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Community Identity and Actionable Risk Communication: A Theoretical Framework for Motivating Flood Preparedness

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Community Identity and Actionable Risk Communication:
A Theoretical Framework for Motivating Flood Preparedness

by

Rachel Hogan Carr

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Presented to the Graduate and Research Committee
of Lehigh University
in Candidacy for the Degree of
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ABSTRACT

Recent social science research has made significant progress in understanding what motivates people to prepare for hazards, but the floodplain management community has not effectively used this research to inform its public education programs. This paper draws on “actionable risk theory” to advance a theoretical framework for flood preparedness education. The framework identifies best practices for flood education, and suggests actions that encourage “milling” behaviors among citizens. In order to motivate collective, rather than only individual responses to risk, the framework also builds on social network and social movement research to propose activities that help build a “community identity around risk.” Through a review of education programs in the earthquake sector of the natural hazards community, this paper demonstrates how some components of this framework are already working to motivate preparedness. Finally, reviewing past flood education efforts, it recommends ways to improve flood programs so they better motivate preparedness.

“We're all in this together.”
- Earthquake Country Alliance slogan

I. INTRODUCTION

At 10:20 a.m. on October 20, 2011, the Great California ShakeOut – a voluntary, mock earthquake readiness drill – took place throughout the state of California. For the drill, more than 8.5 million individuals simultaneously engaged in a “Drop, Cover, Hold on” exercise, wherever they were at that time.¹ Schools, hospitals, corporations, small businesses, daycares, religious groups, families, individuals and other organizations registered in advance to participate in what is now recognized as the nation’s largest preparedness drill. And they not only participated, they also shared photos of themselves online afterward, crouched beneath desks and tables, or engaged in other preparedness actions to spread the word about what they had done. Even in an era of flash mobs and social media mobilization, this extent of public participation is astounding, especially when considered in light of social science findings that suggest people do not readily prioritize preparedness for future, possible, and seemingly distant risks.

In contrast, in 2011, when storm predictions for Hurricane Irene and Tropical Storm Lee forecast some of the most significant amounts of rainfall and tremendous hurricane-force winds to reach the East Coast of the United States in many years, a huge public debate waged in newspapers and social media sites. Analysts and individuals living in the affected region suggested that the event was being over-hyped by media outlets urging people to prepare. They questioned whether the talk of readiness was really

¹ Southern California Earthquake Center, "The Great California ShakeOut." <http://www.shakeout.org/california>, (accessed July 25, 2012).

necessary, or if it was instead a ploy to increase media ratings.² Hydrologists for the National Weather Service report that they still hear these complaints, even after those two events caused 58 deaths, and \$8.2 billion dollars in damages and losses.³ The contrast of these two hazard-related events raises a critical question: why did the California ShakeOut engage so many people in a voluntary preparedness drill for a possible future risk, while the acute threat of an impending dangerous hurricane and consequent flooding was not enough to motivate others to prepare?

As the most common, costly and deadly natural disaster in the United States, flooding certainly warrants preparedness action.⁴ Estimates for economic losses from 2011 floods alone in the Upper Midwest, along the Mississippi River, and the East Coast as a result of Hurricane Irene, topped \$13.5 billion.⁵ Floods claim nearly 100 lives annually on average, and even these tremendous losses are dwarfed by those resulting from Hurricane Katrina in 2005, estimated now at \$125 billion in economic damages, and

² J. Barron. “‘Some Hurricane,’ New Yorkers Grumble as Danger Passes,” *New York Times*, August 28, 2011, <http://www.nytimes.com/2011/08/29/nyregion/after-the-storm-new-yorkers-complain-about-the-hype.html>; Petula Dvorak, "Overhyped Irene makes Washington the inevitable butt of snickers," *Washington Post*, August 28, 2012, sec. Local, http://www.washingtonpost.com/local/overhyped-irene-makes-washington-the-inevitable-butt-of-snickers/2011/08/28/gIQA1eGgJ_story.html; Jack Mirkinson, "Hurricane Irene: Was Media Coverage Overhyped?," *Huffington Post*, August 29, 2011, sec. Media, http://www.huffingtonpost.com/2011/08/29/hurricane-irene-media-hype_n_940215.html.

³ Charles Perry, “Significant floods in the United States during the 20th century – USGS measures a century of floods.” Fact Sheet 024-00. United States Geological Survey: Reston, VA, 2000. <http://pubs.usgs.gov/fs/2000/0024/report.pdf>.

⁴ L.A. Avila & J. Cangialosi, “Tropical Cyclone Report: Hurricane Irene (AL092011),” National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS), National Hurricane Center: Miami, FL, 2011; D.P. Brown, “Tropical Cyclone Report: Tropical Storm Lee (AL123011),” NOAA, NWS, National Hurricane Center: Miami FL, 2011.

⁵ “Billion Dollar U.S. Weather/Climate Disasters,” NOAA, National Climatic Data Center: National Environmental, Satellite, Data and Information Service,” <http://www.ncdc.noaa.gov/oa/reports/billionz.html#chron>. (last updated April 26, 2012, accessed January 14, 2012).

about 1,800 deaths.⁶ The specter of rising flood losses makes questions about the success, and failure, of flood education to motivate preparedness all the more urgent. Efforts to date have not overcome public resistance to preparing for natural hazards, and have failed to produce a prepared public even in the face of repetitive losses. What are the methods to overcome this resistance, and what steps should the floodplain management community take to improve outcomes for preparedness?

In this paper, I address these questions by proposing a new framework for flood education, one that calls for the creation of a “community identity around risk.” This framework applies findings from recent social science research (which I will refer to as “actionable risk communication theory or actionable risk theory”) about what motivates individuals to prepare for a wide range of hazards. It is predicated on the idea that creating a community identity around risk can successfully motivate preparedness actions. Actionable risk communication theory draws on social science theories rooted in a “social diffusion” perspective, to provide the basis for establishing best practices for public education aimed at motivating people to prepare for exposure to hazards.⁷ The fundamental tenets of actionable risk communication theory have already been applied by the earthquake sector of the natural hazards community, and have garnered tremendous public response. This paper aims to transfer understanding from this theoretical research, and its applications, to the floodplain management field in order to improve outcomes for public preparedness for floods.

⁶ S. T. Ashley & W. S. Ashley. “Flood fatalities in the United States,” *Journal of Applied Meteorology and Climatology* 47, no.3 (2008): 805-818. DOI: <http://dx.doi.org/10.1175/2007JAMC1611.1>; A. Graumann, *et al.*, “Hurricane Katrina: a climatological perspective,” Technical Report 2005-01, NOAA National Climate Data Center, Oct. 2005. <http://www.ncdc.noaa.gov/oa/?reports/tech-report-200501z.pdf> (updated August 2006.)

⁷ These theories, known as “diffusion of innovations” and “communications” theories, are discussed further in Part III.

The past several decades have seen tightened building standards and significantly improved flood warning technology. Despite these advances, flood losses in the United States are likely to rise in the future, not simply for climatic reasons but also as a result of societal demands on floodplains, such as dense population on coasts.⁸ Flood losses average nearly \$8 billion annually in the United States.⁹ Multiple climate change assessments project a general future trend in the United States, that “wetter areas will get wetter,” with rising precipitation levels increasing the risk of flooding in already flood-prone areas.¹⁰ Compounding the loss issue is increasing population density along both the East and West coasts, where flooding is most likely.¹¹

The way these losses are distributed among the population creates even further challenges for the floodplain management community. Poorer populations are most vulnerable to floods, and often suffer the worst losses, not only because their financial assets are tied up primarily in their homes, but also because they are less mobile and must often make riskier choices about where to live.¹² When higher-income individuals select to buy coastal or riverine properties in floodplains, they have the option of safer, primary

⁸ French Wetmore, *et al.*, "The Evaluation of the National Flood Insurance Program, Final Report," *American Institutes For Research*, 2006, p.9; Roger A. Pielke, Jr., Mary W. Downton, "Precipitation and Damaging Floods: Trends in the United States, 1932–97." *Journal of Climate* 13 (2000): 3625–3637. DOI: [http://dx.doi.org/10.1175/1520-0442\(2000\)013<3625:PADFTI>2.0.CO;2](http://dx.doi.org/10.1175/1520-0442(2000)013<3625:PADFTI>2.0.CO;2)

⁹ This figure is calculated over the 30-year period of 1980-2009. "United States Flood Loss Report – Water Year 2011," (NOAA's NWS Hydrologic Information Center Flood Loss Data. <http://www.nws.noaa.gov/hic/summaries/WY2011.pdf>, accessed August 2, 2012).

¹⁰ Paul Durack, Susan G. Wijffels and Richard J. Matear, "Ocean Salinities Reveal Strong Global Water Cycle Intensification During 1950 to 2000." *Science* 336, no. 6080 (April 27, 2012): 455-458. DOI: 10.1126/science.1212222. ; Thomas R. Karl, Gerald A. Meehl, Christopher D. Miller, Susan J. Hassol, Anne M. Waple, and William L. Murray (eds). "U.S. Climate Change Science Program (CCSP), 2008: Weather and Climate Extremes in a Changing Climate. *Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research.*" (U.S. Department of Commerce, NOAA's National Climatic Data Center: Washington, D.C., 2008)

¹¹ Durack, *et al.*, p. 9.

¹² Burrell E. Montz, "The generation of flood hazards and disasters by urban development on floodplains," In D.J. Parker, (ed.), *Floods*. (Routledge: London, 2000). pp. 116-127.

homes, adequate flood and property insurance, and sufficient access to flood warnings. Poor communities do not. Current flood education efforts, which often rely on Internet dissemination, English-only materials, and incorrect assumptions about the motivations to prepare, do not have adequate methods for reaching these most vulnerable audiences.

Attention to environmental justice considerations related to flooding increased in the wake of Hurricane Katrina, and the devastation that occurred in the primarily black and low-income communities in Louisiana. Much of this research looks at the perceived inequities in the provision of resources after the catastrophe, rather than at the need to notify the public about their risks in advance.¹³ How to motivate low-income and marginalized populations to prepare for flooding hazards is still largely unaddressed in theory, and in practice.

In light of these significant flood-related threats and challenges, the floodplain management community in the United States has been calling for improved strategies to reduce flood losses. For instance, at its 2004 Gilbert White Forum, the Association of State Floodplain Managers (ASFPM) called for a new paradigm in floodplain management, and President Obama issued in May 2009 a draft Executive Order that would tighten regulations for floodplain development.¹⁴ There is strong agreement among people in the floodplain management community that top-down regulatory approaches to flood loss mitigation alone are insufficient, and that improving public preparedness through education should be a priority.¹⁵ Historically, federal, state and local efforts have focused their energies on

¹³ For an extensive review of literature related to Hurricane Katrina, see the Hurricane Katrina Research Bibliography. Kai Erikson and Lori Peek, "Hurricane Katrina Research Bibliography," Social Science Research Group, Task Force on Katrina and Rebuilding the Gulf Coast, 2010. <http://katrinaresearchhub.ssrc.org/KatrinaBibliography.pdf>, (accessed August 2, 2012.)

¹⁴ United States Executive Office of the President, Draft Exec. Order, "Floodplain Management," version 0510/2009VI. http://www.eenews.net/public/25/11835/features/documents/2009/07/21/document_gw_01.pdf (accessed December 8, 2009.)

¹⁵ For a good discussion on this topic, see Marshall Frech, "Flood Risk Outreach and the Public's Need to Know," *Journal of Contemporary Water Research and Education* no. 130 (2005):61-69.

structural and land use approaches, as I detail below in Part II. Few efforts in the United States have effectively coordinated public education about flooding to motivate preparedness at the household level, where much of - and arguably, the worst of - the loss and devastation from flooding occurs. For both individuals and flood managers, an inadequate understanding about how to motivate preparedness is likely to blame.

The body of social science research I use to reason about this problem is the culmination of decades of work by Dennis Mileti (professor and director emeritus at the Natural Hazards Center at the University of Colorado at Boulder), and his colleagues, who have been studying “what works” in motivating people to prepare for a variety of hazards. Mileti and his colleagues propose a new model of preparedness that focuses on “communicating actionable risk” and *demonstrating* preparedness actions rather than the common practice of discussing risk in terms of empirical probabilities.¹⁶ Their research suggests that in order to encourage people to prepare, risk prevention and minimization programs should emphasize and incorporate “milling,” or the social process of seeking out information and reflecting upon it with neighbors, friends or family. In short, the key findings are that people are motivated to prepare *by watching others prepare*, and *by learning about preparedness actions from those who have already prepared*. Therefore, programs that promote milling will be more successful than those that focus on communicating risk probabilities. More generally, actionable risk theory suggests that efforts to educate the public about hazards, including flooding, have historically been based on the intuitions of program developers rather than evidence, and on an inaccurate

¹⁶ Michele M. Wood, Dennis Mileti, M. Kano, M. M. Kelley, R. Regan, & L.B. Bourque. “Communicating actionable risk for terrorism and other hazards.” *Risk Analysis* 32 (2011): 601–615. DOI: 10.1111/j.1539-6924.2011.01645.x

understanding of how the public responds to risk messages.

Mileti's research holds much value for the floodplain management community, which is in need of a new framework for educating the public about flood risk and flood preparedness. In this paper, I will draw on this emerging actionable risk theory, as well as social movement and network theories, to argue how and why building a *community identity around risk* can further help educators to promote flood preparedness. My argument will draw on personal correspondence as well as programs and materials from the earthquake sector of the natural hazards community, which has deliberately shaped its public education programs on the basis of social science research. As previously mentioned, an important case study is the Great California ShakeOut, a state-wide earthquake preparedness drill (designed around actionable risk principles) that in 2011 engaged more than 8.5 million people to participate in a mock earthquake exercise. By exploring how the leading earthquake organizations working in California today – which together comprise an applied model of preparedness education – succeed in motivating public preparedness, I intend to demonstrate that those organizations have already begun to develop such a “community identity around risk.” In fact, the emergence of this community identity around risk explains an important part of their success.

In drawing lessons from earthquake preparedness to inform flood education programs, I will, in Part II, provide an introductory background on the floodplain management community, and its previous efforts to address flood losses. In Part III, I review the actionable risk theory and related natural hazards research to identify a series of best practices for motivating individual and household preparedness and to explain the incorporation of milling into education campaigns. Here I also draw on social movement

and network research to suggest how the creation of a community identity around risk (which moves beyond milling to include more explicit efforts at building group and collective identity) will further catalyze preparedness practices at the individual and community levels. In Part IV (Analysis and Recommendations) I systematically review both flooding and earthquake programs and materials to assess how each 1) incorporates best practices for demonstrating and motivating individual preparedness and 2) builds a community identity around risk.¹⁷ After this review, I make specific recommendations for improving flood policy and flood education campaigns to motivate stronger public preparedness. Part V concludes the paper by drawing out the practical implications of the preceding discussion for certified floodplain managers, emergency managers, municipal and regional planning personnel, and non-profit organizations engaged in public education about hazards generally, and flooding in particular.

PART II: An Introduction to the Floodplain Management Community

Before building a theoretical framework to guide floodplain management programs, it will be helpful first to 1) define the floodplain management community; 2) outline briefly the history of floodplain management in the United States; and 3) identify some of the key challenges facing floodplain managers who want to educate the public.

This section will address these issues in turn.

What is floodplain management?

Floodplain management is a growing, specialized professional field that integrates knowledge from the scientific, public policy, and educational sectors in order to manage floodplains in a way that reduce losses from flooding. Some in the field debate whether

¹⁷ The flood materials focus heavily on Texas, Colorado and the Delaware River Basin, which comprises New York, New Jersey, Pennsylvania and Delaware. The materials were shared by the Flood Safety Project of Boulder, Colorado for this research.

“floodplain management” is the most effective description of the field, but in recent years, it has become the most common term for the act of designing, maintaining and regulating floodplains in the United States.¹⁸ The concept supplants the now old-fashioned idea of flood control, which assumed a man-made ability to control waterways. One of the most public organizations in the field is the Association for State Floodplain Managers (ASFPM). This organization has created a series of state-level chapters and a certification process for floodplain managers, who are often engineers whose professional work directly involves the management, design, and oversight of floodplains.¹⁹ For the purposes of this paper, the floodplain management community should be understood in its more informal sense, which includes certified floodplain managers as well as the following: municipal, state and federal employees; professional engineers; consultants; insurance agents; and rescue, recovery and counseling workers whose practices engage the management of floodplains or efforts to reduce flood losses.

The History of Floodplain Management in the United States

Over many decades, the floodplain management community has substantially evolved its model for conceptualizing and reducing flood-related losses. As previously mentioned, the earliest policy efforts around flooding focused on flood control that involved engineering or other efforts to stop flood waters from reaching human-occupied

¹⁸ “Floodplain” as a term is at the center of tremendous misunderstanding about flood risk and frequency. For the purposes of this paper, I will use Freitag’s definition of those lands that are “physically, hydrologically or biologically connected to the main river channel.” Bob Freitag, Susan Bolton, Frank Westerlund and J.L.S.Clark. *Floodplain Management: A New Approach for a New Era*. Washington, DC: Island Press, 2009, p. 20.

¹⁹ Association of State Floodplain Managers, “Floodplain Management Body of Knowledge,” Madison, WI: ASFPM Foundation, 2007. http://www.floods.org/ace-files/documentlibrary/CFM/ASFPM_Floodplain_Management_Body_of_Knowledge_12_15_07.pdf/ (accessed August 2, 2012.)

areas.²⁰ The Flood Control Act of 1936, which cemented the federal role in flood loss mitigation, identified \$370 million worth of flood control projects (including 48 reservoirs) and began a decades-long process of structural flood control projects under the purview of the Army Corps of Engineers.²¹ The legacy of these projects is a complex system of major and minor dams and levees across the country, many of which are aging, decommissioned, removed or maintained at great public and private expense.²²

Two trends have pushed government actions toward increasing non-structural regulatory efforts in the area of flood control. The first is that these structural controls are often insufficient for safely preserving human life and property, and have deleterious effects on ecosystems and water quality.²³ The second is the tremendous expense required to build and then maintain these systems over time.²⁴ The most notable and important of the regulatory approaches is the National Flood Insurance Program (NFIP), which was established in 1968 and is now under the purview of the Federal Emergency Management Agency (FEMA). The NFIP offers communities a chance to opt-in to subsidized flood insurance packages in exchange for adhering to a system of federal regulations on floodplain developments and structures. In more recent years, new federal regulatory programs have emerged, such as those that encourage the evacuation and purchase of

²⁰ For a good history of flood control efforts, see: Howard Rosen and Martin Reuss, eds., “The Benefits and Costs of Flood Control: Reflections on the Flood Control Act of 1936,” p. 110 in *The Flood Control Challenge: Past Present, and Future*. Chicago, Illinois: Public Works Historical Society, 1988. See also Freitag, et al.

²¹ Jamie W. Moore and Dorothy P. Moore, *The Army Corps of Engineers and the Evolution of Federal Floodplain Management Policy*, p. 13. Institute of Behavioral Science, University of Colorado, 1989.

²² American Society of Civil Engineers, “2009 Report Card for America’s Infrastructure: Water and Environment, Dams,” <http://www.infrastructurereportcard.org/fact-sheet/dams> (accessed August 3, 2012).

²³ William L. Graf, “Damage Control: Restoring the Physical Integrity of America’s Rivers,” Presidential Address, *Annals of the Association of American Geographers* 91, no. 1 (2001):1-27.

²⁴ Kenneth Rubin, “The New Federalism and National Flood Control Programs,” p. 135 in *The Flood Control Challenge: Past, Present, and Future*. (Chicago, Illinois: Public Works Historical Society, 1988).

repetitively flooded properties,²⁵ and the reconstruction of deteriorated riparian buffers to put distance between the water and human development.²⁶ These buy-out and restoration programs reflect a new trend in modern floodplain management, which no longer aims to control floods, but instead aims to “mitigate flood losses” and protect the “natural and beneficial functions of floodplains.”²⁷ In short, the era of frequent and expensive engineering projects to reduce flood losses has passed, at least in significant measure, and is replaced with an era in which it is considered prudent to use other adaptive techniques to maintain the ecological health of rivers and watersheds, as well as to protect lives and property.

Few of these newer non-structural efforts, however, have tried to educate the public about steps they can take to prepare for flooding. For instance, ASFPM's 2007 comprehensive review of federal flood programs and policies – inclusive of agricultural, coastal, insurance, mapping, disaster response, mitigation and other programs - includes not a single program that has education as a primary or even substantial component. ASFPM makes clear its position on this issue: “The federal agencies, in collaboration with states, localities, and the private sector, must find clearer ways to communicate flood risk so that it is meaningful to citizens and communities, thus enabling them to take

²⁵ Federal Emergency Management Agency, “Severe Repetitive Loss Program,” <http://www.fema.gov/severe-repetitive-loss-program/> (accessed August 3, 2012.)

²⁶ Many states offer riparian buffer restoration programs. Pennsylvania has included riparian buffer restoration in its Pennsylvania Stormwater Best Management Practices Manual. See: Pennsylvania Department of Environmental Protection, “Pennsylvania Stormwater Best Management Practices Manual,” 2006. Chapter 6, p. 191. http://www.stormwaterpa.org/assets/media/BMP_manual/chapter_6/Chapter_6-7-1.pdf/ (accessed August 3, 2012.)

²⁷ Task Force on the Natural and Beneficial Functions of the Floodplain. *The Natural & Beneficial Functions of Floodplains: Reducing Flood Losses by Protecting and Restoring the Floodplain Environment*. A Report for Congress. FEMA 409. Washington, D.C.: Federal Emergency Management Agency, 2002.

appropriate steps to reduce risk and damage.”²⁸

Public Education: Key Challenges for the Floodplain Management Community

Even as the floodplain management community advances calls for improved public education about flooding, it remains challenged by how to do so. It is not alone in this challenge, however. As Mileti and his colleagues note, “There has been a dearth of experience-driven policy shaping the design of public education campaigns about hazards, and substantial underuse of theory from the social and behavior sciences to inform such efforts.”²⁹ Adding to this problem, unlike the earthquake sector of the natural hazards community, which has based its education programs on social science research, the floodplain management community has not formed an effective national collaboration designed to educate the public about flooding. It also has not yet created a consistent public message about preparedness. As my review of flood education materials shows below, doing so will be critical to improving public understanding about flood risk, not least because past efforts have been ineffective.

The majority of previous flood education efforts focus on raising awareness among the public about their level of “flood risk,” defined usually as the recurrence interval of flood events of a certain magnitude, such as the 100-year-flood, the 500-year flood, etc.³⁰ While most natural disasters are ranked by their size or impact, such as through the Saffir-Simpson scale for hurricanes, floods are measured by the likelihood of their recurrence. These recurrence intervals are measured in dramatically long time-spans that lead people to perceive only occasional flood risk; e.g., “it only happens once every

²⁸ Association of State Floodplain Managers, “National Flood Programs and Policies in Review 2007,” (Madison, WI: ASFPM Foundation, 2007).

²⁹ Wood, *et al.* 2011, p. 2.

³⁰ United States Geological Survey, “Floods: Recurrence Intervals and 100-year floods.” <http://ga.water.usgs.gov/edu/100yearflood.html> (accessed August 3, 2012).

100 years.” The truth, however, is quite different, with the average 30-year mortgage holder having a 25% likelihood of experiencing a flood during that payment period.³¹

The failure of this recurrence interval approach to motivate public preparedness is now widely understood – and widely bemoaned - among floodplain managers, who are saddled with regulatory language that was designed for use in determining insurance coverage areas.

Currently the 100-year-flood remains the predominant terminology in flood risk communication messages, and the persistence of this language is not a small matter and not merely a choice of words. The regulatory definition of the 100-year flood (including under its new name, preferred by many, the “1% annual chance flood”) is insufficient for successfully communicating about flood risk not merely because it creates confusion in the public mind about the likelihood of a major flood; this argument has been well-made by others.³² More importantly, this “flood risk” approach also misses a major distinction between flooding and other hazards that must be considered when shaping flood education messages. While many natural hazards may be inevitable, flooding is also a *natural* and *beneficial* function of water and land systems; indeed, flooding should be anticipated, and some may argue welcomed, as a regular part of river variability. Understanding flood “risk” in the context of these ecological benefits means communities must focus on preparing for the inevitability of flooding rather than attempting to expand the intervals between floods. I will revisit this point below because it bears on how risk is defined, but at present my point is that the risk-and-probability approach to flood

³¹ Federal Emergency Management Agency, “Definitions of FEMA Flood Zone Designations,” <https://msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogId=10001&langId=-1&content=floodZones&title=FEMA%2520Flood%2520Zone%2520Designations/> (accessed August 3, 2012).

³² Roger Pielke, Jr. “Nine Fallacies of Floods,” *Climatic Change* 42 (1999): 413-438.

education fails to convey the actual costs and benefits of flooding, and may in fact deter preparedness.

The current approach to flood education also fails to incorporate an accurate understanding about what motivates individuals to take action toward preparedness. As will be described below, an array of sociological theories about human perception of risk and loss – such as the optimistic bias, loss aversion and availability heuristics – can predict the failure of these past risk-and-probability approaches to education about risk. Drawing on these findings, actionable risk theory proposes instead a “substantial departure” from this standard approach to risk communication and instead calls for stressing communication about actions rather than risks to motivate preparedness.³³

Recently, perhaps in response to actionable risk theory or other advances in understanding human judgment and decision-making, some governmental efforts have tried to build action-oriented flood education messages into their operations. National Weather Service (NWS) in particular has long made explicit flood warnings that include directions for how to prepare property, avoid driving in floodwaters, and evacuate to safe ground. FEMA additionally prepares publications covering various aspects of flooding and flood preparedness, including the need to purchase flood insurance and create an emergency kit, for instance. FEMA has recently revamped its Ready.gov website to emphasize preparedness actions more prominently. As I will discuss in the analysis below, although these actions represent very small steps forward in efforts to promote public preparedness, they do little to advance what I contend is a critical component of public preparedness: building a community identity around risk.

³³ Wood, *et al.* 2011, p. 4.

PART III. Developing a Theoretical Framework for Flood Risk Preparedness

Although social science-informed flood education campaigns have been relatively few compared to the extent of the problem, research about how sociological and psychological processes affect an individual's understanding of the risk of a particular threat is extensive. The Natural Hazards Research Center has prepared the *Public Hazards Communication Bibliography*, which summarizes more than 350 articles concerning the communication of public hazards (including natural and technical) to the public.³⁴ A review of this collection, as well as other studies, reveals important trends in people's motivation for preparedness and in people's response to public warnings, including flood warnings. Beyond the physical barriers of proximate and linguistic access to the forecast tools and warning messages,³⁵ this research identifies various social and psychological reasons that prevent people from taking preparedness actions including their past experience with the risk,³⁶ the effect of uncertainty on decision-making,³⁷ the credibility of or personal connection to the source of warning,³⁸ and learning styles.³⁹

Most important for present purposes, many studies identify a strong link between

³⁴ Dennis Mileti, *et al.*, 2006. *Annotated Bibliography for Public Risk Communication on Warnings for Public Protective Actions, Response and Public Education*. Revision 4. (University of Colorado at Boulder, Natural Hazards Center, 2006). <http://www.colorado.edu/hazards/publications/informer/infrmr2/pubhazbibann.pdf> (accessed on August 3, 2012).

³⁵ Benigno E. Aguirre, *et al.*, "Saragosa, Texas, Tornado, May 22, 1987: An Evaluation of the Warning System," (Washington, D.C.: National Academy Press, 1991).

³⁶ Robin Dillon-Merrill, *et al.*, "Why Near-Miss Events Can Decrease an Individual's Protective Response to Hurricanes." *Published Articles & Papers*. 2010. Paper 94. http://research.create.usc.edu/published_papers/94.

³⁷ Baruch Fischhoff, "Risk Perception and Communication Unplugged: Twenty Years of Progress." *Risk Analysis* 15, no. 2 (1995): 137-145.

³⁸ Ronald W. Perry, "Citizen Evacuation in Response to Nuclear and Non-Nuclear Threats." Seattle, WA: Battelle Human Affairs Research Center, 1981; Larry Christensen and Carlton E. Ruch, "The Effect of Social Influence on Response to Hurricane Warnings." *Disasters* 4, no. 2 (1980): 205-210.

³⁹ Sabine Marx, "Communication and Mental Processes: Experiential and analytic processing of uncertain climate information." *Global Environmental Change* 17 (2007): 47-58. DOI:10.1016/j.gloenvcha.2006.10.004.

being part of social networks and the likelihood of taking of preparedness actions. Specifically, the more involvement one has in a social network, the more likely one is to receive and heed a hazard warning.⁴⁰ Some link better preparedness outcomes to common and prevailing beliefs about preparedness within a community. For instance, one study of preparedness behaviors in a heavily flooded Australian community found the community to be “staunchly resilient” despite repetitive flooding and poor physical circumstances relative to flooding. Researchers cited the community's “well-developed and functional social and institutional networks” and the belief of residents that “they have a personal responsibility for preparation and personal mitigation activities” as reasons for this resiliency.⁴¹ Place attachment can also affect flood preparedness. Mishra, *et al.*, define place attachment as an “emotional bond between individuals, groups, or communities and their physical environments,” and they find that those with such attachments are more likely than others to prepare for floods in India.⁴² These findings – concerning networks and place -- make sense, intuitively. If someone is connected to an area, and has strong information portals and relationships to preserve, she will be more likely to receive information and use it to take care of her physical place within the community.

The important role played by social and community context is also affirmed by

⁴⁰ Ford Burkhart, “Media, Emergency Warnings, and Citizen Response.” (Boulder, CO: Westview Press, 1991); R.A. Clifford, “The Rio Grande Flood: A Comparative Study of Border Communities.” (Washington, D.C.: National Research Council, National Academy of Sciences, 1956); Russell R. Dynes, *et al.* 1979. “The Accident at Three Mile Island: Report of the Emergency Preparedness and Response Task Force,” (Washington, D.C.: Executive Office of the President); D.J. Parker and J.W. Handmer, “The Role of Unofficial Flood Warning Systems,” *Journal of Contingencies and Crisis Management* 6 (1998): 45–60. DOI: 10.1111/1468-5973.00067.

⁴¹ Diane Keogh, *et al.*, “Resilience, vulnerability and adaptive capacity of an inland rural town prone to flooding: a climate change adaptation case study of Charleville, Queensland, Australia,” *Natural Hazards* 59 (2011): 699-723. DOI:10.1007/s11069-011-9791-y.

⁴² Sasmita Mishra, Sanjoy Mazumdar, and Damodar Suar. “Place attachment and flood preparedness.” *Journal of Environmental Psychology* 30 (2010): 187-197. DOI:10.1016/j.jenvp.2009.11.005

studies showing that concern for community well-being during flood events may motivate preparedness more effectively than regard for one's own welfare. Kim and Kang undertook a study of hurricane preparedness in Tuscaloosa, Alabama during Hurricane Ivan to examine how factors such as *neighborhood belonging* affected hurricane preparedness. For the study, the researchers created measures of “personal risk perception” (perceived risk to one's life or personal property, measured through statements such as “I thought my house would lose power or water” or “I thought my family would get hurt.”) and “social risk perception” (perceived risk to someone else's life or property, measured through statements such as “I thought other people in Tuscaloosa would lose power or water” or “I thought other people in Tuscaloosa might have to move to a shelter.”).⁴³ Their findings suggest that, when planning for a future hurricane event, one's sense of risk to other people's properties and belongings is more effective than a personal risk perception in motivating preparedness. This means that people who recognize a community-level threat might be more likely to meet or talk with others about the event and to begin getting ready for evacuation, than those who are focused primarily on their own risk, the perception of which is more easily diminished when not reinforced by social networks. Interestingly, the study also found that once a hurricane is underway, people are more motivated by their *own* personal risk perception, rather than social risk perception. The emphasis, therefore, should be on building community-level risk perception in *advance* of the events, to motivate better preparedness before the hurricane hits. The authors advise that messages for future hurricane events advise people that “you have to do something for others and your

⁴³ Yong-Chan Kim and Jinae Kang. "Communication, neighbourhood belonging and household hurricane preparedness," p. 479-480. *Disasters* 34, no. 2 (2010): 470-488. DOI:10.1111/j.0361-3666.2009.01138.x (accessed July 31, 2012).

community.” In other words, one should construct pre-hurricane preparedness messages that focus on community-level damage: “It seems that when a natural disaster is still a future event, individuals’ concern about community (as responsible citizens) is a stronger factor in taking preparedness steps than perception of one’s own risks.”⁴⁴ They further call for building a “community-level communications network” that can connect residents to “storytellers” (media, neighbors, organizations) who can share information.

Sociological research also explains the ways in which errors in risk perception and judgment can negatively affect how individuals prepare for hazards and respond to warnings. I have already discussed why people's judgment is negatively affected by the poorly chosen “100-year-flood” terminology. Extensive research on behavior phenomena such as loss aversion (the tendency for an individual to be more concerned with losses than pleased with gains),⁴⁵ the optimistic bias (the tendency to perceive a risk as a greater threat to others than to oneself),⁴⁶ and the availability heuristic (the tendency to call upon events in one's memory to decide the probability of an event)⁴⁷ demonstrates that individuals regularly miscalculate their own risk, and make apparently “poor” risk decisions as a result.⁴⁸ Collectively, these factors elucidate the complexities of communicating about risk vulnerability to public audiences. But as Slovic notes, lay perceptions about risk, while failing in certain understandings, can inform researchers about how more effectively to assess and communicate risk. He argues that in order to

⁴⁴ Kim and Kang, p. 484.

⁴⁵ Richard Thaler, Amos Tversky, Daniel Kahneman and Alan Schwartz, “The Effect of Myopia and Loss Aversion on Risk Taking: An Experimental Test,” *The Quarterly Journal of Economics* 112 (May 1997): 647-661, 15p.

⁴⁶ N.D. Weinstein and W.M. Klein. “Unrealistic optimism: Present and future.” *Journal of Social and Clinical Psychology* 15, no.1 (2006): 1-8. DOI:10.1521/jscp.1996.15.1.1

⁴⁷ Marx, 2007.

⁴⁸ Paul Slovic, M.L. Finucane, E. Peters, and D.G. MacGregor, “Risk as Analysis and Risk as Feelings: Some Thoughts about Affect, Reason, Risk, and Rationality,” *Risk Analysis* 24 (2004): 311–322. DOI: 10.1111/j.0272-4332.2004.00433.x.

successfully communicate and manage risks, communities must have an open exchange between professional and lay audiences. “Each side, expert and public, has something valid to contribute. Each side must respect the insights and intelligence of the other.”⁴⁹ Despite significant advances in expert-lay communication, as well as the previously discussed research on the role of networks, place, and community in shaping preparedness action, the field of flood education has failed to produce a framework upon which to build coherent and successful flood education programming in the United States.

Communicating Actionable Risk: A New Approach for Hazards Education

In a paper entitled “Communicating Actionable Risk for Terrorism and Other Hazards,” Michele M. Wood, Dennis Mileti and others offer a new theoretical model for motivating hazard preparedness for terrorism and other “high consequence, low-probability events.” This model builds on and adds significant understandings to Mileti's seminal 1999 book *Disasters by Design*, which largely set the agenda for disaster preparedness and management in the natural hazards field over the past two decades. This recent research asserts that hazard education in the past has operated on the “hunches and intuitions” of the program designers rather than on any social science evidence about what gets people to act. As they explain, “Although it feels good, our intuition about how to motivate behavior change often misses the mark.”⁵⁰ Thus, rather than rely on intuitions, actionable risk communication stresses that programs and policies need to focus on describing and demonstrating preparedness actions that can and should

⁴⁹ Paul Slovic, “Perception of Risk,” *Science*, 1987. 236. no. 4799: 280-285, p.285.
DOI:10.1126/science.3563507.

⁵⁰ Dennis Mileti, *Disasters By Design: A reassessment of natural hazards in the United States*. (Washington, DC: Joseph Henry Press, 1999); Wood, *et al.*, 2011, p. 2.

be taken. This “actionable risk communication theory” or “actionable risk theory” has key findings that the authors suggest are transferable to a broad range of hazards, which I will now discuss and apply in the flooding context.

Diffusion of Innovations and Communications Theories

Actionable risk theory is based on social science research constructing what is referred to as theories of “communications” and “diffusion of innovations.” These theories address issues related to how information is transferred in social structures and networks. The diffusion of innovations theory was popularized by rural sociologist Everett Rogers in 1962, in his groundbreaking book *Diffusion of Innovations*. Rogers proposes that individuals adopt new practices through a 5-step process that includes periods of (acquiring) knowledge, (seeking) persuasion, (weighing) decision, (choosing) implementation, and finally, (pursuing) confirmation that the new practice is one they will adopt and continue.⁵¹ Critical to this theory is that innovation is adopted *over a period of time* through *communication channels* and as part of a *social system* “engaged in joint problem solving to accomplish a common goal.”⁵² Rogers defines innovation as “an idea, practice, or object that is perceived as new by an individual or another unit of adoption.”⁵³ After his book publication, research on diffusion of innovations quickly spread to include a variety of fields, such as marketing, public health and medical sociology, general sociology, and communication research.⁵⁴ Communication theory also looks at channels of communication that operate within social systems, asking more

⁵¹ Everett M. Rogers, *Diffusion of Innovations*. 3rd ed. New York: The Free Press, 1983.

⁵² Ibid, p. 9

⁵³ Ibid, p. 11

⁵⁴ Ibid, p. 57-79

generally, “Who says what in which channel to whom and with what effect?”⁵⁵ Both theories assume the importance of a community-level perspective in understanding and shaping people’s behavior and both conceive of individuals as actors embedded in social networks that can influence their behaviors.

Testing the Model

Drawing on these theories along with findings from empirical research, Mileti and his colleagues identify seven constructs relevant to a model for “predicting household preparedness actions as a result of public education campaigns.”⁵⁶ These constructs, and the findings about them, form the basis for what I will refer to as “best practices” for motivating preparedness. The seven constructs are:

1. Content of Preparedness Information Received
2. Density of Preparedness Information Received
3. Consistency of Information Received
4. Preparedness Action Information Observed
5. Knowledge of Preparedness Actions
6. Perceived Effectiveness of Preparedness Actions
7. Milling About Preparedness Actions

To test the assumptions about the relevance of these constructs, and about their proposed theoretical model for motivating preparedness, Mileti’s group sampled approximately 2,800 individuals in the United States, who were stratified according to low and high “terrorism visibility areas.”⁵⁷ Respondents answered questions about the content of information they had received, observed or taken related to specific actions, including the following: development of emergency plans (evacuation, meeting places, etc.); stockpiling of supplies (food water, antibiotics, etc.); the purchase of things to make one's

⁵⁵ Harold Lasswell, “The structure and function of communication in society,” In Bryson L (ed). *The Communication of Ideas*, (New York: Institute for Religious and Social Studies, 1948), p. 37-51.

⁵⁶ Wood, *et al.*, 2011, p. 4

⁵⁷ Wood, *et al.*, 2011, p. 5-9

house safer; and duplication of important documents (birth certificate, medical prescriptions, and passports). They were also questioned about their knowledge, their perceived effectiveness of preparedness actions, and the density of information they received – i.e., whether the individuals had heard information about terrorism from newspapers, TV anchors or reporters, radio hosts, friends, relatives, employers, or the Department of Homeland Security. Finally, respondents were questioned about their milling behaviors, or whether they have “actively looked for information about preparing for a future terrorist act.”⁵⁸

The findings resulting from this research reveal a great deal about what works to motivate the public through hazard education campaigns. The primary finding relates to the power of milling, which I describe below after discussing how the remainder of the findings can form the basis for best practices for flood education.

Best Practices: The New Rules for Flood Education

With the exception of “information consistency,” all the constructs tested in the actionable risk communication theory were found effective for motivating individuals to prepare for hazards. These constructs, re-phrased and re-conceived as educational objectives, can help guide and inform flood education campaigns, policies and programs. In the table below, I characterize each specific research finding and then the three best practices that emerge, with examples for how they might be applied to flood education.

⁵⁸ Wood, *et al.*, 2011, p. 7-9

Table 3.0 Best Practices for Motivating Preparedness for Hazards

Construct and Related Findings	Best Practices	Examples
<p>“Effects of Preparedness Information Observed” was the “single strongest predictor of all in motivating household preparedness in America.” It directly influenced actions taken, as well as the perceived effectiveness of taking preparedness actions.</p>	<p><i>Demonstrate Preparedness Behaviors.</i></p>	<p>Education campaigns should visually show the desired prepared actions being taken; e.g. show families packing an emergency kit, elevating properties, moving important items to the upper levels of the floors, checking flood alerts on cell phones and websites.</p>
<p>“Content of Preparedness Information Received” influenced household knowledge and action taken related to preparedness.</p>	<p><i>Provide Information About Actions to Take to Prevent Future Losses.</i></p>	<p>Education efforts should focus on actions to take to reduce losses, rather than focusing on the disaster or risk (probability) itself; e.g. FEMA and other agencies’ brochures, websites and relevant materials should disseminate information about building flood kits, purchasing flood insurance, and signing up for weather alerts. These materials should also explain that doing so will reduce losses in the future.</p>
<p>“Density of Preparedness Information Received” influenced knowledge and action related to preparedness</p>	<p>Repeat messages <i>multiple times</i>, from <i>multiple sources</i>, through <i>multiple channels of communication</i>.</p>	<p>Federal and local agencies should unite to co-brand flood messages on TV, radio and internet, for an extended campaign.</p>

Among these best practices, *demonstrating preparedness behaviors* is particularly important for educators to consider. This practice requires people to reconsider the practice of crafting graphic images of the damages that hazards can produce, in order to scare people into preparing. Specifically, the actionable risk communication model does not hold that fear works to motivate preparedness – indeed, quite the opposite is true. What motivates people is seeing others take the preparedness actions that they should

take. Showing repeated images of cars turning away from flooded roads, then, is preferable to showing cars underwater. **The message, in short, is to make available to people's minds images of the actions they should take, and not the ones they should avoid.**

Giving information of a certain kind is also important: receiving preparedness information helps motivate preparedness, but actionable risk communication theory finds this information is most effective if it focuses on the actions one should take to prepare. The message is to focus on preparing *in order to avoid flood losses*. For example, if one wants to motivate a property owner to take preparedness actions, one should tell the floodplain resident that in order to reduce losses, he or she needs to turn off utilities or make an emergency preparedness kit. One should not attempt to motivate preparedness by explaining that a property owner has a 1% annual chance of a major flood on her property. While this distinction might seem sensible stated so plainly, the latter approach has been more common among flood education policies and programs to date. Lastly, the model supports that providing *dense information* – that is, information that is repeated by multiple channels over time – is another critical part of successful messaging. Far from making people “tune out,” actionable risk communication theory states that “repetition is essentially the only way to help people “tune in.”⁵⁹ Though the particular research discussed above did not statistically support that the *consistency* of information received had an effect on preparedness, previous research does, and the authors leave the issue on the table as a consideration for those interested in motivating preparedness.⁶⁰

⁵⁹ Wood, *et al.*, 2011, p. 12

⁶⁰ Dennis S. Mileti and Joanne.D. Darlington. “The role of searching in shaping reactions to earthquake risk information.” *Social Problems* 44, no. 1 (1997): 89-103. Mileti has repeatedly cited the example of seatbelt buckling campaigns as an example of an effective, concise and

Why Milling Works

The research of Mileti and his team on terrorism preparedness also demonstrates a key role that milling can play in flood education programs. Milling, as defined in actionable risk communication theory, is the act of “engaging in searching behavior... and interacting with others to affirm the appropriateness of preparedness actions.”⁶¹ Put more simply, to mill is to seek out information, and then reflect upon it with neighbors, friends and families. Actionable risk communication theory suggests that these practices of seeking out, reflecting on, and sharing information should be the key element in effective hazard education campaigns:

“The strongest motivator of taking preparedness actions is when people share what they have done to prepare with other individuals who have not done much. Thus, the most powerful preparedness spokespersons are not government agencies or non-government organizations, but instead members of the public who have already prepared.”⁶²

The explanations for why milling is so effective interestingly point toward issues of social influence, and of perceived personal power. By definition, milling precedes the taking of action for preparedness. And much social science research supports that taking action is preceded by searching out information and considering it with others.⁶³ As Wood, *et al* propose, “Perhaps this is because information seeking allows people to have a sense of control of their own response to risk communications and to perceive their actions as self-driven.”⁶⁴ In previous work, Mileti has referred to this in discussing the

consistent public education message; Dennis S. Mileti and Lori A. Peek, “Understanding Individual and Social Characteristics in the Promotion of Household Disaster Preparedness,” *New Tools for Environmental Protection: Education, Information and Voluntary Measures* (2002): 125-140.

⁶¹ Wood, *et al.*, 2011, p 5.

⁶² Ibid, p. 12

⁶³ Rogers, 21-23, describes this process from the diffusion of innovations perspective.

⁶⁴ Wood *et al.*, 2011, p. 5

importance of “people believing it was their own idea to prepare.”⁶⁵ Another suggestion states that observing others taking actions leads “observers to think the actions they are observing are effective because others have performed them.”⁶⁶ In his presentation to a group of floodplain managers in October 2009 in Washington, D.C., Mileti described milling as everyday decision-making with consultation from friends and peers. He offered the theoretical example of a man shopping for a new red sports car. He would not simply buy the car, but first would poll his friends: “Would I look sexy in that car, do you think?” Mileti proposed the man might ask.⁶⁷

While these examples highlight the centrality of social influence to the actionable risk communication model, Rogers offers yet another consideration. As he describes it, an innovation presents an “individual or an organization with a new alternative or alternatives, with new means of solving problems.”⁶⁸ But this new alternative also involves uncertainty. And “uncertainty implies a lack of predictability of the future. It motivates an individual to seek information.”⁶⁹ The same scenario applies to preparedness for hazards: the uncertainty of risk can motivate information-seeking, but not always in the way that program designers expect. National Weather Service, for instance, conducted a service assessment after the Joplin, MO tornado in 2011.⁷⁰ From this assessment they confirmed that upon hearing about a tornado warning people did not

⁶⁵ Dennis Mileti, “Changing People’s Readiness Behavior: Public Education & Information Research Findings & Evidence-Based Applications for Practice,” Presentation to National Consortium for the Study of Terrorism and Responses to Terrorism, Revision 12b. PowerPoint Presentation.

⁶⁶ Wood *et al.*, 2011, p. 11

⁶⁷ Personal Correspondence from ASFPM Gilbert F. White Symposium Forum #2, Washington, D.C., October 2009.

⁶⁸ Rogers, p. xviii-xix

⁶⁹ Rogers, p. xviii

⁷⁰ “NWS Central Region Service Assessment Joplin, Missouri, Tornado – May 22, 2011,” (Kansas City, MO: National Oceanic and Atmospheric Administration, National Weather Service, Central Region Headquarters. July 2011).

follow the warning directions, but rather took secondary actions to confirm the warning was correct – by calling 9-1-1 or a relative down the street to see if anyone had in fact seen the tornado. It was only after the information was confirmed with peers that the caller decided to prepare. Milling, it appears, influenced the perceived effectiveness of taking actions, and motivated preparedness steps. “Official” messages alone did not.

Based on similar findings, Wood, *et al.* conclude that the target for hazard campaigns may not be the unprepared, but rather the prepared: “(P)reparedness programs need to expand their current practice and entice such individuals *to share what they have done with others*” (emphasis added).⁷¹

Richard Thaler, writing with Cass Sunstein in the recent book, *Nudge*, reached similar conclusions about how “choice architects,” or those who frame the conditions under which people make decisions, might influence behavior. “If choice architects want to shift behavior and to do so with a nudge, they might simply inform people about what other people are doing.”⁷² The authors take the notion of social pressure further, to explain how strongly social influence can shape behaviors of all kinds. They review a body of research that supports a simple take-away message: people will do what they believe others are doing, whether that is paying their taxes or scooping up dog waste. Sunstein and Thaler suggest that phrases such as “most people prefer,” “most people are turning to,” and “growing numbers of people” are highly effective for motivating specific choices among undecided individuals.⁷³ They theorize that social influence works in two ways. The first is information transfer, as proposed in the milling philosophy. Individuals

⁷¹ Wood, *et al.*, 2011, p. 12

⁷² Richard H. Thaler and Cass R. Sunstein, “*Nudge: Improving Decisions about Health, Wealth and Happiness*,” p. 62, (New Haven, Connecticut: Yale University Press, 2008).

⁷³ Thaler and Sunstein, p. 66

hand off knowledge and information – right or wrong – to one another. Kuran and Sunstein have noted elsewhere how this transfer of information can trigger “availability cascades” that can influence behavior as “collective beliefs” about information begin to grow and compound as each new person reinforces the information.⁷⁴ For flood education, such an understanding underlies the importance of spreading the “right” information about preparedness actions. The second mechanism of social influence Thaler and Sunstein discuss moves us closer to an understanding of community identity, and this is the power of peer pressure, or of “doing what others do.”⁷⁵ Those who want the approval of others, will copy them. If this is so, it raises important questions about identity and belonging that pertain to preparing for hazards. Specifically, could the influence of community identity and belonging also motivate preparedness behaviors? If doing what others do is a factor in decision-making, then is there a role for being a part of what others are?

Building a Community Identity Around Risk

The actionable risk communication research discussed above was tested in the context of terrorism, but based on theoretical findings from experiments concerning a wide range of hazards. The research suggests that the findings can be transferred to understanding about motivating preparedness for other “high-consequence low probability” events. Flooding is such an event. As a risk topic, however, flooding can be distinguished from other “high-consequence low probability” events because flooding is not anomalous to a normal occurrence. The probability of flooding in any given region can be higher or lower, but generally, flooding is a natural and beneficial function of river

⁷⁴ Timur Kuran and Cass Sunstein, “Availability Cascades and Risk Regulation,” *Stanford Law Review* 51, no. 4 (Apr., 1999): 683-768.

⁷⁵ Thaler and Sunstein, 54-55.

ecosystems. Far from falling into definitions of risk as something that “may or may not occur,” flooding is a certain and essential part of river life; only the timing, location and magnitude of flooding at any given time is in question.⁷⁶ As such, the conclusions of risk communication research, and specifically those of natural hazards research, must be applied with care to the cause of flooding.

Addressing education about a natural and important event like flooding might logically look very different than a campaign about terrorism or some public health issues that are rare and detrimental, such as traffic accidents. Those events are ones that are uniformly negative in character, and that most would agree should be prevented at all times. Flooding, however, cannot be stopped in the traditional sense (despite the history of efforts to do so; see Part II.). Rather, if flooding is to be understood properly, the objective of flood education must be to normalize the hazard in everyday life, and motivate individuals to take the proper adaptive steps to reduce losses. Thus, instead of responding to floods as “fluke events” or as “beyond imagination,” as they are regularly described in media reports, residents should come to understand that floods are an integral and unavoidable part of the landscape in which they live.⁷⁷ In fact, floods created and continue to maintain the landscape in which they live. This is in contrast to earthquakes, which represent a one-way response to plate motions. Floods, on the other hand, create and maintain the floodplain through millennia of sediment deposition and reworking.

⁷⁶ Sven Ove Hansson, “Seven Myths of Risk,” p. 7. *Risk Management* 7, no. 2. (2005): 7-17.
URL: <http://www.jstor.org/stable/3867684>.

⁷⁷ Numerous media reports use this terminology to describe flood events, even in floodplains with a history of flooding.

I propose that naturalizing the relationship between community members and their flood-prone landscape can be achieved by flood education programs that work to build or create a “community identity around risk.” In such a relationship, the boundaries between the hazard and the “victim” are softened, and instead a more cooperative relationship is built -- one in which community members understand themselves as part of a larger system of people and lands (i.e., floodplains) that together make way for the river's occasional high rises. In this context floods are not conceived of as devastating anomalies affecting unsuspecting communities, but rather they are episodic natural events for which the community has prepared a series of evacuation and preparedness plans to accommodate. Floods, in this approach, become a part of the culture of the community in which they occur, and preparedness becomes the normative response. Communities draw strength from their collective understanding of risk (“we know how to handle this”), and motivation to prepare from their sense of belonging (“we prepare together, for everyone's sake”).

The importance of building a community identity around risk is evidenced by literature on disaster cultures, which concerns the cultural response to disasters. Harry E. Moore early on connected community identity to disasters in 1964 with the notion of a “disaster culture,” through which communities develop a set of “cultural defenses” in response to the history or future threat of a disaster.⁷⁸ How and whether communities respond normatively to the presence of disasters has also been studied by researchers at the University of Delaware's Disaster Research Center, who refer to “disaster subcultures.” When a community has experienced a disaster, such as a flood, and

⁷⁸ Harry E. Moore, "Toward a Theory of Disaster." *American Sociological Review* 21, no. 6 (1956): 733-737. <http://www.jstor.org/stable/2088426>.

continues to carry the “residues” of that experience, a “disaster subculture” is formed.⁷⁹ As explained by Wenger and Weller, the contours of this disaster subculture can vary widely from community to community, and are defined by a series of dialectic relationships that determine how that subculture manifests, or doesn't. The first of these is the latent or manifest dialectic, which refers to the degree to which the disaster subculture penetrates everyday life (manifest) or only emerges as a new disaster approaches (latent). Disaster subcultures also vary in the extent to which the culture is embodied in the individuals in the community, or the organizations that respond to the disasters. Further, the subcultures can either respond in instrumental ways – through technology and actions in response to disaster control – or through expressive ways, such as the “norms, values, beliefs, legends and myths about disaster.”⁸⁰

A community's subculture can also be understood in terms of its scope – whether the subculture exists only in the affected areas, such as the floodplains, or throughout the larger geographic community. As examples, Wenger and Weller describe the highly manifest and individualistic expression of disaster subculture in Marietta, Ohio, a town that openly acknowledges and embraces its “flood town” status, and that coaches newcomers about the appropriate normative responses to flooding. Here, the scope is broad: the entire community, organizationally and individually, identifies flooding as part of community life. This approach stands in contrast to Cincinnati, Ohio, which Wenger and Weller find to be largely latent and organizational in its disaster subculture. In Cincinnati, highly developed flood control plans exist under the control of official

⁷⁹ Dennis Wenger and Jack Weller. "Disaster Subcultures: The Cultural Residues of Community Disasters. Preliminary Paper #9," p. 2. Disaster Research Center, 1973.
<http://dspace.udel.edu:8080/dspace/handle/19716/399>.

⁸⁰ Wenger and Weller, p. 2-4.

agencies who implement them at the time of disasters. In Marietta, residents retain much of the knowledge of flood crests and mitigation approaches, along with the key institutional groups, who are also organized in response. In charting the development of disaster subcultures, Wenger and Weller identify a few key factors that predict whether the disaster will be salient enough to form an enduring subculture. Specifically, they conclude that:

“...one can expect a subculture to develop within a community that has experienced repetitive impacts from a disaster agent that allows a period of forewarning, results in diffuse damage that cuts across class and status lines in the community, produces consequential damage to the human and material resources of the community, and is perceived as posing a continuing threat.”⁸¹

Flooding most certainly can be defined as such a disaster. In describing these characteristics, Wenger and Weller caution that disaster subcultures can produce negative consequences, as well as adaptation during and in the wake of disaster events. If, for instance, a community has collectively identified as a “flood city” it may be less prepared when another, different disaster strikes; it may have focused its disaster preparedness too narrowly. Or, the legends about the disaster may understate future conditions, leading people to believe that they have experienced the worst possible scenario.⁸² However, a defining and concluding statement in the study suggests the potential of such a “disaster subculture” to help motivate preparedness through social networks: “The true indication of the existence of a disaster subculture can be found in the perpetuation of successful patterns of adaptation to disaster contexts by the process of socialization.”⁸³

Social Networks and Movements as the Basis for Collective Action

How disaster cultures or subcultures form in response to the history or threat of

⁸¹ Wenger and Weller, p. 9.

⁸² Wenger and Weller, p. 11-16.

⁸³ Wenger and Weller, p. 17.

disasters demonstrates the important role that social networks and movements can play in building a community identity around risk. From an educator's perspective, building a community identity around risk in order to encourage people to prepare collectively can happen *intentionally*, rather than in an accidental or haphazard way. Such an identity can be developed through flood education programs and messages, and conceived in conjunction with the best practices and milling approaches discussed above. Indeed, because of its community-level perspective, actionable risk communication theory is a perfect companion to the community identity approach. Specifically, what is required for building a community identity around risk is more explicit consideration of community networks, and of how people's belief in a shared identity can further motivate preparedness behaviors.

Social networks and social movements, which have been shown effective mechanisms for spreading beliefs and behaviors, are helpful here. Social networks are, at essence, the social structures that link individuals to one another. They can be understood as an "organized set of people that consists of two kinds of elements: human beings and the connections between them."⁸⁴ Networks, most basically, connect individual actors through dyads, or pairs of people, and expand out infinitely from there. In describing how the positive effects of actions such as organ donation can ripple through a community, Christakis and Fowler explain that "social networks spread happiness, generosity, and love."⁸⁵

Pertinent to flood risk interests, other research demonstrates how these networks can also spread knowledge of risks effectively. Rickard found that commercial pesticide

⁸⁴ Nicholas A. Christakis and James H. Fowler, *Connected: The Surprising Power of Our Social Networks and How They Shake Our Lives*, p. 13, (New York: Little, Brown and Company, 2009).

⁸⁵ Christakis and Fowler, p. 7.

applicators served as “informal risk communicators” to clients, to whom they offered not only technical services (spraying of chemicals) but also care and concern (through the sharing of information about the risks of the chemicals, and the failure to use them).⁸⁶ As noted earlier, multiple hazards studies suggest that involvement in social networks improves the likelihood that a person will receive, and importantly, believe a warning message.⁸⁷ Burkhart's 1991 study of how different channels of information affect community response to a hazard found that social networks (along with media) were a primary source of preparedness information.⁸⁸ The community identity approach to preparedness that I am proposing therefore incorporates social networks as a mechanism for spreading preparedness behaviors within a community.

Beyond the simple transfer of knowledge between individuals, research about networks shows that social networks can also mobilize participation in group efforts. Klandermans and Oegema found that informal networks, primarily friendship ties, were more effective at recruiting participation in a Dutch peace movement than were formal networks, such as recruiting by organizations or direct mail pieces.⁸⁹ Further, *which* group someone identifies with can influence the types of behaviors he will select to take. Christakis and Fowler, for instance, explain how one's sense of belonging shaped the type of strategies undertaken by political activists. Whether the activists were linked to formal government networks or worked outside official channels changed whether they sought change from within the system (through lobbying), or without (through civil

⁸⁶ Laura Rickard, "In backyards, on front lawns: examining informal risk communication and communicators." *Public Understanding of Science* 20, no. 642 (2011). DOI:10.1177/0963662509360295.

⁸⁷ Clifford, 1956; Dynes, 1979.

⁸⁸ Burkhart, 1991.

⁸⁹ Burt Klandermans and Dirk Oegema, “ Potentials, Networks, Motivations, and Barriers: Steps Towards Participation in Social Movements,” *American Sociological Review* 52, no. 4 (1987): 519-531. URL <http://www.jstor.org/stable/2095297>.

disobedience). “So people who think of themselves as Democrats might join the Sierra Club, but they are very unlikely to join less established groups such as the Yippies that might be pursuing the same goal with different methods.”⁹⁰ In this case, social identity -- a belief in who one was -- determined how individuals spent their political energy. For the case of flooding, these studies suggest a need to rely on social networks and community to mobilize a group effort at preparedness, and further, that helping people to self-identify as part of a “prepared community” can be critical for motivating them to direct their energy toward preparedness.

The role of networks in motivating group participation is also important because the group can create a sense of belonging and collective capacity to resist shared challenges. For instance, as Pardo found in a study of low-income female Mexican American political activists, group identity can launch political activism where there was none previously. Disempowered mothers facing immediate threats to the safety of their families and neighborhoods were able to transform their social networks into the basis for strong political activism. By drawing on the strength of their “traditional” or “informal” connections and developing a collective identity as Mexican Americans and mothers, the “Mothers of East Los Angeles” overcame traditional barriers to political participation (their role as women, and their lack of political efficacy). Against all theoretical and actual odds, this group became a powerful political group, and tackled a variety of threats to their urban community.⁹¹

⁹⁰ Christakis and Fowler, p. 204.

⁹¹ Mary Pardo. "Mexican American Women Grassroots Community Activists: "Mothers of East Los Angeles" *Frontiers: A Journal of Women Studies* 11, no. 1 (1990): 1-7. URL: <http://www.jstor.org/stable/3346696>.

In a flooding context, a similar effect can take place when communities use networks and a sense of responsibility to the community to motivate preparedness. Revisiting the research in Australia mentioned earlier, recall that researchers attributed the heavily flood-prone community's resilience to community networks and beliefs. There, residents are found to have “high levels of sense of belonging in the community and participation in community activities,” and also to “believe they, as well as Local Council, are responsible for preparing for floods.”⁹² Despite tremendous flooding and poor physical surroundings, residents remain, and community businesses opt not to relocate for the convenience of customers.

In both these previous studies, a collective sense of strength, belonging and responsibility motivated collective action in the face of a threat. A 2006 U.K. study of how women view the causes of breast cancer showed that shifting the emphasis from individual to collective risk more effectively motivated women to seek out ways to get involved in reducing environmental causes of breast cancer. In this case, focus groups of both breast cancer survivors and those without the disease were asked to map their narrative understandings of suspected environmental hazards in their neighborhoods – at the local factories, mines, workplaces. The researchers found that during the course of the mapping, the understanding of the participants shifted from an individual focus on the causes of risk, such as diet, exercise and genetics, to a communal identity of risk factors for breast cancer. Researchers describe that as a result the group of women began to identify not as individual victims, but as a collective citizenry with a shared concern about breast cancer risk. From this position, the women began to seek out ways to get

⁹² Keogh, *et al.*, p. 715.

involved in larger collectives looking at environmental causes of breast cancer.⁹³ Alone, the women could work only to address their own risk. As a group, they were empowered to seek out answers that could benefit not only themselves, but also their community of at-risk women.

Taken together, these examples demonstrate that a sense of identity and belonging within a group can alter or create patterns of action. Social influence, Sunstein argues, works through information transfer and “peer pressure.” Community identity, as various studies suggest, works further by tapping into a sense of how one is supposed to behave because of who one is within that peer group. As Sunstein notes, arguing that “most people do” a particular behavior can persuade another to take that action. In the case of preparedness, where the decision to engage requires a long-term commitment to a lifestyle and mindset, stronger motivation can be found by noting that “people with whom I connect and choose to relate” do this or that behavior. Rather than mere herd behavior directing one to do simply what another does, having a community identity around risk taps into one’s self-identity and connection to *who those other people are*. It engenders a sense of responsibility to the others in a community that one has intentionally entered. The assumption is not merely that people will prepare because they are asked to, but because they understand that being prepared is what *their community* does.

In the context of flooding, communities can form an identity around the risk that bonds them as members of a collective who know and understand the capacities of the river. Their identity, whether as “river folk” or a “flood city” can include a strong understanding of river variability, and a pride in their ability to accommodate the river's

⁹³ Laura Potts, “Narratives of Risk and Collective Identity,” *Auto/Biography* 14 (2006): 116–133.

rise and fall. Together, the group would understand both *how* – through information transfer - and *why* – through community action - to prepare in advance against the shared threat of losses to life and property from flooding.

Community response to risk can take other forms than I propose, and it generally does. As Wenger and Weller describe, the natural response of communities to disaster can form a disaster subculture, but such a subculture, if not cultivated correctly, can create its own problems (too narrow a definition of risk or an assumption that the community knows the worst risks that can occur). Most frequently, communities respond to risk by assigning responsibility for mitigation and loss control to professionals, including municipal officials or emergency managers, and government agencies. In this model, the emphasis on flood loss reduction centers often around structural projects. Residents are given the job of waiting for flood warnings, but are provided with little direction about what to do when that warning is issued. Individual preparedness is therefore given scant attention. As noted by Mileti, relying too heavily on institutional and governmental responses has its own threats. When governments appear very proactive in addressing hazard issues, “individuals may be lulled into a false sense of security and become less prepared to cope with or respond to a disaster event because organizational adaptations to the threat appear to be sufficient.”⁹⁴ Recently, Sayre provided an interesting description of another response in Tokyo, where tremendous preparedness exists but is “concealed” from daily life. Here, preparedness is tucked into everyday life – umbrellas at the bottom of handbags, pop-up coffins built into the walls of school gymnasiums – in an out-of-sight sort of style, intentionally kept out of mind but

⁹⁴ Joanne M. Nigg and Dennis Mileti, “Natural Hazards and Disasters,” In *Handbook of Environmental Sociology*, p. 283. Riley E. Dunlap and William Michelson, eds. (Westport Connecticut: Greenwood Press, 2002).

ready as needed.

In contrast, building community identity around risk is an explicit process of intentional action, rather than concealed intentions. When educators and others build such an identity they will make it plain to all that motivating preparedness within the community is their goal. Recalling Wenger and Weller's dialectic relationships, when people share a community identity around risk it is manifest all the time, and not waiting to emerge only in times of crisis. As an approach to preparedness, it is also broad in scope, and inclusive of the entire community. It depends upon individual as well as institutional planned responses to the risk, and lastly, includes both instrumental as well as expressive understandings of risk. Indeed, it is the inclusion of expressive responses – norms, values and beliefs about who a community is in relationship to their risk – that helps to create the community identity around risk.

Consider, then, what this might entail in the context of communities at risk for flooding. In such a context, having a community identity that is grounded in flood-related risk requires 1) that individuals understand river variability as a natural process of the river, and 2) that this variability requires the joint attention and preparation of the individual with his or her neighbors, in order to reduce loss for all of them. The end goal is a community that organizes its collective life and practices around the presence of the risk, in order to reduce loss of life and property, and damage to the physical environment.

As a matter of flood education, creating a community identity around risk is not an accidental process, but rather requires an intentional effort to infuse educational messages with proper content (as drawn from the best practices of actionable risk theory) about flooding preparedness. It also requires that messages encourage the sharing and

discussion of this content and these action steps with peers and neighbors (i.e., milling). Lastly, it requires messages that identify the recipient of the message as connected to a larger community of people who are prepared for flooding. With this in mind, in Part IV of this paper, I examine how the earthquake preparedness sector of the natural hazards community has already begun to build such a community identity around risk, and I compare these efforts to those of the floodplain management community. However, before doing so, it will be important to understand with more specificity what is meant by the terms “community” and “identity.”

Understanding Community and Identity

Assumed in the milling philosophy is that individuals have neighborly and family or peer relationships upon which they can draw in their decision-making process. The concept of a decline in community, popularized again recently by Robert Putnam's book *Bowling Alone*, is not new, and suggests generally that advances in transportation and other technology have created a more mobile, and therefore more geographically and relationally disconnected society.⁹⁵ Despite this premise, there is evidence to suggest that neighborly connections do still operate in the United States. For instance, a survey by the insurance agency State Farm about the role of neighbors, for instance, found that 71 percent of neighbors “chat with neighbors face-to-face at least once a month,” and 12 percent stay in touch via social media. The survey also found that neighbors still actively interact, share childcare, lend tools and financial resources, and rely on each other's presence to improve happiness.⁹⁶

⁹⁵ Robert Putnam. *The Collapse and Revival of American Community*. (New York: Simon & Schuster, 2000); Claude S. Fischer *et al.*, *Networks and Places: Social Relations in the Urban Setting*, p. 164-167, (New York: The Free Press, 1977).

⁹⁶ State Farm. *State of American Neighbors Survey*. 2011. <http://stateofneighbors.com/State of the>

In a departure from the unstated assumptions of what “community” means in the disaster culture and disaster subculture theories, I allow for a broader and more inclusive description of community than merely the municipal or geographic boundaries surrounding floodplain areas. Specifically, I avoid the discussion of whether community must be this traditional neighborly community, conceived of in the sense of “corporate groups producing communal ties.”⁹⁷ Instead, I adopt a more expanded sense of community, a “community without propinquity” which allows for extra-local relationships carried out by choice with “modern means of communication and transportation.”⁹⁸ This conception of community permits both types of community to influence an individual's motivation to act. Given the very local nature of the flooding phenomenon, it is reasonable to expect that one's local, geographic boundaries will be a particularly salient factor in defining the community that shares an identity around risk. Previous disaster culture studies have assumed this to be so. But, if we follow Fischer in accepting that “new sources of personal networks are supplementing traditional ones,” and that the “closed corporate groups of the past are waning,” then we must also consider this community identity in broader contexts.⁹⁹

For the purpose of this paper, whether an individual views themselves as part of a municipal community, for instance, or a statewide one, or a national one, or even a demographic one of a particular type, is not the key distinction. Indeed it may be incumbent upon flood educators to identify in given scenarios what level of community they are addressing, and adapt their modes accordingly. Fundamentally, what matters is

American Neighbor Survey (accessed August 3, 2012)

⁹⁷ Fischer, *et al.*, p. 164.

⁹⁸ Fischer, *et al.*, p. 166.

⁹⁹ Fischer, *et al.*, p. 196.

that the individual who is the target of the flood education messages conceives that he or she is part of a larger group of people operating with a set of normative agreements about what it means to be a part of that community. Keller offers a definition that works for this purpose: “To qualify for community, social categorization must be translated into a consciousness of kind, a sense of belonging, and a shared destiny, past or future.”¹⁰⁰ The community at stake here is, most basically, of the type that Cohen explains as “symbolic,” by which he means not that it is shifting or illusory, but rather that it is self-defining to individuals and “refer[s] to more substantial areas of their identities.” Understood in this context, “Community is more than oratorical abstraction: it hinges crucially on consciousness.”¹⁰¹ This kind of community is constructed symbolically, Cohen argues, and becomes a “resource and repository of meaning.”

Following von Zomeren *et al.* I define community identity in the context of social identity, which “refers to the socially shared understandings of what it means to be a group member.”¹⁰² This sort of identity centers on group belonging rather than on assertion of individual traits, or on the connection of an individual to the group itself. It presumes that, insofar as flood preparedness actions are concerned, one will be motivated to act based on one's identification as a member of a flood-prepared community (such as the city where they live, or perhaps as part of a group of emergency managers or volunteer watershed monitors which has identified itself as flood-prepared). In some cases, the majority of a community may have control over the decision to live by a river,

¹⁰⁰ Suzanne Keller, *Community: Pursuing the Dream, Living the Reality*, p.8, (Princeton, New Jersey: Princeton University Press, 2003).

¹⁰¹ Anthony P. Cohen, *The Symbolic Construction of Community*, p. 13. Key Ideas, Series Editor, The Open University. London: Routledge, 2003.

¹⁰² Martin van Zomeren and Tom Postmes, “Toward an Integrative Social Identity Model of Collective Action: A Quantitative Research Synthesis of Three Socio-Psychological Perspectives,” p. 505. *Psychological Bulletin* 134, no. 4 (2008): 504–535.

and take pride in having made a decision to be flood-prepared. In other cases, such as low-income communities with limited options, the need to be prepared may be one of many difficult realities in their lives. Although the circumstances of the community might require different messages, in either case, the identity of the individual is linked to their sense of belonging to a flood-prepared community.

In many ways, these definitions blur the distinctions between “community” and “identity” because the sense of belonging required to form a “community” is also the basis of the identity itself. What matters for those designing flood education messages is that they understand their job as not merely educating about what actions to take, but also about what community identity to conceive. If disaster cultures emerge naturally in ways that do not always support flood preparedness, then educators must help to redefine a disaster culture that incorporates better scientific and technical knowledge about the risk, and also stronger agreement about how the community prepares for and effectively responds to flood risk. Considered another way, the flood educator becomes a facilitator of dialogue within the community about flood risk, and aims to achieve consensus on one critical point: that the community is a flood-ready one.

Flood education programming that helps to build a community identity around flood-related risk is the third central component of the theoretical framework proposed in the preceding sections. Specifically:

- I have proposed that flood education should be guided by a series of three best practices that provide information about and demonstrate preparedness behaviors:
 1. Demonstrate preparedness behaviors
 2. Provide information about actions to take to reduce losses

3. Repeat messages *multiple times*, from *multiple sources*, through *multiple channels of communication*.

- I have also proposed that such education should call on social networks and relationships to promote the practice of milling, so that individuals will share information about their own preparedness steps and encourage their friends, families and neighbors to take similar steps.

- Finally, a successful flood education program should craft messages that cultivate a community's sense of collective belonging and shared response to flood related threats. In doing so, programs can motivate people to prepare not merely for themselves, but also for the sake of their community.

PART IV: ANALYSIS AND RECOMMENDATIONS

Having proposed a theoretical framework for flood education, in this section I use this framework for three purposes: 1) to identify the successes and failures of the past flood education efforts at employing the strategies proposed in the theoretical framework; 2) to gain insights from the approaches of the earthquake sector of the natural hazard (which has employed actionable risk communication strategies in its education programs, and has begun to develop a community identity around risk); and 3) to make recommendations for improving flood policies and programs so that they will better motivate preparedness among public audiences. Toward this end, in what follows I first provide an overview of the methods I use to evaluate past and present preparedness programs. Second, I analyze a series of materials produced by the earthquake and flood education sectors to provide examples of how the principles of the framework have, and

have not, been used by these sectors of the natural hazard community.

A. Methods:

Drawing on an extensive collection of flood and earthquake education materials, such as websites and videos, brochures, reports, and various other components of education campaigns, I first assess whether and how these materials incorporate the three primary components of the theoretical hazard education model -- best practices, milling, and cultivating a community identity around risk -- proposed in the preceding section on developing a community identity around risk. In all cases, the analysis considers the content of the materials, including text and graphic design. Where information about distribution is available and relevant, the analysis also considers the method and strategy for dissemination of the materials. More specifically, in reviewing each material, I assess whether the material does the following:

- a) Incorporates the “best practices” of the actionable risk communication model:
 - Does it demonstrate preparedness behaviors?
 - Does it provide information about actions to take to reduce losses?
 - Does it repeat messages multiple times, from multiple sources, through multiple channels of communication?
- b) Promotes “milling” about preparedness
 - Does it encourage the sharing of information with others?
 - Does it encourage the seeking out of further information?
- c) Cultivates a community identity around risk
 - Does it incorporate understandings about community, group, and collective action and responsibility?
 - Does it engender feelings of community belonging?

To better understand the logic of the earthquake programs, I gained insights from federal employees and key leaders who have influenced, established and now lead the various programs (such as the Great California ShakeOut) and educationally focused collaborations (such as the Redwood Coast Tsunami Working Group) that guide these programs. Because I intend to inform efforts to create effective risk education programs, I focus on the most relevant examples of how the earthquake sector's efforts have met the objectives of the proposed theoretical framework. I then follow with a review of flood programs, and recommend ways to improve flood programs so that they might better motivate public preparedness.

B. Analysis

1. Earthquake Programs

Earthquakes are an ever-present threat to Southern California, and the consequences of a major earthquake are always enormous. In the past 10 years, a strong coalition of earthquake organizations – including emergency response, federal agencies and others – have gathered together to jointly address earthquake risk through technical, planning and education responses. The most notable of these programs is the “Great California ShakeOut” mentioned in the introduction to this paper. This massive emergency preparedness drill, which has now spread across the country and internationally, was born in response to the ShakeOut Scenario produced by the United States Geological Survey's Multi-Hazards Demonstration Project in 2008. This “Scenario” was a multi-disciplinary research project that demonstrated the anticipated effects – including scientific, damage and loss projections, along with shaking

visualizations – of a 7.8 magnitude earthquake on the southernmost 300 km of the San Andreas fault, which is considered “a plausible event on the fault most likely to produce a major earthquake.”¹⁰³ The Scenario forecast 1,800 deaths and \$213 billion in damages.¹⁰⁴ It also “identified factors that will determine whether the event would be a disaster or a catastrophe, that is, whether the event would disrupt southern California for a few years, or for decades.”¹⁰⁵ The Scenario was selected to be California's annual “Golden Guardian” project for 2008. Golden Guardian projects traditionally involve a mass preparedness drill mobilizing emergency responders and institutions. But in a departure designed to help the public understand the anticipated impacts of an earthquake of this size, the 2008 Golden Guardian drill opened up to the general public through the creation of the “Great California ShakeOut.”

The Great California ShakeOut invited the public to learn about earthquake safety and to collectively engage in a statewide “Drop, Cover, Hold On” drill. Headed by the Southern California Earthquake Center (SCEC), a coalition of southern California earthquake organizations (now known as the Earthquake Country Alliance) used the scenario to rally public attention around the earthquake scenario. This coalition formed the Great California ShakeOut preparedness drill with a goal of engaging 5 million participants in what was “initially conceived as a once-in-a-lifetime event.”¹⁰⁶ Working with public institutions, governments, schools, and through direct-to-public

¹⁰³ Lucile M. Jones and Mark Benthien, “Preparing for a “Big One”: The Great Southern California ShakeOut, p. 576. *Earthquake Spectra* 27, no. 2 (May 2011): 575–595.

¹⁰⁴ Jones and Benthien, p. 578.

¹⁰⁵ United States Geological Survey, Multi-Hazards Demonstration Project, “ShakeOut Scenario,” <http://urbanearth.gps.caltech.edu/shakeout/> (accessed August 3, 2012).

¹⁰⁶ Mark Benthien and Robert de Groot. *SCEC Communication, Education and Outreach: Report for SCEC 2011 Annual Meeting*, p.32-33, (Southern California Earthquake Center, 2011). <http://www.scec.org/meetings/2011am/SCECProceedingsXXI-Sect3-CEOHighlights.pdf> (accessed July 20, 2012).

advertisements, the Great California ShakeOut enrolled 5.4 million participants in its first year. Participants joined through schools, hospitals, workplaces and as individuals, all of which organized their own “Drop, Cover, Hold On” drills in their own locations, timed for 10:00 a.m. on November 13, 2008. Although emergency management drills generally operate under highly regimented and controlled exercises, the Shakeout allowed workplaces, emergency management offices, child care centers, schools and other locations to rally their members in the way that worked for them, and then to report about it afterward through photo and story submissions online. By 2011, the fifth year of the event, ShakeOuts had spread to multiple states and countries.

ShakeOut organizers deliberately and self-consciously incorporated Mileti's and others' social science research into the program design. The result is a campaign that is part education, part social networking, and part mass practice for an earthquake disaster. Participants who visit the ShakeOut website, which is the primary registration and marketing device for the event, encounter an extensive amount of preparedness information about what are now a series of different earthquake scenarios that respond to different regions within the state of California. Participants also can register to participate during the Shakeout drills, and can exchange photos, videos, and stories of their preparation and drill exercises. Because it is the primary vehicle for dissemination, I have used the website www.shakeout.org as the source of materials for the campaign (including reports, brochures and marketing pieces, which are also available in hard copy and online).

Although the Shakeout is the most prominent of the earthquake education efforts, partnerships and organizations including the Earthquake Country Alliance (ECA), the

Redwood Coast Tsunami Working Group (RCTWG), and the California Emergency Management Agency (CAL-EMA), have initiated other complementary efforts and websites to help disseminate earthquake preparedness messages. RCTWG produces the *Living on Shaky Ground* magazine series and has coordinated full-scale tsunami evacuation drills and emergency warning system tests in California. CAL-EMA publishes hazards maps and preparedness information for earthquakes, and participates in many collaborative education initiatives. One frequently used resource is the *Putting Down Roots in Earthquake Country* handbook, which the SCEC and the Earthquake Country Alliance (ECA) annually revise and release. The publication, first produced by SCEC in 1995, is produced now annually in partnership with the Earthquake Country Alliance, in both English and Spanish, and it includes a regional version for the San Francisco Bay, developed by United States Geological Survey (USGS) with partners. The SCEC views “Putting Down Roots” as not just an online handbook, but also as a “framework for providing earthquake science, mitigation and preparedness information to the public.”¹⁰⁷ Additionally, the ECA also organizes the Dare to Prepare campaign, which focuses on preparation actions.

A different group has organized a public earthquake education campaign, Totally Unprepared, which takes a younger, edgier tone than traditional bureaucratic or governmental programs. The Totally Unprepared campaign is organized by CAL-EMA, the California Earthquake Authority, and the Alfred E. Alquist Seismic Safety Commission. The website uses urban lingo, jokes, humor and games to share earthquake preparedness messages. The Totally Unprepared group acknowledges the social science research of Mileti and colleagues and justifies its approach by linking to the three

¹⁰⁷ Benthien and de Groot, p. 34.

following objectives derived directly from actionable risk communication theory:

- 1) delivering concise information about preventing future loss instead of generic incident-based messages; and
- 2) providing branded messaging from multiple sources through multiple channels over time instead of focused on one day; and
- 3) facilitating “observed preparation behavior”¹⁰⁸

Other organizations, including FEMA, USGS and the American Red Cross are also involved in the ShakeOut as well as other earthquake planning activities. For the purpose of the following analysis, I have selected the ShakeOut and related projects described here because they are the most prominent and also are representative of the efforts taken by all of the involved agencies. These efforts are instructive because they do incorporate the tenets of the theoretical framework previously proposed; as such, their successes inform the recommendations section of this paper. Let us consider, then, whether the ShakeOut materials incorporate best practices, milling, and efforts to cultivate a community identity around risk.

Best Practices:

Question 1: Does the program material demonstrate preparedness behaviors?

Demonstration of preparedness behaviors – and most particularly, “Drop, Cover, Hold On” - underlies nearly every earthquake safety material produced among the California-based organizations involved in the ShakeOut. One of the central, organizing messages of the earthquake safety sector is the “Drop, Cover, Hold On” routine, which encourages people to drop wherever they are as soon as they feel shaking, take cover

¹⁰⁸ Totally Unprepared, “About Us,” <http://www.totallyunprepared.com/about-us/> (accessed August 3, 2012).

beneath a sturdy object, and hold on until the shaking is over. This procedure reduces common injury from earthquakes, such as glass cutting people's feet as they try to run away from the shaking, and is considered the safest response to shaking. The earthquake organizers in Southern California have made this routine a pivotal part of all of their educational campaigns, and it is the central activity of the Shakeout annual drill. All of the earthquake organizations working in California (and elsewhere) use the same image for demonstration. The "Drop, Cover, Hold On" logo is simply designed with block-style graphics (exemplified below in Illustration 4.0) that demonstrate exactly the steps a person should take when they feel ground shaking.

Illustration 4.0 "Drop, Cover, Hold On" logo. From:

<http://www.shakeout.org/california/downloads/DropCoverHoldOnFlyer.pdf>¹⁰⁹



This image has its own website, (www.dropcoverholdon.org) and is repeated on nearly every educational resource that the ShakeOut produces, including videos, brochures for ShakeOut organizers, and others. The image is ubiquitous across the various education websites and campaigns that promote earthquake safety in California.

¹⁰⁹ Southern California Earthquake Center, "Protect Yourself," <http://www.shakeout.org/california/downloads/DropCoverHoldOnFlyer.pdf> (accessed August 3, 2012).

But beyond this graphic image, the ShakeOut website also includes photos of past participants engaging in the Drop, Cover, Hold On poses. The site is populated with many photos of people, ranging from parents and children to emergency managers, all engaged in Drop, Cover, Hold On activities in their own individual locations:

Illustration 4.1



Illustration 4.2



4.1: Fairfield, CA: Joy Gamble: “We're ready for the next quake at JoyJoy's Creative Learning in Fairfield, Ca.”

4.2: San Gabriel Valley Surgical Center, West Covina, CA: “the brave of the bravest!!!”¹¹⁰

Some of the images (such as 4.2) capture an esprit de corps among the groups practicing while others involve children or other groups who are engaged in more serious simulations (such as 4.1).

This approach of using both graphical and photographic representations of desired behaviors is used in many of the ShakeOut materials. For instance, the downloadable flyer “Shakeout: Individuals and Families Get Ready to ShakeOut” has a clean graphical style that shares only a few visual images. First, the logo of the organization, which is

¹¹⁰ Southern California Earthquake Center, “Photos from the ShakeOut: 2011,” http://www.shakeout.org/california/share/photo_view.php?page=2&year=2011/ (accessed August 3, 2012).

simply a geographic image of the state of California with a stylized “ShakeOut,” and second, the standard three-part “Drop, Cover, Hold On” graphic, which also includes words as well as images. The last image is a photographic example of a father and child beneath a table, demonstrating again the desired behavior. The effect is to demonstrate in every media what “Drop, Cover, Hold on” looks like. The ShakeOut site also shares images of people taking other preparations, such as stockpiling food, or securing utilities.

Ill. 4.3 Stockpiling food, essentials:



Ill. 4.4 Attaching gas shut-off wrenches:¹¹¹



In an earlier piece produced by a different earthquake education campaign called the Emergency Survival Program, fact sheets about securing one's belongings showed clear illustrations of secured furniture, appliances, etc.¹¹² This approach was repeated in the Dare to Prepare campaign, discussed below. Rather than merely suggesting what to do, these images reinforce for the user what it will *look like* to have one's belongings secured.

In a different approach, the Totally Unprepared campaign features short television programs in which a pair of hosts (one punk-rock styled, and the other a firefighter) tour the homes of famous local celebrities in Southern California to investigate whether or not

¹¹¹ Id.

¹¹² County of Los Angeles, California. Emergency Survival Program, “ESP Focus: Secure it Now!” http://www.scec.org/education/public/espfocus/Feb_06.pdf / (accessed August 3, 2012). Flyer.

their home is prepared. The hosts help the owners systematically identify the weaknesses in their preparedness, and show the steps to improve (locate water and gas shut-off valves, secure furniture, etc.). In these shows, the participants openly acknowledge their desire and need to prepare.

Thus, in each of these instances, the materials create visual images of real-life and illustrated people taking preparedness actions. Readers and viewers can see what a secured home looks like, or what it looks like for a group to “Drop, Cover, Hold On” in the middle of a workplace. The emphasis, graphically and from a content perspective, is on the *demonstration* of preparedness actions.

Question 2: Do the program materials provide information about actions to take to prevent future losses?

Generally, the earthquake preparedness materials focus exclusively on actions to take, and very little on levels of risk. The most central messages about how to prepare – such as “Drop, Cover, Hold on” – are blanketed everywhere, for everyone. Messages are then tiered downward, in order of relevance and importance. Information about risk and probability is provided in these materials for those who are motivated to understand the science behind earthquakes and tectonic shift, but these messages are given less play in most educational materials.

The *Putting Down Roots in Earthquake Country* handbook is an excellent example of how materials try to stress action steps. The handbook is available in hard copy, or online as a .pdf that can be downloaded.¹¹³ Before users can download the

¹¹³ Southern California Earthquake Center, *Putting Down Roots in Earthquake Country*, <http://www.earthquakecountry.info/roots/index.php> (accessed August 13, 2012).

document online, the website prompts them first to answer a series of questions about their own preparedness. The questions include: “Have you identified hazards in your home (heavy items that can fall on you during shaking, unsecured water heaters, etc.) and begun to fix them? Have you created a disaster plan? Have you created a disaster supply kit? Have you identified your home's potential weaknesses (house not bolted to foundation, unbraced cripple walls, etc.) and begun to fix them? Do you know how to protect yourself during an earthquake?” These action steps are reinforced multiple times throughout the document, with an emphasis on describing how taking action steps can help reduce losses. An interactive tool, “The Seven Steps to Earthquake Safety,” describes in detail each of the steps a person or household can take to reduce losses.

In yet another collaborative education campaign for earthquake readiness, the “Dare to Prepare” campaign encourages people to “Secure Your Space” to protect ones' life and property, and family. Announcing that “Shift Happens,” the “Secure Your Space” outreach materials detail specific steps (such as strapping furniture and appliances to walls, and latching cabinets and retrofitting buildings) in step by step detail to help reduce losses during a shaking event. The materials also provide instructions on how to hire reputable contractors, and reinforce “Drop, Cover, Hold On” messages simultaneously.¹¹⁴

The Totally Unprepared campaign also features detailed instructions for securing items, making emergency wallet cards, developing home and pet earthquake kits, and purchasing earthquake insurance. In what may be a nod to Sunstein and Thaler’s work,

¹¹⁴ Southern California Earthquake Center, “Secure Your Stuff: Tall Furniture/Bookcases,” *Putting Down Roots in Earthquake Country Handbook*, <http://www.daretoprepare.org/stuff/bookcases.html/> (accessed August 3, 2012).

that site also features an email sign-up, asking viewers whether they “need a nudge” to prepare. Visitors who sign up will receive occasional emails with reminders and information about how to prepare.

The trend across the earthquake materials is clear: stressing actions is a key component of the message. But as actionable risk communication theory emphasizes, simply saying what to do isn't enough. People must also understand that taking actions will help reduce losses. The California Emergency Management Agency and the California Earthquake Authority worked with the research firm Harris Interactive in 2011 to conduct tests on public audiences about the kinds of messages that work to promote earthquake preparedness. A report from that study revealed the sorts of values and beliefs that people hold are closely related to their preparedness behaviors. Consistent with Mileti's research findings, that study called for a transition away from messages that simply relay “what to do,” and toward messages that also described “why to do it.”¹¹⁵ In assessing people's core values that are related to earthquake preparedness and recovery, the study looked into the emotional and affective responses that people rely on for making preparedness decisions. Across all demographics, people valued the feeling of “protecting one's family.” Other key values were feelings of “control,” “survival” and “peace of mind.” Drawing on these values, the report suggests, will motivate better preparedness among families. However, the study also cited emotive responses related to people's admission that they were “in denial” about their earthquake risk, and that they had failed to prepare. According to the study, these latter responses *negatively* influence preparedness. Such feelings, the study suggests, lead to a lack of peace of mind and self-

¹¹⁵ Harris Interactive, Inc., “Message Research Executive Summary,” California Earthquake Authority and California Emergency Management Agency, 2011.

esteem, and start a cycle of defeat in which the individuals end up with the “the idea that preparation is futile and can’t be done.”¹¹⁶

Overall, these responses to preparedness suggest that that instead of selling fear, the campaigns need to sell the fact that action now will make life on the *other side* of the earthquake event look better. The report recommends earthquake organizations relay messages that “Preparing now will help your family survive and recover from California’s next damaging earthquake,” and that “Taking simple steps to prepare will help you get back to normal faster after the next big quake strikes.”¹¹⁷

Such messages are populated throughout the earthquake safety sites. ShakeOut.org uses nearly that exact language in its “Why Participate?” section, stating that “*What we do now will determine our quality of life after our next big earthquake.*” (emphasis original). The Dare to Prepare campaign uses slightly different language that has the same effect when it says “These and other actions will greatly reduce your risk of damage or injury, and limit your need for community resources after the next earthquake.”¹¹⁸ *Putting Down Roots in Earthquake Country* offers its preparedness actions, and notes that actions taken now can reduce losses later: “If we all follow these steps, we may save billions of dollars and prevent countless casualties in the next large earthquake.”¹¹⁹

These examples demonstrate that the earthquake community has adopted the best practice of advising about actions to take. And importantly, it has pushed the envelope of

¹¹⁶ Harris Interactive, p. 9.

¹¹⁷ Ibid, p. 2.

¹¹⁸ Southern California Earthquake Center, “Dare to Prepare,” <http://www.daretoprepare.org/> (accessed August 3, 2012).

¹¹⁹ Southern California Earthquake Center, “The Seven Steps to Earthquake Safety,” *Putting Down Roots in Earthquake Country Handbook*, <http://www.earthquakecountry.info/roots/steps.html> (accessed August 3, 2012).

understanding what motivates behavior by focusing on explaining how steps taken now to prepare will reduce losses in the future. Where previous generations of educators have taken positive steps by creating educational materials that state, “Get an earthquake kit,” these newer efforts further recognize the importance of explaining to people how taking actions today will reduce losses tomorrow.

Question 3: Do the program materials repeat messages multiple times, from multiple sources, through multiple channels of communication?

The Great California ShakeOut is unique within the preparedness field not only because of its size, but also because of its design, leadership structure, and organizing principles. Although the ShakeOut is organized primarily through the Southern California Earthquake Center (SCEC), public branding of the event advertises a variety of organizations with equal emphasis. This umbrella approach to advertising the event can encourage broader participation from other organizations as it allows all organizations to share the glory of a highly successful campaign; however, members of the earthquake community and government agencies observing the event still well understand who is the lead agency. Insofar as this approach also incorporates the research imperative to provide “dense information” and to brand a campaign with multiple partners, it serves not just the institutional partners, but also the public. In other words, what is branded, from the public perspective is not the messenger, but the essential message – i.e., practice how to protect yourself during an earthquake.

Thus, what these earthquake preparedness practices in California demonstrate is that the various campaigns, such as the ShakeOut and the Dare to Prepare campaigns, are

effective when they work in conjunction with one another. The “Drop, Cover, Hold On” website is promoted on the Dare to Prepare website, along with the ShakeOut activities and the *Putting Down Roots in Earthquake Country* handbook. These sites are also promoted on the ShakeOut website, and the links between the various initiatives therefore allow viewers to move fluidly back and forth among them. The “Drop, Cover, Hold On” campaign is also found on the Totally Unprepared website, as is information about the *Putting Down Roots* handbook. The messages also extend into museums, such as the Birch Aquarium in San Diego, which created an exhibit about earthquakes that features the “Seven Steps” imagery that is central to the *Putting Down Roots* handbook.¹²⁰ A user interested in earthquake preparedness in California will find consistent messaging through campaigns that are commonly focused on the action steps to take (Dare to Prepare, ShakeOut, “Drop, Cover, Hold On”) rather than on any particular organizing body. In fact, it is not easy to discern on any of them who is the sponsoring agency; instead, in most cases, there are lists of multiple official organizing groups behind each campaign. The United States Geological Survey (USGS) page for earthquake preparedness, as another example, refers visitors to *Putting Down Roots* handbook and the ShakeOut website, as well as to a technical FEMA resource for securing one's home.

This approach is deliberate. In responding to the tenets of actionable risk communication, earthquake organizations and campaigns downplay the role of federal agencies in branding messages, and instead allow the various smaller organizations – including churches, workplaces, state agencies and others – to share the message. The ubiquitous use of “Drop, Cover, Hold On” in all materials, and the shared approach on multiples sites of listing the same ways to stabilize furniture and homes, creates a

¹²⁰ Benthien and de Groot, p. 34.

uniform impression for the person seeking information about earthquake information.

2. Milling Activities

Of all of the resources for earthquake safety, the ShakeOut has most prominently promoted milling among neighbors, families and friends. From within the ShakeOut website, participants can invite friends or family to register for the ShakeOut event, and to share information about preparedness. Participants are invited to submit photos of themselves engaging in their preparedness activities in their schools, homes or businesses, and to view others doing the same. The ShakeOut website invites the reader to “Share Your Experience” and also to invite friends and families to register, as well as to encourage employers or other groups to participate.¹²¹ The intention to promote conversation about earthquake preparedness is explicit. In its annual report about the Communication, Education and Outreach program, the SCEC acknowledges that the ShakeOut is about more than informing Californians about their earthquake risk: “The ShakeOut teaches people a life-saving response behavior while fostering a sense of community that facilitates further dialogue and preparedness.”¹²² For the ShakeOut process, making people talk to one another is essential.

In a different approach, Totally Unprepared suggests that people “throw a party for earthquake awareness,” in order to build neighborly connections that people can draw on for help in times of an earthquake.¹²³ A general preparedness campaign known as “72

¹²¹ Southern California Earthquake Center, “Individuals and Families Prepare to ShakeOut,” <http://www.shakeout.org/downloads/ShakeOutIndividualsFamilies2011.pdf> (accessed August 3, 2012).

¹²² Benthien and de Groot, p. 34

¹²³ Totally Unprepared, “Have You Put Your Friends In Your Earthquake Kit?”, <http://www.totallyunprepared.com/2012/03/have-you-put-your-friends-in-your-earthquake-kit/> (accessed August 3, 2012).

hours” and organized by the San Francisco, California Department of Emergency Management, aims to help people survive the first 72 hours after any major disaster, when critical power and other services might be off-line. Notably, the site has a link to “Email this site to a friend,” which is the kind of activity that fosters milling and the spread of preparedness behaviors.¹²⁴ In these and other ways, the guiding principles of actionable risk communication are clearly at play in the earthquake campaigns.

The “Living on Shaky Ground” campaign of the Redwood Coast Tsunami Working Group offers much technical information about tsunamis, earthquakes and how to prepare, but also clearly incorporates some milling efforts. A promotional banner, “Seven Steps that May Save Your Life,” encourages people to learn about how to protect their home, and then “Talk to your family about what you have learned.”¹²⁵ A letter by the group’s director, Lori Dengler, to the local newspaper, the *Times-Standard/Humboldt Beacon* encourages people to use the annual tsunami drill as a chance to “discuss tsunami and earthquake safety with family, friends and co-workers.”¹²⁶ These messages are consistent throughout the campaign’s materials.

Overall, milling efforts are less entrenched than the best practices (provide information about actions to take to reduce losses, demonstrate preparedness behaviors, repeat information through multiple sources, multiple times, through multiple channels) in earthquake preparedness campaigns. The *Putting Down Roots* campaign, for instance,

¹²⁴ City and County of San Francisco, California, “Are You Prepared?” <http://www.72hours.org> (accessed August 3, 2012).

¹²⁵ Redwood Coast Tsunami Working Group, Humboldt State University, “Living on Shake Ground: How to Survive Earthquakes and Tsunamis in Northern California,” http://humboldt.edu/rctwg/images/uploads/LOSGfairBanners_5_2009_small.pdf (accessed August 3, 2012).

¹²⁶ Lori Dengler, “Tsunami preparedness week offers North Coast important chance to test alerts,” *Times-Standard/Humboldt Beacon*, March 25, 2012. Retrieved from http://humboldt.edu/rctwg/images/uploads/tsunami_week_my_words_2012.pdf (accessed August 3, 2012).

is not very explicit in its encouragement of milling. It encourages people to create a family preparedness plan, and then to “Share your plan with people who take care of your children, pets, or home,”¹²⁷ but beyond this it largely handles preparedness as a household activity rather than one to be shared with neighbors and others. The earthquake community has begun a concerted effort, however, to educate partner organizations about the importance of milling to preparedness activities. When viewed all together, these small steps to promote milling create a consistent message to people that seeking out and sharing news about preparedness, and reflecting on these same preparedness behaviors with neighbors and others, is part of the task of getting ready for an earthquake event.

3. Community Identity Around Risk

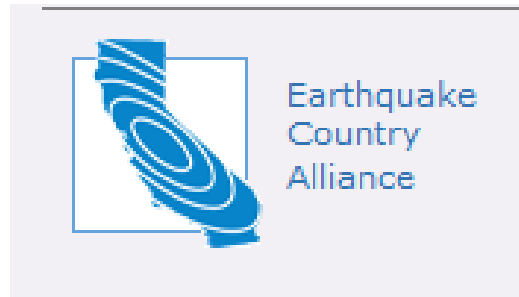
Although the SCEC and partner organizations may not explicitly acknowledge that they are building a community identity around risk, their materials reflect an awareness of the need for people to experience a sense of belonging and community response as the context of their preparedness actions. For instance, the logos for both the Great California ShakeOut and the Earthquake Country Alliance prominently feature images of the state of California. The logos do not attempt to brand a particular concept or identity beyond that of California itself, but the intention is clear when paired with Earthquake Country Alliance's slogan: “We're all in this together.” Conceived by Lucile Jones, the leading seismologist and earthquake educator with USGS, this slogan exemplifies an effort by the earthquake organizations to relay that being a Californian means being prepared for an earthquake.

¹²⁷ Southern California Earthquake Center, “#2: Create a disaster-preparedness plan,” *Putting Down Roots in Earthquake Country Handbook*, <http://www.earthquakecountry.info/roots/step2.html> (accessed August 3, 2012).

Ill.4.5 Great California ShakeOut¹²⁸



Ill. 4.6 Earthquake Country Alliance¹²⁹



The ShakeOut logo on the left has a subtle crack in the words, suggesting a shift in the tectonic plates that cause earthquakes. Together with the easily recognizable image of the state of California, this logo links the risk of earthquakes to those who identify with California as a geographical place. The Earthquake Country Alliance logo (Ill. 4.6) puts a bulls-eye on top of the state of California, again layering risk on top of geography. Upon seeing these logos, viewers are invited to reflect with one another on their shared geography, and the risk that it presents. All participants can look to these logos and reflect, “Yes, that is me. I am a Californian, a person who lives in a place where earthquake risk happens.” The ECA's slogan, “We're All In This Together,” makes explicit that the experience of risk is something that is shared collectively. Thinking back to Cohen's definition of community as something that “refers to the more substantial areas of their identities,” the shared sense of risk and geography that is evoked by these logos help to cultivate such a community. When such a sense of community exists, the threat of earthquake damage in California does not represent merely individual damage to those living there, but rather, it represents complete devastation of the community. In

¹²⁸ Southern California Earthquake Center, “The Great California ShakeOut,” <http://www.shakeout.org/california/> (accessed August 3, 2012).

¹²⁹ Southern California Earthquake Center, “Earthquake Country Alliance,” <http://www.earthquakecountry.info/> (accessed August 3, 2012).

treating people as members of a community – as having an identity that is collective – these logos, in all their simplicity, evoke the importance of a collective response.

To elaborate this point, the other earthquake programs draw out a sense of collective responsibility to prepare. The Dare to Prepare campaign, for instance, cautions that taking steps now to prepare will “limit your need for community resources after the next earthquake.”¹³⁰ *Putting Down Roots* encourages individuals to “Work with your neighbors to identify who has skills and resources that will be useful in an emergency, and who may need special attention (children, elderly, disabled, etc.).”¹³¹ *Totally Unprepared* encourages people to “Put their friends in their earthquake kit... [because] establishing meaningful connections with the people who live around you and can help you survive will make earthquake recovery infinitely more bearable.” These approaches all work to create the experience of earthquakes as a collective experience, and therefore, as something that requires a collective – rather than an individual – response to the risk.

The ShakeOut campaign is also deliberate in fostering a community response to risk. In practice, the earthquake campaigns recruit the majority of participants through organizations, including churches, hospitals, workplaces and schools. This recruitment strategy represents a real reconsideration of the ways that agencies like FEMA and others have traditionally conceived of how people plan to prepare. Rather than doing what the government tells them to do, earthquake campaigns urge people to do what their employers, neighbors or churches are doing. The ShakeOut website has special instructions for organizing neighbors to prepare, that includes the creation of a

¹³⁰ Southern California Earthquake Center, “Dare to Prepare,” <http://www.daretoprepare.org/> (accessed August 3, 2012).

¹³¹ Southern California Earthquake Center, “#2: Create a disaster-preparedness plan,” *Putting Down Roots in Earthquake Country Handbook*.

“neighborhood earthquake plan.” But rather than serving to start merely a cascade of social influence, earthquake agencies are in fact also promoting a sense of belonging. For instance, ShakeOut resources include posters, banners, videos and other materials that ShakeOut organizers can use in their own homes, schools, or organizations. One of these is a poster that says simply, “Join Us for the Largest Earthquake Drill in U.S. History.”¹³² This flyer, with its stark graphic design and use of the words “largest” and “history,” creates a sense of a burgeoning social movement, rather than merely an earthquake drill. The message is not about “getting a kit,” but instead about participating in something larger, a collective, community event. The SCEC, as mentioned earlier, identifies the work of the ShakeOut as “fostering a sense of community” around preparedness.¹³³

Although this collective orientation comes out clearly in the ShakeOut campaign, it is not yet universal among the earthquake organizations. The Dare to Prepare campaign, for instance, encourages people to share their plan with neighbors, but does not follow this with any overt steps to create a community identity around earthquake risk. In some instances, earthquake organizations execute some, but not all, of the potential practices for cultivating a community identity around risk. For instance, the Totally Unprepared campaign focuses very much on social identities and popular responses, and tries to be inclusive of all types people (including punk rockers, firefighters, multiple ethnicities, “Brooklyn Hipsters” and “Wannabe Hippies”), but does not connect these diverse individuals to a collective threat in a way that creates a common, shared identity around risk. Specifically, by emphasizing the relevance of risk

¹³² Southern California Earthquake Center, http://www.shakeout.org/southeast/downloads/ShakeOut_SouthEast_2012_Poster_JoinUs_Color.pdf, (accessed August 3, 2012).

¹³³ Benthien and de Groot, p. 34.

to different types of people, *Totally Unprepared* gets across the idea that “preparedness is for you,” but it does not effectively counter this individual response with messaging that “preparedness is something you do for your community.” Thus, not all of the efforts of the earthquake community have hit the mark. But, as I demonstrate below, they have in much greater measure than in the floodplain community, and with increasing success. Central to the earthquake community’s programming is a concerted effort to create a community identity around risk that motivates individuals to prepare, for their own sake, and sometimes for the sake of their community. Thus, earthquake preparedness campaigns have, in many cases, succeeded in incorporating earthquakes into the shared and collective life of whole communities. Let us turn, then, to the flood education materials, for the purpose of evaluating their current impact and potential.

2. Flood Education Materials

The earthquake community has clearly organized its various campaigns around a few central organizing premises about what to do to prepare for an earthquake. Flooding, however, poses a different kind of threat than earthquakes, and it requires a different public response. Various federal agencies and non-profit organizations have conducted flood education programs, but unlike the earthquake community, the floodplain management community has not identified a core statement (akin to “Drop, Cover, Hold On”) that explains an appropriate and uniform behavioral response to floods. This may be a function of the hazard itself, as flooding (excluding flash flooding) generally happens over a longer period of time, while earthquakes occur suddenly and with little warning, and require immediate response. It may also be a matter of how the public perceives the associated risk. For instance, some have suggested that people are very afraid of

earthquakes because they make people feel “out of control.”¹³⁴ With flooding, longer lead time and the perceived localized nature of flooding may cause people to feel they have more control over the hazard. In truth, with modern forecasting technology, flooding impacts from any given event are much easier to predict than earthquake impacts, which will range vastly between, say, a 6.0 and an 8.0 magnitude quake. Thus, while floods may cost citizens many times as much in damages when compared to earthquakes, and while identifying a proper level of preparedness might be much easier, people may still be less motivated to prepare for floods than earthquakes.¹³⁵

But even if such irrationality persists, citizens’ failure to prepare for floods may also be due to the failure of past public education campaigns to relay effective messages about flood risk and preparedness – even to officials and emergency management audiences. The problem comes through prominently in this review of approximately 100 pieces of flood education materials, including those readily available to the public through federal and public websites and distribution channels (such as brochures and pamphlets), as well as those in a collection developed over the past 15 years by the Flood Safety Project in Boulder, CO.

The materials in this latter collection focus heavily but not exclusively on flood education developed specifically for the states of Texas and Colorado, which are both among the most flood-prone states in the nation, and therefore provide a revealing

¹³⁴ David Appell, “Easing Jitters when Buildings Rumble.” *Scientific American* 294 (2006): 36 – 37. doi:10.1038/scientificamerican0106-36.

¹³⁵ A scenario project in California for a severe flood event, also coordinated by Lucy Jones of USGS, predicted \$400 billion in direct property losses, in contrast to a little more than \$200 billion for the earthquake scenario. Floodplain managers have not, however, organized around this scenario in the same way as the earthquake community. See: Keith Porter, *et. al.*, “Overview of the ARkStorm Scenario,” U.S. Geological Survey Open-File Report 2010-1312, 183 p. and appendixes.

historical perspective. Specifically, the materials from the Flood Safety Project include hard-copy and video materials that document a decade or more of flood-education efforts. The remaining materials I will review include those from federal agencies and non-profit organizations including relief and recovery groups such as the American Red Cross, flood control districts, watershed associations, municipalities and other organizations concerned with flood education. These materials usually are more recently developed and allow me to single out pieces designed for general or national distribution, such as the Federal Emergency Management Agency's (FEMA) Ready.gov website and the National Weather Service (NWS) flood education materials. Together, FEMA and the National Oceanic and Atmospheric Administration (NOAA)'s NWS offices comprise the primary repository of national flood education efforts. Their campaigns are central to this analysis.

As background, the floodplain management community, and its limitations, should be understood within its distinct institutional context. Unlike the earthquake community, the floodplain management community does not have a collaboration of organizations working closely to create consistent messaging about flood risk and preparedness. Although the Association of State Floodplain Managers (ASFPM) is a leader in floodplain management policy, the organization has historically focused on policy initiatives to achieve its mission, such as those related to land use and insurance, and less on broad public education. It has engaged Dr. Dennis Mileti, inviting him to present his social science research about preparedness to floodplain managers, and it does undertake other public education programs. But for the purpose of educating the public about flooding, ASFPM does not play the sort of role, for instance, that the SCEC plays

in earthquakes. While the state chapters do hold some promise for picking up the mantle for public education and initiatives at the local level, my review of their materials alongside those of national organizations reveals that the floodplain management community has been less effective than the earthquake community in meeting the goals of the previously proposed theoretical framework. Specifically, although a large number of the reviewed materials attempt to offer information about how to prepare for a flood, few demonstrate preparedness behaviors. Furthermore, as I discuss below, the messages about how to prepare are not consistent in their content (what to do), language (how to describe the action) or tone (style of delivery). Finally, milling is only rarely promoted, and almost none of the flood-related education materials have attempted to, or succeeded in, cultivating a community identity around risk.

In discussing these limitations, my analysis will review a representative sample of flood education efforts, which will be used to inform the next section of the paper, where I make recommendations for improving flood education programs and policies. The subset of chosen materials represent the variety of types of materials reviewed (website, brochure, etc.) and the range of effectiveness in reaching the three imperatives of the theoretical framework developed in Part III: best practices, milling and community identity around risk.

2. Best Practices

While flood education efforts do succeed in following the best practice of directing people about what actions to take, they have been less effective at demonstrating preparedness and at repeating messages multiple times from multiple sources through multiple channels. Let us examine how effective the floodplain

management community has been in meeting each of the three best practices of the proposed framework (demonstrate preparedness behaviors, provide information about actions to take to reduce losses, and repeat messages multiple times, from multiple sources, through multiple channels).

Question 1: Does the program material demonstrate preparedness behaviors?

As the federal agency in charge of hazards response and preparation, FEMA is a central, recognizable source of information on flood preparedness. FEMA's flood awareness page on its Ready.gov website (its central source for hazard preparedness), organizes preparedness information by hazard type. Information about flooding is found under the Natural Hazards category, and is organized by actions one should take before, during and after a flood. This approach of dividing flooding actions into before, during and after a flood event is common among many organizations, and it reflects an awareness that flood events present safety challenges that can be addressed over the sometimes large number of days it takes for a flood to build, crest and then recede. Despite the fact that the site is formed as a resource for preparedness information, the flood portion of the site offers essentially no demonstrations of how to prepare. Throughout all sections related to flooding (before, during and after a flood, and the additional resource sections), only one single image shows what preparedness looks like. That image is of a sandbagged home, and is suggestive of a family that has prepared in advance of a pending flood. The image has no corresponding caption, and no text on the page references sandbagging as a technique. The photo is placed in the "during a flood" section, but sandbagging is something that must be done in advance of an expected flood in order to have any effect. A visitor to the site looking for information about how to

prepare would be left with many questions: Is sand-bagging the first step, or a last-ditch effort? Should everyone sandbag? How does one properly sandbag? How does sandbagging work? DOES sandbagging work? None of these issues is addressed on the site.

Ill. 4.7 FEMA Floodsmart.gov photo of sandbagged home¹³⁶



This image, from <http://www.ready.gov/floodawareness>, stands alone on the page without explanation or description of what it represents and means for homeowners.

Further, external links to various pamphlets, brochures and “interactive flood risk resources” are designed to educate people about flooding, but none of these take the step of actually demonstrating how to prepare for floods.

Another FEMA website, Floodsmart.gov, is the central site of the National Flood Insurance Program, and is the repository of much of the federal government’s public flood education information. But as with the Ready.gov site, the Floodsmart.gov site fails to demonstrate any preparedness behaviors. In contrast to the Shakeout website, which has a photo of person engaged in “Drop, Cover, Hold On” as the top image, the Floodsmart.gov site has an image of devastation after a hurricane:

¹³⁶ Federal Emergency Management Agency, “Floods,” www.ready.gov/floodawareness, accessed August 3, 2012.

III. 4.8. FEMA Floodsmart.gov home page image¹³⁷



Further, the site is populated with tense and dramatic video footage of floods and flood damage. It offers one video that emphasizes how two homeowners with similar damage from a flood fared very differently because one owner had flood insurance, while the other did not. This video does demonstrate some of the benefits of flood insurance, perhaps, but it fails to meet effectively demonstrate what preparedness looks like in the context of safeguarding one's home. The video does not, for instance, offer images of someone talking with an insurance agent, or examining their home's flood-proofing options. The emphasis is on fearful and dramatic images of flood loss, in an effort to motivate individuals to "understand their flood risk" and purchase flood insurance.

The National Weather Service (NWS) is another federal agency involved in flooding through its forecast and warning capacities. Historically, NWS has not provided extensive preparedness information, but nonetheless, public and professional audiences alike rely heavily on NWS flood forecasts and guidance about impending flood events. Because safety is an important concern of NWS meteorologists and hydrologists, the NWS has produced a few initiatives pointed at this goal.

While these initiatives are designed to promote flood safety, they fail to

¹³⁷ Federal Emergency Management Agency, "Hurricane Season Is Here. Are You Ready?" www.floodsmart.gov, accessed August 3, 2012.

demonstrate safety in practice. One of the earliest examples is a booklet NWS began producing a few decades ago, known as *Floods: The Awesome Power*. This booklet is still in production and is revised periodically.¹³⁸ It contains full-color graphics of floods and storms, information on flood risk, fatalities and preparation, but notably does not visually demonstrate a single preparedness behavior throughout its 16 pages. Another example of the failure to demonstrate desired behaviors is NWS' "Flood Safety" website that focuses on its annual "Flood Safety Awareness Week" held each March.¹³⁹ Here, rather than highlighting how to prepare, the webpage starts off with a listing of flood fatalities by year, and then provides links to forecast tools as well as other sources of scientific information about flooding. At the end of a very long mass of densely packed information, the web page offers a "flood safety" section with a series of disconnected links to information such as an audio flood awareness public service announcement and graphics of "natural hazards fatalities."¹⁴⁰ None of these links bring the viewer to a page that demonstrates actual preparedness behaviors. As with the Floodsmart.gov site, one video produced by NWS, "Water's Fury" provides tense and dramatic footage of past flood events alongside interviews with victims who made the wrong flood response decision. This movie, while full of dramatic quality, has the unintended consequence of demonstrating visually the wrong decisions, over and over.¹⁴¹ Thus, although this page is

¹³⁸ I reviewed both a hard copy version of this booklet, published in 2002, and the online .pdf published in 2005. See: *Floods: The Awesome Power*, National Oceanic and Atmospheric Administration, National Weather Service, 2002. See 2005 version at: http://www.floodsafety.noaa.gov/resources/FloodsTheAwesomePower_NSC.pdf (accessed August 3, 2012).

¹³⁹ "NWS Flood Safety Awareness Week," National Oceanic and Atmospheric Administration, National Weather Service," <http://www.floodsafety.noaa.gov/> (accessed August 3, 2012).

¹⁴⁰ National Oceanic and Atmospheric Administration, National Weather Service, Office of Climate, Water and Weather Services, "Natural Hazards Statistics: Weather Fatalities For 2011," <http://www.nws.noaa.gov/os/hazstats.shtml> (accessed August 3, 2012).

¹⁴¹ National Weather Service and The Weather Channel, *Water's Fury*, April 2004,

linked on the “flood safety” section of NWS’s “Flood Safety” website, viewers of this video are presented with fearful images and images of what not to do – and none about what they ought to do to prepare for flooding.

It is worth pausing at this point to recognize one good and important NWS flood campaign, “Turn Around, Don’t Drown.”¹⁴² The “Turn Around, Don’t Drown” slogan was created by an NWS employee to warn drivers of the dangers of driving on wet roads. This educational campaign has gained traction through the creation of stickers, posters, magnets, videos and other materials, and has been used by other organizations engaged in flood education. As will be described further below, the campaign meets the best practice imperatives of the framework. Specifically, the “Turn Around, Down Drown” campaign has had occasional success in being represented visually through public service announcements and other promotional videos. For instance, a PSA produced by the Susquehanna River Basin Commission shows a mother driving her son through a tense rainstorm. At the last minute, the white-knuckled mother makes the right decision, and turns her sport utility vehicle around and drives away from a dark, wet road.¹⁴³ The Nurture Nature Center in Easton, Pennsylvania, a non-profit engaged in flood education, also visually demonstrated the Turn Around, Don’t Drown concept in an animated video, “The Day of the Flood.”¹⁴⁴ This video shows a commercial truck that is stopped from driving onto a wet road by a stationed police officer with a stop sign. The truck safely

<http://www.nws.noaa.gov/os/water/multimedia/Waters%20Fury.mov> (accessed August 6, 2012).
Movie.

¹⁴² “Turn Around, Don’t Drown” Home Page, National Oceanic and Atmospheric Administration, National Weather Service, Office of Climate, Water and Weather Services, <http://tadd.weather.gov/> (accessed August 3, 2012).

¹⁴³ Susquehanna River Basin Commission, “TADD Making the Right Decision,” http://tadd.weather.gov/multimedia/VTS_01_1.VOB.ff.mov (accessed August 3, 2012). Video.

¹⁴⁴ Nurture Nature Center, “The Day Of The Flood,” Easton, Pennsylvania: Nurture Nature Center, 2010. <http://focusonfloods.org/the-day-of-the-flood> (accessed August 3, 2012).

turns around and finds an alternate route. While these two campaigns are effective in demonstrating one particular preparedness behavior, they are exceptions to the broader set of flood education efforts. Perhaps because of the frequency of flooding throughout the United States, and the abundant video and photographic footage of the shocking damage flooding can create, the flood education materials have tended to demonstrate *damage* from flooding rather than preparedness actions. “Turn Around, Don’t Drown,” because of its clear and concise action statement, has lent itself more easily to visual demonstrations of preparedness, and should be looked to as an example for the floodplain management community for how to achieve this best practice.

Most recently, the National Oceanic and Atmospheric Administration has revised its strategic plan, and created a public education campaign called “Weather-Ready Nation” which aims to build “community resiliency” to extreme weather events, including floods.¹⁴⁵ The initiative aims to improve NWS's forecast and research capacities for the purpose of improving decision-making support services for emergency managers, first responders, governments, businesses and public audiences. The Weather-Ready campaign is clever and innovative, and importantly, focuses on the need to prepare for extreme weather events. The campaign slogan “Be a Force of Nature” promotes “never bowing to extreme weather. It means taking appropriate actions before, during and after extreme weather.”¹⁴⁶ Like the ShakeOut campaign, the Weather-Ready Nation campaign includes media toolkits that people can download and use in their own locations, including posters and social media tools, including a “Be a Force of Nature”

¹⁴⁵ “Weather-Ready Nation” Home Page, National Oceanic and Atmospheric Administration, <http://www.nws.noaa.gov/com/weatherreadynation/> (accessed August 3, 2012).

¹⁴⁶ “Weather-Ready Nation: Be a Force of Nature,” National Oceanic and Atmospheric Administration, <http://www.nws.noaa.gov/com/weatherreadynation/force.html> (accessed August 3, 2012).

widget that provides quick access to the campaign's various features. This campaign takes some steps toward demonstrating preparedness behaviors. For instance, the "Be a Force of Nature Poster," shows people receiving cell phone alerts about weather warnings. But while the campaign urges people to "Know Your Risk. Take Action. Be an Example," it provides few visual examples of what preparedness looks like.¹⁴⁷ Thus, while the campaign does share stories of people who made wise decisions and avoided bad results, it does not visually demonstrate those decisions to the public.

In addition to these national campaigns, flood-prone communities often rely on locally produced and region-specific materials to learn about flooding in their area. These sorts of documents are prepared for specific communities and they often include flood histories of the region, checklists for readiness, and directions from the emergency management agency about how to properly prepare and where to look for more information during times of high water. These materials are often more technical in nature because they point to local and specific issues. Generally, because these are often one-time efforts for a discrete population, and because the authors are working in isolation from the rest of the floodplain management community, these guides are uninformed by social science imperatives for preparedness. Some do make some progress in demonstrating preparedness. For example, the Boulder County Transportation Department produced a Flood Protection Handbook in January 2002; a 40-page document that addresses flood hazards, government programs, flood preparedness and flood-proofing, and how to handle times of flooding and recovery.¹⁴⁸ This handbook has several images throughout that demonstrate technical methods for making homes more

¹⁴⁷ Id.

¹⁴⁸ *Boulder County Flood Protection Handbook*, Boulder, Colorado: Transportation Department, 2002.

flood-resistant, such as elevating homes, installing a standpipe “donut” or floor drain plug, or turning electricity off. Others, such as the Yardley Borough Flood Book for Residents, from the Yardley, PA emergency management office are produced without extensive publishing support and lack graphic images demonstrating preparedness.¹⁴⁹ The Regional County Flood Control District in Clark County, Nevada, is a highly active organization when it comes to public flood information. But it, too, often heeds the instinct to advertise flood damage, rather than preparedness. In an annual billboard campaign to advertise flood safety, organizers succumbed to the instinct to demonstrate cars underwater. The images are well-designed and eye-catching, but demonstrate the wrong, rather than the right, preparedness behavior.

III. 4.9 2011 Billboard Contest Winner, Regional Flood Control Dist. Clark County, NV¹⁵⁰



Together, this review of local and national efforts suggests that overall, while the floodplain management community has made various efforts to educate the public about how to prepare for flooding, few of these efforts have heeded the best practice of *demonstrating* preparedness actions. Emphasis has been placed on “knowing your risk”

¹⁴⁹ Wes Foraker, *Yardley Borough Flood Handbook for Residents*. Borough of Yardley, Pennsylvania Emergency Management Office, 2010, <http://yardleyboro.com/emgmanagement.php> (accessed August 3, 2012).

¹⁵⁰ Regional Flood Control District of Clark County, Nevada, “2004-Present Billboard Safety Campaign,” <http://www.ccrfed.org/2004billboards.htm> (accessed August 3, 2012).

and increasing “flood awareness” instead of showing people what preparedness could look like in their own lives.

Question 2: Does the program material provide information about actions to take to prevent future losses?

Generally, flood education materials have been more effective in providing information about actions individuals can take to prepare for floods, than they have been in demonstrating how to take those actions. For instance, FEMA’s Ready.gov site offers very little direct instruction about actions to take. In the category of how to prepare before a flood, the site offers just five generic bulleted recommendations, such as “Build an emergency kit” and “make a family communications plan.” Another of the bulleted items advises people in one sentence to “avoid building in a floodplain unless you elevate and reinforce your home,” without providing any further information about how to elevate or reinforce one’s home. Although the site is called Ready.gov and is ostensibly about preparedness for hazards, the flood hazard section of the site devotes substantially more space and energy into describing the various causes of flooding, and how to stay safe after a flood, than it does to providing guidance on how to get ready for them. For those who do experience a flood and must evacuate, FEMA suggests moving one’s belongings upstairs, securing one’s home, turning off electrical equipment, and evacuating safely by avoiding driving through water. Notably absent are the multiple pages of detailed information, tiered behind short summary messages that populate the earthquake sites. Further, the site does little to suggest how preparing now will reduce

losses later.¹⁵¹

The Floodsmart.gov site, as another example, focuses much of its information on issues related to insurance and “understanding risk,” “risk scenarios,” and “defining risk.” It uses calculators to help visitors assess their risk and calculate flood loss damage under various scenarios. The “Flood Risk Scenarios” tool asks visitors to find out: “What are your chances of experiencing a flood?”¹⁵² The site’s apparent purpose is to provide information about flood insurance and flood loss reduction. But throughout the entire of the Floodsmart.gov site, only one text-only page offers visitors any direction on what to do to prepare to minimize losses beyond the purchase of flood insurance. The preparedness directions it does offer are in fact more extensive than those offered in the Ready.gov site, and address what should be in an emergency plan, for instance. But preparedness represents a very small portion of the site’s information. Finally, despite the fact that various literatures argue repeatedly that hazard awareness is insufficient for motivating preparedness, the information on both the Floodsmart.gov and Ready.gov site focuses on “being aware” that a flood can occur. Neither site emphasizes the ways in which preparedness behaviors taken now will reduce losses later.

NWS’s efforts at flood risk education also offer relatively little effective instruction about how to be safe. Although the NWS Flood Watch and Warning statements sometimes make one or two sentence statements about the need to monitor flood levels and look for evacuation notices, these are not primarily used as sources of information for action steps. Instead, as mentioned earlier, NWS segments its flood safety

¹⁵¹ FEMA, www.ready.gov/floods (accessed August 3, 2012)

¹⁵² “Flood Risk Scenarios,” Floodsmart.gov, The Official Site of the NFIP, Federal Emergency Management Agency, http://www.floodsmart.gov/floodsmart/pages/flooding_flood_risks/flood_scenarios.jsp (accessed August 3, 2012).

information on its Flood Safety site, which does link to some effective materials for information about how to prepare. The site links, for instance, to a Flood Emergency Checklist prepared by the American Red Cross, which is offered in both English and Spanish languages. Primarily, the site offers a series of links to technical forecast tools that can help an individual to identify when a flood hazard may be imminent. If used properly, the tools that are offered on the Flood Safety site, such as the Advanced Hydrologic Prediction Service (AHPS), can be critical in helping communities to guard against flood losses. The AHPS site shares information about predicted river levels and crest times, allowing individuals and emergency managers alike to plan for needed evacuations and other preparedness actions.¹⁵³ But without proper explanation, the meaning of these tools is not clear to the reader who comes to the site seeking information about how to prepare. The NWS site takes no steps to connect the use of these tools to preparedness actions, or to describe how using the tools can reduce losses in the future.

The *Floods: The Awesome Power* booklet, as another example, provides extensive information about how to “Know Your Risk” through various tools, encourages the use of NOAA weather radios and provides details about the creation of emergency preparedness plans and evacuation strategies. As with the other NWS and NOAA pieces, however, the emphasis is on learning about the power of floods, and not what to do to prepare.¹⁵⁴ Similarly, the Weather-Ready Nation site, for all of its efforts to advance preparedness, offers very little in the way of instruction of its own, and refers visitors back to the Ready.gov site to learn how to prepare.

¹⁵³ National Oceanic and Atmospheric Administration, National Weather Service, Advanced Hydrologic Prediction Service, <http://water.weather.gov/ahps> (accessed August 3, 2012).

¹⁵⁴ *Floods: The Awesome Power*, 2005.

As with the first best practice, the “Turn Around, Don’t Drown” campaign tops the list of successful campaigns when it comes to providing instruction about how to take action. Its very slogan, in fact, combines clear information about what action to take (Turn Around) and also about how doing so will reduce losses (Don’t Drown). Because of its emphasis on how the action will help reduce losses, “Turn Around, Don’t Drown” is arguably more effective even than “Drop, Cover, Hold On” as a rallying phrase for action.

Local flood education materials are more effective than their national counterparts at providing detailed information about action steps to take. The Yardley Borough Flood Book, for instance, provides pages of text information and emergency checklists that help residents of that borough understand the various preparedness options they have. It details safety steps related to evacuation, securing cabinets and other household furniture and objects, and keeping toxic waste items out of floodplains. This book provides unusual detail about practices such as removing carpet in advance of a flood, which will reduce the costs of replacing it later. The book also appears to have taken a tip from social science research because it follows such advice with the note that “As excessive as it may seem, these tips can save time and money in returning your home and life to normal.”¹⁵⁵

In other cases, these sources of information give great care and energy to detailing the local on-the-ground conditions related to flooding, while giving much less (and sometimes no) attention to preparedness. As an example, *High Water: A Guide to the Colorado River/Highland Lakes Floodplains from Lampasas to Bastrop Counties* is a highly polished and large book filled with full-color maps of the floodplains and water

¹⁵⁵ Foraker, p. 6.

ways in that region.¹⁵⁶ This guide, and another from the Lower Colorado River Authority (LCRA), “The Colorado River Flood Warning Guide,” offers in-depth details about floodplains, flood levels, dam capacity and discharge levels, weather broadcast station information and other technical information. The latter guide offers not a single piece of information about how to respond to flood warnings. Likewise, the 168-page *High Water* guide offers only two pages of summary instruction on protecting oneself against floods.

In general, both national and local sources of information for flood education take efforts to provide people with basic information about how to prepare. This information ranges from basic statements such as “get an emergency kit” to more detailed instruction about how to guard against flood losses by securing one’s home. Occasionally, local sources of information are more instructive than national sources, in part because local sources link the information to on-the-ground floodplain conditions. Overall, however, few of these materials make efforts to explain to people that taking these actions will reduce losses in the future, which would enhance their effectiveness.

Question 3: Do the program materials repeat messages multiple times, from multiple sources, through multiple channels of communication?

As noted earlier, the flood community lacks a coalition of agencies and organizations working jointly to message flood preparedness. It also lacks a popular or effective slogan for focusing public attention on flood risk and preparedness. As such, most of the information that comes across in various flood education materials is

¹⁵⁶ Lower Colorado River Authority, *High Water: A Guide to the Colorado River/Highland Lakes Floodplains from Lampasas to Bastrop Counties*, LCRA Water Co. Land and Environmental Services and Corporate Communications, 1997; Lower Colorado River Authority, *Colorado River Flood Warning Guide*. Austin, Texas: LCRA Water Resources and Corporate Communications.

disjointed in language, tone and content. Further, because there is not a consistent campaign structure, materials are often disseminated through isolated or ineffective channels.

Some themes emerge consistently in the materials, such as the previously mentioned division of flood response behaviors into “before,” “during,” and “after” flood categories. Many efforts also try special approaches for children (see, for an example, the Clark County Regional County Flood Control District’s “Kid’s Page”),¹⁵⁷ and many sources prioritize vehicle safety during floods above other kinds of messages. Most materials recommend that people “get an emergency kit” or “make a plan,” though it varies to what extent they will elaborate on what should be in a kit or plan.

Beyond these broad themes, the materials fail to identify specific, repeated messages about how to prepare. Most of FEMA’s flood education materials is disseminated online, and has been reviewed in the preceding sections on the first two best practices (demonstrating preparedness actions and providing information about actions to take to prevent future losses). But in addition to the Ready.gov and FloodSmart initiatives, FEMA publishes technical bulletins and brochures about, for instance, how to prepare and repair one’s home and belongings,¹⁵⁸ or how and why to buy flood insurance.¹⁵⁹ FEMA also offers a major publication, *Are you Ready? An In-depth Guide to Citizen’s Preparedness*, for a range of hazards, including natural hazards.¹⁶⁰ These brochures and guides are generally disseminated through insurance and federal offices or

¹⁵⁷ Clark County, Nevada Regional County Flood Control District, “Kid’s Page,” <http://www.ccrfcd.org/kidspage.htm> (accessed August 6, 2012).

¹⁵⁸ Federal Emergency Management Agency, *Repairing Your Flooded Home*, Publication 234, Aug. 1992.

¹⁵⁹ For an example, see: Federal Emergency Management Agency, “Nothing Could Dampen the Joy of Home Ownership,” Publication F-080, July 2008.

¹⁶⁰ Federal Emergency Management Agency, *Are You Ready? An In-depth Guide to Citizen's Preparedness*, Publication IS-22, August 2004.

by request through the mail. As such, they are unlikely to capture large audiences not already seeking flood preparedness information. Generally, the bulletins are issued by FEMA alone, without partners, and so these messages come to people in isolated pockets. The messages are not consistently blanketed, co-branded or easily found in multiple media.

One important point to emphasize about these materials is the graphic design quality of the materials. The earthquake materials, and particularly the ShakeOut materials, use a combination of bold graphic design and very little text to relay essential messages. Simple graphics and language, with important words repeated over and over (consider the frequent use of “Drop, Cover, Hold On” across all materials) make it easy for readers to quickly grasp key points. In contrast, much of the flood education material, such as *Floods: The Awesome Power* (and other NWS materials), use text-heavy formats that do not present a clear plan of action for those engaged in a cursory review of the materials.¹⁶¹

There are exceptions. The NWS “Turn Around, Don’t Drown” campaign, for instance, is effective as an example of how dense information can be repeated through multiple channels, from multiple sources, multiple times. This short and simple slogan has been emblazoned on stickers, posters, magnets, videos, street signs and other materials, and has been used by various organizations engaged in flood education. It uses a simple graphic image – a yellow road sign – to accompany the short phrase. NWS liberally encourages the use of the phrase by other organizations. As mentioned above, the “Turn Around, Don’t Drown” campaign is also effective because it invites the

¹⁶¹ On the positive side, *Floods: The Awesome Power booklet* is co-sponsored by a variety of federal and non-profit organizations, including FEMA, American Red Cross, NWS and the National Safety Council.

participation of partner organizations. When organizations such as the Nurture Nature Center or various river basin commissions take the campaign and employ it in their own materials, it reinforces the information for people through multiple sources, channels and over periods of time. As actionable risk theory explains for us, when individuals are then later faced with a wet road, they are more likely to have made it “their own idea” to “Turn Around, Don’t Drown.”

In another productive instance of cross-germination of messaging between federal agencies, the Ready.gov site provides detailed explanations of the flood watch and warning terminology that is used by the National Weather Service. In fact, because these watches and warnings get so many people to begin their preparedness actions, many organizations take care to explain these terms to the public. The City of Boulder, Colorado, as an example, lists the definitions on their website, though it offers essentially no other flood preparedness information.¹⁶² Unfortunately, by the time watch and warning messages have been issued, the time for preparation has often passed. But this effort to promote a general understanding of the watch and warning terminology aligns with the best practice of co-branding information and repeating it through multiple channels. It is also likely to result in a more informed public that can better respond to announcements of flood watches or warnings.

Additionally, NOAA’s Weather-Ready Nation campaign has momentum for providing dense information, as it engages multiple media sources to spread its main message, which is to “Be a Force of Nature.” Materials sharing this same message can be found online, in print, and are disseminated through public service announcements.

¹⁶² City of Boulder, Colorado, “Be Prepared,” http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=4921&Itemid=2070 (accessed August 3, 2012).

Further, the campaign invites people to start their own education programs in their own location. In contrast to the ShakeOut, however, the campaign is branded by NOAA alone, without a series of partners, which may decrease its legitimacy in the public mind, and may also have the result of “branding the messenger” instead of the message.

Because there is no central repository for flood preparedness information, many individuals look to their local communities for information. The Lower Colorado River Authority (LCRA), for instance, has produced an extensive number of materials about flooding in that region, including brochures about driving safety, large maps complete with information about river gages and weather radio stations, and general weather safety guides. The Clark County Regional Flood Control District in Nevada has conducted extensive flood education programs for its community, including school programs, flood safety advertising campaigns, and the creation of a “Flood Channel” that provides news about flooding.¹⁶³ Efforts such as these vary in quality depending on the resources available, and they generally follow the national models with respect to their level of success at meeting the first two best practices. I mention them here because they present missed opportunities for repeating messages multiple times through multiple channels.

Whereas the LCRA produces a full-color, beautifully produced wall-sized guide to the flood warning stages and broadcast information related to various dams and locations on the Colorado River (complete with technical details about historic crest levels, lake volume and the discharge capacity of dams), this guide fails entirely to mention a single safety step in preparing for floods beyond listening for evacuation information. If organizations were able, instead, to agree upon a few key preparedness steps, such guides could quickly become valuable preparedness tools for disseminating

¹⁶³ Clark County, NV Regional Flood Control District, Annual Report, 2001-2002, p. 8.

messages easily through various media.

On the positive side, and presumably as a result of an effort to maximize limited resources for printing and other costs, these organizations often do a good job of co-branding messages. As an example, the LCRA's brochure, "Danger: Flooded Roadway Ahead" is co-branded by an area emergency medical organization, a local news station, a fire department and other groups.¹⁶⁴ Such a technique is common among smaller non-profit organizations, who offer to print organizational logos on brochures in exchange for support from these organizations to cover the costs of printing or staff time. The effect is to brand the message, and it aligns with the best practice of repeating information through multiple sources.

Overall, national organizations have not taken a lead role in identifying key flood messages that can be repeated through multiple channels and sources. With limited resources local organizations are not likely to be successful in undertaking such a strategy, and this review of their materials suggests they have not. The national organizations, however, could take a lesson from the regional groups and consider how to co-brand their messages across the various federal agencies. Local organizations could then follow suit.

2. Milling

Though historically flood educators have not successfully promoted extensive milling, recent efforts make progress in acknowledging the influence of social networks on people's decisions to prepare. Even more fully than the ShakeOut initiative, Weather-Ready Nation uses social media including Twitter and Facebook applications to spread

¹⁶⁴ Lower Colorado River Authority, *et al.*, "Danger: Flooded Roadway Ahead." Brochure.

their news. Further, during the 2012 National Severe Weather Preparedness Campaign, FEMA and NOAA collaboratively promoted the “Pledge to Prepare” campaign, which encourages people to register and join the National Preparedness Coalition.¹⁶⁵ The site explains that members “will be able to collaborate with thousands of fellow members across the country on ways to participate and get your community involved.” Once registered, participants can link to discussion forums on topics related to preparedness. FEMA’s link to this campaign goes further to recognize the influence of social networks on motivating others to prepare by suggesting that pledging will “inspire others to act.”¹⁶⁶ It promotes milling about preparedness by telling others to be “an example” and further encourages individuals to “tell other others about it!”¹⁶⁷

III. 4.10 FEMA “Pledge to Prepare”



NOAA’s Weather-Ready Campaign is even more explicit about the power of social networks, noting on its home page that “being a force of nature means inspiring others to

¹⁶⁵ Federal Emergency Management Agency, “Pledge to Prepare: Register,” <http://community.fema.gov/connect.ti/system/register?nextURL=%2Fconnect.ti%2FREADYNPM%2FrequestJoinGroup%3FSHOWREG%3D%26amp%3BCONFIRM%3DN%26amp%3BDONE%4D> (accessed August 5, 2012).

¹⁶⁶ <http://www.ready.gov/floods>

¹⁶⁷ FEMA, www.ready.gov (accessed August 3, 2012).

do the same through setting an example in your community and social networks.”¹⁶⁸

These steps are an advance in previous and long-standing efforts by floodplain managers to address flooding as a matter of community cooperation. Because flooding can happen in small localized areas, floodplain managers have often encouraged neighborhoods to plan together. The Yardley Flood Book, for instance, proposes “[Y]our neighborhood is a part of your home. Neighbors need to look out for one another. Do you have your neighbors’ phone number? During an evacuation you may want to stay in contact with one another.”¹⁶⁹ Such language is not uncommon in flood education materials. Several materials suggest that neighborhoods call together planning meetings to discuss neighborhood vulnerabilities for floods.¹⁷⁰

While these efforts demonstrate that flood managers are aware of the need for collaboration and interaction within the members of a community, in general, they have focused on connecting neighbors during an acute flood event. There have been few concerted efforts to sustain a social dialogue about preparedness behaviors *in advance* of an event, as has been undertaken by the earthquake communities. For example, floodplain managers have not encouraged individuals to exchange photos of their preparedness behaviors, and they have not generally engaged organizations such as workplaces and churches to host preparedness events. Thus, although the national efforts by NOAA and FEMA seem to suggest that this tide may be turning, significant steps remain in fully integrating milling activities into flood education campaigns and programs.

¹⁶⁸ NOAA, Weather-Ready Nation, <http://www.nws.noaa.gov/com/weatherreadynation/> (accessed August 3, 2012).

¹⁶⁹ Foraker, p. 4.

¹⁷⁰ Federal Emergency Management Agency, Project Impact, “Building a Disaster Resistant Community.”

3. Community Identity Around Risk

In comparison to the earthquake community, very few of the historical and current efforts to educate the public about preparedness for flooding call upon community and collective responses, or engender a sense of community belonging. One historical effort that achieved some success was Project Impact, a federal program organized through FEMA that aimed to build “disaster-resistant communities” that would be safer in the face of flood risk. This program (which has now been defunded) shows signs of intentionally building community identity around risk, and was by design, a local community approach to flood loss reduction and education.¹⁷¹ A brochure for the program describes the well-documented way that communities pull together in the wake of disaster, and then calls upon communities to use that spirit now, before the crisis hits: “But imagine if damage could be avoided by taking steps before the disaster. *Project Impact* is about tapping that same collaborative spirit BEFORE the disaster strikes.”¹⁷² This language assumes the reader has (and evokes for those who do not) a community understanding about one’s responsibility to one’s neighbors. Such assumptions should underlie materials that aim to cultivate a community identity around risk, and Project Impact was headed in the right direction in that regard.

Few other national efforts have taken this approach, despite their common references to community and neighborhoods in flood education materials. *Floods: The Awesome Power* booklet, as an example, features a section on “What My Community Can Do.” This booklet also calls for Community Preparedness Plans,¹⁷³ as do other

¹⁷¹ Federal Emergency Management Agency, “What is Project Impact? Be Flood Alert News Minutes,” National Flood Insurance Program, :60 Radio Segments., CD-ROM.

¹⁷² Project Impact, “Building a Disaster Resistant Community,” FEMA. Spring 1998.

¹⁷³ *Floods: The Awesome Power*, 2002, p. 10

national and local materials. But these discrete references to community most often conjure images of communities and neighborhoods as groups of people who can form committees to carry out technical tasks. They do not invite the participant to perceive of themselves as part of a larger collective preparing for floods. They do not, for instance, invite participants to join others in a large exercise, or advise them to “share their experience” with others around them. While the bold design of the earthquake materials draws attention to, and in multiple media invites responses from the participants (by submitting their own story, or by emailing links to friends), the calls for community participation in the flood materials are generally efforts to get emergency management and municipal officials talking to residents who have experienced flooding. This latter connection is an important piece of helping the community to understand flooding, but is different than creating a community identity around risk. Creating a community identity around risk is an intentional effort to call upon collective responses to flooding so that residents feel “we are flood-ready.” It is also about engendering a sense of community belonging, which evokes the feeling that “I’m part of a flood-ready community, so I prepare.” Such efforts are hard to find among flood education campaigns. As with milling, however, the floodplain management community is advancing its understanding about how to cultivate such a sense of community belonging and responsibility through its flood education messages. The Weather-Ready Nation campaign does not shy away from evoking the image of social movements, and explicitly states it is starting a “national movement for preparedness.”¹⁷⁴ Weather-Ready Nation materials provide examples of

¹⁷⁴ Federal Emergency Management Agency, “Be a Force of Nature: A NOAA and FEMA Public Education Campaign,” http://www.nws.noaa.gov/com/weatherreadynation/files/Be%20a%20Force%20of%20Nature_Background_final.pdf (accessed August 3, 2012).

individuals who properly prepared and responded to weather risk (including flood risk) and survived in the face of extreme weather. These then invite the public to join and also “Be a Force of Nature.” These personal stories are compelling, and they challenge the reader to conceive of themselves in similar situations. I question, though, whether the “Be a Force of Nature” slogan has the unintended effect of connecting the participant to the hazard, rather than to a community that has formed in response to the hazard. In other words, rather than eliciting a community response that can motivate preparedness, this campaign runs the risk of focusing back on individual responses – “I can be a Force of Nature,” rather than “We are Together Forces of Nature.” By calling on individuals to take an action, to “Be” a force of nature, the campaign slogan subtly suggests that they must become something they are not yet. Presumably, the assumption is that they must become prepared.

The campaign also finds some success in its logo design, which is simply designed, with a small swirl suggestive of a serious weather and wind event. The graphic design elements are bold and light on text, which help to draw the reader in, and the swirl, which echoes a large wind event, reminds the viewer of their risk of severe weather. But as with the slogan, the logo does not connect the viewer to a larger community. The Weather-Ready Nation logo instead connects people to the call to prepare.

III. 4.11 “Be a Force of Nature” logo from Weather-Ready Nation¹⁷⁵

(from <http://www.nws.noaa.gov/com/weatherreadynation>)



By way of comparison, the ShakeOut logo (recall the outline of California with a subtle tectonic plate crack in the middle) unites everyone precisely as they are, where they are: as earthquake-prone Californians. In this case, the call is not to become something, or to prepare, but is instead to conceive of oneself in a community risk perspective. The distinction here is subtle, but worth reflecting on if we are to embrace the importance of fostering a community identity that triggers a collective motivation to prepare.

Despite its limitations, the Weather-Ready Nation campaign does have substantial merits in treating preparedness as something people do because of a commitment to community. Therefore, it should be studied in coming years to see how this element develops. The program calls upon individuals to inspire others to act in recognition of the influence of community actions on neighbors and the need for collective responses. And although the campaign is branded by NOAA alone, the project recognizes that being successful requires the partnership of “government agencies and emergency managers, researchers, the media, insurance industry, non-profits, the private sector and more.”

Weather-Ready Nation falls short of cultivating a community identity around risk, but it

¹⁷⁵ NOAA, Weather-Ready Nation, <http://www.nws.noaa.gov/com/weatherreadynation> (accessed August 3, 2012).

is the most promising of the efforts studied here.

Another interesting initiative to consider in light of a community identity approach to risk response is the ASFPM's "No Adverse Impact" program, which encourages communities to enforce local regulations on floodplain management in excess of what the federal minimum standards require. ASFPM describes:

"No Adverse Impact Floodplain Management is a managing principle that is easy to communicate and, from legal and policy perspectives, tough to challenge. In essence, No Adverse Impact floodplain management takes place when the actions of one property owner are not allowed to adversely affect the rights of other property owners."¹⁷⁶

While ASFPM envisions that a No Adverse Impact (NAI) approach will be measured by reductions in physical outputs such as flood peaks and velocities, the organization also allows the community to identify other impacts it considers important. It also allows for different definitions of community, ranging from municipality to watershed regions. What NAI requires is that communities establish their own standards and criteria, and then apply community penalties to those who adversely impact the floodplain. In doing so, ASFPM presents NAI as a challenge to communities that have historically accepted what are regarded as low federal standards. But NAI is primarily a policy principle oriented toward the management of land use. While it does embrace a community philosophy for loss mitigation, it does not extend that philosophy into motivating preparedness at either the community or individual level. As I discuss below, however, the NAI philosophy may be flexible enough for use in this capacity.

¹⁷⁶ Association of State Floodplain Management, "NAI - No Adverse Impact Floodplain Management: Background," <http://www.floods.org/index.asp?menuID=349&firstlevelmenuID=187&siteID=1> (accessed August 3, 2012).

In sum, the floodplain management community has not endeavored to build a community identity around flood risk. Although this field has often called upon communities to respond to flooding, it has done so in a technical sense, often by asking for the formation of committees to assess vulnerabilities. Flood managers as an aggregate group have not endeavored to call on collective or community responses to risk, or to engender a sense of community belonging in order to motivate community preparedness actions. But this context provides much opportunity. Some tools and templates, such as the Project Impact framework, the No Adverse Impact approach, and the Weather-Ready Nation campaign start moving in this direction, and provide the basis for success in this area.

C. Recommendations: How to Improve Flood Policy and Education

Many recommendations follow from the theoretical framework for flood education I have proposed and used to compare the successes and failures of the earthquake and floodplain management communities. In the remainder of this paper I will discuss these options and then turn to reflecting on future research.

Best Practices

First, let us consider how the floodplain management community might apply the best practices in their current and future campaigns. As conceived in the theoretical framework proposed in Part III of this paper, the best practices require that messages about risk achieve three ends. They must: 1) demonstrate preparedness actions 2) provide information about actions to take to reduce losses; and 3) repeat the actions multiple times from multiple sources and through multiple channels.

The preceding analysis shows that the floodplain management community finds

its greatest success in providing information about actions to take, but that it has not been able to effectively coordinate messages about actions across institutions (that is, from multiple sources). This lack of consistency and failure to repeat messages leaves individuals without a clear sense of what actions they should take, and, importantly, about why they should take them. In order to achieve these goals, the floodplain management community's most prominent need is a loosely knit group of organizations that jointly agree to message flood safety and preparedness in consistent and cooperative ways.

Consider the Earthquake Country Alliance, or the regional working bodies that guide the ShakeOuts in various locations in California, as examples of how collaborations of institutions and agencies can jointly message key preparedness concepts while retaining their own institutional missions. The Redwood Coast Tsunami Work Group, a Humboldt University-sponsored group focused on tsunamis and earthquakes, can spread the "Drop, Cover, Hold On" message alongside the California Earthquake Authority, which is the insurance authority for earthquakes in the state. The floodplain management community should develop its own version of the Earthquake Country Alliance, or some other institutional mechanism by which the various federal, state, regional and non-profit organizations vested in flood education can develop a comprehensive strategy for messaging flood preparedness.

This organizational entity or mechanism should also take efforts, as the earthquake sector did, to learn from the findings of the most current social science research about human behavior, so that flooding messages respond to these best practices and incorporate other understandings of social behavioral phenomena related to risk preparedness. Consider the earthquake preparedness community's messaging workshops

that were sponsored by the California Emergency Management Agency and the California Earthquake Authority in 2011. These workshops informed the earthquake community about the values that consumers respond to concerning preparedness for earthquakes. The summary report for this exercise, prepared in October 2011, explains that earthquake agencies intend to create a “shared plan for different programs” that allows various sectors to use “the same research-based messages in different, yet coordinated programming throughout the diverse earthquake preparedness arena.”¹⁷⁷ Thus, an allied approach allows for agencies to carry out their own discrete tasks, but with coordinated messaging to the public. Such an approach in the flooding sector could allow for a central organizing flood education slogan, based on social science research about what motivates flood preparedness.

In the floodplain field, a broad organizing entity should encompass organizations such as FEMA, NWS, ASFPM, USGS, and other non-profit organizations involved in flood science, education, recovery and training. This group should include staff from outreach and education departments as well as physical scientists, so that all participants can learn to use the same messages when dealing with the public. While the social science literature suggests that leading with science information about risks is not sufficient for motivating preparedness, adding scientific explanations into messages does add credibility and legitimacy, and it is important that scientists be part of the public discussion. Specifically, it is the probabilities of risk that people tune out, but when these probabilities are put in a broader scientific context of the physical processes and patterns of flooding, they can help to increase people’s confidence in other things they have heard. Therefore, science-trained employees should be provided with training about the key

¹⁷⁷ Harris Interactive, Message Research Executive Summary, 2.

messages individuals need for motivating preparedness, so that the employees can intersperse these messages with their other, physical science knowledge when talking to public audiences.

The first task of this broader organizational entity I am proposing should be to identify a core set of preparedness steps the public should take, and a concise way to convey these (akin to “Drop, Cover, Hold On”) steps. Should people practice for a flood event? Perhaps not, but maybe it is important that people receive warnings about when to prepare and evacuate, through messages such as “Be In the Know About When To Go.” The Nurture Nature Center in Easton, PA has adopted a short phrase, “Floods Happen. Lessen the Loss.”¹⁷⁸ to encompass the message that floods are natural, to be expected, and that losses can be reduced. This message might be coordinated with specific action steps to complete the messaging.

My review of the flood education materials also suggests some cautions for floodplain managers. Because images of flood damage are so prolific (victims and onlookers often document flood events), they are easily and often shared in public education materials. Video footage of extreme flood scenarios, for instance, showing victims in perilous situations or waters rising above legendary monuments, are frequently incorporated into websites and brochures. While these images are effective for explaining the capacity of flood waters to create damage, they are not effective at motivating preparedness. Given actionable risk communication theory’s emphasis on demonstrating preparedness behaviors, educators should avoid the use of images of cars underwater, and should instead share images of cars turning *away* from wet roads. Likewise, rather than sharing high-drama high-water photos, programs should encourage and incorporate

¹⁷⁸ Nurture Nature Center, “Focus on Floods,” www.focusonfloods.org (accessed August 3, 2012).

photos of individuals taking preparedness actions, such as putting together emergency kits, turning off utilities, or calling friends and family with news of an impending flood event. Such efforts need not be solely the province of national or well-funded education campaigns. Community organizations and municipalities could invite these photos and post them on existing blogs and news sources, or even community bulletin boards. Such changes in message can happen over time, as organizations renew their materials or update their websites, even absent a coordinated campaign. The collective effect of these changes in small materials would be to very quickly to change the images of flood education from ones focusing on disaster and damage, to ones of preparedness and action.

Further, educators should consider the authority that is presenting the flood education message, and should endeavor to co-brand their message with as many partners as possible. Mileti advises co-branding all warning messages with the local fire department, based on research suggesting that firefighters are the most trusted authority in America today.¹⁷⁹ Such an approach might also be effective for general preparedness messages, as well as acute warning messages. This could emerge at the national level, as has been done with the ECA and the ShakeOut, but should also happen at the local level. Local and regional communities can identify their own tier of important local messages and ask their firefighters and swift water rescue teams to help disseminate these messages, through pot-luck dinners, letters to residents or other means. For instance, communities that have difficulty encouraging residents to evacuate during flood events

¹⁷⁹ GfK Group, "International Levels of Trust in Individual Professional Groups," Germany, 2009, http://www.gfk.bg/imperia/md/content/gfkbulgaria/newsletters/pm_trust_index_2010_en_chart.pdf (accessed August 5, 2012).

might have rescuers and firefighters demonstrate proper evacuation techniques. In communities where residents have difficulty receiving alerts about upcoming floods, these first responders might help municipalities to set up local phone trees or other communications plans with the residents. The point is to engage multiple authorities within the community in presenting flood preparedness information, so that the community can come to integrate those ideas as their own. As a corollary to this idea, communities – and national programs – should consider building programs that get the media to focus specifically on how to present information about flood risk accurately, in order to reduce errors in public judgment that result from incorrect media information.

Milling

The theoretical framework proposed in this paper also requires that educators consider how to promote milling through flood education messages. Rather than presenting preparedness as something that one does by oneself, messages should emphasize the importance of sharing of preparedness information with neighbors, or others in one's community. For instance, programs could encourage neighbors to “Prepare, Then Share” the news about their readiness actions. This kind of campaign asks more of individuals than merely preparing; it asks them also to spread news of their actions with close friends, neighbors, family and social media contacts.

Existing services and programs can also be adapted in minor ways to increase milling about flood preparedness. For instance, NWS flood watches and warnings could include a short statement encouraging readers to notify friends and families about the alert. FEMA’s “Pledge to Prepare” initiative could invite submissions of photos and stories of preparedness behaviors, much as the ShakeOut does. The next edition of the

Awesome Power booklet could emphasize through photos and words the “awesome power” of individuals to influence and help others to prepare, rather than emphasizing the extreme devastation of floods. Subtle changes over time can be incorporated at low cost, with high impact.

Communities might also consider special efforts to improve preparedness understanding among audiences most likely to share that information with others. Consider the informal risk communicators identified in Rickard's study: these professionals did not merely apply commercial pesticides, they also informally explained the risks of doing so to their customers.¹⁸⁰ In the flooding context, such informal risk communication might come from landscapers, plumbers and other tradespeople that are often called in to remedy and prevent flood damages. Targeted messages to these groups about the best ways to prepare might quickly move throughout the community, and promote milling among those who have solid, reliable information to share.

As seen from the ShakeOut campaign, a highly effective approach to promoting milling is presenting a high-stakes scenario that can inspire communities to learn more about how to protect themselves against extreme risk. For the floodplain management community, this might mean creating a large shared project – organized by the loose coalition of organizations mentioned above – that can focus broad interest on flood risk in the United States, or a particular region. The project might involve creating a website or publication, or other major events such as a special “Flood Day” that can potentially provide a focal point for media and the public. For the East Coast of the United States an ideal initial project could be the creation of a scenario depicting damage from flood levels equivalent to those of the historic 1955 flood of record in the region. This tremendously

¹⁸⁰ Rickard, 2011.

damaging flood event, which occurred as a result of two major hurricanes drenching the eastern seaboard, caused extensive loss of life and property. Multi-generational stories, epic photos and memorabilia from the flood have captured and held the public memory and interest for nearly 60 years. Creating a scenario that demonstrated how those same flood levels would impact the East Coast of the United States today could renew public interest in understanding how to guard against such an event, and promote milling accordingly.

Community Identity Around Risk

To fully engage the motivations of the public to prepare, educators need to move beyond the promotion of milling to consider also how messages can cultivate a community identity around risk. For instance, the Weather-Ready Nation campaign, which has already identified a plan to start a national movement for preparedness, could apply its strategy specifically to the cause of flooding and create a “River-Ready” or “Stream-Ready” program specifically for flooding. Rather than promoting that people can “Be a Force of Nature,” the River and Stream-Ready programs could emphasize that “We are River (or Stream) Ready.” Recalling the ShakeOut logos that so effectively layered risk upon geography, the logos for such a campaign could be interchangeable with outlines of river basins, or could be comprehensive of larger regions or even the entire country. The point would be to connect the experience of flood risk to the community identity, such as it may be defined in any given campaign.

Further, all flood risk messages should be tiered to emphasize first the community responsibility and belonging involved in preparing for floods; and second, the best practices and promotion of milling. This order is not a matter of priority – all three

components are essential for effective motivation – but rather of effective marketing. Because the idea of tiered messages inherently presumes that some people will only catch the first message, the notion here is to engage as broad a population in connecting to preparedness as possible. By calling first on the collective response, the messages are likely to move more rapidly through the community via social networks, and to have the content of the messages (as embedded in the best practices) shared and reinforced through community dialogue. Further, these messages should also engage the idea that river variability is a normal and expected part of river life, and that this variability is part of the community experience. Materials should emphasize the actions taken now to prepare for flooding can reduce risk later, not merely for oneself, but for the community at large.

Given environmental justice concerns related to the disparity of impacts from flood disasters, special attention must be paid to the ways that building a community identity around risk can bring together entire communities, and not just subcultures and subgroups. Some social science research has explored the ways that symbols of popular culture can unite various class and cultural groups around a common disaster. Quarantelli, et al., for instance, studied the spread of yellow ribbons as signs of solidarity in the wake of tragedies. The researchers first saw the trend on their own campus, after the World Trade Centers collapsed on September 11, 2001, and saw it re-emerge as a show of solidarity after Hurricane Katrina.¹⁸¹ Further investigation of popular cultural documents suggests that this kind of solidarity is a somewhat frequent response to tragedy and loss associated with disasters. Notably, the effects of such symbolism persist

¹⁸¹ E.L. Quarantelli and Ian Davis, "An Exploratory Research Agenda for Studying the Popular Culture of Disasters (PCD): Its Characteristics, Conditions, and Consequences," Disaster Research Center, 2011. <http://dspace.udel.edu:8080/dspace/handle/19716/5968> (accessed July 31, 2012).

across “different social systems and cultural patterns, as well as different kinds of collective crises.”¹⁸² Thus, there may be an important role for the use of symbolism in bringing together diverse members of a community to collectively define and represent community identity and meaning surrounding hazards, including flooding. One specific question to look at in this regard is how such symbolism could work to solidify a social norm for preparedness across classes, races and other demographic variations.

Environmental justice considerations require us to reconsider, too, the ways in which emergency management and other organizations present flood information to public audiences. While traditionally flood hazard information has come in a top-down format from emergency management offices or federal agencies, in the context of sometimes dramatic inequalities of race and class, the effort to create a community identity around risk requires a different approach. Paton describes a participatory approach to flood education in which communities are actively involved in discussing and defining the relevant issues related to flooding in their region, and in shaping community response plans.¹⁸³ ASFPM's No Adverse Impact planning principle similarly makes room for communities to establish the standards and areas of concern for themselves, rather than the authority of the federal government.

Such participatory approaches could also be applied to the pre-planning stage of motivating preparedness among individuals and households, but they must be inclusive of the entire community across the categories of race, class and geography that define the actual community at risk. Busy officials might perceive that targeting floodplain residents

¹⁸² Quarantelli and Davis, 161.

¹⁸³ Douglas Paton, “*Community Resilience: Integrating Hazard Management and Community Engagement*,” Paper from School of Psychology, University of Tasmania, 2006. <http://www.engagingcommunities2005.org/abstracts/Paton-Douglas-final.pdf> (accessed August 3, 2012).

for education is a more effective use of time, but if effective flood response requires a community understanding of river variability and joint responsibility, then educating only the floodplain residents will fail to create a response that is truly collective. Similarly, using outreach materials that only reach higher income audiences, such as Internet-based appeals and techniques, will fail to reach those without access to that technology. Even in the earthquake community, reaching audiences without Internet is still a challenge, and is being actively addressed by transferring information through alternative venues, such as schools, hospitals and workplaces. The same is true with English-only appeals in communities where multiple languages are spoken.

Additionally, flood educators must consider carefully the values to which the intended audiences will respond, and should not assume a shared value system among all members of a community. While all campaigns will not have the capacity to engage in research such as that conducted by Harris Interactive for the earthquake messaging sector, the proposed floodplain management collaborative organization could undertake such a project to better understand the sorts of values that various populations hold related to flood response. They could then share these results with the rest of the floodplain management community so that all organizations could work together in creating messages that respond to communities' expressed values surrounding preparedness.

Part V. CONCLUSION

This paper has developed and applied a framework for evaluating and designing the activities and materials of education campaigns that are intended to motivate public preparedness for flood risk. Three features are central to this framework. First, drawing on actionable risk theory, I have argued that a series of three best practices should be

incorporated into flood education materials and programming. These practices involve demonstrating preparedness actions, providing information about actions to take to reduce losses, and repeating information through multiple sources and channels. Second, I have also argued that these practices should incorporate activities that promote milling, which is an effective way to turn citizens into educators of fellow citizens about natural hazards. Third, drawing on social movement and social network theory, I have argued that flood education activities should aim to create a community identity around flood-related risk, so that preparedness becomes recognizable as a matter of collective meaning and value to those who can and do share a way of life with rivers and the natural systems that make up river areas. Each of these components of flood preparedness education and programming are crucial to improving citizens' responses to flooding risk. Thus, for the purpose of improving on current practice, I have compared current flood education activities and materials to the highly successful activities and materials characterizing the earthquake management community's approach to public preparedness.

While flood campaigns have taken some important steps to better motivate citizens to prepare for flooding, they remain insufficient in many ways. For the purpose of improving existing programs, I have drawn on the theoretical framework explained above, as well as the successful practices of the earthquake preparedness community to offer a series of specific recommendations for improving flood management education, especially on the eastern seaboard. These recommendations include creating a coalition of floodplain management groups that can jointly message key action steps for preparedness through a central organizing program, such as through a scenario project demonstrating modern-day impacts of the 1955 flood crests on the East Coast.

Additionally, I recommend approaches for creating new and modifying existing programs such as the Weather-Ready Nation campaign so that they better incorporate messages of community identity and the collective need to prepare. Finally, I propose adapting federal services such as the NWS flood watch and warnings system, so that it better promotes milling behaviors and successfully engenders a community identity around risk.

This framework and set of recommendations are especially important in light of the significant resources that are currently required to deal with domestic flood damages. Specifically, annual flood losses in the United States are currently around \$8 billion. Federal, state and local governments spend hundreds of millions more in structural and non-structural projects to prevent these losses. In recent years, premiums paid into the National Flood Insurance Program have outpaced its ability to pay claims, leaving large taxpayer debts as a result. Further, as I have shown here, the money that governments do spend on programs to motivate preparedness for flooding is often misspent, as these programs fail to incorporate effective education strategies. Even small improvements in programs that intend to motivate preparedness, therefore, have the potential to result in significant economic gains by reducing government spending on flood losses.

More generally, it is increasingly clear that the burden to prevent flood losses must be borne by the public as well as by governments. Effective public policies should devote resources to preventing problems, rather than cleaning up the problems after they occur. Given the rising cost of flood damages, it is hard to imagine an area where this is more important than in the area of flooding. How to convey this message of partnership and responsibility is the challenge. Without a clear understanding of what motivates preparation, governments will likely continue to fail to provide successful education

programming. The framework proposed here draws on existing research about what motivates preparedness, and also advances a new consideration about how building a community identity around risk can offer an alternative, and possibly more successful, approach for individuals and agencies aiming to motivate preparedness in one specific area of public policy.

Although the proposals I have advanced here draw on recent social science research on human behavior, it is important to note that the theory and practice of flood education is an evolving field, and one that is of critical importance in the 21st Century. Much additional research remains to be completed if severe flood losses are to be avoided in the future. A promising area for further research is in identifying which participatory approaches can best motivate public preparedness across lines of race and class. For instance, community workshops that invite ordinary citizens to act as an authority on how to ready for floods in their own communities might overcome expert-lay conflicts in ways that help to build a community identity around risk. Federal and other agencies often struggle with how to present flood mitigation projects to flood-damaged communities, especially when those communities feel underserved by the agencies. New types of education collaborations could help these organizations (including science-based agencies such as NOAA and United States Geological Survey) to communicate their science knowledge alongside residents' knowledge in shared conversations, so that the experience and authority of the residents is also given full weight and consideration.

The principles embodied in this framework should also be considered in light of broader public policies and services. Public policies, such as the National Flood Insurance Program (NFIP), have tremendous regulatory power to influence the behaviors

of local communities. The Community Rating System (CRS) initiative of the NFIP for instance, encourages communities to take additional flood preparedness steps -- above the required minimum activities -- by providing reduced insurance premiums to communities that undertake certain advanced actions related to zoning, land use, building code and flood warning programs, among other topics. The CRS program could use its existing incentive system to motivate the use of best practices, milling and activities that cultivate the creation of a community identity around flood-related risk. National Weather Service could also create more substantial resources for preparedness, and link them directly to their flood forecast and warning products as they are issued, providing information about how to prepare exactly when it is most needed.

As noted by the Intergovernmental Panel on Climate Change in its 2001 Summary for Policymakers of Working Group II: “The costs of weather events have risen rapidly despite significant and increasing efforts at fortifying infrastructure and enhancing disaster preparedness.”¹⁸⁴ Motivating public preparedness is a critical step in reducing these losses. Further investigation into how the basic features of the theoretical framework for flood education that I have proposed here can infuse federal and other policies and services is crucial to effectively motivating public preparedness. With respect to the various agencies and laws addressing the increasingly important threat of flood related losses, motivating preparedness is an important goal. This proposal for building a community identity around risk is supported by research from other fields about the effectiveness of community identity in motivating collective action and

¹⁸⁴ McCarthy, *et al.* *Climate Change 2001: Impacts, Adaptation and Vulnerability. Contribution of Working Group 2 to the Third Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK: Cambridge University Press, 2001.

responses; however, more exploration will be necessary for fully understanding the nuances of how people understand their collective responsibilities related to risk preparedness. Because it is a growing hazard that affects so many communities in the United States, flooding stands out as a topic that is an excellent starting point for such an exploration.

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APPENDIX A

ASFPM:	Association of State Floodplain Managers
CAL-EMA:	California Emergency Management Agency
ECA:	Earthquake Country Alliance
FEMA:	Federal Emergency Management Agency
LCRA:	Lower Colorado River Authority
NOAA:	National Oceanic and Atmospheric Administration
NFIP:	National Flood Insurance Program
NWS:	National Weather Service
RCTWG:	Redwood Coast Tsunami Working Group
SCEC:	Southern California Earthquake Center
USGS:	United States Geological Survey

VITA

Rachel Hogan Carr is the Director of the Nurture Nature Center in Easton, Pennsylvania, a non-profit science center with a focus on educating the public about flood risk and other risk topics. In 2011, she was named Informal Science Educator of the year by the American Meteorological Society for her flood education work. In 2005, she received a B.A. in history from Moravian College, where she received an award for the Best Undergraduate Paper in 2005, for her paper titled, "A Seat At the Table: The Overlooked Role of Women in the Fight for Food and Drug Regulation in the United States." She previously worked as a community organizer. Carr is scheduled to graduate in September 2012 from Lehigh University with a Master of Arts in Environmental Policy Design. In 2012, Carr received a Strohl Summer Research Fellowship from Lehigh University to support this research about motivating flood preparedness.