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COMMUNITY UNDERSTANDING OF THE TSUNAMI RISK AND WARNINGS SYSTEMS IN AUSTRALIAN COMMUNITIES

Annual project report 2014-2015

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Cover: A sign signifies a tsunami evacuation zone in New Zealand.

Credit: David Bruce, Bushfire and Natural Hazards CRC.

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EXECUTIVE SUMMARY

Purpose

This report provides a review of the initial stages of research into Community Understanding of the Tsunami Risk and Warnings Systems in Australian Communities. The need for this work derives from the fact that the Australian coastline faces some 8,000km of active tectonic plate boundary capable of generating tsunami that could reach Australia in 2-4 hours. Recognition of this risk led to the development of the Australian Tsunami Warning System (ATWS).

The exposure of coastal areas and short lead times makes it important that members of the communities exposed to tsunami threat accept their risk and act on this to increase their response capability. The latter includes knowing of the ATWS, being able to receive warnings, and being able to respond (rather than having to react) to warnings in timely and effective ways. This project is researching these aspects of community response capability.

Procedure

This project has adopted a qualitative approach (thematic analysis) to understand people's tsunami risk and warnings beliefs. Community members living in coastal areas are currently being interviewed. The interviews are asking for people's views on:

- Causes, location of origin of tsunamis, and tsunami travel times,
- warning times and how long people will have to respond to warnings,
- warning sources and media of dissemination, and
- what people will be warned of and the actions warnings should trigger.

Results

Initial interviews in communities in NSW, Queensland, Tasmania and WA identified diverse views on what people should be warned of, and how to warn them. Views on what people should be warned of included long term issues (e.g., problems evacuating, long term impact on infrastructure, resourcing etc.) and immediate actions (e.g., knowing one's evacuation route). A need to adapt warnings to specific geographical localities and to enhance community readiness was identified.

Following discussions with end-user agencies, NSW SES and Surf Life Saving Australia/Australian Tsunami Advisory Group, the project has been refocused to more clearly examine how interaction between community members and end-user agencies influences tsunami risk and warning beliefs. The results of this work will be used to inform the development and implementation of a community engagement strategy that can be used by end-user agencies to develop community warning and response strategies.

END USER STATEMENT

Andrew Richards, *Manager, Community Engagement, NSW State Emergency Service*

As an end user for the tsunami project I have been actively involved in the development of the research agenda through several teleconferences with Doug, I understand Sarah has also been involved representing SLSA. I was interviewed by Katelyn and participated in a focussed discussion and presentation with/ to other agency representatives at the RAF and provided more specific feedback on the project deliverables and approach. I have sourced interviewees from SES and am currently assisting to connect the research team to other coastal agencies and organisations. I acknowledge involvement of the SES, SLSA and ATAG as end users in co-creation and implementation of the project and I am satisfied with the progress report. Well done team!

Sarah Anderson, *Public Safety Project Coordinator, Surf Life Saving Australia*

In representing ATAG as an end user of this research, I've worked closely with the research team via teleconferences and a face-to-face meeting to prepare the research deliverables. Doug discussed the deliverables with the ATAG group via a teleconference at the latest ATAG meeting in May 2015. The group refined the deliverables through a collaborative process with Doug. I've also assisted Katelyn in promoting the interview opportunity to SLS members. Other ATAG members have been invited to do the same thing. I recognise the contribution of the SES and ATAG to the project and its development. The project is proceeding well and we look forward to the next stages.

INTRODUCTION

The Eastern Australian coastline faces some 8,000km of active tectonic plate boundary that is capable of generating tsunami that could reach Australia in 2-4 hours (Australian Bureau of Meteorology, 2008; Dominey-Howes, 2007). Bird and Dominey-Howes (2006) cite work by Molino-Stewart that identifies that in New South Wales, some 330,000 people are living at or below a height of 10 metres above sea-level and within 1km. of the coast or a coastal river. The at-risk population is thus high. Recognition of this risk promoted the development of the Australian Tsunami Warning System (ATWS) on the grounds that an effective warning system has a pivotal role to play in effective tsunami risk management in Australia.

The effectiveness of a warning system is a function of its ability to detect a threat, issue a warning, and facilitate timely action in those at risk. While the ATWS can detect a threat and issue a warning (e.g., as was the case in 2009 and 2010), realizing the full benefits of the system also involved insuring that those at risk can receive and interpret the warning and are able to act on it as soon as it is received. This introduces a need to consider the relationship between the ATWS and the public. The ATWS, consequently, identified the general public as warnings recipients. However, the manner of their relationship with the ATWS is not articulated in detail.

This is not an omission per se. Rather it reflects the fact that the level of diversity (e.g., in terms of geographic location, topography, demographics, length of residence etc.) that exists when areas facing tsunami threats are taken as a whole makes it difficult to formulate specific relationships in ways that could accommodate all possible contingent relationships that affect how people receive, interpret and act on warnings. This means that national warnings developments must be complemented by local (geographical, community-based) initiatives. That is, specific issues surrounding receiving and acting on warnings must be developed at a local level to reflect and, where possible, accommodate diversity in the development of local warnings and community response capabilities. It is essential that these issues are tackled prior to a tsunami event occurring.

Activation of the ATWS could result in warning times (depending on initial location of the tsunamigenic event and the point of impact on the Australian coastline) that could range from 90 minutes to 3 hours. Warning times of these durations would not be sufficient for people to develop their capacity to respond in situ (e.g., to prepare their property, plan an evacuation etc.) on receipt of a warning. This, in turn, highlights the need for warning system development to include developing peoples' capability to respond promptly and appropriately in advance of tsunami hazard activity occurring.

Achieving this objective is a task that faces several significant hurdles. Firstly, it is well documented that even when the hazard (e.g., bushfires in Australia, earthquakes in New Zealand) occurs relatively frequently, levels of household and community preparedness are generally low. This issue is magnified by the highly infrequent and often discounted perceptions of tsunami and tsunami hazards in Australian coastal communities (Paton, Frandsen & Johnston, 2010). Consequently, attempting to encourage preparedness for a hazard that is

effectively (from a community perspective) unknown in Australia will be difficult. A second challenge concerns the need to consider the design issues that need to be accommodated in the public education and community outreach component of a comprehensive tsunami risk management strategy.

For example, the ATWS describes how the dissemination of warnings information can derive from one of several sources. While the ATWS identifies one warning source, Bird and Dominey-Howes (2006) found considerable diversity with regard to public expectations regarding the sources of tsunami warnings. This makes it important to ensure that the agencies with potential roles to play in this process (State and Territory Emergency Services, Relevant Government Agencies (and many NGOs (e.g., Red Cross, Surf Life Saving organizations, Fishing associations etc.) and Communication Channels (e.g., news media – and, both directly and indirectly, various social media communication channels)) are coordinated and provide consistent and complementary information to public recipients. Achieving this level of coordination is a challenge (Bird and Dominey-Howes, 2006; Paton & McClure, 2013; Posetti & Lo, 2012; Watson, 2012). This makes it vital to include all potential stakeholders in the development of warnings and warning response processes.

Consequently, researching the characteristics of effective tsunami warning systems, how they are developed, how they are implemented, and accommodating and engaging all community and agency stakeholders in the process is important. How this can be done, and the issues that must be accommodated in the developmental process, represent currently unanswered sources of questions. These questions provide the context for this project. Following from the above discussion, this project will focus on issues arising at the interface between agencies and the public and on issues relating to how people receive and interpret warning and how they develop an enduring capacity to respond in effective and timely ways to the receipt of a warning. The latter is important and derives from the fact that the infrequent nature of the hazard requires the maintenance of community knowledge and capability over time. The challenge inherent in facilitating sustained warning response capacity is evident from work on tsunami warning processes in communities in which the hazard is acknowledged as a component of the local hazard-scape (Gregg, Houghton, Paton, Johnston & Yanagi, 2007; Johnston et al., 2005).

An initial literature review on tsunami hazards and risk in Australian contexts has been completed. This was used to formulate the research questions established for this project (see below). Because the project will adopt a qualitative approach the literature review has served as a context for the development of research questions. This analysis will use a qualitative approach (thematic analysis) to identify key issues in the development of tsunami risk beliefs and processes and their relationship to warnings and warnings processes (in a way that maintains the opportunity to develop work in this area while producing initial systematic insights into the process).

When adopting such an approach, it is not recommended that the researcher conduct an exhaustive literature review prior to carrying out the research. This approach is recommended to ensure that the data collection (and initial analyses) is not biased by existing research findings or theory and to avoid developing additional preconceived ideas that may bias the analysis (Strauss &

Corbin, 1998). It is proposed that any relevant materials discovered during the course of the research are only to be used to enhance the developing theory (Charmaz, 2006; Douglas, 2006).

The literature was reviewed initially to develop the research question and ensure that the work could be situated within the literature (Andrews, 2003). Thereafter, the evolving theory/model of warning response processes will emerge during the research process. Once the study is completed, the research findings will inform the development of a comprehensive review. A complete literature review, and one informed by the research findings, will be submitted with the final report.

Research on tsunami risk beliefs and perceptions of tsunami warning systems and their effectiveness is limited. Johnston, Paton, Coomer and Frandsen (2009) found that, following the introduction of the ATWS, community knowledge of this hazard and its implications was mixed. While the majority of their respondents (from communities in NSW, Queensland, WA and Tasmania) were knowledgeable about the causes of tsunami, they were less clear about significant characteristics of tsunami hazards such as the timing and spacing of tsunami waves. These kinds of misunderstandings have been implicated in increasing risk to communities affected by tsunami (e.g., Gregg et al., 2007).

Johnston et al. found that 89% of respondents could describe the elements of the ATWS. This is an improvement on the findings of Bird and Dominey-Howes (2006) in Sydney. They found low rates (8% for council officers and 29% of the public) of knowledge about a warning system for Sydney. However, despite the improvement in knowledge of the ATWS, this has not automatically converted into enhanced public response capability. For example, a majority (66%) believed that it is difficult to prepare for tsunami (and highlights key issues regarding the fact that knowing one's risk and knowing what to do to manage the risk at household and community levels is not the same – Paton & McClure, 2013). It is thus important to conduct research into how to develop community response capability. This need has been reinforced by other research findings.

For example, while Johnston and colleagues found that some 95% of respondents stated that they would evacuate if instructed to do so, 98% did not know of an evacuation route (official or otherwise). This illustrates how a belief in complying with a formal request need not necessarily convert into developing the actual capability to do so. Evidence for exercising some caution in accepting data that implies public compliance can be implied from other sources. Anecdotal data, derived from media reports, suggesting that people's behaviour may be inconsistent with their expressed beliefs comes from observations that Gold Coast residents flocked to the beach following a tsunami warning issued following the 2010 Chilean earthquake. This highlights a need for more systematic research into the relationships between people's expressed intentions and what their actual behaviour is likely to be.

Additional evidence for increasing research into people's ability to act on warnings comes from Johnston et al's. finding that some 69% of respondents were unaware of the existence of neighbourhood or community plans (cf. Bird & Dominey-Howes, 2006) and were generally unprepared to respond despite their apparent (and high) level of risk acceptance. These data highlight a key issue regrading people's readiness to respond in effective and timely ways to events

that may present limited response times (difference between when a warning is issued and the arrival of the hazard). These issues were further highlighted in Paton, Frandsen and Johnston's (2010) mixed methods analysis of tsunami risk beliefs and preparedness in Tasmania.

Interviews with residents found that while all acknowledged the risk posed by tsunami, only one of 29 respondents believed that it was a significant threat to them or their community. This position was based on their being unaware of tsunamis in Tasmania's history, a lack of obvious local causes, and no evidence of past events. Paton and colleagues found that this was reflected in their structural equation modelling analysis. Paton et al. found that risk perception was a poor predictor of action. In contrast, risk rejection (e.g., no evidence of past events, exaggeration of risk) had a significant and negative influence on beliefs and actions.

Together the above works highlights that:

a) People's acceptance of the existence of a hazard does not automatically translate into motivation to develop their capacity to respond and to act in the (unpredictable) circumstances in which they may find themselves and in which they will have limited time to make decisions and take appropriate actions,

b) More work is needed to investigate the relationship between the origins and construction of individual and collective risk beliefs, the recognition of a threat, and that

c) The development of a motivation basis is crucial to providing a foundation for risk communication and community outreach/ engagement programs designed to fully realize the potential of the ATWS to provide warnings that trigger timely and effective community responses. This analysis provides the rationale for Research Questions 1 – 3.

Paton et al. (2010) identified that community tsunami preparedness was influenced by community processes and planning. As introduced above, Johnston et al. (2009) reported low levels of neighbourhood or community planning. Given that risk perceptions and the action people take to confront risk are socially constructed (e.g., Paton & McClure, 2013), it is important that research examines how and why (or not) people engage with others in ways that facilitate the development and maintenance of beliefs and actions required to enhance their capacity to respond (rather than react) to ATWS warnings in timely and effective ways.

However, the complexities of contemporary communities, particularly with regard to community diversity and the growing tendency for communities to be relational rather than locational in urban areas, create additional challenges for this research goal. For this reason, this research will explore both how community interaction and, particularly, interaction via social media (with its greater capacity to accommodate relational community membership and its increasing use as a risk communication/community engagement tool) influence the development of tsunami risk beliefs and actions. This provides a rational for Research Question 4 (and will also inform #3).

The final research question stems from how Figure 1 describes the dissemination of warnings information deriving from (potentially) several sources. This makes it

important to explore how the several agencies that comprise the State and Territory Emergency Services, Relevant Government Agencies (as well as NGOs (see above) and Communication Channels coordinate and complement the dissemination of information to public recipients. This provides the rationale for Research Question 5. This will also draw on findings emanating from #4 given the growing popularity of social media as vehicles for disseminating information to and relating with the public.

Research Questions:

1. What are individuals' perceptions of tsunami risk in their local Australian communities?
2. How do individuals in these communities develop their tsunami risk beliefs and preparedness?
3. What risk communication issues arise when dealing with low/no risk awareness/acceptance?
4. How might social/communities and the technologies and social media resources influence communication about and encourage community engagement about tsunami risk and preparedness within at-risk communities?
5. How do community engagement processes, direct and social-media mediated, facilitate the effective linking of formal sources of tsunami warning advice and information (State and Territory Emergency Services, Relevant Government Agencies and Communication Channels with the public?

PROJECT BACKGROUND

The aim of the project is to identify the nature and origins of current community tsunami beliefs and knowledge and examine how beliefs/knowledge can inform the development of, implementation of, and evaluation of tsunami risk communication, warnings systems and tsunami preparedness in Australia. The outcomes of this work will be the provision of evidence-based warnings strategies and practices for at-risk coastal communities with participating end users who include the Australian Tsunami Advisory Group, Surf Life Saving Australia and NSW SES and the subsequent development of an action research program that will evaluate tsunami-related community engagement/warning processes and their development in ways that will map onto the needs of end-user agencies.

Since commencement of the first qualitative study, the project has grown through the active engagement between end-user stakeholders and researchers, and now includes two new qualitative pilot studies and a tsunami risk communication literature review. These additions are being carried out under the funding extension approved in June 2015. This decision was made based on further discussions with ATAG, SLSA and NSW SES since late 2014 which have helped to further identify specific research objectives that they wish to obtain through the project. These research objectives are as follows:

Project RESEARCH Objectives (POs)

ATAG

PO1. Identify factors that influence how people are interpreting tsunami risk and warnings processes and identify how to influence behaviour and reactions for tsunami events (being low frequency).

PO2. Identify how community groups are using the "Tsunami: The Ultimate Guide" publication to inform their developing a community engagement framework to increase utilization of "Tsunami: The Ultimate Guide."

PO3. Identify how teachers are using "Tsunami: The Ultimate Guide" and whether there are accessibility issues with the location of "Tsunami: The Ultimate Guide."

NSW SES

PO4. Conduct a review of risk communication/warning processes from existing literature to inform and develop SES practice.

PO5. Identify how (selected) coastal and marine groups interpret warnings and develop approaches for risk communication with these groups about the risks and actions related to them in the event of a tsunami, including those relating to land versus marine tsunamis.

We are currently addressing each of these project objectives with an action research program which is looking to integrate the findings from the first qualitative interview study with the two pilot studies which will be described in the "what has the project been up" to section of this report. Collectively from these studies the following project deliverables will be developed:

Project Deliverables (Ds)

ATAG

D1. Report on people's interpretation of tsunami risk and warnings. This will be sourced from interviews from coastal areas around Australia. It will include a) analysis of the reasons for people's risk and warnings beliefs, and b) recommendations for developing risk communication messages to increase ability to receive and act on warnings. Date: August 2015

D2. Report on how target volunteer groups and community groups are interpreting their risk and whether and how they are communicating this within their community/ group. The report will include discussion of whether and how each group is using "Tsunami: The Ultimate Guide" (and why or why not) and use these data to develop recommendations for developing the use of "Tsunami: The Ultimate Guide" to support warning and preparedness programs. Date: September 2015

D3. Report on how teachers (and schools) are using "Tsunami: The Ultimate Guide" and how and why (or why not) they are doing so and whether/how this is linked to other hazard/risk management activities. The report will identify recommendations for developing the use of "Tsunami: The Ultimate Guide" to support warning and preparedness programs in schools. Date: October 2015

NSW SES

D4. Compile a report reviewing work on risk communication and behaviour change and deliver a workshop that will cover: how this information can be used; what policy and practice issues are raised in doing so; and what new risk communication needs arise specifically in relation to tsunami warning and preparedness programs. Date: July 2015

D5. Report on Interviews with selected SES and coastal and marine groups (e.g., SLS clubs, marine rescue, coastal care groups, beach goers, marine workers (transport, fishing), boaters, fisherman, divers etc.). Date: Early October 2015.

D6. Provide a workshop with SES representatives to identify the implications of the research for the 2015/16 risk management program. Date: October 2015

WHAT THE PROJECT HAS BEEN UP TO

The first study for this project set out to interview community volunteers that participate in coastal activities and emergency services in a range of Australian coastal communities; so to identify community perceptions and understanding of tsunami risk, and awareness of tsunami warning systems. In particular, this study is looking to address research outcome PO1, but will also feed into project deliverables D1, and in part, D2 and D6.

Community volunteers were chosen as a group of interest because they would represent a "best case" example of current community levels of tsunami awareness, knowledge of warnings, and readiness for a tsunami threat. This is because these individuals are embedded in the community and so will provide insight into the community contexts that inform tsunami risk perceptions. Also, due to their coastal volunteering activities, they are more likely to been exposed to tsunami risk communications and knowledge than other community members and therefore, they would have had opportunity to develop an understanding of tsunami risk despite infrequent and unpredictable nature of tsunami events. By understanding the processes and contexts by which these volunteers already learn about and understand tsunami risks and warnings, this therefore will help the project to determine potential means for communicating and engaging with coastal communities about tsunami risk and warnings.

In response to the requests and recommendations of our End Users we have since the start of this project also incorporated two pilot studies: the first of which is investigating tsunami community engagement and education both in schools and in communities, and the second is investigating tsunami knowledge and existing communication processes within select coastal recreation groups and occupations. The first pilot study addresses research objectives PO2, PO3 and PO5, and will inform deliverables D2, D3 and partially D6. Meanwhile, the second pilot study will address objectives PO1, PO2, PO5, and deliverables D1, D2, D5 and D6 respectively.

Both pilots will adopt the same semi-structured qualitative interview technique which will be analysed using a thematic analysis approach (Braun & Clark, 2002; Guest, MacQueen & Namey, 2011) as the first study for this project. This ensures that interview questions and analysis for each of these studies remains complementary and will facilitate the later integration of the results of the prospective projects into the theory development process. Recruitment for both of these pilot studies is currently underway and interviews will be collectively conducted between June and September. Our End Users will then assess whether the findings of these studies warrant a continuation of the project with new and/or ongoing studies to further explore the issues framed by their research objectives and any additional new objectives that are generated by the project.

Community Volunteer Interviews

So far the first study includes 18 telephone interviews have been conducted since November 2014 with community volunteers affiliated with Surf Life Saving Australia, the Australian Red Cross and Coastcare, Tasmanian SES and NSW SES. Participants were from coastal areas around Greater Hobart, Bruny Island, Burnie, Adelaide, Sydney, Moruya Heads, Darwin, and Perth. Interviews were conducted

using a semi-structured qualitative questionnaire schedule asking participants to describe their current knowledge of tsunamis, their perceptions of tsunami risk in their local communities, what they would do in the event of a tsunami, where and how they would expect to find tsunami related information.

An update on the project and this study was presented at the March RAF in Sydney. During this presentation a number of initial anecdotes identified during interview and transcription process were describe including:

- Participants so far have either expressed the view that they were unsure how likely it would be that a tsunami would affect themselves and their community, or thought that is was very unlikely.
- People expected warnings to come from a number of sources with radio and sms being the most commonly mentioned. People also acknowledged internet/social media, word of mouth and tv as other ways they might receive a tsunami warning.
- Some thought that the tsunami warnings would be like those sent out by the bushfire warning systems (which some interviewees had received in the past). With specific information such as how long until the tsunami will hit, where, where to evacuate to, locations of evacuation centres, etc.
- Only 8 interviewees acknowledged either the SES or BOM as official sources of tsunami warning communications, with only 1 acknowledging both.
- Most interviewees highlighted the need to acknowledge the existence of multiple ways of getting out warnings, that warnings should be issued by all potential warning sources, and that they would seek multiple sources (i.e., on receiving a warning respondents stated that they would first check with at least one other source) before acting on a tsunami warning.
- Social media has been described both as a useful means of communicating risk and receiving warnings, and as potential negative source of warnings or information. The latter aspect of social media sources included concerns about this medium increasing the risk of spreading false information, eliciting panic, and (some) people stating that they trusted the information from social media less compared with other sources (e.g., ABC radio). Meanwhile, others highlighted that social media was a good way to inform and warn a lot of people quickly. The role of social media provided a good example of the contradictory positions that could be taken by different sectors of the community. Those holding positive beliefs about social media expressed the opinion that people would information and warnings more seriously if issued via social media compared with other sources (particularly if information about warnings arrived via social media from people they trusted to share information and to pass warnings on to them).
- It was perceived that warnings would provide enough time to for them respond to a tsunami threat, with estimations of warning time being between 20 mins and several hours. Some acknowledged this this time would be variable and depend on things such as, the origin of the tsunami

event and how quickly the event was identified as being likely to cause a tsunami.

- Interviewees estimated that around 30mins was enough time for them to respond. Responses included checking alternate information and warning sources, check on their neighbours, contact loved ones, gather together people/pets and items, and evacuate. A few acknowledged not being at home, potential traffic issues, and being separated from children as issues that might affect their response. While some respondents mentioned that factors such as stress and fear (see below) might affect what others were doing, few believed this could be a factor impeding their own preparations and actions within the time between warning and impact.
- Most ascribed their knowledge as coming from stories of tsunami events such as the Boxing Day Tsunami and the Japan Tsunami in the news. For some interviewees their knowledge as came from personal experience working or living in a tsunami affected area, conversation as with friends affected by tsunami, their university studies, or through work with their respective volunteer organisations.
- So far, none of the interviewees have acknowledged the "Tsunami: The Ultimate Guide" website or associated materials as a source of information during the interviews.

Since the RAF, the coding of the interviews has highlighted some more anecdotes that will be explored with further analysis.

- Few interviewees have discriminated between marine-based tsunamis and land tsunamis.
- The impacts of a tsunami were described most commonly in terms of large and devastating land tsunamis likes those they had observed on the news, or the tsunami have no/limited impact as it would be too small.
- Interviewees tend to describe that they would seek out more information after receiving a warnings, and this was more common if they had received the warning from others in the community or through the news. These (mass media) sources were often (but not always) described as untrustworthy, where in contrast they would seek out information from sources they deemed as trustworthy most commonly being the ABC emergency broadcast and the BOM website.
- In general, the internet was the "go to" place for finding out additional information about tsunami.
- A number of people thought that they wouldn't prepare (such as make a plan, prep home, pack essentials to take with them) until they had received a tsunami warning (see above re. the time frame people expect to be available to conduct such preparedness).

- Interviewees suggested community meetings to be a useful way to teach people about tsunami risk, despite this though a number suggested they or others wouldn't probably attend these.
- Interviewees suggest that initiatives to educate and prepare people for tsunami should be cost effective, and that attention should be focused towards education for more likely hazards such as bushfire and not on very rare events like tsunami.
- Some participants described a believe that people were well prepared for bushfires and other natural hazards and approaches used in communication, education and warnings for bushfires should be applied to tsunami.
- In contrast, some thought that overall bushfire preparedness was low, so if people aren't preparing for a more common hazard, why should we focus on educating and preparing for (much less frequent) tsunami.
- There was a common concern that people in the community would overreact and panic when they received a tsunami warning because people wouldn't know what it meant or hadn't experienced it before.
- Text message warnings were the most common preferred form of receiving a warning in particular from a trusted source such as the emergency services or the government. This was reasons given for this were because that was the one source of communication they kept on them (besides radio, TV etc.) and because other's would be less likely to be listening to the social media, radio or TV.

The final findings from the thematic analysis of these interviews will be presented in a report (D1) which will highlight the reasons for current levels community of tsunami risk perception and readiness, and the report will also provide recommendations for risk communication strategies for increasing tsunami readiness and awareness in Australia.

Education and Engagement Pilot

The first pilot study is looking at how "Tsunami: The Ultimate Guide" is or is not being used within communities and school settings, why "Tsunami: The Ultimate Guide" is being used in this way and how does this relate to educators and engagers perceptions of tsunami risk, warnings, and readiness. Recruitment of Teachers through Teaching Associations, SLSA and SES volunteers began in June this year, with interviews anticipated to be finished by late August.

Selected Coastal Groups Pilot

The second pilot study will interview selected coastal community group members to identify how these different groups interpret tsunami risk and differentiate between different types of tsunami and how that translates into tsunami related responses and behaviours. The coastal groups targeted will include at-risk marine users such as beach goers, water based recreation sports such as fishers, boaters, and, marine workers.

By interviewing these groups we will be looking to develop a series of recommendations on how these different marine groups manage tsunami risk and how these groups can be better engaged in tsunami risk awareness and readiness strategies and so be utilized as a resource for facilitating community engagement and outreach. Given the diverse (within each geographic area) nature of community group characteristics, needs, history, resources etc., adopting a bottom-up approach that capitalizes on local expertise and knowledge will represent a more cost-effective basis for developing local warnings and preparedness processes.

So far we have begun recruiting SLSA, NSW SES volunteers to participate in these interview this month. Meanwhile, we are currently in the process of engaging with, and gathering the support of a number of groups to assist with recruitment including: NSW Coastcare, NSW fishing associations (such as NSW Fishing Clubs Association Inc, Amateur Fishermen's Association of NSW), The Boat Owner's Association of NSW, Maritime Union of Australia (Newcastle and South NSW Branches), and the NSW Water Scouts.

A Literature Review will be developed for the SES. This review will summarise key issues in warnings process and preparedness. This will provide a foundation for ensuring that research and practice utilises what is known and builds on existing knowledge.

PUBLICATIONS LIST

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