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INCREASING RESIDENTS' PREPAREDNESS AND PLANNING FOR NATURAL HAZARDS

Annual project report 2016-2017

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The University of Melbourne





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EXECUTIVE SUMMARY

This project addresses the following problem statements: 1) what measures can best be used to capture individuals' preparedness and planning for natural hazards?, 2) how effective are traditional strategies, such as community engagement groups vs. brochures vs. websites vs. advertising in increasing preparedness and planning by residents of hazard prone areas?, and 3) what are some of the key barriers and motivators for residents' engagement with disaster resilience building activities, and how can strategies be improved to increase preparedness for natural hazards? All problem statements are being addressed within the context of bushfires and floods.

Over the past 12 months, this project has undertaken the following:

- We have developed and finalized two survey studies that address Problem Statement 3. These studies examine the role of perceived community culture in motivating residents to engage with resilience building initiatives and preparedness activities. The first study examines this in the context of bushfires, and the second does so in the context of floods.
- Data collection for the two studies addressing Problem Statement 3 was conducted between October 2016 and March 2017. The bushfire study contains two waves of data, one collected at the start of the bushfire season, and one collected towards the end of the fire season. This data was collected in four states across Australia, namely Western Australia, South Australia, Victoria, and Tasmania. The flood study contains a single wave of data collection, which was collected in February 2017. This data was collected in New South Wales and Queensland.
- In addition to the above, this year saw the finalization of a paper on bushfire preparedness in households with versus without children, written in collaboration with Prof Kevin Ronan. This paper has received an invitation to be resubmitted with minor revisions from the journal "Natural Hazards".
- Finally, this year was the final year of the first stage of the BNHCRC (2014-2017). The project leaders of this project were informed that the project will not be continued in the second phase due to a requested shift in focus to recovery rather than preparedness for natural hazards by its end-users. Subsequently, discussions were held with end-users around the potential utilization of the project outcomes, and a 3-month extension was put in place in order to finalize technical reports on the community culture study. These reports will be finalized in the first quarter of the 2017-2018 financial year.



END USER STATEMENT

Andrew Richards, *New South Wales State Emergency Service, NSW*

The 'Improving Household Level Preparedness for Natural Hazards' project began in 2014 by measuring household preparedness for bushfires and floods and measuring the effectiveness of traditional strategies to increase householder preparedness.

This project shifted its focus in response to end-user feedback in 2015 to incorporate the influence of community culture and in 2016 developed community based engagement strategies such as community led approaches on household preparedness.

In 2017, the project team has developed

- A Hazard Note and paper on children and household preparedness
- A paper on the relationship between worry and preparedness.
- A technical report on community culture and how preparedness for bushfires and floods is shaped by social norms, ability and attitudes.

Utilisation of this project will provide agencies with:

- a) evidence-based feedback about the effectiveness of their current strategies that motivate people to prepare and plan for natural hazards;
- b) evidence to assist agencies to improve the effectiveness of existing engagement strategies;
- c) stakeholder briefings, hazard notes and technical reports;
- d) the groundwork for the transformation of the Bushfire Household Preparedness tool into an industry standard tool and measures for floods and other hazards.



INTRODUCTION

The increasing frequency and complexity of natural hazards poses a challenge for community resilience. Communication and education of risk mitigation strategies play an essential role in building and maintaining resilience through preparation by residents. However, before the start of this project, relatively little was known about the effectiveness of existing hazard communications and education strategies in increasing preparedness and planning. Also, we identified a need to determine what some of the key barriers and enablers to preparedness are to improve the baseline effectiveness of these community engagement strategies.

This project combines expertise in communication, social and consumer psychology, and disaster and emergency management. It is designed to aid the development of evidence-based strategies that motivate appropriate action during the prevention and preparedness phases of disasters. More specifically, it will address the following problem statements: 1) what measures can best be used to capture individuals' preparedness for hazards?, 2) how effective are existing traditional strategies such as community engagement groups vs. brochures vs. websites vs. advertising in increasing preparedness by residents of hazard prone areas?, and 3) what are some of the barriers and enablers in residents' preparedness for hazards, and how can the existing strategies used to increase preparedness for hazards be improved?

These problem statements will be examined through quantitative survey-based studies across Australia, with individual/household level preparedness for bushfires and floods as the main outcome variables of interest.

By addressing these problem statements, this project will provide evidence-based recommendations for end-users about how to improve the effectiveness of strategies that aim to increase preparedness amongst residents of hazard prone areas.



PROJECT OVERVIEW

The first stage of the project started in January 2014 and will continue until June 2017. The 3 phases that form a part of Stage 1 are outlined below:

PROJECT PHASES STAGE 1 (2014 – 2017)

Phase 1

In the first phase, the focus was on the development of the key dependent measures for the studies, namely measures of preparing for bushfires and floods. These measures needed to cover a variety of preparedness types, so as to form a basis on which to compare individual households on how prepared they are for response to and recovery from bushfires and floods.

Phase 2

In the second phase, we used these dependent measures to examine the relative effectiveness of traditional communication strategies that are currently being used, such as the availability of community-based information sessions, providing information through websites and brochures, and the use of advertising campaigns in increasing preparedness for bushfires and floods.

Phase 3

In the third phase of the project, we focused on identifying key barriers and motivators for residents' engagement with disaster resilience building activities. In other words, the Phase 3 study examined why some individuals or households prepare more so than others, and why some individuals or households engage with disaster resilience building programs in their community more so than others. This was examined within the context of community culture. More specifically, two studies examined the role of different community norms and attitudes and their influence on residents' motivation to prepare. This allowed for the identification of ways in which current strategies may be improved.



PROJECT ACTIVITIES SINCE JULY 2016

RESEARCH ACTIVITIES JULY 2016 – JUNE 2017

Objective and Method. To address the problem statement attached to Phase 3, namely 'What are some of the barriers and enablers in residents' preparedness for hazards, and how can the existing strategies be improved?', we designed two studies that examined the role of community culture, specifically community attitudes and social norms, in motivating residents to engage in resilience building activities related to bushfires (study 1) and floods (study 2). Results from these studies will be presented in two Technical Reports, which are planned to be finalised in the first quarter of 2017-2018.

Method study 1

The bushfire study was designed as a longitudinal study with two waves of data collection (see details copied from draft Technical Report below):

"Data was collected at two time points. The first point of data collection (Wave 1) was two weeks into the 2016/2017 bushfire season and the second point of data collection was eight weeks into the 2016/2017 bushfire season (Wave 2). Exact timing of the data collection was staggered by state and region, depending on when the official fire season was declared in each locality.

To select participants, we used a short screening questionnaire. Potential respondents were screened out and not eligible to complete the survey if they;

- i. Were under the age of eighteen years old, or*
- ii. The closest bushland (e.g., park, reserve, undeveloped public or private land, etc.) that was at least one hectare in size, was more than 100 meters away from where they lived, or*
- iii. They were not the main person making bushfire safety related decisions in their household, or alternatively they did not equally share the decision making with their partner/spouse or other adults in the house.*

The study was conducted in Victoria, South Australia, Western Australia and Tasmania. A total of 871 respondents successfully completed Wave 1, with 291 residents residing in VIC, 265 in SA, 209 in WA and 106 in TAS. In addition, a total of 248 respondents successfully completed both surveys with 75 residents residing in VIC, 45 in SA, 69 in WA and 59 in TAS."

Results study 1.

Preliminary results show the following (see details copied from draft Technical Report below):

- Peers' attitudes towards preparing are perceived to be similar to residents' own attitudes, whereas council and ES are believed to hold more positive attitudes towards preparing.



- Residents perceive other residents to be less prepared than they are, unless it regards their peers, whom they judge to be equally prepared. Council and ES are perceived to be *more* prepared.
- Residents hold higher expectations towards themselves when it comes to being prepared than expectations perceived of other residents and peers, Council is perceived to hold similar expectations to the residents' own expectations, whereas the Emergency Service is seen to hold greater expectations.
- Perceived ability to prepare is more important than personal attitude towards preparing in predicting preparedness. The former is related to all aspects of preparedness, whereas the latter is only related to planning/evacuation and perceived ability to respond/recover.
- Perceived attitudes towards preparing of peers are more relevant than the perceived attitudes of residents in general in predicting preparedness.
- When it comes to official bodies, the perceived attitudes towards preparing of the local Emergency Service are more important in relation to predicting ability to respond, whereas the perceived attitudes of the local council are more important in relation to predicting availability of social support in the aftermath, and they are negatively related to planning and fire resistance.
- Community groups' perceived actions (descriptive norms) speak louder than their words (attitudes) in predicting preparedness.
- Descriptive norms (as compared to injunctive norms) are stronger and more consistent predictors of preparedness when they are set by residents and peers, whereas injunctive norms (as compared to descriptive norms) are better predictors of preparedness when they are set by the local council.

Method study 2

The flood study was designed as a single wave study (copied from draft):

“Quantitative research was conducted with an online survey. Respondents were recruited through an online panel provider. Data was collected in February 2016 during the flood prone period of the year.

To select participants, we used a short screening questionnaire. Potential respondents were screened out and not eligible to complete the survey if they;

- I. Were under the age of eighteen, or*
- II. They reported that their local community/suburb was not an area that could potentially be flooded by a nearby river/creek/waterway, or*
- III. They reported that their home was not at risk of getting flooded by a nearby river/creek/waterway, or*



IV. They were not the main person making flood safety related decisions in their household, or alternatively they did not equally share the decision making with their partner/spouse or other adults in the house.

The study was conducted in New South Wales (NSW) and Queensland (QLD). A total of 297 respondents successfully completed the survey, with 146 residents residing in NSW and 151 in QLD. Within NSW, 78 respondents lived in major urban areas, whereas 68 lived in non-urban areas. Within QLD, 116 respondents lived in major urban areas, whereas 35 lived in non-urban areas."

Results study 2.

The project team is currently in the process of writing up results.

END-USER ENGAGEMENT JULY 2016 – JUNE 2017

A summary of key contact moments with our end-users over the past 12 months, the purpose of the contact, and its outcomes has been provided below:

- Early August 2016: A teleconference was set up in early August to discuss project planning for Stage 2 of the BNHCRC.
- Mid August 2016: Our project leaders were notified that this project will not receive funding for the second stage of the BNHCRC. Instead, it will enter the utilization phase.
- Mid August 2016: Final feedback was sought and received in relation to the two community culture studies that were developed to address Problem Statement 3, with data collection planned to start in October 2016.
- Early September 2016: A teleconference was set up to discuss the news regarding discontinuation of the project and to discuss which utilization products would still be of use to our end-users.
- September 2016: The AFAC/BNHCRC conference in Brisbane provided us with an opportunity to meet with some of the researchers from our cluster and some of the end-users. In addition, it provided us with an opportunity to share a summary of the findings in relation to a study on household preparedness in households with versus without children with a larger audience.
- February 2016: We finalized a draft of a Hazard Note covering the findings in relation to the study on household preparedness in households with versus without children. This draft was sent out to our end-users for feedback. The feedback was integrated into the Hazard Note, which was submitted to the CRC in March 2016.
- February 2016: We finalized a paper on household preparedness in households with versus without children. This paper was sent out to our end-users with an invite for questions and comments. The paper is currently



under review at Natural Hazards. It has received feedback from reviewers and we were invited to resubmit with minor revisions.

PROJECT RELATED PUBLICATIONS

Below is an overview of the three project related papers that have been published in high standing peer-reviewed journals since the start of the project. Abstracts from each of the papers are copied below.

1. McNeill, I.M., Dunlop, P.D., Skinner, T.C., & Morrison, D.L. (2016). A value and expectancy based approach to understanding residents' intended response to a wildfire threat. *International Journal of Wildland Fire*, 25, 378-389.

[To motivate residents to evacuate early in case of a wildfire threat, it is important to know what factors underlie their response-related decision-making. The current paper examines the role of the value and expectancy tied to potential outcomes of defending versus evacuating upon awareness of a community fire threat. A scenario study amongst 339 Western Australians revealed that residents intending to leave immediately upon awareness of a community fire threat differ from those not intending to leave immediately in both value and expectancy. For one, intended leavers were more likely than those intending to defend their property to have children. Also, the data showed a trend towards intended leavers being less likely to have livestock. Furthermore, intended leavers placed less importance on the survival of their property than those with other expressed intentions. They also reported lower expectancies regarding the likelihood of achieving positive outcomes by defending than those intending to defend or wait and see before deciding what to do. Finally, intended leavers perceived it more likely that they would avoid harm to their pets by evacuating than those intending to defend throughout or wait and see. These findings have important implications for strategies to influence residents' response-related decision-making.]

2. McNeill, I.M., & Dunlop, P.D., Skinner, T.C., & Morrison, D.L. (2016). Predicting risk-mitigating behaviors from indecisiveness and trait-anxiety: two cognitive pathways to task avoidance. *Journal of Personality*, 84, 36-45.

[Objective: Past research suggests the traits indecisiveness and trait-anxiety may both decrease the likelihood of performing risk-mitigating preparatory behaviors (e.g. preparing for natural hazards), and suggests two cognitive processes (perceived control and worrying) as potential mediators. However, no single study to date has examined the influence of these traits and processes together. Examining them simultaneously is necessary to gain an integrated understanding of their relationship with risk-mitigating behaviors.



Method: We therefore examined these traits and mediators in relation to wildfire preparedness in a two-wave field-study amongst residents of wildfire-prone areas in Western Australia (total N = 223).

Results: Structural equation modeling results showed that indecisiveness uniquely predicted preparedness, with higher indecisiveness predicting lower preparedness. This relationship was fully mediated by perceived control over wildfire related outcomes. Trait-anxiety did not uniquely predict preparedness or perceived control, but did uniquely predict worry, with higher trait-anxiety predicting more worrying. Also, worry trended towards uniquely predicting preparedness, albeit in an unpredicted positive direction.

Conclusions: This shows how the lack of performing risk-mitigating behaviors can result from distinct cognitive processes that are linked to distinct personality traits. It also highlights how simultaneous examination of multiple pathways to behavior creates a fuller understanding of its antecedents.]

3. McNeill, I.M., & Dunlop, P.D. (2016). Development and preliminary validation of the CUWQ: A measure of individual differences in constructive vs. unconstructive worry. *Psychological Assessment*, 28, 1368-1378.

[This article presents a measure of individual differences in the tendencies to worry constructively and unconstructively, called the Constructive and Unconstructive Worry Questionnaire (CUWQ). The measure is based on a control theory perspective of worry, and separates the tendency to worry in a way that facilitates goal-pursuit and threat reduction (Constructive Worry) from the tendency to worry in a way that hinders goal-pursuit whilst sustaining threat awareness (Unconstructive Worry). CUWQ scores were validated in two independent nonclinical samples, including North American (Sample 1, N = 295) and Australian (Sample 2, N = 998) residents. Final scale items were elected based on Sample 1, and the measure showed good model fit through a confirmatory factor analysis in Sample 2. In addition, scores on the two subscales showed criterion-related validity by statistically predicting a variety of outcomes in both samples: Constructive worry was positively associated with punctuality and wildfire preparedness and negatively associated with trait-anxiety and amount of worry. Unconstructive worry, on the other hand, was positively associated with trait-anxiety and amount of worry, and negatively associated with punctuality and wildfire preparedness. The two scale-scores were uncorrelated in Sample 1 and positively correlated in Sample 2, thereby showing that having a tendency to worry in an unconstructive manner does not prohibit one from worrying in a constructive manner as well. Understanding how the two tendencies to worry differ from each other and separating their measurement enables a better understanding of the role of worry in both normal behavior and psychopathology.]



In addition, the following papers have come out of the project by our PhD student Cathy Cao:

- Cao, Y., Boruff, B.J., & McNeill, I.M. (in press). Towards personalised public warnings: harnessing technological advancements to promote better individual decision making in the face of disasters. *International Journal of Digital Earth*. (2015 Impact factor = 2.76)
- Cao, Y., Boruff, B.J., & McNeill, I.M. (2016). Is a picture worth a thousand words? Evaluating the effectiveness of maps for delivering wildfire warning information. *International Journal of Disaster Risk Reduction*, 19, 179-196. (2015 Impact factor = 1.24)
- Cao, Y., Boruff, B.J., & McNeill, I.M. (2016). Defining Sufficient Household Preparedness for Active Wildfire Defense: Toward an Australian Baseline. *Natural Hazards Review*, 17.



PUBLICATIONS LIST TO DATE

PEER REVIEWED JOURNAL PUBLICATIONS

- McNeill, I.M., Dunlop, P.D., Skinner, T.C., & Morrison, D.L. (2016). A value and expectancy based approach to understanding residents' intended response to a wildfire threat. *International Journal of Wildland Fire*, 25, 378-389. (Based on Bushfire CRC data; Impact factor = 2.51)
- McNeill, I.M., & Dunlop, P.D., Skinner, T.C., & Morrison, D.L. (2016). Predicting risk-mitigating behaviors from indecisiveness and trait-anxiety: two cognitive pathways to task avoidance. *Journal of Personality*, 84, 36-45. (Based on Bushfire CRC data; Impact factor = 2.94)
- McNeill, I.M., & Dunlop, P.D. (2016). Development and preliminary validation of the CUWQ: A measure of individual differences in constructive vs. unconstructive worry. *Psychological Assessment*, 28, 1368-1378. (Accepted November 5, 2015; Based on BNHCRC data; Impact factor = 2.75)

TECHNICAL REPORTS

- McNeill, I. M., Boldero, J. B., & McIntosh, E. (2015). Report on the selection of Preparedness and Planning measures for "Improving the Role of Hazard Communications in Increasing Residents' Preparedness and Response Planning for Recurring Natural Hazards".
- McNeill, I. M., Boldero, J. M., & McIntosh, E. (2016). Household preparedness for bushfires: The role of residents' engagement with information sources.
- McNeill, I. M., Boldero, J. M., & McIntosh, E. (2016). Household preparedness for floods: The role of residents' engagement with information sources.
- McNeill, I. M., Boldero, J. M., & McIntosh, E. (2016). September 2015 community led planning study: Lessons Learned in Relation to the Low Response Rate.

CONFERENCE PRESENTATIONS

- McNeill, I., Boldero, J., Handmer, J., Johnston, D., Dudgeon, P., & Wearing, A. (2014). Improving the role of hazard communications in increasing residents' preparedness and response planning. Poster presented at the AFAC and Bushfire and Natural Hazards CRC joint conference, Wellington, New Zealand, September 2-4, 2014.
- McNeill, I. M., Boldero, J. B., & McIntosh, E. (2015). Preparing for fires and floods: The role of different information sources. Presentation at the Disaster and Emergency Management Conference, Gold Coast, May 4-5, 2015.
- McNeill, I., Boldero, J., & McIntosh, E. (2015). Does the use of information sources lead to better hazard preparedness? Poster presented at the AFAC and Bushfire and Natural Hazards CRC joint conference, Adelaide, Australia, September 1-3, 2015.
- McNeill, I., Boldero, J., & McIntosh, E. (2015). Household preparedness for fires and floods: An empirical evaluation of the role of information sources.



Paper presented at the 2nd International Symposium on Disaster Management, Melbourne, Australia, October 12-14, 2015.

- McNeill, I., Dunlop, P. (2016). Introducing the CUWQ: A measure of individual differences in constructive and unconstructive worry. Poster presented at the European Conference on Personality, Timisoara, Romania, July 19-23, 2016.
- McNeill, I., Dunlop, P. (2016). Introducing the CUWQ: A measure of individual differences in constructive and unconstructive worry. Paper presented at the European Conference on Personality, Timisoara, Romania, July 19-23, 2016.



CURRENT TEAM MEMBERS

PROJECT MANAGEMENT/LEAD RESEARCH TEAM

- Dr Ilona McNeill (Project Leader) – The University of Melbourne
- A/Prof Jennifer Boldero (Project Leader) – The University of Melbourne
- Ms Adriana Vargas-Saenz (Research Assistant) – The University of Melbourne. Adriana joined our team as a part-time casual staff member in April 2017

EXTENDED RESEARCH TEAM

- Prof John Handmer – RMIT University
- Prof David Johnston – GNS Science/Massey University
- Dr Paul Dudgeon – The University of Melbourne
- Emeritus Professor Alex Wearing – The University of Melbourne
- Dr Patrick Dunlop – The University of Western Australia

END-USERS AND ASSOCIATED FEEDBACK PROVIDERS

- Andrew Richards (Lead End-User) – NSW SES
- Amanda Leck – AFAC
- Anthony Clark – RFS NSW
- Fiona Dunstan and Peta O'Donohue – CFS
- Glenn Benham – SA MFS
- Gregory Wild – Fire & Rescue NSW
- Gwynne Brennan and Karen Enbom – CFA
- John Richardson – Red Cross
- Michelle Coombe – SAFECOM
- Phil Canham – ACT ESA
- Sandra Barber – TFS
- Susan Davie – VIC SES
- Suellen Flint and Tracey Leotta – DFES
- Trent Curtin – MFB
- Wendy Kelly – AGD

STUDENTS (COMPLETED)

- Yinghui (Cathy) Cao – The University of Western Australia. Cathy finished her PhD thesis in early 2017.



REFERENCES

- ¹ McNeill, I. M., Boldero, J. M., & McIntosh, E. (2016). Household preparedness for bushfires: The role of residents' engagement with information sources.
- ² McNeill, I. M., Boldero, J. M., & McIntosh, E. (2016). Household preparedness for floods: The role of residents' engagement with information sources.
- ³ McNeill, I., Boldero, J., & McIntosh, E. (2015). Does the use of information sources lead to better hazard preparedness? Poster presented at the AFAC and Bushfire and Natural Hazards CRC joint conference, Adelaide, Australia, September 1-3, 2015.
- ⁴ McNeill, I., Boldero, J., & McIntosh, E. (2015). Household preparedness for fires and floods: An empirical evaluation of the role of information sources. Paper presented at the 2nd International Symposium on Disaster Management, Melbourne, Australia, October 12-14, 2015.
- ⁵ McNeill, I., Boldero, J., & McIntosh, E. (2016). September 2015 community led planning study: Lessons learned in relation to the low response rate.
- ⁶ McNeill, I.M., Dunlop, P.D., Skinner, T.C., & Morrison, D.L. (2016). A value and expectancy based approach to understanding residents' intended response to a wildfire threat. *International Journal of Wildland Fire*, 25, 378-389.
- ⁷ McNeill, I.M., & Dunlop, P.D., Skinner, T.C., & Morrison, D.L. (2016). Predicting risk-mitigating behaviors from indecisiveness and trait-anxiety: two cognitive pathways to task avoidance. *Journal of Personality*, 84, 36-45.
- ⁸ McNeill, I.M., & Dunlop, P.D. (in press). Development and preliminary validation of the CUWQ: A measure of individual differences in constructive vs. unconstructive worry. *Psychological Assessment*.