monitoring criteria have available data. (Understandably, a new concept such as social resilience will not have been measured prior to its recognition, though some measures of related concepts may be relevant). Populating the framework with monitoring criteria data falls outside the requirements of the current research (although where possible data has been provided). Further research will be required to provide relevant data around the remaining criteria.

Table 8. Social resilience monitoring and reporting framework.

Social resilience indicator	Monitoring criteria
People-place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	1. Stewardship (broad and/or NRM focus). 2. Level of attachment to community. 3. Connection to country (Indigenous). 4. Shared vision for community (broad and/or NRM focus). 5. Appropriate regional growth management strategies / initiatives / processes, based on that vision, which look to balance economic, social and environmental aspects of development. 6. Take-up of environmentally friendly technologies and practices.
Knowledge, skills and learning Individual and group capacity to respond to local needs and issues.	1. Collaborative learning community strategies in place. 2. There is evidence of science communications, environmental education, extension, community capacity building, and/or action learning programs in the region. 3. Government resources directed towards community capacity building programs (broad and/or NRM focus). 4. The community supports regional growth (NRM) strategies / initiatives / processes. 5. Government provides accessible and appropriate information to community (broad and/or NRM focus). 6. Year 12 completions. 7. Take-up of post-secondary training / education opportunities (broad and/or NRM focus). 8. Number of Masters Degrees / PhDs in region.

Social resilience indicator	Monitoring criteria
Community networks Processes and activities that build and support people and groups in a place.	1. People know two or more of their neighbours. 2. Social connections (Indigenous). 3. Some family members live 'close by'. 4. Number of active local community groups (broad and/or NRM focus). 5. Proportion of population living in same Statistical Local Area as five years ago. 6. Collaborative public, private, community and university sector responses to issues of social inclusion. 7. Volunteering (broad and/or NRM focus). 8. Diverse cultures are embraced and respected. 9. Perceived effectiveness of non-government interagency networks. 10. Formal agreements between public, private, community and university sector stakeholders to work together on identified community issues (broad and/or NRM focus). 11. Cultural / community festivals, programs and networks. 12. Perceptions of living in a safe community. 13. Junior sports clubs/participants.
Engaged governance Collaborative processes for regional decision making (includes partnerships, planning, supportive and creative institutions).	1. Government agencies have policies / strategies / guidelines relating to engaged governance (broad and/or NRM focused). 2. Governments agencies provide appropriate resources to support engaged governance initiatives (broad and/or NRM). 3. A diverse range of local community members / groups are actively engaged in local governance (broad and/or NRM). 4. Engaged governance initiatives use culturally appropriate methods (broad and/or NRM focus). 5. Input from local people influences (broad and/or NRM) decision making processes. 6. Community satisfaction with decision making processes (broad and/or NRM focus). 7. Community trusts government. 8. Different types of knowledge (Indigenous, expert, community and political) inform decision making processes (broad and/or NRM focus).

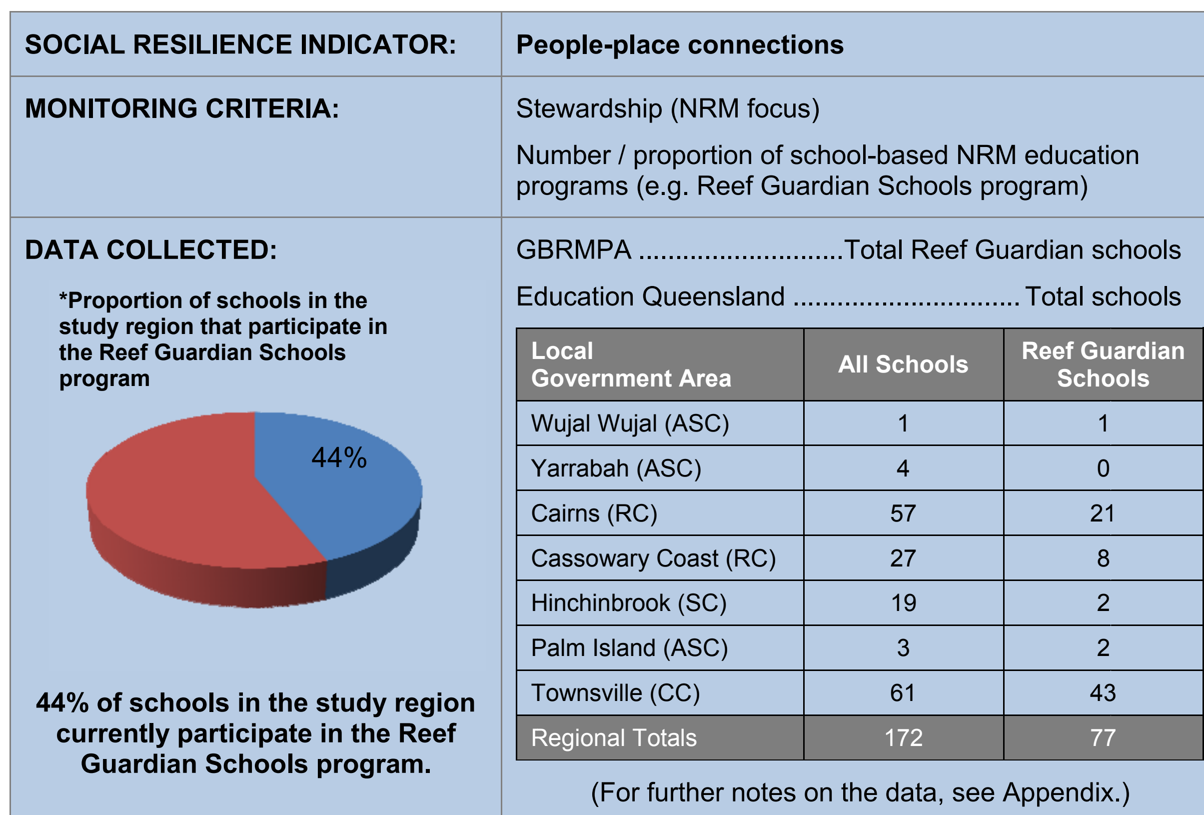
Social resilience indicator	Monitoring criteria
Diverse and innovative economy Regional economy comprises a broad range of industry and services, and supports new and exciting opportunities.	1. Diversity of regional economy. 2. Community capacity for innovation. 3. Number and/or diversity of main employing industries (broad and/or NRM focus). 4. Number and/or diversity of local 'family' businesses. 5. Community support for local businesses/producers. 6. Residents are confident of appropriate ongoing employment (broad and/or NRM employee focus). 7. Government agencies support development of innovative technologies and practices (include sustainable NRM focus). 8. Socio-economic status of population.
Community infrastructure Appropriate services and facilities to support identified community needs	1. Main regional population centres have community facilities and services which meet infrastructure benchmarks or community needs. 2. Equitable and reasonable access to community infrastructure for people not from main regional population centres. 3. Appropriate and accessible public open and green space (NRM). 4. Housing is affordable. 5. Appropriate support to find employment. 6. Access to day and/or after school care. 7. Government policies/strategies/projects respond to needs of people with a disability.

The following section presents baseline data specific to the study region and relating to a selection of ten monitoring criteria. The data selection has been drawn from the Appendix (this document), which addresses each of the fifty proposed monitoring criteria in terms of providing notes regarding data sources and baseline data. Where possible in the following section, statistical maps have been provided to further illustrate the data sourced. **Please note that colour coding has been applied to the maps in order to show similarities and differences in data scores between local government areas. Whilst the colour coding ranges between high and low scores, these do not necessarily suggest a 'good' or 'bad' result in relation to the monitoring criteria.**

Monitoring Criteria and Baseline Data

People-Place Connections

Box 1. Proportion of schools, by Local Government Area, participating in the Reef Guardian Schools program, 2010.



SOCIAL RESILIENCE INDICATOR:	**People-place connections**
MONITORING CRITERIA:	Stewardship (NRM focus) Number / proportion of school-based NRM education programs (e.g. Reef Guardian Schools program)
DATA COLLECTED: ***Proportion of schools in the study region that participate in the Reef Guardian Schools program** 44% **44% of schools in the study region currently participate in the Reef Guardian Schools program.**	GBRMPA ....Total Reef Guardian schools Education Queensland .... Total schools

Local Government Area	All Schools	Reef Guardian Schools
Wujal Wujal (ASC)	1	1
Yarrabah (ASC)	4	0
Cairns (RC)	57	21
Cassowary Coast (RC)	27	8
Hinchinbrook (SC)	19	2
Palm Island (ASC)	3	2
Townsville (CC)	61	43
Regional Totals	172	77

(For further notes on the data, see Appendix.)

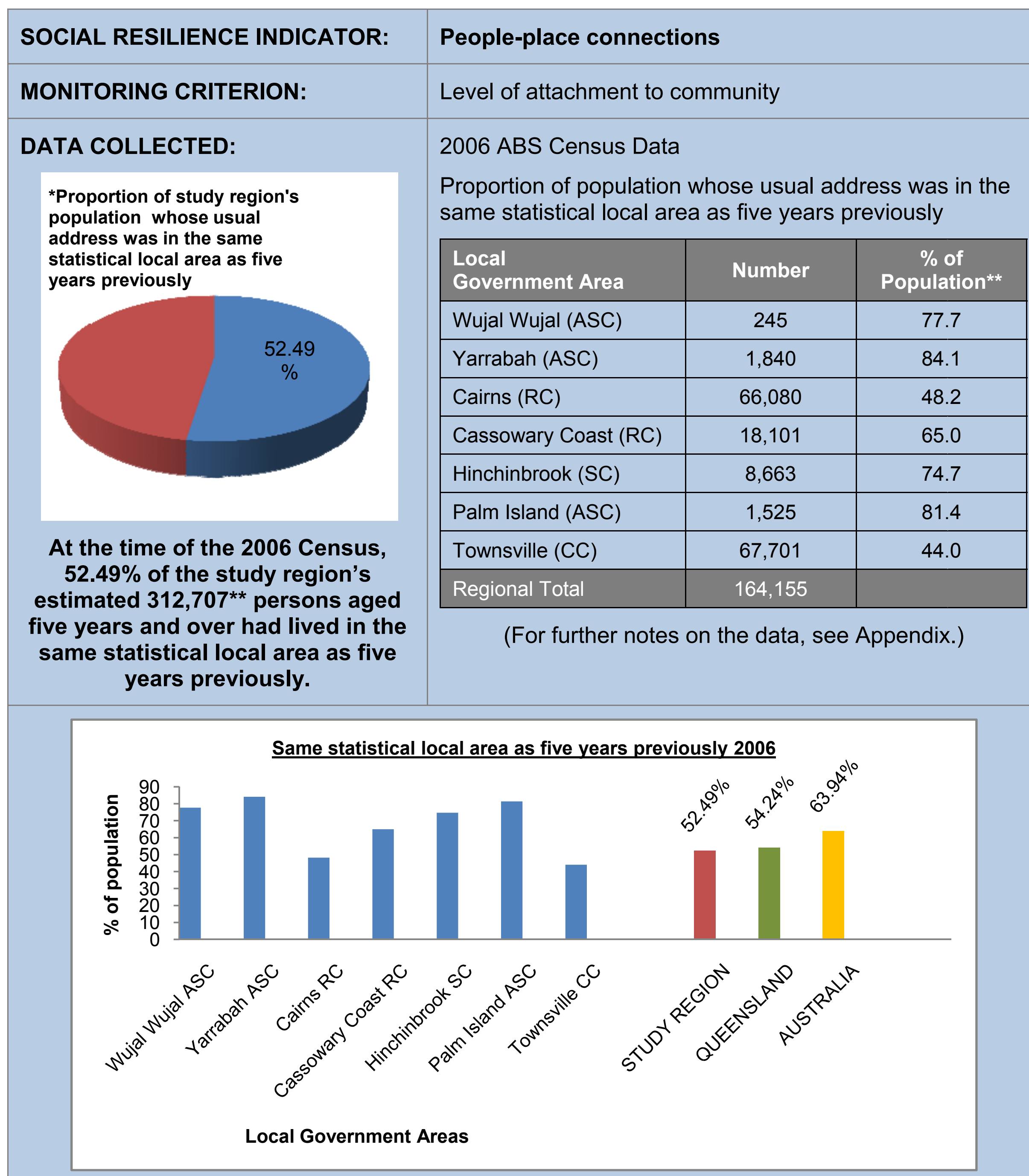
Footnotes:

GBRMPA – Great Barrier Reef Marine Park Authority
NRM – Natural Resource Management

* Includes State and non-State; primary, secondary, special and distance education schools as at May 2010.

Sources: GBRMPA (online database and personal contact) and Education Queensland (online database).

Box 2. Proportion of the population, by Local Government Area, whose usual address was in the same statistical local area as five years previously, 2006.



SOCIAL RESILIENCE INDICATOR:	People-place connections
MONITORING CRITERION:	Level of attachment to community
DATA COLLECTED:	2006 ABS Census Data

At the time of the 2006 Census, 52.49% of the study region's estimated 312,707 persons aged five years and over had lived in the same statistical local area as five years previously.**

Proportion of population whose usual address was in the same statistical local area as five years previously

Local Government Area	Number	% of Population**
Wujal Wujal (ASC)	245	77.7
Yarrabah (ASC)	1,840	84.1
Cairns (RC)	66,080	48.2
Cassowary Coast (RC)	18,101	65.0
Hinchinbrook (SC)	8,663	74.7
Palm Island (ASC)	1,525	81.4
Townsville (CC)	67,701	44.0
Regional Total	164,155	

(For further notes on the data, see Appendix.)

Footnotes:

* Based on: count of persons five years of age and over, and place of usual residence. Includes 'same usual address' and 'different usual address, same statistical local area', between 2001 and 2006.

** Total count includes persons who did not state whether they were usually resident at a different address five years ago.

Data for 2008 reformed Local Government Areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B38.

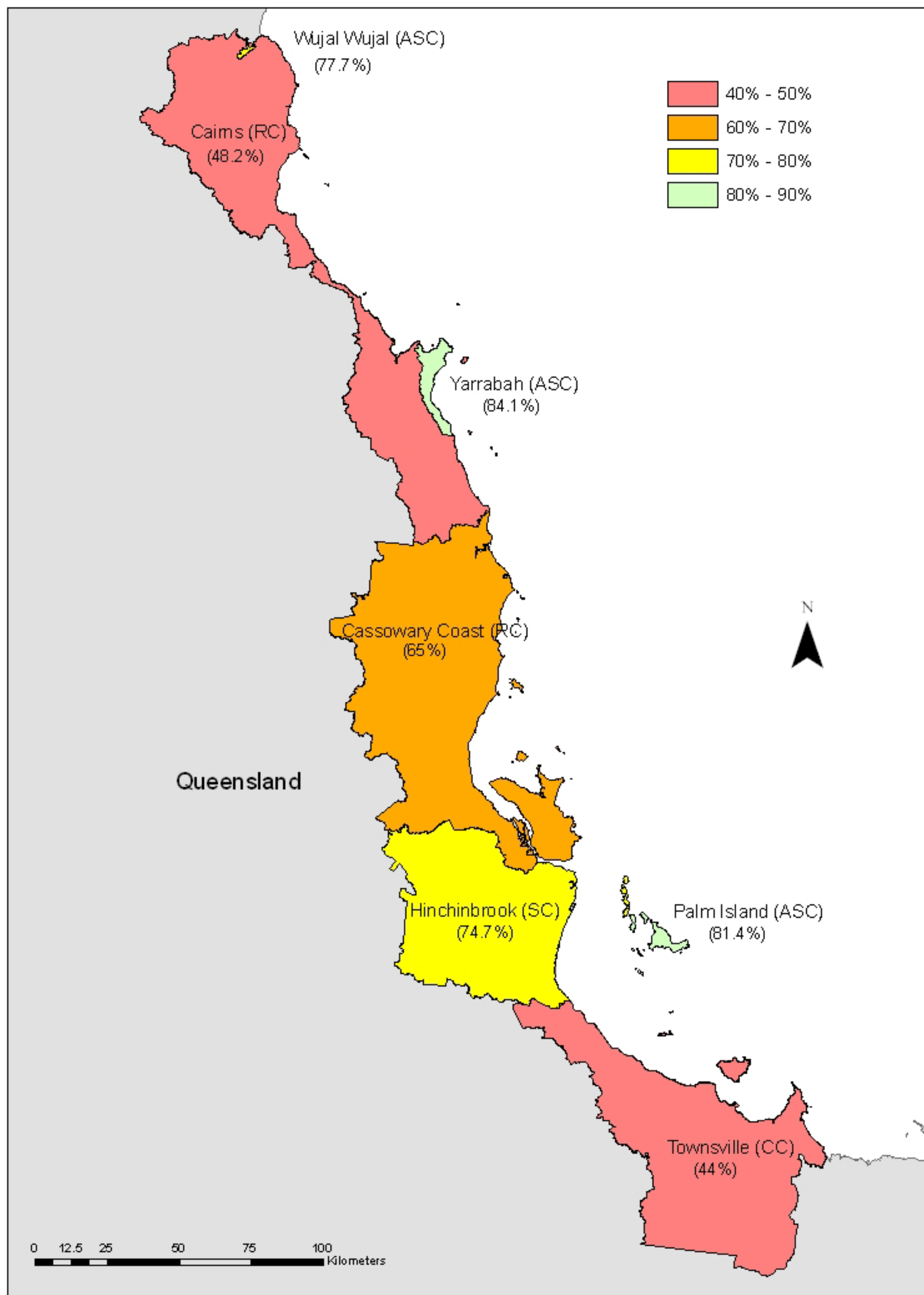
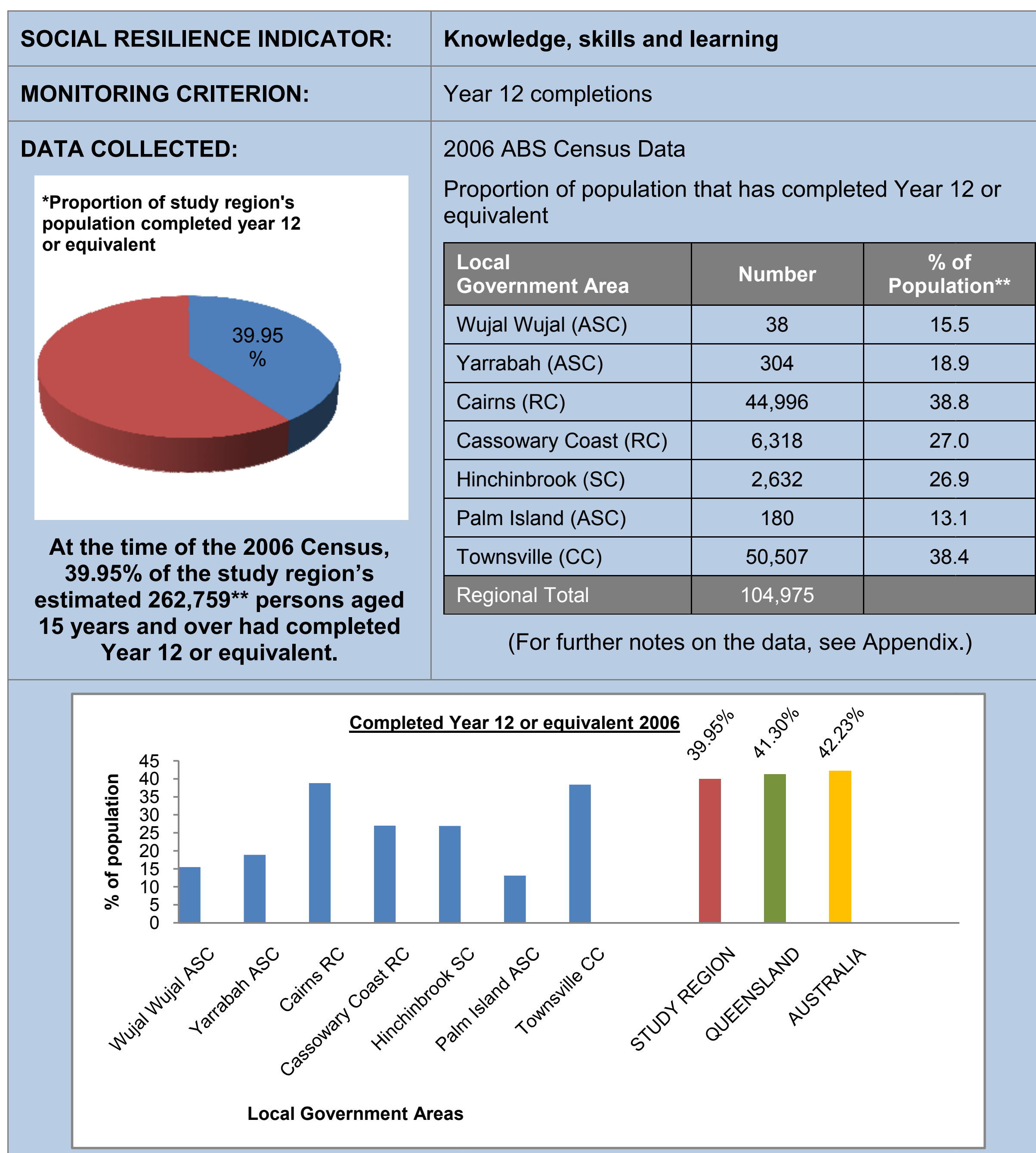


Figure 10. Proportion of the population, by Local Government Area, whose usual address was in the same statistical local area as five years previously, 2006.

Footnotes:
Count of persons five years of age and over (included in the total count were persons who did not state whether they were usually resident at a different address five years ago). Based on place of usual residence. Includes; 'same usual address' and 'different usual address, same statistical local area', between 2001 and 2006.
Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).
Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B38.

Knowledge, Skills and Learning

Box 3. Proportion of the population, by Local Government Area, that had completed Year 12 or equivalent, 2006.



SOCIAL RESILIENCE INDICATOR:	**Knowledge, skills and learning**
MONITORING CRITERION:	Year 12 completions
DATA COLLECTED:	2006 ABS Census Data

At the time of the 2006 Census, 39.95% of the study region's estimated 262,759 persons aged 15 years and over had completed Year 12 or equivalent.**

Proportion of population that has completed Year 12 or equivalent

Local Government Area	Number	% of Population**
Wujal Wujal (ASC)	38	15.5
Yarrabah (ASC)	304	18.9
Cairns (RC)	44,996	38.8
Cassowary Coast (RC)	6,318	27.0
Hinchinbrook (SC)	2,632	26.9
Palm Island (ASC)	180	13.1
Townsville (CC)	50,507	38.4
Regional Total	104,975	

(For further notes on the data, see Appendix.)

Footnotes:

* Based on count of persons 15 years of age and over, and place of usual residence.
** Total count includes 'highest year of schooling not stated'.

Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B15.

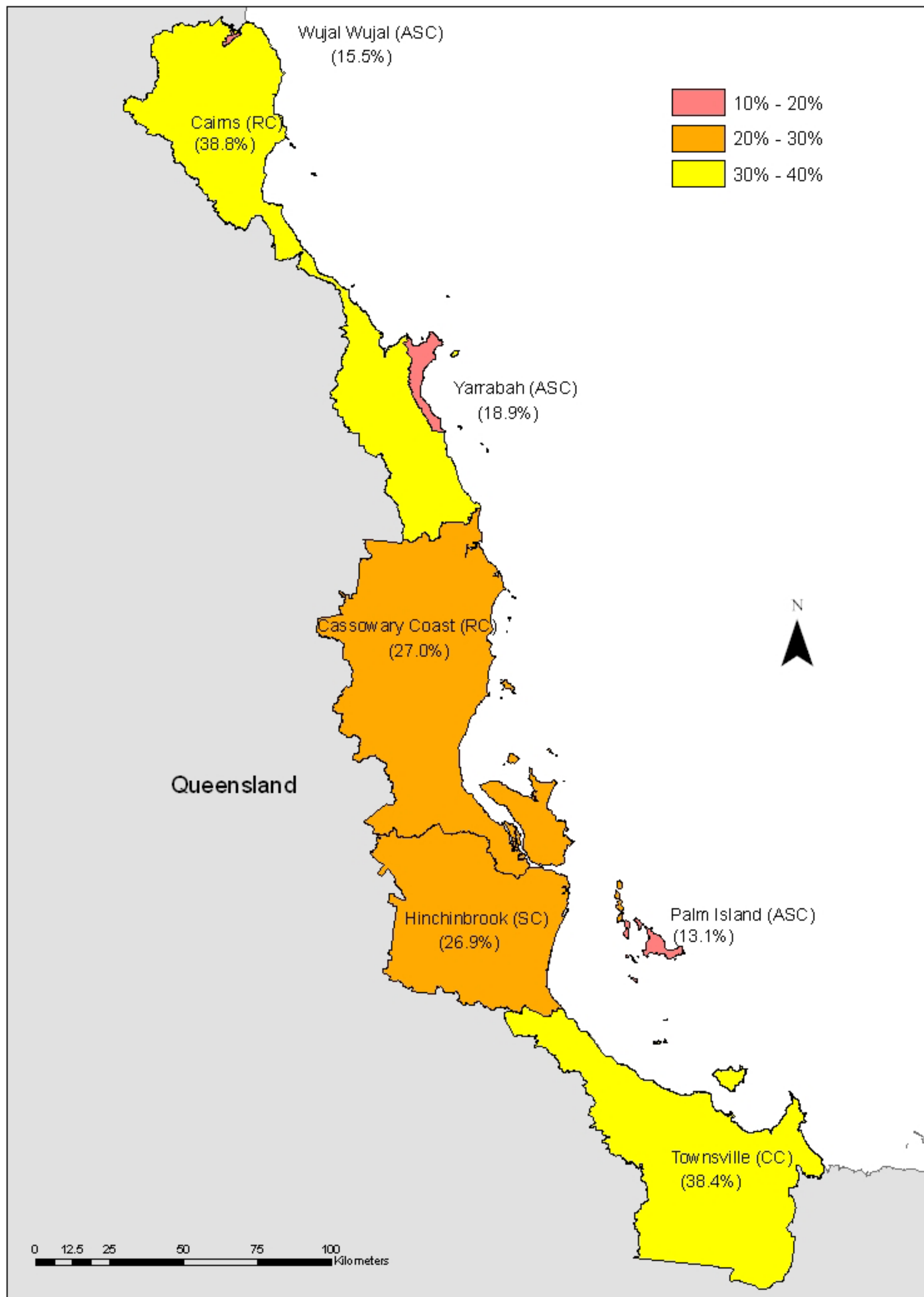


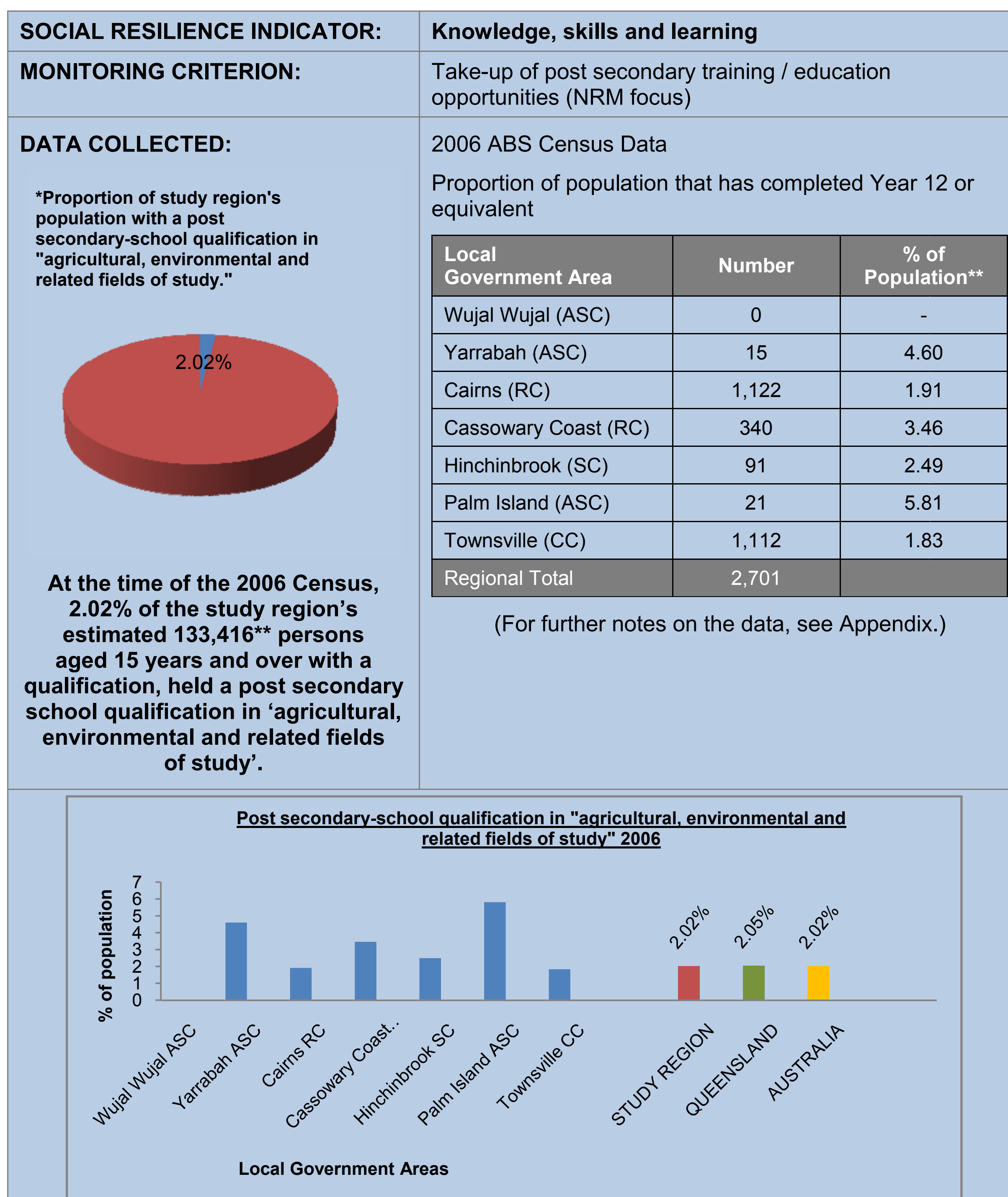
Figure 11. Proportion of the population, by Local Government Area, that had completed Year 12 or equivalent, 2006

Footnotes:

Based on; count of persons 15 years of age and over, and place of usual residence. Total count includes 'highest year of schooling not stated'. Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B15.

Box 4. Proportion of the population, by Local Government Area, with a post secondary school qualification in 'agricultural, environmental and related fields of study', 2006.



SOCIAL RESILIENCE INDICATOR:	**Knowledge, skills and learning**
MONITORING CRITERION:	Take-up of post secondary training / education opportunities (NRM focus)
DATA COLLECTED:	2006 ABS Census Data Proportion of population that has completed Year 12 or equivalent

At the time of the 2006 Census, 2.02% of the study region's estimated 133,416 persons aged 15 years and over with a qualification, held a post secondary school qualification in 'agricultural, environmental and related fields of study'.**

Local Government Area	Number	% of Population**
Wujal Wujal (ASC)	0	-
Yarrabah (ASC)	15	4.60
Cairns (RC)	1,122	1.91
Cassowary Coast (RC)	340	3.46
Hinchinbrook (SC)	91	2.49
Palm Island (ASC)	21	5.81
Townsville (CC)	1,112	1.83
Regional Total	2,701	

(For further notes on the data, see Appendix.)

Footnotes:

NRM – Natural Resource Management

* Count of persons 15 years of age and over with a qualification (excludes persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED)). 'Qualification' includes; Postgraduate Degree, Graduate Diploma, Graduate Certificate, Bachelor Degree, Advanced Diploma, Diploma, Certificate I, II, III, IV, 'inadequately described' and 'not stated' responses. Based on place of usual residence.

** Total count includes 'field of study inadequately described' and 'field of study not stated'.

Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B40.

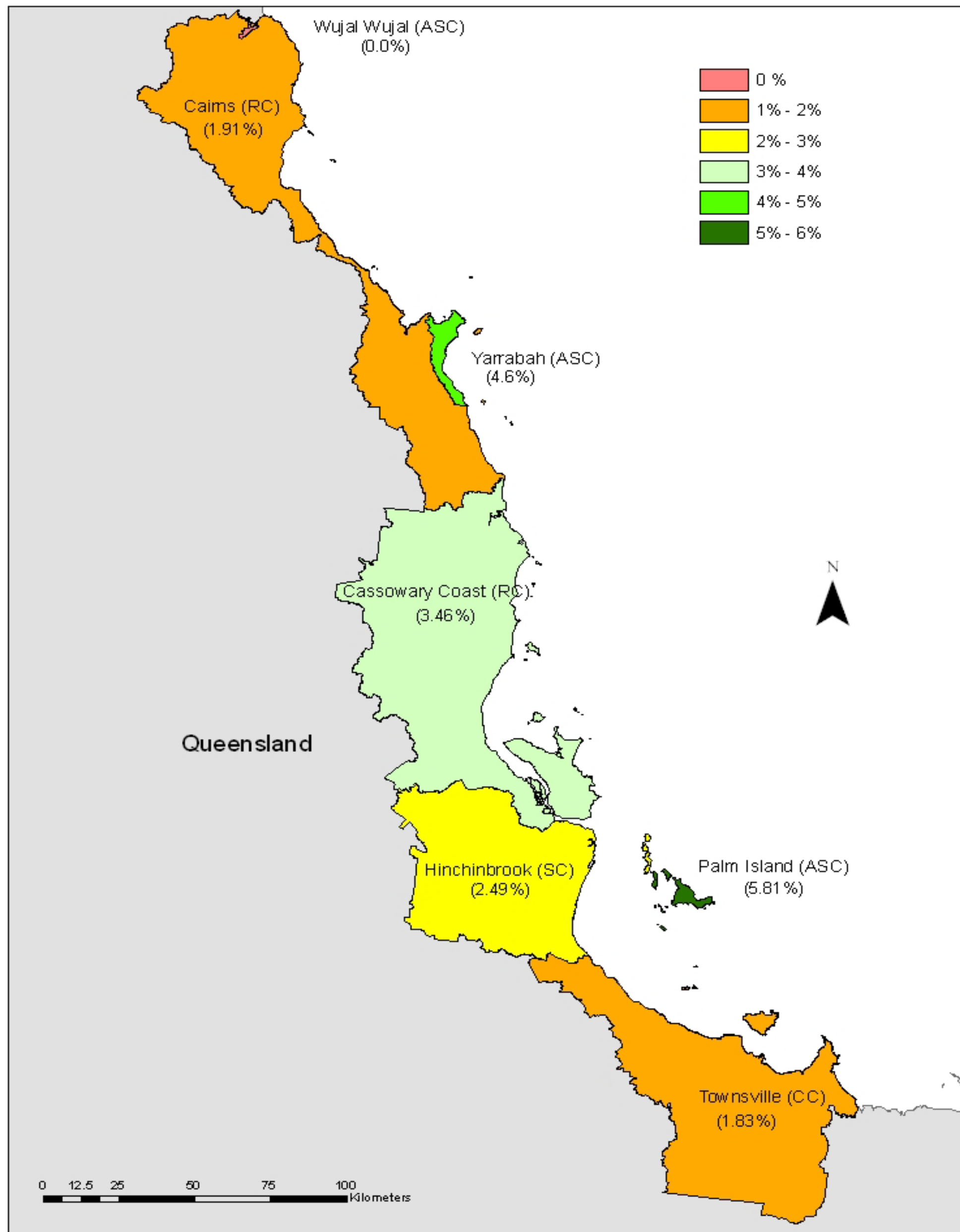


Figure 12. Proportion of the population, by Local Government Area, with a post secondary school qualification in 'agricultural, environmental and related fields of study', 2006.

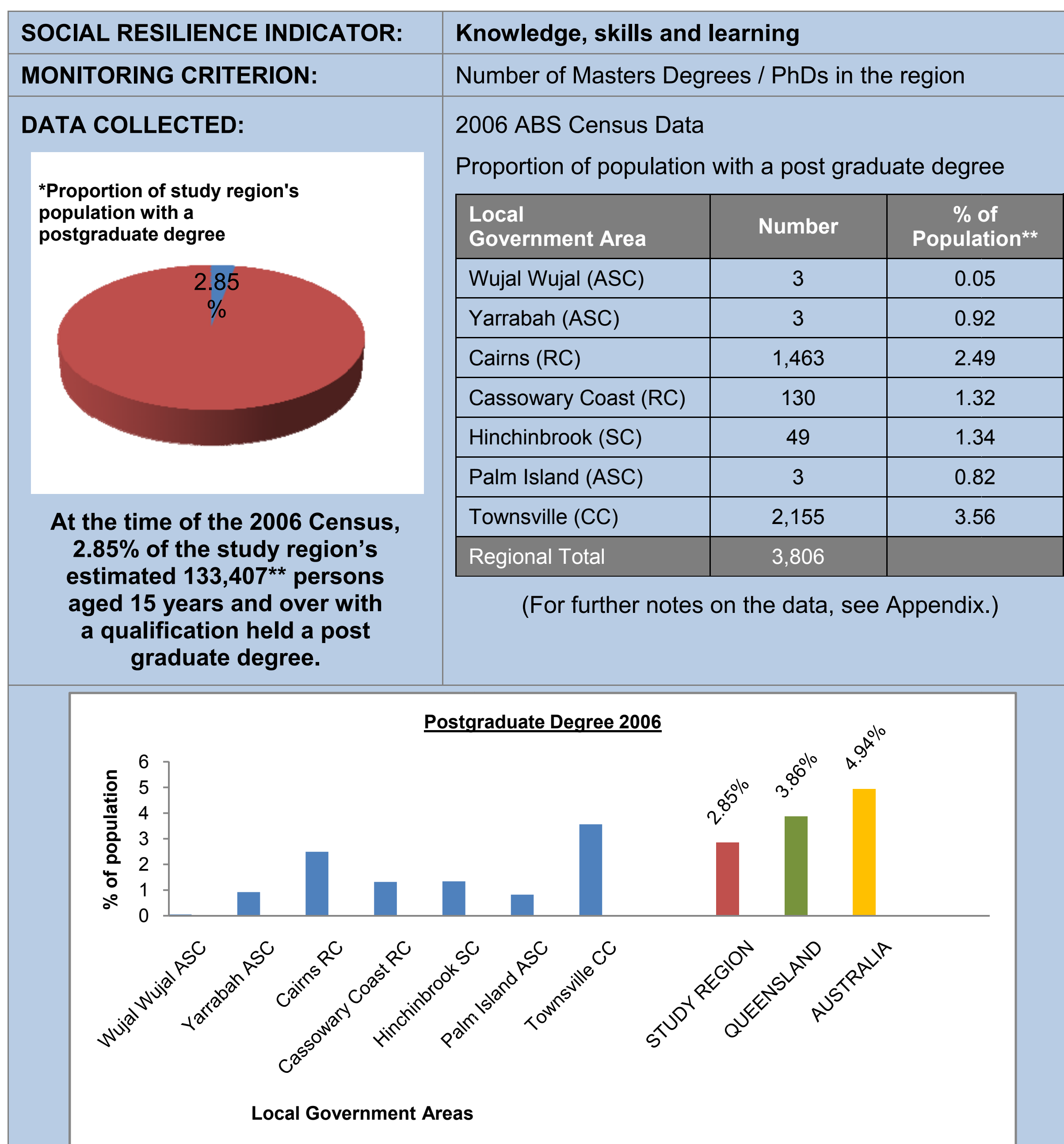
Footnotes:

NRM – Natural Resource Management

Count of persons 15 years of age and over with a qualification (including 'field of study inadequately described' and 'field of study not stated'). Excludes persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED). 'Qualification' includes; Postgraduate Degree, Graduate Diploma, Graduate Certificate, Bachelor Degree, Advanced Diploma, Diploma, Certificate I, II, III, IV, 'inadequately described' and 'not stated' responses. Based on place of usual residence. Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics(ABS), Census of Population and Housing, 2006. Basic Community Profile – B40.

Box 5. Proportion of the population, by Local Government Area, with a post gradúate degree, 2006.



SOCIAL RESILIENCE INDICATOR:	Knowledge, skills and learning
MONITORING CRITERION:	Number of Masters Degrees / PhDs in the region
DATA COLLECTED:	2006 ABS Census Data

Proportion of population with a post graduate degree

Local Government Area	Number	% of Population**
Wujal Wujal (ASC)	3	0.05
Yarrabah (ASC)	3	0.92
Cairns (RC)	1,463	2.49
Cassowary Coast (RC)	130	1.32
Hinchinbrook (SC)	49	1.34
Palm Island (ASC)	3	0.82
Townsville (CC)	2,155	3.56
Regional Total	3,806	

(For further notes on the data, see Appendix.)

At the time of the 2006 Census, 2.85% of the study region's estimated 133,407 persons aged 15 years and over with a qualification held a post graduate degree.**

Footnotes:

* Count of persons 15 years of age and over with a qualification (excludes persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED). Includes; Doctoral and Master Degrees. Based on place of usual residence.

** Total count includes 'level of education inadequately described' and 'level of education not stated'.

Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B39.

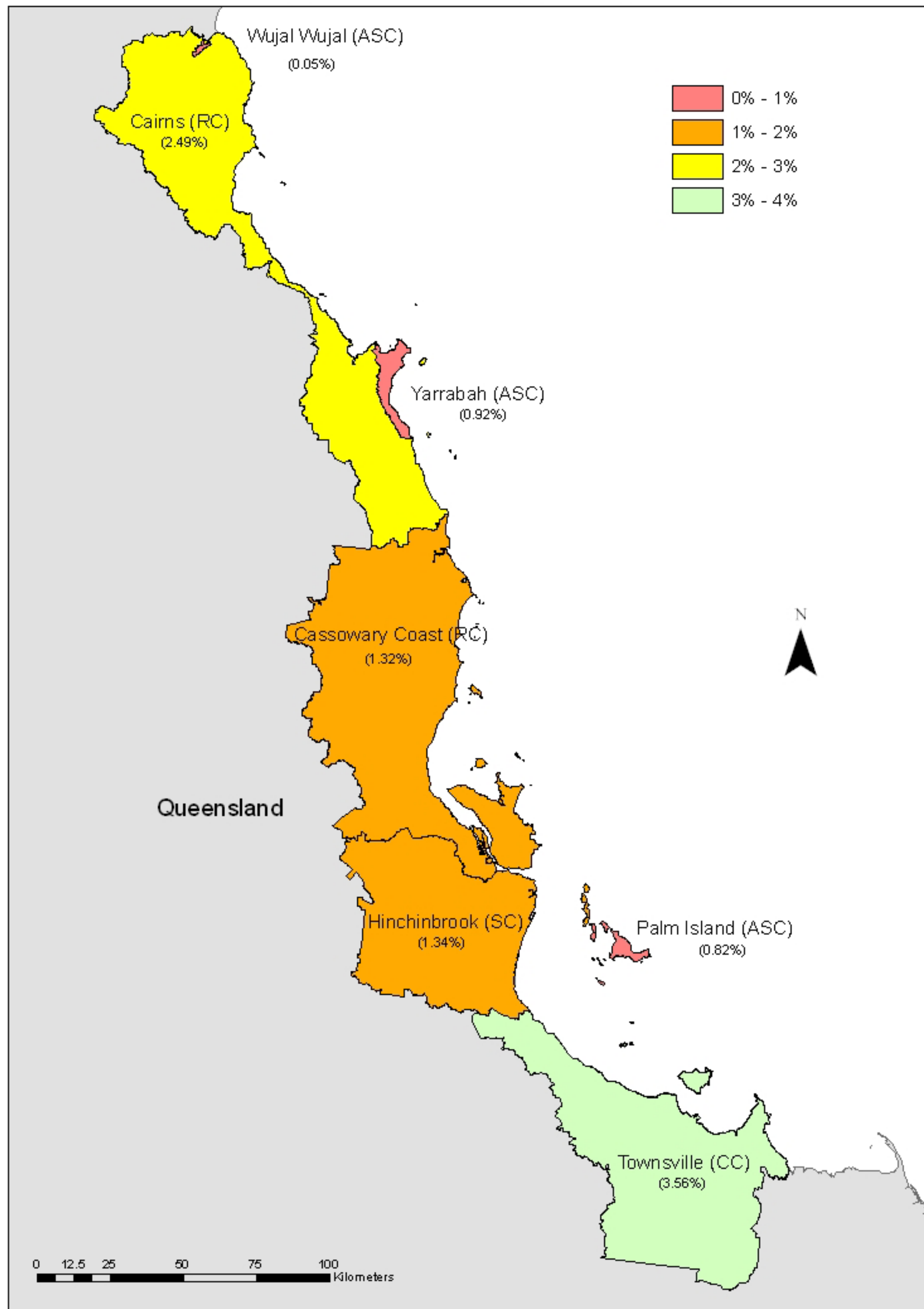


Figure 13. Proportion of the population, by Local Government Area, with a post graduate degree, 2006.

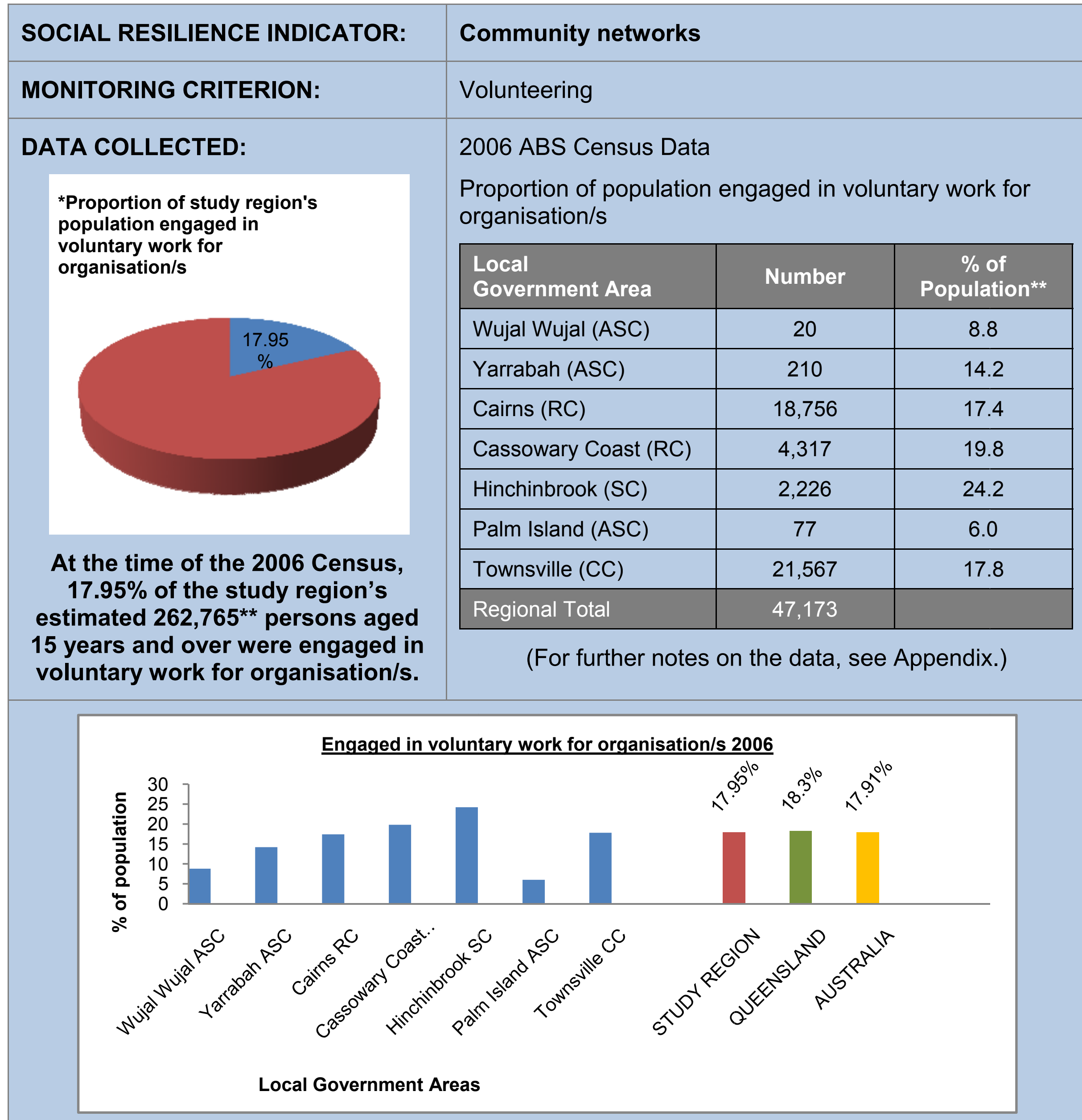
Footnotes:

Count of persons 15 years of age and over with a qualification (Including 'level of education inadequately described' and 'level of education not stated'). Excludes persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED). Includes; Doctoral and Master Degrees. Based on place of usual residence. Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B39.

Community Networks

Box 6. Proportion of the population, by Local Government Area, engaged in voluntary work for organisation/s, 2006.



SOCIAL RESILIENCE INDICATOR:	Community networks
MONITORING CRITERION:	Volunteering
DATA COLLECTED:	2006 ABS Census Data

At the time of the 2006 Census, 17.95% of the study region's estimated 262,765 persons aged 15 years and over were engaged in voluntary work for organisation/s.**

Proportion of population engaged in voluntary work for organisation/s

Local Government Area	Number	% of Population**
Wujal Wujal (ASC)	20	8.8
Yarrabah (ASC)	210	14.2
Cairns (RC)	18,756	17.4
Cassowary Coast (RC)	4,317	19.8
Hinchinbrook (SC)	2,226	24.2
Palm Island (ASC)	77	6.0
Townsville (CC)	21,567	17.8
Regional Total	47,173	

(For further notes on the data, see Appendix.)

Footnotes:

* Based on; count of persons 15 years of age and over, and place of usual residence. The 'Voluntary Work for an Organisation or Group' variable records people who spent time doing unpaid voluntary work through an organisation or group, in the twelve months prior to Census Night.

** Total count includes 'voluntary work not stated'.

Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).
Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B18.

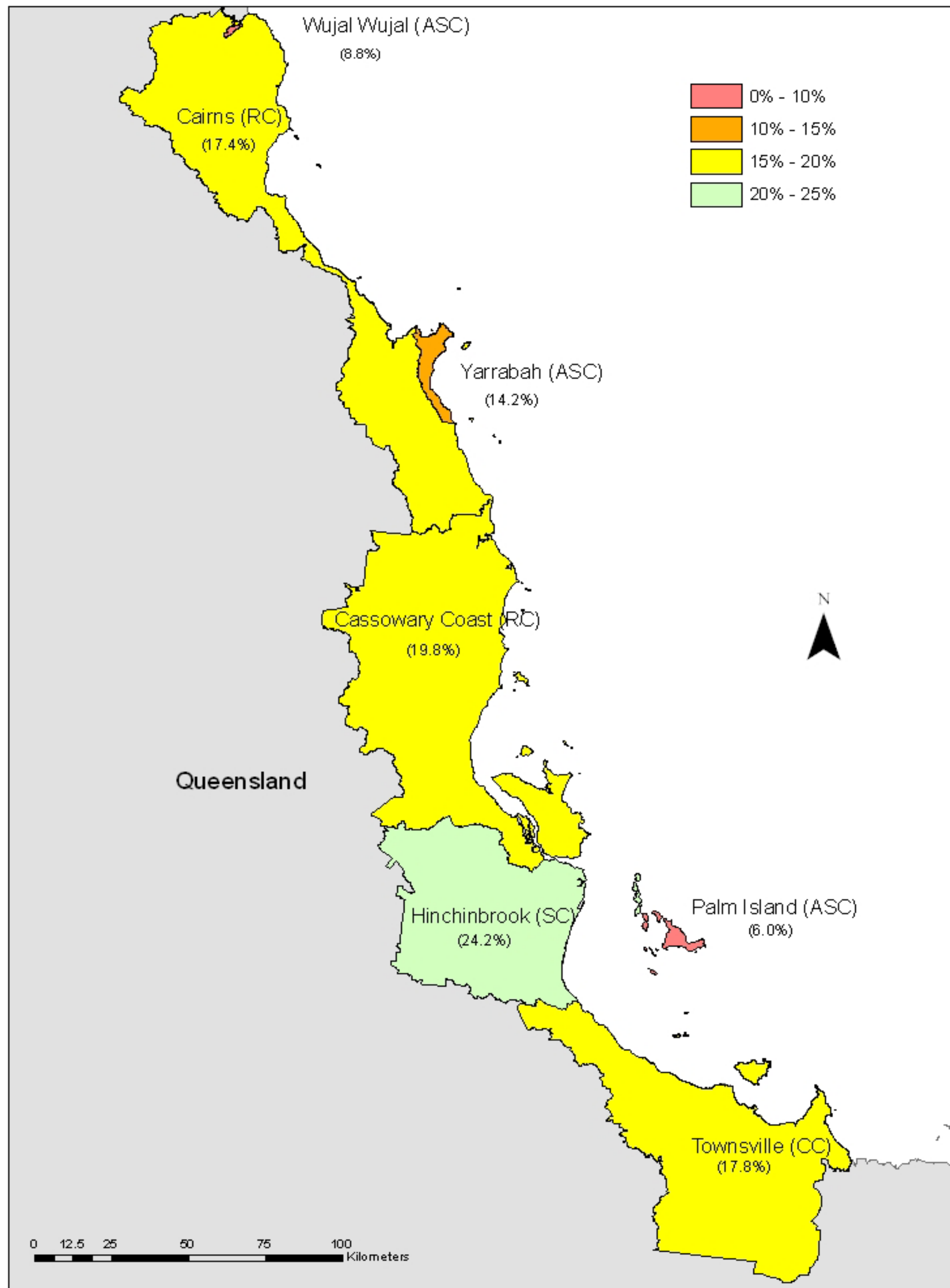


Figure 14. Proportion of the population, by Local Government Area, engaged in voluntary work for organisation/s, 2006.

Footnotes:

Based on; count of persons 15 years of age and over (including 'voluntary work not stated'), and place of usual residence. The 'Voluntary Work for an Organisation or Group' variable records people who spent time doing unpaid voluntary work through an organisation or group, in the twelve months prior to Census Night. Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B18.

Engaged Governance

Data has not been located for this monitoring criterion.
Data sources require further investigation.

Diverse and Innovative Economy

Box 7. BITRE Index of Industrial Diversity Deciles by statistical local area, 2006.

SOCIAL RESILIENCE INDICATOR:	**Diverse and innovative economy**
MONITORING CRITERION:	Diversity of regional economy

DATA COLLECTED:

2006 ABS Census Data

BITRE Industrial Diversity Index calculates the diversity of a regional economy based on the distribution of employment across sectors (ABS ANZSIC 2006)

BITRE Index of Industrial Diversity Deciles by statistical local areas, 2006	*Decile position	
Yarrabah, Wujal Wujal, Douglas, Cranbrook, Murray	1	1 = Least diversified
Dalrymple, Stuart-Roseneath, Pimlico, Pallarenda-Shelley Beach	2	↓
Gulliver, Palm Island, Hermit Park, Vincent, Thuringowa (C) – Pt B	3	
Heatley, Rosslea, Hyde Park-Mysterton, Cairns (C) – Western Suburbs, Mt. Louisa-Mt. St. John-Bohle, Mundingburra, Cairns (C) – Pt B	4	
Aitkenvale, Kelso, Thuringowa (C) – Pt A Bal, Townsville (C) – Pt B	5	
Cairns (C) – Northern Suburbs, Kirwan	6	
Rowes Bay-Belgian Gardens, North Ward-Castle Hill, Currajong, Douglas (S), Cairns (C) – Mt. Whitfield, Cardwell, Burdekin	7	
Hinchinbrook, City, Railway Estate, South Townsville, Oonoonba-Idalia-Cluden, Garbutt, Cairns (C) – City	8	
West End, Cairns (C) – Trinity, Atherton, Wulguru, Cairns (C) – Barron	9	↓
Cook, Eacham, Cairns (C) – Central Suburbs, Mareeba, Herberton, Johnstone	10	10 = Most diversified

The study region's index values for individual statistical local areas range between 42.4 and 81.3 for deciles 1 to 3, and between 82 and 90.6 for deciles 4 to 10.

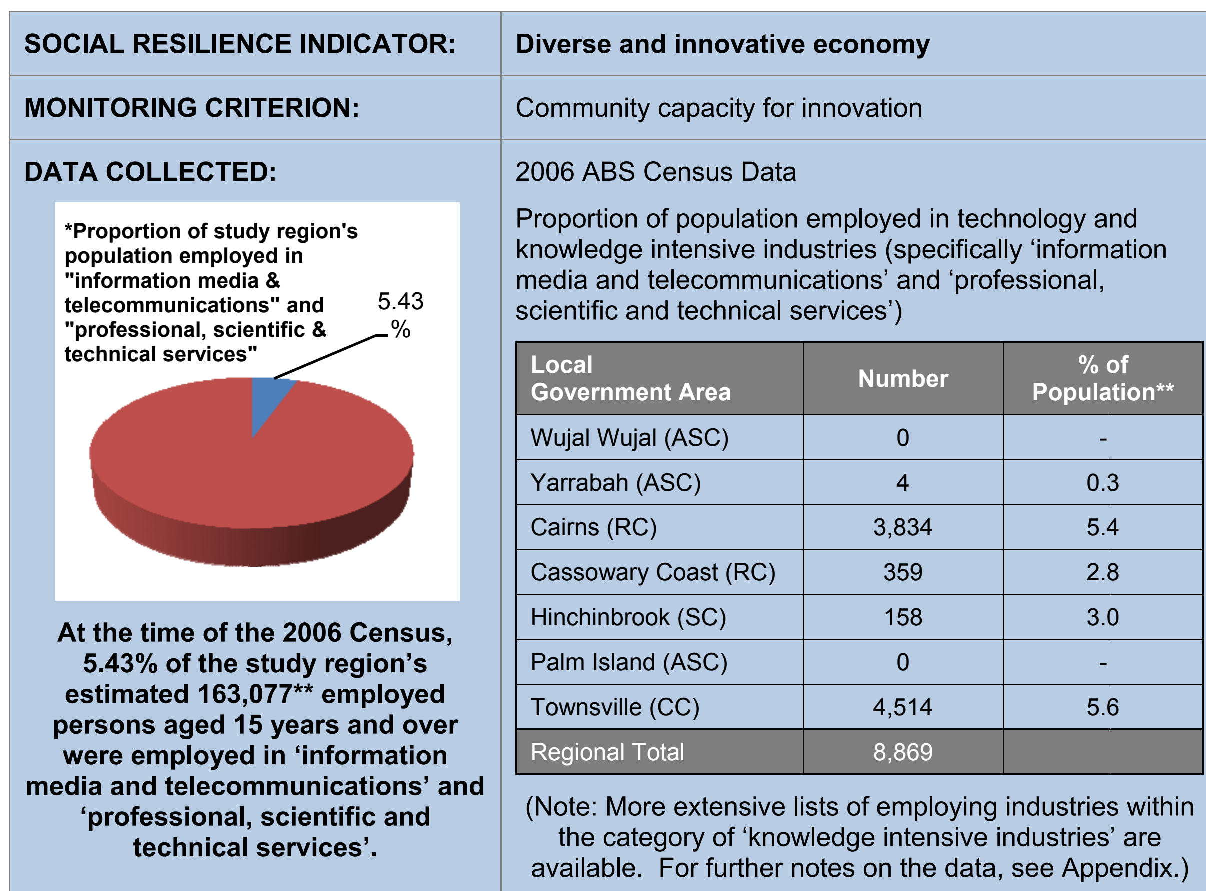
Note that the vast majority of SLAs have readings of over 80. The index is therefore not necessarily a fine discriminator between regions. BITRE recommends comparing places similar in size and trends over time.

(For further notes on the data, see Appendix.)

Footnotes:

BITRE – Bureau of Infrastructure, Transport and Regional Economics
ANZSIC – Australian and New Zealand Standard Industrial Classification
The inclusion of 'Pt A' or 'Pt B' in SLAs indicates the SLA was formed by splitting an LGA between two or more SSDs; 'Pt A' (Part A) usually denotes the more urban part of the split LGA (ASGC, 2006, p. 12).
* These national deciles are based on equal numbers of statistical local areas within each decile.
Source: BITRE, derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006.

Box 8. Proportion of the population, by Local Government Area, employed in 'information media and telecommunications' and 'professional, scientific and technical services', 2006.



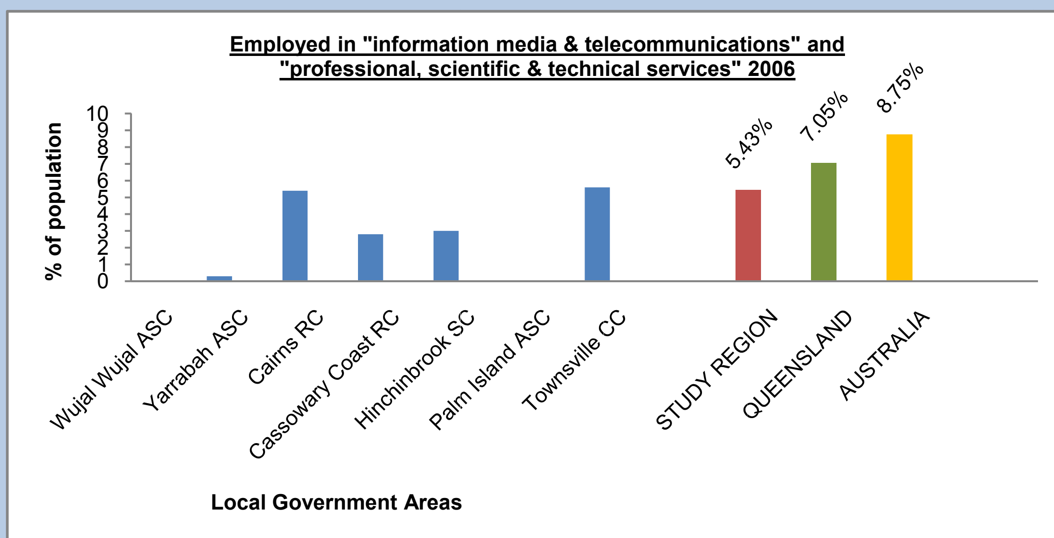
SOCIAL RESILIENCE INDICATOR:	**Diverse and innovative economy**
MONITORING CRITERION:	Community capacity for innovation
DATA COLLECTED:	2006 ABS Census Data

At the time of the 2006 Census, 5.43% of the study region's estimated 163,077 employed persons aged 15 years and over were employed in 'information media and telecommunications' and 'professional, scientific and technical services'.**

Proportion of population employed in technology and knowledge intensive industries (specifically 'information media and telecommunications' and 'professional, scientific and technical services')

Local Government Area	Number	% of Population**
Wujal Wujal (ASC)	0	-
Yarrabah (ASC)	4	0.3
Cairns (RC)	3,834	5.4
Cassowary Coast (RC)	359	2.8
Hinchinbrook (SC)	158	3.0
Palm Island (ASC)	0	-
Townsville (CC)	4,514	5.6
Regional Total	8,869	

(Note: More extensive lists of employing industries within the category of 'knowledge intensive industries' are available. For further notes on the data, see Appendix.)



Footnotes:

* Based on employed persons 15 years of age and over, and place of usual residence. Industry of employment was coded to the 2006 Australian and New Zealand Standard Industrial Classification (ANZSIC) edition.

Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B42.

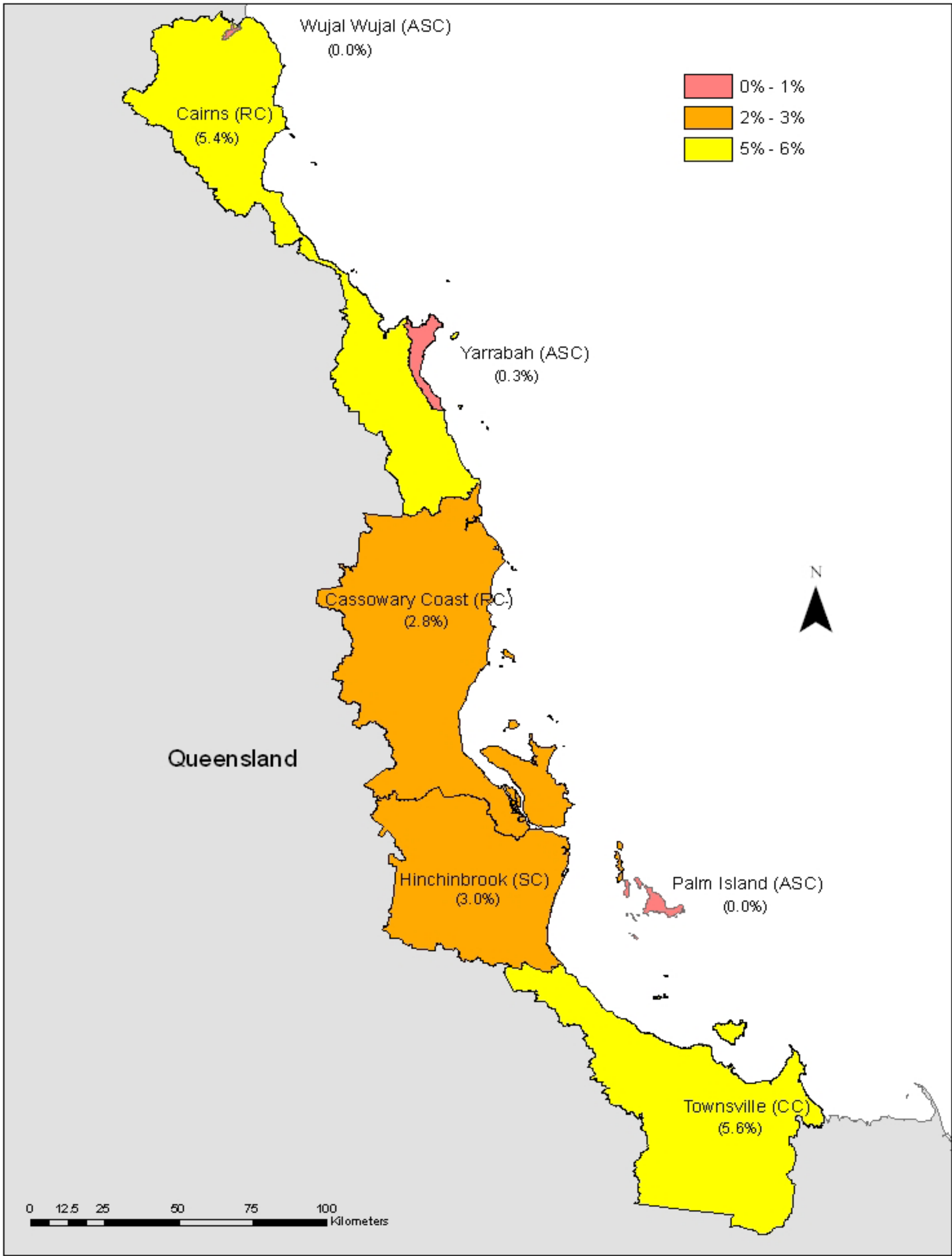


Figure 15. Proportion of the population, by Local Government Area, employed in 'information media and telecommunications' and 'professional, scientific and technical services', 2006.

Footnotes:

Based on employed persons 15 years of age and over, and place of usual residence. Industry of employment was coded to the 2006 Australian and New Zealand Standard Industrial Classification (ANZSIC) edition. Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B42.

Box 9. SEIFA Index of Relative Socio-economic Advantage and Disadvantage quintiles by Local Government Area, 2006.

SOCIAL RESILIENCE INDICATOR:	Diverse and innovative economy
MONITORING CRITERION:	Socio-economic status of population

DATA COLLECTED:

2006 ABS Census Data

SEIFA is a summary measure of the social and economic conditions of geographic areas across Australia.

The SEIFA Index of Relative Socio-economic Advantage and Disadvantage is calculated using Census variables related to both advantage and disadvantage, such as income and education. Quintile scores range between 1 (being most disadvantaged) and 5 (being least disadvantaged).

SEIFA Index of Relative Socio-economic Advantage and Disadvantage *Quintiles, 2006

2006 LGA	Percentage of Population / Quintile: Most-Least Disadvantaged					Overall Quintile Position
	1	2	3	4	5	
Atherton (S)	32.56	31.07	32.13	4.25	0.00	3
Cairns (C)	16.24	18.70	19.49	24.34	21.24	5
Cardwell (S)	54.19	19.49	17.89	7.36	1.07	2
Douglas (S)	14.84	35.11	26.72	16.85	6.47	4
Eacham (S)	20.47	29.50	43.29	6.73	0.00	4
Herberton (S)	85.94	13.01	1.05	0.00	0.00	1
Hinchinbrook (S)	51.03	42.52	6.45	0.00	0.00	2
Johnstone (S)	40.77	46.64	12.59	0.00	0.00	2
Palm Island (S)	100.00	0.00	0.00	0.00	0.00	1
Thuringowa (C)	15.34	22.63	26.44	26.14	9.45	4
Townsville (C)	9.84	24.30	27.89	16.48	21.50	5
Wujal Wujal (S)	100.00	0.00	0.00	0.00	0.00	1
Yarrabah (S)	100.00	0.00	0.00	0.00	0.00	1

Across the study region, higher proportions of Local Government Area populations were located in the two most disadvantaged SEIFA quintiles tan in th eless disadvantaged quintiles.

(For further notes on the data, see Appendix.)

Footnotes:

LGA – Local Government Area
SEIFA – Socio-economic Indexes for Areas

Based on aggregated collection districts where SEIFA scores are available. Collection Districts with no SEIFA score are excluded from the calculations (ABS, 2008).

Note: Overall quintile position scores for Queensland 2008 LGA boundaries were unavailable at the time of printing. The above is therefore based on 2006 LGA boundaries.

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia – Data only, 2006, Cat. No. 2033.0.55.001.

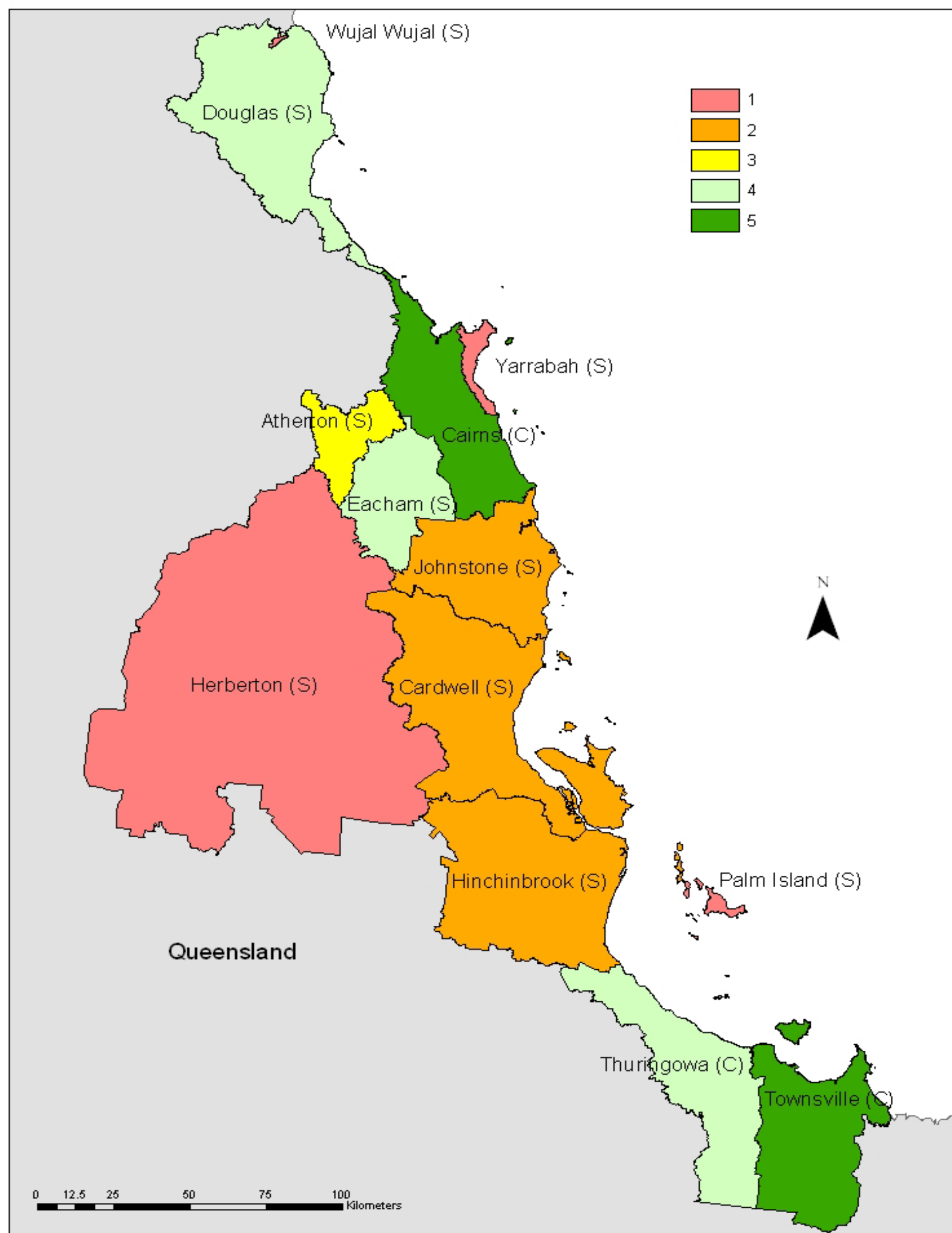


Figure 16. SEIFA Index of Relative Socio-economic Advantage and Disadvantage quintiles by Local Government Area, 2006.

Footnotes:

SEIFA – Socio-economic Indexes for Areas

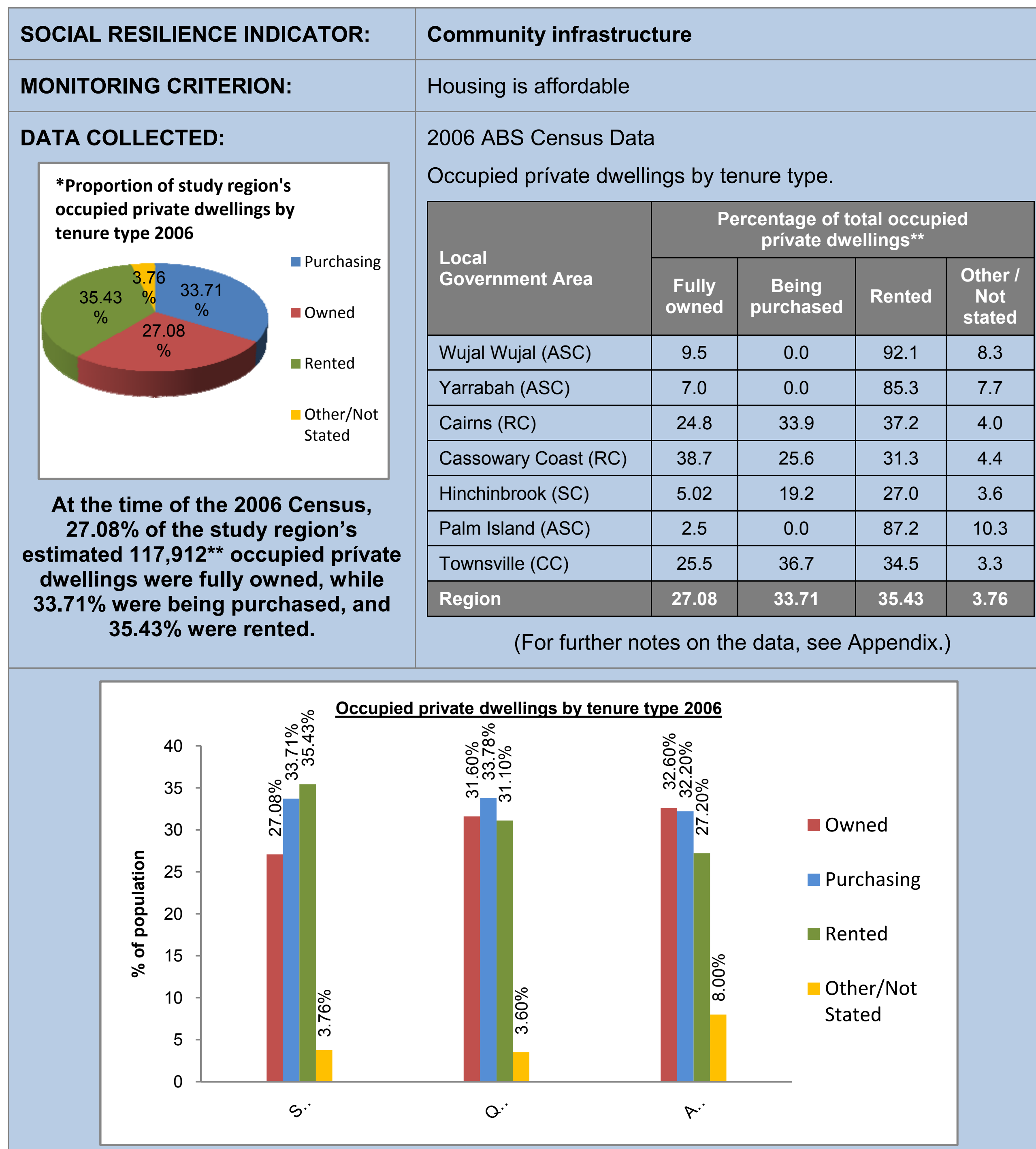
Based on aggregated collection districts where SEIFA scores are available. Collection Districts with no SEIFA score have been excluded from the calculations (ABS, 2008).

Note: Overall quintile position scores for Queensland 2008 LGA boundaries were unavailable at the time of printing. This map is therefore based on 2006 LGA boundaries.

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia - Data only, 2006, Cat. No. 2033.0.55.001.

Community Infrastructure

Box 10. Occupied private dwellings by Local Government Area and tenure type, 2006,



SOCIAL RESILIENCE INDICATOR:	Community infrastructure
MONITORING CRITERION:	Housing is affordable
DATA COLLECTED:	2006 ABS Census Data

At the time of the 2006 Census, 27.08% of the study region's estimated 117,912 occupied private dwellings were fully owned, while 33.71% were being purchased, and 35.43% were rented.**

Occupied private dwellings by tenure type.

Local Government Area	Percentage of total occupied private dwellings**			
	Fully owned	Being purchased	Rented	Other / Not stated
Wujal Wujal (ASC)	9.5	0.0	92.1	8.3
Yarrabah (ASC)	7.0	0.0	85.3	7.7
Cairns (RC)	24.8	33.9	37.2	4.0
Cassowary Coast (RC)	38.7	25.6	31.3	4.4
Hinchinbrook (SC)	5.02	19.2	27.0	3.6
Palm Island (ASC)	2.5	0.0	87.2	10.3
Townsville (CC)	25.5	36.7	34.5	3.3
Region	**27.08**	**33.71**	**35.43**	**3.76**

(For further notes on the data, see Appendix.)

Footnotes:

* Count of occupied private dwellings. Excludes 'Visitors only' and 'Other not classifiable' Households. Includes dwellings being; purchased under a rent/buy scheme, rented from a parent/other relative or person, rented through a 'Residential park (includes caravan and marinas)', 'Employer-government (includes Defence Housing Authority)' and 'Employer-other-employer' (private), and dwellings 'Being occupied under a life tenure scheme'.

Data for 2008 reformed local government areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile – B32.

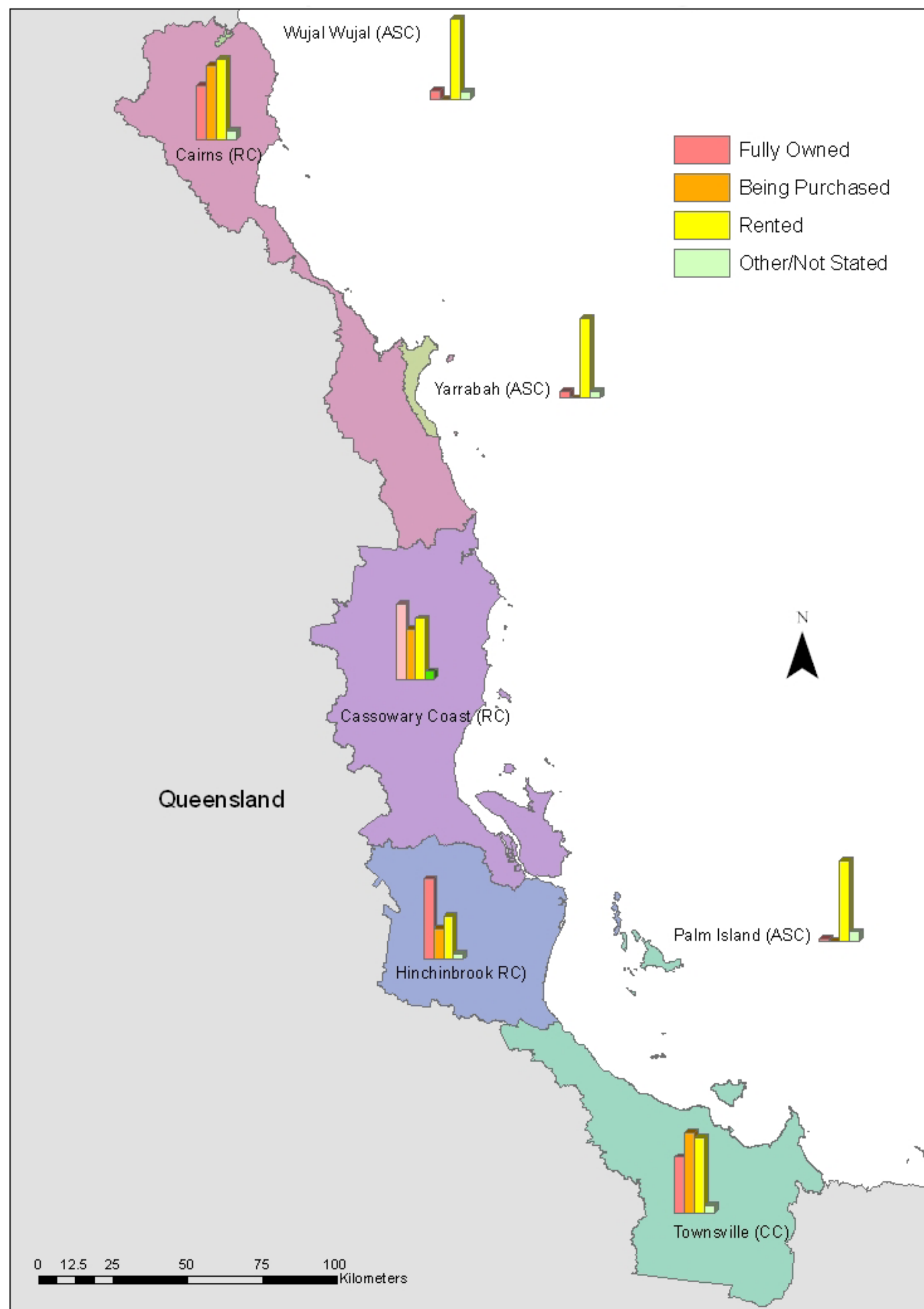


Figure 17. Occupied private dwellings by Local Government Area and tenure type, 2006.

Footnotes:

Count of occupied private dwellings. Excludes 'Visitors only' and 'Other not classifiable' Households. Includes dwellings being; purchased under a rent/buy scheme, rented from a parent/other relative or person, rented through a 'Residential park (includes caravan and marinas)', 'Employer-government (includes Defence Housing Authority)' and 'Employer-other-employer' (private), and dwellings 'Being occupied under a life tenure scheme'.

Data for 2008 reformed Local Government Areas are derived from concorded population-based statistical local area data (ASGC 2006).

Source: Office of Economic and Statistical Research (OESR), derived from Australian Bureau of Statistics (ABS), Census of Population and Housing, 2006, Basic Community Profile - B32.

Management Options to Enhance Social Resilience in Far North Queensland

This section is designed to assist not only this project's research partners, but also other organisations that could choose to acknowledge social resilience as part of their working agendas. Our project partners were environmental management organisations (Wet Tropics Management Authority, Great Barrier Reef Marine Park Authority); organisations with combined environment and resource management and social development mandates (Terrain NRM, Girringun Aboriginal Corporation and other Indigenous groups), and one organisation with a social development and planning role (Department of Communities). Through these partners we also liaised with a citizen group developing indicators of sustainability for the region. Our vision was also to include local government and peak business bodies in the project: while this was not realised for timing reasons, we consider an agenda of managing the Far North Queensland region to be open to all organisations with roles in environmental management, social or economic development. As the SMARTT framework for indicators suggests, an ideal set of indicators should be capable of 'talking' across environmental and social management purposes, towards integrated planning and management.

While our research brief has been to focus on *social* resilience, we do not envisage regional managers working towards this concept as a separate issue from the integrated management of the social-ecological system, or from managing to promote sustainability. Both resilience and sustainability 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 social-ecological system. In choosing to manage the region in ways that enhance social resilience, organisations thus need to consider the relationships between these concepts.

Although Walker and Salt (2006) explain resilience as an alternate construct to sustainability that recognises the dynamic nature of complex adaptive systemsresilience and sustainability have tended to be pursued by different teams and policy makers, in different arenas. Regional managers will not want to view them as alternate options, however: they will want to manage for both. They also need to manage for human well-being, a component of sustainability. We view the relationships between well-being, sustainability and resilience as follows. The priority of promoting human *well-being* derives mostly from socio-economic argumentation and policy. It is oriented to managing economies and key attributes of quality of life. While important, it neglects the role of the environment (source of the resources that underpin quality of life) and time dimensions. *Sustainability* thinking brought in an integration between environmental, economic and social dimensions of human need, alongside vital considerations of the needs of future generations (a time dimension and sense of responsibility), and a suggestion of managing at nested scales with slogans such as 'think global, act local'. One of the critiques of sustainability thinking is that in practice, integration of the ecological, economic and social has been limited. Recognition of social-ecological systems, and their resilience, offers conceptual and practical opportunities that enhance sustainability thinking and practice.

Thus as Walker and Salt (2006) explain, *resilience* thinking is a necessary enhancement of our ways of thinking about sustainability. Because it is strongly seated in the idea of social-ecological systems, it provides more integration than was encouraged in sustainability. Importantly, it also moves sustainability thinking into the paradigm of 'complexity', recognising that managing the earth is not about planned linear improvements or returns to equilibria after unexpected disturbances, but about managing complex adaptive social-ecological systems that may transform unexpectedly into new states if some thresholds are

crossed. Figure 18 expresses these relationships. Note that well-being focuses on a present, while sustainability and resilience focus on present and future.

Figure 18. Relationships between well-being, sustainability and resilience thinking in social-ecological systems.

We thus consider managing for social resilience as an important aspect of managing for the resilience of a complex, adaptive, social-ecological system, which should include consideration of the three 'pillars' of sustainability:ecological, social and economic. If one did not manage for both simultaneously, one would risk perpetuating persistent but undesirable states (as resilience theorists often point out). Given the scope of our project, which did not explicitly include sustainability, we focus on the adaptive capacity inherent in social resilience. Our case studies have nevertheless featured a variety of issues exploring social resilience in a sustainable social-ecological system:

- The adaptation to an economic sustainability issue, of restructuring the dairy industry to remove reliance on subsidies;
- Adaptation to a new water management regime, to improve sustainability in water allocation;
- The social dimensions in adapting to the conservation decision to protect the Wet Tropics forests as a world heritage area;
- The sustainability of urban growth, and its impacts on natural systems;
- Addressing a threat to marine ecosystems that also threatened livelihoods; and
- The ways in which Indigenous people approach the management of a social-ecological system for integrated human and ecological resilience: 'healthy country, healthy people'.

One more point requires clarification. Some resilience theorists make a sharp distinction between resilience, in the sense of retaining past states, and transformation, conversion to new states in a system (Walker & Salt, 2006). Others treat resilience as incorporating both options. We take the latter view in our definition of social resilience:

> "...how individuals, communities and societies adapt, transform, and potentially become stronger when faced with environmental, social, economic or political challenges" (see 'Introduction', page 1).

Our research has identified six key social and institutional attributes as helping the Far North Queensland region and its communities to be resilient: people-place connections; knowledge, skills and learning; community networks; engaged governance; a diverse and innovative economy; and community infrastructure. These are not exclusively social; they connect across the dimensions of sustainability. The first is inherently about the social-ecological system, but in social resilience perspective, we are emphasising people's sense of connection with and custodianship over the natural and built environments. Community infrastructure also combines built with human elements, hence environmental with the social. Having a diverse and innovative economy ensures continuing opportunities within a dynamic system underpinned by the quality of natural resources.

These attributes can be accepted as the key indicators of social resilience for the Great Barrier Reef region and its communities, a focus for management action by those seeking to enhance social resilience and a focus for ways to measure, monitor and report on social resilience. Regional partners may choose to manage for social resilience by:

- Being aware of social resilience context, without intention to intervene ('acknowledge it');
- Making constructive use of social resilience characteristics in management actions ('use it'); or
- Meeting environmental and other mandates in ways that simultaneously enhance social resilience ('grow it').

Under the first option, regional organisations might find out about and recognise variations in people-place attachment within their region, and possibly vary their communication strategies accordingly. Under this management role they would not try to increase levels of people-place attachment, but 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, and 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 excellent opportunity for new landcare or community-based monitoring groups. School communities in such places might be receptive to becoming Reef Guardian Schools.

The third option, to pursue organisational mandates in a new way that enhances social resilience, would take a step further. It could involve:

- Facilitating formation of and 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;
- Developing new, more engaged, governance forms such as co-management with Traditional Owners; and
- Explicitly building governance capacity, for example resourcing the formation and activities of Indigenous organisations, and conducting projects and research collaborations that enhance governance capacity throughout the community.

Table 9 outlines a range of options to stimulate regional organisations in their thinking about ways of managing for social resilience, or acknowledging social resilience in non-

interventionist ways, in meeting their environmental or social mandates. It suggests possibilities for management action under each attribute of social resilience (and hence indicator of social resilience), and provides examples of existing or potential management activities by our research partner organisations or others. Relevant management actions are already occurring: this analysis provides a social resilience management framework to assist regional organisations in making conscious management choices that they consider consistent with their roles.

Note that the columns in the table are not sharply distinguished, or mutually exclusive. Some options straddle columns, and in many instances actions in the second and third columns (‘Use it’, ‘Grow it’) draw on information collected under the first (‘Acknowledge it’).

Table 9. Options with examples for managing a region to enhance social resilience: 'acknowledge it, use it, grow it'.

Definitions:

People–place connections............................Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.
Knowledge, skills and learning ....Individual and group capacity to respond to local needs and issues.
Community networks ....Processes and activities that build and support people and groups in a place.
Engaged governance ....Collaborative processes for regional decision making (includes partnerships, planning, supportive and creative institutions).
Diverse and innovative economy.................Regional economy comprises a broad range of industry and services, and supports new and exciting opportunities.
Community infrastructure and services......Appropriate services and facilities to support identified community needs.

Management Option (1, 2 or 3) ► **Resilience attribute and indicator ▼**	**1. Pursue existing mandates in consciousness of social characteristics, without trying to intervene** **('Acknowledge it')**	**2. Take advantage of resilience characteristics in management strategies** **('Use it')**	**3. Pursue organisational mandates in a new way that enhances social resilience** **('Grow it')**
People-place connections	**Identify:** • How much people care about the region and its natural assets. • To what extent their sense of identity is connected with the nature of the region or its attributes (e.g. identities as keen recreational fishers, outdoor people).	Call upon people's identification with the region and its natural resources in supporting management strategies: • in the World Heritage Areas; • in mixed landscapes, and the land-marine environmental impacts; and • in urban, infrastructure (including roads), and other built environment planning. This could be done through: • communication plans that connect with people's sense of place, and the importance of the natural assets; • encouragement of local participation in planning and decision-making about the region; and • encouragement of leadership in championing environmental, social and economic improvements.	Seek to build stronger sense of place, identification with the region and its natural and social assets, through a variety of initiatives potentially drawing on the other social resilience attributes (e.g. engaged governance, community networks, and improvement of community infrastructure).

Management Option (1, 2 or 3) ► Resilience attribute and indicator ▼	1. Pursue existing mandates in consciousness of social characteristics, without trying to intervene (‘Acknowledge it’)	2. Take advantage of resilience characteristics in management strategies (‘Use it’)	3. Pursue organisational mandates in a new way that enhances social resilience (‘Grow it’)
People-place connections ***Examples***	**Research:** • Resilience case studies (in this project see Case Studies section, p. 25, and conducted by James Cook University, see Gooch *et. al.* 2010) on Townsville, school communities and water quality improvement planning. • Kuku Nyungkal People, Country and Culture DVD project documenting Indigenous people-place relationships. • MTSRF-WTMA-Rainforest CRC-James Cook University research on visitor experience of the Wet Tropics World Heritage Area. • CSIRO-MTSRF research on cultural-biophysical indicators.	Selection of committed local residents for advisory boards such as GBRMPA Local Marine Advisory Committees, Board of Terrain NRM.	• Communication strategies to build consciousness of the region’s assets. • Girringun Aboriginal Corporation’s explicit agenda of promoting ‘healthy country, healthy people’ through a combined social and environmental set of initiatives including social development (Wishbone Program with Tully State High School); social with economic (Girringun Arts); cultural heritage management (CHM database, Wildriver and Working on Country ranger programs, Cardwell Indigenous Ranger Unit); and environmental management (Wildriver and Working on Country ranger program, Cardwell Indigenous Ranger Unit Traditional Use of Marine Resources Agreement; proposed land to sea, multi-tenured Indigenous Protected Area). • GBRMPA Reef Rescue program with schools and local governments.
Knowledge, learning and skills Note: This attribute has general capacity and specific NRM components.	**General capacity:** • Identify levels of knowledge and skills within the region, be aware of their effects on capacity for all purposes. To what extent is this a well-educated, learning society with an orientation to innovation and adaptation? **NRM capacity:** • Scope areas of knowledge, learning and skills that are important to the region and specific management needs, e.g. water quality threats to the		• Build educational levels, access to information (e.g. scientific literacy, quality of and access to libraries, web-based information). • Build social-ecological system knowledge pertinent to key issues (present and anticipated future) through investment in research (ecological, social, economic and policy); and investment in dissemination (extension, effective communication strategies).

Management Option (1, 2 or 3) ► Resilience attribute and indicator ▼	1. Pursue existing mandates in consciousness of social characteristics, without trying to intervene ('Acknowledge it')	2. Take advantage of resilience characteristics in management strategies ('Use it')	3. Pursue organisational mandates in a new way that enhances social resilience ('Grow it')
	Great Barrier Reef. Consider a knowledge cycle: - Existence and creation of knowledge (do we know enough, and we are doing enough to improve knowledge about, the nature of the problems, and social dimensions of the problems?) - Access to the knowledge (is it readily available, and disseminated in the best ways to those who need it?) - Adoption of knowledge (are those who need it using it? What needs adapting ifit is not well used? - Evaluation and innovation: learning from experience and further research to improve knowledge further.		• Promote social learning efforts by selected parts of the community, through appropriate facilitation approaches (requiring explicit investment). This could expand on the roles of the GBRMPA existing Community Partnership office positions. • Increase capacity in agricultural extension, through organisations such as Terrain and local governments, and peak primary industry bodies.
Knowledge, learning and skills ***Examples***	Inclusion of knowledge levels in social profiling. MTSRF-UQ studies of landholder adoption of land use practices. **Existing:** • Investment in science by DEWHA (MTSRF, NERP), universities, CSIRO, AIMS, agency sponsorship and solicitation of research. • 'Social learning' efforts by primary industry groups to address the water quality challenges and land use practices entailed. • Agricultural extension positions, e.g. on Terrain NRM staff.	Cultural heritage database training provided by Girringun staff to other Aboriginal corporations in Queensland.	• Investment in biophysical social and economic science, on targeted themes and areas (e.g. under the Reef Rescue program). • Agricultural extension positions dedicated to work with landholders, e.g. Terrain NRM's Sustainable Industries position.

Management Option (1, 2 or 3) ► Resilience attribute and indicator ▼	1. Pursue existing mandates in consciousness of social characteristics, without trying to intervene ('Acknowledge it')	2. Take advantage of resilience characteristics in management strategies ('Use it')	3. Pursue organisational mandates in a new way that enhances social resilience ('Grow it')
Community networks	Identify the strength or otherwise of: • Community social networks throughout the region (considering communities of place, and communities of interest e.g. bird watchers). • Cross-sectoral networks, the extent to which leaders and active members in government, industry, and voluntary capacities tend to know one another and be capable of communication and joint action when required.	Draw on community and occupational networks when an issue arises, e.g. to increase communication, organise new actions, form new collaborations.	• Seed or strengthen local or interest groups where required, through facilitation around a purpose. • Actively build networks across sectors, for instance build relationships through invited participation on committees and in initiatives.
Community networks *Examples*	GBRMPA Community Partnerships and Terrain NRM staff identifying local networks.	• The success of the 'I fish and I vote' campaign by recreational fishers before the 1996 Queensland elections demonstrates the power of organised networks when motivated by an issue. • Many of the early landcare groups formed in the 1990s built on tennis clubs, church groups and similar community networks (Carr, 2002). • North Queensland Traditional Owner Land and Sea Management Alliance (and predecessor: Rainforest Aboriginal Alliance)	• The scientific and stakeholder advisory committees formed by GBRMPA to advise on the rezoning prior to 2003 also had the benefit of building cross-science and cross-stakeholder relationships. • Crown of Thorns Starfish case study (this report) shows the power of an industry-GBRMPA collaboration to solve a problem. • Network building between indigenous groups at national and international conferences (e.g. Girringun participation at *Healthy Parks, Healthy People* conference, Melbourne, April 2010)

Management Option (1, 2 or 3) ► Resilience attribute and indicator ▼	1. Pursue existing mandates in consciousness of social characteristics, without trying to intervene ('Acknowledge it')	2. Take advantage of resilience characteristics in management strategies ('Use it')	3. Pursue organisational mandates in a new way that enhances social resilience ('Grow it')
Engaged governance	Know the stakeholders and their institutional arrangements, their interests and ways of acting.	Use and strengthen current processes for engagement and collaboration.	• Build and improve capacity for the types of collaboration in Column 2. • Develop new policy and processes for engagement and collaboration, acknowledging diverse knowledge systems, power structures, resource constraints, and stakeholder capacities. • Develop 'win-win' collaborations and initiatives that respect and meet interest groups' and government interests equally.
Engaged Governance *Examples*	• GBRMPA Local Marine Advisory Committees, Community Partnerships positions. • WTMA Community Consultative Committee, Conservation Sector Liaison Group, Tourism Industry Liaison Group, Scientific Advisory Committee. • Indigenous engaged governance structures and practices: - Girringun Aboriginal Corporation - North Queensland Traditional Owner Land and Sea Management Alliance (and predecessor: Rainforest Aboriginal Alliance)	• Traditional Use of Marine Resource Agreements. • Co-management of protected areas. • Existence and approaches of collaborative regional bodies for NRM, e.g. Terrain NRM. • Strengthening through evaluation processes e.g. framework for evaluation of the Girringun Indigenous Ranger Unit co-management relationship; renegotiation of Girringun's TUMRA.	• Resourcing and expansion of Aboriginal Traditional Owner representative bodies such as Girringun Aboriginal Corporation, Jabalbina Yalanji Aboriginal Corporation, Central Wet Tropics Institute for Country and Culture Aboriginal Corporation, other rainforest TO networks and organisations, NQTOLSMA. • WTMA's Aboriginal Resource Management position, regional Agreement, and relationship with North Queensland Traditional Owner Land and Sea Management Alliance. • Innovative partnerships such as: - Barron River, multi-party Green Corridors riverbank restoration project. - Collaboration between tourism industry and GBRMPA to solve COTS infestations.

Management Option (1, 2 or 3) ► **Resilience attribute and indicator ▼**	**1. Pursue existing mandates in consciousness of social characteristics, without trying to intervene** **('Acknowledge it')**	**2. Take advantage of resilience characteristics in management strategies** **('Use it')**	**3. Pursue organisational mandates in a new way that enhances social resilience** **('Grow it')**
A diverse and innovative economy	• Know and monitor the structure and diversity of the economy, and what this means for opportunities. • Pay particular attention to Indigenous opportunity within this.	Promote economic diversity as an appealing feature of the region, e.g. agri-ecological tourism based on the diversity of primary industry and natural landscapes	• Intervene to make the economy more diverse and innovative: - Build and extend value chains from primary to tertiary industries - Diversify reliance on primary industries and on major sectors - Diversify within sectors, e.g. types of tourism, visitor experiences offered, and their infrastructure. • Increase Indigenous opportunities within the economy. • Build 'green economy' jobs, e.g. in natural resource management. (Terrain NRM carbon trading initiative)
A diverse and innovative economy ***Examples***	National monitoring of economic structure, by Bureau of Infrastructure, Transport and Regional Economies.		• Past choices to diversify the region from its agricultural basis to include tourism, and diversification among agricultural products. • Investment in meaningful Indigenous roles in the economy, e.g. ranger positions, school positions, health sector positions, Indigenous roles in the tourist industry. • 'Degree Celsius' carbon joint venture (Terrain NRM with BIOCARBON Pty Ltd).

Management Option (1, 2 or 3) ► Resilience attribute and indicator ▼	1. Pursue existing mandates in consciousness of social characteristics, without trying to intervene ('Acknowledge it')	2. Take advantage of resilience characteristics in management strategies ('Use it')	3. Pursue organisational mandates in a new way that enhances social resilience ('Grow it')
Community infrastructure and services	Monitor availability of infrastructure and services, against state and national benchmarks.		• Build infrastructure that supports other resilience attributes, e.g. walking tracks to natural areas can enhance people-place relationships; community gathering places can support development of community networks. • This is a strong opportunity to enhance sustainability, e.g. through tropical architecture (Cairns case study, this report), energy-sensitive transport infrastructure.
Community infrastructure and services ***Examples***	• Examine parity in access to services, e.g. by rural and remote residents including Indigenous communities. • Monitor impacts of road and power corridors, tourism infrastructure, on environments (MTSRF-JCU projects).		• Walking tracks with interpretation, to support building of people-place relations. • Girringun Aboriginal Corporation office, meeting, cultural heritage and arts building spaces that provide a meeting place for community and government, and a place to provide training, cultural heritage keeping place and arts workshop.

Note that the actions outlined in Table 9 need not be restricted to residents of the region. The Great Barrier Reef and Wet Tropics forests are national and international icons, and it makes sense to consider and enhance Australian and international dimensions under some of the options. Promotion of these natural assets for tourism purposes almost certainly highlights their role in a national sense of place. The managers of these World Heritage Areas recognise that public support from other states enhances their popular mandate for conservation.

Table 9 is not intended to be government-centric. We hope it will be equally useful to Indigenous people and non-government bodies, formal and informal. Community leaders and industry bodies will also be in a position to identify actions appropriate at their scales of influence.

Conclusion

This framework for considering management actions satisfies the final ‘T’ in our SMARTT framework for use of indicators in monitoring and evaluation: ‘talk’. Our analysis promotes cooperation and collaboration across organisations with regional mandates. Environmental management organisations, and organisations with joint environmental and social mandates, can work in ways that enhance social resilience (and well-being). Equally, designers of infrastructure and those with mandates to foster social well-being can work in ways that support environmental sustainability and resilience. We encourage regional organisations to communicate and cooperate towards shaping Far North Queensland as a nested, sustainable and resilient, set of social-ecological systems, in which local patterns combine into regional ones, and enhance the national (and global) social-ecological system. We encourage them to underpin, and monitor, their progress towards fostering a resilient North Queensland by developing and co-investing in a shared monitoring and evaluation system that incorporates this project’s social resilience indicators and monitoring criteria, with ecological indicators developed under the CSIRO State of the Region reporting project and other research projects.

References

ABS (2004) The Australian dairy industry. In: *Year Book Australia, 2004*. Online resource of the Australian Bureau of Statistics (ABS) http://www.abs.gov.au/ausstats/ABS@.nsf/90a12181d877-a6a6ca2568b5007%0bb861c/b006a83a9127b0f5ca256dea00053965!OpenDocument

ABS (2006) *Census of population and housing.* Online resource of the Australian Bureau of Statistics (ABS) http://www.abs.gov.au/websitedbs/d3310114.nsf/Home/census

ABS (2008) *Information Paper: An Introduction to Socio-Economic Indexes for Areas (SEIFA), 2006*. Online resource of the Australian Bureau of Statistics (ABS) http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/2039.0Main%20Features12006?opendocument&tabname=Summary&prodno=2039.0&issue=2006&num=&view=

ABS ANZSIC (2006) Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006 (Revision 1.0). Online resource of the Australian Bureau of Statistics (ABS) http://www.abs.gov.au/ausstats/abs@.nsf/39433889d406eeb9ca2570610019e9a5/a77d93484dc49d63ca2571230056842!OpenDocument

Adger, W. (2000a) Institutional Adaptation to environmental risk under the transition in Vietnam. *Annals of the Association of American Geographers* 90(4): 738-358.

Adger, W. (2000b) Social and ecological resilience: Are they related? *Progress in Human Geography* 23(3): 347-364.

Aiello, R. (2006) *Crown of thorns starfish. A step by step guide. Developing effective control programs*. Ocean Antics Consulting Environmental Management Strategies, Cairns.

AIMS (2007) *Crown-of-thorns starfish*. Online resource of the Australian Institute of Marine Science (AIMS) http://www.aims.gov.au/docs/research/biodiversity-ecology/threats/cots.html

Ames, S. (1997) *A Guide to Community Visioning.* American Planning Association: Washington, D.C.

Anderson, J. (2004) *Dairy Deregulation in northern Queensland: the end of traditional farming? Anthropological Forum* 14: 282.

Armstrong, A. and Francis, R. (2003) Social indicators – promises and problems: a critical review. *Evaluation Journal of Australasia* 3(1): 17-26.

Aronson, J., Floret, C., LeFloc'h, E., Ovalle, O. and Pontanier, R. (1993) Restoration and rehabilitation of degraded ecosystems in arid and semi-arid lands. I. A view from the south. *Restoration Ecology* 1(1): 8-17.

ASGC (2006) 1216.0 Statistical Geography Volume 1 – Australian Standard Geographical Classification (ASGC), July 2006 http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1216.0Main+Features1Jul%202006?OpenDocument

Bauer, R. (ed.) (1966) *Social Indicators.* The M.I.T. Press: Cambridge, Mass., London.

Berkes, F. and Turner, N. (2006) Knowledge, learning and the evolution of conservation practice for social-ecological system resilience. *Human Ecology* 34(4): 479-494.

BTRE (2005) *Focus on Regions No. 4: Social Capital.* Information Paper 55. Online resource of the Bureau of Transport and Regional Economics (BTRE) http://www.bitre.gov.au/publications/21/Files/ip55.pdf

BITRE (2009) *Industry Structure Database 2009*. Online resources of the Bureau of Infrastructure, Transport and Regional Economics (BITRE) http://www.bitre.gov.au/info.aspx?ResourceId=253&NodeId=66

Briggs, S. (2003) Command and control in natural resource management: Revisiting Holling and Meffe. *Ecological Management & Restoration* 4: 161-162.

Buikstra, E., Ross, H., King, C.A., Baker, P.G., Hegney, D., McLachlan, K. and Rogers-Clark C. (2010) The Components of Resilience: Perceptions of an Australian Rural Community. *Journal of Community Psychology* 38(8): 976-991 [doi:10.1002/jcop]

Cairns Regional Council (2009) *Chronological History of Cairns, Timeline 1770 to 1896*. Online resource of the Cairns Regional Council http://www.cairns.qld.gov.au/content/heritage/Timeline.htm

Carpenter, S., Walker, B., Anderies, J. M. and Abel, N. (2001) From metaphor to measurement: resilience of what to what? *Ecosystems* 4: 765-781.

Carr, A. (2002) *Grass roots and green tape: principles and practices of environmental stewardship.* Federation Press, Annandale, N.S.W.

Cobb, C.W. and Rixford, C. (1998) *Redefining Progress. Lessons learned from the history of social indicators.* Online resource available at http://www.sisreg.it/site/administrator/components/com_jresearch/files/publications/Cobb_Lessons%20learned%20from%20the%20history%20of%20social%20indicators_1998.pdf

Cobb, C., Halstead, T. and Rowe, J. (1995) If GDP is Up, Why is America Down? *The Atlantic Monthly* October: 59-78.

Commission on Social Determinants of Health (2007) *A conceptual framework for action on the social determinants of health.* Online resource available at http://www.who.int/social_determinants/resources/csdh_framework_action_05_07.pdf

Cook, P. (2007) *The Great Tropical Drive. An historical journey.* Corinda, Pictorial Press Australia.

CRC Reef Research Centre (2003) Crown-of-thorns starfish on the Great Barrier Reef. Current State of Knowledge, November 2003 (Revised edition). Online resource of the CRC Reef Research Centre Ltd, Townsville http://www.reef.crc.org.au/publications/brochures/COTS_web_Nov2003.pdf

Cuthill, M. (2002) Coolangatta: A Portrait of Community Well-being. *Urban Policy and Research* 20(2): 187-203.

Cuthill, M. (2003) The contribution of human and social capital to building community well-being: A research agenda relating to citizen participation in local governance in Australia. *Urban Policy and Research* 21(4): 373-391.

Cuthill, M. (2004) Community Visioning: Facilitating Informed Citizen Participation in Local Area Planning on the Gold Coast. *Urban Policy and Research* 22(4): 427-445.

Cuthill, M. and Fien, J. (2005) Capacity Building: Facilitating citizen participation in local governance. *Australian Journal of Public Administration* 64(4): 63-80.

Cuthill, M., Ross, H., Maclean, K., Owens, K. and Witt, B. (2008) Reporting social outcomes of development: An analysis of diverse approaches. *The International Journal of Interdisciplinary Social Science* 3(6): 145-158.

Cullen-Unsworth, L. (2010). *Best Practice and use of methods for the development of a series of cultural indicators for the Wet Tropics World Heritage Area.* Final Project Report to the Marine and Tropical Sciences Research Facility, Cairns http://www.rrrc.org.au/publications/final_reports.html

Cutter, S. L., Mitchell, J. T. and Scott, M. S. (2000) Revealing the vulnerability of people and places: A case study of Georgetown County, South Carolina. *Annals of the Association of American Geographers* 90: 713-737.

Dairy Adjustment Authority (2006) Dairy Industry Adjustment Package. Australian Government Department of Agriculture, Fisheries and Forestry.

Dairy Australia (2008) *A history of dairy industry regulation in Australia*. Online resource available at www.dairyaustralia.com.au

Daly, H. and Cobb, J. (1994) *For the Common Good.* Second Edition. Beacon Press: Boston.

Davidson-Hunt, I. J. and F. Berkes (2003) Nature and society through the lens of resilience: toward a human-in-ecosystem perspective. Pp. 53-82 in F. Berkes, J. Colding, and C. Folke (eds.) *Navigating social-ecological systems.* Cambridge University Press, Cambridge, UK.

DERM (2009) *Barron Water Resource Amendment Plan Consultation Report.* Queensland Department of Environment and Resource Management (DERM) http://www.derm.qld.gov.au/wrp/pdf/barron/barron_wrp_amend_consult_report.pdf

DIP (2009) *Far North Queensland Regional Plan 2009-2031.* Queensland Department of Infrastructure and Planning (DIP) http://www.dip.qld.gov.au/regional-planning/regional-plan-3.html (viewed 19 November 2010).

Doran, G. (1981) There's a S.M.A.R.T. way to write management's goals and objectives *Management Review* 70(11): 35-36.

Ekos Research Associates (1998) *The use of social indicators as evaluation instruments.* Final Report prepared for Strategic Evaluation and Monitoring, Human Resources Development Canada http://www.hrsdc.gc.ca/eng/cs/sp/sdc/evaluation/sp-ah064e/sp-ah064.pdf

Emtage, N. (2009) *Market segmentation study of rural landholders in relation to the promotion of natural Resource management on private land in the Wet Tropics region of Queensland.* Report to the Marine and Tropical Sciences Research Facility. Reef and Rainforest Research Centre Limited, Cairns (65pp.) http://www.rrrc.org.au/publications/downloads/494-UQ-Emtage-N-2009-Landholders-Market-Segmentation-Study.pdf

Engelhardt, U., Hartcher, M., Cruise, J., Engelhardt, D., Russell, M., Taylor, N., Thomas, G. and Wiseman, D. (1999) *Fine-scale surveys of crown-of-thorns (Acanthaster planci) in the central Great Barrier Reef region.* CRC Reef Research Centre, Townsville. Technical Report No. 30 http://www.reef.crc.org.au/publications/techreport/TechRep30.html

Fisk, D. A. and Power, M. C. (1999) *Development of cost-effective control strategies for crown-of-thorns starfish.* CRC Reef Research Centre, Townsville. Technical Report No. 25 http://www.reef.crc.org.au/publications/techreport/TechRep25.html

Flora, C. Flora, J. and Fey, S. (2004) *Rural Communities: Legacy and Change.* Second Edition. Westview Press: Boulder, Colorado.

Folke, C. (2003) Freshwater for resilience: A shift in thinking. *Philosophical Transactions: Biological Sciences* 358: 2027-2036.

Folke, C. Hahn, T. Olsson, P. and Norberg, J. (2005) Adaptive governance of social-ecological systems. *Annual Review of Environmental Resources* 30: 441-473.

Frawley, K. (2000) European Settlement: "jungle scrubs" to "smiling homesteads". In: Lane, M. and McDonald, G. (eds.) *Securing the Wet Tropics?* Leichhardt, The Federation Press.

Freebairn D. and King, C. (2003) Reflections on collectively working toward sustainability: indicators for indicators! *Australian Journal of Experimental Agriculture* 43(3): 223-238.

Galbraith, J. (1984) *The Affluent Society.* Fourth Edition. Houghton Mifflin Company: Boston.

Garmezy, N. (ed.) (1974) *The study of competence in children at risk for severe psychopathology*. John Wiley, New York.

Gasteyer, S. and Flora, C. (1999) *Social indicators: An annotated bibliography on trends, sources and development, 1960-1998.* Northern Regional Center for Rural Development http://www.soc.iastate.edu/extension/ncrcrd/rrd181.pdf

GBRMPA (2006) *Crown-of-thorns starfish on the Great Barrier Reef*. Fact Sheet No. 3. Great Barrier Reef Marine Park Authority (GBRMPA), Townsville http://www.gbrmpa.gov.au/__data/assets/pdf_file/0008/2141/FactSheet-03.pdf

GBRMPA (2009) Sustainable traditional use of marine resources. Online resource of the Great Barrier Reef Marine Park Authority (GBRMPA), Townsville http://www.gbrmpa.gov.au/corp_site/key_issues/conservation/indigenous_partnerships/sustainable_traditional_use_of_marine_resources

Girringun Aboriginal Corporation (2010a) What is Girringun? Online resource available at http://www.girringun.com.au/about_us/what-is-girringun

Girringun Aboriginal Corporation (2010b) Girringun Vision Statement. Online resource available at http://www.girringun.com.au/about_us/girringun-vision-statement

Girringun Aboriginal Corporation (2010c) Girringun National Park. Online resource available at http://www.girringun.com.au/about_us/girringun-national-park

Glavovic, B.C., Scheyvens, R. and Overton, J. (2003) Waves of adversity, layers of resilience: Exploring the sustainable livelihoods approach. Pp. 289-293 In *Contesting development: Pathways to better practice, third biennial conference of the Aotearoa New Zealand International Development Studies Network (DevNet).* Institute of Development Studies, Massey University, Victoria.

Gooch, M., Rigano, D., Butler, J. and Cullen, L. (2010) *Developing and refining indicators of community-scale resilience to changing water quality.* Report prepared for the Marine and Tropical Sciences Research Facility (MTSRF), Cairns (April 2010).

Greiner, R., Patterson, L., Bligh, V. and Milligan, S. (2007a) *Well-being of Traditional Owners: Contributions by Girringun Aboriginal Corporation.* Final Report to Burdekin Dry Tropics NRM and Far North Queensland NRM. River Consulting, Townsville http://www.riverconsulting.com.au/reports/TO-Wellbeing_Girringun_Report.pdf

Greiner, R., Patterson, L., Bligh, V., and Milligan, S. (2007b*) Well-being of Traditional Owners: Contributions by Girringun Aboriginal Corporation. Appendices*. Report prepared for Burdekin Dry Tropics NRM and Far North Queensland NRM. River Consulting: Townsville http://www.riverconsulting.com.au/reports/TO-Wellbeing-Girringun_Appendices.pdf.

Grime, J. P. (1979) *Plant strategies and vegetation processes.* John Wiley, New York.

Guijt, I. (1998) *Participatory monitoring and impact assessment of sustainable agriculture initiatives: an introduction to the key elements.* SARL Discussion Paper No.1, IIED: London.

Gunderson, L.H. (2000) Ecological resilience – in theory and application. *Annual Review of Ecology, Evolution and Systematics* 31: 425-439.

Gunderson, L.H., C.R. Allen, and C.S. Holling (2010) *Foundations of ecological resilience*. Island Press, Washington D.C.

Gunderson, L.H., Light, S.S. and Holling, C.S. (1995) Lessons from the Everglades. *BioScience* 45: S66-S73.

Gunderson, L. and Folke, C. (2005) Resilience – now more than ever. *Ecology and Society* 10(2): 22 (URL: http://www.ecologyandsociety.org/vol10/iss2/art22/)

Gunderson, L. and Holling, C. (eds.) (2002) *Panarchy: Understanding transformation in human and natural systems.* Island Press: Washington D.C.

Hanley, A. (2006) *Millaa Millaa. A pictorial record from 1910.* Atherton, Tableland Printing Service.

Hawkes, J. (2001) *Fourth Pillar of Sustainability: Culture's Essential Role in Public Planning.* Common Ground and the Cultural Development Network Publishing: Flinders Lane.

HeavyRunner, I. and Marshall, K. (2003) Miracle survivors: Promoting resilience in Indian students. *Tribal College Journal* 14: 14-18.

Hegney, D., Buikstra, E., Baker, P., Rogers-Clark, C., Pearce, S., Ross, H., King, C. and Watson-Luke, A. (2007) Individual resilience in rural people: a Queensland study, Australia. *Rural and Remote Health* 7: 620 [URL: http://www.rrh.org.au/publishedarticles/article_print_620.pdf

Hegney, D.G., Ross, H., Baker, P., Rogers-Clark, C., King, C., Buikstra, E., Watson-Luke, A., Mclachlan, K. and Stallard, L. (2008) *Identification of personal and community resilience that enhances psychological wellness: a Stanthorpe study.* The University of Southern Queensland, Toowoomba, Australia.

Holling, C.S. (1973) Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics* 4: 1-23.

Holling, C.S. (1995) What Barriers? What Bridges? Pp. 3-36 In Gunderson, L., Holling, C.S. and Light, S.S. (eds.) *Barriers and bridges to the renewal of ecosystems and institutions.* Columbia University Press, New York.

Holling, C.S. (1996) Surprise for science, resilience for ecosystems, and incentives for people. *Ecological Applications* 6: 733-735.

Holling, C.S. (2001) Understanding the complexity of economic, ecological, and social systems. *Ecosystems* 4: 390-405.

Holling, C.S. and Gunderson, L.H. (2002) Resilience and adaptive cycles. Pp. 25-62 In Gunderson, L.H. and Holling, C.S. (eds.) *Panarchy: Understanding transformations in systems of humans and nature.* Island Press, Washington D.C.

Holling, C.S., Gunderson, L.H. and Peterson, G.D. (2002) Sustainability and panarchies. Pp. 63-102 In Gunderson, L.H. and Holling, C.S. (eds.) *Panarchy: Understanding transformations in systems of humans and nature.* Island Press, Washington, D.C.

Holling, C.S. and Meffe, G.K. (1996) Command and control and the pathology of natural resource management. *Conservation Biology* 10: 328-337.

Jacksonville Community Council Inc. (2000) *Creating a community agenda: Indicators for health and human services.* Prepared for the United Way of Northeast Florida.

Janssen, M. A. (2002) A future of surprises. Pp. 241-260 In Gunderson, L.H. and Holling, C.S. (eds.) *Panarchy: Understanding transformations in human and natural systems.* Island Press, Washington D.C.

Johnston, W. T. (1988) *Murder in the Boonjie Scrub.* Eacham Historical Society, Malanda, Queensland.

Kaplan, H. (2005) Understanding the concept of resilience. Pp. 39-47 In Goldstein, S. and Brooks, R.B. (eds.) *Handbook of resilience in children.* Springer, New York.

Kaplan, H.B. (1999) Towards an understanding of resilience: A critical review of definitions and models. Pp. 17-83 In Glantz, M.D. and Johnson, J.L. (eds.) *Resilience and development.* Kluwer Academic/Plenum, New York.

Keesing, J.K., Bradbury, R.H., Devantier, L.M., Riddle, M.J. and De'ath, G. (1992) Geological evidence for recurring outbreaks of the crown-of-thorns starfish: a reassessment from an ecological perspective. *Coral Reefs* 11: 79-85.

King, D. and MacGregor, C. (2000) Using social indicators to measure community vulnerability to natural hazards. *Australian Journal of Emergency Management* Spring 2000: 52-57.

Kulig, J. (2000) Community resiliency: The potential for community health nursing theory development. *Public Health Nursing* 17(5): 374-385.

Kulig, J., Edge, D. and Guernsey, J. (2005) *Community Resiliency and Health Status: What are the links?* University of Lethbridge: Canada.

Kulig J.C., Hegney D. and Edge, D.S. (2009) Community resiliency and rural nursing: Canadian and Australian perspectives. Pp. 385-400 In Winters, C.A. and Lee, H.J. (eds.) *Rural nursing: concepts, theory and practice.* Third edition. Springer, New York.

Lalonde, C.E. (2005) *Identity formation and cultural resilience in Aboriginal communities.* Department of Psychology, University of Victoria, Canada.

Lalonde, C. (2006). Identity formation and cultural resilience in Aboriginal communities. Pp. 52-71 In Flynn, R.J., Dudding, P. and Barber, J. (eds.) *Resilience in child welfare.* University of Ottawa Press, Ottawa.

Lebel, L., Anderies, J.M., Campbell, B., Folke, C., Hatfield-Dodds, S., Hughes, T.P. and Wilson, J. (2006) Governance and the capacity to manage resilience in regional social-ecological systems. Pp. 119-138 In Walker, B.H., Anderies, J.M., Kinzig, A.P. and Ryan, P. (eds.)*Exploring resilience in social-ecological systems: comparative studies and theory development.* CSIRO Publishing, Collingwood Victoria.

Luthar, S.S., Cicchetti, D. and Becker, B (2000) The construct of resilience: A critical evaluation and guidelines for future work. *Child Development* 71: 543-562.

Maclean, K., Ross, H., Cuthill, M., Witt, B. and Harringtion, R. (in prep.) *Converging Disciplinary Understandings of Social Resilience.*

Maguire, B. and Hagan, P. (2007) Disasters and communities: understanding social resilience. *The Australian Journal of Emergency Management* 22: 16-20.

Manderson, L. (2005) The social context of well-being. Pp. 1-27 In Manderson, L. (ed.) *Rethinking wellbeing.* Griffith Press: Netley, South Australia.

Manyena, S.B. (2006) The concept of resilience revisited. *Disasters* 30: 433-450.

Marshall, N. A. and Fenton, D. M. (2001) *A Guide to the Fishers of Queensland. Part A: TRC-Analysis and Social Profiles of Queensland's Commercial Fishing Industry*. CRC Reef Research Centre Technical Report No. 36. CRC Reef, Townsville http://www.reef.crc.org.au/research/fishing_fisheries/commercial.html

Marshall, N.A., Fenton, D.M., Marshall, P.A. and Suffon, S.G. (2007) How resource dependency can influence social resilience within a primary resource industry. *Rural Sociology* 72: 359-390.

Masten, A. and Garmezy, N. (1985) Risk, vulnerability, and protective factors in developmental psychopathology. Pp. 1-52 In Lahey, B. and Kazdin, A. (eds.) *Advances in clinical child psychology.* Plenum Press, New York.

May, R.M. (1977) Thresholds and breaking points in ecosystems with a multiplicity of stable states. *Nature* 269: 471-478.

McDonald, G. and Roberts, B. (2006) SMART Targets for Great Barrier Reef Catchments. *Australasian Journal of Environmental Management* 13(2): 95-107.

McIntosh, R.P. (1987) Pluralism in ecology. *Annual Review of Ecology and Systematics* 18: 321-341.

Meadows, D. (1998) *Indicators and information systems for sustainable development.* A report to the Balaton Group. The Sustainability Institute, Hartland Four Corners, V.T. http://www.nssd.net/pdf/Donella.pdf

MTSRF (2008) *Project 1.1.2 Condition and trend of the Great Barrier Reef ecosystem: Indicators, thresholds of potential concern, and ecological influence of the Great Barrier Reef Zoning Plan on mid and outer shelf reefs.* Project outline http://www.rrrc.org.au/mtsrf/theme-_1/project_1_1_2.html.

Norris, F.H., Stevens, S.P., Pfefferbaum, B., Wyche, K.F. and Pfefferbaum, R.L. (2008) Community resilience as a metaphor, theory, set of capabilities, and strategy for disaster readiness. *American Journal of Community Psychology* 41: 127-150.

National Water Commission (2010) The National Water Initiative http://www.nwc.gov.au/www/html/117-national-water-initiative.asp (viewed 19 November 2010).

OESR (2010) *Queensland Regional Profiles*. (MTSRF Study Area regional profile derived using local government areas, 2006.) Online resource of the Queensland Government Office of Economic and Statistical Research http://statistics.oesr.qld.gov.au/qld-regional-profiles

OESR (2010) *Queensland Regional Profiles*. (MTSRF Study Area regional profile derived using reformed local government areas, 2008.) Online resource of the Queensland Government Office of Economic and Statistical Research http://statistics.oesr.qld.gov.au/qld-regional-profiles

OESR (2010) *Queensland Regional Database*. Online resource of the Queensland Government Office of Economic and Statistical Research http://www.oesr.qld.gov.au/products/qld-regional-database/qld-regional-database/index.php

Olsson, P., Folke, C., Galaz, V., Hahn, T. and Schultz, L. (2007) Enhancing the fit through adaptive co-management: Creating and maintaining bridging functions for matching scales in the Kristianstads Vattenrike Biosphere Reserve, Sweden. *Ecology and Society* 12: 28.

OECD (2007) *Society at a Glance: OECD Social Indicators, 2006 Edition.* Online resource of the Organisation for Economic Cooperation and Development (OECD) http://puck.sourceoecd.org/vl=5274871/cl=34/nw=1/rpsv/ij/oecdthemes/99980142/v2007n3/s1/p1l

Ostrom, E. (2009) A general framework for analysing sustainability of social-ecological systems. *Science* 325: 419-422.

Pahl-Wostl, C., Craps, M., Dewulf, A., Mostert, E., Tabara, D. and Taillieu, T. (2007) Social learning and water resources management. *Ecology and Society* 12: 5.

Peterson, G., Allen, C.R. and Holling, C.S. (1998) Ecological resilience, biodiversity and scale. *Ecosystems* 1: 6-18.

Pickett, S.T.A., Parker, V.T. and Fiedler, P.L. (1992) The new paradigm in ecology: implications for conservation biology above the species level. Pp. 65-88 In Fiedler, P.A. and Jain, S.K. (eds.) *Conservation biology: The theory and practice of nature conservation, preservation and management.* Chapman & Hall Inc., New York.

Pretty, J. (1999) Can sustainable agriculture feed Africa? New evidence on progress, processes and impacts. *Environment, Development and Sustainability* 1(3): 253-274.

Pritchard, L. and Sanderson, S. E. (2002) The dynamics of political discourse in seeking sustainability. Pp. 147-172 In Gunderson, L.H. and Holling, C.S. (eds.) *Panarchy: understanding transformations in human and natural systems.* Island Press, Washington D.C.

Queensland Government (2009) *Water Resource (Barron) Amendment Plan (No. 1) 2009.* The State of Queensland http://www.legislation.qld.gov.au/LEGISLTN/SLS/2009/09SL266.pdf

Queensland Government Department of Natural Resources and Mines (2005) *Barron Resource Operations Plan* http://www.derm.qld.gov.au/wrp/barron_rop.html

Queensland's National Water Initiative State Implementation Plan (2006) Queensland State Implementation Plans http://www.nwc.gov.au/resources/documents/QLD-NWI-Implementation-Plan.pdf

Resilience Project (2009) *Resilience Research Centre* http://www.resilienceproject.org/

Richardson, G.E. (2002) The metatheory of resilience and resiliency. *Journal of Clinical Psychology* 58: 307-321.

Sapountzaki, K. (2007) Social resilience to environmental risks. *Management of Environmental Quality* 18: 274.

Sharpe, A. (2004) *Literature review of frameworks for macro-indicators*. Centre for the Study of Living Standards, Ontario, Canada http://www.csls.ca/reports/LitRevMacro-indicators.pdf

Shiva, V. (1988) *Staying Alive: Women, Ecology and Development.* Zed Books: London.

Sirgy, M., Michalos, A., Ferris, A., Easterlin, R., Patrick, D. and Pavot, W. (2006) The Quality-of-Life (QOL) Research Movement: Past, Present, and Future. *Social Indicators Research* 76(3): 343-466.

Smith, J. (1991) *The idea brokers: Thing tanks and the rise of the new policy elite.* Free Press: New York.

Smyth, D (2008) Just add water? Taking Indigenous Protected Areas into Sea Country. Chapter 8. Pp. 95-110 In Smyth, D. and Ward, G.K. (eds.) *Protecting Country: Indigenous governance and management of protected areas.* Australian Institute of Aboriginal and Torres Strait Islander Studies, Canberra http://www.aiatsis.gov.au/research/publications/ProtectingCountry8.pdf

Sustainable Seattle (2008) *Sustainable Seattle and Indicators.* http://sustainableseattle.org/Programs/IndicatorsIntoAction/regionalindicators/historicalregionalindicatorwork/

Swain, D. and Hollar, D. (2003) Measuring progress: Community Indicators and the quality of life. *International Journal of Public Administration* 26(7): 789-814.

Sweatman, H. (2008) No-take reserves protect coral reefs from predatory starfish. *Current Biology* 18: R598.

Sweatman, H.P.A. (1995) A field study of fish predation on juvenile crown-of-thorns starfish. Coral Reefs 14: 47-53.

URS Sustainable Development (2004) *A framework for reporting indicators of sustainability.* Report prepared for the Department of the Premier and Cabinet, Government of Western Australia, Perth.

UNCED (1993) *Agenda 21, Programme of Action for Sustainable Development.* United Nations Conference on Envrionment and Development (UNCED), New York http://www.un.org/esa/dsd/agenda21/res_agenda21_00.shtml?utm_source=OldRedirect&utm_medium=redirect&utm_content=dsd&utm_campaign=OldRedirect

UNISDR (2005) Building the Resilience of Nations and Communities to Disasters. Pp. 40-61 In *Proceedings of the World Conference on Disaster Reduction (Japan, 18-22 January 2005).* United Nations International Strategy for Disaster Reduction (UNISDR), Geneva http://www.unisdr.org/wcdr/thematic-sessions/WCDR-proceedings-of-the-Conference.pdf

Walker, B., Holling, C.S., Carpenter, S.R. and Kinzig, A. (2004) Resilience, adaptability and transformability in social-ecological systems. *Ecology and Society* 9: 5.

Walker, B.H., Anderies, J.M., Kinzig, A.P. and Ryan, P. (2006) Introduction. Pp. 1-4 In Walker, B.H., Anderies, J.M., Kinzig, A.P. and Ryan, P. (eds.) *Exploring resilience in social-ecological systems.* CSIRO Publishing, Collingwood, Victoria.

Walker, B. and Salt, D. (2006) *Resilience thinking: sustaining ecosystems and people in a changing world*. Island Press, Washington, USA.

Watson, A., Alessa, L. and Glaspell, B. (2003) The relationship between traditional ecological knowledge, evolving cultures, and wilderness protection in the circumpolar north. *Conservation Ecology* 8(1): 2 [URL: http://www.consecol.org/vol8/iss1/art2]

Westley, F. (2002) The devil in the dynamics: adaptive managment on the front lines. Pp. 333-360 In Gunderson, L.H. and Holling, C.S. (eds.) *Panarchy: Understanding transformations in human and natural systems.* Island Press, Washington, D.C.

Westley, F., Carpenter, S.R., Brock, W.A., Holling, C.S. and Gunderson, L.H. (2002) Why systems of people and nature are not just social and ecological systems. Pp. 103-119 In Gunderson, L.H. and Holling, C.S. (eds.) *Panarchy: Understanding transformations in systems of humans and nature.* Island Press, Washington, D.C.

Wills, J. (2001) *Just, vibrant sustainable communities: A framework for progressing and measuring community wellbeing.* Published by the Local Government Community Services Association of Australia http://www.lgcsaa.org.au

Wilkes, G. (2002) Introduction: A second generation of resilience research. *Journal of Clinical Psychology* 58: 229-232.

WTMA (2010) *About the Wet Tropics Management Authority.* Online resource of the Wet Tropics Management Authority (WTMA) http://www.wettropics.gov.au/mwha/mwha_aboutwtma.html

WTMA (1996) *Wet Tropics in profile. A reference guide to the Wet Tropics of Queensland World Heritage Area.* Wet Tropics Management Authority (WTMA), Cairns.

WTMA (2005) The Wet Tropcs of Queensland World Heritage Area Regional Agreement. Online resource of the Wet Tropics Management Authority (WTMA) http://www.wettropics.gov.au/rah/rah_pdf/regional_agreement.pdf

WTMA (2006) *History of World Heritage listing.* Online resource of the Wet Tropics Management Authority (WTMA) http://www.wettropics.gov.au/mwha/mwha_history.html

Zurba, M. (2009) *How well is co-management working? Perspectives, partnerships and power sharing along the way to an Indigenous Protected Area on Girrigun country.* Masters Thesis, Natural Resources Institute, The University of Manitoba, Canada.

Appendix

Social Resilience Monitoring and Reporting Framework: Data Sources and Baseline Data

Introduction

The purpose of this appendix is to demonstrate a practical translation of the social resilience monitoring and reporting framework published in this report.

The table in this appendix (see Table A2) translates the social resilience indicators and monitoring criteria identified by the study into a set of corresponding data sources and baseline data applicable to the study region. Monitoring criteria were assessed and selected using a SMARTT framework (adapted from Doran, 1981 and McDonald and Roberts 2006). Criteria must be specific, measurable, achievable, relevant and time lined, and must talk with and across horizontal and vertical reporting processes. It is intended that the monitoring criteria and their corresponding data will enable NRM agencies to review and track outcomes from their management decisions and interventions through a social resilience lens.

A limitation of the framework is that not all of the monitoring criteria proposed have available data. This is appropriate given the newness of the concept of social resilience. One should not expect measures developed for completely different social and economic reporting purposes to adapt readily to a new topic.

Within the constraints of the study, populating the framework with data has been completed where possible, however further research will be required to provide data around the remaining criteria. Within the table further below (Table A2) all gaps in the data have been denoted by the wording ‘requires further investigation’. This indicates one of two things: there may exist a number of options in terms of source, measurement or proxy for a particular criterion; or there appears to be a lack of relevant and publicly available data. The latter applies mostly to the ‘engaged governance’ social resilience indicator and monitoring criteria.

Major data sources

Guidelines for data collection were based on public availability and that comparative data sets be included where possible. Comparative data was sought for the purpose of contextualising or benchmarking the study region data against, for instance, state and/or national data. In future this could include comparison against best practice benchmarks. Additionally, for some of the monitoring criteria, potential comparative state or national data sources have been included even though that type of data was not located for the study region. The reasoning for this is that comparative data sources may provide a point to work back from in the event that local surveys are developed. Overall the majority of the data originates from:

1. Australian Bureau of Statistics (ABS), mostly drawing from 2006 Census of Population and Housing data;
2. Queensland Treasury, Office of Economic and Statistical Research (OESR), particularly 2006 ABS Census data that has been concorded to 2008 reformed Local Government Area boundaries; and
3. Bureau of Infrastructure, Transport and Regional Economics (BITRE).

Through the course of data collection it was also evident that some data, potentially relevant to the monitoring criteria and the study region, are not publicly available but may be accessed through, for instance, industry membership for a fee or on request. Instances of these types of data and their sources (not drawn from for Table A2, although noteworthy for further investigation) include:

- **OESR Queensland Regional Database – GovNet User**
  State and local Queensland Government users accessing the Queensland Regional Database (also known as QRSIS) via 'Data Hub' on GovNet have access to more records than are offered on the public version of the database.
  http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index-datahub.shtml

- **OESR Queensland Household Survey (QHS)**
  The QHS is a statistical survey of Queensland householders that commenced in 2000 and is conducted every May and November by the OESR Office of the Government Statistician (OGS), under the *Statistical Returns Act*. The QHS collects statistics on a range of topics such as education, health, industry, the environment, use of technology, energy and water use. This information is used by Queensland Government agencies to inform their policy development, performance measurement and service delivery.
  http://www.oesr.qld.gov.au/about-our-services/surveys/qld-household-survey/index.shtml

- **Local Government Association of Queensland (LGAQ) – Community Satisfaction Survey**
  The LGAQ Community Satisfaction Survey is conducted every two years and provides an overview of how residents regard the performance of local government across themes such as 'Basic Services and Infrastructure', 'Community Lifestyle Services', 'Managing the Shire/City', 'Customer Services/ Communication', and 'Qualities of Council'. Survey results are available free of charge to LGAQ members.
  http://www.lgaq.asn.au/web/guest/about-lgaq

In some cases further ABS survey data is available on request and for a fee. Subject to confidentiality and sampling variability constraints, survey tabulations can be produced using data items, populations and geographic areas chosen to meet individual requirements.

Explanatory notes

Explanatory notes and limitations on the data have been provided for each individual data set, and are presented in Table A2. Generally, the data presented has been replicated from reports generated through the OESR and ABS websites. Where it was necessary, percentages of populations have been calculated. Whilst most of the data presented is shown to one decimal point, some extend to two decimal points in order to register a percentage or to provide finer comparison (e.g. between study region and national populations). Most of the data presented is from 2006, but where concordance to new (2008) Queensland local government boundaries is available, this is shown.

Whilst we have made all efforts to present accurate information in this appendix and the report that it accompanies, from sources believed to be reliable, we are unable to guarantee its accuracy or completeness. We are grateful for our consultations with the OESR for their advice on data quality and presentation.

Study area by local government area boundaries and population estimates

The Australian Standard Geographical Classification (ASGC) is a hierarchical geographical classification, defined by the ABS and used in the collection and dissemination of official statistics. The Local Government Area (LGA) is one of the most generally recognisable spatial units inside the ASGC. An objective of the data collection process was to source study region data at LGA level wherever possible. This enables regional managers to observe variation within their region, and enables local governments to use the data. We have also agreed with our counterparts at James Cook University (study of social resilience at community scale) that local government provides a convenient representation for community scale.

In March 2008 Queensland's LGA boundaries underwent major reform. Whilst most of the 2006 data presented in the table further below has been concorded by the OESR to 2008 reformed LGA boundaries, there are some instances where concordance or the LGA unit level was not available. Examples of this variation in reporting in the table further below include 'SEIFA', 'Industrial Diversity Index' and 'ARIA' data that respectively are reported by 2006 LGA boundaries and in the last two cases by smaller units of statistical local areas (SLAs).

Variations in the geographic units used for presenting the data also have implications for what has been reported in terms of the study region's estimated resident population/s (ERP) (see Table A1). ERP data from 2008 has been provided below as additional information and mostly to illustrate overall population growth in the study region since 2006 data was collected. In short, representations of the study region vary by number and scale (see Figures A1 and A2). The monitoring criteria table further below should therefore be read as a broad, rather than exacting, depiction of the study region.

Table A1. Study region by Local Government Area and population.

Terrain NRM study area	State of the Region study area	*Estimated Resident Population @ 30/06/2006	**Indigenous proportion of ERP @ 30/06/2006 (%)	*Estimated Resident Population @ 30/06/2008
LGAs (2006)				
Wujal Wujal (S)	Wujal Wujal (S)	348	94.5	352
Douglas (S)	Douglas (S)	10,906	8.0	11,482
Yarrabah (S)	Yarrabah (S)	2,558	96.9	2,636
Cairns (C)	Cairns (C)	136,632	7.8	147,702
Atherton (S)	Atherton (S)	11,558	5.6	12,280
Eacham (S)	Eacham (S)	6,771	3.3	6,882
Johnstone (S)	Johnstone (S)	19,478	8.2	20,036
Herberton (S)	Herberton (S)	5,743	12.7	5,878
Cardwell (S)	Cardwell (S)	10,164	8.4	10,422
Hinchinbrook (S)	Hinchinbrook (S)	12,239	6.4	12,249
Palm Island (S)	Palm Island (S)	2,145	93.5	2,193
Subtotal:		**218,542**		**232,112**
	Thuringowa (C)	63,002	6.0	69,684
	Townsville (C)	102,276	5.2	106,453
	Total:	**383,820**	**7.9**	**408,249**
LGAs reformed boundaries (2008)				
Wujal Wujal (ASC)	Wujal Wujal (ASC)	348	94.8	352
Yarrabah (ASC)	Yarrabah (ASC)	2,558	96.9	2,636
Cairns (RC)	Cairns (RC)	147,538	7.8	159,184
Cassowary Coast (RC)	Cassowary Coast (RC)	29,642	8.3	30,458
Hinchinbrook (SC)	Hinchinbrook (SC)	12,239	6.4	12,249
Palm Island (ASC)	Palm Island (ASC)	2,145	93.4	2,193
Subtotal:		**194,470**		**207,072**
	Townsville (CC)	165,278	5.5	176,137
	Total:	**359,748**	**8.0**	**383,209**
Queensland				
		4,090,908	**3.3**	**4,308,570**

Footnotes:

* **Estimated Resident Population (ERP):** ERP is the official ABS measure of population and data is based on place of usual residence. ERP refers to all people who usually live in Australia (including residents who were overseas for less than 12 months). It excludes foreign diplomatic personnel and their families and overseas visitors who were in Australia for less than 12 months.

The sum of the local government areas may not be equivalent to the region total due to confidentialisation of the local government area data. Data for Reformed Local Government Area(s) are based on concorded Statistical Local Area data (ASGC 2006). The concordance is population based and has been derived from the Planning Information and Forecasting Unit within the Department of Infrastructure and Planning (since relocated to within the Office of Economic and Statistical Research).

Source: Australian Bureau of Statistics, Regional Population Growth (Cat no. 3218.0) and unpublished data. Derived from the Queensland Regional Database maintained by the Office of Economic and Statistical Research (OESR).

****Indigenous Proportion of ERP:** Based on place of usual residence.

Includes persons whose Indigenous status was stated as Aboriginal, Torres Strait Islander, or ‘both Aboriginal and Torres Strait Islander’.

Total population count, against which Indigenous proportion calculated, includes ‘Indigenous status not stated’.

Note: Based on ASGC 2006 (confidentialisation and concordance notes as above also apply here).

Source: Australian Bureau of Statistics, Census of Population and Housing, Indigenous Profile – I02

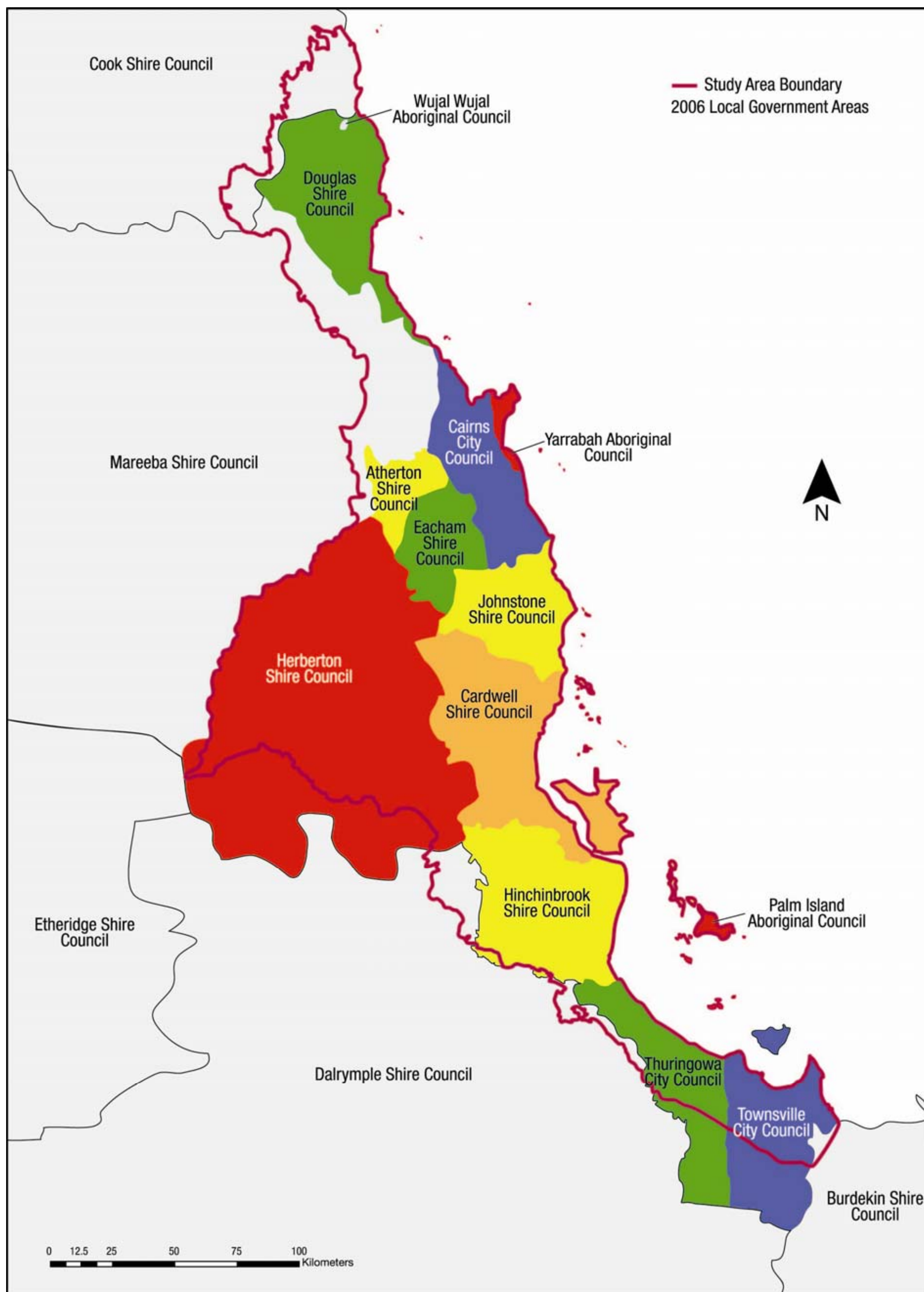


Figure A1. Study region by Local Government Area, 2006.

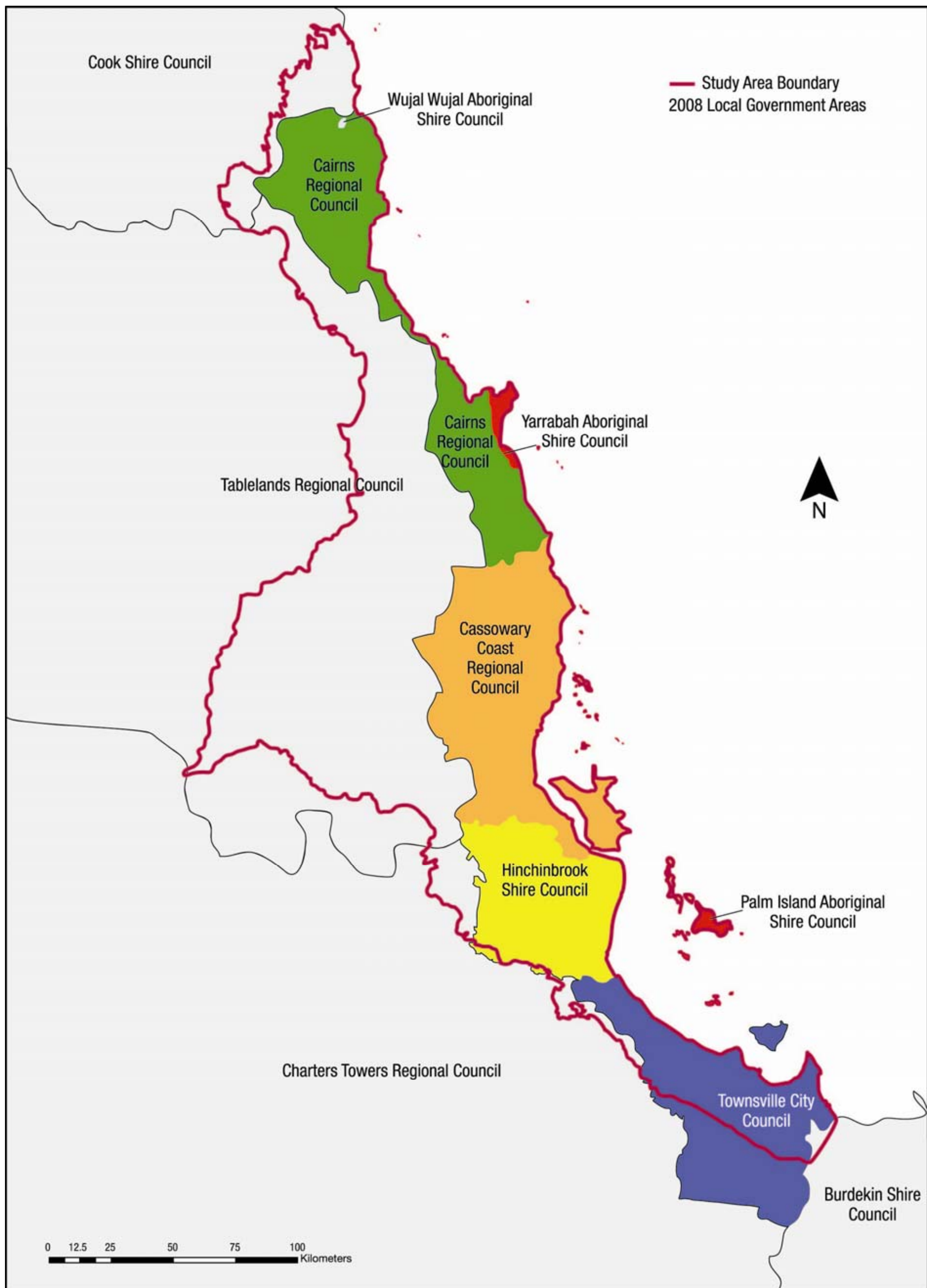


Figure A2. Study region by Local Government Area, 2008.

Table A2. Social resilience indicators, monitoring criteria and data sources available.

The table below presents baseline data specific to the study region and provides notes regarding data sources. The table is organised according to six social resilience indicators, a proposed fifty corresponding monitoring criteria and where available, data relating to the monitoring criteria. In some cases where a measurement with direct relevance to the monitoring criteria was not available a proxy (alternate or surrogate) may be sufficiently informative and has been reported in the table. Where data has not been located for a particular monitoring criterion gaps have been denoted by the wording 'requires further investigation'.

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	**1. Stewardship (broad and/or NRM focus).**	Evidence of stewardship initiatives (e.g. community based education programs, networks). Measurements could include the following:						
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	1. Stewardship (broad and/or NRM focus) (*continued*)	• The number / proportion of school-based (NRM) education programs.	For example: GBRMPA Reef Guardian Schools Program: http://www.reefed.edu.au/home/guardians/reef_guardian_schools/queensland		As at May 2010	By region and school name (LGAs verified with source).		
			Compared with: Education Queensland Registry of Schools http://education.qld.gov.au/directory/phone/	All schools count includes State and non-State primary, secondary, special and distance education schools	2010	By LGA.	44% (77 out of 172) schools in the study area are participants in the Reef Guardian Schools Program.	Consider benchmark against other 'good practice' NRM school-based education programs.
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	1. Stewardship (broad and/or NRM focus) (*continued*)	• The number / proportion of local council (NRM) community programs.	For example: GBRMPA Reef Guardianship Councils Program: http://www.gbrmpa.gov.au/corp_site/key_issues/water_quality/reef_guardian_councils		As at May 2010	By LGA	Five of the seven LGAs in study area were participants in the Reef Guardianship Councils Program. Participation by the other two LGAs in the study area reported as likely in the near future.	Consider benchmark against other 'good practice', council community NRM programs.
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	1. Stewardship (broad and/or NRM focus) (*continued*)	• The number / proportion of (NRM) volunteer organisations. NB: In this criterion 'volunteering' focuses on organisations that engage volunteers. In Criterion 7 ('Community networks'), the focus is on people who volunteer.	Requires further investigation. Potential sources: • Peak volunteer body, Volunteering Queensland (VQ), which includes links to FNQ Volunteers Inc. and Volunteering North Queensland Inc. as VQ regional representatives http://www.volunteeringqld.org.au/DotNet/Organisation/OrganisationSearch.aspx	• Proportion of NRM organisations represented online is unclear (e.g. ten 'Conservation / environment / animal liberation' organisations listed within the study area, however this may be an incomplete listing). • Compilation from a variety of sources is likely to be required.	As at May 2010	By suburban location of volunteer organisation.	Incomplete. Requires further investigation. Completion and maintenance of existing databases of volunteer organisations may be valuable.	Requires further investigation. Potential source: • Volunteering Australia http://www.volunteeringaustralia.org/html/s01_home/home.asp
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	1. Stewardship (broad and/or NRM focus) (*continued*)	• The number / proportion of people working on country and/or are employed or volunteer as rangers: - Indigenous; and - All.	Requires further investigation. Potential sources: • Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA); Working on Country Program data; Aboriginal organisations, e.g. Girringun; • Queensland Department of Environment and Resource Management (DERM) http://www.derm.qld.gov.au/				Requires further investigation.	Requires further investigation. National benchmarking of Indigenous employment in environmental management may be valuable to the DEWHA and other organisations.

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	1. Stewardship (broad and/or NRM focus) (*continued*)	• The number / proportion of landholders (specifically in farming communities) adopting best farming practices.	Requires further investigation. Potential sources: • MTSRF Project data, landholders' survey: Emtage, N. (2009) *Market segmentation study of rural landholders in relation to the promotion of Natural Resource Management on private land in the Wet Tropics region of Queensland.* Report to the MTSRF published by Reef & Rainforest Research Centre, Cairns: http://www.rrrc.org.au/publications/downloads/494-UQ-Emtage-N-2009-Landholders-Market-Segmentation-Study.pdf		2009		Requires further investigation. Wet Tropics region.	Requires further investigation.
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.			• ABS Survey of Land Management Practices in the Great Barrier Reef Catchments (ABS LMP Survey): http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/4619.0.55.001Main%20Features12008-09?opendocument&tabname=Summary&prodno=4619.0.55.001&issue=2008-09&num=&view	First time this survey has been conducted. The ABS intends to repeat it in the future.	June 2008 to June 2009	By river catchment areas.	See ABS LMP Survey, report section 'Wet Tropics NRM Region'	• ABS LMP Survey; • Results also provided for Burdekin, Mackay-Whitsunday, Fitzroy and Burnett Mary NRM regions. Possible source: • ABS Land Management and Farming in Australia, 2007-08 http://www.abs.gov.au/AUSSTATS/abs@.nsf/mf/4627.0/
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	**2. Level of attachment to community.**	• Length of residency in a community (Local Government Areas) is a generally accepted proxy for 'attachment' (e.g. see Bureau of Transport and Regional Economics (BTRE) (2005) Information Paper 55 *Focus on Regions No. 4: Social Capital* http://www.bitre.gov.au/publications/21/Files/ip55.pdf • Residence within the same 'statistical local area' (rather than at the same address only) has been selected to capture persons who changed address but remained in the same statistical local area. • In Queensland, statistical local areas generally align with suburbs, particularly urban areas (ABS, SEIFA Information Paper	ABS Census Basic Community Profile (BCP) ↓ Data Set: B38 'Place of usual residence for five years' ↓ For same Statistical Local Area (SLA) add: 'Persons, same usual address five years ago as in 2006' **and** 'Persons, different usual address five years ago, same Statistical Local Area' Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-	• Count of persons aged 5 years and over (includes persons who did not state whether they were usually resident at a different address 5 years ago). • Based on place of usual residence. • Gender breakdowns available. • NB: This data includes Indigenous population, for whom 'attachment' may otherwise be measured as in Criterion 3.	2006 (and address in 2001)	• Based on Australian Standard Geographic Classification (ASGC) 2006. • Concorded with 2008 reformed LGAs. • (Other geographic units are available.)	Estimated number and proportion of the population (aged five years and over) who lived in the same statistical local area as five years ago: Wujal Wujal 245 (77.7%) Yarrabah 1,840 (84.1%) Cairns 66,080 (48.2%) Cassowary Coast 18,101 (65.0%) Hinchinbrook 8,663 (74.7%) Palm Island 1,525 (81.4%) Townsville 67,701 (44.0%) **Total: 164,155 (52.49%)** **52.49% of the 312,707 count of persons (aged five years and over) lived in the same SLA as five years ago.**	Queensland: **Total: 1,978,673 (54.24%)** **54.24% of the 3,647,455 count of persons (aged five years and over) lived in the same SLA as five years ago.**

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	**Comparative data** e.g. State / National averages / industry targets / benchmarks
		(2008), see 'State Suburb Codes'). NB: This measurement is also used for Criterion 5 in 'Community networks'	services/online-tools/qrsis/index.shtml					Australia: **Total: 11,890,857 (63.94)** **63.94% of the 18,594,885 count of persons (aged five years and over) lived in the same SLA as five years ago.**
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	**3. Connection to country (Indigenous).**	• No proxy measurement for 'connection to country' is available. • Requires further investigation (e.g. count of Traditional Owner visits to country per year, self-reports of Traditional Owners).	Requires further investigation. Possible sources: • Cullen-Unsworth (2010) • Greiner *et al.* (2007a) • Greiner *et al.* (2007b)		Data collected in 2006	Girringun Traditional Owners Area: Southern Wet Tropics	Requires further investigation. No proxy measurement for 'connection to country' is available. Descriptive / contextual Indigenous data source: • Queensland LGAs data via OESR / Indigenous Regional Profile (IRP) Database http://www.oesr.qld.gov.au/queensland-by-theme/demography/indigenous-people/profiles/indigenous-reg-profiles/index.shtml	Requires further investigation. No proxy measurement for 'connection to country' is available. Descriptive / contextual Indigenous data sources: • National and state data available via OESR IRP Database http://www.oesr.qld.gov.au/queensland-by-theme/demography/indigenous-people/profiles/indigenous-reg-profiles/index.shtml • ABS National Aboriginal and Torres Straight Islander Social Survey (NATSISS), 2008 http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/4714.0Main%20Features12008?opendocument&tabname=Summary&prodno=4714.0&issue=2008&num=&view=
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	**4. Shared vision for community (broad and/or NRM focus).**	• Evidence of community visioning processes. • Requires further investigation (e.g. conduct of community consultations towards developing local or regional visions; specific energy or environmental visions). • This could be approached in the form of a set of agree/disagree potential vision statements within a survey.	Requires further investigation. Potential source: Local council (community consultation reports) Possible survey questions.	This is a qualitative issue. Systematic data availability is highly unlikely.		We suggest region-wide and by LGA for local governments.	Requires further investigation.	Requires further investigation.

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	**5. Appropriate regional growth management strategies / initiatives / processes based on that vision, that look to balance economic, social and environmental aspects of development.**	• Evidence of regional growth management processes. • Requires further investigation (e.g. sustainability plans that incorporate economic, social and environmental considerations).	Requires further investigation. Possible source: • Far North Queensland Regional Plan 2009-2031 (2009) (and its background data) http://www.dip.qld.gov.au/regional-planning/regional-plan-3.html	Requires specific: • Listing of relevant growth management strategies / initiatives / processes; and • Collation, e.g. from reports/ plans, websites.		Options are: region, local government areas	Requires further investigation.	Requires further investigation.
People–place connections Recognition of human-environment interdependencies and connections, including sense of 'place' stewardship, and sustainable resource use patterns.	**6. Take up of environmentally friendly technologies and practices.**	• Evidence of recycling, solar energy use, organic / non-chemical agriculture, green ISO compliance, extension programs. • Requires further investigation.	Requires further investigation. Potential sources: • MTSRF Project data, landholders survey; Emtage, N. (2009)*Market segmentation study of rural landholders in relation to the promotion of natural resource management on private land in the Wet Tropics region of Queensland* http://www.rrrc.org.au/publications/downloads/494-UQ-Emtage-N-2009-Landholders-Market-Segmentation-Study.pdf		2009		Requires further investigation.	Requires further investigation.
			• ABS Survey of Land Management Practices in the Great Barrier Reef Catchments (ABS LMP Survey) http://www.abs.gov.au/ausstats/abs@.nsf/mediareleasesbyCatalogue/93B003BD17A3F247CA25770D0016ED29?OpenDocument	First time this survey has been conducted. ABS intends to repeat in the future.	2008-2009	By river catchment areas.	ABS LMP Survey report section; 'Wet Tropics NRM Region' summary and 'Downloads/Data Cubes' by catchment area for 'Chemical Use'.	ABS LMP Survey; results also provided for Burdekin, Mackay Whitsunday, Fitzroy and Burnett Mary NRM regions.
			• Office of Clean Energy (e.g. take up of solar rebate schemes). http://www.cleanenergy.qld.gov.au/					ABS *Environmental Views and* Behaviour Survey 2007-2008 http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4102.0Main+Features20Jun+2010

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
Knowledge, skills and learning Individual and group capacity to respond to local needs and issues.	**1. Collaborative learning community strategies in place.**	• Evidence of the existence of collaborative learning community strategies (could include e.g. number, focus and reach). • Requires further investigation.	Requires further investigation.	This is a qualitative issue. Systematic data availability is highly unlikely.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Knowledge, skills and learning Individual and group capacity to respond to local needs and issues.	**2. There is evidence of science communications, environmental education, extension, community capacity building, and/or action learning programs in the region.**	Requires further investigation.	Requires further investigation.	Compilation from a variety of sources is likely to be required.		We suggest region-wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Knowledge, skills and learning Individual and group capacity to respond to local needs and issues.	**3. Government resources directed towards community capacity building programs (broad and/or NRM focus).**	Requires further investigation (e.g. government funding allocations towards community capacity building programs, measured per head of population).	Requires further investigation. Potential source: • Government grants websites, annual reports.	Requires specific collation, e.g. from annual reports, websites.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Knowledge, skills and learning Individual and group capacity to respond to local needs and issues.	**4. The community supports regional growth (NRM) strategies / initiatives / processes.**	• Evidence of community support for regional growth strategies / initiatives/ processes. • Requires further investigation (e.g. costs / benefits raised in community consultations relating to regional growth). • This could be approached in the form of a set of agree/disagree potential regional growth statements within a survey.	Requires further investigation. Potential sources: • State and local government reports. Possible survey questions.	This is a qualitative issue. Systematic data availability is highly unlikely.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Knowledge, skills and learning Individual and group capacity to respond to local needs and issues.	**5. Government provides accessible and appropriate information to community (broad and/or NRM focus).**	• Evidence of accessible and appropriate information provision made by government. • Requires further investigation (e.g. include 'local' or 'community' 'attitudes' / 'perceptions' of government information provision).	Requires further investigation. Possible source: • 'Community Satisfaction Survey' Local Government Association of Queensland (LGAQ) http://www.lgaq.asn.au/web/guest/about-lgaq (e.g. See responses to questions in the 'Customer Services / Communication' theme)	• Provides an overview of how residents regard the performance of local government. • Conducted every two years. • Survey results are available free of charge to LGAQ members.	2009	• We suggest region wide, and by LGA for local governments. • Unclear to what unit level the LGAQ data is available. Possibly limited to State level.	Incomplete. Requires further investigation, e.g. identify local council surveys (such as below). • Townsville City Council 2006 *Community Attitude Survey* http://www.townsville.qld.gov.au/resources/68.pdf • Thuringowa City Council 2007 *Community Attitude Research* http://www.townsville.qld.gov.au/resources/67.pdf	Requires further investigation. • Determine whether local surveys can be compared to e.g. state level LGAQ 'Community Satisfaction Survey' results.

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
Knowledge, skills and learning Individual and group capacity to respond to local needs and issues.	**6. Year 12 completions.**	• Proportion of region's residents (aged 15 years and over) who have completed Year 12.	ABS Census Basic Community Profile (BCP) ↓ Data Set: B15 'Highest year of school completed' ↓ See: 'Persons, Year 12 or equivalent' Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml	• Count of persons aged 15 years and over (including highest year of schooling not stated). • Based on place of usual residence. • Age and gender breakdowns available. • The Census is conducted every five years.	2006	• Based on (ASGC) 2006. • Concorded with 2008 reformed LGAs. • (Other geographic units are available.)	Estimated number and proportion of the population (aged 15 years and over) that have completed Year 12 or equivalent: Wujal Wujal 38 (15.5%) Yarrabah 304 (18.9%) Cairns 44,996 (38.8%) Cassowary Coast 6,318 (27.0%) Hinchinbrook 2,632 (26.9%) Palm Island 180 (13.1%) Townsville 50,507 (38.4%) **Total: 104,975 (39.95%)** **39.95% of the 262,759 count of persons (aged 15 years and over) completed Year 12 or equivalent.**	Queensland: **Total: 1,279,682 (41.30%)** **41.30% of the 3,097,996 count of persons (aged 15 years and over) completed Year 12 or equivalent.** Australia: **Total: 6,723,224 (42.23%)** **42.23% of the 15,918,076 count of persons (aged 15 years and over) completed Year 12 or equivalent.**
Knowledge, skills and learning Individual and group capacity to respond to local needs and issues.	**7. Take up of post-secondary training / education opportunities (broad and/or NRM focus*).**	• ***BROAD MEASUREMENT:** Proportion of region's residents (aged 15 years and over) with a non-school qualification.	ABS Census Basic Community Profile (BCP) ↓ Data Set: B39 'Non-school qualifications by level of education' ↓ See: 'Persons, Total (with a qualification)' (Includes Postgraduate Degree, Graduate Diploma, Graduate Certificate, Bachelor Degree, Advanced Diploma, Diploma, Certificate I, II, III, IV, 'inadequately described' and 'not stated' responses) Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml	• Count of persons aged 15 years and over with a non-school qualification (including 'Field of study inadequately described' and 'Field of study not stated'). • Excludes schooling up to Year 12 and persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED). • Based on place of usual residence. • Age and gender breakdowns available. • The Census is conducted every five years.	2006	• Based on (ASGC) 2006. • Concorded with 2008 reformed LGAs. • (other geographic units are available)	Estimated number and proportion of the population (aged 15 years and over), that have a non-school qualification: Wujal Wujal 57 (24.8%) Yarrabah 325 (21.9%) Cairns 58,752 (54.6%) Cassowary Coast 9,803 (44.9%) Hinchinbrook 3,644 (39.6%) Palm Island 362 (28.4%) Townsville 60,464 (49.9%) **Total: 133,407 (50.8%)** **50.8% of the 262,780 count of persons (aged 15 years and over) have a non-school qualification.**	Queensland: **Total: 1,560,868 (50.4%)** **50.4% of the 3,097,996 count of persons (aged 15 years and over) have a non-school qualification.** Australia: **Total: 8,361,814 (52.53%)** **52.53% of the 15,918,082 count of persons (aged 15 years and over) have a non-school qualification.**
Knowledge, skills and learning Individual and group capacity to respond to local needs and issues.	7. Take up of post-secondary training / education opportunities (broad and/or NRM focus*) (continued)	• ***NRM MEASUREMENT:** Proportion of region's residents (aged 15 years and over with a non-school qualification) with an NRM qualification.	ABS Census Basic Community Profile (BCP) ↓ Data Set: B40 'Non-school qualification: Field of study' ↓	• Count of persons aged 15 years and over with a non-school qualification (including 'Field of study inadequately described' and 'Field of study not stated'). • Excludes schooling	2006	• Based on (ASGC) 2006. • Concorded with 2008 reformed LGAs. • (Other geographic units are available.)	Estimated number and proportion of the population (aged 15 years and over with a non-school qualification), whose qualification is 'agriculture, environment or related field of study:	

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
			See: 'Persons, Agriculture / Environmental and Related Studies, Total' (Includes Postgraduate Degree, Graduate Diploma, Graduate Certificate, Bachelor Degree, Advanced Diploma, Diploma, Certificate I, II, III, IV, 'inadequately described' and ' not stated' responses) Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml	up to Year 12 and persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED). • Based on place of usual residence. • Age and gender breakdowns available. • The Census is conducted every five years.			Wujal Wujal 0 - Yarrabah 15 (4.6%) Cairns 1,122 (1.91%) Cassowary Coast 340 (3.46%) Hinchinbrook 91 (2.49%) Palm Island 21 (5.81%) Townsville 1,112 (1.83%) Total: 2,701 (2.02%) **2.02% of the 133,416 count of persons (aged 15 years and over who hold a non-school qualification) have a qualification in 'agriculture, environment or related field of study.**	Queensland: Total: 32,309 (2.05%) **2.05% of the 1,560,871 count of persons (aged 15 years and over who hold a non-school qualification) have a qualification in 'agriculture, environment or related field of study.** Australia: Total: 169,039 (2.02%) **2.02% of the 8,361,814 count of persons (aged 15 years and over who hold a non-school qualification) have a qualification in 'agriculture, environment or related field of study.**
Knowledge, skills and learning Individual and group capacity to respond to local needs and issues.	**8. Number of Masters Degrees / PhDs in the region.**	• Proportion of region's residents (aged 15 years and over and with a non-school qualification) who have a postgraduate degree.	ABS Census Basic Community Profile (BCP) ↓ Data Set: B39 'Non-school qualification: level of education' ↓ See: 'Persons, Postgraduate Degree' (Includes Doctoral and Masters Degrees). Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml	• Count of persons aged 15 years and over with a non-school qualification (includes 'Level of education inadequately described' and 'Level of education not stated'). • Excludes persons with a qualification out of the scope of the Australian Standard Classification of Education (ASCED). • Based on place of usual residence. • Age and gender breakdowns available. • The Census is conducted every five years.	2006	• Based on (ASGC) 2006. • Concorded with 2008 reformed LGAs. • (Other geographic units are available.)	Estimated number and proportion of the population (aged 15 years and over with a non-school qualification), who have a postgraduate degree: Wujal Wujal 3 (0.05%) Yarrabah 3 (0.92%) Cairns 1,463 (2.49%) Cassowary Coast 130 (1.32%) Hinchinbrook 49 (1.34%) Palm Island 3 (0.82%) Townsville 2,155 (3.56%) Total: 3,806 (2.85%) **2.85% of the 133,407 count of persons (aged 15 years and over with a non-school qualification) have a postgraduate degree.**	Queensland: Total: 60,402 (3.86%) **3.86% of the 1,560,868 count of persons (aged 15 years and over with a non-school qualification) have a postgraduate degree.** Australia: Total: 413,101 (4.94%) **4.94% of the 8,361,814 count of persons (aged 15 years and over with a non-school qualification) have a postgraduate degree.**
Knowledge, skills and learning Individual and group capacity to respond to local needs and issues.	**8. Number of Masters Degrees / PhDs in the region (*continued*).**	• **BROAD MEASUREMENT** (e.g. university education): Proportion of region's residents (aged 15 years and over and with a non-school qualification), whose level of education is a Bachelor degree or higher.	ABS Census Basic Community Profile (BCP) ↓ Data Set: B39 'Non-school qualification: level of education' ↓ See: 'Persons, Bachelor	• Count of persons aged 15 years and over with a non-school qualification (includes 'Level of education inadequately described' and 'Level of education not stated'). • Excludes persons	2006	• Based on (ASGC) 2006. • Concorded with 2008 reformed LGAs. • (Other geographic units are available.)	Estimated number and proportion of the population (aged 15 years and over with a non-school qualification), whose level of education is a bachelor degree or higher: Wujal Wujal 12 (10.52%) Yarrabah 37 (11.38%)	

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
			Degree or higher' (Includes: Bachelor Degree, Graduate Diploma, Graduate Certificate, Postgraduate Degree) Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml	with a qualification out of the scope of the Australian Standard Classification of Education (ASCED). • Based on place of usual residence. • Age and gender breakdowns available. • The Census is conducted every five years.			Cairns 12,482 (21.24%) Cassowary Coast 1,396 (14.24%) Hinchinbrook 566 (15.53%) Palm Island 34 (9.39%) Townsville 15,045 (24.88%) **Total: 29,572 (22.16%)** **22.16% of the 133,407 count of persons (aged 15 years and over with a non-school qualification) have a bachelor degree or higher.**	Queensland: **Total: 405,904 (26%)** **26% of the 1,560,868 count of persons (aged 15 years and over with a non-school qualification) have a bachelor degree or higher.** Australia: **Total: 2,482,311 (29.68%)** **29.68% of the 8,361,814 count of persons (aged 15 years and over with a non-school qualification) have a bachelor degree or higher.**
Community networks Processes and activities that build and support people and groups in a place.	**1. People know two or more of their neighbours.**	• This criterion suggests social connections and sources of support (e.g. who can help out in a time of crisis).	• Requires further investigation (e.g. identify where there is any existing local survey or whether there is a need to conduct one). Possible comparative source: • ABS General Social Survey (GSS) (See 'Social / Community Involvement' data sets). The question as to how commonly neighbours help each other out is relevant to this criterion.	• Based on persons aged 18 and over. • The survey is conducted every four years.	2006	Limited to state / territory and national.	Requires further investigation, e.g. Investigate whether relevant local surveys are conducted.	Requires further investigation. If local surveys exist, determine whether results can be compared with. e.g. ABS GSS http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/C6BF68E57D3A308CCA256E21007686F8
Community networks Processes and activities that build and support people and groups in a place.	**2. Social connections (Indigenous).**	Attendance at funerals (suggested by Girringun staff). We suggest approximate counts to nearest 20 or 50 attendees.	Requires further investigation.	This was suggested by a study partner. It is a good proxy for social connections within a community. It would require ethical consideration and the support of the Indigenous community for this proxy to be used, and an arrangement with an Indigenous organisation, churches and/or funeral providers for data collection.			Requires further investigation.	Requires further investigation.
Community networks Processes and activities that build and support people and groups in a place.	**3. Some family members live 'close by'.**	This criterion suggests social support: e.g. who can help out in a time of crisis; there is someone to confide in.	Requires further investigation (e.g. identify where there is any existing local survey or whether there is a need to conduct one). Possible comparative source: • ABS General Social Survey (GSS) (see 'Social / Community Involvement' data sets). The question as to 'reasons for last move' contains response options relevant to this criterion.	• Based on persons aged 18 and over. • The survey is conducted every four years.	2006	Limited to state / territory and national.	Requires further investigation, e.g. Investigate whether relevant local surveys are conducted.	Requires further investigation. If local surveys exist, determine whether results can be compared with. e.g. ABS GSS http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/C6BF68E57D3A308CCA256E21007686F8
Community networks	**4. Number of active local**	Requires further investigation (e.g.	Requires further investigation.	Compilation from a		We suggest region	Requires further investigation.	Requires further investigation

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
Processes and activities that build and support people and groups in a place.	**community groups (broad and/or NRM focus).**	count of active NRM and/or general local community groups, calculated per head of population).	Potential sources: • Local councils' community groups listings, cross checked against, e.g. Volunteering Queensland listing of local volunteer groups http://www.volunteeringqld.org.au/DotNet/Organisation/OrganisationSearch.aspx	variety of sources is likely to be required.		wide, and by LGA for local governments.		(e.g. state / national registries for count of active NRM and/or general local community groups, calculated per head of population).
			Possible supplementary / comparative information: • The ABS General Social Survey (GSS) 'Community Participation' data set provides self-reported indication of which community groups respondents participated in. It is not a count of the community groups in existence.	• Based on persons aged 18 an over. • The survey is conducted every four years. • Note: Community 'participation' (see previous column) is defined to include 'Volunteering'. However this source has not been repeated in the 'Volunteering' monitoring criteria in this table owing to other definitional / sampling differences.	2006	Limited to state / territory and national.	Requires further investigation.	Possible supplementary / comparative information: ABS GSS, see 'Community Participation' data set, (includes 'types' of community groups respondents participated in, such as 'Environmental or animal welfare group') http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/C6BF68E57D3A308CCA256E21007686F8
Community networks Processes and activities that build and support people and groups in a place.	**5. Proportion of population living in same SLA as five years ago.**	• Proportion of region's residents (aged five years and over) who live in the same statistical local area (SLA) as five years ago. • Residence within the same 'statistical local area' (rather than at the same address only) has been selected to capture persons who changed address but remained in the same statistical local area. • In Queensland, statistical local areas generally align with suburbs, particularly in urban areas (ABS, SEIFA Information Paper, 2008 see 'State Suburb Codes'). • NB: This measurement is also used as a proxy for Criterion 2 in 'people-place connections'.	ABS Census Basic Community Profile (BCP) ↓ Data Set: B38 'Place of usual residence five years' ↓ Add: 'Persons, same usual address five years ago as in 2006' and 'Persons, different usual address five years ago, same Statistical Local Area' Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml	• Count of persons aged five years and over (includes persons who did not state whether they were usually resident at a different address five years ago). • Based on place of usual residence. • Gender breakdowns available. • The Census is conducted every five years.	2006 (and address in 2001)	• Based on (ASGC) 2006. • Concorded with 2008 reformed LGAs. • (Other geographic units are available.)	Estimated number and proportion of the population (aged five years and over) who lived in the same statistical local area as five years ago: Wujal Wujal 245 (77.7%) Yarrabah 1,840 (84.1%) Cairns 66,080 (48.2%) Cassowary Coast 18,101 (65.0%) Hinchinbrook 8,663 (74.7%) Palm Island 1,525 (81.4%) Townsville 67,701 (44%) **Total: 164,155 (52.49%)** **52.49% of the 312,707 count of persons (aged five years and over) lived in the same SLA as five years ago.** (NB: This refers to 'individuals', not 'households').	Queensland: **Total 1,978,673 (54.24%)** **54.24% of the 3,647,455 count of persons (aged five years and over) lived in the same SLA as five years ago.** Australia: **Total: 11,890,857 (63.94%)** **63.94% of the 18,594,885 count of persons (aged five years and over) lived in the same SLA as five years ago.**

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
Community networks Processes and activities that build and support people and groups in a place.	**6. Collaborative, public, private, community and university sector responses to issues of social inclusion.**	• Evidence that collaborative research or cross-government projects focusing on social inclusion are being implemented. • Requires further investigation.	Requires further investigation.	Compilation from a variety of sources is likely to be required.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Community networks Processes and activities that build and support people and groups in a place.	**7. Volunteering (broad and/or NRM focus*).**	• ***BROAD MEASUREMENT:** Proportion of region's residents (aged 15 years and over) who are engaged in voluntary work. • NB: In this criterion 'volunteering' focuses on people who volunteer. In Criterion 1 ('People-place connections') the focus is on organisations that engage volunteers.	ABS Census Basic Community Profile (BCP) ↓ Data Set: B18 'Voluntary Work for Organisations' ↓ See: Persons, Volunteer, Total (Organisation type eg. NRM, not available through this data set) Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml	• Count of persons aged 15 years and over (including 'voluntary work not stated'). • Based on place of usual residence. • Records people who spent time doing unpaid voluntary work, through an organisation or group, in the twelve months prior to the Census. • Age and gender breakdowns available. • The Census is conducted every five years.	2006	• Based on (ASGC) 2006. • Concorded with 2008 reformed LGAs. • (Other geographic units are available.)	Estimated number and proportion of the population (aged 15 years and over) who were engaged in voluntary work for an organisation/s: Wujal Wujal 20 (8.8%) Yarrabah 210 (14.2%) Cairns 18,756 (17.4%) Cassowary Coast 4,317 (19.8%) Hinchinbrook 2,226 (24.2%) Palm Island 77 (6.0%) Townsville 21,567 (17.8%) **Total: 47,173 (17.95%)** **17.95% of the 262,765 count of persons (aged 15 years and over) were engaged in voluntary work for an organisation/s.**	Queensland: **Total: 568,230 (18.30%)** **18.30% of the 3,097,996 count of persons (aged 15 years and over) were engaged in voluntary work for an organisation/s.** Australia: **Total: 2,850,995 (17.91%)** **17.91% of the 15,918,076 count of persons (aged 15 years and over) were engaged in voluntary work for an organisation/s.**
		• ***NRM MEASUREMENT:** Requires further investigation (e.g. proportion of region's residents aged 15 years and over who are engaged in NRM voluntary work).	Requires further investigation. Potential source: Volunteering Queensland http://www.volunteeringqld.org.au/home/index.php/government/volunteering-trends				Requires further investigation.	Requires further investigation. Potential sources: • Report commissioned by the Department of Communities: Ironmonger (2008) *The economic value of volunteering in Queensland* http://www.communityservices.qld.gov.au/volunteering/documents/economic-value-of-volunteering.pdf (Mostly 2004 data, p. 17 for 'Organisation Types') • ABS 2006 Voluntary Work Survey (state and national data) http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/C52862862C082577CA25731000198615/$File/444

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
								10_2006.pdf (See 'organisation type' and 'activity type')
Community networks Processes and activities that build and support people and groups in a place.	**8. Diverse cultures are embraced and respected.**	• Evidence that diverse cultures are embraced and respected. • Requires further investigation (focused on 'local' or 'community' 'attitudes' / 'perceptions').	Requires further investigation (e.g. identify any existing local survey or whether there is a need to conduct one. Could also take some of the data results for Criterion 11 into account e.g. count of cultural festivals).	This is a qualitative issue. Systematic data availability is highly unlikely.		We suggest region wide, and by LGA for local governments.	• Requires further investigation. • Access descriptive / contextual 2006 data (e.g. birth countries, languages, religions) concorded with 2008 reformed LGAs at: OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.html	• Requires further investigation. • Access descriptive / contextual data (e.g. birth countries, languages, religions) at: ABS/Census Data http://abs.gov.au/websitedbs/D3310114.nsf/home/Census+data
Community networks Processes and activities that build and support people and groups in a place.	**9. Perceived effectiveness of non-government interagency networks.**	Requires further investigation (focused on 'local' or 'services sector' 'satisfaction' / 'attitudes' / 'perceptions').	Requires further investigation (e.g. identify any existing local services sector survey or whether there is a need to conduct one).	This is a qualitative issue. Systematic data availability is highly unlikely.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Community networks Processes and activities that build and support people and groups in a place.	**10. Formal agreements between public, private, community and university sector stakeholders to work together on identified community issues (broad and/or NRM focus).**	• Evidence of the existence of formal agreements between public, private, community and university sectors to work together on identified community issues. • Requires further investigation.	Requires further investigation (e.g. local council, university social research websites).	This would require specific listing of relevant agreements.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Community networks Processes and activities that build and support people and groups in a place.	**11. Cultural / community festivals, programs and networks.**	• Requires further investigation (based on identifying and/or collating an inventory of cultural / community festivals, programs and networks). • NB: This data may also inform Criterion 8.	Requires further investigation. Possible sources: • Arts Queensland http://www.arts.qld.gov.au/publications/resources.html Cross-check across sources e.g. local councils and media' cultural / community activities and events listings.	Compilation from a variety of sources is likely to be required.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation. Possible sources: • Australia Council http://www.australiacouncil.gov.au/research • Department of the Environment, Water, Heritage and the Arts http://www.culturaldata.gov.au/ • ABS National Centre for Culture and Recreation Statistics http://www.abs.gov.au/websitedbs/c311215.nsf/43b68f1dafb94862ca256eb0000221a5/8086c7185b84f467ca256b260020f899!OpenDocument • ABS Directory of Culture and Leisure Statistics, 2002 (updated 2007) http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/1143.0.55.001Main%20Features12002?opendocument&tabname=Summary&prodno=1143.0.55.001&issue=2002&num=&view
Community networks	**12. Perceptions of living in a**	• Requires further investigation	Requires further investigation (e.g. identify any existing local			We suggest region wide, and by LGA for	Incomplete. Requires further investigation e.g. identify local	Requires further investigation.

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
Processes and activities that build and support people and groups in a place.	**safe community.**	(focused on 'local' or 'community satisfaction' / 'attitudes' / 'perceptions'). • The question "I live in a safe community" is used regularly in community surveys.	survey or whether there is a need to conduct one).			local governments.	council surveys (such as below).	
			Possible source: • '*Community Satisfaction Survey*' Local Government Association of Queensland (LGAQ) http://www.lgaq.asn.au/web/guest/about-lgaq • (See 'Community Lifestyle Services' theme, 'Community Safety' responses)	• Provides an overview of how residents regard the performance of local government. • Conducted every two years. • Survey results are available free of charge to LGAQ members.	2009	Unclear what unit level the LGAQ data is available to. Possibly limited to State level.	• Townsville City Council (2006) *Community Attitude Survey* http://www.townsville.qld.gov.au/resources/68.pdf • Thuringowa City Council (2007) *Community Attitude Research* http://www.townsville.qld.gov.au/resources/67.pdf	Determine whether local surveys can be compared to e.g. State level LGAQ '*Community Satisfaction Survey*' results. • See also *ABS Crime Victimisation survey (2008-2009)* http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4530.0Main+Features12008-09 (See 'Feelings of safety' data set)
Community networks Processes and activities that build and support people and groups in a place.	**13. Junior sports clubs / participants.**	Requires further investigation. Dependant on extent of comparable data, consider, as a proxy, a focus on one or two sports that have broad reach e.g. soccer and netball.	Requires further investigation. Potential sources: local council community directories, schools and sports clubs' registries.			We suggest region wide, and by LGA for local governments.	Requires further investigation. Possible sources: • Department of Communities; Sport and Recreation http://www.sportrec.qld.gov.au/Industryinformation/Clubs/Juniorsport.aspx	Requires further investigation. Possible sources: • Australian Sports Commission http://www.ausport.gov.au/information • ABS National Centre for Culture and Recreation Statistics http://www.abs.gov.au/websitedbs/c311215.nsf/43b68f1dafb94862ca256eb0000221a5/8086c7185b84f467ca256b260020f899!OpenDocument • ABS Children's Participation in Cultural and Leisure Activities, Australia, 2009 http://www.abs.gov.au/ausstats/abs@.nsf/mf/4901.0 (See 'Organised Sport')
Engaged governance Collaborative processes for regional decision making (includes partnerships, planning, supportive and creative institutions).	**1. Government agencies have policies / strategies / guidelines relating to engaged governance (broad and/or NRM focus).**	• Evidence of government agencies' engaged governance policies / strategies / guidelines. • Requires further investigation (e.g. study of government policy documents).	Requires further investigation. Potential sources: identify relevant (i.e. broad and/or NRM focus) government agencies, to source policy documents / reports relating to engaged governance strategies and guidelines.	Requires specific collation, e.g. from government agency reports, websites.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Engaged governance	**2. Government agencies provide appropriate**	• Evidence of appropriate resources provision by	Requires further investigation.	This is a qualitative issue. Systematic data		We suggest region wide, and by LGA for	Requires further investigation.	Requires further investigation.

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
Collaborative processes for regional decision making (includes partnerships, planning, supportive and creative institutions).	**resources to support engaged governance initiatives (broad and/or NRM focus).**	government agencies to support engaged governance initiatives. • Requires further investigation.		availability is highly unlikely.		local governments.		
Engaged governance Collaborative processes for regional decision making (includes partnerships, planning, supportive and creative institutions).	**3. A diverse range of local community members / groups are actively engaged in local governance (broad and/or NRM focus).**	• Evidence that a diverse range of local community members/groups are actively engaged in local governance. • Requires further investigation. • NB: This criterion may also inform Criterion 8.	Requires further investigation.	Compilation from a variety of sources is likely to be required.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Engaged governance Collaborative processes for regional decision making (includes partnerships, planning, supportive and creative institutions).	**4. Engaged governance initiatives use culturally appropriate methods (broad and/or NRM focus).**	• Evidence that culturally appropriate methods are used in engaged governance initiatives. • Requires further investigation.	Requires further investigation (e.g. reports by cultural groups, including Indigenous organisations).	This is a qualitative issue. Systematic data availability is highly unlikely.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Engaged governance Collaborative processes for regional decision making (includes partnerships, planning, supportive and creative institutions).	**5. Input from local people influences (broad and/or NRM) decision making processes.**	• Evidence of input from local people that influences decision making processes. • Requires further investigation.	Document existence and use of advisory committees, liaison staff, specific consultative processes.	• This is a qualitative issue. Systematic data availability is highly unlikely. • Requires specific collation, e.g. from annual reports, websites.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Engaged governance Collaborative processes for regional decision making (includes partnerships, planning, supportive and creative institutions).	**6. Community satisfaction with decision making processes (broad and/or NRM focus).**	Requires further investigation (focused on 'local' or 'community' 'satisfaction' in / 'perceptions' of local decision making processes).	Requires further investigation (e.g. identify any existing local survey or whether there is a need to conduct one). Possible source: • '*Community Satisfaction Survey*' Local Government Association of Queensland (LGAQ) http://www.lgaq.asn.au/web/guest/about-lgaq	• Provides an overview of how residents regard the performance of local government. • Conducted every two years. • Survey results are available free of charge to LGAQ members.	2009	We suggest region wide, and by LGA for local governments. Unclear what unit level the LGAQ data is available to. Possibly limited to state level.	Incomplete. Requires further investigation e.g. identify local council surveys (such as below). • Townsville City Council (2006) *Community Attitude Survey* http://www.townsville.qld.gov.au/resources/68.pdf • Thuringowa City Council (2007) *Community Attitude Research* http://www.townsville.qld.gov.au/resources/67.pdf	Requires further investigation. Determine whether local surveys can be compared to e.g. State level LGAQ '*Community Satisfaction Survey*' results.
Engaged governance Collaborative processes for regional decision making (includes partnerships, planning, supportive and creative institutions).	**7. The community trusts the government.**	Requires further investigation (focused on 'local' or 'community' 'attitudes' / 'perceptions' of government trustworthiness).	Requires further investigation (e.g. identify any existing local survey or whether there is a need to conduct one). Possible source: • *'Community Satisfaction Survey*' Local Government Association of Queensland (LGAQ) http://www.lgaq.asn.au/web/guest/about-lgaq • NB: 'Trust' does not appear to be explicitly measured by this survey however perceptions of trust might be found in responses to questions in the	• Provides an overview of how residents regard the performance of local government. • Conducted every two years. • Survey results are available free of charge to LGAQ members.	2009	We suggest region wide, and by LGA for local governments. • Unclear what unit level the LGAQ data is available to. Possibly limited to State level.	Incomplete. Requires further investigation e.g. identify local council surveys (such as below). • Townsville City Council (2006) *Community Attitude Survey* http://www.townsville.qld.gov.au/resources/68.pdf • Thuringowa City Council (2007) *Community Attitude Research* http://www.townsville.qld.gov.au/resources/67.pdf	Determine whether local surveys can be compared to e.g. state level LGAQ '*Community Satisfaction Survey*' results.

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
			'Qualities of Council' theme.					
Engaged governance Collaborative processes for regional decision making (includes partnerships, planning, supportive and creative institutions).	**8. Different types of knowledge (Indigenous, expert, community and political) inform decision making processes (broad and/or NRM focus).**	• Evidence that different types of knowledge inform decision making processes. • Requires further investigation (e.g. extent of community representation in consultative processes). • NB: This criterion may also be informed by data from Criterion 3.	Requires further investigation (e.g. agency reports of community consultations and participants). See annual reports, agency websites, and consider soliciting self-reports from relevant organisations.	• Requires specific collation, e.g. from annual reports, websites. • Compilation from a variety of sources is likely to be required.		We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Diverse and Innovative economy Regional economy comprises a broad range of industry and services, and supports new and exciting opportunities.	**1. Diversity of the regional economy.**	BITRE Industrial Diversity Index: This index measures the extent of reliance on a single, or multiple sectors and businesses.	ABS Census. According to the Bureau of Infrastructure, Transport and Regional Economics (BITRE); "This index provides a summary measure of the extent to which each statistical local area (SLA)/labour market region is characterized by a diversified industry structure. An index value of 100 indicates a region is completely diversified, with employment spread evenly across all ANZSIC industry subdivisions. An index value of zero indicates a region's employment is fully concentrated in a single industry." Access via BITRE/ Industry Structure database (BITRE, 2009) at: http://www.bitre.gov.au/info.aspx?ResourceId=253&NodeId=66 (see database tab titled: POW_SLA_2006-1dg1993; column 'U').	• Note that the vast majority of SLAs have readings of over 80. • For instance, index scores relating to the decile positions of the SLAs listed in the table on the right range between 42.4 and 81.3 (for deciles 1 to 3) and between 82 and 90.6 (for deciles 4 to 10). • Therefore the index is not necessarily a fine discriminator between regions. BITRE recommends comparing places of similar size along with trends over time.	2006	• The index is available by SLA (of which there are 52 in the study region). • Deciles shown in the right hand table are based on equal numbers of statistical local areas within each decile.	BITRE Index of Industrial Diversity Deciles Decile position is shown in the right-hand column, where 1 is 'least diversified' and 10 is 'most diversified': Yarrabah, Wujal Wujal, Douglas, Cranbrook, Murray — **1** Dalrymple, Stuart-Roseneath, Pimlico, Pallarenda-Shelley Beach — **2** Gulliver, Palm Island, Hermit Park, Vincent, Thuringowa (C) – Pt B — **3** Heatley, Rosslea, Hyde Park-Mysterton, Cairns (C) - Western Suburbs, Mt Louisa-Mt St John-Bohle, Mundingburra, Cairns (C) – Pt B — **4** Aitkenvale, Kelso, Thuringowa (C) – Pt A Bal, Townsville (C) – Pt B — **5** Cairns (C) - Northern Suburbs, Kirwan — **6** Rowes Bay-Belgian Gardens, North Ward-Castle Hill, Currajong, Douglas (S), Cairns (C) – Mt Whitfield, Cardwell, Burdekin — **7** Hinchinbrook, City, Railway Estate, South Townsville, Oonoonba-Idalia-Cluden, Garbutt, Cairns (C) – City — **8** West End, Cairns (C) – Trinity, Atherton, Wulguru, Cairns (C) – Barron — **9** Cook, Eacham, Cairns (C) – Central Suburbs, Mareeba, Herberton, Johnstone — **10**	Requires further investigation. The BITRE/Industry Structure database provides national data. For long term monitoring our region could select benchmark interstate comparators, and also compare with the state and national figures.
Diverse and Innovative economy Regional economy comprises a broad range of industry and	**2. Community capacity for innovation.**	• Proportion of region's residents (aged 15 years and over and employed) who work in technology and knowledge intensive industries.	ABS Census Basic Community Profile (BCP)	• Count of employed persons aged 15 years and over. • Based on place of	2006	• Based on (ASGC) 2006. • Concorded with 2008 reformed	Estimated number and proportion of the population (aged 15 years and over and employed) who were employed in 'Information media and	

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
services, and supports new and exciting opportunities.		• NB: We have selected the two industries of 'Information media and telecommunications' and 'Professional scientific and technical services' from the ABS Census 'Industry of Employment' data set, as appropriate to our area of focus. • A more extensive list of employment industries within the category of 'knowledge intensive industries' is available in the Australian and New Zealand Standard Industrial Classification (ANZSIC 1993); see 4 digit ANZSIC codes. http://www.abs.gov.au/Ausstats/abs@.nsf/66f306f503e529a5ca25697e0017661f/7cd8aebba7225c4eca25697e0018faf3!OpenDocument • Data (by pre-reformed LGA) can be extracted through the ABS website using CDATA Online http://www.abs.gov.au/CDATAOnline)	↓ Data Set: B42 'Industry of Employment' ↓ Add: 'Information media and telecommunications' and 'Professional / scientific & technical services' Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml We have used the ABS/OESR source in the study region data column to enable concordance with the 2008 local government boundaries. The 2003 BITRE Industry Structure Database lists 'Technology and Knowledge Intensive Industries' data under the 2001 LMR tab, (see columns BE and BF) The 2009 update of the database does not list this information. http://www.btre.gov.au/info.aspx?ResourceId=253&NodeId=66	usual residence. • Industry of employment was coded to the 2006 Australian and New Zealand Standard Industrial Classification (ANZSIC) edition. • Age and gender breakdowns available. • The Census is conducted every five years.		LGAs. • (Other geographic units are available.)	telecommunications' and 'Professional / scientific and technical services' industries: Wujal Wujal 0 - Yarrabah 4 (0.3%) Cairns 3,834 (5.4%) Cassowary Coast 359 (2.8%) Hinchinbrook 158 (3.0%) Palm Island 0 - Townsville 4,514 (5.6%) **Total: 8,869 (5.43%)** **5.43% of the 163,077 count of persons (aged 15 years and over and employed) were employed in 'Information media and telecommunications' and 'Professional / scientific and technical services' industries.**	Queensland: **Total: 128,759 (7.05%)** **7.05% of the 1,824,996 count of persons (aged 15 years and over and employed) were employed in 'Information media and telecommunications' and 'Professional / scientific and technical services' industries.** Australia: **Total: 430,106 (8.75%)** **8.75% of the 4,911,131 count of persons (aged 15 years and over and employed) were employed in 'Information media and telecommunications' and 'Professional / scientific and technical services' industries.**
Diverse and Innovative economy Regional economy comprises a broad range of industry and services, and supports new and exciting opportunities.	**3. Number and/or diversity of main employing industries (broad and/or NRM focus).**	• Proportion of region's residents (aged 15 years and over and employed) by the type of industry they are employed in. • An extensive list of employment industries is available in the Australian and New Zealand Standard Industrial Classification (ANZSIC 1993). http://www.abs.gov.au/Ausstats/abs@.nsf/66f306f503e529a5ca25697e0017661f/7cd8aebba7225c4eca25697e0018faf3!OpenDocument • Data (by pre-reformed LGA) can be extracted through the ABS website using CDATA Online http://www.abs.gov.au/CDATAOnline	ABS Census Basic Community Profile (BCP) ↓ Data Set: B42 'Industry of Employment' (18 types of industry) From the same data set, for NRM focus see: 'Agriculture, Forestry and Fishing' Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml We have referred to the ABS/OESR source above to enable concordance with the 2008 local government boundaries. The 2009 BITRE Industry Structure Database (BITRE 2009) also provides employment industry data by statistical local areas (SLAs), pre-reformed local government areas	• Count of employed persons aged 15 years and over. • Based on place of usual residence. • Industry of employment was coded to the 2006 Australian and New Zealand Standard Industrial Classification (ANZSIC) edition. • Age and gender breakdowns available. • The Census is conducted every five years.	2006	• Based on (ASGC) 2006. • Concorded with 2008 reformed LGAs. • (other geographic units are available)	Requires further investigation.	Requires further investigation. State and national data exists via OESR / ABS – Basic Community Profile.

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
			(LGAs), states and territotries (S/T) and BITRE working zones. http://www.btre.gov.au/info.aspx?ResourceId=253&NodeId=66					
Diverse and Innovative economy Regional economy comprises a broad range of industry and services, and supports new and exciting opportunities.	**4. Number and/or diversity of local 'family' businesses.**	Potential proxy: counts of owner managed enterprise and/or small to medium enterprises (SME), both defined by number of employees.	ABS Census Working Population Profile (WPP) ↓ Data Set: W10 Industry of employment by owner managers by number of employees ↓ See: Total, Total (number of owner managed enterprises) See also: Enterprise size and types re diversity. Access WPP data via ABS 2006 Census Database – Community profiles http://abs.gov.au/websitedbs/D3310114.nsf/home/Census+data	• Count of owner managed enterprises. • Based on place of work. • Industry of employment coded to the 2006 Australian and New Zealand Standard Industrial Classification (ANZSIC) edition. • The Census is conducted every five years.	2006	2006 LGA boundaries	Requires further investigation.	Requires further investigation. State and national data available from the same (ABS WPP) source.
			• Proportion of total businesses classified as 'small' and/or 'medium'. • ABS Counts of Australian Businesses • Data Set: Business Counts by 1-Digit ANZSIC by Employment Size • Access 2006/07 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database (See: 'Subjects / Business') http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml	• It is not currently possible to account for those businesses which operate out of multiple locations, other than at their main location. • Businesses are defined as small (employing less than 20 people, including non-employing businesses), medium (employing 20 or more people but less than 100 people) and large (employing 100 or more persons).	2006/07	• Based on (ASGC) 2006. • Concorded with 2008 reformed LGAs. • (Other geographic units are available.)	Requires further investigation.	Requires further investigation. State data available from the same (OESR) source.
Diverse and Innovative economy Regional economy comprises a broad range of industry and services, and supports new and exciting opportunities.	**5. Community support for local businesses / producers.**	• Evidence of community support for local businesses / producers. • Requires further investigation (e.g. consumption of produce from local sustainable/organic farming; measured via registers of local farmers markets).	Requires further investigation.			We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Diverse and Innovative economy Regional economy comprises a broad range of industry and services, and supports new and exciting opportunities.	**6. Residents are confident in appropriate ongoing employment (broad and/or NRM employee focus).**	• Requires further investigation. • Measurements could include: - 'Community confidence' / 'business confidence', 'NRM agencies employees' perceptions', surveys. - Duration of work contracts.	• Requires further investigation. • Possible survey questions. • This could be approached in the form of a set of agree/ disagree potential ongoing employment statements within a survey.			We suggest region wide, and by LGA for local governments.	Requires further investigation. Descriptive / contextual data source (i.e. measurement of 'ongoing employment' not included): • ABS 2006 Census • BCP B42 'Industry of Employment' data set.	Requires further investigation. Possible source: • *Queensland Employment Projections by Industry and Statistical Division 2009-10 to 2010-11* (OESR, 2010) http://www.oesr.qld.gov.au/publications/single-

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
							• Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml (For NRM focus see e.g. count of persons employed in 'Agriculture, Forestry and Fishing')	publications/economic-performance/qld-employment-proj-industry-sd/index.shtml (See 'Northern' and 'Far North' Statistical Divisions)
Diverse and Innovative economy Regional economy comprises a broad range of industry and services, and supports new and exciting opportunities.	**7. Government agencies support development of innovative technologies and practices (include sustainable NRM focus).**	• Evidence that government agencies support development of innovative technologies and practices. • Requires further investigation (e.g. government incentives / investment into extension, efforts to attract new industries).	Requires further investigation. Possible source: • Department of Employment, Economic Development and Innovation (DEEDI) http://www.deedi.qld.gov.au/ (e.g. funding registers / business incubators)			We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Diverse and Innovative economy Regional economy comprises a broad range of industry and services, and supports new and exciting opportunities.	**8. Socio-economic status of population.**	Socio-Economic Indexes for Areas (SEIFA). SEIFA "is a summary measure of the social and economic conditions of geographic areas across Australia. SEIFA comprises a number of indexes" (OESR Regional Profiles, 2010, p. 24). One such index is the Index of Relative Socio-economic Advantage and Disadvantage: "a continuum of advantage (high values) to disadvantage (low values) which is derived from Census variables related to both advantage and disadvantage, like household with low income and people with a tertiary education. … While SEIFA represents an average of all people living in an area, SEIFA does not represent the individual situation of each person. Larger areas are more likely to have greater diversity of people and households" (ABS, SEIFA Information Paper, 2008 see 'Main features: Product description' webpage).	ABS Census • Access SEIFA data from the ABS at http://www.abs.gov.au/websitedbs/D3310114.nsf/home/Seifa_entry_page	• Based on aggregated collection districts where SEIFA scores are available. • Collection Districts with no SEIFA score have been excluded from the calculations. • For further information see ABS SEIFA website http://www.abs.gov.au/websitedbs/D3310114.nsf/home/Seifa_entry_page • The Census is conducted every five years.	2006	• 2006 LGA (pre-reform) boundaries • (Other geographic units are available.) • NB: Overall quintile position scores (refer column on far right) for 2008 LGA boundaries were unavailable at the time of printing. 2006 data concorded with 2008 reformed LGA boundaries and reported as proportions of the population within each quintile can be accessed via OESR / Queensland Regional Database • http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml	SEIFA Index of Relative Socio-economic Advantage and Disadvantage Quintiles OQP = Overall Quintile Position (1 being most disadvantaged, and 5 being least disadvantaged)	• Requires further investigation. • The ABS recommends benchmarking against other LGAs of similar size and regional characteristics.

	Percentage of LGA population / quintile (rounded to nearest tenth)					OQP
	1	2	3	4	5	
Atherton	32.6	31.1	32.1	4.3	0.00	3
Cairns	16.2	18.7	19.5	24.3	21.2	5
Cardwell	54.2	19.5	17.9	7.4	1.1	2
Douglas	14.8	35.1	26.7	16.9	6.5	4
Eacham	20.5	29.5	43.3	6.7	0.0	4
Herberton	85.9	13.0	1.1	0.0	0.0	1
Hinchinbrook	51.0	42.5	6.5	0.0	0.0	2
Johnstone	40.8	46.6	12.6	0.0	0.0	2
Palm Island	100.0	0.0	0.0	0.0	0.0	1
Thuringowa	15.3	22.6	26.4	26.1	9.5	4
Townsville	9.8	24.3	27.9	16.5	21.5	5
Wujal Wujal	100.0	0.0	0.0	0.0	0.0	1
Yarrabah	100.0	0.0	0.0	0.0	0.0	1

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
Community infrastructure Appropriate services and facilities to support identified community needs.	**1. Main regional population centres have community facilities and services which meet infrastructure benchmarks or community needs.**	Evidence that main population centres have community facilities and services which meet infrastructure benchmarks or community needs. Requires further investigation (e.g. Local councils' infrastructure plans analysed against community needs assessment reports).	Requires further investigation (e.g. state and local government, consultancies).			We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Community infrastructure Appropriate services and facilities to support identified community needs.	**2. Equitable and reasonable access to community infrastructure for people not from main regional population centres.**	Evidence that people who do not reside in main regional population centres have equitable and reasonable access to community infrastructure. Measurements could include: • Mean travel distance to selected services. • Doctors (or other selected services) per 100, 000 of population.	Requires further investigation (e.g. identify where there is any existing local survey or whether there is a need to conduct one).			We suggest region wide, and by LGA for local governments.		
		• Service users' perceptions of equity and accessibility to community infrastructure.	Possible source: • '*Community Satisfaction Survey*' Local Government Association of Queensland (LGAQ) http://www.lgaq.asn.au/web/guest/about-lgaq (e.g. see responses to questions in the 'Basic Services / Infrastructure' theme).	• Provides an overview of how residents regard the performance of local government. • Conducted every two years. • Survey results are available free of charge to LGAQ members.	2009	Unclear what unit level the LGAQ data is available to. Possibly limited to state level.	Incomplete. Requires further investigation e.g. identify local council surveys (such as below). • Townsville City Council (2006) *Community Attitude Survey* http://www.townsville.qld.gov.au/resources/68.pdf • Thuringowa City Council (2007) *Community Attitude Research* http://www.townsville.qld.gov.au/resources/67.pdf	• Requires further investigation. • Determine whether local surveys can be compared to e.g. State level LGAQ 'Community Satisfaction Survey' results.
Community infrastructure Appropriate services and facilities to support identified community needs.	**2. Equitable and reasonable access to community infrastructure for people not from main regional population centres (*continued*).**	Accessibility / Remoteness Index of Australia (ARIA).	• ARIA is developed by GISCA, the National Centre for Social Applications of Geographic Information Systems. • ARIA+ are indexes of remoteness derived from measures of road distance between populated localities and service centres. ARIA+ is the standard ABS endorsed measure of remoteness. More info at: http://gisca.adelaide.edu.au/projects/category/about_aria.html • Free online database: http://gisca.adelaide.edu.au/projects/aria_online_scores.html	• Scores range from 0 (being highly accessible) to 15 (being very remote). • Based on assumption that with greater population comes greater access to services. • Note: Index scores do not take into account other variables such as access to a motor vehicle / public transport, and for which 2006 ABS Census data e.g. BCP29 'Number of Motor Vehicles by Dwellings' can be accessed via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-	2006	• SLA • (Other geographic units are available free of charge. LGA units possibly available by purchase)	Incomplete. Requires further investigation. Of the 52 SLAs that make up the study region, below is a random selection of 8 SLA ARIA+ scores. Wujal Wujal ....7.26 (*Remote*) Cairns (C) City................3.01 (*Moderately Accessible*) Atherton ....4.03 (*Moderately Accessible*) Herberton ....8.32 (*Remote*) Cardwell ....6.99 (*Remote*) Hinchinbrook ....6.04 (*Remote*) Palm Island ....9.64 (*Remote*) Townsville (C) – Pt B................4.34 (*Moderately Accessible*)	• Incomplete. Requires further investigation. • NB: Index scores are nationally relative.

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
				tools/qrsis/index.shtml				
Community infrastructure Appropriate services and facilities to support identified community needs.	**3. Appropriate and accessible public open and 'green' space (NRM).**	• Requires further investigation. • Measurements could include: - Green space as proportion of the region (including WTWHA) and of each LGA. - Green space as a proportion of city area. - Development of Greenfield sites. - Green space levies.	Requires further investigation (e.g. local councils).			We suggest region wide, and by LGA for local governments.	Requires further investigation.	Requires further investigation.
Community infrastructure Appropriate services and facilities to support identified community needs.	**4. Housing is affordable.**	Home ownership and rental proportions of the region's occupied private dwellings.	ABS Census Basic Community Profile (BCP) ↓ Data Set: B32 'Tenure and Landlord Type by Dwelling Structure' ↓ See: 'Fully Owned, Total', 'Being Purchased,Total', and 'Rented, Total' Access 2006 data concorded with 2008 reformed LGAs via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml	• Count of occupied private dwellings (excludes 'Visitors only' and 'Other not classifiable' households). • Includes dwellings being; purchased under a rent/buy scheme, rented from a parent /other relative or person, rented through a 'Residential park (includes caravan and marinas)', 'Employer-government (includes Defence Housing Authority)' and 'Employer-other-employer' (private), and dwellings 'Being occupied under a life tenure scheme'.	2006	• Based on (ASGC) 2006. • Concorded with 2008 reformed LGAs. • (Other geographic units are available.)	Percentage of occupied private dwellings: Fully owned / Being pur-chased / Rented / Other / Not stated **Wujal Wujal**: 9.5 / 0.0 / 82.1 / 8.3 **Yarrabah**: 7.0 / 0.0 / 85.3 / 7.7 **Cairns**: 24.8 / 33.9 / 37.2 / 4.0 **Cassowary Coast**: 38.7 / 25.6 / 31.3 / 4.4 **Hinchinbrook**: 50.2 / 19.2 / 27.0 / 3.6 **Palm Island**: 2.5 / 0.0 / 87.2 / 10.3 **Townsville**: 25.5 / 36.7 / 34.5 / 3.3 **Study Region**: 27.08 / 33.71 / 35.43 / 3.76	Percentage of occupied private dwellings: Fully owned / Being pur-chased / Rented / Other / Not stated **Queensland**: 31.50 / 33.78 / 31.10 / 3.6 **Australia**: 32.60 / 32.20 / 27.20 / 8.0
Community infrastructure Appropriate services and facilities to support identified community needs.	**5. Appropriate support for finding employment.**	• Evidence of appropriate support to find employment. • Requires further investigation. • Measurement/s could include: - Local perceptions of employment support. - Extent of services available. - Government investment into employment pathways.	• Requires further investigation (e.g. identify where there is any existing local survey or whether there is a need to conduct one). • Possible sources: - Employers, persons looking for employment. Centrelink, recruitment agencies. - Department of Employment, Economic Development and Innovation (DEEDI) http://www.deedi.qld.gov.au (e.g. to identify employment pathway programs / funding)	Compilation from a variety of sources is likely to be required.		We suggest region wide, and by LGA for local governments.	• Requires further investigation. • Supplementary data source: Department of Education, Employment and Workplace Relations (DEEWR), Small Area Labour Markets Australia. • Access data via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml (See: 'Subjects / Economy / Labour')	• Requires further investigation. • Supplementary data source: Department of Education, Employment and Workplace Relations (DEEWR), Small Area Labour Markets Australia. • Access data via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml (See: 'Subjects / Economy / Labour')
Community infrastructure Appropriate services and facilities to support identified community needs.	**6. Access to day and/or after-school care.**	Requires further investigation (e.g. childcare places as a proportion of LGA population).	Requires further investigation.			We suggest region wide, and by LGA for local governments.	Requires further investigation. Possible sources: • Office for Early Childhood Education and Care, Department of Education and	Requires further investigation. Possible sources: • Office for Early Childhood Education and Care, Department of Education

Social resilience indicator	Monitoring criteria	Measurement / proxy	Data source	Data notes / limitations	Data time period	Data geographic unit/s	Study region data	Comparative data e.g. State / National averages / industry targets / benchmarks
							Training http://education.qld.gov.au/earlychildhood/office.html • Community Services, Department of Communities http://www.communityservices.qld.gov.au/childcare/	and Training http://education.qld.gov.au/earlychildhood/office.html • Community Services, Department of Communities http://www.communityservices.qld.gov.au/childcare/ • ABS Childhood Education and Care, Australia, Survey 2008 (Reissue) http://www.abs.gov.au/ausstats/abs@.nsf/mf/4402.0
Community infrastructure Appropriate services and facilities to support identified community needs.	**7. Government policies / strategies / projects respond to needs of people with a disability.**	Evidence that government policies/strategies/projects respond to the needs of people with a disability. Requires further investigation.	Requires further investigation.	This monitoring criterion is widely accepted as a good benchmark; a society that caters well for those with a disability generally serves other needs well.		We suggest region wide, and by LGA for local governments.	Requires further investigation. Possible source: • Disability and Community Care Services, Department of Communities http://www.disability.qld.gov.au/ Descriptive / contextual data source: • 2006 ABS Census data e.g. BCP17 'Core Activity Need for Assistance' can be accessed via OESR / Queensland Regional Database http://www.oesr.qld.gov.au/online-services/online-tools/qrsis/index.shtml	Requires further investigation. Possible sources: • *Disability Services Queensland Consumer Satisfaction Survey and Carer Satisfaction Survey* (2006) (2009 survey results due for release in 2010) http://www.disability.qld.gov.au/community/satisfaction-survey/ • The survey findings indicated that in 2006 83% of consumers (actual consumers and proxies) and 72% of carers across Queensland were satisfied with the disability services they received. • Australian Institute of Health and Welfare (AIHW) report: Disability support services 2007-08 http://www.aihw.gov.au/publications/dis/dis-56-10751/dis-56-10751.pdf