Response, recovery and adaptation in flood-affected communities in Queensland and Victoria

Dr Deanne Bird, Pamela Box, Tetsuya Okada and Dr Katharine Haynes (Macquarie University) and Assoc Prof. David King (James Cook University) provide insights into the recovery and adaptation to reduce flood risk.®

ABSTRACT

This research aims to identify the factors that inhibit and enable adaptation strategies within flood-affected communities. To achieve this, a mixed methods survey was carried out in three case study locations of Brisbane and Emerald in Queensland, and in Donald, Victoria. Resident experiences of the flooding in terms of response and recovery were also examined in order to understand the broader story from a local perspective.

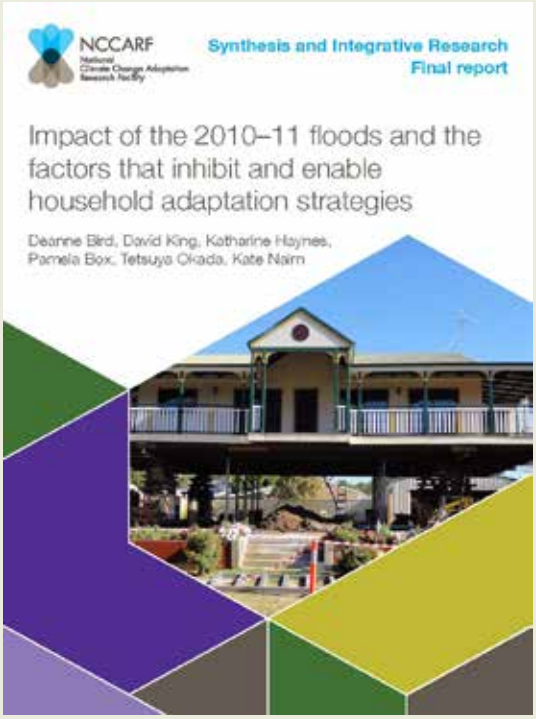
Introduction

Severe floods in 2010–11 impacted extensive areas on Australia's east coast, especially in Queensland and Victoria. Small centres are regularly flooded, but the 2010/11 events included extensive flooding of a major city and consequent extreme economic impacts. Regular repeats of such events will force change and adaptation on communities and governments in the long term (IPCC 2012). These events provide an opportunity to explore the challenges and opportunities for adaptation facing residents and local government officers during the reconstruction period, and to identify the extent to which resilience and adaptive capacity are already present in flood-affected communities.

Research was carried out in Emerald and selected suburbs of Brisbane in Queensland, and in Donald in Victoria. People were evacuated from the flood danger in all of these places and some experienced severe losses. Emerald and Donald are both inland rural settlements that have previously faced extended drought. Suburbs in Brisbane that were flooded are in existing flood prone areas where future floods may be expected.

In Brisbane the suburbs of Chelmer, Graceville, Tennyson, and Rocklea were surveyed. These suburbs were chosen following discussion with officials at the Department of Communities, Child Safety, Youth and Families, as residents within each represent a variety of demographic groups.

This paper provides a condensed overview of the findings of this research published in the full report *Impact of the 2010/11 floods and the factors that inhibit and enable household adaptation strategies* by Bird *et al.*



Surveying flood-affected communities

Interviews were carried out with emergency management staff, planners, engineers and administrators in local councils and state government departments responsible for flood and natural hazard risk reduction. Interviews were also conducted at the community level to gain an idea of the household experience before, during and after the floods. During the interviews, residents were asked to give information

on the warnings they received, how they responded, what adjustments they made to their houses, the extent of damage to their property and what, if any, adaptations they had made, or were planning to make, to reduce future risk.

Some interviewees were recruited through door knocking in flood-affected communities. Other interviewees were approached using an opportunistic technique—where the initial respondent (council official or resident) suggested others who might be willing to participate in the research.

Questionnaires were delivered by researchers to households for self-completion, with assistance from the Community Flood Recovery Group in Donald. Questionnaires were also available online and advertised by the Central Highlands Regional Council in Emerald and regional Queensland ABC Radio. The questionnaires gathered information on householder capacity to cope with the 2010–11 events, the implementation of any current changes during the reconstruction phase, and views, expectations and plans for further adaptations. A copy of the questionnaires is included in the NCCARF report (Bird *et al.* 2013).

Fieldwork was undertaken in August and September 2011. Overall, 18 interviews and 62 questionnaires were completed in Brisbane, 16 interviews and 53 questionnaires were completed in Donald and 21 interviews and 95 questionnaires were completed in Emerald.

Overview of case study results

Impacts and findings from Brisbane, Queensland

The majority of Brisbane respondents were aware that their home was vulnerable to flood yet very few tried to protect their house with sandbags. This could be due, according to survey respondents, to the difficulty of obtaining sandbags in some flood-affected neighbourhoods. The most common form of adjustment prior to or during the flood was raising or relocating household items to a safe location. There was a widely held assumption that Wivenhoe Dam had 'flood proofed' Brisbane, and that the risk should have been minimal. A lack of awareness of flood risk was evident in some residents' responses, due both to the long amount of time since Brisbane was last flooded and a belief that Wivenhoe Dam would prevent any potential flooding.

Flood damage was still evident around Brisbane eight months on. In all, 56 per cent of respondents had either yet to complete or start rebuilding and 15 per cent had not returned to their property on a permanent basis. This was due to a number of factors, including cost, the need to wait for insurance decisions, and there being more properties to be rebuilt than there were builders. A number of abandoned properties were evident in the case study area with a local councillor suggesting up to 10 per cent of properties may be abandoned permanently.

Respondents voiced their dissatisfaction of how the flood response had been handled; a number believed that the rest of the city had 'moved on' while they continued to deal with the flood's aftermath. The emotional stress of the flood event and recovery process has had an impact on wellbeing, with 63 per cent of women and 56 per cent of men reporting that the flood had negatively affected their wellbeing, in terms of at least one of the following factors: relationships with family / friends, financial status, physical health, mental health, and general happiness. The loss of sentimental items was also deeply felt by many respondents.

Flood insurance was a source of dissatisfaction for many respondents, with 33 per cent having thought their insurance covered them for all types of flood. The percentage was even higher for those with incomes over $100 000 (57 per cent). Those residents also did not qualify for the Premier's Relief Fund—a restriction a number of residents felt was unfair. While some respondents believed flood should be a standard inclusion on insurance policies, others expressed cynicism and distrust in the insurance industry believing they would not make flood coverage more accessible. Some considered insurance to be too expensive.

Respondents were largely positive about the considerable amount of help from volunteers provided on the first and second weekends after the flood, but there was a feeling that the volunteers, while eager, were not well organised. The volunteers were held in much higher regard than the city council and SES, but many residents reported not having seen either council workers or SES volunteers during the flood or in the immediate clean up. This was reflected in a high level of dissatisfaction with both organisations' responses to the flood. The one exception to this was a local councillor who was held in high regard by residents for her involvement in the flood response.

Most Brisbane respondents were not considering significant changes to reduce their flood risk. While 50 per cent stated they were likely to or had modified their insurance policy, few other changes were likely to be implemented. While some properties were being raised or rebuilt at a higher level, many respondents did not see the value in this. Residents largely felt responsibility for flood mitigation was in the hands of the city council, as well as better management of Wivenhoe Dam, and felt there was little they could do personally to reduce their risk.

While cynicism towards insurance and the local council were very common, there was a strong feeling of resilience in the community. Many respondents talked of how much closer they felt to their neighbours and wider community, expressing that, while the flood was a negative experience, it had produced some positive outcomes.

Image: Risk Frontiers

Researchers came across two girls offering free drinks to flood victims and volunteers. The driver of this vehicle had lost the contents of her home in Gympie due to flooding and wanted to help others affected by the floods.

Impacts and findings from Donald, Victoria

In Donald, the perception of risk was low with few residents making adjustments to protect their family and home from flood. This is not surprising since 55 per cent of respondents indicated that their house was not vulnerable to flood and a further 37 per cent stated they were not aware their home was vulnerable. It is therefore understandable that nearly all respondents indicated nothing had prevented them from making adjustments since they did not believe it was necessary to do so.

The lack of information available to residents prior to and during the flood may also have contributed to their lack of motivation to make changes, such as raising household items, sandbagging the house, devising an evacuation plan, or preparing an evacuation kit. Residents did not receive detailed hazard information and were therefore uncertain about the risk during this specific event.

Known and trusted sources of information (e.g. the SES and ABC Radio) were unable to provide appropriate, relevant and timely advice to residents and, on the whole, residents lacked knowledge of the various measures that could be taken to reduce the impact of flooding on their home. However, it would be fair to assume that, in light of recent flooding in September 2010, respondents should have had adequate awareness of how they could protect their homes and properties. Nevertheless, the January 2011 flood was much larger than that experienced in September 2010, there was a lack of sandbags during the 2011 event, the SES was unable to gain access to Donald, and volunteers focused their efforts on specific places instead of working throughout the town where needed. The cumulative effect of all these issues resulted in many residents being ill prepared.

Most respondents' low risk perceptions were reasonable as few reported flood damage to their house contents and building structure although more than half reported property damage and some revealed that their businesses were impacted. It is likely that some, but not all, of the recorded property/business damage occurred outside the urban area as a number of residents living within the township of Donald own and run farms on the periphery. This might explain the fact that a higher proportion of men who completed the survey indicated that they had suffered negative impacts to their wellbeing as a result of the flood as it is predominantly men who physically operate the farm. However, this result contradicts observations by social workers who reported an increase in women suffering from depression.

As with other parts of Australia that were flooded during the 2010–11 summer, the preceding prolonged drought resulted in flood mitigation efforts being placed on the backburner in Donald. Local government feared criticism from the public if they maintained or implemented flood mitigation works during the 14-year drought and some residents pushed for development in flood-prone areas based on the fact that properties had not flooded since they had lived in Donald.

Many respondents in Donald *thought* they had full insurance cover but very few actually *knew* they were covered for all types of flood. The remaining respondents, a little more than half, knew that they were not covered or were covered for storm damage only. Nearly half those who were unaware of their

insurance cover indicated they had no previous experience of flood. All respondents who knew they did not have any insurance cover at the time of flood had a household income of less than $50 000, possibly indicating that full insurance cover was too expensive.

Despite many respondents believing in the likelihood of a flood in the next 10 years, many do not intend to make changes to reduce their risk. Of those who indicated they would consider changes, the most popular methods were to modify insurance policies, improve garden drainage and build permanent barriers around properties, which could prove difficult due to local government restrictions. Respondents whose wellbeing suffered after the flood perceive that they are less able to make changes to reduce flood risk compared to others in their community.

An interesting adaptation that some farmers were making for drought and flood was the planting of River Saltbush as fodder for sheep. While River Saltbush and Old Man Saltbush grass varieties survive well in high-salinity soils and drought conditions, the River Saltbush survived the flood even though it was submerged for an extended period. In comparison, Old Man Saltbush died off. These findings may prove valuable to other sheep farmers in the area.

The resident-formed 'Donald Community Flood Recovery Group' was awarded $135 000 in government funding to conduct a flood study that includes the simulation of a once-in-200-year event. Although policy changes are hoped to result from such studies, it may take a long time until they are implemented. Nevertheless, local residents are very positive about the group and the work they are undertaking. The dedication and persistence of this group of residents is not only encouraging to Donald residents, but should serve as a good example to other communities in Australia.

Impacts and findings from Emerald, Queensland

Despite the recent flood in 2008, two-thirds of Emerald respondents were unaware that their home was vulnerable to flood. This is surprising given the fact that the majority of respondents were living in single storey buildings, which were not raised on stumps or stilts and located in a flood-prone area. Nearly all residents undertook some form of adjustment prior to or during the flood, possibly due to the persistent and detailed flood messages communicated via SMS by the local council. Many people raised household items up from the floor, followed warning advice, sandbagged their homes or moved household items to a safe location. As with other communities, Emerald residents reported a lack of sandbags which instigated innovative ideas using pillow cases and potting mix.

Only a quarter of respondents indicated that their house was not impacted by the flood but more than a third suffered major impacts to their house contents or noted that house contents were completely destroyed. Repairs to flood-affected homes were slow to complete with 38 per cent of respondents stating that repairs were ongoing and, for a few, they had not yet begun. For some, this process had been delayed by a lack of builders in the town (possibly due to outside contractors unable to find or unable to afford accommodation) or due to the long process of waiting for outcomes on insurance claims.

A vast majority of people evacuated their homes and, at August 2011, several householders had not returned on a permanent basis. The housing shortage in Emerald exacerbated this situation with many evacuees forced to live with family and friends or leave town altogether. Although Emerald residents were clearly upset about the flooding disaster and the impact it had on their home, family and community, around two-thirds indicated they were neither better nor worse off following the flood in relation to their financial status, general happiness, physical health, mental health, and relationships. Where there was change, however, it was overwhelmingly negative (around a third of respondents) with respect to their financial status, general happiness, physical health, and mental health. In contrast to this result, officials discussed how the flood had a significant impact on personal relationships, particularly where others were relying on friends or family to provide accommodation. Surprisingly, those respondents with a mid-to-high household income indicated more negative impacts in terms of wellbeing compared to those in the low and low-to-mid income brackets.

Some new residents who moved to Emerald after January 2011 were renting in flood-affected houses with no flood insurance, as there were no other options available to them. The inability to acquire adequate flood insurance was a concern to many existing residents. Leading up to the flood a greater percentage (42 per cent) of Emerald respondents knew they had insurance cover for all types of flood. Of these, most were high-income earners (>$150 000), homeowners, had lived at that address for more than a year and had previous flood experience. During the rebuild, many insurance companies did not support or encourage improvements to reduce flood impact. However, there were stories of a few householders who took steps to mitigate their flood risk. For example, one homeowner who was denied full insurance cover raised their home after the 2008 flood impacted it. They were subsequently offered full cover, which they accepted.

Nevertheless, when rebuilding after the 2008 flood many residents opted to rebuild 'better' (i.e. upgrade old with more desirable) instead of rebuilding with the aim of becoming more resilient to flood. This was repeated again after the 2010 flood. Understandably, residents were concerned about property values and wanted to rebuild their homes to a level that would increase a sale price. However, few respondents understood that building a more flood resilient home may possibly increase value of those located in flood hazard zones (by, e.g., replacing carpet with tiles, raising air conditioning units and power points). Many respondents who had made changes to reduce their flood-risk did so based on their own intuition and experience.

The process of raising houses in flood-prone areas is complex and expensive.

Unfortunately, the experience and knowledge gained from floods in 2008 and 2010 had not transferred to other development projects around Emerald with many new developments consisting of slab-on-ground construction, even in high flood-risk areas. More alarming was the reconstruction of the Coles shopping complex located adjacent to the Nogoa River. The entire building was gutted after the 2010 flood and tenants within the complex were unable to break their lease, according to reports. Some new developers were building homes on stilts and a new shopping complex was being constructed on higher ground, on the eastern side of the river. This was considered a positive step for the community, as it would provide service to those isolated from the main part of town (on the western side) during future floods.

Although Emerald is considered to be a wealthy town and therefore one might assume that residents are more resilient, it is obvious that wealth does not necessarily ensure that people are less vulnerable to natural hazard events. Wealth appeared to be a constraint to many people's recovery, as most were not entitled to the Queensland Premier's Flood Appeal payments because their annual income was above the cut-off level. Many people had lost income due to their businesses suffering flood damage, their insurance companies were not paying up, and they could not afford the repairs to their homes. Officials noted that many of these people, particularly men, were reluctant to come forward and ask for assistance. In response, local council and state government agencies, non-government organisations and community groups are working together to ensure that all flood-affected people receive help where needed.

As a result of the 2010 flood, the changes that ranked highest that had already been done or were likely to be done, were 'modify insurance policy' and 'move air conditioning unit higher'. Significantly, those respondents who did not own their home at the time of the flood were unlikely, or not at all likely, to make changes following the flood (57 per cent c.f. 37 per cent who have made, or are likely to make, changes). Of those people who owned their home, there was a very significant difference between those who were unlikely, or not at all likely, to make changes following the flood (63 per cent) compared to those who have made, or are likely to make changes (28 per cent). Again, this could relate to the fact that many people wanted to rebuild 'better' instead of 'more resilient' or they lived in slab-on-ground constructions and did not think improvements were possible.

Similarities and differences inherent within each case study

Overall, Emerald residents were more proactive in their attempts to reduce their risk to flood than those in Brisbane and Donald (Table 1), which could relate to their recent experience. Emerald residents not only had more flood experience (52 per cent) than Brisbane (26 per cent) and Donald residents (32 per cent), but many of them had experienced flood in December 2008. Although Donald flooded in September 2010, this event was only minor compared to the January 2011 flood and very few residents acknowledged this as past experience.

Brisbane and Emerald residents suffered more damage within and around the home compared to Donald residents, whereas slightly more businesses were affected in Donald (Table 2). However, this is most likely

Table 1: Adjustments made to help protect family and home prior to and during the flood.

Flood risk adjustment	Brisbane	Donald	Emerald
Devised an evacuation plan	23	13	26
Prepared an evacuation kit	13	2	25
Followed warning advice on radio / television / Internet	42	17	57
Sandbagged house	13	32	40
Built temporary flood barriers around property	-	11	12
Kept drainage clear of debris	8	15	20
Raised household items up off floor	65	17	64
Moved household items to a safe place	61	9	40

a reflection of the survey methods since businesses were not specifically targeted in the study.

More residents in Emerald reported that their flood repairs were complete while more Brisbane residents reported that repairs were ongoing or had not yet begun. A similar amount of respondents from each location stated that they had not returned to their home on a permanent basis.

Most interestingly, there was a significant difference between the numbers of female respondents who suffered some negative impact to at least one of the following:

- relationships with family and friends
- financial status
- physical and mental health, and
- general happiness.

That is, 36 per cent of female Donald respondents reported some negative impact compared to 63 per cent in both Brisbane and Emerald. Moreover, there was a significant difference between male and female respondents within Donald. More male respondents (52 per cent) reported negative impacts than female (36 per cent), which is different to the situation recorded in Brisbane and Emerald.

These anomalies could relate to the many years of hardship experienced in Donald during the drought and the complexity of issues that were compounding its effects. For example, Kiem *et al.* (2010) found that farmers around Donald and Mildura felt that they could deal with the drought, but other factors were exacerbating the situation, such as the closure of the Australian Wheat Board, lower international agricultural commodity prices, and issues surrounding irrigation and water trading policies associated with the Murray River. It is possible that the much-anticipated but untimely arrival of the rain at harvesting time brought further disappointment and stress to male respondents.

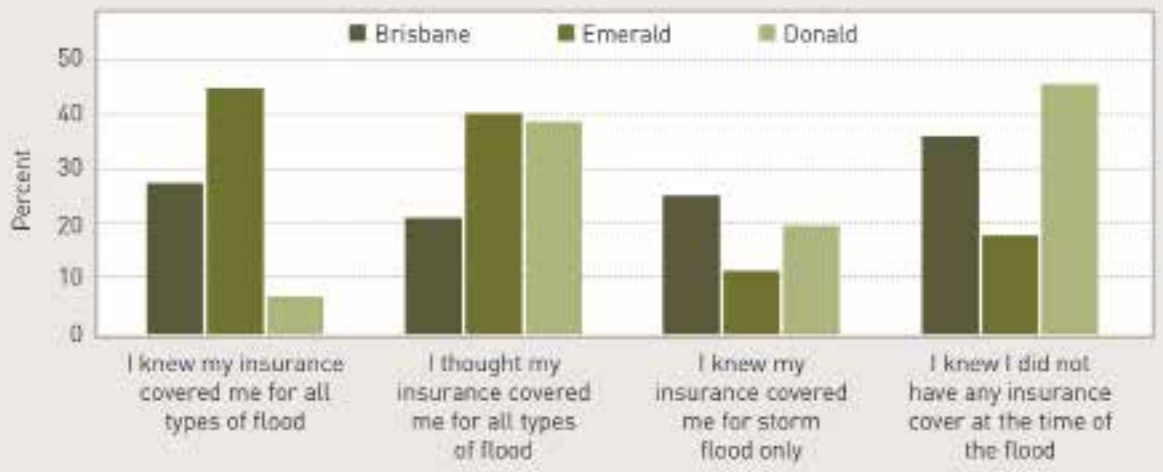
On the other hand, rural women often take secondary employment in order to ensure the financial stability of their family (Kiem *et al.* 2010; Shaw, van Unen & Lang 2013) and although the rain caused crop damage at harvest time, farmers were better off now than they were during the drought. It is possible that female respondents perceived the rain as a positive thing since it had improved their financial situation.

This result contradicts observations by social workers who reported an increase in women suffering from depression. A viable reason for this anomaly cannot be offered without further investigation. However, in

Table 2: Comparisons between estimated impacts and level of recovery.

Percent of:	Brisbane	Donald	Emerald
• respondents who evacuated	77	27	81
• respondents who perceived some damage to home contents	73	29	74
• respondents who perceived some damage to building structure	85	35	76
• respondents who perceived some damage to property / yard	93	56	87
• respondents who perceived some damage to own business	37	41	23
• respondents whose flood repairs are complete	31	10	58
• respondents whose flood repairs are ongoing	44	20	38
• respondents whose flood repairs have not started	12	-	5
• evacuated respondents who had not returned home on a permanent basis	15	16	15
• female respondents who suffered some negative impacts	63	36	63
• male respondents who suffered some negative impacts	56	52	41

Figure 1: Comparisons between insurance knowledge.



line with the literature and previous research (e.g. Enarson 2000, Hazeleger 2013, Women's Health 2012), we suggest that men are more reluctant than women to present themselves for counselling but are comfortable discussing such matters anonymously. Other factors to consider are whether or not men have a stronger emotional connection to the land or are more or less affected by the financial stress of farming than women.

The result that many more respondents in Emerald knew their insurance covered them for all types of flood is not surprising since many had experienced flood in 2008 (Figure 1). Similarly, the result that fewer Emerald respondents knew they were not covered or covered for storm flood only is also expected when considering recent experiences. It is surprising that more Emerald respondents *thought* they were covered for all types of flood compared to Brisbane and Donald respondents.

From the available data, it is difficult to draw any conclusions about those likely to know or not know about their type of coverage in Brisbane. The result that more Donald respondents knew they did not have any insurance cover at the time of the flood could relate to their belief that they were not vulnerable to flood. It is also possible that these respondents could not afford insurance since all had a household income of less than $50 000.

Due to the transient nature of the Emerald community, it is not surprising to learn that Emerald residents were the least likely to be living at the same place in the years to come (Table 3). In comparison, the result that most Donald respondents planned to be in the same place in years to come was expected. When the question was framed in terms of reducing flood vulnerability, fewer Emerald residents were likely to move to a flood-safe location. This result is most probably related to the fact that there is little available housing outside of the flood zones, and also because many expect to be moving anyway—the transience of a mining town population—and will accept the risk of flooding in the meantime.

Despite many residents recognising that a flood is likely to occur within the next year in Brisbane and Emerald and within the next 10 years in Donald, most have not, or do not, intend to make changes. When asked what was preventing people from making changes, the most common answers were financial cost, design and construction of the home, insurance limitations, council / government restrictions to build levees on private properties, and they were renting. Others simply could not fathom how one could prevent Nature from occurring and believed that it was too hard: *'I'm not God'*.

There were also issues associated with people wanting to replace for 'better' instead of 'more flood resilient' and this was possibly exacerbated by situations where residents witnessed businesses, councils and governments rebuilding like for like. There was little or no support coming from the insurance industry to assist people to make changes to reduce their risk.

Nevertheless, there were some factors that encouraged people to make changes. These included the history of flood events, the inconvenience and stress associated with being flooded, a need to protect the children, belongings and assets, and a desire to

Table 3: Comparisons between intentions to relocate.

Intention	Brisbane	Donald	Emerald
I plan to live where I am for many years to come	62	85	49
I plan to move elsewhere in this town in the coming years	13	6	7
I plan to move to another town in the coming years	8	2	17
Undecided /don't know	10	6	16
Permanently move to a flood safe location (not at all likely & unlikely)	62	73	55

One example of preparing property for flood is the construction of a concrete wall which is reinforced along the river-side with a trench that forms the garden bed. The property owner worked with a carpenter, concreter, plumber and several engineers to develop this measure.

have peace of mind. Additionally, people stated the pain and heartache experienced during the floods was a significant factor driving their desire to reduce their vulnerability.

Conclusion

The survey results provide a great deal of valuable information on the various barriers and opportunities people face in making changes to reduce their vulnerability to flood prior to, during and after an event. A number of significant factors identified as either enabling or inhibiting response, recovery and/or adaptation are direct experience, outcome expectancy, communication and information, governance and physical protection, insurance, financial restraint and relief assistance, housing including design/construction, rental properties, builders and guidance, health and wellbeing, relocation, and volunteers and community initiatives.

A dominant finding from the study is that a greater number of constraints inhibit adaptation than factors that enable adaptive change and behaviour. Balanced against the criticisms and fault identification the study showed that resilient communities do get on with their lives and largely drive recovery themselves. The extensive qualitative comments and opinions garnered from interviews and questionnaires reflect high levels of acceptance of catastrophe and stoic endurance. This does not necessarily translate to adaptation to future events and a changed hazard landscape, but it does reflect strong resilience in the community. As strong resilience exists in the community the next step to adaptation is a logical and achievable transition. Resilience can be built on to advance adaptive behaviour, but it needs to be nurtured and facilitated by external agencies.

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About the authors

Dr Deanne Bird is a social science Research Fellow specialising in disaster risk reduction and climate change adaptation. Deanne is currently investigating Indigenous adaption in relation to extreme events and climate change in northern Australia.

Assoc Prof. David King is an Associate Professor of Geography in the School of Earth and Environmental Sciences at James Cook University, and is Director of the Centre for Disaster Studies, and the Centre for Tropical Urban and Regional Planning. He is a Fellow of the Planning Institute of Australia.

Pamela Box is a PhD student in the Department of Environment and Geography at Macquarie University studying shared responsibility in flood risk management in Australia.

Tetsuya Okada is a researcher and translator at Risk Frontiers as well as a PhD student at Macquarie University studying post-disaster recovery and risk reduction measures, focusing on the 2011 Queensland–Victoria floods in Australia and the 2011 Tohoku earthquake and tsunami in Japan.

Dr Katharine Haynes is a senior Research Fellow specialising in disaster risk reduction and climate change adaptation. Katharine's research interests include the implementation and adaptation of policy and organisational procedure, the science–policy interface, risk communication, and community and youth-based disaster risk reduction.