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Evaluating Resilience in Two Remote Australian Communities

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Abstract

Although the occurrence of extreme events generally cannot be prevented, their negative effects can be lessened by various risk reductions actions and by improving the capacity of communities and individuals to cope. Improving the resilience of both individuals and communities reduces the effects of hazards allowing a faster recovery and return to normal and is increasingly becoming a goal of communities, organisations and governments throughout the world.

Improving resilience is complicated and often requires numerous interrelated actions that vary depending specific circumstances of the people, community and location. To meaningfully determine, co-ordinate, plan and prioritise the most effective measures of improving resilience, a baseline assessment of the community's strengths and weaknesses is required.

This paper contributes by examining the status of community resilience in two remote towns within the Northern Territory of Australia. A qualitative narrative assesses community resilience for small remote locations and discusses relevant issues alongside the scoring achieved using a common scoring methodology. It further provides insights and an examination of the methods of assessment and appropriateness of assessment methodology.

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1. Introduction

Society has always been susceptible to extreme events. While the occurrence of these events generally cannot be prevented; the risks can often be minimised and the impacts on affected populations and property reduced. For

people and communities, the capacity to cope with, adapt to, learn from, and where needed transform behaviour and social structures in response to an event and its aftermath all reduce the impact of the disaster [15]. These capacities can broadly be considered resilience. Improving resilience at various scales and thereby increasing the capacity to cope with and reduce the effects of natural hazards has increasingly become a key goal of governments, organisations and communities within Australia and internationally.

In 2010, the Council of Australian Governments (COAG) adopted resilience as one of the key guiding principles for making the nation safer. The National Strategy for Disaster Resilience [3] outlines how communities and the various levels of government should aim to improve social and community resilience with the view that resilient communities are in a much better position to withstand adversity and to recover more quickly from extreme events. The Sendai Framework for Disaster Risk Reduction [22] also uses resilience as a key concept and similarly calls for a people centred, multi-hazard, multi-sectoral approach to disaster risk reduction. Although there is an obvious range of benefits from a resilience approach, there becomes a distinct need to be able to assess and monitor a community's ability to prevent, prepare, respond to and recover from disasters.

In recognition of the need to be able assess resilience, a number tools have been developed [20, 7, 1, 6, 18, 13]. Approaches and scales vary from a top-down assessment method of community resilience across a whole country [8] through to participatory local level workshops [1]. In general, top-down assessments over a large area such as a nation, state or city provide a standardised measure for comparison between areas and communities with the greater assessment extent. Theoretically this provides a knowledge base and justifiable system for decision-making in regard to planning and resource allocation by organisations such as state-based emergency services, state and federal governments. Additionally these approaches have the capacity to consider resilience factors that occur at larger scales such as the spatial dependencies between places, communities and regions [7,25].

Alternatively, community-based assessments generally use a workshop approach with key community leaders and stakeholders. Often relying on subjective local knowledge makes comparison between communities difficult, they however they have an increased capacity for analysing and assessing and incorporating greater levels of local knowledge, cultural practices and divergent interests or values within a community [9]. By emphasising the role of local communities, this process can increase community engagement, risk awareness and resilience-thinking as well as help provide more informed local level decision-making. It is primarily their capacity for facilitating local social learning and change that community-based approaches have been widely promoted [21].

However, with no clear consensus on the factors of resilience or even its definition, each method considers the factors that determine resilience differently [2,13]. Frazier et al [25] discuss that most methods neglect various spatial and temporal factors as well as spatial autocorrelation issues which, when combined with the numerous differences between methods, highlight that there has been very limited actual evaluation of these tools in regards to coping with and recovering from disasters [21].

This paper assesses the status of community resilience in two remote towns within the Northern Territory of Australia using a community based assessment. A qualitative narrative examines community resilience in the study areas and discusses these issues alongside the scoring achieved. nd an examination of the methods of assessment and appropriateness of assessment methodology.

1.2 The Community Disaster Resilience Scorecard

The Community Disaster Resilience Scorecard was developed by the Torrens Resilience Institute [1,2] as a tool to identify and assess community resilience to disasters and extreme events. The underlying philosophy is that resilience is a process and the completion of the scorecard assessment provides a framework for the planning and development of ongoing and futures actions. The suggested methodology is to use a workshop approach with key community members to assess and discuss various resilience factors leading to a framework for future action.

The Scorecard has four main sections or components which consider the connections within the community, the level of risk and vulnerability, emergency procedures and the availability of community resources. Each section contains four to seven questions that are either answered via self-assessment or from information sources such as Australian census data. A scoring system for each question uses a points ranging from a low of one through to a maximum of five. Each question's points are then combined cumulatively to produce a score for the section. A rating is then allocated by converting this score to a percentage of the possible maximum for the section as follows;

- less than 25 per cent - Red Zone – indicates a significant issue or weakness to be addressed as a priority
- 26-75 per cent - Caution Zone (yellow) – represents that some aspects need monitoring or strengthening
- less than 75 per cent - Green zone – identifies that a community has strength within this area of resilience.

The sum of the sectional scores is then used to provide a single overall rating for the community's state of disaster resilience with descriptions ranging from 'likely to suffer greatly in a disaster or have great difficulty recovering' through to 'extremely resilient' [1,2].

The Resilience Scorecard was piloted in four Australian communities [1] and was subsequently used to examine resilience in coastal south-east Queensland [21] and rural Victoria [14]. This paper expands this sample by providing an assessment of two largely indigenous remote communities in the Northern Territory of Australia and examines the Scorecard's viability to assess resilience in these areas.

1.3 Study areas

The Ngukurr community is located on the Roper river approximately 300km south-east of Katherine and 70km inland from the Gulf of Carpentaria in the Northern Territory. The area has a population of 1056 people [4] who are predominately indigenous and collectively refer to themselves as Yugul Mangi people. The area has a rich history with evidence of habitation by Aboriginal groups for more than 40,000 years and there are currently seven traditional language groups within the region in addition to English and Kriol [5].

Gunbalanya, which is historically referred to as Oenpelli, is an Aboriginal community in west Arnhem Land and is located approximately 300 km east of Darwin. Gunbalanya has similar size and dynamic to Ngukurr with a population of approximately 1200 and numerous spoken languages. Both communities are considered significant towns within their area and feature a school, health services, convenience store, supermarket, police station, sports club and arts centre.

During the yearly November to April wet season, both local river systems swell beyond capacity and causes each town and the surrounding areas to become isolated for up to 2-3 months at a time. Accessibility during these periods is restricted to limited barge services and the chartered light aircraft.

Both communities are subject to the *Northern Territory All Hazards Emergency Management Arrangements* [16] under which the responsibility for disaster preparedness, response and recovery planning is conducted by a Local Counter Disaster Planning Committee. A key task of the committee is to develop and maintain a Local Counter Disaster Plan that is approved by the Northern Territory Counter Disaster Council. The plans provide an assessment of the threats most likely to affect the community as well as the roles and responsibilities of agencies, stakeholders, key personnel as well as response and recovery procedures [16].

1.4 Scoring Method

The scorecard system uses a number of information sources including self-assessment, census data from the Australian Bureau of Statistics [4], as well as local and state government planning documents. The process described as the optimal by the designers of the method involves meeting with a representative working group of between 10 and 15 people, three times over a four to six week period [1]. This method was not achievable in this instance due to the remoteness of the towns and availability of staff and community members.

Instead, as part of a separate research project focusing on resilience issues in indigenous communities, 14 residents of each town, including elders, attended a three-day resilience workshop in the Ngukurr area in June 2015. A number of these people have been engaged as either local researchers or as participants in various resilience projects that included interviewing residents about resilience issues [19]. With this strong understanding of disaster resilience issues within in their communities, a resilience assessment for the two communities was undertaken. The self-assessment questions were answered by participants with direct questioning or through discussion of various resilience issues. Scoring of questions based on external data occurred after the workshop although most of the issues had been discussed with participants.

2. Scoring of Community Resilience

Table 1: Scoring of Resilience for Gunbalanya and Ngukurr

Question / Indicator	Gunbalanya Score (1 Low - 5 High)	Ngukurr
Section 1. How connected are the members of your community?		
1.1 What proportion of your population is engaged with organisations?	1	1
1.2 Do community members have access to a range of communication systems that allow information to flow during an emergency?	2	2
1.3 What is the level of communication between the local governing body and the population?	1	1
1.4 What is the relationship of your community with the larger region?	2	2
1.5 What is the degree of connectedness across community groups?	2	2
Section 1 Score/Rating	8 (Red)	8 (Red)
Section 2. What is the level of risk and vulnerability in your community?		
2.1 What are the known risks of identified hazards in your community?	3	3
2.2 What are the trends in relative size of the resident population and the daily population?	5	5
2.3 What is the rate of the population change in the last 5 years?	4	3
2.4 What proportion of the population has the capacity to independently move to safety?	2	2
2.5 What proportion of the resident population prefers communication in a language other than English?	1	1
2.6 Has the transient population been included in planning?	1	1
2.7 What is the risk that your community could be isolated?	1	1
Section 2 Score/Rating	17 (Caution)	16 (Caution)
Section 3. What procedures support community disaster planning, response & recovery?		
3.1 To what extent and level are households within the community engaged in planning for disaster response and recovery?	1	1
3.2 Are there planned activities to reach the entire community about all-hazards resilience?	1	1
3.3 Does the community actually meet requirements for disaster readiness?	1	1
3.4 Do post-disaster event assessments change expectations or plans?	1	1
Section 3 Score/Rating	4 (Red)	4 (Red)
Section 4. What emergency planning, response and recovery resources are available in your community?		
4.1 How comprehensive is the local infrastructure emergency protection plan?	3	3
4.2 What proportion of population with useful skills emergency response/recovery can be mobilised?	1	1
4.3 To what extent are all educational institutions engaged in emergency preparedness education?	1	1
4.4 How are available medical and public health services included in emergency planning?	3	3
4.5 Are readily accessible locations available as evacuation or recovery centres and included in resilience strategy?	2	2
4.6 What is the level of food/water/fuel readily availability in the community?	2	2
Section 4 Score/Rating	12 (Caution)	12 (Caution)
TOTAL	41 (Caution)	40 (Caution)

Section 1: How connected are the members of your community?

The importance of both formal and informal communication networks was widely recognized as was the role of community connectedness in enhancing disaster resilience. As found by Singh-Peterson [21] there were a number of alignment issues between the information received, how that was represented by the actual indicators and by the scoring system. For example question 1.1 uses information from the Census as an indicator for connectedness focusing on membership and number of community of clubs, service groups, sporting teams etc. Both towns scored 1 (under 20%) in this instance. However in a small isolated town a low response would be expected as the opportunities and capacity to maintain a variety of groups and organizations is relatively small. In some cases such as with local sporting teams, membership may be low but the organization very well supported by the community.

In small isolated communities where ‘everyone knows everyone’ extensive social interactions often occur in more commonplace settings such when shopping in the town’s one store. Similarly connections occur on numerous levels and in different arenas including for ceremony, religion, sport, art and cultural festivals, many of which would not be recognized within the Census. Although there is wide agreement that familial connections are weakening, especially among young people, indigenous culture still has strong kinship connections with extended families in regular contact and often living together and participants felt the connections were strong at a local level.

There are a number of communication systems for both communities with digital television and regional radio stations. In addition to land line telephones both areas are serviced by the Telstra mobile phone network although there is no coverage by other providers. While there are suitable systems in place, participants specifically discussed the lack of communication and location specific information, including local weather warnings in the lead up to and during past extreme events. In part this would be due to the small size of both towns in isolated environments that would limit the amount of interest from mainstream media and the availability of location specific information.

The scoring for governance uses a measure based on the International Association for Public Participation Spectrum [12] that ranges from ‘passive’ to ‘active participation’. The issue of governance was very strongly discussed and participants clearly felt that their role was extremely passive including in emergency management procedures where support was delivered in a non-consultative, fly-in-fly-out manner. Similar to findings by Gray [10] and Veland et al [23], it was felt that this method often did not respect cultural protocols and local knowledge.

Government agencies and organisations such as medical centres are part of, or have networks locally and within the region. In the past, ties of kinship and ceremony built strong relationships over a larger area but, due to a range of factors, these networks are not as strong as they were. For many people the isolation due to flooding, lack of transport and distance reduces their capacity to be regularly involved in a larger regional setting. Locally there is some advertising, primarily on community noticeboards, of various activities and events within the area.

Overall, both towns scored 8 out of a possible 25 for this section which rates as ‘red’. While it is felt that this reflects the connectedness of the community in a broader context of information flows and government interaction, it does not reflect the connectedness between residents at the local scale.

Section 2: What is the level of risk and vulnerability in your community?

Overall, this section attracted a ‘caution’ rating with scores ranging across from the lowest to the highest for various indicators. Local risks are well known and there was considerable discussion of cyclones as well as fire and smoke (predominately from fire management and burning). On the scorecard, the recognition of multiple risks would generate a higher score but existing emergency mapping only covers flooding and hence a score of 3. In this instance however further extent and risk mapping would have limited utility due to the spatial scale of likely events such as cyclones.

While it is a valid question and a significant factor of resilience for larger areas, the difference between daily and resident populations in a small town is often negligible and both towns scored the maximum level of 5. Conversely both towns scored 1 for the incorporation of transient populations in planning but as the number of people within this category in both towns is negligible this was not seen as problematic.

Census data was used to determine the capacity of residents to independently move to safety (see Question 2.4). Only 2.5 per cent of the population of each town indicated they required assistance for core activities (self care,

body movements or communication). However, in terms of evacuating out of town the ‘number of motor vehicles per dwelling’ indicates that 50 per cent of homes in Ngukurr and 55 per cent in Gunbalanya do not have a motor vehicle [4]. The ‘number of persons usually resident’ figure shows that for Ngukurr 74 of 121 (60 per cent) and in Gunbalanya 83 of 150 (55 per cent) of homes have six or more people. Subtracting the number of people in smaller households from the overall population shows an average of around 12 people per house for larger households (confirmed by participants). While a precise figure is not calculated, a proportion of households without a vehicle would coincide with these large households. Therefore, the capacity to self-evacuate by vehicle would be considerably less than half the residents of each town. Further, both towns are isolated by road for months each year and evacuation may only be possible by light aircraft, which can also be problematic due to cultural considerations [23]. While relatively few people require core assistance, the reduced capacity to evacuate from each town derives a score of 1. Similarly, the same score was allocated to question 2.7 which considers the possibility of isolation with scoring based on a range of planning levels and access to transport.

For many people in predominately indigenous communities English is only one of many languages spoken. This was reflected in question 2.5 where, according to the ABS [4], around 90% of residents do not normally speak English at home. The scorecard considers anything more than 35% to be a rating of 1, however communication levels are still high between residents and the level of English is still good, particularly within the context of emergency management but there is a possible disjunction between the majority of residents and any English-only speaking authorities.

Finally, question 2.3 examines population change and in this instance Gunbalanya scored 4 (6-12%) as opposed to Ngukurr’s score of 3 (13-19%). This would give Gunbalanya a section score of 17 rather than Ngukurr’s 16 but does not however affect the rating for the section where both towns were just within the range of ‘caution’ (14-28).

Section 3: What procedures support community disaster planning, response and recovery?

This section highlighted numerous issues with each community scoring the lowest possible for each question and subsequently the lowest possible score 4 for the section. Planning for emergency situations at a household level was understandably felt to be very limited due to other more urgent priorities such as food availability, housing, social and family concerns. While there is a Local Counter Disaster Management Plan, few participants had seen it. It was mentioned that in both towns the plan was held in the local police station and that even if residents knew of it and were inclined to read it, many would not be comfortable doing so with where it was located.

Many participants did not know that the local school was a designated public shelter. Others discussed that local cultural protocols, norms and practices affect how these facilities are used and expressed concerns that in the past these considerations had not been accounted for. This was also noted during Cyclone Monica by Veland, Howett & Dominey-Howes [23]. During past events many people had evacuated to relatives housed and it was discussed that some buildings including houses had a yellow marking indicating that they were cyclone proof. It was also mentioned however that other buildings that residents thought were cyclone proof were not marked.

The assessment of whether the community actually meets requirements for disaster readiness provides a number of descriptive options for scoring. Although there are a number of plans, procedures and structures in place, for residents this would be classed as an unknown level of awareness by community members and hence score 1. Similarly post-event assessments from past events and emergency situations had not included the local population and therefore not affected expectations of the community.

There was a discrepancy between the responses of workshop participants and that of a household survey [19] where the survey responses showed a noticeably higher level of knowledge of current planning and shelter options. This may be due to workshop participant selection or despite measures to ensure that cultural considerations were accommodated, participants may not have wished to speak up during this part of the discussion.

Section 4: What emergency planning, response and recovery resources are available in your community?

Planning at a governmental and infrastructure supply level uses a top down, command and control approach and across a number of government levels, agencies and organisations and is generally designed to incorporate multiple

hazards and structures. For example, local power supply in both towns is managed by the Northern Territory Power and Water Corporation that has identified various risks and contingencies for both locations.

Participants discussed that emergency management was conducted by the local police and on a fly-in / fly-out basis from Darwin. It was felt there was a distinct lack of communication from both sources and little consideration of cultural norms from those outside the area. It was strongly felt that although local people, knowledge and skills were available including a number willing to be trained, these resources were not utilized. Gunbalanya does however have a volunteer emergency services unit with six members and Ngukurr is listed as one of a number of locations on the Northern Territory Emergency Service website [17] as having a local ‘Emergency response group’ although this is described by NTES as “a group of organized volunteers with no formalised training”.

The Northern Territory Department of the Health and the local medical clinics have plans for emergency management that incorporates the broader region. However, when considering the size of facilities and issues of accessibility particularly during an emergency situation there is an understandable limit to the capacity of available services. With the size of both towns the local school is likely to be the only evacuation / recovery centre. At a community scale the level of food, water and fuel is generally adequate as both towns become isolated annually. However at the household level the average income is very low and food stores are often negligible with a significant portion of the population having daily or near-daily dependence on external supplies which in a number of cases would include locally obtained ‘bush tucker’.

3.0 Overall Results and Conclusion

Overall, Ngukurr scored 40 and Gunbalanya 41 out of a possible 110 points which gives both a rating of ‘caution’ meaning that considerable work is warranted to identify strategies and build disaster resilience. The scoring of self-assessment questions throughout the process was generally the same for both communities. Although there were a number of differences between the towns for external data, for only one question (2.3) was there a change in scoring for the assessment.

The scoring is however reasonably unbalanced within some sections and a few questions misrepresent the situation. For example, the absence of a difference between the daily and resident population in question 2.2 significantly raised the sectional score, although this was partly balanced by the lack of tourists and transient workers in question 2.6. This highlights the need for anyone using indicators in decision making to actually examine the composition of the scoring rather than relying on an overall score. It may be more useful in some cases where questions have limited relevance for these to be removed from the matrix but retained as issues to be discussed.

The objective of this study was to assess the state of resilience in two small remote predominantly indigenous communities in northern Australia, as well as determine the applicability of the Torrens Scorecard approach for these communities. It must be noted that levels of poverty and social issues within each community are high and while participants were keen and discussed possible improvements, disaster resilience is understandably not a priority under the prevailing circumstances.

Despite the inclusion of elders and a number of participants having been previously involved in disaster resilience activities in their area, the level of knowledge of local plans and procedures was limited. This highlights the importance of involving key participants and despite repeat invitations to the relevant government officials and agencies, most did not respond and none were able to attend.

While it appears that many procedures are in place across a range of spatial scales from local through to Territory wide, the level of communication to the general population is very limited and non-consultative. There is a strong disconnection between the primarily indigenous residents and people in positions of authority in both towns. This was highlighted in multiple discussions and is an issue found in numerous indigenous communities [10,23,24]. In this instance it was particularly shown by the fact that post-event assessments from past emergency situations had not included the local population.

As also found by Singh-Peterson and colleagues [21], there were issues of determining and accessing data as well as a number of questions not entirely relevant nor suited to small communities. Although both towns had a low score and significant issues in regard to disaster resilience, what was not represented were those differences attributable to the community’s small size, self-reliance and the cultural background of the population. With little or no expectation

of assistance from authorities the reliance is on one's self, friends and family. Under the predominate culture with these towns, this 'self'-reliance incorporates a large kinship network and translates into a community that informally appears to have a reasonable ability to cope with stress. However, with the small size and low socio-economic status of the population, recovery from abnormal situations can be anticipated to be slow and only to a very poor level that in other areas would be deemed unacceptable [23].

The scorecard method provides a rating system to connect a level of description and understanding to a numerical value. However the 'caution' rating ranges from a score of 34 to 98 and the potential difference between communities with this range belies the rating's value. Similarly, based on this rating method and the underlying scoring matrix it appears unlikely that any community in Australia would be considered to be in the 'red zone' for overall scoring. However, there is no doubt that the scorecard method did provide excellent discussion points on numerous emergency management and societal issues as well as provide a reminder for topics that may be missed in an unstructured setting. Similarly, even when used with the changes and limitations involved in this study, it did identify a range of very significant issues that could greatly improve the resilience of these communities.

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