

Article

## Flood Risk in Australia: Whose Responsibility Is It, Anyway?

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Received: 5 August 2013; in revised form: 27 August 2013 / Accepted: 18 September 2013 /

Published: 7 October 2013

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**Abstract:** This paper presents research into four key stakeholders in flood risk management in Australia: local councils, the insurance industry, the State Emergency Service (SES), and local residents; examining the perception of their own roles and responsibilities, and those of the other stakeholders. Key informant interviews were conducted in four locations—Brisbane and Emerald, in Queensland, Dora Creek, in New South Wales, and Benalla, in Victoria. We find that understanding of the roles and responsibilities of each stakeholder varied considerably between research participants. Insurance representatives felt their concerns about increasing flood risk costs were unheeded until the 2010–2011 floods made them the “canary in the coal mine”. Councils felt they had limited options for reducing flood risk. SES representatives felt they were too relied upon for event response, with requests for assistance outstripping their capacity to assist, and many residents were uncertain how to prepare for flood, relying on emergency agencies and the local council to protect them. Key lessons for flood risk management in Australia are (a) an urgent need for all stakeholders to better understand each others’ roles and responsibilities; and (b) residents must take greater responsibility for their own personal protection. Only then can the vision of shared responsibility presented by the 2009 National Strategy for Disaster Resilience be achieved.

**Keywords:** flood risk management; responsibility; stakeholders; perception; 2010–2011 floods; Australia

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## 1. Introduction

The 2010–2011 Summer saw significant flooding across Australia, exacerbated by a strong La Nina event, similar to previous widespread flood events in 1974 and the mid-1950s [1]. Australia has recently seen a high number of flood events in a short period of time, at a time when concerns about the future impact of climate change and increased population growth and damage costs in coastal and other flood risk zones have raised questions about how to best address these growing vulnerabilities and costs [2]. Flood risk management in Australia involves multiple stakeholders, including all three levels of government, the State Emergency Service (hereafter SES) and other emergency response agencies, the insurance industry, catchment management authorities, and local communities. To best manage risk, all these stakeholders need to have a clear understanding of their own, as well as each others' roles and responsibilities. This paper is an exploratory analysis focusing on four stakeholders, local councils, the level of government most closely involved with flood impacts, the SES, the insurance industry, and local residents. Councils and the SES make local flood preparation and response decisions, and insurance is a source of financing for personal recovery, *i.e.*, a personal mitigation tool, and local residents can make their own personal plans and preparations. Other stakeholders are involved in flood and water management, including state and federal governments and catchment management authorities. This preliminary study has focused on the stakeholders with the most immediate involvement in flood planning decisions, but the roles of these other stakeholders should be addressed in future research. State governments provide the legislative framework for flood risk management, and federal government is involved in funding flood mitigation and providing disaster relief. Environmental and planning issues are not part of the federal government's mandate [3]. While they provide the national policy framework for flood risk management, they are not directly involved in local flood risk and have therefore been excluded from this study.

The current arrangement is framed by how powers are divided between the three levels of government, starting from the tasks required and moving out to who completes those tasks, and this shifts the approach from stakeholder-focused to task-focused. An early 1980s review of disaster response in Australia found a focus on crisis-response over pre-event planning and mitigation [4]. Beginning instead with the jobs to be done, and assessing how each stakeholder can be involved in completing those tasks, would aim to address some of the current shortcomings.

This paper aims to answer five questions: (1) What importance does each stakeholder group place on flood risk management? (2) What are the views of each stakeholder group on their own and each others' roles and responsibilities with regard to flood risk management? (3) How do the views of key stakeholder groups align or differ? (4) What views does each stakeholder group have about the need for a national standard for flood risk information and management? (5) What lessons can be learned from the recent floods experienced in Australia?

## 2. Flood Risk Management in Australia

The floods of the 2010–2011 Summer highlighted the extent of the flood hazard across Australia [1], and raised the questions of how to better address flood risk. The inquiry following the Black Saturday fires in Victoria in 2009 raised the idea of "shared responsibility" for fire management; that preparation for, and response to, fires is not the domain of one stakeholder alone, but involves various

levels of government, emergency services, and local communities [5]. The National Strategy for Disaster Resilience (NSDR) applies the same idea to all natural hazards [6]. These documents provide a framework for who needs to be involved and makes general comment about how and why different stakeholders need to be involved [6]. This paper seeks to examine how well four of those stakeholders—Local council, SES, the insurance industry, and local residents—Reflect the aims of the NSDR.

In Australia, land use and hazards planning is the domain of state and territory governments, enacted at local government level. The Australian Capital Territory differs from the other states and territories in that it does not have local councils, only the territory government. The federal government does not make planning laws. In New South Wales, 1977 saw the introduction of policy which allowed for the removal of subsidies to developments built in areas that have at least a 1 in 100 chance of being flooded each year, as well as requirements for mapping of those areas. Public concerns over the impact on housing prices of publically available flood risk information eventually led to a change to a more flexible approach in the mid-1980s, removing the requirement to use the 100 years flood planning level, but also leading to less publically-available flood risk information [7]. A study by the Insurance Council of Australia in the late 1990s found that, although many councils had information about their flood risk, close to half had not included that information in their planning schemes [8].

Flood risk management in Australia has evolved over time, often influenced by flood and hazard events [9]. Table 1 presents a brief overview of key flood hazard events and the changes in planning and response they precipitated. The earliest example of official discussion of living with floods following European settlement was a flood in Windsor, west of Sydney, after which the then-Governor of New South Wales, Lachlan Macquarie, criticised settlers for living in known flood areas and advised them to move to within surveyed townships [10]. At least two towns have been completely relocated due to floods—Gundagai, New South Wales, and Clermont, Queensland, with other towns partially relocated. In the case of Gundagai, floods in the 1840s led to residents requesting the relocation of the town, which was rejected by the New South Wales Governor [11]. That town was moved following an 1852 flood which killed 89 people, the largest number of casualties caused by a flood in Australia [12]. In Clermont, buildings that were not destroyed by the 1916 flood were physically moved to their new location [13].

Discussions about flood insurance have followed a number of flood events. Establishing a scheme paid for by both the general public and those in flood-prone areas was suggested following flooding in Maitland, north west of Sydney, in 1875 [14], and discussed at a federal level in the 1950s [15]. Neither of these suggestions went further, but a national disaster insurance scheme was investigated in the mid-1970s following the flooding of Brisbane in January 1974 and Cyclone Tracy's impact on Darwin on Christmas Day of the same year. After investigation the federal government rejected the proposal based on concerns about the cost, and that a public scheme did not align with the philosophy of the conservative Coalition government of the time, who preferred minimal government intervention in business and private issues [16]. Following storms in Wollongong in 1998, residents used media campaigns to pressure insurers into offering payouts, and the federal Labor opposition issued a media release calling for a federal inquiry into flood insurance [17]. Even as recently as 2008, the involvement of the private sector through the insurance industry in flood management and response

was limited, with government and individuals the predominant actors [18]. Given how recent that was, it is unsurprising that confusion about flood insurance was so common during the 2010–2011 floods.

Following the 2010–2011 floods and confusion over what coverage was included in different insurance policies, the federal government established the National Disaster Insurance Review to investigate issues around the availability and affordability of insurance for natural disasters such as flood [19]. The federal government, in early 2013, rejected the suggestion of the National Disaster Insurance Review to either make flood insurance compulsory or subsidise premiums in the highest risk areas [20]. Most recently, the insurer Suncorp stopped offering cover in the towns of Emerald and Roma, in Queensland, following significant losses in both towns in three consecutive years [21], but have recently resumed offering policies in Emerald after the state government announced funding for mitigation [22]. Globally, with earthquakes in Christchurch, New Zealand in September, 2010, and February, 2011, the earthquake and tsunami in Japan in March, 2011, and floods along the Mississippi in the USA in April and May, 2011, amongst other disasters in addition to Australia's floods, 2011 was the most costly year on record for natural disasters [23]. As a result, the premiums of many insurance companies have increased to more accurately reflect the true cost of providing insurance in high-risk locations.

**Table 1.** Selected natural hazard events and resultant changes in disaster management in Australia.

Year	Event	Legislation/reports/response
1817	Windsor flood	Edict criticising residents living in known flood areas
1852	Gundagai flood	Relocation of town
1875	Maitland floods	Discussion of flood insurance
1916	Clermont flood	Relocation of town
1955	Maitland floods	Establishment of NSW State Emergency Service
1967	Hobart fires	Establishment of Tasmanian SES
1974	Brisbane flood; Cyclone Tracy	Federal investigation of disaster insurance; building codes for wind resilience; establishment of Qld SES
1983	Ash Wednesday fires	Inquiries, Victorian Emergency Management Act
1998	Wollongong storm	Federal flood insurance discussions
2009	Black Saturday fires	Inquiry; "shared responsibility"; National Strategy for Disaster Resilience (adopted 2011)
2010–2011	Widespread floods	Victorian and Queensland flood commissions; National Disaster Insurance Review
2013		Rejection of compulsory flood insurance

The State/Territory Emergency Service is the key agency for disaster preparedness and response. Preceding the SES were civil defence organisations, established during the Great Depression of the 1930s and World War 2, and concerned with responding to potential attacks on Australia. The New South Wales (NSW) SES was the first agency dedicated to responding to emergencies and natural hazards, and was formed after the floods of 1955 [24]. It was followed by other states, such as in Tasmania after the 1967 Hobart fires [25] and in the Queensland after the 1974 Brisbane flood [26]. Other major events, such as the Ash Wednesday fires in Victoria, led to the drafting of that state's Emergency Management Act [27].

Issues around roles and responsibility have been raised in inquiries into a number of recent events. The National Strategy for Disaster Resilience (NSDR) was originally drafted in 2009 and adopted in

February 2011 [28], following the 2010–2011 floods. The Strategy builds on the 2008 National Disaster Resilience Framework [29], which began articulating the concept of “shared responsibility”, combining shared understanding of risk and a holistic and national approach to all disasters. The commission into the Black Saturday bushfires in Victoria states that communities, individuals, and all levels of government need to “accept increased responsibility” for fire safety and preparedness [5] by developing local fire response plans and shelters, and by improving education and communication. It also noted confusion between agencies about responsibilities and roles during the fires [30]. Although this was again a reaction to a major event, the Black Saturday Commission provided some specific suggestions of how councils and the community—both individuals and as a whole—could address fire risk. The inquiry into the Victorian floods found confusion over roles around both flood warnings and infrastructure, and that communities felt excluded from flood planning and response processes [31]. Similarly, the Queensland Flood Commission of Inquiry (QFCI), whose terms of reference covered the roles and actions of all governments, emergency services, the insurance industry, and a small subsection on the community, amongst other foci, found in its interim report that councils had inconsistent levels of flood knowledge and preparation, that information and warnings were not always shared effectively, and that emergency services were not sufficiently resourced to respond to the scale of flooding [32]. The final report discussed the need for consistent and up to date planning arrangements that take into account flood risk [33].

### 3. Methodology

Three of the stakeholder groups selected for this study are institutional stakeholders, in that they have official functions: council, SES, and the insurance industry, while the fourth is the local community. As they are responsible for local planning decisions and implementation, local councils were one of the stakeholder groups selected for this paper. State and Territory Emergency Services’ roles have some variation across Australia, but all are involved in natural hazard planning and response. Following media coverage of the 2010–2011 floods, the insurance industry was criticised for non-payment of claims and confusion over policy wording [34]. Flood insurance has only become widely available in Australia in recent years, and so the role of insurance in flood risk management is still being clarified. This study is limited in scale, and it should be noted that interviewees’ responses do not necessarily reflect the wider views of the stakeholder groups.

Semi-structured interviews were conducted with representatives of these three stakeholder groups, with these interviews being digitally recorded. A total of thirteen interviews were conducted, seven with council mayors and environmental or sustainability officers, three with representatives from the insurance industry (one from an insurance company, one from the Insurance Council of Australia, and one from a reinsurer), and three with representatives from the local units of the State Emergency Service. Interviewees were asked:

- how important flood awareness and planning was for their organisation/area;
- how they viewed the other stakeholders’ roles in regards to flood;
- what responsibility they felt residents had in preparing for floods;
- their thoughts on having national standards or guidelines around planning, information, and response.

Council, SES, and insurance participants were contacted by phone or email to introduce the research and arrange an interview. Council and SES participants were identified from their local council and SES websites. Interviews were conducted with council and SES representatives at the same time as fieldwork with local residents. Interviews lasted between 25 min and 1 hour.

A questionnaire was distributed to residents in the four case study locations, asking them about their awareness of flood risk, insurance status, and thoughts on flood risk reduction and the role of council, SES, and themselves in reducing flood risk. Council flood maps were used to identify those streets with the highest flood risk or, in the case of Brisbane and Emerald, those streets worst affected by their recent flood. All homes in identified streets were doorknocked, and 300 questionnaires distributed. Both Brisbane and Emerald surveys were also available online, with the Emerald survey promoted on local radio and available from the council website, so some participants will have completed the survey without direct contact with the researchers. As such, participants were self-selecting and their responses may not represent all views of each community. A total of 247 surveys were completed by residents across the four case study locations. The Queensland fieldwork was conducted in August and September 2011, approximately 7 months after their respective floods. The Dora Creek fieldwork was conducted in April 2012, and the Benalla fieldwork in May 2012. In all four locations the data collection took about one week. Insurance industry interviews were conducted in October and November 2012.

Four case study areas were selected to conduct interviews with local councils and residents in flood risk zones: Benalla in Victoria, Dora Creek in New South Wales, and Emerald and Brisbane in Queensland. The four locations were selected because of their high flood risk, their variation in size and their location in different states. New South Wales, Queensland, and Victoria together are home to more than 90% of Australia's at-risk properties [35]. The four locations selected have all experienced multiple floods in their history. Emerald has had two record floods recently, in 2008 and 2010 [36]. As well as the January 2011 flood, Brisbane has experienced numerous floods, the largest three in the nineteenth century, in 1841, 1844, and 1893 [36]. However, even the most recent previous major flood, in January 1974, is beyond living memory for much of the population. Benalla was only slightly affected by the Victorian floods in 2010 and 2012, and last experienced severe flooding in 1993. Dora Creek was last flooded on the June long weekend in 2007, and has a flood history dating back to the 1920s [37]. The communities are of different sizes: Dora Creek is a small peri-urban community between the cities of Sydney and Newcastle, Benalla and Emerald are large rural centres, and Brisbane is a major state capital. Two locations, Brisbane and Benalla, are among the ten communities with the most properties at risk in the country [35]. Interviews in Brisbane and Emerald also discussed the experience of the recent floods, and those in Benalla and Dora Creek were asked if there had been any changes in attitudes following the 2010–2011 floods.

#### **4. Results**

The following results are presented thematically, comparing the responses of the different stakeholder groups across key issues identified. Tables 2 and 3 provide the key points raised by each stakeholder group in response to each theme or question. While the answers provided by individual research participants within each stakeholder group were not always consistent, there was generally agreement on the broader issues. Answers are briefly expanded upon following the tables, and then

analysed in the discussion. Table 2 presents responses about their own and each others' roles, while Table 3 addresses some of the concepts discussed during interviews. Following the tables are some paragraphs and quotes expanding on the key points. Both masculine and feminine pronouns are used to accompany quotes to protect the anonymity of interviewees.

Representatives of council, SES, and the insurance industry held similar views about the importance of flood risk management as a concept, the importance of each stakeholder, and the need for residents to be aware of their flood risk. All three groups were concerned about complacency amongst residents, which they attributed to a lack of memory of previous floods, flood events being smaller than expected floods, and lack of knowledge about their risk. The insurance representatives focused primarily on the cost of premiums as an indicator of risk, and a blunt impetus for change. SES representatives' responses reflected a focus on the practicalities of flood events and the importance of having awareness of risk and applying it. Residents' responses often reflected both a passivity and an uncertainty about flood risk, and expectation that government and emergency agencies would take responsibility for flood prevention and response. Residents were not asked directly about either cooperation between stakeholders or national approaches/guidelines to flood, but a handful of respondents remarked on the need for various government levels and emergency services to work together more effectively.

When asked about the importance their council places on flood planning, council representatives in all locations recognised the high risk of their location. One council representative in Lake Macquarie stated that "realistically it's one of those examples you look back on and think that in hindsight you'd never have allowed development here". The need to adapt to flood risk was well acknowledged, with Emerald, Brisbane, and Benalla councillors emphasising new developments away from flood risk zones and the raising of properties in flood risk areas. Dora Creek is considerably more constrained by its topography, and so the local council and SES focused more on the need for evacuation plans. Climate change was not explicitly covered in this research, but both Benalla and Lake Macquarie councils stated they were incorporating climate change predictions into their planning decisions. On the other hand, one insurance representative felt that, while climate change is an important issue, the more immediate need is to address those areas currently at risk of flood.

The cost of flood risk was raised by respondents. The role of insurance is of course central to cost discussions, and insurance representatives felt that, while premiums have risen, they still do not accurately reflect the cost of living in high-risk locations. At the same time, they were mindful that residents would simply drop insurance if they felt premiums were too high. The greater spending on disaster relief compared to risk reduction was criticised, particularly the contrast between funding for disaster recovery in 2011 and risk reduction funding in 2012. One insurance representative stated that "last year they [the federal government] handed out \$800 million in grants, recovery grants to the local communities across Australia. So contrast \$800 million to \$20 million [for risk reduction], \$800 million in post-event recovery to \$20 million in pre-event mitigation, and we've got it completely wrong as a community". Councils felt that they needed more financial support from state and federal governments to afford to mitigate their flood risk. All stakeholders felt flood risk needed to be included in planning decisions, and worried that other interests—particularly financial interests in development—led to flood risk being downplayed.

**Table 2.** Perceptions of roles and responsibilities.

Stakeholder	Own role in flood planning	Views of role of insurance	Views of the role of SES	Residents' responsibilities	Views of role of council
Council	<ul style="list-style-type: none"> <li>• One of the most important planning issues</li> <li>• Desire increased mitigation funding</li> <li>• Were aware their locations were at high risk of flood</li> <li>• Need for communication about risk</li> <li>• Risk cannot be removed</li> </ul>	<ul style="list-style-type: none"> <li>• Feel residents should have flood cover</li> <li>• Feel insurers only care about profit</li> <li>• Aware premium increases are due to new cover</li> <li>• Want insurers to do more education</li> <li>• Dissatisfaction over insurance in Brisbane</li> </ul>	<ul style="list-style-type: none"> <li>• Community engagement and awareness</li> <li>• Work with SES on education campaigns</li> <li>• Event response</li> <li>• Critique in Brisbane for not being visible enough</li> </ul>	<ul style="list-style-type: none"> <li>• Must take personal responsibility, not just rely on council</li> <li>• Need to know their risk</li> <li>• Cannot expect floods to be “prevented”</li> <li>• But residents can’t be made accountable</li> <li>• Increased interest from residents</li> </ul>	<ul style="list-style-type: none"> <li>• Flood planning an important job</li> <li>• Use planning laws to reduce flood risk</li> <li>• Need to balance with other interests</li> <li>• Need good information on their risk</li> </ul>
SES	<ul style="list-style-type: none"> <li>• Flood management and response “core businesses”</li> <li>• Focus on response and evacuation</li> <li>• Different locations have different flood types/issues</li> <li>• Education and awareness programs</li> </ul>	<ul style="list-style-type: none"> <li>• See it as important personal mitigation</li> <li>• Did not have detailed knowledge on insurance issues</li> <li>• Have not had enquiries from residents</li> </ul>	<ul style="list-style-type: none"> <li>• Provide education and information</li> <li>• Event response—Evacuation, sandbagging, <i>etc.</i></li> <li>• Discuss with council at regional level</li> <li>• Joint programs with council</li> </ul>	<ul style="list-style-type: none"> <li>• Must take personal responsibility</li> <li>• Need to know how they’d be affected in a flood</li> <li>• Should have plans/ preparations ready to go</li> <li>• Can’t expect SES to always be there</li> </ul>	<ul style="list-style-type: none"> <li>• Important collaborators on awareness/education</li> <li>• Discussions at regional rather than local level</li> <li>• Use planning laws to reduce flood risk</li> </ul>
Insurance Industry	<ul style="list-style-type: none"> <li>• Signalling risk/influencing decisions through price signal</li> <li>• Want insurance and hazard costs considered in planning decisions</li> <li>• Feel councils don’t always take risk into account</li> </ul>	<ul style="list-style-type: none"> <li>• The “canary in the coal mine” on flood risk and cost</li> <li>• Is an indicator of risk, not transferrer of risk</li> <li>• Should influence decision-making and planning</li> <li>• Attend community meetings on request</li> </ul>	<ul style="list-style-type: none"> <li>• Educate community about risk</li> <li>• Flood event response</li> <li>• Don’t want SES’ role to be “overextended”</li> <li>• Role as “flood experts”; general advice, but not specific planning</li> </ul>	<ul style="list-style-type: none"> <li>• Must take personal responsibility</li> <li>• Insurance as a way to take personal responsibility</li> <li>• Concerned about complacency around floods</li> <li>• Need to have knowledge, but won’t be “technical experts”</li> </ul>	<ul style="list-style-type: none"> <li>• Need to consider flood in planning decisions</li> <li>• Feel some councils downplay their risk</li> <li>• Should implement stricter building requirements</li> </ul>
Residents	<ul style="list-style-type: none"> <li>• Expectation that officials will “take care” of the risk</li> <li>• More concerned with local issues</li> </ul>	<ul style="list-style-type: none"> <li>• Distrust of insurers</li> <li>• Misunderstanding of insurance cover</li> <li>• Find it too expensive</li> </ul>	<ul style="list-style-type: none"> <li>• Response and evacuation assistance</li> <li>• Education about flood risk</li> <li>• Assistance in flood planning</li> <li>• Seen as response agency, rather than preparedness</li> </ul>	<ul style="list-style-type: none"> <li>• Confusion over how to prepare for floods</li> <li>• Expectation of “official” assistance</li> <li>• High awareness of risk in all locations except Emerald</li> </ul>	<ul style="list-style-type: none"> <li>• Highly variable; significant levels of dissatisfaction</li> <li>• Should use planning laws to keep people out of flood zones</li> </ul>



**Table 3.** Concepts and themes of responsibility from interviews.

Stakeholder	Flood history and memory	Cooperation and coordination	View of role of government	National approaches/standards
Council	<ul style="list-style-type: none"> <li>• Need to remind people of the risk</li> <li>• Felt long-term residents were better informed than new residents</li> <li>• Concerned about complacency following long dry periods or smaller than expected floods</li> </ul>	<ul style="list-style-type: none"> <li>• Joint awareness/education campaigns with SES</li> <li>• Limited interaction with insurers</li> <li>• Need for “strategic” decision makers to communicate with “on the ground” groups</li> </ul>	<ul style="list-style-type: none"> <li>• Mitigation and disaster relief funding from all government levels</li> <li>• Want increased funding for mitigation and studies</li> <li>• Extra assistance for small/poor councils</li> <li>• Roles in planning, education, and awareness</li> <li>• Facilitate communities helping themselves</li> </ul>	<ul style="list-style-type: none"> <li>• Supportive of information standards</li> <li>• Concern standards would be too low</li> <li>• Want incentives for going above requirements</li> <li>• Uniform terminology so it is understandable across the country</li> </ul>
State Emergency Service	<ul style="list-style-type: none"> <li>• Need to remind people of the risk</li> <li>• Information/awareness campaigns</li> <li>• Benalla’s success with do not drive through floodwater’s campaign</li> <li>• Feel long-term residents are aware, new residents are not</li> </ul>	<ul style="list-style-type: none"> <li>• Joint awareness/education campaigns with council</li> <li>• Minimal interaction with insurers</li> </ul>	<ul style="list-style-type: none"> <li>• Funding for education/awareness programs</li> <li>• Discussions at state level, no local involvement</li> </ul>	<ul style="list-style-type: none"> <li>• Need to take into account local variations/differences</li> <li>• Preparations are different for flash flood to slow river floods</li> <li>• Similar/same terminology should be used in awareness campaigns</li> </ul>
Insurance industry	<ul style="list-style-type: none"> <li>• Council should do more flood education</li> <li>• Make use of floods to fund mitigation while memory is fresh</li> <li>• Flood information on rates notices</li> <li>• Flood needs to be “in the conversation at the dinner table at least once a year”</li> </ul>	<ul style="list-style-type: none"> <li>• Attend community information meetings when invited</li> <li>• Limited interaction with councils</li> <li>• Minimal interaction with SES</li> </ul>	<ul style="list-style-type: none"> <li>• Disagreement over government involvement in insurance</li> <li>• Some support for assisting current residents, but not future</li> <li>• Some feeling that market forces should decide</li> <li>• Building standards should include structural resilience</li> </ul>	<ul style="list-style-type: none"> <li>• Interest in centralised flood information portal</li> <li>• Disagreement over government involvement in insurance</li> </ul>
Residents	<ul style="list-style-type: none"> <li>• Some want reminders, some do not</li> <li>• Assumptions about safety: dams would “prevent” floods</li> <li>• Misunderstanding of floods frequency and Average Recurrence Interval</li> </ul>	<ul style="list-style-type: none"> <li>• A handful of comments on the need for various stakeholders—state and local government, SES, insurers—to work together</li> </ul>	<ul style="list-style-type: none"> <li>• Desire for dams, levees, <i>etc.</i>, to prevent floods</li> <li>• Expectations that officials would “take care” of floods</li> </ul>	<ul style="list-style-type: none"> <li>• No relevant comments</li> </ul>

The desire for land use plans that minimise the exposure of the community to floods was common to all four groups. While council representatives discussed the difficulty of balancing development and population growth pressures and limitations of local topography, some other respondents were more blunt. One insurance representative singled out what he/she saw as poor development decisions in Emerald, saying “you can at least take into account what would be worst and what would be best in developments for that area”. At the same time, councils felt they were often unable to meet expectations, particularly the Queensland locations, who were implementing the recommendations of the interim Queensland Flood Commission of Inquiry interim report [32]. As one council representative in Emerald described it, “they want all this done by next week or something. It’s impossible”. SES representatives saw their role as both assisting during flood events and facilitating community preparedness, with one SES representative in Cooranbong (Dora Creek) stating “it (flood preparedness) is our responsibility, but it doesn’t negate what the resident’s responsibilities are too”. Residents had less to say on the role of the SES, with many seeing them as solely a response agency, and a similar view came from the insurance representatives.

## 5. Discussion

### 5.1. Cooperation and Shared Responsibility

Both councils and the SES are stakeholders with a clear public interest function and purpose. While flood insurance is available to the public, it is a business with private and financial interests. As such, the three stakeholders are answerable to different groups: councils and the SES to the public, and insurers to policy holders, reinsurers and shareholders. While representatives of all other stakeholder groups interviewed viewed insurers as ethically questionable and concerned only with profit, those views were based on expectations that saw insurers more as charities than businesses. Similarly, while the representatives of insurers felt that their role did not include involvement in local flood mitigation and planning discussions, representatives from both council and SES felt that insurers should do more to educate individuals and communities about their local risk—an expectation for insurers to operate with a greater public interest focus.

Good cooperation between stakeholders is necessary to effectively manage flood risk [38,39]. The findings of this research indicate that the level of interaction between the stakeholders varied, but in these four case studies it was strongest between councils and the SES. While there were examples of cooperation between council and the SES such as the Floodsmart program in Benalla [40], the interaction of councils with insurers was more limited, with some attendance at community meetings and information events, but only at the request of local communities rather than as a formalised process. Even where terms such as resilience and cooperation are used, there is often little in the way of practical application given. Resilience is the ability of an individual, community, or organisation, to cope with and recover from disruption without losing their normal functioning [41]. The National Strategy for Disaster Resilience (NSDR), adopted by the Council of Australian Governments (COAG) in 2011, discusses the need for “shared responsibility” in addressing risks [6]. It defines a resilient community as one that “works together to understand and manage the risks that it confronts”, and recognises that addressing hazards requires the involvement of governments, emergency services, local communities, and insurers, describing it as “the collective responsibility of all sectors of society,

including all levels of government, business, the non-government sector and individuals” [6] but gives little guidance on how this is achieved or looks in reality. Emergency Management Australia’s guidelines have also discussed the need for prepared communities and active citizens [42]. A review by Richards [43] of the 2010–2011 floods observed an improvement in collaboration and coordination between various stakeholders, but noted the need for further improvement. For local and national resilience to floods and other hazards to improve, clear steps for how to work together as stakeholders are needed.

### *5.2. Residents’ Roles and Expectations*

While representatives of councils and the SES stressed that flood risk can never be removed completely and that floods need to be prepared for, residents’ responses indicated they favoured structural flood prevention options. The expectation of residents that preparing for flood was the responsibility of officials is common in regards to natural hazards [35,44,45]. In their analysis of media coverage of the 2011 Brisbane flood, Bohensky and Leitch [46] found that the community had placed expectations for preparedness and even prevention of floods on government. Drabek [47] noted that people will minimise the risk in their minds if disaster information is not specific enough, an observation well demonstrated by the comment of one Brisbane resident who stated that, despite living on the river, because his/her suburb was not specifically mentioned as one that would flood that “I assumed I was fine”. Just as residents in the four case study locations had high expectations of official assistance during flood events, research following the Black Saturday bushfires in Victoria in 2009 found that up to a quarter of residents expected emergency services to personally notify them of the need to evacuate before they would leave their homes [48]. Residents were also more concerned with what councils and the SES could do for them, rather than being proactive with their own preparations [27]. The need for all residents to be proactive in their own flood preparation, emphasised by all three institutional stakeholders, needs to be made clearer to residents.

Research into the 2000 floods in the United Kingdom found that residents there also attributed responsibility for the causes and solutions to official agencies [49]. Lave and Lave [50] found that residents in three Pennsylvanian communities both saw flood management as a government responsibility and lacked adequate knowledge to take flood protective actions themselves, while a Dutch study found the majority of residents see the government as having some or all responsibility for preparing for and preventing flood damage [51]. Despite these expectations, some residents in all four case study locations expressed a desire for better education and information about flood risk. These people recognised the importance of personal preparedness but were uncertain of what they could do to be better prepared. Many of those who expressed an interest in personally taking responsibility for planning for floods wanted information and resources so they could make use of it in future flood events. Comments made by these respondents included “I would follow recommendations”, “I would educate my children”, or saying information would be useful in preparedness simply “cause it would”. While there was a strong expectation of official help during a flood, the desire of some residents for better flood information shows there is ground on which to encourage residents to be more aware of their own flood risk and know what they can do themselves in the event of a flood.

### 5.3. Role of Emergency Services

While the SES originally emerged as an agency responsible for disaster response and recovery, its role has evolved over time and now also includes the provision of education to the public, the creation of flood plans, starting with the New South Wales State Emergency Service Act 1989, and participation in floodplain management committees [39]. Today, the SES is involved in emergency response, education and awareness, in all states and territories; contributes to development planning discussions in all states except Queensland and the Australian Capital Territory; and is responsible for evacuation in all states except Tasmania [52]. Representatives of the insurance industry saw the role of the SES as predominantly in post-disaster recovery, with one arguing that having too much involvement in other activities, particularly around land use and planning decisions, would “run the risk of diluting the mandate” the SES was designed for. Similarly, many residents largely viewed the SES as a response agency, rather than one involved in disaster preparedness. SES representatives, on the other hand, referred to public education programs, often conducted jointly with local councils, as part of their contribution to flood risk management. Residents voiced a desire for greater assistance from the SES during a flood event. A recent study by Gissing *et al.* [38] showed an increase of almost 200% in the number of requests for assistance in the space of one decade in the state of Victoria. Any attempt to increase the involvement of the SES in flood risk management will need to address the limited resources and personnel of the organisation, an issue noted in the interim report into the Queensland floods [32]. Gissing *et al.* [38] go on to stress the need for community engagement and preparedness, to encourage personal preparation rather than reliance on SES assistance during an event.

### 5.4. Insurance Discussions

The 2010–2011 floods were followed by confusion and criticism in the media over insurance coverage and definitions [53]. As a result some residents were uncertain of the role of insurance in addressing flood risk and their own flood cover. Until recently, flood insurance has not been widely available on residential policies in Australia [19]. This was at least in part due to a lack of detailed flood risk information, particularly maps indicating the potential extent and depth of extreme events. However, flood insurance has become increasingly available since 2008 because insurance companies now have the information to price individual household risk more accurately [54]. Views of the role and trustworthiness of insurance diverged between the stakeholders. For example, one insurance representative described his/her industry’s role as “the canary in the coal mine”, referring to the high level and cost of flood risk in Australia. On the other hand, one council representative described insurers as “pricks”, and felt they were more concerned with profits than the wellbeing of policy holders. All three insurance representatives suggested that residential dwellings should be constructed in a way that is able to withstand flood impacts, so they can be repaired at a lower cost rather than knocked down and rebuilt [55]. This would also reduce not only the cost of reconstruction but also insurance premiums.

### 5.5. Remembering, Forgetting, and Knowing Risk

The importance of flood history and memory of these events was frequently mentioned in responses from all stakeholder groups. As one insurance representative put it, “We’ve written poems, songs, and movies about our risk, but we forget when we’re in drought. We need to learn the lessons of the past.

We should use the dry periods as a time to put in mitigation”. The lengths of time since the last flood occurred varied in each of the four case study locations. Emerald has had two very large floods in quick succession (2008 and 2010), and as a result, many residents took further precautions in 2010 [56]. Brisbane’s most recent flood event prior to January 2011 was almost 40 years ago (1974) and, hence, beyond many people’s lifetimes, their memory, or the length of time they have been living in that location. In Benalla, the last significant flood occurred in 1993, still within much of the community’s living memory, but this event was followed by a number of smaller-than-expected floods, which led to residents expressing distrust in the information provided by the council and the SES. While most of the participants interviewed in the four stakeholder groups were in favour of actions that served as reminders of past events, such as memorials, flood height markers, signs, *etc.*, some residents just wanted to “forget”, as one Brisbane resident put it. Even by the first anniversary of the 2011 Brisbane flood, learning about the flood was largely limited to reflections on “community spirit”, as opposed to long-term adaptation [46]. Not only do residents sometimes desire to ignore past events, official responses do not always demonstrate that the lessons from past events have been learnt. For example, the vulnerability of New Orleans to Hurricane Katrina was exacerbated because lessons from Hurricane Betsy in 1965 had not been fully implemented: population growth continued to occur in the areas of the city most at risk, memories of the flood were lost due to population change, and a false sense of safety emerged as a result of the construction of flood protection levees [57].

In Australia, the Commission into the Black Saturday bushfires made similar observations about community memory and changes in population and land use since the severe fires of 1983 and 1939, noting that while previous fires had been severe, they had not been experienced by many of those currently living in the affected areas [58]. Similarly in Brisbane, many of the residents participating in this study commented that they thought the flood risk had been “taken care of” following the 1974 flood with the construction of Wivenhoe Dam. A representative of Brisbane council felt that poor management of the Wivenhoe Dam, upstream from the city and designed for both water storage and flood mitigation, had contributed to the flooding in their ward. Both he/she and several local residents stated that the dam had been described as being “built to stop future floods (so that) Brisbane wouldn’t flood again”, and this reliance on protection contributed to the dissatisfaction with officials over the Brisbane flood.

An interest in standardised information and planning requirements, language, and a single body for all information about flood risk was observed in the three institutional stakeholder groups. However, the need to balance the prescriptive elements of any standards while allowing flexibility to be responsive to local issues was highlighted as a potential challenge to any national approach. Insurance representatives referred to the United States’ National Flood Information Program (NFIP)’s centralised information agency and location as a model Australia could use. Suggestions for government involvement in subsidising insurance was frequently discussed but not supported by all respondents. The concerns expressed by some stakeholders regarding government subsidies were that they might provide an incentive for people to live in the highest-risk areas—this phenomenon has been observed as a result of the United States’ NFIP [59]. Despite those concerns, there is an acknowledged need to address the risk of those residents currently living in high-risk locations and those who were not aware of the risk when they moved into that property. One of the insurance representatives described this as finding a way to “grandfather in the grandfathers”, and made a suggestion he/she described as “lifetime squatter rights”, where the insurance premiums of current residents in such areas would be

subsidised, but those of future residents would not be. This would set a clearly defined time limit to the extent of government intervention. Recently-announced changes to the NFIP will see increases in insurance premiums for properties subjected to repetitive losses due to flooding [60].

This study is small in size, and while the research participants in the four locations showed interest in their flood risk, this cannot be taken as indicative of all councils across Australia. These councils saw flood as a high priority, but those locations that are less concerned may not take action if it is not required, *i.e.*, if any system is purely voluntary [61]. Related to this are Green's [62] warnings against flood risk management assumptions: that approaches and techniques that worked in one place will work in others; that getting stakeholders together will automatically result in cooperation; or, alternately, that the market will solve everything. One difficulty to be addressed is how to have structured, but responsive, approaches to flood events. Any process needs to be both meticulous and spontaneous, having both clear planning beforehand and flexibility to adapt [63]. The comments of residents in Benalla, that they wanted detailed plans from council and yet were critical of "cry wolf" warnings of events that were not serious, demonstrate the challenges of providing flood risk information that is credible and appropriate in a given situation.

## 6. Conclusions

Responsibility for flood risk management in Australia does not fall to any one stakeholder alone, but needs to be properly understood as the responsibility of multiple government and private sector actors—including the communities at risk. As the government's vision through the NSDR is to share responsibility between these stakeholder groups and calls for a stronger culture of shared responsibility in the face of rising losses due to floods and other natural hazards, future flood risk management arrangements need to focus on better defining and understanding the roles and responsibilities of each stakeholder group and improving communication and cooperation between organisations. While this study is only exploratory, the responses suggest there are differences in the understanding of different stakeholder groups of the roles and responsibilities of their own and those of other stakeholders involved in flood risk management. Differences in expectation are most notable with respect to the role of the resident: while representatives of local councils, the SES, and insurers expect residents to take more responsibility to protect themselves and their properties, the expectation of residents is that flood risk management is "someone else's job". The consequences of this situation are twofold: (1) poor communication, coordination, and cooperation between public and private organisations and residents; and (2) unrealistic expectations of the public of the skills, capacities and services that can be provided by public and private organisations to householders in order to reduce the risk of flooding at the property level. Further investigation into these differences in expectations, as well as the roles and responsibilities of other stakeholders, such as catchment management authorities and state and federal governments, are needed to better be able to address flood risk.

The various inquiries and reports following the 2010–2011 floods largely failed to include the potential roles and responsibilities of residents to be more aware of and better prepared for flood events, instead restricting their comments on residents to recommendations that flood risk information and warnings be more understandable and easily accessible [31,32]. In our opinion, this is an important oversight in the current debate over shared responsibility advocated by the NSDR. The question of whether residents should take more responsibility to prepare themselves for floods and to act in ways

that will minimise their vulnerability and potential impacts must be openly discussed. A debate that focuses only on the roles of governments, emergency services, and insurers and neglects the role of individuals is flawed and misses the boat.

### Acknowledgements

The authors thank John McAneney, Deanne Bird, and Katharine Haynes for their advice and input. The Brisbane and Emerald case studies were also part of a National Climate Change Adaptation Research Facility (NCCARF) funded study into the 2010–2011 floods, titled “Impact of the 2010–2011 floods and the factors that inhibit and enable household adaptation strategies”. Pamela Box is a Ph.D. candidate at Macquarie University. Financial assistance was provided by Macquarie University through their MQRES scholarship and additional research budget. An earlier version of this paper was presented at the 2013 Floodplain Management Association National Conference at Tweed Heads, Australia.

### Conflicts of Interest

The authors declare no conflict of interest.

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