

# HOW CAN WE IMPROVE COMMUNITY ENGAGEMENT FOR FLOODPLAIN MANAGEMENT?

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## **Abstract**

*Managing the floodplain: a guide to best practice in flood risk management in Australia* (Attorney-General's Department, 2013, p.145), states that "community engagement is vital to the successful development of the flood management study and plan. The community should be consulted to allow their concerns, suggestions and comments about management and options to be considered". Community engagement is also strongly suggested in the preparation of flood studies, and the implementation and evaluation of floodplain management options.

However, much of this community engagement is conducted by engineers and planners with little or no technical understanding in the field. In some cases, this results in community engagement not being effective as it could be.

This paper draws on research and practice in the field to provide guidance for floodplain managers to improve community engagement.

The psychologies underpinning community interest in floodplain management are identified and discussed. Interest factors include risk awareness, risk perception, flood experience, self-efficacy and protection motivation.

An initial step in the design of an effective community engagement plan should be a community profile to understand demographics including vulnerable groups. A high-level social network analysis is also recommended to harness social capital.

The community engagement plan should include both the engagement methodology and content, along with responsibilities, timeframes and evaluation techniques.

The paper concludes with helpful hints including:

- Importance of ongoing and regular dialogue with communities
- Gaining advice from local community engagement specialists including from councils
- Using the floodplain management committee to provide advice on community engagement
- Using a multi-source approach including both traditional and non-traditional methods.

## **Introduction**

'Managing the floodplain: a guide to best practice in flood risk management in Australia' (the Guide) (Australian Emergency Management Institute, 2013) provides a framework to understand and manage flood risk and its consequences to the community.

The Guide defines flood mitigation as “permanent or temporary measures taken in advance of a flood aimed at reducing its impacts” (p. 167). Flood mitigation is viewed as an important step in the goal of increased resilience to floods (p. xiii).

The Guide acknowledges that communities have an important role in providing advice and local knowledge about managing flood risk including mitigation measures. It encourages consultation with potentially-affected communities throughout the steps in its flood risk management framework including through reference committees, flood studies and floodplain management studies and plans.

“Community engagement is vital to the successful development of the flood management study and plan. The community should be consulted to allow their concerns, suggestions and comments about management and options to be considered.” (Australian Emergency Management Institute, 2013, p. 145)

In Australia, much of this community engagement relating to flood mitigation planning is conducted by engineers and planners (usually flood consultants and local council staff) with little or no technical understanding in the fields of community engagement or education. This may result in community engagement not being effective as it could be.

Whilst the Guide provides extensive details of understanding and treating flood risk, conducting a flood study, developing a floodplain management study and plan etc., it gives minimal advice on how to carry out community engagement that it strongly advocates.

This paper attempts to fill this gap. Firstly, it examines the academic literature related to the psychological and sociological predispositions of people to engage in floodplain risk management planning. From this and relevant past experiences and practices, some guidance in good practice community engagement for floodplain risk management planning is provided.

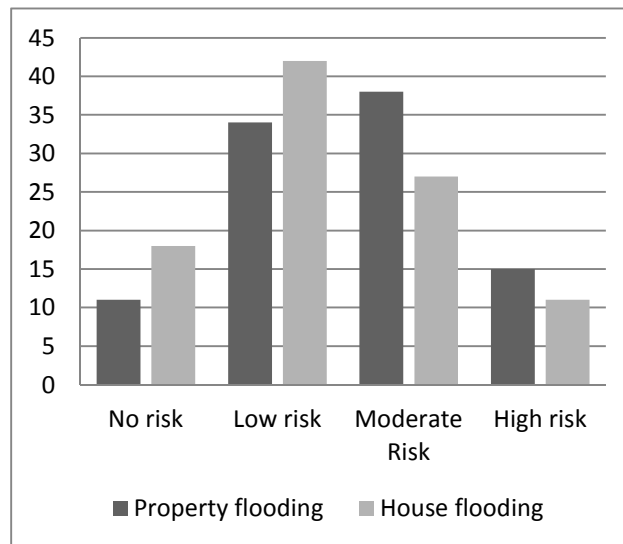
## **Why do people engage in floodplain risk management?**

An initial determinant of the willingness to engage in pre-planning for an emergency or disaster is **risk awareness**. If people do not envisage they are at risk in any way, they will be oblivious and not be involved.

It is common to find a relatively high percentage of people residing in floodplains that are unaware of their flood risk. For example, as shown in Figure 1, approximately 18% of those living in high risk flood-prone parts of Fairfield City (Sydney) did not know that they were at risk of above-floor flooding (Molino Stewart, 2012).

Studies across Europe (Bradford et al., 2012) support this observation, finding on average 20% of those living in flood-prone areas unaware of their risk of flooding. “Awareness was subsequently found to be strongly correlated to previous **flood experience**.”

Another factor influencing flood risk awareness is the **mobility** of the at-risk population. If the population is transient or a receiver of migrants (such as Fairfield City), the result is that knowledge of a localised flood risk may not readily be passed on between generations (Blyth et al., 2001); a problem that increases as the **duration between floods** becomes greater.



**Figure 1: Awareness of flood risk from those living in high-risk Fairfield City floodplains (source: Molino Stewart, 2012)**

Once people are aware of the existence of flood risk, then a major factor in determining their propensity for engagement in mitigation and preparedness activities appears to be **risk perception**. There is a plethora of psychological theories, models and research into why people conduct emergency pre-planning activities. Most of these identify the level of perception of risk as an important determinant.

In general terms, risk perception can be considered as an individual's interpretation or impression based on an understanding of a particular threat that may potentially cause loss of life or property. Eiser et al. (2012) prefer to use the phrase 'risk interpretation' to refer to "how we anticipate the outcomes of choices made either by ourselves, or by other decision-makers. Simply stated, interpretation of risk is a special case of the interpretation of uncertain information, and 'risk-taking, 'preparing' and 'avoidance' are special kinds of actions chosen under conditions of uncertainty".

To simplify matters, it would be useful to assume a linear relationship starting with risk awareness leading to risk perception and then to actions such as involvement in mitigation and preparedness activities. However, theoretical and research studies demonstrate much more complex interrelationships at play.

One model showing variables impacting on risk perception and then on hazard mitigation measures is the Protective Action Decision Model (Lindell and Hwang, 2008). As for risk awareness, it shows (Figure 2) that hazard experience has a strong influence on risk perception. **Gender, ethnicity and income** are also determinants. Thus there are inequities across a flood-prone community in risk perception.

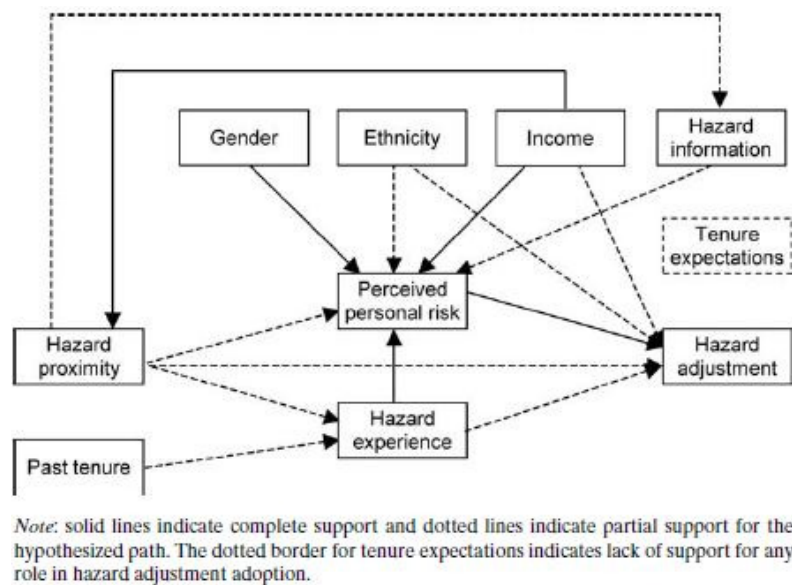
Prior flood experience can trap people into expecting the same again, the so-called 'prison of experience' (Kates, 1962), where people expect the future to be like the past. Thus, if a previous event resulted in minor disruption and impact then they are unlikely to be involved in planning for anything more significant.

Studies of people's low risk perception of flooding have identified some other factors including:

- Low risk perception in structurally protected areas e.g. behind levees, dams (Ludy and Kondolf, 2012): the 'levee syndrome'.

- Low levels of understanding of the probabilistic terminologies that describe flood magnitudes (Bradford et al., 2011)
- Disconnect between the language used by the engineering community and that understood by the public at large (Bradford et al., 2011)
- Unrealistic optimism, psychological attachment to the home or economic interests in not wishing to devalue the home by accepting and acknowledging risk (Burningham et al., 2008).

The latter issue can work in the opposite way when risk perception relating to property is heightened by flood information and instigates worry. As a result people become involved in floodplain risk management studies and planning to protest or complain over perceived risks to their property values e.g. by changes to flood extents such as due to sea level rise projections (Molino Stewart, 2011).



**Figure 2: Refined Protective Action Decision Model (Lindell and Hwang, 2008)**

It should be noted that there may be a discrepancy between the floodplain manager's and citizen's perception of flood risk (Paton, McClure and Burgelt, 2006). As stated previously, people can overestimate the capacity of flood mitigation strategies to eliminate a threat. Also they are not always privy to the data and objective analysis of flood risk available to floodplain managers. The likelihood that expert and citizen estimates of risk will coincide depends on the degree to which citizens are actively involved in decision making about acceptable levels of risk and the strategies used to mitigate this risk.

To add to the complexity of this psychological background, some researchers have found a direct relationship between risk perception and flood preparedness (e.g. Miceli et al. 2008; Grothmann and Reusswig 2006), while others found no such relationship (Siegrist and Gutscher 2008; Steinfuhrer and Kuhlicke 2007). Other factors identified that can impact on people's pre-flood actions include **self-efficacy** (one's belief in one's ability to succeed in specific situations or accomplish a task), **trust in the information source**, **fatalism** (the belief that the destructive effects of a hazard are inevitable) and perception of **time until the next flood**.

Arguably it is more difficult for people to become engaged in mitigation activities than preparedness activities, as mitigation involves ‘passive’ activities when a flood threat is not imminent (Sutton and Tierney, 2006). In an extensive literature review of those involved in public mitigation (Shreve et al., 2014), previous flood experience and **emotion** (e.g. worry) were found to be the main factors for engagement.

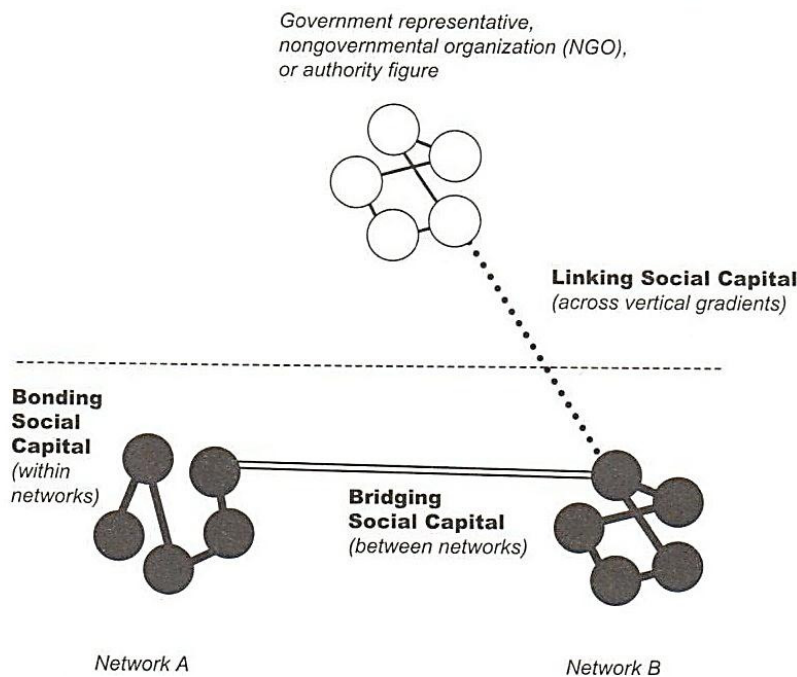
Studies of community involvement in flood mitigation activities provide further evidence for community engagement planning. For example, an international sample showed a general trend of limited interest in flood hazards, reluctance towards evacuation and lack of consensus between the general public and authorities (Krasovskaia et al., 2001). Flegentreff (2003) found that people supported non-structural mitigation measures (e.g. landuse planning) prior to a flood event, but then reverted to confidence in the existing structural defences after a flood.

## Community connectedness

The previous discussion provides an insight into why people might engage in floodplain risk management. However, people are social beings and live in communities, and therefore there are also broader social influences that explain their involvement (or lack of) in floodplain risk management.

People are bound together in communities through **social capital**. Social capital has been defined as the “networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (Putnam, 1995). It consists of those bonds created by belonging to a group that instils trust, solidarity, and cooperation among members.

There are three types of social capital as shown in Figure 3: bonding, bridging and linking.



**Figure 3: Bonding, bridging, and linking social capital (from Aldrich, 2012, p. 34)**

Social capital plays a considerable role in all phases of the disaster risk management cycle (Koh and Cadigan, 2008; Kuhlicke et al., 2011; Aida et al., 2013). In the mitigation phase, social trust can streamline decision-making in public flood protection projects, which are more likely to be accepted when backed by the wider community in a participative process. Public knowledge can complement expert knowledge and increase efficiency, particularly when decisions are made in conflicting and uncertain situations (Gamper and Turcanu, 2009). Citizen participation, therefore, creates opportunities to fast-track decision-making in floodplain risk management.

Kanakis and McShane (2016) in a study of flood- and cyclone-impacted communities in North Queensland found that 'social connectedness' was one of the main psychosocial determinants in the residents' desire to carry out and be involved in pre-disaster risk minimisation activities.

Though social capital is generally considered a resource that encourages community involvement in flood mitigation planning, certain negative effects need to be acknowledged. For example, Babicky and Seebauer (2016) found that expected social support might downplay risk, making it less likely that households engage in pre-flood action. They showed that "greater stocks of social capital are associated with lower levels of risk perception and higher levels of self-efficacy. This combination undermines the intention to take flood mitigation measures, making the adoption of non-protective responses such as wishful thinking, denial or fatalism more likely".

The **media** (including social media) have been shown to influence people's intention to be involved and carry out mitigation actions. For example, media coverage that emphasises devastation reinforces people's belief that disasters are too catastrophic for personal action to be effective (Keinen, Sadeh and Rosen, 2003). On the other hand, media coverage that shows distinctive damage and the value of mitigation options (e.g. levees) can help enhance people's outcome expectancy beliefs and propensity to be involved in mitigation and preparedness actions (Paton, McClure and Burgelt, 2006).

**Political juntas and power factions** can be highly influential in people's involvement in flood mitigation planning. For example, political parties and politicians may attempt to strongly sway their constituents to become involved in floodplain risk management for a particular outcome. Developers may wish to 'stack' engagement activities with pro-development community members. There are several lobby groups wishing to engage in flood risk management planning for a range of reasons e.g. the National Flood Forum in the United Kingdom.

## **Studies into community engagement and risk management planning**

There are a few studies of community engagement for hazard risk management planning that provide an insight into the more effective practices.

From research in the USA, Godschalk, Brody and Burby (2003) observed that "citizen interest in participating in the formulation of hazard mitigation policies in comprehensive plans is low, despite mounting evidence of perils to life and property from floods, hurricanes and earthquakes". To overcome this they recommended "co-ordinating hazard mitigation plans with comprehensive plan elements, connecting mitigation policies and quality of life concerns and preparing small area plans for locations with high hazard vulnerability. It is necessary to devise creative participation programmes in communities facing high hazard risks".

In a study of community engagement in wildfire mitigation in Canada, the USA and Australia, McGee (2011) conceded that “actively engaging members of the public in hazard mitigation can be challenging”. A key engagement strategy identified was ongoing communication between neighbours, and between neighbours and government agencies. “Interactive approaches involving two-way communication and partnerships are increasingly being advocated as a way to more actively engage citizens in wildfire mitigation and management”.

Fordham (1999) observed that flood professionals generally use top-down engagement activities that largely leave them in control of floodplain risk management planning.

“Professionals involved in flood planning and management employ a range of techniques but typically favour a limited number, such as public meetings with slide and video displays, and written information or newsletters. These clearly favour one-way communication - from the expert to the public - and leave the professionals largely in control (although public meetings can, of course, be highly adversarial and threatening to those ‘at the front’).” (Fordham, 1999, p. 32)

Instead, Fordham promotes “the participation of people in the analysis of problems and the development of proposals (which) is a vital characteristic of community based mitigation. The starting point is always the specific problems a community faces and people’s perceptions of how to solve them”.

Paton and McClure (2013) from community engagement theory identified several key community engagement implications for risk management planning. These included:

- Embedding discussions in existing social contexts (e.g. community meetings)
- Engaging with communities over time
- Allowing community members to define and resolve their own risk management problems
- Engaging with diverse communities to develop collaborative approaches to confront the threat
- Inviting representatives of community and business groups to review hazard scenarios
- Working with community leaders and training them to provide information and advice pertinent to the needs of their communities
- Agency and council staff to act as facilitators, mentors, change agents and coordinators as required, rather than directing in a top-down process.

## **What does this mean in practice?**

The previous discussion highlights complex reasons for why (or why not) people would engage in floodplain risk management planning. It also provides some guidance on general engagement approaches that have worked or could work well. These learnings can be transferred into the following suggested practices.

1. An initial step should be a community profile of the at-risk area to understand demographics including vulnerable groups. This can be obtained using census data and any relevant social research (e.g. local council community surveys). A high-level social network analysis is also recommended to help understand social capital. This can include the analysis of the Community Directory available on the websites of many local councils. It will provide details of community groups and linkages in the community being studied.
2. As shown in the psychological context provided previously, it is important early to advise all residences, businesses and other landuses (e.g. caravan parks) in

the flood-prone area that they are at risk of flooding. This will help ensure risk awareness across the flood study area. This could be done via a letter, or if the flood study or plan is in a small area, by doorknocking. It is not sufficient to assume that landowner notifications of flooding will suffice as many Australian flood-prone communities can over 25% renters, especially in metropolitan areas.

3. It is critical to communicate early (e.g. by media releases, face-to-face discussions, world cafes) in the flood risk management process about the local flood risk to enable accurate risk perception by local community members. This could build on existing community flood education and engagement. Content of the communication should be tailored locally to aspects of risk perception such as flood probability, the 'levee syndrome', the 'prison of experience' and impacts on property values. The communication should use non-technical language to introduce the flood investigation and explain flood probabilities and possible mitigation options. It should also encourage community participation in the process and advise how this could be done.
4. There are numerous psychological impediments for people to be engaged in floodplain risk management. For these reasons, the timing and venues used in community engagement are critical. People do not usually want to travel far and therefore informal interactions at local shopping centres and online appear to be more successful than in a community hall or council office. The timing should be when people are most available e.g. evenings, at weekends.
5. The process should utilise existing community engagement networks such as community groups, schools, chambers of commerce, Culturally and Linguistically Diverse (CALD) communities, religious groups and progress associations. Community representatives on the floodplain management committee may also be a conduit to people in the at-risk study area. These techniques will enable the engagement to 'lock into' social capital in the community.
6. Ongoing dialogue between flood professionals and citizens is critical to build up trust throughout the flood study and planning. Community members should be helped in relation to their risk perception – one way to do this is through the use of maps and flood photos. Their local flood knowledge and insight should be harnessed and appreciated. Participatory mapping and problem solving activities should be part of the engagement process to enable both flood professionals and community members to work together, rather than a top-down approach. Another useful participatory engagement technique is 'crowdsourcing' (a form of citizen science) where numerous community members provide information that is useful to the risk management planning process. For example, some local councils encourage community members to provide their photographs of previous flooding in the area to help build flood scenario data.
7. One of the tenets of community engagement is to 'close' each phase of the engagement by providing feedback to the community on input it has provided. This builds trust by demonstrating that community input has been heard and considered. An effective technique for phase closure is the use of a project bulletin providing details of community feedback and advertising the next phase in the risk management planning process.
8. For a true participatory engagement process, local communities should be involved in the planning of the engagement. Use of the floodplain management committee (assuming it has community representatives) is recommended to assist flood consultants and local council staff in the engagement development.
9. Local councils usually have community engagement and/or communications specialists than can advise what local social networks should be tapped into and the most effective engagement techniques. These specialists should be



'sounding boards' for the review of the community engagement plan and its roll-out.

10. An engagement approach using multiple techniques (traditional and non-traditional) is recommended as different people engage in different ways. If possible, a sample of the community should be surveyed to find out their preferred methods of engagement e.g. drop-in sessions, Listening Posts, public meetings, online engagement tools such as Bang the Table, social media, emails, websites.
11. The community engagement plan for the flood study or floodplain risk management planning should include both the engagement methodology and content, along with responsibilities, timeframes and evaluation techniques. A valuable guide to developing an effective community engagement plan is provided by the Victorian Government: <http://www.dse.vic.gov.au/effective-engagement>

## Conclusion

Even after a range of community engagement techniques have been used, community interest and engagement in the floodplain risk management process may be low.

The apparent lack of community interest should not be viewed as a failure or futile. It may be that those community members attending will 'spread the message' to others, and even become a 'champion' or supporter of the process.

There are complex psychological and sociological interactions that influence community engagement in local floodplain risk management. These should be understood and addressed in the development and implementation of community engagement plans. From the research, a participatory approach is encouraged to maximise community trust, input and benefit.

## References

Aida, J., Kawachi, I., Subramanian, S. V., & Kondo, K., 2013, Disaster, Social Capital, and Health. In I. Kawachi, S. Takao & S. V. Subramanian (eds.) *Global Perspectives on Social Capital and Health*, New York, Springer.

Aldrich, D.P., 2012, *Building resilience: social capital in post-disaster recovery*, Chicago, University of Chicago Press.

Australian Emergency Management Institute, 2013, *Managing the floodplain: a guide to best practice in flood risk management in Australia*, Australian Emergency Management Handbook Series, Commonwealth of Australia.

Babcicky, P., & Seebauer, S., 2016, The two faces of social capital in private flood mitigation: opposing effects on risk perception, self-efficacy and coping capacity, *Journal of Risk Research*, DOI: 10.1080/13669877.2016.1147489

Blyth, K., Baltas, E., Benedini, M., & Givone, P., 2012, *Risk of inundation - planning and response interactive user system*, Telematics Application Programme, 2001.

Bradford, R. A., O'Sullivan, J. J., Langan, S. J., Rotko, P., Bonaiuto, M., Twigger-Ross, C., Waylen, K., Aaltonen, J., Watson, R. D., & Carrus, G., 2011, Improving flood communications in Europe: Results from vulnerable and impacted communities, *Proceedings of the International Symposium on Urban Flood Risk Management*, Graz, Austria, 553–558.

Bradford, R.A., O'Sullivan, J. J., van der Craats, I.M, Krywkow, J., Rotko, P., Aaltonen, J., Bonaiuto, M., De Dominicis, S., Waylen, K., & Schelfaut, K., 2012, Risk perception – issues for flood management in Europe. *Natural Hazards and Earth System Sciences*, Vol. 12, pp. 2299-2309.

Burningham, K., Fielding, J., & Thrush, D., 2008, “It’ll never happen to me”: Understanding public awareness of local flood risk, *Disasters*, Vol. 32, pp. 216–238.

Eiser, J.R., Bostrom, A., Burton, I., Johnston, D.M., McClure, J., Paton, D., van der Pligt, J., & White, M.P., 2012, Risk interpretation and action: A conceptual framework for responses to natural hazards. *International Journal of Disaster Risk Reduction*, Vol. 1, pp. 5–16.

Flegentreff, C., 2003, Post-Disaster Situations as “Windows of Opportunity”? Post-Flood Perceptions and Changes in the German Odra River Region after the 1997 Flood. *ERDE-BERLIN*-, Vol. 134, No. 2, pp. 163.180.

Fordham, M., 1999, Participatory planning for flood mitigation: models and approaches. *Australian Journal of Emergency Management*, Summer 1998/1998, pp. 27-34.

Gamper, C. D., & Turcanu, C., 2009, Can Public Participation Help Managing Risks from Natural Hazards? *Safety Science*, Vol. 47, No. 4, pp. 522–528.

Godschalk, D.R., Brody, S., & Burby, R., 2003, Public Participation in Natural Hazard Mitigation Policy Formation: Challenges for Comprehensive Planning. *Journal of Environmental Planning and Management*, Vol. 46, No. 5, pp. 733–754.

Grothmann, T., & Reusswig, F., 2006, People at risk of flooding. Why some residents take precautionary action while others do not. *Natural Hazards*, Vol 38, pp.101–120.

Kanakis, K., & McShane, C. J., 2016, Preparing for disaster: preparedness in a flood and cyclone prone community. *Australian Journal of Emergency Management*, Vol. 31, No. 2, pp. 18-24.

Kates, R. W., 1962, *Hazard and choice perception in flood plain management*, Chicago, Illinois, University of Chicago.

Keinen, G., Sadeh, A., & Rosen, S., 2003, Attitudes and reactions to media coverage of terrorist acts. *Journal of Community Psychology*, Vol. 31, pp. 149-165.

Koh, H. K., & Cadigan, R. O., 2008, Disaster Preparedness and Social Capital. In I. Kawachi, S. V. Subramanian, & D. Kim (eds.), *Social Capital and Health*, 273–285. New York: Springer.

Krasovskaia, I., Gottschalk, L., Saelthun, N.R., & Berg, H., 2001, Perceptions of the risk of flooding: the case study of the 1995 flood in Norway. *Hydrological Sciences Journal*, Vol. 46, No. 6, pp. 855-868.

Kuhlicke, C., Steinführer, A., Begg, C., Bianchizza, C., Bründl, M., Buchecker, M., & De Marchi, B., 2011, Perspectives on Social Capacity Building for Natural Hazards:

- Outlining an Emerging Field of Research and Practice in Europe. *Environmental Science & Policy*, Vol. 14, No. 7, pp. 804–814.
- Lindell, M., & Hwang, S.N., 2008, Households' Perceived Personal Risk and Responses in a Multihazard Environment. *Risk Analysis*, Vol. 28, No. 2, pp. 539-556.
- Ludy, J. & Kondolf, G., 2012, Flood risk perception in lands “protected” by 100-year levees, *Natural Hazards*, Vol. 61, pp. 829–842.
- McGee, T. K., 2011, Public engagement in neighbourhood level wildfire mitigation and preparedness: Case studies from Canada, the US and Australia. *Journal of Environmental Management*, Vol. 92, pp. 2524-2532.
- Miceli, R., Sotgiu, I., Settanni, M., 2008, Disaster preparedness and perception of flood risk: a study in an alpine valley in Italy. *Journal of Environmental Psychology*, Vol. 28, pp. 164-173.
- Molino Stewart, 2011, *Community and stakeholder consultation for the Lake Macquarie Waterway Flood Management Plan*. Report for Lake Macquarie City Council. [https://works.bepress.com/neil\\_dufty/12/](https://works.bepress.com/neil_dufty/12/)
- Molino Stewart, 2012, *Community flood education and awareness in Fairfield City*. report prepared for Fairfield City Council. [https://works.bepress.com/neil\\_dufty/20/](https://works.bepress.com/neil_dufty/20/)
- Paton, D., McClure, J., & Burgelt, P.T., 2006, Natural hazard resilience: the role of individual and household preparedness. In D. Paton, & D. Johnston, *Disaster Resilience: An Integrated Approach*, Springfield, Illinois, Charles C Thomas.
- Paton, D., & McClure, J., 2013, *Preparing for disaster: building household and community capacity*, Springfield, Illinois, Charles C Thomas.
- Putnam, R., 1995, Bowling Alone: The Collapse and Revival of American Community, *Journal of Democracy*, Vol. 6, pp. 65-78.
- Shreve, C., Fordham, M., Anson, S., Watson, H., Hagen, K., Wadhwa, K., Begg, C, Muller, A, Kuhlicke, C., & Karanci, N., 2014, *Report on risk perception and preparedness*. Report for the TACTIC Consortium.
- Siegrist, M., & Gutscher, H., 2008, Natural hazards and motivation for mitigation behavior: people cannot predict the affect evoked by a severe flood. *Risk Analysis*, Vol. 28, pp. 771–778.
- Steinfuhrer, A., & Kuhlicke, C., 2007, *Social vulnerability and the 2002 flood*. Country report Germany (Mulde River). Report T11-07-08 of FLOODsite Integrated Project.
- Sutton, J., & Tierney, K., 2006, *Disaster preparedness: concepts, guidance, and research*. University of Colorado Natural Hazards Center, Institute of Behavioural Science.