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Improving Social Resilience in Response to Climate Change in Far North Queensland and Torres Strait

Katie Costantini
SIT Study Abroad

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**Improving Social Resilience in Response to Climate Change in Far North Queensland
and Torres Strait**

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ISP Ethics Review

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The ISP paper by Katie Costantini (student) does/does not* conform to the Human Subjects Review approval from the Local Review Board, the ethical standards of the local community, and the ethical and academic standards outlined in the SIT student and faculty handbooks.

*This paper does not conform to standards for the following reasons:

Completed by: Peter Brennan

Academic Director: Peter Brennan

Signature:

Program: Australia: Sustainability and Environmental Action

Date: 12/12/2014

Abstract:

Currently, most approaches to decision-making in response to climate change have been based on biophysical knowledge, even though climate change is an inherently social dilemma. Social resilience involves communities' ability to mitigate and prepare for the effects of climate change and recover to an improved state. Professor Allan Dale and his colleagues at the Cairns Institute at James Cook University developed a framework for social resilience based on four attributes: (1) Economic Viability, (2) Community Knowledge, Aspirations, and Capacity, (3) Community Vitality, and (4) Governance. They are using this framework to evaluate and monitor Far North Queensland and Torres Strait (FNQ&TS). Regional decision-makers use the profiles created for each subregion to prioritise and develop strategies to improve each attribute.

The first goal of my research was to update and refine the most recent social resilience profile for the Northern Gulf, a subregion of FNQ&TS. I created a table with new evidence, conclusions, and suggested changes in assigned ratings for each sub-attribute of the framework. I analyzed available literature, reports, and media and conducted three interviews. I found a slight decrease in all attributes except Governance, which has improved due to increased connectivity between regional institutions and organizations. I then identified strategies and adaptations to improve social resilience, such as educational and skill-building opportunities, research into potential sustainable farming and pastoral practices, adoption of the precautionary principle, increased service accessibility, and collaborative governance arrangements.

My findings support the prioritization of improved natural disaster management in FNQ&S as a whole. Current funding arrangements over-invest in recovery and under-invest in mitigation. The Productivity Commission recently released a draft report on Australia's natural disaster funding arrangements. The second goal of my project was to write a policy paper that will be used in negotiations regarding natural disaster funding arrangements. I conducted content analysis of relevant documents and three interviews. The common concerns with the current arrangements and the Commission's recommendations include inefficient processes, lack of financial support and underinvestment in mitigation. Common goals include community engagement and awareness, support for local business, and effective governance. I used this information to outline a policy agenda of social, economic, and environmental adaptations. However, it is vital that there is an effective system of trilateral governance to support these strategies and adaptations, which will necessarily improve the social resilience of FNQ&TS.

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List of Common Abbreviations:

FNQ&TS- Far North Queensland and Torres Strait

GSD- Gulf Savannah Development

NGRMG- Northern Gulf Resource Management Group

QLD- Queensland

1. Introduction

1.1. Social Resilience: Definition and past approaches

Social resilience can be defined as “the way in which individuals, communities and societies adapt, transform, and potentially become stronger when faced with environmental, social, economic, or political challenges” (Cuthill, Ross, Maclean, Owens & Witt, 2008, p.146). Resilience thinking first evolved in ecological literature in the 1970’s in order to understand and adaptively manage complex ecological systems under stress. Sociological and psychological concepts of resilience, however, focus on individual resilience and adaptability as well as community and institutional resilience. Dale et al. (2014b) define three forms of community resilience: 1) resistance, or the ability to absorb perturbation; 2) recovery, or the speed and ability to recover from stressors; and 3) creativity, or “the ability of a social system to maintain a constant process of creating and recreating, so that the community not only responds to adversity, but in doing so, reaches a higher level of functioning.” In the context of global climate change, evaluating and improving the social resilience of communities is necessary to avoid or mitigate the potential effects of climate change on natural resource availability, economies, settlements, and individual and community well-being. Currently, most approaches to planning and decision-making in response to climate change have been based on biophysical and engineering knowledge, while social considerations are often marginalized, even though climate change is an inherently social dilemma (Dale et al., 2014b, pp.4-7).

1.1.1. Development of a social resilience framework of evidence-based indicators

In order to address the lack of socially focused strategies, Dale et al. (2011) have developed a framework of social resilience indicators to assess communities’ social resilience. The goal of this framework is to organize information in such a way that is useful and meaningful to stakeholders and decision makers in a community. The framework consists of four clusters of social resilience attributes: (1) Economic Viability, (2) Community Knowledge, Aspirations, and Capacity, (3) Community Vitality, (4) and Governance. Each cluster consists of multiple lines-of-evidence that can be used to identify priority interventions to apply in the short and long term, as well as to measure progress (Table 1). Each cluster is then rated on a scale of 1 (community will be irreversibly impacted and is unlikely to recover) to 5 (community will easily mitigate and adapt to severe impacts of climate change). Economic vitality is rated based on evidence such as income levels and

disparity, dependence on natural resources, and economic diversity. The Community Knowledge, Aspirations, and Capacity rating is based on awareness of climate change, education and skill levels, and community desire for sustainable resource management. Community Vitality is assessed according to general happiness and health, access to and disparity in community services, housing, and infrastructure vulnerability. Finally, Governance is rated based on collaboration and adaptive management among key decision making groups and sectors, as well as use of available integrated knowledge data (Dale et al., 2011).

Table 1. Social Resilience Attributes and Lines of Evidence (Dale et al., n.d., p.21)

Attribute Cluster	Example Resilience Attributes That Can Be Used to Gather Multiple Lines of Evidence and as a Basis for the Development of Attribute Indicators
Knowledge, Aspirations and Capacity	<ul style="list-style-type: none"> • Regional individual, family and business levels of awareness of climate change and natural resource sustainability. • Education levels and spread across the region. • Skill levels and spread across the region. • Regional aspirations for sustainable natural resource management. • Regional individual/business leadership/ complex problem solving.
Governance	<ul style="list-style-type: none"> • Connectivity and trust within and among key decision-making institutions and sectors within the region. • Adaptive management capacity of key decision-making institutions and sectors within the region. • Adaptive use and management of integrated knowledge sets within the region.
Economic Viability	<ul style="list-style-type: none"> • Regional diversity and quality of growth in economic activity. • Regional vulnerability of natural and energy resource base. • Regional inclusiveness and economic fairness/ equity. • Regional workforce participation and employment.
Community Vitality	<ul style="list-style-type: none"> • Regional demographic stability. • Wellbeing/ happiness within the general regional community. • General regional community health and disparities. • Regional community services access, and disparities. • Regional measures of housing, accommodation and accessibility. • Regional aspects of built infrastructure vulnerability. • Regional community safety and risk.

1.2. Social Resilience in Far North Queensland and Torres Strait (FNQ&TS)

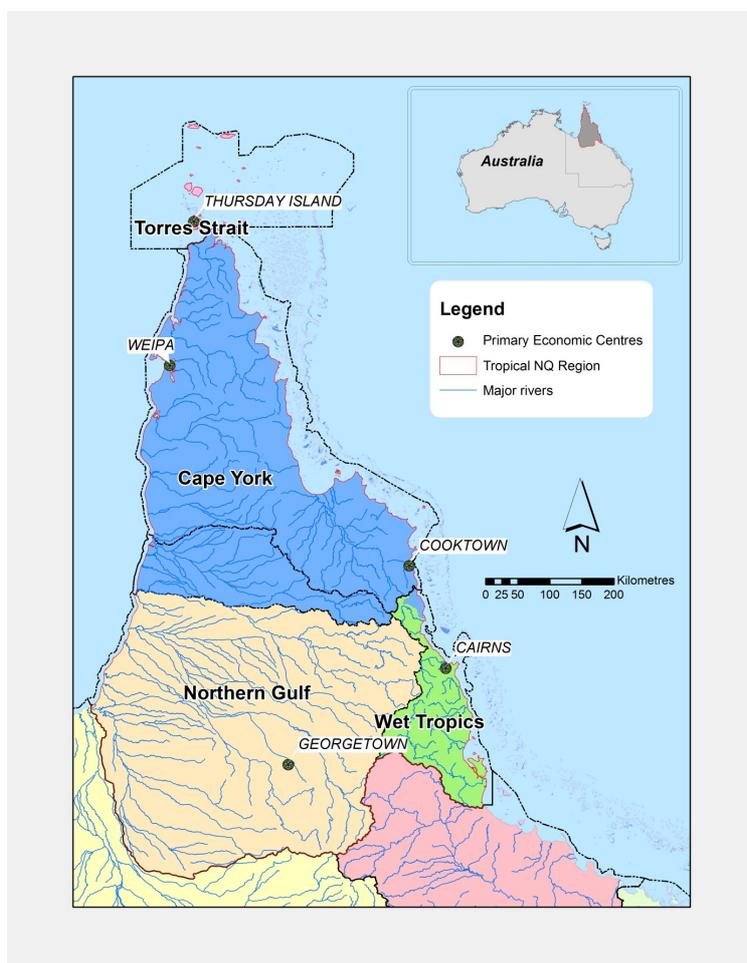


Figure 1. Map of FNQ&TS, showing four distinct subregions (Dale et al., n.d., p.20).

Dale et al. (2014c) are now in the process of applying this framework to four subregions of FNQ&TS: the Wet Tropics, Cape York, Torres Strait, and the Northern Gulf (Figure 1). This region is vulnerable to the current and potential future effects of climate change, which include sea level rise, more intense dry spells, temperature increase, more intense coral bleaching, and more intense cyclones and flooding. They have completed two rounds of benchmarks in the Wet Tropics and one round the three other subregions within the past few years. The benchmarking process includes five tasks: assessing possible biophysical implications

of climate change; reviewing evidence against attributes in each cluster, using available socio-economic research and relevant monitoring studies; working with regional focus groups and with management and economic stakeholders to refine evidence and reach conclusions; creating index ratings for each cluster of the framework; and receiving feedback from focus groups on the assigned ratings and proposed strategies for improvement (Dale et al., n.d., pp. 1-8). The framework was used in each subregion to create a social resilience “profile,” or a table outlining evidence, conclusions, and resilience ratings for each attribute cluster.

1.2.1. First round assessments

In its most recent benchmark assessment, the Wet Tropics region was found to be particularly vulnerable in the areas of Economic Viability, due to the need for more economic

diversity and business-scale resilience in tourism and agriculture, and Community Knowledge, Aspirations, and Capacity, due to the need for improvement in disaster awareness and preparedness at both the individual and government levels. The community vitality rating suffered from vulnerability in certain sectors, including capacity for community risk management due to increased cost of private property insurance, reliance on aid and philanthropy, lack of health services, social and economic disparity, unaffordability of housing due to low income and high unemployment, and vulnerability of some evacuation roads and hospitals. Issues in Governance included stakeholders having less control over the government's environmental agenda and a high turnover of people in leadership positions (Dale et al., 2014c, pp. 9-11).

The Cape York Peninsula subregion was found to be highly vulnerable in terms of all four clusters. The economy depends on welfare and subsidies. The primary industries are mining and tourism, which are often seasonal, low-skill, low-income, and affected by cyclones. There is also a very high rate of unemployment among Indigenous people. The region is very dependent on natural resources, but still has low levels of food, energy, and water security. This dependency was not found to lead to formulation of strategies for more sustainable resource management, despite awareness of the need to adapt. In terms of vitality, the subregion struggles with high population growth rates, substance abuse, poor access to services, over-crowding, and low insurance coverage. The Governance systems include strong leadership, but poor collaboration among sectors (Dale et al., 2014c, pp. 13-15).

The Torres Strait subregion was also found to have low levels of social resilience. The economy is dependent on fishing and tourism, both of which are highly vulnerable to the sea-level rise already occurring. There is low food, energy and water security due to high levels of imported resources. There are also high levels of unemployment and the region largely includes vulnerable indigenous populations. Awareness of climate change and its potential effects is generally low, but was found to be growing. However, there is a lack of tertiary and vocational educational facilities. The Community Vitality was found to be vulnerable due to people's spiritual connection to the land. There is a great deal of Indigenous culture in the subregion, so the loss of cultural sites would greatly affect people's sense of place, culture, and community. Finally, the Governance institutions are poorly connected and the amount of available social and economic data was poor (Dale et al., 2014c, pp. 15-17).

In its first benchmark assessment, the Economic Viability of the Northern Gulf subregion was found to be vulnerable, but still to have some capacity to respond to the impacts of climate change over time. The subregion had particularly vulnerable pastoral and

fishing sectors due to fire and drought, but economic advances in agriculture, mining, tourism, and recreation were observed. Many people in the subregion were experiencing personal financial hardship and there were high levels of debt, but overall rates of unemployment were relatively low. The Community Knowledge, Aspirations and Capacity displayed social resilience such that the community had a high capability to mitigate and adapt to climate change. People were very aware of climate change and natural resource sustainability. There were also high levels of individual practical knowledge. However, resilience was reduced by high levels of out-migration for education and employment. Community Vitality was stable and had a high capacity for adaptation, with stable population turnover and a high proportion of working-age adults. However, the region had been affected by recent natural disasters, leading to debt, mental health issues, and lower food and energy security. The region did have functional response systems, but needed better real-time data. The Governance also had a good capacity for adaptation with well-connected sectors (Dale et al., 2014c, 11-13).

1.2.2. The Second benchmark assessment of the Northern Gulf

The current research focus of Dale and his colleagues is the formation and refinement of a second-round benchmark analysis of the North Gulf subregion. According to a presentation prepared by Dale (2014) for stakeholders in the Northern Gulf subregion, certain aspects of social resilience have improved since the last benchmark, while others have remained stable or continued to decline. In terms of economic viability, there have been slight improvements in the window for tourism and recreation enterprises as well as the development of a North Queensland Irrigation Strategy. There have also been improvements in the sustainability of Gulf fisheries, conditions of pastures, road transport assets and supply of sustainable energy sources. In terms of Community Knowledge, Aspiration, and Capacity, natural resource management awareness activities are occurring. However, school and post-school education is still below the average for Queensland and there is no secondary education beyond Year 10. This is balanced, however, by high levels of practical and Traditional Knowledge. In terms of Community Vitality, the population grew 0.9% and strategies are needed to address high rates of mental health issues, lack of health services, sufficient public transportation, and land/housing availability. Finally, in terms of Institutional Governance, there is improved connectivity between the natural resource management body, Traditional Owners, the human service sector, local government, and key industry planners. There has also been progress made in consideration of climate change in

infrastructure and natural resource management, strategic capacity of regional councils, and Traditional Owner institutional capacities.

Based on the evidence gathered to date, key strategic priorities have been identified. These include coastal management risk assessment and planning schemes, infrastructure risk identification, focus on energy independence, partnership between the insurance industry and government to raise preparedness, integrated disaster recovery training, increase in the capacity of the human services sector, RADAR installations, increase in awareness of flood risk and emergency response, bio-regional planning and ecosystem service analysis (Dale, 2014). The first focus of my research was to contribute to the second benchmark analysis of social resilience indicators in the North Gulf subregion, in order to refine and update its current profile. This analysis is important to monitor the progress made in response to previous social resilience evaluations and emergent strategies. This profile will be used to update to assist in the planning and facilitation of a workshop for stakeholders in the North Gulf subregion.

1.3. Strategy Development to Improve Natural Disaster Management in FNQ&TS

This profile, as well as the most current profiles of the other three subregions, can be used to inform strategy development to address emergent social, economic, and environmental issues in order to improve social resilience. One key area that needs to be addressed is preparedness for natural disasters. Tropical cyclones pose a serious risk to FNQ&TS, due to conditions such as the region's reliance on agriculture and tourism and vulnerable urban infrastructure. According to a report from CSIRO, the overall warming of the oceans and the atmosphere increases the amount of moisture transported from the ocean to the air, which raises the likelihood of intense rainfall events, such as tropical cyclones. While the frequency of these storm events is projected to decrease, their intensity is projected to increase. These intense cyclones and other low-pressure systems can cause ocean surges, which, along with sea level rise, will lead to more coastal flooding (CSIRO, 2011).

In the past decade this region has experienced significant bushfires, floods, and two category five cyclones: Larry in 2006 and Yasi in 2011. Communities have been successfully reconstructed, but the economic and social impacts of these events, such as high levels of debt and increased insurance premiums, are still apparent. According to Dale et al. (2014c), the economy of this region is based primarily on agriculture, cattle grazing, fishing, mining, and tourism, all of which are vulnerable to climate change and disaster events. There are high levels of personal financial hardship, lack of affordable insurance, and below average

income. The area is also sparsely populated, with remote, and often under-resourced, communities connected by vulnerable transport and other infrastructure links. While there are many long-term residents who have experienced multiple cyclone and flooding events, there is also a large transient population that may be insufficiently aware of, and prepared for, disaster risks. The combination of these factors leaves this region exceptionally vulnerable to the impact of future natural disasters. However, the region also has well-informed and connected local governments, councils, and management groups, as well as links to regional research institutions (Dale et al., 2014c). Therefore, there is substantial capacity to improve the region's natural disaster management through reformed planning and funding arrangements and policy development. The current profiles for the FNQ&TS subregions can be used to prioritize possible strategies and policies to bring about disaster resilience, which would, in turn, improve upon the region's social resilience.

1.3.1. Current natural disaster funding arrangements

This past year, the Australian Government Productivity Commission released an inquiry and draft report on Australia's natural disaster funding arrangements. The funding for natural disaster mitigation is shared between Federal, State, and Local governments through the National Partnership Agreement on Natural Disaster Resilience (NPANDR). According to the Productivity Commission's report, in recent years, the Australian government mitigation spending was only 3% of its expenditure on recovery, which is funded through the Natural Disaster Relief and Recovery Arrangements (NDRRA) and the Australian Government Disaster Relief Payments (AGDRP). While the AGDRP provides one-off payments for "adversely affected" residents, the NDRRA is meant to allow the Federal Government to act as a "safety-net" for state and local governments by providing reimbursement (up to 75%) for state eligible expenditure over specified thresholds. The key findings asserted by the Commission were the over-investment in recovery and reconstruction and lack of funding and incentive for mitigation and adaptation, as well as overly prescriptive NDRRA requirements and inconsistent administration leading to inefficiency and inequity. Also, future natural disaster costs are treated as contingent liabilities in the Australian Government's budget, which de-incentivizes spending on mitigation and does not accurately communicate the level of risk (Productivity Commission, 2014, p.15).

1.3.2. Productivity Commission's recommendations

Based on its findings, the Commission has recommended the implementation of a

new policy and funding framework that will support and incentivize mitigation, increase accountability, and allow for greater state and local autonomy. They proposed a reduction in post-disaster support, with a decrease of its cost sharing contribution from 75% to 50% and an increase in the triggers for Australian government assistance, as well as the option for states to purchase additional “top-up” insurance. They also suggest an increase in annual mitigation expenditure to \$200 million distributed per-capita, as well as improving information distribution, land use planning, asset management planning and working to reduce insurance premiums (Productivity Commission, 2014). The current mitigation strategies, however, tend to focus almost entirely on road and other infrastructure construction and betterment rather than considering potential social, economic and environmental adaptations and planning. In fact, according to the Department of Local Government, Community Recovery and Resilience, the only funding available in Queensland for mitigation efforts other than flood mitigation infrastructure consists of \$24 million in 2014-15 through the Natural Disaster Resilience Program (DLGCRR, 2014). FNQ&TS has the potential to pilot a new policy and funding agenda for natural disaster resilience. This agenda should aim to create communities that are aware and educated about their risks, take steps to mitigate the potential implications of those risks, and are able to not only restore and repair to a pre-disaster level, but also adapt to reach a higher level of functioning.

1.4. Purpose of Study and Implications on Sustainability

This study aimed to improve the social resilience of FNQ&TS through contributing to ongoing monitoring of social resilience indicators, and developing strategies based on priority issues. The maintenance of up-to-date profiles allows for the identification, organization and prioritisation of key issues within each subregion. The goal of this part of my research was to create a table of suggestions to refine and update the most recent version of the Northern Gulf profile using multiple lines of evidence of new, missing, or altered information. I then made conclusions and recommendations for changes in the assigned social resilience value for each attribute in the framework, as well as recommendations for possible strategies to improve specific aspects of social resilience. Allan Dale then integrated my suggested changes and additions into the existing profile to develop the final 2014 version of the document. Based on current literature, reports, and the profiles for all four subregions, natural disaster management and funding arrangements have been identified as a priority focus for strategy development. Therefore, the second goal of my research was to write a policy paper that identified common concerns among regional stakeholders regarding the Commission’s

findings and recommendations, key goals for disaster resilience in the region, and outline emergent strategies and adaptations to reach these goals. This paper will be used to spark discussion among regional stakeholders in the process of strategy development and implementation for improved natural disaster management.

Both goals of my research relate to sustainability, which I understand as a way of life that allows a community to meet its needs, while not compromising the ability of future generations to meet their needs, through responsible use of renewable resources, living within the carrying capacity of a location, and a balance among the economy, politics, and the environment. According to Dale, Vella, and Cottrell (2014), “community sustainability also relates to resilience because its purpose is to maintain a working ecosystem that will sustain communities and their resource use into future generations” (Dale et al, 2014, p.9). By evaluating the social resilience of FNQ&TS and monitoring progress, appropriate strategies can be devised and implemented in order to make communities prepared to prevent or mitigate potential issues due to the biophysical implications of climate change, allowing the region to continue to function and thrive well into the future.

2. Methods

2.1. Location and Resources

This research took place at the Cairns Institute at the James Cook University Cairns campus. The Cairns Institute is a research institution focused on enhancing livelihoods and wellbeing of communities in Northern Australia and the global tropics. This project was developed and completed with mentorship from Professor Allan Dale, whose work focuses on tropical regional development with a focus on governance systems. My work on both the Northern Gulf profile and natural disaster policy will contribute to his current research goals involving ongoing monitoring of subregional social resilience and development of strategies and policy agendas to address emergent economic, social, and environmental issues. To complete my research, I was given access to Allan Dale’s past research and subregional profiles, the resources used to develop those publications, and additional literature and reports that needed to be, but had yet been, incorporated into his research. I was also given access to the University library to gather further resources information.

2.2. Updating and Refining the Northern Gulf Social Resilience Profile

I first analysed the most recent version of the Northern Gulf social resilience profile,

which was last formally updated in 2013. The social resilience framework consists of four attributes: Economic Viability; Community Knowledge, Aspirations, and Capacity; Community Vitality; and Governance, each of which is comprised of multiple sub-attributes. Each sub-attribute is given a rating of 1 to 5, and the overall resilience rating for the attribute is the sum of the values for the sub-attributes. The goal of my research was to create a new table, using the existing framework, consisting of new evidence relevant to the subregion, implications of this evidence, and a suggested increase, decrease, or no change in the assigned value for each sub-attribute. The completed table was incorporated into the Northern Gulf profile to finalize the 2014 social resilience ratings of the subregion. Regional stakeholders will use this table to discuss current issues and collaborate in the development of strategies and programs to improve social resilience. Therefore, the table must be succinct, comprehensive, and easy to understand. To see the completed table, refer to Appendix I.

2.2.1. Gathering evidence from available literature, reports, research, and media

The majority of evidence was gathered from academic literature, government reports, and publications from regional organizations. I began my data collection using sources provided to me by Allan. I read and analysed each source using the social resilience framework. The data that I gathered consisted of objective facts and statistics, as well as subjective opinions and ideas relevant to the Northern Gulf. I synthesized my notes from each source into concise, clear bullet points, which I then placed into the most relevant sub-attribute. Objective points were placed in the “Evidence” column and subjective points were placed in the “Conclusions” column. After my initial resources were integrated into the table, I looked for any contradictions and identified gaps in the table. I used these gaps to focus my search for additional resources, which I found through online databases, online periodicals and newspapers, and government and regional organizations’ webpages. In total, I analysed nine academic journal articles, six government reports, five news reports and media releases, two submissions to government inquiries, and the 2014 Northern Gulf Resource Management Group (NGRMG) draft NRM plan.

2.2.2. Interviews with Regional Stakeholders

Certain sub-attributes of the table are subjective in nature and required input from interviews with experts and stakeholders from the subregion. I conducted three semi-structured interviews. The interview subjects had very different experiences and roles within the region. Each person was contacted to inform specific sections of the Northern Gulf profile

relevant to their area of expertise as well the Governance attribute, which includes information about connectivity, collaboration, and capacity of regional institutions and decision-makers. Therefore, I developed a different set of questions and probes for each interview. All three interviews, however, addressed perceptions and justifications of recent changes in the subregion, opinions of the quality of governance and collaboration among key-decision makers, and opinions on proposed irrigation and agricultural developments.

The first interview was conducted in Cairns on November 6th, 2014 with Joe Rhodes, an environmental scientist who studies water and catchment quality. I selected him so that I could learn more about the connectivity and between local governments, NRM bodies, and researchers, as well as current research funding arrangements. The second interview, also conducted in Cairns on November 6th, 2014, was with Bob Cobavie, a consultant who started Outsource Management and who supplies strategic business planning to people in the Northern Gulf region, particularly those in agribusiness and tourism. He was selected to provide information and first-hand perceptions of the economic conditions in the Northern Gulf and the availability of business planning and financial aid services. For both interviews, I received written consent to use recorded content from the interview and full names in the profile and my report. The third interview was conducted over the phone on November 7th, 2014 with an anonymous researcher who has worked with beef producers in the Northern Gulf for over 25 years. This person was selected to provide information on the economic and social condition of beef producers and the environmental condition of their land. This person asked to remain anonymous, but I received verbal consent to use recorded content from the interview in the profile and in my report.

I used my list of questions and probes as a guide to structure the interviews, but I chose to omit or reword some question and to add additional questions based on the interviewees' responses and on unanticipated subjects of conversation. Each interview was recorded, and the tapes were transcribed. I analysed the transcripts using the social resilience framework and identified information pertaining to specific sub-attributes. Relevant content from each interview was synthesized into bullet points to add to the profile.

2.2.3. *Evaluating Social Resilience Ratings*

Once all lines of evidence, including both written resources and interview content, were integrated into the profile, I made three sets of conclusions. I first added my own analysis of the collected data to the "Conclusions" column. These additions were specific to a single point or small groups of points in the "Evidence" column and considered direct

implications on the respective attribute of social resilience. I then analysed each sub-attribute as a whole and compared it to the “Evidence” and “Conclusions” from the most recent Northern Gulf profile, in order to make a conclusion about whether the assigned rating should increase, decrease, or stay the same based on the information in my table. Ratings for each sub-attribute were compiled into a “Suggested 2014 Resilience Rating” for each attribute cluster. Finally, I analysed each attribute cluster as a whole and identified the most pressing issues and possible strategies to address them.

2.3. Natural Disaster Management

The Australian Government recently asked the Productivity Commission to complete a public inquiry into the efficiency, efficacy, and sustainability of current natural disaster funding arrangements. The Commission released its draft report, after receiving 224 submissions to its inquiry, with findings and recommendations in September 2014. I first read and annotated this document in order to gain a comprehensive understanding of the current funding arrangements, the main issues associated with those arrangements, and strategies proposed by the Commission.

2.3.1. Content Analysis of available literature, reports, and submissions to the Productivity Commission’s inquiry and draft report on natural disaster funding arrangements

I used content analysis to review several documents of relevance to natural disaster management in Australia, including academic literature, information published on government websites, federal and state government reports, and federal and state plans and strategies, to gain a sound understanding of the current disaster management and funding arrangements and relevant research findings. In addition to the report itself, submissions by organizations and regional councils to the Productivity Commission’s draft report were also reviewed to determine the reactions, concerns, and suggestions of national, regional and local groups. Content analysis was used to:

- Identify common reactions and concerns regarding the current funding arrangements and the Commission’s recommendations in the context of FNQ&TS
- Identify common goals for natural disaster management and resilience in FNQ&TS
- Gather possible policy tools and strategies/adaptations for natural disaster mitigation

I used these concepts to develop a qualitative coding scheme, which I used to gather and organize data (Table 2).

Table 2. Content Analysis Coding Scheme

Article Name:				
Source:				
Key ideas/ messages		Notes	Quotations	Implications/Conclusions
Context of FNQ&TS Region	Social			
	Political			
	Environmental			
	Economic			
Current natural disaster response (system and funding)				
Current natural disaster mitigation (system and funding)				
Government/organization collaboration and roles (governance)				
Implications of commission's report/recommendations				
Possible strategies/adaptations	Social			
	Political			
	Environmental			
	Economic			
	Integrated			
How to prioritize/ make decisions				

2.3.2. Interviews with Regional Stakeholders

I supplemented my review of submissions to the Productivity Commission's inquiry and draft report with three semi-structured interviews. I created one set of questions and probes, which I used for all three interviews. The questions addressed the three topics are stated above. Certain questions were omitted or altered, and new questions were added in each interview, based on responses and unexpected topics of conversation. The first interview was conducted on November 13th, 2014 with Darlene Irvine, who works with the Far North Queensland Regional Organisation of Councils (FNQROC) in Cairns. I also analyzed two submissions to the Productivity Commission from FNQROC, but I chose to interview Darlene to gain a more personal perspective on the issues. I received written consent to use recorded content from the interview in my policy paper and report. The other two interviews were conducted over the phone. One was conducted on November 18th, 2014 with a person involved in the Queensland State Emergency Services and Emergency Queensland, who wished to remain anonymous but gave verbal consent to use recorded content of the interview in my policy paper and report. The final interview was conducted on November 19th, 2014 with Glen Alderton, who also works with the Queensland State Emergency Services. I received verbal consent to use recorded content from the interview in my policy paper and report. These two interviewees were chosen to provide opinions and perspectives from people

directly involved in the natural disaster relief and recovery processes. All three interviews were recorded and transcribed. The transcripts were analyzed using the above coding scheme and integrated into the rest of the content analysis results.

2.3.3. *Writing a Policy Paper*

I used the results of my content analysis to develop a policy paper outlining the context of natural disasters in FNQ&TS, the Productivity Commission's findings and recommendations, common concerns and feedback from regional stakeholders and organizations, possible strategies and adaptations for mitigation, and to propose governance arrangements to allow those strategies to be implemented. This paper will be used in an upcoming meeting of FNQ&TS stakeholders and decision makers to discuss, develop, and implement these emergent strategies and governance arrangements. For the purposes of this report, sections of the policy paper have been incorporated into the Introduction, Methods, and Results and Discussion sections. To see the complete paper, refer to Appendix II.

2.3.4. *Limitations of Data*

Both parts of my research would have benefited from additional interviews and analysis of available literature and reports. However, time constraints prevented me from collecting further data. If I were to continue my research on the Northern Gulf, I would try to interview people involved in other industries, such as mining and tourism, to gain further insight into the economic viability of those sectors. I would also contact people involved in the Department of Housing and Public Works and the Department of Communities, Child Safety and Disability Services to add additional data pertaining to the availability of housing, public services, and human services. Finally, it would be helpful to interview local government representatives and mayors to learn about intergovernmental collaboration. These contacts should be considered in the development of the 2015 Northern Gulf profile. If I was to continue my work on natural disaster policy, I would continue to gather and analyze submissions to the Productivity Commission's draft report. I would also attempt to interview contacts from the organizations and institutions that published those submissions, to gather a more personal perspective on their opinions. These contacts could include people from local governments, regional councils, non-profit organizations, and local businesses.

3. Results and Discussion

3.1. Northern Gulf Profile Update

The product of my research on the current levels of social resilience in the Northern Gulf is a document of suggested changes and additions to the most recent version of the subregion's profile, formatted according to the social resilience framework outlined by Dale et al. (2011). This document consists of new evidence and conclusion I gathered from written resources and interviews, as well as my findings regarding the implications of this evidence for the social resilience value of each sub-attribute. The contents of this document are summarized below. To see the complete table, refer to Appendix I.

3.1.1. Economic viability

The pastoral industry is still very vulnerable to climate change and requires significant aid from management and planning groups. Projected longer dry seasons, increased temperature, and increased intensity of rainfall events pose serious threats to water quality and availability as well as reduction in soil and vegetation condition (NGRMG, 2014b, pp. 11-13). According to an anonymous researcher who has been working with beef producers in the Northern Gulf for over 25 years, levels of farm debt are continuing to increase following the cumulative effects of poor wet seasons, cyclones, bushfires, and the residual effects of the Live Export Ban, which temporarily prohibited the live export of cattle to Indonesia. Many cattle graziers are only able to pay off interest on their debt, so their interest rate increases and exacerbates their level of financial hardship (Anonymous, 2014a, pers.comm.). Bob Cobavie of Outsource Management Pty Ltd also noted that graziers and primary producers are heavily dependent on the quality of the wet season and it can take from 3-5 years for the cattle industry to recover from a major hit such as a cyclone or drought (Cobavie, 2014, pers.comm.). Unfortunately, there is a high chance that rainfall will be below the median for the region in the upcoming wet season (BOM, 2014). Primary producers and graziers, however, can benefit from partnerships with current research institutions developing climate-resistant practices and business and financial planning services through organizations such as Outsource Management Pty Ltd.

Fishing and mining sectors are also vulnerable to the effects of climate change. The mining industry in particular is negatively affecting the levels of economic viability in the subregion. For example, the mining group Kagara Ltd went into liquidation in 2014 and reported a net loss of A\$48.9 million, and MMG Century Zinc Mine in Carpentaria is set to end open-cut production in July 2015 (Serenc, 2014 and Stephens, 2014). Additionally,

abandoned mines pose a serious environmental threat due to seepage of contaminated leachates into water sources (NGRMG, 2014b, p. 65). The fishing industry, according to Cobavie, is also affected by poor wet seasons and natural disasters, but is able to bounce back quickly compared to other industries (Cobavie, 2014, pers.comm.).

The fragility of these industries leads to lower levels of investor confidence, which also depends heavily on climate conditions. Economic confidence may also be low due to levels of unemployment, low income, and a low-skill workforce. A recent Queensland Government report stated that 47% of people in the Northern Gulf are in the most disadvantaged socio-economic quintile and the unemployment rate in 2013 was 10.5%, compared to 6.1% in Queensland as a whole (Queensland Government, 2014, p.31 and p.37). The unemployment rate is expected to increase with the projected loss of 700 jobs when MMG Century Mine closes (Stephens, 2014). Although communities have had ample time to prepare for the closure of the mine, loss of employment and loss of support of local business by the mining company will still pose significant challenges. The improvement of the socio-economic status of these communities and others in the subregion is dependent on the up-skilling of the workforce, increased education opportunities, and economic diversification.

Economic diversification will help improve the social resilience of the region by increasing investor confidence, lowering levels of unemployment, and decreasing the risk that a single weather event will completely wipe out the Northern Gulf economy. It also provides the opportunity to develop sustainable industries and to consider environmental threats and disaster risk in the planning and implementation of proposed enterprises. The Integrated Food and Energy Development (IFED) project is proposing an irrigation scheme in the Gilbert River catchment as part of the Etheridge Integrated Agriculture Project (EIAP), which would allow for development of the agricultural sector (NGRMG, 2014b). If successful, this could help increase the region's economic viability and food security. However, the projects need to be carefully researched, planned, and must apply the precautionary principle. There are numerous concerns with the proposal, such as the high cost, uncertainty of feasibility, and potential threats to ecosystems. There is also potential for sustainable tourism ventures. In fact, Cobavie stated that many cattle graziers and farmers are opening up their land for tourist experiences and accommodation. He also mentioned the possibility of more tourism opportunities focusing on sharing Indigenous culture (Cobavie, 2014, pers.comm.).

All economic sectors could also benefit from proposed and developing renewable energy schemes. There are five renewable energy projects underway in the subregion: the

first stage of the Ergo Energy Doomadgee Solar farm, further development of the Normanton Solar Farm, Infigen's Forsayth Wind Farm, a bio-energy plant as part of the proposed EIAP, and a proposed solar farm in Gregory Township (Gulf Energy Group, 2013). These projects have the potential to increase energy security and decrease dependency on gas and oil.

Overall, based on the data I gathered, I suggested that the rating for Economic Viability should be decreased from 17 to 16 out of a total of 30. I felt that the ratings for "Economic growth and diversity", "Inclusiveness and economic fairness/equity", "Workforce participation and employment" and "Economic confidence" should not change in value compared to the last published ratings. However, I suggested that the ratings for "Vulnerability of natural and energy resource base" and "Vulnerability of key economic infrastructure assets" should each be decreased by 0.5. The natural and energy resource base in the subregion is very vulnerable due to the lack of long term planning, which is prevented by financial hardship and lack of necessary funding and resources. Also, renewable energy schemes may be affected by cuts in funding, and proposed economic diversification strategies all rely on land and water quality, which can be impacted by climate change and natural disasters.

There are a number of strategies that I think should be discussed and developed by Northern Gulf stakeholders and decision-makers. First, accessible education and up-skilling programs should be a priority. Relevant knowledge and experience are vital to the success and sustainability of current industries, and even more so for the diversification of the economy. Tourism and agriculture operations require specific skills and abilities in order to be successful. If these new enterprises are developed without properly skilled leaders, they are not likely to withstand future obstacles, including climate change. Existing businesses should also be given access to planning and advice programs and workshops, which should integrate relevant research to improve the sustainability of business, pastoral, and farming practices. Finally, it is vital that the precautionary principle is used in the development of the IFED project, which has potential to both help increase economic viability and lead to significant environmental damage.

3.1.2. Community Knowledge, Aspirations, and Capacity

The most recent version of the Northern Gulf profile, which reported heightened awareness of the impact of natural disasters after Cyclone Yasi, suggests awareness of climate change and lack of natural resource sustainability. All three interviewees, however,

reported that even if people in the Gulf are aware of climate change, they have a strong incentive to make decisions for short-term economic gain rather than long-term sustainability, due to high levels of debt and personal financial hardship. An anonymous beef production researcher stated, “They aren’t concerned about climate change, they are concerned about holding onto the property, paying their bills, they are concerned about surviving.” This person also noted that many people in the Gulf are also sceptical of climate change because they interpret it as natural variation normally experienced in the region (Anonymous, 2014a, pers.comm.).

General education and skill levels in the region are also deficient. According to a Queensland Government report, there is a high disparity between the percentage of men and women who have a non-school qualification (e.g. bachelor’s degree, diploma, etc.). Of completed non-school qualifications, only 4.6% were in the “Agriculture, Environmental, and Related Studies” field of study (QLD Government, 2014a, pp. 24-25). Also, there is a significant shortage of available secondary and higher-level education, which forces young people to leave the subregion. Once they receive degrees, most do not return to the Northern Gulf. This creates a serious succession issue, because many current farmers and cattle graziers are reaching an age where they are unable to manage necessary labour, have high debt and personal financial hardship, and are not able to sell their land for a profit. Therefore, there is a concern about loss of knowledge and skill in these industries (Cobavie, 2014, pers.comm.). In addition to formal educational services, skill-building workshops and planning services can significantly help in the up-skilling of the workforce. These programs help build capacity for problem solving, innovation, and adaptation to climate change.

Based on this data, I suggested that the overall rating for Community Knowledge, Aspirations, and Capacity be decreased from 12 to 11.5 out of 20. I concluded that the resilience ratings for the “Education/knowledge levels and spread across the community,” “Individual leadership and complex problem solving,” and “Community cultural integrity” sub-attributes should not change. Education levels are still low, capacity for problem solving remains high, with help from regional organizations providing financial and business aid, and Indigenous culture still has a strong presence in many communities. I suggested that the rating for “Community awareness levels of climate change and natural resource sustainability” be decreased from 4 to 3. People may be aware of the impacts of natural disasters, but they do not consider climate change or sustainability in the majority of their decisions. I also suggested that the rating for “Skill level and spread across the community”

should be increased from 2 to 2.5 because of increased access to business and financial planning services and workshops.

In order to increase the overall resilience rating for this attribute, more workshops and long-term planning aids need to be accessible, especially in remote areas. There should also be some type of financial incentive to attend. This could possibly occur through partnerships with insurers. Strategies also need to be developed to attract young people to stay in the Northern Gulf and start careers in agriculture and the pastoral industry. This will help prevent a loss in knowledge and skill. There is no point in educating and skilling current farmers and cattle graziers in the region if the knowledge is not passed on to the next generation.

3.1.3. Community Vitality

The average annual growth rate of the estimated resident population in the Northern Gulf was 1.1% and has been stable since 2001 (Queensland Government, 2014b, p. 4). This means that the population of the subregion will double by 2071, so there will need to be significant changes in infrastructure and resource management to accommodate that population size. The Queensland Government reported a trend of population ageing, which has implications on succession of businesses and the need for income support and aged care services. Access to aged care services as well as other critical infrastructure such as child care services, hospitals, and fire stations is lacking. This reflects the remoteness of the Northern Gulf. In fact, three shires in the Northern Gulf do not have fire stations and two do not have aged care services (Queensland Government, 2014b, pp. 5-7, 30). The remoteness of the region is further exacerbated by the poor quality of transport links, vulnerability of roads to cyclones and floods, and the poor quality and high cost of internet. Improvement of roads and transportation planning will help mitigate potential effects of extreme weather events and help make resources and services more accessible. According to Gulf Savannah Development (2014), cost-effective internet services in the subregion are vital to improving education, healthcare, access to information, and safety (GSD, 2014). Safety and risk management in the region are also impacted by lack of funding for mitigation as part of the country's natural disaster funding arrangements. However, as discussed in the next section of this paper, there is opportunity to create a new policy agenda that will allow for increase funding and resources for mitigation.

Based on this evidence, I suggested that the rating for this attribute should decrease from 14.5 to 14 out of 30. The rating for "Demographic stability" should be decreased by 0.5 due to new data showing the ageing of the population, population displacement from natural

disasters, financial hardship, and the lack of incentive for young, educated people to stay in the region. However, there was no evidence to suggest change in any of the other sub-attributes. Poor access to services and housing is still an issue and natural disaster management has yet to be improved.

Development of new natural disaster funding arrangements should be the priority strategy to improve the Northern Gulf's rating for Community Vitality. The FNQ&TS region is highly vulnerable to natural disasters, and local governments and regional councils require more federal and state aid to plan and implement mitigation strategies. These strategies will decrease community risk through economic, social, and environmental adaptations, which will, in turn, increase social resilience. These strategies could also involve the development of more accessible infrastructure, transportation and human services.

3.1.4. Governance

This attribute is perhaps the most important aspect of social resilience. In order for any strategy development or adaptations to be implemented and successful in addressing the other three attributes, there needs to be an effective system of governance. The connectivity among key institutions and decision makers in the region is generally good. For example, the NGRMG is comprised of key regional stakeholders, and works with graziers, Indigenous groups, and local governments. In the autumn of 2014, both NGRMG and GSD appointed new CEOs who are committed to forming a "stronger and energetic working relationship." The gulf has also partnered with the Alliance of Northern Gulf Indigenous Groups (ANGIG) to receive coordination, projects, support and direction from Members of ANGIG (NGRMG, 2014a). According to Cobavie, there is also a good quality of connectivity among the mayors of the Northern Gulf (Cobavie, 2014, pers.comm.).

In order for this connectivity to be productive, these institutions and organizations must have the capacity for adaptive management. According to Dale et al. (2014c), there is no current systematic planning approach that recognizes the need to address threats on a catchment-scale level rather than just on individual properties. Also, most environmental planning has been driven from Brisbane and Canberra. The NGRMG, however, has the capacity to use partnerships with research institutions and available information to create a long-term regional agenda. For example, there have been recent improvements in spatial data management and extension of land management practices (Dale et al., 2014a, pp.8-9). In fact, the recently release Draft NRM plan from NGRMG suggests that potential physical, social

and economic effects of climate change will be integrated into future planning and management actions (NGRMG, 2014b).

One of the main downfalls of governance in the Northern Gulf is the ineffective use and management of data and knowledge. An anonymous beef production researcher commented that while there is ample opportunity for organizations and local governments to partner with research institutions, there is often a lack of adoption of applicable research by farmers and cattle graziers (Anonymous, 2014a, pers.comm.). Also, Joe Rhodes, an environmental scientist, stated his concern that scientific research that constrains or contradicts larger institutions' political or economic agendas is avoided and disregarded (Rhodes, 2014, pers.comm).

I suggested that the overall rating for this attribute be increased from 9 to 9.5 out of 15 due to improvement in "Connectivity within and among key decision making institutions and sectors", in the form of improved relationships among local governments, financial planning services, NGRMG and GSD. However, beneficial research still needs to be developed and funded through collaboration with other institutions, organizations, and government, and that information needs to be available and implemented in farming and pastoral practices, community and land planning, and resource management. Governance in the region would also benefit from increased community engagement through meetings and workshops. The ideas, concerns, and needs of community members need to be integrated into local and regional planning and policies, which need to be supported and funded through collaboration with state and federal government.

3.2. Natural Disaster Policy

Below are the results from my content analysis of academic literature, government and organizational reports, submissions to the Productivity Commission's Inquiry and Draft Report, and the transcripts from three interviews. I created a document containing the coding schemes for all of my sources and used it to develop the following outline of four topics: concerns regarding current natural disaster management, concerns regarding the Productivity Commission's recommendations, common goals for natural disaster management, and potential strategies and adaptations for natural disaster mitigation. Based on these results, I propose governance arrangements that will allow for these strategies and adaptations to be implemented.

3.2.1. Content Analysis Results- Common Concerns regarding current natural disaster funding arrangements

1. Inefficient processes, unclear guidelines and delays in approvals/funding- Due to the prescriptive, rigid requirements and approval process, it is a difficult process for regional councils and local governments to receive necessary funding in a timely manner (Productivity Commission 2014). Also, due to the timeline of the approval process, regions in FNQ&TS are forced to carry out reconstruction in the wet season, which increases overall cost (FNQROC, 2014). Due to lack of sufficient trilateral collaboration between federal, state, and local government, there are often gaps and duplications in policies and responsibilities, which can lead to unnecessary spending (FNQROC, 2012). Also, the lack of clear guidelines leads to inconsistent and unequal support for local governments, depending on who they seek support from (LGAQ, 2014).

“You know you have your federal process, your state process, and those two are tic-taking off each other... If local government has an issue and you go to QRA [Queensland Reconstruction Authority], it’s a federal government doing and if you go to the federal government, it’s a state government doing. It’s an interpretation that makes it bloody hard for local governments.” (Irvine, 2014, pers. comm.)

“The changeover of staff in local government is amazing. Might go through 3 or 4 CEOs in a year in some places. The CEOs are core figures in community disaster management. The lack of trained people in a community....” (Alderton, 2014, pers. comm.)

2. Lack of funding/incentives for mitigation; too much money pumped into recovery- The NDRRA is the main source of funding for natural disaster management funding, and it is designed to provide money for immediate relief and a two year recovery period (Australian Government, 2011). It encourages the reconstruction of infrastructure and essential public assets back to their pre-disaster state (Queensland Government, 2014c). In fact, many communities are reliant on post-disaster funding to maintain or repair roads and infrastructure that were already damaged prior to the disaster event (Anonymous, 2014b, pers.comm.). This lack of maintenance increases the cost of reconstruction. There are very limited funds for betterment. There may be funds for mitigation and betterment strategy development, but there are not sufficient funds for implementation (Irvine, 2014, pers.comm.). Therefore, instead of creating more robust, resilient infrastructure, governments are repeatedly spending on the same reconstruction project with each disaster event (McGowan& Tiernan, 2014).

“The current position on betterment is perverse and results in multi-dimensional policy failure and high on-going costs.” (RAI, 2014, p.3)

3. Focus on infrastructure as a means of mitigation- While there is limited funding for mitigation, there is an even greater lack of funding for mitigation projects other than infrastructure development. In fact, the Productivity Commission identified several other mitigation measures such as hazard mapping and awareness programs, emergency management plans, land-use planning, and taxes or subsidies to incentivize particular actions (Productivity Commission, 2014). The NDRRA is predominantly viewed as a way to fund reconstruction of roads and essential public assets, and because this is the main source of natural disaster management funding, if mitigation is funded at all, it is usually through these avenues. The concept of the “Thing Theory” proposes that

communities focus on building tangible “things” to show their commitment to recovery (RAI, 2014).

4. Not enough support for local business and economy- Community resilience is dependent on the resilience of the local economy (Queensland Government, n.d.). The main economic sectors in FNQ&TS are extremely vulnerable to disaster events and do not receive sufficient funding for either both recovery or mitigation efforts (Queensland Government, 2014). Government spending also tends not to benefit local businesses. Businesses and primary producers suffer from both the initial loss of cash flow as well as the costs of damages to their property (RAI 2014). Without proper support, the local economy will suffer, which will lead to reduced employment and population displacement (Anderson-Berry & King, 2005).

“The lack of funding for small business recovery reflects a lack of appreciation of the critical interdependencies between business recovery and community recovery, particularly in rural settings where the majority of businesses are owned and operated by local residents.” (RAI, 2013, p.6)

5. Lack of affordable insurance- High premiums discourage the uptake of private insurance by businesses and households, which leads to increased financial vulnerability in the face of a disaster event (Productivity Commission, 2014). Lack of mitigation efforts increase risk of damage and increase costs of recovery, which necessarily increase the price of insurance (CCRC, 2014). It was also noted that insurance companies do not make adequate use of available hazard data to set premiums (Alderton, 2014, pers.comm).

3.2.2. *Content Analysis Results-Common Concerns regarding the Productivity Commission’s Recommendations*

1. Lack of support for primary producers and businesses- The Productivity Commission recommended ceasing reimbursement by the federal government for assistance to businesses and primary producers by arguing that these groups should be responsible for their own risk management through planning and insurance (Productivity Commission, 2014). However, insurance is often unaffordable and many businesses and primary producers in FNQ&TS do not have access to adequate support for financial planning and risk management (LGAQ, 2014).
2. Cost-shifting to State government will put pressure on local governments and councils- The main concern noted in both conversations with regional stakeholders and submissions by regional groups was the proposed decrease in recovery funding through lower rates of reimbursement and increased triggers for eligible expenditure. The Queensland Government does not have the capacity to supply the additional 25% of reimbursement and local governments and councils in the region do not have the capacity to generate the amount of revenue to offset such a large decrease in funding (Queensland Government, 2014). Also, even if local governments receive increased funding for mitigation, the Commission recommended supplying the funds on a per-capita basis, which would put FNQ&TS at a disadvantage due to the sparse population (FNQROC, 2014).

“In a major event such as Cyclone Yasi, Cassowary Coast Regional Council may have to fund up to \$30 million. Its main income source is Council rates, which are limited by the

community's ability to pay. To suggest that Councils could fund this cost by increasing rates is unrealistic and unsustainable.” (CCRC, 2014, p.4)

“Effectively, the Commission is arguing that the burden should rest with those who live in these areas rather than sharing the burden across all who benefit from our economic contribution. A simple assessment on the average earnings of people living in regular at-risk areas shows those communities are below the National and State averages.” (FNQROC, 2014, p.3)

3. Impactical insurance solutions- The Commission’s report included multiple recommendations involving the uptake up private insurance to decrease vulnerability and lower the costs of reimbursement (Productivity Commission, 2014). However, this can only occur with the restructuring of the insurance system to lower premiums.

“Where insurers do not have an accurate picture of exposure prior to mitigation, there may be circumstances where an expected premium reduction does not occur because, for example, the insurer was using out of date information showing a lower risk for an individual property. Equally, there are occasions where mitigation has been implemented but insurers have not been able to access data about the reduced risk and therefore cannot reflect it in their premiums (or did not know about it at all).” (IAG, 2014, p.7)

4. Lack of recommendation to allow day-labor- Due to restrictions on reimbursement for day labor, local governments and councils are not able to use their own employees or equipment for reconstruction, which leads to unnecessary increases in cost of recovery. The commission acknowledged this problem but did not offer a solution in its recommendations (FNQROC, 2014).

“Massive amounts of aid money are funnelled into reconstruction projects following disasters, only to have that money go to companies outside the disaster area.” (RAI, 2013, p.10)

3.2.3. Content Analysis Results- Common vision and goals for disaster resilience

1. Local community engagement- Community members are the individuals directly impacted by disasters and have the best insight into the population’s needs (Pearce, 2003). Therefore, they should have a role in the process of building disaster resilience as well as in the development and implementation of mitigation strategies (Rowland, 2014). Effective communication and collaboration needs to exist between community members and members of local government and authorities.

“Local authorities which do not effectively engage with and involve the local community and community organisations not only risk their alienation from the process but also the loss of local knowledge, innovation, enthusiasm and the determination of those local groups.” (RAI, 2013, p.12)

2. Efficient collaboration and communication between governments, councils, organizations, and business- In order to have a resilient community, all sectors must be aware of their roles and responsibilities, communicate their needs and capacity, and collaborate to reach collectively formulated goals for both mitigation and recovery strategies (Queensland Government, 2013).
3. Community awareness of risks and mitigation options to reach “new normal”- In order to be resilient, community members must have a solid understanding of hazards risks as well as available options for mitigation actions that they can take at both individual and

societal levels (Alderton, 2014, pers.comm.). There must be a collective acknowledgement of the goal to achieve a higher level of functioning as a community, by using community knowledge and experience of disasters and risks to adapt socially, economically, and environmentally (Pollman & Uniyal, 2008).

4. Focus on planning to support local economy- Local businesses and primary producers need to be as prepared as possible for disasters so that they are able to minimize damage and re-open as quickly as possible following a disaster event (RAI, 2014). To achieve this, there needs to be sufficient advising, planning and financial support.
5. Heavy investment in mitigation and adaptation without reducing recovery funds- While there seems to be a consensus on the need to increase mitigation funding; this needs to occur without decreasing federal support for recovery (Save the Children, 2014). If mitigation is successful, it should lead to a substantial decrease in the cost of recovery over the long term, thereby eliminating the need for cuts in reimbursement rates.

“It is acknowledged the Commissions draft does recognise these difficulties and the fiscal imbalance, however, a reduction in funding will not necessarily ‘sharpen the incentives and investment in mitigation’; rather, we could potentially see the alternative solutions which in the short term seem financially viable, such as ‘temporary’ cheaper, ‘throw away’ or ‘modular’ assets which are expected to be damaged each year.” (FNQROC, 2014, p.5)

“Even if the Government decides to make linkages between mitigation expenditure and relief and recovery savings, such savings may take years to emerge and it would be disastrous for councils if relief and recovery expenditure was reduced prematurely without allowing time to realise any savings.” (ALGA, 2014, p.7)

3.2.4. Potential Strategies and Adaptations for Natural Disaster Mitigation

1. Economic

- Policies to support local business and creation of business continuity plans- One form of mitigation is thorough planning. Businesses need to have comprehensive, evidence-based continuity plans that take into account their type and level of their own risk and their community’s risk. These plans should also attempt to adapt business practices to reduce these risks, through methods such as crop selection or improved water management. This can be encouraged through support from existing consulting and resource management organizations and mitigation funding.

“Central to any community recovery is the recovery of local businesses. This is key to helping to overcome population displacement, restoring confidence within the community about the future, and ensuring resources available in the recovery phase have maximum local impact.” (RAI, 2014, p.18)

“Business recovery plays a significant role in encouraging people back to the area. In spite of the existence of infrastructure and housing, without confidence in the future of the local economy, recovery is highly unlikely.” (RAI, 2014, p.22)

- Economic Diversification- In order to decrease vulnerability, the economy needs to have multiple, viable sectors. In FNQ&TS, this can be achieved through the development of the agricultural and tourism sectors. For example, the Integrated Food and Agriculture

Development (IFED) project is proposing a privately funded, large-scale enterprise for irrigated cropping, grazing, and primary processing in the Northern Gulf subregion (NGRMG, 2014, p.40). However the planning and implementation of such projects much be integrated with natural disaster management planning to increase resilience.

- Affordable insurance- Households and businesses need to be able to purchase insurance to reduce their vulnerability. This could be used as incentive for individual and business level mitigation through reduced premiums for those households and businesses that are sufficiently prepared, rather than just basing *premiums on somewhat arbitrary zones*.

“Well the insurance companies could be fairer on individuals, I know that. The way they determine if you’re in a flood zone...There is not really a program, they just draw a line on the map and say well there you’re in a flood zone. The insurance companies need to utilize the flood studies and the data that have been gained over the last 5 or 6 years to decide on premiums instead of just willy-nilly blanketing a whole region as one scenario.” (Alderton, 2014, pers. comm.)

2. Human/Social

- Incentivize individual mitigation actions- Individuals and households do not only need to be properly resourced with risk information, educational opportunities, and access to planning advice, but they also need to have incentive to effectively and fully make use of these resources. This is the basis for the “bottom-up” aspect of mitigation and needs to be achieved through effective polices, funding, and insurance arrangements.

“There is so much complacency in the community to start with, no matter what is implemented at local and state level it is still up to the individual as well to implement their own resilience programs...but they tend not to do that too much. No matter how much work is done at state, federal, and local level, the most important level is the individual level and that is where we are falling down.” (Alderton, 2014, pers.comm.)

- Development and monitoring awareness, preparedness and vulnerability-A large part of mitigation is community education and awareness. Mitigation funding could be used to support strategies such as social research to inform community workshops and social action campaigns to address community-specific needs. The awareness, preparedness, and vulnerability of communities should be continually monitored and improved based on current risks and knowledge.
- Community continuity plans and policies prevent population displacement-Communities also need to establish comprehensive, evidence-based continuity plans, with collaboration between community members, local government, and regional councils in order to address community-specific circumstances and needs. This plan needs to have a large focus on prevention of population displacement in the event of a disaster, which can lead to a downward economic and social spiral. Engagement of community members, local businesses and organizations in the development of plans and policies is vital and will help establish community cohesion.
- Build humans services sector-Improved accessibility and coordination of human services will help increase community vitality, which will then decrease vulnerability through improved well-being and capacity to spend time and money on other mitigation actions.

3. *Environment (Natural and Built)*

- Hazard mapping/modeling and integrated, publically-available data- In order to properly reduce risk, present hazards need to be systematically understood and continually monitored in order to inform policies and decisions. This information must be publically available, understandable, shared between governments and institutions, and used for collaborative decision-making.
- Natural disaster management integrated into land-use planning, building regulations, and natural resource management-Natural disaster mitigation needs to become an integrated component of “business as usual” decision making. Hazard and risk data, as well as educated and experienced leaders, need to be accessible to inform plans and regulations.

“When disaster planning is not incorporated into land use planning it causes problems of recovery and resilience and, potentially in the future, of maladaptation to climate change.” (Byron et al., 2014, p.3)

- Resilient, robust infrastructure/ Betterment- While infrastructure should not be the sole focus of mitigation, it is still a vital aspect. Funding and resources needs to be available to reconstruct damaged assets to a higher, hazard-resistant quality and to identify *and* implement feasible projects based on community-specific risks and needs. Funding should also be allocated to the betterment/retrofitting of assets with environmental, cultural , and community value.

“Rather than continuing to replace like with like, communities should be provided with infrastructure that is more able to survive local weather conditions, therefore decreasing the likelihood of having to replace the same infrastructure following the next natural disaster.” (RAI, 2014, p.21)

- Multi-modal transport systems- Diversification of available transport systems and links will decrease vulnerability and increase the likelihood that mobility will be possible during and after a disaster event.

3.2.5. *Potential Governance Arrangements to Achieve this Agenda*

1. Broad trilateral agreement between federal, state and local government on strategies for mitigation and recovery- In order for any of the above mitigation strategies to be successful, there must be effective trilateral collaboration and agreement among federal, state and local governments. Local governments need to use their knowledge and experience from community engagement to communicate their needs to higher levels of government. State and Federal government must meet those needs through agreements on feasible resourcing and funding arrangements, so that local governments and regional councils can carry out their own natural disaster-management programs. Specifically, there must be collective agreement on increased funding for mitigation and planning on how to use those funds for a diverse range of strategies.
2. Policies to incentivize investment in mitigation including insurance sector reform- Trilateral collaboration must inform policy development to encourage state and local investment in mitigation. This could include increased, more flexible recovery funding for local governments that demonstrate active mitigation and preparation. There also needs to be insurance sector reform to incentivize households, businesses and local

governments to insure their assets. There need to be effective collaborations and partnerships between local governments, communities, and insurers so that all parties are aware of their roles and responsibilities, premiums accurately reflect risks, and levels of risk appetite are informed by estimated insurance costs.

“The potential insurance premiums generated by various levels of exposure should be part of the calculation of what is tolerable before new development takes place. This will help the community make an informed choice, understanding the trade-offs for living in particular areas.” (IAG, 2014, p.8)

3. Regionally agreed and accredited mitigation, response, and recovery plans as a framework for governance and decision making- Comprehensive, evidence-based mitigation, relief, and recovery plans need to be developed on a regional basis using experience and knowledge from local governments, businesses, organizations and community members. These plans should be accredited through a trilaterally agreed framework that ensures plans are holistic and consider long-term consequences.

“Allowing Councils’ autonomy to manage relief expenditure would enable Local Governments to prioritise the restoration of services on a regional basis. Councils will need to ensure that Asset Registers are accurate and that Asset Management Plans and Strategic Network Plans and strategies consider regional levels of service, natural hazards and resilience planning. However, further assistance to achieve this would be required from State and/or Federal Governments.” (CCRC, 2014, p.4)

“...the steps forward in basic information made by agencies such as Geoscience Australia and the Bureau of Meteorology have not yet been effectively integrated into policy frameworks. In the future, new capabilities that are emerging from ‘big data’ innovations are likely to make a reasonable top-down or aggregate evaluation of this issue available to decision makers.” (RAI, 2014, p.13)

4. Budgetary agreement and management- Funding for mitigation, relief, and recovery needs to be discussed and agreed upon through trilateral collaboration. There needs to be increased funding for mitigation that will allow implementation of regional accredited plans for a wide range of mitigation actions. However, adequate funds must still be provided for relief and recovery based on accurate assessment of local and state government’s needs and capacity to generate revenue. There must be continual monitoring, reporting, and adaptation of plans, policies, and funding arrangements to reflect current conditions and needs.

*“We argue that post-disaster support from the Australian Government needs to remain **and** mitigation needs to be immediately, significantly increased. With mitigation support now, Councils could plan more effective mitigation works as part of their asset renewal plans. Currently they need to plan based on the current level of support on offer, which is extremely competitive and significantly over-subscribed, leaving Councils to base their financial planning and subsequent works on their current capacity.” (FNQROC, 2014, p.6)*

“Given that the occurrence and severity of natural disasters cannot be directly regulated, an increase in the investment of Australian Government resources in well-targeted mitigation should be an important part of future policy and funding approaches. Such an approach is consistent with the current Australian Government’s roles and responsibilities for disaster management, as well as being firmly in the national interest.” (RAI, 2014, p.10)

3.2.6. *Implications for social resilience*

In order for FNQ&TS to become more socially resilient, it must also become resilient to natural disasters. The region's remoteness, vulnerable economic sectors, and low socioeconomic profile make it particularly susceptible to the effects of future disaster events. The Productivity Commission's inquiry on natural disaster funding arrangements presents an opportunity to develop a new policy agenda that can perhaps be piloted in FNQ&TS, due to its distinct challenges and capacity for a collaborative system of governance. While the shift in focus to mitigation and adaptation is necessary, this must occur through a trilateral agreement and commitment by all three levels of government, as well as effective engagement with local businesses, community members and relevant organizations. This policy agenda must address current inefficient and ambiguous guidelines and processes, lack of affordable insurance, and lack of funding and resources to implement mitigation projects. It is vital that the federal government invests heavily in a wide range of mitigation efforts, including social, economic, and environmental adaptations in addition to infrastructure betterment.

These adaptations will improve the first three attributes of social resilience: Economic Viability; Community Knowledge, Aspirations, and Capacity; and Community Vitality. Increased financial support and the development of business continuity plans will help local businesses and primary producers prepare for future natural disasters, increase their capacity for adaptive management, and decrease vulnerability of those sectors. Affordable insurance will help decrease the vulnerability of both businesses and individual households. Community Knowledge, Aspirations, and Capacity and Community Vitality with both benefit from the proposed human/social adaptations, by building community safety, access to human services, general wellbeing, and levels of community awareness. The proposed environmental adaptations will also benefit the first three attributes by decreasing the vulnerability of economic infrastructure, increasing the resilience and quality of transportation, improving access to services and hazard/risk information.

However, in order for this to occur, the primary focus must be on establishing a functional, collaborative trilateral governance system. There must be agreement and commitment across all three levels of government to create a systematic, evidence-based policy framework that will inform regionally-accredited mitigation, response, and recovery plans. This collaboration will help increase the rating of the Governance attribute though

increased connectivity, capacity for adaptive management and use of all available knowledge and data sets.

4. Conclusions

In order to improve social resilience in FNQ&TS, there must be ongoing monitoring and reporting on the region's Economic Viability, Community Knowledge, Aspirations, and Capacity, Community Vitality, and Governance. Changes in these attributes can occur over very short time frames. My research identified new evidence to update the social resilience profile for the Northern Gulf subregion.

Overall, there has been a slight decrease in the subregion's Economic Viability, due to increased vulnerability of the natural resource and energy base as well as of key economic infrastructure assets. Personal financial hardship and high levels of debt prevent long-term planning to ensure the sustainability of business, pastoral, and farming practices, and instead lead to myopic decision making for short-term economic survival. The current mainstay industries are pastoralism, mining and fishing, all of which are vulnerable to climate change and natural disasters. While economic diversification is possible through increased agriculture and tourism, those sectors are equally reliant on the quality of the natural environment and weather conditions.

There was also a slight decrease in the Northern Gulf's Community Aspirations, Knowledge, and Capacity due to evidence of low levels of awareness of climate change and vulnerability of resources. People may be aware of changes in climate and the importance of preserving land and water quality, but they do not have the financial capacity to adopt sustainable practices unless they have incentive through immediate economic benefit. This decrease was slightly balanced, however, by an increase in skill-building, business advice, and financial planning services.

Community Vitality is similar in condition to the most recent profile, with poor accessibility of services, transportation, and housing. I suggested a slight decrease in the rating for "Demographic stability" due to an ageing population, displacement due to financial hardship and natural disasters, and the low likelihood that young people who receive a higher education will return to the Northern Gulf.

The Governance in the subregion as experienced a slight improvement. There still needs to be improvement in the use of available research in management and decision-making at the government, business, and individual levels. However, connectivity among key

institutions and sectors is improving and is likely to continue on this trend due to strong partnerships between NGRMG and GSD as well as linkages to local governments and businesses.

Based on these collective suggestions, I have identified priority strategies and adaptations to improve the social resilience in the Northern Gulf. These include: increased educational and skill-building opportunities for businesses and community members; further research into potential sustainable farming and pastoral practices and application of those findings; adoption of the precautionary principle in the development of economic sectors; increased service accessibility; and governance arrangements that emphasize trilateral collaboration and community engagement. One priority strategy that emerged from my research, as well as from the current profiles for the other three subregions, was the need to improve natural disaster management.

The major concerns with the current arrangements, among national, regional, and local institutions and organizations, are: the inefficiency and ambiguous interpretations of guidelines and processes for funding; over-investment in recovery and lack of resources and funding for mitigation actions; lack of support for local businesses and producer;, and lack of affordable insurance. The Productivity Commission identified all these issues in its draft report, but I found several common concerns with the Commission's recommendations for new funding and management arrangements. These included: continued lack of support for the local economy; the inability of state and local governments to generate revenue to offset proposed cost-shifting; the lack of a solution to the restrictions on day-labor; and impractical insurance solutions. Based on the suggestions and needs expressed in submissions to the Commission, and on the interviews I conducted, the new natural disaster management and funding arrangements need to involve community engagement and awareness, continuity planning for businesses and households, support for the local economy, and funding and governance provisions that will create an opportunity to achieve these goals.

The potential strategies and adaptations that I identified to achieve natural disaster resilience include economic, social, and environmental solutions. These need to involve not only robust infrastructure and transportation, but also: economic diversification; affordable insurance; planning aid for businesses and producers; incentives for mitigation actions at individual, business, and community levels; increased awareness and preparation through workshops and accessible hazard and risk information; and land-use planning and resource management practices that integrate natural disaster management. In order for these solutions to be implemented effectively, there needs to be an efficient, collaborative, and streamlined

system of governance. This should include accredited regional plans based on individual community needs, which are accepted and supported through trilateral agreements and commitments to mitigation. These strategies and adaptations will necessarily improve both natural disaster resilience and social resilience of the Northern Gulf and the FNQ&TS region as a whole.

My suggestions for the Northern Gulf will be incorporated into its most recent profile. This document and my policy paper will be used in meetings between Professor Allan Dale, regional stakeholders, and representatives from decision-making institutions. The Northern Gulf Profile will be used initially in a meeting on November 28th to discuss how the social resilience in the subregion has evolved since their last meeting, and to continue to prioritise, develop and plan strategies to improve all four attributes. The policy paper will be used in negotiations with regional councils and Advance Cairns, a regional development organization, to discuss natural disaster funding arrangements and management. Research in both parts of my project can be further developed through the ongoing analysis of literature and reports that become available, as well as additional interviews with contacts from regional organizations, institutions, departments of government, and representatives from all economic sectors. Interviews and surveys of community members could also allow insight into individual perceptions of social resilience attributes in the region. It also would be interesting to study people's opinions on regional natural disaster preparedness and possible incentives for individual mitigation. Finally, I believe more research needs to be done to investigate the how sustainable practices and long-term planning can be incentivized in economically struggling communities and sectors, such as the pastoral industry in the Northern Gulf.

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Appendix I: Suggestions for Additions and Changes to Northern Gulf Profile

Attribute 1: Economic Viability

Attribute Component	Evidence	Conclusions	Suggested Change in Value and Logic
1.1 Diversity and quality of growth in economic activity.	<ul style="list-style-type: none"> • The importance of improving economic diversity and strengthening the economic base both emerged as key themes within the region’s local community plans (NGRMG 2014b, pp.24-30). • In communities where tourism is the main industry, the preservation of both the natural environment and cultural heritage is a main concern (NGRM 2014b, pp.24-30). • There is potential for a 20,000 to 30,000ha irrigation development in the Gilbert River catchment to support year-round cropping. A recent study found that with third-party investment on water storage and delivery and crops approaching full yield potential, commercial returns on irrigated agriculture were possible. There are >2 million ha of land suitable to irrigation, but there is only enough water to irrigate 4% of that land (Petheram et al., 2013). • Integrated Food and Energy Development (IFED) is proposing the Etheridge Integrated Agriculture Project (EIAP), which would be a privately funded, large-scale enterprise for irrigated cropping, grazing, and primary processing with a capital cost of \$1.8 billion and annual revenue of \$809 million (NGRMG 2014b, p.40). • A recent study used a computer model to examine scenarios of various supply and demand shifts as well as impacts of climate change on the development of irrigated agriculture in remote Northwest Queensland. No clear welfare gains were predicted from irrigation development (Wittwer & Banjeree, 2014). • The mining group Kagara Ltd, which mined in Chillagoe and Einasleigh, went into liquidation in January 2014 following its collapse in early 2012 after it reported a net loss of A\$48.9 million in the half year ending December 2011. More than \$100 million is still owed to over 800 creditors (Serenc, 2014). • In the Cape and Gulf region between 2012-13 and 2013-14, farm cash income decreased from \$84,800 to \$55,000 (ABARES, 2014, p.5). • Reduction in beef cattle numbers and stocks of grain and fodder in Queensland are expected to result in further decline in profit after a loss of \$4900 in 2012-13 and a loss of \$77,000 in 2013-14 (ABARES, 2014, p.5). • Production of beef in Queensland is projected to increase by 138% by 2050 (Nguyen et al., 2013, p.2). • The Port of Karumuba in Carpentaria Shire has advantages over East coast ports in that its shipping time to Asia is reduced significantly, shipping 	<ul style="list-style-type: none"> • There is a need for improvement of transport links, specifically through networks of sealed roads, in order to facilitate more efficient transport of people and goods (NDRMG 2014). • The economies of multiple communities in the region rely on the preservation of the natural environment to attract tourists. However, economic and growth and infrastructure development necessary to accommodate tourism pose serious environmental concerns. • If the irrigation infrastructure is sufficient, the agricultural sector has potential to grow to meet rising Asian market demand (NGRMG, 2014b, po.38-39). The diversification of agriculture to include cropping will also decrease the vulnerability of the sector and increase the need for labor (Petheram et al., 2013). • A large increase in beef production will put pressure on existing road infrastructure due to competition for use with other industries such as the minerals and energy sectors (ABARES, 2013). • Irrigation development in the Gilbert River catchment has the potential to create new opportunities for cropping, but this benefit must be weighed against potential threats to ecosystems, water security, and preservation of Indigenous cultural sites. Further research should investigate the long-term feasibility of the irrigation scheme with respect to depletion of natural resources. 	<p>No change in value</p> <p>2.5</p> <p>Pastoral, fishing, and mining sectors are still very vulnerable to climate change and require significant aid from management and planning groups. A slight decrease in resilience due to direct and indirect economic effects of the closure of Century Mine and further increase in farmer debt is balanced by potential for growth and diversification through tourism and development of infrastructure such as irrigation systems and Port Karumba.</p>

	<p>operations do not have to cross sensitive areas of the Reef, there are reduced trucking times for Queensland cattle, and it has untapped potential for imports. Gulf Savannah Development (GSD) is encouraging the development of the Port to increase trans-shipment and exports and meet the Asian market demand (GSD, 2014, p.3).</p> <ul style="list-style-type: none"> • The Aquis Great Barrier Reef Resort is a proposed 340.6 ha project in Yorkeys Knob that is projected to add \$52.5 billion in GRP gains for Far North Queensland from 2014-2030 and aims to help attract tourists to other areas in North Queensland, such as the Northern Gulf (Aquis, 2014, p.1). • A multi-species bio-economic and stochastic model examined the Australian Northern Prawn Fishery. The study found that the current strategies diversifying catch across subregions require a compromise between expected performance and risk. Also, increasing fleet size in current economic conditions will increase both expected economic performance and increase variability of performance (Gourguet, 2014). • Levels of farm debt are continuing to increase following cumulative effects of poor wet seasons, cyclones, bushfires, and residual effects of the live export ban (Anonymous, 2014, pers.comm.). • Some cattle farmers are opening their land for tourism and accommodation to profit their land in new ways (Cobavie, 2014, pers.comm.). 	<ul style="list-style-type: none"> • The viability of eco-tourism ventures should be explored in the Northern Gulf, due to their ability to simultaneously improve the economic viability and preserve areas with natural and cultural significance. • There is a movement toward greater economic diversification through proposed irrigation systems and renewable energy schemes as well as through opportunities for tourism and recreation. However, this development could be time-consuming, expensive, and vulnerable to climate change. • There are more pastoral support and education services working with primary producers in the Gulf to help with financial and business planning. 	
<p>1.2 Vulnerability of natural and energy resource base.</p>	<ul style="list-style-type: none"> • The cumulative impact of angling tourists threatens the sustainability of both recreational and commercial fishing industries (Greiner 2013 in NRGMG 2014). • Existing and abandoned mining sites pose a serious environmental threat due to vegetation clearing and waste disposal. Seepage of contaminated leachate is a major cause of water pollution both while mines are in operation and, if not properly rehabilitated, long after they are abandoned. The Northern Gulf region contains thousands of historical mines that still contribute to elevated levels of toxicants in runoff water (NRGMG, 2014b). • The wind development company Infigen has proposed a wind farm in Forsyth with an expected installed capacity of 70-80 MW. They received development consent in September 2012 (Advance Cairns 2014 in NRGMG 2014). • A recent assessment of the Northern Gulf and Cape York Peninsula gave the condition of the native vegetation a score of 79 out of 100 (NRGMG 2014). • More research is needed to investigate the impacts of water extraction for the EIAP on the \$250 million Gulf fishing industry. There is a strong correlation between streamflow and Gulf fishery catches (TWS, 2014, p.22). • Diverting water for irrigation from either the Flinders or Gilbert catchments, as proposed for the EIAP, could affect the water's current use for fishing, tourism, and recreation. Their trade-off has not been extensively modelled (TWS, 2014, p.22). 	<ul style="list-style-type: none"> • Although the native vegetation is in moderately good condition, significant conservation efforts are needed to prevent destructive processes such as grazing, mining, and weed invasion from causing a major decline in biodiversity (Morgan, 2001 in NGRMG, 2014b, p.75). • Food production is reliant on soil health. Due to the size and remoteness of the northern Gulf region, it is difficult to monitor soil condition. The use and improvement of remote-sensing technology is necessary to understand how the landscape is changing (NRGMG 2014, p57). • Rehabilitation of abandoned mines could create employment and improve water quality. • Current development schemes are focused on "sustainable" economic and population growth, but use the term to mean strategies and infrastructure that are 	<p>Decrease in value</p> <p>2.5</p> <p>Personal financial hardship, debt, and lack of funding for mitigation prevent long-term planning to decrease vulnerability of pastures and agricultural land. Development of renewable energy schemes may be impacted by cuts in federal funding. Transportation, cattle farming, fishing, and tourism all rely on land and water quality, which will be impacted by predicted climate change and cyclones.</p>

	<ul style="list-style-type: none"> • Droughts in the Gilbert River catchment are more common than in other agricultural areas, making farming development risky (TWS, 2014, p.22). • If the EIAP occurs, it could pose serious threats to vegetation communities and wetland that rely on the Gilbert River and create a high risk for blue-green algal blooms (TWS, 2014, p.23). • There are significant gas reserves in the Gulf, particularly in the Burketown area (GSD, 2014, p.4). • There are five renewable energy projects underway in the Gulf Savannah: the first stage of the Ergo Energy Doomadgee Solar farm, further development of the Normanton Solar Farm, Infigen’s Forsayth Wind Farm, a bio-energy plant as part of the proposed EIAP, and a proposed solar farm in Gregory township (Gulf Energy Group, 2013). 	<p>less damaging to the environment and not truly sustainable into the far future given the projected effects of climate change.</p> <ul style="list-style-type: none"> • There is potential to create localized, renewable sources of energy through solar and wind power plants. The subsequent energy security would create a solid foundation for development of sustainable infrastructure and industry. This could be jeopardized by cuts in federal funding. • Mining for natural gas could permanently damage potentially profitable land. • If the next wet seasons are good, profit production could increase in both the agricultural and fishing sectors, but if there are more below-average wet seasons, debt will continue to increase leaving the region very vulnerable. 	
<p>1.3 Inclusiveness and economic fairness/ equity.</p>	<ul style="list-style-type: none"> • The median total personal income in the Northern Gulf in 2011 was \$24,103, compared to a median of \$30,524 in Queensland as a whole. 47.4% of people are in the most disadvantaged quintile. The region of Kowanyama has a particularly low median income, with 67.8% of people earning less than \$20,800 per year and 100% of people in the most disadvantaged quintile (QLD Government, 2014a, p.33). • The median total family income in the Northern Gulf in 2011 was \$55,410, with 19.2% of families earning less than \$31,200 per year (QLD Government, 2014a, p.34). • Indigenous landowners across Australia can benefit economically from carbon-offset projects, such as growing diverse native flora as a method of carbon sequestration. A recent study, however, found that there are fewer benefits from planting on Indigenous lands in Australia’s northern regions due to low density of forests and low level of historical clearing. Some Indigenous communities in Northern Australia are reducing emissions through an early dry-season savannah burning scheme (Renwick, 2014). 	<ul style="list-style-type: none"> • Employment in the agricultural sector provides a low income and profits are susceptible to projected implications of climate change such as increased temperatures, intensity of high-rainfall events and wildfires, and longer dry seasons. • Improvement in the socio-economic status of communities is hindered by lack of available skills training, education, and local opportunities for higher-income employment. 	<p>No change in value</p> <p>2.5</p> <p>There are still high levels of debt, which continue to increase and will be further impacted by predicted below-average wet seasons. There is potential for increased income through development of tourism and cropping on current pastoral land.</p>

1.4 Workforce participation and employment.	<ul style="list-style-type: none"> The unemployment rate in the Northern Gulf at the end of the December quarter 2013 was 10.5% compared with 6.7% in 2011. The unemployment rate in Queensland decreased from 6.1% to 5.9% (QLD Government, 2014b, p.15). The top three industries of employment in the Northern Gulf in 2011 were agriculture, forestry and fishing (16.1%), public administration and safety (10.3%), and health care and social assistance (9.6%). The industries with the lowest percentage of employment were Information media and telecommunication (0.5%), financial and insurance services (0.8%), and rental, hiring, and real estate services (1.1%) (QLD Government, 2014b, p.16). Multiple groups are working towards developing business opportunities for indigenous people through the organization of art centres and tourism enterprises. MMG Century Zinc Mine in Carpentaria is set to end open-cut production in July 2015, leading to the loss of over 700 jobs, which will mainly affect local indigenous communities (Stephens, 2014) Due to the Native Title Act, Aboriginal people have been granted the land at Bidunggu and Karumba, but these communities may not be sustainable without continued support from Gulf Century Alliance (GCA) and the State Government and the need for services for the mine (Everingham, 2013). 	<ul style="list-style-type: none"> These unemployment rates are more accurate than those from the OESR because they specifically pertain to the Northern Gulf. Although communities have had ample time to prepare for the closure of Century Mine, the loss of the mine will still present significant challenges. 	<p>No change in value</p> <p>2.5</p> <p>The closure of Century mine will lead to significant job loss and impact other local industry. However, other employment opportunities will arise through development of tourism and agriculture in the region. However, the people employed in these industries will need guidance from external sources due lack of necessary knowledge and skills.</p>
1.5 Economic confidence.	<ul style="list-style-type: none"> Current energy investors are considering down-sizing or moving their operations due to the monopoly environment present in Queensland (GSD, 2014, p.4). There is a 70-80% chance that rainfall will be below the median for the region from November to January and a 65-80% chance that maximum temperatures will be above the median (BOM, 2014). 	<ul style="list-style-type: none"> Economic confidence depends heavily on weather conditions. If the next wet season is below average, confidence will continue to decrease with the increase in debt and financial hardship. 	<p>No change in value</p> <p>2.5</p> <p>Confidence remains low, but there is potential for increase with the development of agricultural and irrigation schemes. The confidence level can change dramatically with fluctuations in climate and extreme weather events.</p>
1.6 Vulnerability of Key Economic Infrastructure	<ul style="list-style-type: none"> Cattle grazing is the principle land use in the Northern Gulf region. Unsustainable grazing practices, in combination with climate change, have led to a loss of ground cover, resulting in soil erosion and degradation, weed invasion, threatening of native flora, and water quality reduction (NGRMG 2014b, p.59). 	<ul style="list-style-type: none"> NRM aims to retain sufficient ground cover on pastoral lands to prevent erosion. However, this does not converge with the economic goal of maintaining sufficient levels of animal production 	<p>Decrease in value</p> <p>2.5</p>

Assets.	<ul style="list-style-type: none"> • There is widespread gully erosion in alluvial areas, which is accelerated by reduced ground cover and erosion from cattle grazing and climate change. This poses threats to the pastoral industry due to loss of riparian land, existing infrastructure, future land development, downstream aquatic ecosystems, indigenous cultural use of the land and water bodied, and long-term sustainability of the land (NGRMG, 2014b, p.138). • The overall water quality is generally good, with the exception of localized areas. However, Cattle Creek and Two-Mile Creek are hotspots of significant water pollution, most likely due to irrigation and land clearing. The dissolved oxygen levels in Cattle Creek are barely sufficient to support fish life (NGRMG, 2014b, p.122). • The Gulf Development Road/Savannah Way has unsealed sections, which increases risk of accidents and discourages tourism in remote towns on the route. Approximately 110km of the Hann Highway, another important transport link, is also unsealed (GSD, 2014, p.4). 	<p>(NGRMG, 2014b, p.38).</p> <ul style="list-style-type: none"> • Longer dry seasons, continued warming of temperature, and increased intensity of high rainfall events due to climate change pose a serious threat to the agricultural and pastoral sectors. For example, water quality and availability will be compromised and flooding and wildfires will lead to significant reduction in soil and vegetation condition (NGRMG, 2014b). • Lack of funding and support for mitigation strategies leaves primary producers vulnerable because they do not have the financial means to invest in the future productivity of their land. 	<p>Not only are current economic assets such as pastures and fisheries vulnerable to climate change, but proposed infrastructure to improve economic growth and diversification, such as irrigation, transportation, and tourism, are also extremely vulnerable. Without proper planning and mitigation strategies, economic infrastructure will remain fragile.</p>
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2013 Resilience Rating

16

Maximum for this Attribute

30

Attribute Two: Community knowledge, aspirations and capacity.

Attribute Component	Evidence	Conclusions	Suggested Change in Value and Logic
2.1 Community awareness levels of climate change and natural resource sustainability.	<ul style="list-style-type: none"> In meetings conducted by the NGRMG, communities in the Northern Gulf highlighted the need for economic development while still ensuring community and environmental sustainability. (NGRMG, 2014b, p.24-30). A recent study consisting of 18 interviews and 91 surveys of beef producers in north-eastern Australia found that most people were motivated to learn new practices and skills to improve land condition and production by awareness of the unsustainability of current practices, financial hardship, and organized learning programs. They reported learning primarily through observation of peers and first-hand experience. Evidence of transformative learning that fostered sustainability was only observed in 5 interviewees (Lankester, 2013). The Compost Carpentaria Project initiated by NGRMG set up a compost system at Karumba Waste Transfer Station and aims to encourage local people to engage in gardening and organic food production (NGRMG, 2014a.). 	<ul style="list-style-type: none"> Due to levels of debt and personal financial hardship, primary producers have a strong incentive to make decisions for short-term economic gain rather than considering long-term sustainability. People often interpret current extreme weather events and climate change as normal variation previously experienced in the region. 	<p>Decrease in value</p> <p style="text-align: center; font-size: 2em;">3</p> <p>People are aware of the detrimental impact of extreme weather events and some communities place value in conservation and sustainability, but the incentive for financially struggling primary producers to adapt is purely for short-term survival. People will likely only adopt sustainable practices if they are immediately beneficial.</p>

2.2 Education/ knowledge levels and spread across the community.	<ul style="list-style-type: none"> • Between 2001 and 2011, the share of persons with a bachelor degree or higher in the Northern Gulf increased from 16.4% to 17.8%, but is still well below the Queensland average (QLD Government, 2014a, 23). • Of males age 25-44 in the Northern Gulf in 2011, 65.2% had a non-school qualification (e.g. bachelor degree, diploma). Only 55.4% of females age 25-44 had a non-school qualification. This discrepancy is significantly larger than that of Queensland as a whole (QLD Government, 2014a, p.24). • The fields of study with the largest share of non-school qualifications in the Northern Gulf in 2011 were Engineering and Related Technologies (16.0%), Management and Commerce (9.6%), and Society and Culture (7.3%). Only 4.6% of non-school qualifications were in Agriculture, Environmental, and Related Studies (QLD Government, 2014a, 25). • In 2012, the Northern Gulf Region has 2,229 students commencing or continuing with vocational education and training (QLD Government, 2014a, p.26). • Many children rely on Internet for distance education. Currently, 5GB of data at a speed of 1056kpbs is available for \$92/month compared to \$20/month at speeds of 2-3MBS in metro areas (GSD, 2014, p.4). 	<ul style="list-style-type: none"> • Few people in the Northern Gulf are receiving higher education in agriculture and environmental sciences necessary to increase the knowledge base necessary for sustainable communities. • The discrepancy in higher education between males and females in the Northern Gulf mirrors that of less developed societies. • After receiving a university degree, people who grew up in the Northern Gulf are unlikely to return to the region, so their parents' investment in their education does not benefit the community. • With the transition of baby boomers into retirement and children not returning to the region, there is a concern about succession and loss of knowledge and skill from the industry (Cobavie, 2014, pers.comm.). 	<p>No change in value</p> <p>2</p> <p>Education levels are still low and access to secondary and higher education is poor. Those who leave the region for university education usually do not return. There is opportunity for development of vocational programs and increase access to education through improved transportation.</p>
2.3 Skill levels and spread across the community.	<ul style="list-style-type: none"> • Of employed persons in the Northern Gulf in 2011, 17.4% were classified as managers, 16.9% as labourers, and 13.7% as technicians or trade workers. Only 13.2% classified as professionals compared to 18.9% in Queensland (QLD Government, 2014a, p.40). • Facilitators, including financial planners, consultants, and accountants, recently met with 35 cattle farmers in a workshop aimed to teach longer term planning and management skills (Cobavie, 2014, pers.comm.). 	<ul style="list-style-type: none"> • Opportunities for skill building and financial help need to be brought into the communities due to the large distance to major centers. Regional organizations and governments need to facilitate such workshops. • Connectivity and collaboration among Northern Gulf communities can help transfer new skills and knowledge to farmers and producers not able to attend workshops. 	<p>Increase in value</p> <p>2.5</p> <p>There are improved skill-building and financial planning services being brought into the Gulf. However, the value may decrease in the future due to attrition of current producers and succession issues, which will lead to loss of knowledge and skill, especially in the pastoral industry.</p>

2.4 Individual leadership and complex problem solving.	<ul style="list-style-type: none"> • There has been a reduction in investment in research and development including the Tropical Agriculture Research Hub, Wlkamin Research Station, and Kamerunga Horticulture Research Station. However, the Malanda Chamber of congress is intitating the Autralian Tropical Agricultural Precint to provide infrastructure for industry-driven approach to agricultural education and research (Johnson, 2014). 	<ul style="list-style-type: none"> • No additional conclusions 	No change in value
4		Capacity for adaption and problem solving remains high with help from regional organizations and external groups providing financial and business planning. Communities have learned to be innovative and determined from previous hardships.	
2.5 Community Cultural Integrity	<ul style="list-style-type: none"> • The closure of Century Mine will cause permanent change to the landscape and cultural sites and unemployment may lead to the loss of knowledgeable elders from the region (Everingham, 2013). 	<ul style="list-style-type: none"> • No additional conclusions 	No change in value
4		Indigenous culture remains present and strong in many communities. However, the cultural integrity of these communities is vulnerable to climate change due to effects on important cultural sites. The closure of Century Mine will also have significant effects on indigenous land and communities. Therefore, there is potential for a decrease in this value in the near future.	
2013 Resilience Rating			11.5
Maximum for this Attribute			20

Attribute Three: Community Vitality

Attribute Components	Evidence	Conclusions	Suggested Change in Value and Logic
3.1 Demographic stability.	<ul style="list-style-type: none"> The average annual growth rate in the Estimated Resident Population of the Northern Gulf Region was 1.2% between 2001 and 2013 and 1.1% between 2011 and 2013. The averages for Queensland were 2.2% and 2.0% respectively (QLD Government 2014b, p.4). Between 2001 and 2012, the share of persons age 65 and older in the Northern Gulf increased from 10.7% to 14.8%. The share of persons 0-14 has decreased from 22.5% to 19.9% (QLD Government, 2014b). From 2011 to 2036, the population of the Northern Gulf Region is expected to increase from 2,718 persons to 39,678 persons (QLD Government, 2014b, p.5). There are conflicting demographic data regarding age between those provided by OESR and those provided by the QLD Government. The QLD Government data is more recent and should replace the OESR data. Most of the population in the Northern Gulf is in the 45-64 (27.9%), 25-44 (26.1%), and 0-14 (19.9%) age groups (QLD Government, 2014a, p.5) In the Northern Gulf some 18.7% are Indigenous. The average for all of Queensland in 3.6% (QLD Government, 2014a, p.9). Between 2001 and 2011, the share of persons born overseas increased from 14.2% to 15.6% in the Northern Gulf (QLD Government, 2014a, p.13). The percentage of persons in the Northern Gulf who had a different address one year ago was 14.2% and five years ago 34.3% (QLD Government, 2014a, p.11). 	<ul style="list-style-type: none"> There are a greater proportion of both adults at working age and older people compared to the Queensland average. If the growth rate remains stable, the population of the Northern Gulf will double by 2071. There will need to be significant change in infrastructure and resource management to accommodate this population size. The ageing of the population is projected to continue to increase significantly, which has implications on economic growth and importance of income support and health and aged care services (ABS 2009). 	<p>Decrease in value</p> <p>3</p> <p>The region is experiencing ageing of the population and increase in debt and financial hardship may lead people to leave the region. Improved infrastructure, accommodation, and economic viability is needed to keep young people in the region and maintain a stable population.</p>
3.2 Wellbeing/ happiness within the general community.	<ul style="list-style-type: none"> Remote areas of Queensland comprised 3.1% of the total population, but accounted for 4.3% of the total suicide incidence from 2008-2011 (De Leo et al., 2013, p.41). From 2008 to 2010, the highest number of suicides by Aboriginal and Torres Islander people were in North and Far North Queensland (26.2%) (De Leo et al., 2013, p.75). 	<ul style="list-style-type: none"> Increasing debt, financial hardship and continued below average wet seasons will negatively impact community well-being. This can be countered by fostering strong community support systems. 	<p>No change in value</p> <p>3</p> <p>There is no evidence to suggest a</p>

change in well-being or happiness, but this is highly dependent on management of debt and the outcome of proposed economic diversification.

No change value

2

No change in value

2

Poor access to services is still an issue, especially in more remote areas. However, this will most likely improve with continued development of financial and business planning services and road improvements. More attention is needed on improved access to education and aged care facilities.

No change in value

2

3.3 General community health and disparities.

- No new evidence

- N/A

3.4 Community services, infrastructure, access, and disparities.

- Croyden and Etheridge Shires do not have any aged care facilities (QLD Government, 2014a, p30).
- Croyden, Etheridge, and Kowanyama Shires do not have fire stations (QLD Government, 2014a, p.30).
- In the Northern Gulf, 67.4% of the region was classified as “Outer Regional Australia” and 32.7% as either “Remote Australia” or “Very Remote Australia” (QLD Government, 2014a, p.32).

- Cost effective access to the internet is necessary for providing education, healthcare, access to business information, and ensuring safety in remote regions of the Northern Gulf (GSD, 2014, p.4).
- There is a need for further improvement of roads and transportation planning to mitigate potential effects of flooding and extreme weather events.

3.5 Housing, accommodation and accessibility.

- There were 362 dwelling sales in the Northern Gulf in 2013. The area with the highest median sale price was Mareeba LGA (\$335,000). The lowest was in Etheridge Shire (\$66,666) (QLD Government, 2014a, p.44).
- In 2013 there were 5 new houses sales and 93 vacant land sales (QLD Government, 2014a, p.44).
- In the 12-month period ending in March 2014 there were 120

- A large discrepancy exists in quantity and value housing between different areas of the Northern Gulf. Efforts to improve housing accessibility are needed in areas such as Croydon, Etheridge, and Kowanyama.
- If accessibility of housing does not

	<p>approvals for building new houses and total value of residential building approvals was \$36.2 million. Of these approvals, 92 (\$26.4 million value) were in Mareeba (QLD Government, 2014a, p.45).</p> <ul style="list-style-type: none"> • Of occupied private dwellings in the Northern Gulf in 2011, 58.5% were fully owned or being purchased and 29.4% were being rented (QLD Government, 2014a, p.18). 	<p>improve, this will hinder efforts to attract a year-round workforce and long-term residents.</p> <ul style="list-style-type: none"> • Home-ownership should be encouraged to create long-term communities with a strong sense of place. 	<p>There is a great disparity in housing among Gulf communities, with some communities facing a substantial lack of accommodation. This is a limiting factor for development of industry and tourism in these areas.</p>
<p>3.6 Community safety, risk and risk management.</p>	<ul style="list-style-type: none"> • After the dairy industry in Far North Queensland was devastated by Cyclone Larry in 2006, a local farmer coordinated the Dairy Recovery Team as a source of information and planning for local government, business, and producers. When Cyclone Yasi struck in 2011, farmers were well prepared and suffered minimal damage (Rural Industries, 2013). 	<ul style="list-style-type: none"> • No additional conclusions 	<p>No change in value</p> <p>2.5</p> <p>The main barriers to resilience are the lack of funding for mitigation and the lack of services in remote areas. Improvement in NDRRA funding policies has the potential to substantially affect community resilience.</p>
<p>2013 Resilience Rating</p>		<p>14</p>	
<p>Maximum for this Attribute</p>		<p>30</p>	

Attribute Four: Governance

Attribute Components	Evidence	Conclusions	Suggested Change in Value and Logic
4.1 Connectivity within and among key decision making institutions and sectors.	<ul style="list-style-type: none"> • Within the Gilbert River catchment, there is little vision or objective development on a local scale (Dale et al., 2014a, p.9). • The Northern Gulf Resource Management Group (NRGMG) is comprised of key stakeholders and works with graziers, aboriginal groups, and local governments (Dale et al., 2014a, p.9). • New CEOs were appointed in the Autumn 2014 for both NGRMG and GSD. They have committed to forming a “stronger and energetic working relationship, for the future of the Gulf” (NGRMG, 2014a). • The newly formed Alliance of Northern Gulf Indigenous Group (ANGIG) has signed an agreement with the NGRMG to deliver coordination, projects, support, and direction from Members of the ANGIC, such as access to training, education, and development planning (NGRMG, 2014a). 	<ul style="list-style-type: none"> • The NGRMG has the capacity to form links to research institutions, such as JCU. However, the culture of the research world is not suited to deliberate partnerships (Dale et al., 2014a, p.9). • The NGRMG is viewed by other institutions as capable and is collaborating with other institutions and government to put management actions in place. 	<p>Increase in value</p> <p>3.5</p> <p>Linkages between the NGRMG, GSD, financial planning services, local governments and other regional institutions are continuing to improve. People recognize the need to improve connectivity with research institutions.</p>
4.2 Adaptive management capacity of key decision making institutions and sectors.	<ul style="list-style-type: none"> • There is no systematic catchment-focused planning approach for the Gilbert River that recognizes the need to address threats beyond individual properties, explore the interaction between threats and management action, and protect/restore natural flora and fauna (Dale et al., 2014a, p.9). • State and Commonwealth environmental planning has been centrally driven from Brisbane and Canberra. There is a lack of small-scale vision across federal, state and regional interests (Dale et al., 2014a, p.9). • Even though the graziers who worked with the NGRMG to establish an Environmental Code of Practice contributed ideas and found that the experience was beneficial and improved communication, none of the graziers used the Code as a tool (Greiner, 2014). 	<ul style="list-style-type: none"> • Changes made to the 1994 Land Act, which introduced “rolling leases” and encourage conversion of leasehold to freehold land, may preclude opportunity for NRM bodies to work with leaseholders to monitor land condition and significantly reduce the State government’s role in land management (NGRMG, 2014b). • Institutions will have a greater capacity for change through direct contact with people and communities, rather than through federal and state policies. • Recent NGRMG plans suggest the inclusion of potential physical, social, and economic effects of climate change in planning and future management 	<p>No change in value</p> <p>2.5</p> <p>There is potential for improvement with new NRM planning and improved connectivity, but this will depend on the ability of institutions to successfully collaborate and implement these plans. Current government policies may limit this capacity.</p>

	<ul style="list-style-type: none"> • Gulf Savannah Development, a regional development organization, proposed that the environment be seen as an “Infrastructure Asset” and that areas of environmental significance should be considered via a “Development Assessment Process” rather than be preserved (GSD, 2014). • Queensland’s Wild Rivers legislation was repealed in June 2014. Planning decisions for development of the 13 rivers previously protected by the act will now be made by local government planning schemes and regional development approvals (Rebegetz, 2014). 	actions.	
4.3 Adaptive use and management of integrated knowledge sets.	<ul style="list-style-type: none"> • NRM in the Gilbert catchment has been informed by extensive research with major institutions, but there is no long-term regional agenda that integrates local and scientific knowledge (Dale et al., 2014a, p.9). • Improved spatial data management, manuals, extension of land management practices, and more recent monitoring of biodiversity and land condition inform regional programs (Dale et al., 2014a, p.9). • Research is used by stakeholders, but there is limited science capacity (Dale et al., 2014a, p.9). • North Queensland Irrigation Agricultural Strategy (NQIAS) knowledge is not well connected to the regional vision (Dale et al., 2014a, p.9). • There is a concern that scientific research that constrains or contradicts larger institutions political or economic agendas is avoided and disregarded. 	<ul style="list-style-type: none"> • There is still a significant disconnect between research institutions and primary producers in the region. Beneficial, applicable research exists but connectivity needs improvement. • Better communication is needed between farmers in debt, banks, and those in capital cities who make banking policies (Cobavie, 2014, per.comm.) 	<p>No change in value</p> <p>3</p> <p>Valuable research exists, but stronger communication of this research to people in the Gulf needs to improve. The quality and quantity of research could decrease due to funding cuts.</p>
2013 Resilience Rating			9.5
Maximum for this Attribute			15

Appendix II: Complete Policy Paper

1. Context: Why getting disaster response right is critical to FNQ&TS Region

1.1. Social resilience indicators in Far North Queensland

Far north Queensland and Torres Strait (FNQ&TS) is a region that is particularly vulnerable to the effects of climate change, including a predicted increase in intensity of tropical cyclones and floods (CSIRO 2011). This region, comprised of Gulf, Cape York, the Wet tropics, and Torres Strait, contains socioeconomically diverse communities, including many disadvantaged Indigenous communities. Previous research has primarily focused on biophysical approaches to climate adaptation, thus marginalizing socioeconomic approaches to creating socially resilient communities. Dale et al. (2011) created a framework of indicators to evaluate social resilience based on multiple lines of evidence in four clusters of key attributes: (1) Economic Viability, (2) Community Knowledge, Aspirations, and Capacity, (3) Community Vitality, (4) and Governance. Dale et al. (2013) used a framework to evaluate the four subregions of FNQ&TS and create comprehensive, integrated data sets that can be used by regional stakeholders and decision makers to identify priority adaptation measures and create the capacity for long term monitoring.

Based on the most recent social resilience profiles published by Dale et al. (2014c), a key priority for entire region is natural disaster management. The economy of this region is based primarily on agriculture, cattle grazing, fishing, mining, and tourism, all of which are vulnerable to climate change and disaster events. There are high levels of personal financial hardship, lack of affordable insurance, and below average income. The area is also sparsely populated, with remote, and often under-resourced, communities connected by vulnerable transport and other infrastructure links. While there are many long-term residents who have experienced multiple cyclone and flooding events, there is also a large transient population that may be insufficiently aware of and prepared for disaster risks. The combination of these factors leaves this region exceptionally vulnerable to the impact of future natural disasters. However, the region also has well-informed and connected local governments, councils, and management groups as well as links to regional research institutions (Dale et al., 2014c). Therefore, there is substantial capacity to improve the region's natural disaster management through reformed planning and funding arrangements and policy development to bring about social and economic adaptations, which would, in turn, improve upon the region's social resilience.

1.2. Current natural disaster arrangements: Productivity Commission's findings

In light of the Productivity Commission's recent inquiry into Australia's natural disaster funding arrangements, this paper will explore the current funding and policies and, using feedback from regional stakeholders, offer potential policy solutions and strategies with a focus on improved governance and socioeconomic adaptations. The funding for natural disaster mitigation is shared between Federal, State, and Local governments through the National Partnership Agreement on Natural Disaster Resilience (NPANDR). According to the Productivity Commission's report, in recent years, the Australian government mitigation spending was only 3% its expenditure on disaster response, which is funded through the Natural Disaster Relief and Recovery Arrangements (NDRRA) and the Australian Government Disaster Relief Payments (AGDRP). While the AGDRP provides one-off payments for "adversely affected" residents, the NDRRA is meant to allow the Federal Government to act as a "safety-net" for state and local governments by providing reimbursement (up to 75%) for state eligible expenditure over specified

thresholds. The key findings asserted by the Commission were the Australian Government's over-investment in recovery and reconstruction and lack of funding and incentive for mitigation and adaptation as well as overly prescriptive NDRRA requirements and inconsistent administration leading to inefficiency and inequity. Also, future natural disaster costs are treated as contingent liabilities in the Australian Government's budget, which de-incentivizes spending on mitigation and does not accurately communicate the level of risk (Productivity Commission, 2014).

1.3. Productivity Commission's Recommendations

Based on its findings, the Commission has recommended the implementation of a new policy and funding framework that will support and incentivize mitigation, increase accountability, and allow for greater state and local autonomy. They proposed a reduction in post disaster support, with a decrease of its cost sharing contribution from 75% to 50% and an increase in the triggers for Australian government assistance, as well as the option for states to purchase additional "top-up" insurance. They also suggest an increase in annual mitigation expenditure to \$200 million distributed per-capita, as well as improving information distribution, land use planning, asset management planning and working to reduce insurance premiums (Productivity Commission, 2014). While we agree with the shift to focus on mitigation and adaptation measures, the current strategies tend to focus almost entirely on road and other infrastructure construction and betterment rather than considering potential social, economic and environmental adaptations and planning. In fact, according to the Department of Local government, Community Recovery and Resilience, the only funding available in Queensland for mitigation efforts other than flood mitigation infrastructure consists of \$24 million in 2014-15 through the Natural Disaster Resilience Program (DLGCRR, 2014). With effective governance, trilateral government collaboration, and the inclusion of social, economic, and environmental adaptations in addition to infrastructure-based mitigation, FNQ&TS as the potential to pilot a new policy and funding agenda for natural disaster resilience. This agenda should aim to create communities that are aware and educated about their risks, take steps to mitigate the potential implications of those risks, and are able to not only restore and repair to a pre-disaster level, but also adapt to reach a higher level of functioning. Based on submissions to the Productivity Commission's report and conversations with regional FNQ&TS stakeholders, we have identified common concerns with the Commission's findings recommendations, key goals for disaster resilience in the region, and outlined emergent strategies and adaptations to reach these goals.

2. Methods

This paper was developed through the review of several documents of relevance to natural disaster management in Australia, including academic literature, information published on government websites, federal and state government reports, and federal and state plans and strategies to gain a sound understanding of the current disaster management and funding arrangements and relevant research findings. In addition to the report itself, submissions by organizations and regional councils to the Productivity Commission's draft report were also reviewed to determine the reactions, concerns, and suggestions of national, regional and local groups. This review was supplemented by conversations with regional stakeholders including representatives from regional councils and emergency and disaster management groups. This paper uses this collective knowledge to:

- Identify common reactions and concerns regarding the current funding arrangements and the Commission's recommendations in the context of FNQ&TS

- Identify common goals for natural disaster management and resilience in FNQ&TS
- Gather possible policy tools and strategies/adaptations for natural disaster mitigation
- Further develop and organize these emergent strategies to allow for continued discussion, expansion, and implementation by regional stakeholders and decision-makers

3. Reactions and Feedback from Regional Stakeholders

3.1. Concerns regarding current natural disaster funding arrangements

3.1.1. Inefficient processes, unclear guidelines and delays in approvals/funding- Due to the prescriptive, rigid requirements and approval process, it is a difficult process for regional councils and local governments to receive necessary funding in a timely manner (Productivity Commission 2014). Also, due to the timeline of the approval process, regions in FNQ&TS are forced to carry out reconstruction in the wet season, which increases overall cost (FNQROC, 2014). Due to lack of sufficient trilateral collaboration between federal, state, and local government, there are often gaps and duplications in policies and responsibilities, which can lead to unnecessary spending (FNQROC, 2012). Also, the lack of clear guidelines leads to inconsistent and unequal support for local governments, depending on who they seek support from (LGAQ, 2014).

“You know you have your federal process, your state process, and those two are tic-taking off each other... If local government has an issue and you go to QRA [Queensland Reconstruction Authority], it’s a federal government doing and if you go to the federal government, it’s a state government doing. It’s an interpretation that makes it bloody hard for local governments.” (Irvine, 2014, pers. comm.)

“The changeover of staff in local government is amazing. Might go through 3 or 4 CEOs in a year in some places. The CEOs are core figures in community disaster management. The lack of trained people in a community...” (Alderton, 2014, pers. comm.)

3.1.2. Lack of funding/incentives for mitigation; too much money pumped into recovery- The NDRRA is the main source of funding for natural disaster management funding, and it is designed to provide money for immediate relief and a two year recovery period (Australian Government, 2011). It encourages the reconstruction of infrastructure and essential public assets back to their pre-disaster state (Queensland Government, 2014c). In fact, many communities are reliant on post-disaster funding to maintain or repair roads and infrastructure that were already damaged prior to the disaster event (Anonymous, 2014b, pers.comm.). This lack of maintenance increases the cost of reconstruction. There are very limited funds for betterment. There may be funds for mitigation and betterment strategy development, but there are not sufficient funds for implementation (Irvine, 2014, pers.comm.). Therefore, instead of creating more robust, resilient infrastructure, governments are repeatedly spending on the same reconstruction project with each disaster event (McGowan& Tiernan, 2014).

“The current position on betterment is perverse and results in multi-dimensional policy failure and high on-going costs.” (RAI, 2014, p.3)

- 3.1.3. Focus on infrastructure as a means of mitigation- While there is limited funding for mitigation, there is an even greater lack of funding for mitigation projects other than infrastructure development. In fact, the Productivity Commission identified several other mitigation measures such as hazard mapping and awareness programs, emergency management plans, land-use planning, and taxes or subsidies to incentivize particular actions (Productivity Commission, 2014). The NDRRA is predominantly viewed as a way to fund reconstruction of roads and essential public assets, and because this is the main source of natural disaster management funding, if mitigation is funded at all, it is usually through these avenues. The concept of the “Thing Theory” proposes that communities focus on building tangible “things” to show their commitment to recovery (RAI, 2014).
- 3.1.4. Not enough support for local business and economy- Community resilience is dependent on the resilience of the local economy (Queensland Government, n.d.). The main economic sectors in FNQ&TS are extremely vulnerable to disaster events and do not receive sufficient funding for either both recovery or mitigation efforts (Queensland Government, 2014). Government spending also tends not to benefit local businesses. Businesses and primary producers suffer from both the initial loss of cash flow as well as the costs of damages to their property (RAI 2014). Without proper support, the local economy will suffer, which will lead to reduced employment and population displacement (Anderson-Berry & King, 2005).

“The lack of funding for small business recovery reflects a lack of appreciation of the critical interdependencies between business recovery and community recovery, particularly in rural settings where the majority of businesses are owned and operated by local residents.” (RAI, 2013, p.6)

- 3.1.5. Lack of affordable insurance- High premiums discourage the uptake of private insurance by businesses and households, which leads to increased financial vulnerability in the face of a disaster event (Productivity Commission, 2014). Lack of mitigation efforts increase risk of damage and increase costs of recovery, which necessarily increase the price of insurance (CCRC, 2014). It was also noted that insurance companies do not make adequate use of available hazard data to set premiums (Alderton, 2014, pers.comm).

3.2 Content Analysis Results-Common Concerns regarding the Productivity Commission’s Recommendations

- 3.2.1 Lack of support for primary producers and businesses- The Productivity Commission recommended ceasing reimbursement by the federal government for assistance to businesses and primary producers by arguing that these groups should be responsible for their own risk management through planning and insurance (Productivity Commission, 2014). However, insurance is often unaffordable and many businesses and primary producers in FNQ&TS do not have access to adequate support for financial planning and risk management (LGAQ, 2014).
- 3.2.2 Cost-shifting to State government will put pressure on local governments and councils- The main concern noted in both conversations with regional stakeholders and submissions by regional groups was the proposed decrease in recovery funding

through lower rates of reimbursement and increased triggers for eligible expenditure. The Queensland Government does not have the capacity to supply the additional 25% of reimbursement and local governments and councils in the region do not have the capacity to generate the amount of revenue to offset such a large decrease in funding (Queensland Government, 2014). Also, even if local governments receive increased funding for mitigation, the Commission recommended supplying the funds on a per-capita basis, which would put FNQ&TS at a disadvantage due to the sparse population (FNQROC, 2014).

“In a major event such as Cyclone Yasi, Cassowary Coast Regional Council may have to fund up to \$30 million. Its main income source is Council rates, which are limited by the community's ability to pay. To suggest that Councils could fund this cost by increasing rates is unrealistic and unsustainable.” (CCRC, 2014, p.4)

“Effectively, the Commission is arguing that the burden should rest with those who live in these areas rather than sharing the burden across all who benefit from our economic contribution. A simple assessment on the average earnings of people living in regular at-risk areas shows those communities are below the National and State averages.” (FNQROC, 2014, p.3)

- 3.2.3 Impractical insurance solutions- The Commission’s report included multiple recommendations involving the uptake up private insurance to decrease vulnerability and lower the costs of reimbursement (Productivity Commission, 2014). However, this can only occur with the restructuring of the insurance system to lower premiums.

“Where insurers do not have an accurate picture of exposure prior to mitigation, there may be circumstances where an expected premium reduction does not occur because, for example, the insurer was using out of date information showing a lower risk for an individual property. Equally, there are occasions where mitigation has been implemented but insurers have not been able to access data about the reduced risk and therefore cannot reflect it in their premiums (or did not know about it at all).” (IAG, 2014, p.7)

- 3.2.4 Lack of recommendation to allow day-labor- Due to restrictions on reimbursement for day labor, local governments and councils are not able to use their own employees or equipment for reconstruction, which leads to unnecessary increases in cost of recovery. The commission acknowledged this problem but did not offer a solution in its recommendations (FNQROC, 2014).

“Massive amounts of aid money are funnelled into reconstruction projects following disasters, only to have that money go to companies outside the disaster area.” (RAI, 2013, p.10)

3.3 Content Analysis Results- Common vision and goals for disaster resilience

- 3.3.1 Local community engagement- Community members are the individuals directly impacted by disasters and have the best insight into the population’s needs (Pearce, 2003). Therefore, they should have a role in the process of building disaster resilience as well as in the development and implementation of mitigation strategies (Rowland, 2014). Effective communication and collaboration needs to exist between community members and members of local government and authorities.

“Local authorities which do not effectively engage with and involve the local community and community organisations not only risk their alienation from the process but also the loss of local knowledge, innovation, enthusiasm and the determination of those local groups.” (RAI, 2013, p.12)

- 3.3.2 Efficient collaboration and communication between governments, councils, organizations, and business- In order to have a resilient community, all sectors must be aware of their roles and responsibilities, communicate their needs and capacity, and collaborate to reach collectively formulated goals for both mitigation and recovery strategies (Queensland Government, 2013).
- 3.3.3 Community awareness of risks and mitigation options to reach “new normal”- In order to be resilient, community members must have a solid understanding of hazards risks as well as available options for mitigation actions that they can take at both individual and societal levels (Alderton, 2014, pers.comm.). There must be a collective acknowledgement of the goal to achieve a higher level of functioning as a community, by using community knowledge and experience of disasters and risks to adapt socially, economically, and environmentally (Pollman & Uniyal, 2008).
- 3.3.4 Focus on planning to support local economy- Local businesses and primary producers need to be as prepared as possible for disasters so that they are able to minimize damage and re-open as quickly as possible following a disaster event (RAI, 2014). To achieve this, there needs to be sufficient advising, planning and financial support.
- 3.3.5 Heavy investment in mitigation and adaptation without reducing recovery funds- While there seems to be a consensus on the need to increase mitigation funding; this needs to occur without decreasing federal support for recovery (Save the Children, 2014). If mitigation is successful, it should lead to a substantial decrease in the cost of recovery over the long term, thereby eliminating the need for cuts in reimbursement rates.

“It is acknowledged the Commissions draft does recognise these difficulties and the fiscal imbalance, however, a reduction in funding will not necessarily ‘sharpen the incentives and investment in mitigation’; rather, we could potentially see the alternative solutions which in the short term seem financially viable, such as ‘temporary’ cheaper, ‘throw away’ or ‘modular’ assets which are expected to be damaged each year.” (FNQROC, 2014, p.5)

“Even if the Government decides to make linkages between mitigation expenditure and relief and recovery savings, such savings may take years to emerge and it would be disastrous for councils if relief and recovery expenditure was reduced prematurely without allowing time to realise any savings.” (ALGA, 2014, p.7)

3.4 Potential Strategies and Adaptations for Natural Disaster Mitigation

1. Economic

- Policies to support local business and creation of business continuity plans- One form of mitigation is thorough planning. Businesses need to have comprehensive, evidence-based continuity plans that take into account their type and level of their own risk and their community’s risk. These plans should also attempt to adapt business practices to reduce these risks, through methods such as crop selection or improved water management. This

can be encouraged through support from existing consulting and resource management organizations and mitigation funding.

“Central to any community recovery is the recovery of local businesses. This is key to helping to overcome population displacement, restoring confidence within the community about the future, and ensuring resources available in the recovery phase have maximum local impact.” (RAI, 2014, p.18)

“Business recovery plays a significant role in encouraging people back to the area. In spite of the existence of infrastructure and housing, without confidence in the future of the local economy, recovery is highly unlikely.” (RAI, 2014, p.22)

- Economic Diversification- In order to decrease vulnerability, the economy needs to have multiple, viable sectors. In FNQ&TS, this can be achieved through the development of the agricultural and tourism sectors. For example, the Integrated Food and Agriculture Development (IFED) project is proposing a privately funded, large-scale enterprise for irrigated cropping, grazing, and primary processing in the Northern Gulf subregion (NGRMG, 2014, p.40). However the planning and implementation of such projects much be integrated with natural disaster management planning to increase resilience.

- Affordable insurance- Households and businesses need to be able to purchase insurance to reduce their vulnerability. This could be used as incentive for individual and business level mitigation through reduced premiums for those households and businesses that are sufficiently prepared, rather than just basing *premiums on somewhat arbitrary zones*.

“Well the insurance companies could be fairer on individuals, I know that. The way they determine if you’re in a flood zone...There is not really a program, they just draw a line on the map and say well there you’re in a flood zone. The insurance companies need to utilize the flood studies and the data that have been gained over the last 5 or 6 years to decide on premiums instead of just willy-nilly blanketing a whole region as one scenario.” (Alderton, 2014, pers. comm.)

2. *Human/Social*

- Incentivize individual mitigation actions- Individuals and households do not only need to be properly resourced with risk information, educational opportunities, and access to planning advice, but they also need to have incentive to effectively and fully make use of these resources. This is the basis for the “bottom-up” aspect of mitigation and needs to be achieved through effective polices, funding, and insurance arrangements.

“There is so much complacency in the community to start with, no matter what is implemented at local and state level it is still up to the individual as well to implement their own resilience programs...but they tend not to do that too much. No matter how much work is done at state, federal, and local level, the most important level is the individual level and that is where we are falling down.” (Alderton, 2014, pers.comm.)

- Development and monitoring awareness, preparedness and vulnerability-A large part of mitigation is community education and awareness. Mitigation funding could be used to support strategies such as social research to inform community workshops and social action campaigns to address community-specific needs. The awareness, preparedness, and vulnerability of communities should be continually monitored and improved based on current risks and knowledge.

- Community continuity plans and policies prevent population displacement-Communities also need to establish comprehensive, evidence-based continuity plans, with collaboration between community members, local government, and regional councils in order to address community-specific circumstances and needs. This plan needs to have a large focus on prevention of population displacement in the event of a disaster, which can lead to a downward economic and social spiral. Engagement of community members, local businesses and organizations in the development of plans and policies is vital and will help establish community cohesion.
- Build humans services sector-Improved accessibility and coordination of human services will help increase community vitality, which will then decrease vulnerability through improved well-being and capacity to spend time and money on other mitigation actions.

3. *Environment (Natural and Built)*

- Hazard mapping/modeling and integrated, publically-available data- In order to properly reduce risk, present hazards need to be systematically understood and continually monitored in order to inform policies and decisions. This information must be publically available, understandable, shared between governments and institutions, and used for collaborative decision-making.
- Natural disaster management integrated into land-use planning, building regulations, and natural resource management-Natural disaster mitigation needs to become an integrated component of “business as usual” decision making. Hazard and risk data, as well as educated and experienced leaders, need to be accessible to inform plans and regulations.

“When disaster planning is not incorporated into land use planning it causes problems of recovery and resilience and, potentially in the future, of maladaptation to climate change.” (Byron et al., 2014, p.3)

- Resilient, robust infrastructure/ Betterment- While infrastructure should not be the sole focus of mitigation, it is still a vital aspect. Funding and resources needs to be available to reconstruct damaged assets to a higher, hazard-resistant quality and to identify *and* implement feasible projects based on community-specific risks and needs. Funding should also be allocated to the betterment/retrofitting of assets with environmental, cultural , and community value.
- *“Rather than continuing to replace like with like, communities should be provided with infrastructure that is more able to survive local weather conditions, therefore decreasing the likelihood of having to replace the same infrastructure following the next natural disaster.” (RAI, 2014, p.21)*
- Multi-modal transport systems- Diversification of available transport systems and links will decrease vulnerability and increase the likelihood that mobility will be possible during and after a disaster event.

3.5 *Potential Governance Arrangements to Achieve this Agenda*

- 3.5.1 Broad trilateral agreement between federal, state and local government on strategies for mitigation and recovery- In order for any of the above mitigation strategies to be successful, there must be effective trilateral collaboration and agreement among

federal, state and local governments. Local governments need to use their knowledge and experience from community engagement to communicate their needs to higher levels of government. State and Federal government must meet those needs through agreements on feasible resourcing and funding arrangements, so that local governments and regional councils can carry out their own natural disaster-management programs. Specifically, there must be collective agreement on increased funding for mitigation and planning on how to use those funds for a diverse range of strategies.

- 3.5.2 Policies to incentivize investment in mitigation including insurance sector reform- Trilateral collaboration must inform policy development to encourage state and local investment in mitigation. This could include increased, more flexible recovery funding for local governments that demonstrate active mitigation and preparation. There also needs to be insurance sector reform to incentivize households, businesses and local governments to insure their assets. There need to be effective collaborations and partnerships between local governments, communities, and insurers so that all parties are aware of their roles and responsibilities, premiums accurately reflect risks, and levels of risk appetite are informed by estimated insurance costs.

“The potential insurance premiums generated by various levels of exposure should be part of the calculation of what is tolerable before new development takes place. This will help the community make an informed choice, understanding the trade-offs for living in particular areas.” (IAG, 2014, p.8)

- 3.5.3 Regionally agreed and accredited mitigation, response, and recovery plans as a framework for governance and decision making- Comprehensive, evidence-based mitigation, relief, and recovery plans need to be developed on a regional basis using experience and knowledge from local governments, businesses, organizations and community members. These plans should be accredited through a trilaterally agreed framework that ensures plans are holistic and consider long-term consequences.

“Allowing Councils’ autonomy to manage relief expenditure would enable Local Governments to prioritise the restoration of services on a regional basis. Councils will need to ensure that Asset Registers are accurate and that Asset Management Plans and Strategic Network Plans and strategies consider regional levels of service, natural hazards and resilience planning. However, further assistance to achieve this would be required from State and/or Federal Governments.” (CCRC, 2014, p.4)

“...the steps forward in basic information made by agencies such as Geoscience Australia and the Bureau of Meteorology have not yet been effectively integrated into policy frameworks. In the future, new capabilities that are emerging from ‘big data’ innovations are likely to make a reasonable top-down or aggregate evaluation of this issue available to decision makers.” (RAI, 2014, p.13)

- 3.5.4 Budgetary agreement and management- Funding for mitigation, relief, and recovery needs to be discussed and agreed upon through trilateral collaboration. There needs to be increased funding for mitigation that will allow implementation of regional accredited plans for a wide range of mitigation actions. However, adequate funds must still be provided for relief and recovery based on accurate assessment of local and state government’s needs and capacity to generate revenue. There must be continual monitoring, reporting, and adaptation of plans, policies, and funding arrangements to reflect current conditions and needs.

*“We argue that post-disaster support from the Australian Government needs to remain **and** mitigation needs to be immediately, significantly increased. With mitigation support now, Councils could plan more effective mitigation works as part of their asset renewal plans. Currently they need to plan based on the current level of support on offer, which is extremely competitive and significantly over-subscribed, leaving Councils to base their financial planning and subsequent works on their current capacity.” (FNQROC, 2014, p.6)*

“Given that the occurrence and severity of natural disasters cannot be directly regulated, an increase in the investment of Australian Government resources in well-targeted mitigation should be an important part of future policy and funding approaches. Such an approach is consistent with the current Australian Government’s roles and responsibilities for disaster management, as well as being firmly in the national interest.” (RAI, 2014, p.10)

3 Conclusions

In order for FNQ&TS to become more socially resilient, it must also become resilient to natural disasters. The region’s remoteness, vulnerable economic sectors, and low socioeconomic profile make it particularly susceptible to the effects of future disaster events. The Productivity Commission’s inquiry on natural disaster funding arrangements present an opportunity to develop a new policy agenda that can perhaps be piloted in FNQ&TS, due to its distinct challenges and capacity for a collaborative system of governance. While we support the shift in focus to mitigation and adaptation, this must through a trilateral agreement and commitment by all three levels of government as well as effective engagement with local businesses, community members and relevant organizations. This policy agenda must address current inefficient and ambiguous guidelines and processes, lack of affordable insurance, and lack of funding and resources to implement mitigation projects. However, state and local governments have expressed that they do not have the capacity to afford the proposed cost shifting to a 50% federal reimbursement rate for recovery funds or a per-capita mitigation funding arrangement. It is vital that the federal government invests heavily in a wide range of mitigation efforts, including social, economic, and environmental adaptations in addition to infrastructure betterment. However, in order to this to occur, the primary focus must be on establishing a functional, collaborative trilateral governance system. There must be agreement and commitment across all three levels of government to create a systematic, evidence-based policy framework that will inform regionally accredited mitigation, response, and recovery plans funded through a budgetary arrangement that will provision necessary funds for mitigation without removing the federal government response and recovery safety net.