



Voluntary relocation as an adaptation strategy to extreme weather events



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ABSTRACT

Migration out of hazard-prone areas presents significant opportunities for disaster risk reduction and climate change adaptation. Alongside and intermingled with opportunistic migration there has always been relocation to escape, particularly from calamity, disaster and warfare. As climate change is considered a likely driver of migration, the literature encompasses a debate as to whether or not migration can be considered to be adaptation. This paper investigates the concept of voluntary within-country migration as an adaptation strategy to reduce disaster risk in Australia. We refer to this internal migration as relocation. The paper examines results of research carried out in Australia at the time of recent and extensive disasters, where opportunities were presented to examine household attitudes towards relocation in the face of future disasters of similar extent. Individuals' attitudes towards relocation were ascertained within an adaptation and mitigation context, at a time of emerging longer-term climate change government policy that advocates retreat from hazard-prone locations. The paper examines demographic data to reveal who is likely to leave or stay. Policy implications of relocation strategies as climate change adaptation strategy within a developed nation are discussed. This research concludes that relocation is a strategy available to some as part of an extensive range of responses to extreme weather events but undertaking unsupported resettlement is not always an option for reasons of family commitment, livelihood opportunities, financial constraints and emotional ties. Those who remain, and those who leave a hazard-prone location may both demonstrate a capacity for adaptation and resilience.

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1. Introduction

Exposure to natural hazards such as bushfire and flood is increasing in Australia due to population expansion

within hazard-prone areas [10,11]. Moreover, 6% of the Australian population resides within 3 km of the coast and in areas with elevations below 5 m above sea level [7]. With the possible threat of climate change exacerbating extreme events (e.g. sea level rise increasing impacts of storm surges ([17]; p.19), it is imperative for households, communities and local governments to implement strategies to reduce hazard risks.

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Within the suite of risk reduction policies that encourage protection (e.g. the construction of levees, fire breaks), accommodation (e.g. raising awareness, adapting behaviour) and retreat (e.g. relocation, migration), it is probable that some people will opt for leaving a vulnerable community for enhanced opportunities elsewhere, and thereby contribute to a retreat strategy. Retreat in this sense will also include some households that are forced away by disaster damage and loss. As Lee [22] suggested, migration (i.e. retreat) is a natural part of life. People are likely to migrate several times during their life, influenced by a complex array of motives and influences, including the impact of disasters and environmental change.

The IPCC [16] viewed migration in response to climate change or climate change induced natural hazards as a failure to adapt, or as a mal-adaptation. However, migration, whether it is temporary, permanent, internal or international, is recognised in some instances as a viable and sustainable adaptation strategy for households, communities and governments to reduce risk (e.g. [4,24,33]). The IPCC [17] warns of the likelihood of climate change induced migration, involving millions of people during this century. Alongside climatic and environmental change that alters the sustainability of current land uses, extreme weather events will repeatedly push societies into crisis. Some people will be forced to leave their homes, quite literally as refugees, but many will voluntarily relocate before they are overwhelmed by catastrophe.

However, a significant amount of research has demonstrated that relocation can reduce livelihood security, social capital and cultural ties [6,28,30,32]. Deteriorating and unsustainable environments can force people to relocate to alternative locations, putting pressure on rural landscapes and alternate cities which may themselves be subject to overpopulation and sea level rise or subsidence. The unsustainability of rural environments occurs in pulses when natural hazards bring short to long-term crises to the population (e.g. [32]). For example, disasters such as floods and drought bring economic loss and food shortages that in the absence of other safety nets can force people to relocate elsewhere [15,25,26,29]. Relocation is most successful where appropriate livelihood provisions are met and people are fully involved and in control of the decision making process surrounding their resettlement [32].

This paper investigates the concept of voluntary within-country migration as an adaptation strategy to reduce disaster risk in Australia. Here, we refer to this internal migration as relocation. The risk reduction strategy of retreat that involves relocating people and communities out of hazard zones, through voluntary relocation, buy-back schemes and rezoning of hazard-prone areas is not new in Australia. Gundagai in New South Wales and Clermont in Queensland provide two historical examples of township that were relocated after flood as both towns experienced severe loss of life. In Gundagai, 89 people out of a population of 250 drowned in May 1851 (Australia's worst-ever flood in terms of loss of life) and 64 people drowned in Clermont on 28 December 1916 [8,9].

More recently, following the January 2009 Black Saturday bushfires in Victoria where 173 people lost their lives, it was recommended by the Royal Commission that the

state government offered a voluntary buy-back of high risk properties. The Labor government in power at the time refused to implement the recommendation due to the political implications and high costs involved. However, a successive Coalition government implemented the scheme and in late 2012 (almost 3 years after the fires) over 100 homeowners accepted buy-back offers [14]. Following devastating flash floods that resulted in the death of 12 people in Grantham, Queensland in January 2011, the local council implemented a voluntary land-swap scheme to relocate residents from the floodplain to higher ground [23]. As of July 2013, 115 households had signed up to relocate to the new Grantham [27].

While there has been very little research on relocation initiatives in Australia (e.g. [27]) many projects have investigated the social impacts of extreme weather events to increase understanding of vulnerability, resilience, hazard awareness and preparedness, and disaster recovery. The National Climate Change Adaptation Research Facility (NCCARF) funded four such research projects. Three of these projects were specifically post-disaster studies aimed at capturing attitudes, behaviour and experience following specific events in Queensland and Victoria [2,3,5]. The fourth project examined adaptation within the built environment in a more general sense, but in being carried out during the wet season of 2010/2011, opportunistic research into some of the events that unfolded during the Queensland floods and Tropical Cyclone Yasi strongly influenced the outcomes [20].

Each of these projects provided a valuable opportunity to assess the willingness, or propensity, of people to relocate voluntarily in the event of worsening disaster impact scenarios. The retreat policy captures two elements of risk reduction: (1) restrictions on further, new development, in identified hazard zones and (2) a residential abandonment and rezoning of existing hazard prone areas, especially following direct structural damage that has occurred during a disaster. For such a policy to be viable, there must be a willingness on the part of households to relocate, not necessarily as part of a formal scheme, but as a broader attitude towards adaptation through relocation.

Using data collected in the four NCCARF studies mentioned above, this paper:

- Examines household intentions to voluntarily relocate following extreme weather events;
- Considers demographic details and census data to reveal who is likely to leave or stay;
- Discusses the policy implications of relocation strategies as a climate change adaptation strategy within a developed nation;

The survey methods used in each of the four NCCARF studies are described in the next section.

2. Survey methods

Survey instruments and measures were developed from the literature of post-disaster and community resilience studies, in particular, Cutter et al. [12,13,19]. In the

four studies reported here, the potential or intention of people and households to move away from their communities if faced with similar disasters in the future was a specific research question.

These four projects were conducted in the following places and utilised quantitative surveys as their main research tools:

1. [2]–
 - a. Mackay, Queensland after flash floods in 2008—87 households;
 - b. Charleville, Queensland after flash floods in 2008—55 households; [3]–
 - c. Brisbane suburbs of Chelmer, Graceville, Rocklea and Tennyson following 2011 floods—62 households;
 - d. Donald, Victoria following 2011 floods—53 households;
 - e. Emerald, Queensland following 2010/2011 floods—95 households;
- [3]–
 - a. Ingham, Queensland following multiple floods—287 households;
2.
 - b. Innisfail, Queensland following Cyclone Larry—231 households;
 - c. Beechworth, Victoria following Black Saturday bushfires—249 households;
 - d. Bendigo, Victoria following extended drought—241 households;
- [20] –
 - a. Mission Beach, north Queensland following tropical cyclone Yasi—43 households;
3.
 - b. Brisbane suburbs of Milton and West End following 2011 floods—70 households.

From 15 communities, the research involved a total of 1463 people, each representing a household or family (ostensibly a household head or household spokesperson, but in many cases a couple responding together). Surveys were mostly distributed through drop off and pick up, involving engagement with the residents, but some were conducted face-to-face, while in one survey some households chose to respond online (specifically [3]). The sample framework was a systematic sample drawn from the community under review, in order to ensure a geographical spread across the whole area that included homeowners and renters and was broadly representative of the demographics of each community. For ethical reasons no persons under 18 years were interviewed. Surveys were mostly carried out between 3 and 18 months after a major disaster had impacted the community (the severe cyclone that struck Innisfail had been in 2006, but during the survey period the area was hit by another severe cyclone, Yasi).

In addition to the formal survey instrument of questionnaires that generated a substantial number of responses, the researchers conducted focus groups and extensive interviews with community leaders, public servants, and representatives of institutions and non-government organisations.

Respondents were asked questions that related to their intention to relocate if the household is impacted by similar extreme hazard events in the future. Questions

about relocation that were asked of householders (and a small number of business owners in Mackay and Charleville) varied slightly from survey to survey, but were either a question about intention to stay or leave using terms of likely to unlikely, or a statement of intent, to which people were asked to respond on a five category worded Likert scale that recorded agreement through to disagreement.

The climate change context of all of these surveys was the likelihood of increasing severity of such extreme events in the future. Questions about people's intentions to remain at their current address or to relocate elsewhere were embedded in large questionnaires which elicited information on a broad range of disaster experiences, hazard mitigation behaviour and preparedness, hazard related adaptive actions, awareness, information, community involvement and a range of social capital factors and demographic information. The surveys were not specifically about people's intentions to stay or leave, but were primarily about their experience and actions taken to reduce risks prior to, during and following specific hazard events. Responses reported in the next section are those indicative of future actions and may be considered to be indicators or analogues for events and adaptation strategies that will become more common and widespread.

3. Relocation intentions of residents in hazard-prone communities

Relocation intentions of households in Mackay and Charleville are very high with 23% of respondents in Mackay and 32% of respondents in Charleville indicating that they are likely to consider moving to a different part of the town (Table 1). In comparison, fewer household respondents in both towns are likely to consider relocating to a different town. Nevertheless, the proportions of households considering leaving Charleville (13%) would represent a significant loss of population in a town that has only grown very slowly in recent decades.

The first question about relocation intentions in the Bird et al. [3] study was not asked in relation to reducing future risk. This question was asked in order to gain a perspective of future intentions of residence. The results indicate that Donald was the most stoic community with 85% of respondents stating that they plan to remain living at their current location for many years to come (Table 2).

Table 1
Intention to relocate in the event of further flooding in Mackay ($N=87$) and Charleville ($N=55$).
Source: [2].

	Intentions of householders	
	Mackay (%)	Charleville (%)
Move to a different part of town		
Not likely to be considered	52	57
Neutral	25	11
Likely to be considered	23	32
Move to a different town		
Not likely to be considered	69	78
Neutral	16	9
Likely to be considered	15	13

Table 2

Intentions to relocate in Brisbane, Donald and Emerald in 2011.

Source: [3].

	Brisbane (N=50) (%)	Donald (N=45) (%)	Emerald (N=74) (%)
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

Table 3

Responses to the question: 'Have you, or how likely are you, to make the following changes as a result of the 2010 or 2011 flood?' in Brisbane. (N=50).

Source: [3].

Brisbane	Not at all likely (%)	Unlikely (%)	Undecided (%)	Likely (%)	Very likely (%)	Already done (%)	N/A (%)
Permanently move to a flood safe location	34	28	12	0	18	2	6
Raise level of home	52	15	6.5	2	4	0	20
Change exterior and/or interior design e.g. use flood proof materials	40	20	2	9	18	2	9
Move electricity outlets/meter boxes higher	44	12	12	10	5	7	12
Move air conditioning unit higher	34	15	5	10	12	2	22
Anchor water tanks to the ground	38	7	7	2	9.5	2	33
Improve garden drainage	41.5	7	7	5	17	5	17
Build permanent flood barriers around property	60.5	14	2	0	5	0	19
Modify insurance policy	22	8	10	12	22	16	10

Included in a range of strategies to reduce future risk, Bird et al. [3] later asked respondents whether or not they were likely to permanently move to a flood safe location as a result of the 2010/2011 floods. The example presented in Table 3 relates to the Brisbane survey of residents in Chelmer, Graceville, Rocklea and Tennyson. While only 18% of respondents stated that they were very likely to move, a further 12% indicated that they were undecided. The results also show that more Donald residents (73%) than Brisbane residents (62%) were not at all likely or were unlikely to permanently move to a flood safe location. However, this figure is lower for Emerald residents (55%).

The other Brisbane survey of Milton and West End [20] recorded only 8% of respondents indicating an intention to leave in the future, but in these two suburbs (as well as in the other four Brisbane suburbs) there were many houses that were still empty at the time of the study during mid-2011. While some of these people may have already moved out, others had possibly relocated temporarily while dealing with repairs and insurance claims. Milton and West End are inner-city suburbs with high numbers of rental or short-term residents.

The much larger 2011 household surveys conducted in Ingham (impacted by floods), Innisfail (impacted by cyclone), Beechworth (impacted by fires) and Bendigo (impacted by drought over several years) also included Likert scale questions about having had considered leaving one's residence after the disaster [5]. Additionally, the survey queried longer-term intentions as to whether or not respondents would like to move away from the community. Responses to these questions show different perceptions between the communities concerning feelings about leaving in relation to the disaster that had occurred and the longer term future of leaving or remaining in the community (Table 4). Of the Queensland towns, fewer

Ingham respondents (11%) indicated that they seriously considered leaving their home/property after the flood than Innisfail respondents (28%) after the cyclone. When comparing the Victorian communities, more Beechworth respondents (26%) than Bendigo respondents (17%) stated that they seriously considered leaving their home/property for good after fire and drought, respectively.

The King et al. [20], survey of Mission Beach showed that during Cyclone Yasi, all of the 43 respondents sheltered at their properties that were immediately adjacent to the beach. Many of their neighbours had left before the cyclone impacted the coast and had not returned to live at their residences. Some properties were holiday rentals that were not occupied at the time of the survey and had been empty during the cyclone. Of those residents who still resided in Mission Beach and took part in the survey, 81% indicated that there were not likely to relocate in order to reduce their vulnerability to coastal hazards (Table 5).

4. Who is likely to relocate following disaster?

Mackay and Charleville were chosen as examples of places that are very regularly impacted by riverine flooding. Charleville is a small outback town with few relocation possibilities within its boundaries. Mackay is a coastal city with some limited choices of relocation within the city, but it also contains a significant itinerant mining population. It must be noted that the global recession occurred between the flood and the survey period and may have therefore biased respondents' intentions for relocation. For example, the recession brought about a temporary slowdown in mining that resulted in many people moving elsewhere for employment opportunities. Consequently survey respondents were able to point to many places, especially rental

Table 4

Desire to leave the community in Ingham, Innisfail, Beechworth and Bendigo in 2011.

Source: [5].

Attitudes towards leaving	Ingham (N=287) (%)	Innisfail (N=231) (%)	Beechworth N=249 (%)	Bendigo N=241 (%)
I seriously considered the option of leaving my home/ property for good				
N/a	21	8	24	22
Strongly disagree	41	37	26	37
Disagree	28	28	26	25
Agree	6	15	16	11
Strongly agree	5	13	10	6
Ideally I would like to move away from this community				
Don't know	4	4	4	
Strongly disagree	47	32	57	43
Disagree	38	43	33	43
Agree	7	15	5	6
Strongly agree	3	6	1	2

Table 5

Attitudes to relocation of Mission Beach residents living in the storm surge zone in 2011 (N=43).

Source: [20].

	Very important and important (%)	Uncertain (%)	Not important and not at all important (%)
Attitude to property buy back schemes as an adaptive strategy	30	5	65
Attitude to policy of retreat from the coast as an adaptive strategy	36	16	48
	Yes (%)		No (%)
Are you likely to relocate in order to decrease or negate your or your family's vulnerability to coastal hazards like storm surge?	19		81

properties, that had been abandoned after the flood but which were experiencing a return of population two years later [2].

Donald is a small Victorian country town with little opportunity for relocation elsewhere locally. Having endured a long period of severe drought the community is stoic. This is reflected in the results with 85% of respondents stating that they intend to continue living where they are for many years to come. Donald residents who were likely to leave following extreme weather events have already left the region [18], but repeated droughts and floods in the years to come may reduce the agricultural population even further. Emerald on the other hand is a mining boomtown with a significant temporary population. Half the respondents indicated that they would move on from this town in the future as opportunities unfold elsewhere, whether or not floods occur. For respondents of flood prone suburbs in Brisbane, 62% revealed that the prospect of them permanently moving to a flood safe location was unlikely, or not at all likely. While there are choices to move to other suburbs within Brisbane, the constraint for homeowners is an inability to sell their properties positioned within the flood hazard zone. People may desire to move to a less flood prone location but finances, and for older residents, age and lack of alternatives, reduce their options.

Analysis of the demographic characteristics of people in Brisbane, Emerald and Donald following the 2010/2011 floods who had expressed an intention to consider

Table 6

Increase in median age of case study settlements.

Source: ABS (2012) Census Data [1].

Median age in years	2001 Census	2006 Census	2011 Census
Hinchinbrook Shire (Ingham)	40	44	47
Cassowary Coast (Innisfail, Mission Beach)	38	41	44
Indigo Shire (Beechworth)	39	41	44
Greater Bendigo	37	38	40
Murweh Shire (Charleville)	35	38	39
All Australia	35	37	37
Greater Mackay	34	36	36
Brisbane	34	35	35
Emerald	33	33	34

relocation in the future revealed a specific demographic pattern: those who considered relocation were predominately young to middle-aged adults, earning middle range household incomes, predominantly vocationally qualified and living within a family structure of a couple with children [3]. These were ordinary average residents. These were the core members of the community.

Boon et al. [5] showed that Ingham residents were the most stoic with 11% stating that they seriously considered relocating following the disaster, which in this instance was flood, compared to 28% in Innisfail, 26% in Beechworth and 17% in Bendigo. It appears that the frequency of

flooding (Ingham has experienced 28 major floods since 1920) has enabled residents to adapt to the unavoidable and recurrent hazard. In terms of leaving the community altogether, Innisfail residents were the most receptive of the idea.

The demographic analysis of respondents, who had considered leaving after disaster experiences in Ingham and Innisfail, revealed that those who rented properties had stronger intentions to leave than people who owned or held a mortgage on their home. This had also been indicated in the Mackay study. In all these communities (Ingham, Innisfail, Beechworth, Bendigo) and Mackay, there was also a strong tendency for newcomers to be more prone to relocation than longer-term residents. Other demographic and social characteristics that are related strongly to the desire to leave or relocate included low sense of place, family and health problems and limited financial capacity [5]. While the disaster was a factor in individuals' consideration of whether to leave or not, these characteristics are not hazard related but do portend to adaptation capacity. Individuals who understood climate change were also more prone to consider the idea of leaving. On the other hand, there was a negative link between household preparation and the intention to leave the community and no link between resilience and relocation intentions [5]. Moreover, measures of adaptability suggested that the more adaptable people were, the less likely they were to leave the community. This finding supports the IPCC [16] assertion that migration may be a failure to adapt, at least for some.

The study of Mission Beach was particularly focused on people's attitudes towards the retreat policy which implies abandonment of beachfront properties in the face of sea level rise and storm surge. These hazards pose a more extreme form of vulnerability than flood in that in the medium to long term, these properties and beachfront land will be lost to the encroachment of the sea. The results here show that many respondents viewed buy-back schemes and retreat policies as important (30%; 36%, respectively). However, fewer (19%) stated that they were likely to relocate to reduce vulnerability to coastal hazards, which is line with the other studies. The fact that these respondents had been directly impacted by storm surge and the majority are not considering moving, underscores the problems of making vulnerable residents aware of the risks and enhancing their willingness to respond to them. An explanation of what appears to be a negative attitude is indicated by the demographics of the population. The majority are retirees who own property and blocks of land. These respondents acknowledged that their locale may be unsustainable in the long-term, but they argued that these impacts are beyond their own lifetimes, and in the meantime they will continue to enjoy paradise knowing something of the risk [20].

A problem in studying relocation in the face of or in response to disasters is that we do not know the characteristics of those who have left. Further research is needed to ascertain why residents chose to leave disaster stricken communities. Similarly, research is needed among new residents who have moved into areas recently hit by disaster. Already at the time of the surveys, from three

months and up to a few years after the events, new people have moved into hazard prone areas [3,20]. There has been a pattern in Queensland of complacency or acceptance setting in after disasters have occurred. After a few years, the disaster is a distant memory and new developments and rebuilding go ahead in areas that remain just as vulnerable [20]. However, we acknowledge that this might be considered by some to represent resilience in the face of disaster.

Lee [22] argued that the more dynamic, better qualified, younger etc. members of society are the ones who migrate, and that the primary motive is economic rather than a flight from problems. The data reviewed here demonstrates that vulnerability predicted the desire to leave, but further research is needed to measure the extent to which vulnerability translates into an actual move, or whether it is connected with an inability to either adapt or migrate, and for what reasons.

5. The changing profile of regional and rural Australian communities

The small towns and rural shires of these surveys, especially Charleville, Ingham and Innisfail had all lost young people throughout the decade 2000–2010. Where population had grown, it had been through an in-migration of older people—retirees, sea and tree changers. This is illustrated by the shift in median age illustrated in Table 6. Many rural settlements in Australia are losing younger populations. Some are gaining more elderly populations and most (like the rest of the country) are ageing. Both Mackay and Emerald are influenced strongly by the mining boom, which has brought younger people into their communities, and Brisbane has experienced youthful in-migration for an extended period of time.

Whether potential migrants are the more adaptable or the more vulnerable residents is a significant factor in building community resilience and adaptive capacity. Emerald, Mackay and Brisbane are dynamic youthful communities, but it was in these places that the socio-demographic indicators suggested that younger families were the most likely to consider relocation in the face of further disastrous floods [3]. Moreover, Boon et al. [5] showed that in the older ageing communities those more prone to consider relocating were those with family, health and financial issues, and a low sense of place. Sense of place was not examined in the younger respondents in Emerald, Brisbane or Mackay, but younger people are much more mobile anyway [22,5], suggesting that they have a less developed sense of place.

6. Policy implications of voluntary relocation

There is a significant policy implication, particularly for retreat and relocation strategies, where around 10 to 20% of the population in hazard-prone areas are willing to consider relocation and migration to other places that are less hazard-prone. On the one hand, this population will include younger, mobile and dynamic members of the community and on the other hand, members who are less resilient, unable to cope or who experience constraining

personal or family issues, just as Lee [22] predicted. Thus some may leave for negative or push factors while others move on because there are positive opportunities elsewhere without the threat of disaster.

Those who choose to remain in a community, compared to individuals who are forced to move through loss, may illustrate different characteristics of resilience in communities; they may stay in the community because of a highly developed commitment to, and sense of, place. The studies of Ingham, Innisfail, Bendigo and Beechworth [5] suggest that older community members will particularly influence that resilience. Sense of place, longevity of residence in the community and commitment to place must be balanced against the reduced incomes of retirees and the lack of time available to start again in another place. Thus affirmative statements of resilience must be balanced against a lack of alternatives, which is an unstated vulnerability. Resilience and vulnerability exist simultaneously in individuals and communities, but while the focus is on building resilience the concurrent vulnerability may be neglected.

The implications of these community attitudes impose constraints on retreat or relocation policies. Those who remain in a hazardous location, that might ideally be decommissioned, are likely to be resilient individuals or households, many of whom do not have a realistic alternative because of vulnerability factors such as age, finances, occupation and family/community commitment etc. If less resilient members of the community leave, the remaining community might become overall even more resilient and more united in challenging and contesting any strategy to relocate their settlement. The loss of younger, potentially resilient members of the community may reduce overall resilience, but may also strengthen the resolve of those who remain. Incentives to relocate will probably have a stronger impact on younger members of the community, but ageing rural settlements face a downward spiral of economic and service contraction as their younger members move out to places that offer greater economic opportunities and a wider range of services.

In the absence of a retreat or relocation policy, communities will continue to be vulnerable to local hazards that are likely to intensify with climate change. Further disaster impacts may force out some individuals, and encourage others to look elsewhere for a new life. The research reported in this paper indicates that intention among a minority of community members. However, the departure of just 10% of a community may be devastating to marginally viable small and rural settlements, where outmigration of young families exacerbates an already present economic decline.

7. Conclusion

The decision to relocate is, usually, made by individuals or households but the source and destination communities feel the consequences as well. These consequences may be both positive and negative and have the potential to be influenced by government policy. It is clear that migration should not be viewed as a mal-adaptive process, but the impact of outmigration on a small community, may have

devastating consequences for fragile economies, that in the long term could reduce resilience for those communities. There remains a need to more clearly identify the extent to which those who remain in, and those who relocate from, a hazard prone location demonstrate a capacity for adaptation and resilience. The process of deciding to relocate is one of weighing up the risks, costs and benefits, not only in an economic, but social and lifestyle senses as well. These are complex issues, which play out differently at different locations. Policies that intervene in the migration process, whether in attempting to arrest outmigration through recovery and reconstruction, or to facilitate relocation, impact upon complex layers of community dynamics and resilience. Relocation is part of a suite of adaptive strategies available to households and communities, where the long-term effects are unequal and variable. Relocation by people and communities is inevitable, but formalising relocation into policy may reduce vulnerability and resilience, thereby initiating complex, and unanticipated social changes.

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Glossary¹

- Resilience:** Resiliency; A measure of how quickly a system recovers from failures [21]
- Vulnerability:** The degree of susceptibility and resilience of the community and environment to hazards [21]
- Mitigation:** Measures taken in advance of a disaster aimed at decreasing or eliminating its impact on society and environment [21]
- Adaptation:** Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities [31].
- Migration:** A permanent or long term change in place of residence.
- Relocation:** A shift to another place of residence either temporarily or as long term migration.
- Resettlement:** A permanent or long term change in place of residence that involves the establishment of a new community or settlement, often used in the context of official schemes to relocate populations.

¹ There are many definitions of the following terms, which are defined as in the dictionary, or the emergency management and climate change glossaries.