RISK BEHAVIOR AND RISK COMMUNICATION: SYNTHESIS AND EXPERT INTERVIEWS

FINAL REPORT FOR THE NOAA COASTAL SERVICES CENTER

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EXECUTIVE SUMMARY

When responding to coastal risks, it is not sufficient to know which risk-aversive actions are most effective. Public will is required. Decision-makers at all levels need to understand the issues, including the risks, and to become motivated toward risk-minimizing action.

One focus of the National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center is to show local decision-makers (such as public officials, emergency managers, land use and transportation planners, floodplain and natural resource managers), how they can help the general public understand the linkages between hazard impacts, community vulnerabilities, and policy alternatives.

The Project. The goal of this risk communication project is to contribute to coastal hazard resilience through better knowledge of the processes involved in risk perception, how these perceptions are influenced by experience, and what strategies might be effective in promoting better citizen understanding of coastal hazards and more effective mitigation and response. There are two parts to this project. The main contribution is a synthesis of existing social science research on risk behavior and risk communication. The findings are interpreted to facilitate their use by coastal risk and resilience communicators. To this end, for the second part of the project, persons active in the risk analysis and communication arena were interviewed for hands-on examples of effective ways to promote behavior that reduces the risk to lives and property.

This research indicates that the crux of risk communication is understanding how risk is perceived, and then knowing what it takes for people to be concerned enough to take mitigating action. A sizable body of knowledge related to risk analysis has evolved across several disciplines and has been applied to numerous risk-related issues such as smoking, seat belt use, insurance purchase, climate change, toxic waste and gambling, but it is not easily accessible to those outside academia, including coastal managers and policymakers.

Defining Risk. Risk is defined and studied differently across disciplines. The simple definition of risk, *Risk = Hazard x Exposure x Probability*, implies that if decision-makers are provided with adequate information about the hazard itself (such as hurricanes), correct information on their level of exposure (such as whether they are located in a surge zone), and estimations of the probability of being impacted at that location (track probabilities and surge models), they can make reasonable estimations of personal risk. However, providing reliable data is only part of the process. If that were all it took, then any two people given the same information and set of circumstances would make similar decisions regarding evacuation. But that is not the case. Human behavior is far more complex, and this is particularly true when choices are made under risky conditions.

Risk is a social construction, and perception is the core issue. People use interpretive frames to make sense of things. Citizens' risk perceptions are affected by the norms of the groups with which they identify, just as the risk assessments of the experts reflect the norms of their associates. Public perceptions may not reflect object reality as defined by experts, but these perceptions influence behavior nonetheless. Lay risk perception is based on a wider framing of topics, considerations, and agendas. It reflects personal experiences and circumstances, and is highly influenced by context, such as social networks.

There is extensive evidence that when people are asked to compare the level of risk between various alternatives, their list looks different than might be expected. Risk has two dimensions: 1) what is known about the hazard itself, and 2) what is felt about it, such as the level of dread or fear. There is a tendency for the public to pay too much attention to the latter dimension, and for experts to pay too little attention to it. It is useful to separate the two when developing risk management strategies.

Several theoretical perspectives can be useful when designing risk communication and outreach programs, including the psychometric paradigm (focusing on psychological factors that influence risk perception), cultural risk theory (focusing on the effects of social and cultural norms and experiences), the mental models approach (emphasizing the images of reality we carry in our head and apply when interpreting new information), and the social amplification of risk perspective (how risk is amplified or attenuated by the channels and processes it goes through). These are not mutually exclusive and each can contribute to a better understanding of the complexities of risk perception.

Risk Attitude. There are individual differences in risk attitude with some people being much more conservative when it comes to taking chances. As examples, males tend to be more risk seeking (culture, perhaps some biological link) and older people tend to be more risk aversive (experience). While risk communication is a key factor in improving risk behavior, it is not always sufficient. A small minority, even when it perceives risk adequately, will be more likely to accept it, perhaps even seek it. Emergency managers are well aware that some citizens in their communities will always take precautions while others will likely not evacuate under any conditions. The advice of the experts is to focus where there is the greatest chance of success. If change can occur there, the "emerging social norms" may draw others in, especially if the change agents are trusted members of the community.

Risk Assessment. It is false to think of risk choices as being between two mutually exclusive options in which a person chooses one level of risk over another. There are often several alternate paths that must be weighed, and how they are weighed will be different for different people. Once the information is obtained, people will decide whether the degree of risk is acceptable.

The source of risk announcements can also make a difference. A flood risk announcement, made by authorities or others from outside the community without understanding local context, are frequently contested or rejected. Top-down campaigns that use a heavy-handed approach to try to convince people that they or their property are at risk are not likely to succeed, and may be resented. If engaged in the risk assessment process, citizens are more likely to accept the results and to perceive their risk adequately.

Risk Communication. Often people get the message, but have more pressing issues to think about. Their options may be limited due to barriers such as insufficient economic or human resources, so they may not see viable options. Worry is a finite resource. That is, there is a limit to how much we can worry about before "emotional numbing" sets in. Concern with one thing will lower concern with another. Thus, it is important for risk managers not to over-warn, or even to over-communicate, but to choose carefully the information they communicate. Providing more information may not always be helpful and can cause overload, increase anxiety, and make it harder to reach decisions. Dealing with emotions up front seems to work best. Acknowledging uncertainties and unknowns builds credibility. When trying to change behavior, a good strategy is to publicly acknowledge current beliefs in an understanding way before starting to carefully lead the public toward attitudes and actions that promote their safety and wellbeing.

Once a coastal manager has a basic understanding of the behavioral objectives and the targeted community, risk-reducing strategies are needed, including strategies for interacting with the stakeholders. Trust and credibility can be particularly important, and difficult, in poor and minority communities. Some of the tendency to distrust arises from their knowledge that they probably bear more risk than others. The risk communication literature offers an abundance of ideas for making an impact with messages. Effectiveness depends on the development of arguments based on the values, interests, and needs of the targeted audience. Thus it is important to target separate messages to specific stakeholders.

Social Marketing. The social marketing movement that applies commercial marketing practices to the public sector holds promise for promoting coastal risk management goals. Community-based social marketing (CBSM) focuses on collective involvement and is particularly suitable for promoting social change. This approach has been used to promote a variety of goals including healthier school cafeteria diets, energy-saving appliances, seat belt use, organ donation, reduction in water use, and weight reduction. Since it is especially effective in areas where there are barriers to be reduced, this approach fits the natural hazards situation well. A community-based approach is more likely to be successful in changing risk-related behavior. Risks are shared and experienced collectively. People look to their social networks for information and guidance, particularly their trusted sources. An effective way to change risk behavior is by facilitating community interaction to address the issue.

Interviews with risk analysis and communication experts and with persons involved in social marketing campaigns reiterated several principles from the literature, including:

- Know your audiences – their circumstances, values, resources, and available options;
- Target your messages to specific stakeholders;
- Focus on a specific behavior;
- Use a positive approach;
- Begin with the easiest audience and use them to change social norms;
- Present the least amount of information necessary to make the point;
- Promote their assets such as the skills they already possess in dealing with uncertainty;
- Build trust – trusted messengers are more likely to be believed.

Best Practices. To apply these principles to the case of coastal risks, some specific suggestions were made by those interviewed for this project. Several emphasized the importance of looking for structural factors that might affect the desired behavior. Structures are often more easily changed than people. Two examples included using insurance rates to send messages about the degree of risk, and working toward a system where the degree of hurricane risk is reflected in real estate transactions. A relatively easy way to get the surge or flood message across is to post markers showing the possible water levels, or the results of past floods, in the community. All of these may require convincing economic interests in the community that safety should be a priority.

Last, but most important, was the emphasis placed on knowing your audience. There was consensus that the work put in up front to understand their values, attitudes, experiences, and circumstances, including barriers, is essential. Then separate campaigns promoting the desired behavior can be targeted to specific groups in the community.

I. INTRODUCTION

A. The Problem

Our coastal areas can be thought of as "people magnets," drawing ever-increasing numbers to the shores to live, work and play. The ambiance created by sea, sand and coastal landscapes combined with the myriad of activities only possible in coastal areas appear to make development irresistible and unstoppable. "It is estimated that 53% of the U. S. population lives on the 17% of land in the coastal zone, and these areas become more crowded every year" (U.S. Global Change Research Program 2001). With the ambiance, however, comes risk. Coastal areas are subject to chronic environmental threats such as sea level rise and natural flooding, as well as the more dramatic danger from the wind, surge and inundation associated with hurricanes and tsunamis. Thus, continued population growth in coastal areas is placing ever-increasing numbers of people and property in harm's way. At the same time it is causing irreversible damage to natural habitats, degrading fish and shellfish populations, and endangering the existence of the flora and fauna that make coastal areas unique.

Those who bear stewardship responsibilities for our coasts are faced with the difficult task of promoting wise development and use, often against seemingly insurmountable odds. In their desire to be in a coastal area people often do not recognize, or refuse to acknowledge, the accompanying risks. It is perhaps even more difficult to get those responsible for land use decisions to understand the extent of risk created by coastal over-development. "Ultimately, choices will have to be made between the protection of human settlements and the protection of coastal ecosystems such as beaches, barrier islands, and coastal wetlands" (U.S. Global Change Research Program 2001). Convincing those making economic and political land-use decisions of the high costs ultimately associated with over-development is a daunting task.

Conservation and management of the nation's coastal resources is a complex undertaking. Scientists are constantly seeking new and better ways to deal with the negative impacts of natural forces, such as climate change and tropical cyclones, as well as human-produced impacts related to coastal development and use. It has become increasingly clear that, while many solutions lie within the realm of physical science, it is not enough to know what risk-aversive actions are effective. There must be public will to take these actions. Decision-makers at all levels, including the general public, need to understand the issues, including the risks, and to become motivated toward appropriate action. The Coastal Services Center (CSC) has been a leader in this respect through its Human Dimensions Program and its emphasis on providing tools and methods to assist coastal managers and planners in acquiring "people-related" information.

The CSC focuses on educating local officials, planners, resource managers, and other local decision-makers, as intermediary channels with the general public, on the linkages between hazard impacts, community vulnerabilities and policy alternatives. The goal of this Risk Communication project is to contribute to coastal resilience through better knowledge of the processes involved in risk perception, how these are influenced by experience, and what strategies might be effective in promoting better citizen understanding of coastal hazards and more effective mitigation and response. This project is designed to inform NOAA coastal managers and their partners on how they might most effectively tailor risk-related education and outreach to target audiences – that is employ social marketing techniques to promote coastal resilience.

B. The Project

This Risk Communication project began from a point of uncertainty about how much risk-related research already exists that is applicable to this endeavor. Therefore, the first phase of the research plan was designed to provide a synthesis of existing social science research on risk behavior, risk communication, and resilience-related outreach and education. The primary emphasis is on interpreting this knowledge base in ways that are useful to local decision-makers (such as public officials, emergency managers, land use and transportation planners, floodplain and natural resource managers, developers and builders) in their coastal risk and resilience communication to the public.

For the second phase of the project a snowball sample of experts in risk communication and/or persons directly involved with relevant public communication campaigns was identified in consultation with the project manager. Topics and questions were developed at the onset, but given the qualitative nature of this data collection, changes were made as the project direction evolved. In total fifteen (15) open-ended telephone interviews were completed. Each interview was recorded and transcribed. Qualitative data analysis was then completed, looking for common themes and relevant ideas and experiences for coastal risk communication and outreach efforts. A list of the interviewees is provided in the Appendix.

II. GUIDANCE FROM THE LITERATURE

A. The Concept of Risk

The concept of risk is complex and difficult to communicate in ways that are convincing and that subsequently lead to effective decision-making. As one example, emergency managers have a challenge convincing residents and businesses in areas threatened by hurricane surge to evacuate. About 15,000 Galvestonians did not evacuate for Hurricane Ike in 2008 in spite of dire warnings of possible 20-foot surge in the bay (Jonsson 2008). Similarly, only 65% of residents of evacuation zones in South Carolina followed evacuation orders for Hurricane Floyd (Dow and Cutter 2000). They accepted considerable risk for a variety of reasons, some no doubt associated with inadequate perception. Not that risk perception necessarily results in effective response. For example, the extent to which homeowners perceive hurricane risk is not sufficient to explain why they take protective actions, such as the purchase of shutters (Peacock, Brody, and Highfield 2004). Nevertheless, there is probably no more important task facing coastal managers than helping citizens understand their level of risk.

Part of the problem in communicating risk convincingly is a lack of understanding about how it is perceived, and then sufficient knowledge regarding what is necessary to create sufficient concern to elicit appropriate response. A sizable body of knowledge related to risk analysis has evolved across several disciplines and has been applied to numerous risk-related issues such as smoking, seat belt use, insurance purchase, climate change, toxic waste and gambling, but it is not easily accessible to those outside academia, including coastal managers and policymakers.

The scholarship related to risk perception, assessment and communication involves work done in a diverse range of fields including cognitive psychology, social psychology, consumer behavior, marketing, advertising, economics, mass communications linguistics, anthropology, decision science, sociology, political science, health education, behavioral medicine, public health, environmental health, law and philosophy (Covello, von Winterfeld, and Slovic 1986). Risk is defined and studied differently across disciplines. There are numerous journals dedicated to risk topics, including two different ones titled *Risk Analysis*. There are numerous departments and centers devoted to risk analysis, usually concerned with economic issues, such as insurance and finance. The federal government has commissioned numerous studies and reports related to environmental risks, such as nuclear waste. Then there is the risk communication field which two years ago was reported to include 2000 books and 8000 articles in peer-reviewed scientific journals (Covello 2007). Several scientific organizations, such as the National Research Council, have conducted national studies on risk communication (National Research Council

1989), weather forecast uncertainty (National Research Council 2003; 2006a), natural hazards (National Research Council 2006b) and other risk-related topics.

There was a lot to review, and it proved to be a challenging task. Social research on risk is handicapped by fragmentation – between a psychometric paradigm and cultural theories on risk perception; between post-modernist and discourse-centered approaches; between economic utility-maximization and economic justice perspectives; between natural hazards and risk-analysis schools of inquiry (Pidgeon, Kasperson, and Slovic 2003). Much of the work is difficult for those outside the respective discipline to comprehend in a useful way. While searching for findings that might be useful to coastal managers, I have no doubt over-generalized complex ideas, and I apologize to the experts.

B. Risk Analysis

At first glance getting people to adequately evaluate their level of risk in a given circumstance appears to be a straight-forward education problem – just provide adequate information in an understandable way. The simple definition of risk, *Risk = Hazard x Exposure x Probability*, (National Research Council 1989) implies that, if decision-makers are provided with adequate information about the hazard itself (such as hurricanes), correct information on their level of exposure (such as whether they are located in a surge zone), and estimations of the probability of being impacted at that location (track probabilities and surge models), they can make a reasonable estimation of personal risk. Of course, producing accurate data on these risk factors is a daunting issue in and of itself. Related to our example above, NOAA has a major national initiative underway currently to improve hurricane forecasting and the subsequent products. However difficult it may be, providing reliable data is only part of the risk assessment and behavior process. If that were all it took, then any two people given the same information and set of circumstances would make similar decisions regarding evacuation. We know that is not the case. Human behavior is far more complex, and this is particularly true when choices are made under risky conditions (Plattner, Plapp, and Hebel 2006). Adding to the problem of protecting our coastal areas is the tremendous priority given to economic gain in a capitalistic society.

Those responsible for managing coastal risk would have a much easier job if they could make expert assessments about the level of risk, decide how to address it, tell people what to do, and the risk would be addressed effectively. Unfortunately, that is not how people make decisions in general, and about risk in particular. Knowledge is important, but our "experiential system" also comes into play (Leiserowitz 2007). The feelings, emotions, and values we have gained through experience, including the experiences of our social networks, have a major effect on our decisions. This is particularly true in a democratic, individualistic society where people depend heavily on their personal assessment of situations, including levels of

risk. They have differing values and priorities, circumstances and experiences on which to base their decisions. They receive information from a variety of sources in addition to the experts. "Ordinary people bring more to their definitions and evaluations of risk than recognised in the reductionist framing of experts" (Wynne 1996). This does not imply irrationality, only different perspectives.

Fortunately, individual human behavior is not as unique as sometimes portrayed. Human traits and behavior fall into patterns – otherwise there could be no social science. Paradigms for studying human behavior vary by discipline and field – and by the perspective of researchers. Over the century or so that human behavior has been systematically studied by social scientists, various hypotheses have been tested, resulting in a much better understanding of why people behave the way they do. Of course, we still cannot predict behavior with anything approaching complete accuracy, but, given adequate information, we can make generalizations that will hold up much, if not most, of the time. This applies to risk behavior, although it presents unique challenges and is heavily influenced by perception.

C. Risk Perception

Perception is the core issue in risk decisions. Perceived risk can be considered the same as real risk. All risk involves some judgment and is perceived (Fischhoff 1989). "…risk has meaning only to the extent that it treats how people think about the world and its relationships. Thus, there is no such thing as 'true' (absolute) and 'distorted' (socially determined) risk" (Kasperson, Renn, et al. 1988, p. 181). Public perceptions are the result of intuitive biases, economic interests and cultural values. "Perceiving a situation seems, at first glimpse, like a remarkably simple operation. You just look and see what's around. But the operation that seems most simple is actually the most complex, it's just that most of the action takes place below the level of awareness" (Brooks 2008, p. A23). Most people want to understand their level of risk and will use that understanding to guide their decisions.

1. Constructing Risk

There is increasing interest in neurological explanations, such as the size of the hippocampus, for understanding our reaction to danger (Ripley 2008). The human brain seems to systematically misjudge some kinds of risk and this may have its roots in our evolution history. Fear of snakes, for example, is typically out of proportion to the threat and it may be that our brains are programmed to react to certain kinds of risk (Kristof 2009). However, the more common explanation is that we learn to fear snakes as a result of our social interactions. While there are individual differences that may be partially explained by biology and evolution, risks are experienced and shared with others and these collective experiences are a major factor in our personal assessments (Flint and Luloff 2005).

In essence risk is a social construction. People use interpretive frames to make sense of things. Assessment does not occur in a vacuum, but arises out of social interactions involving values, emotions and power relations. There is extensive evidence that when people are asked to compare the level of risk between various alternatives, their list looks different than might be expected from mortality rates, for example. "…the risks that kill you are not necessarily the risks that anger and frighten you" (Sandman 1987, p. 21). As one example, people tend to rate the risk from cancer higher than from automobile accidents in spite of the fact that the latter results in far more annual deaths. It helps to think of risk as having two dimensions: 1) known and unknown, and 2) dreaded and non-dreaded. The latter includes things such as whether it is equitably distributed and/or may be catastrophic (Groth III 1998). One risk communication expert suggests using two different terms – call the risk perception based on death rates *hazards* and that based on other factors, such as emotions, *outrage* (Sandman 1987). Thus*, risk = hazard + outrage*.

Numerous factors have been found to be associated with what outrages the public related to risk . Some important ones include:

- **Voluntariness**. A voluntary risk is much more acceptable than a coerced one.
- **Control**. When people have some control over prevention and mitigation, the risk is evaluated as being lower.
- **Fairness**. Those who have to endure more risk than others, without access to greater benefits, are naturally more outraged.
- **Process**. This refers to how the risk is handled by authorities. If the process of communicating about the risk is open and those doing the communicating are considered trustworthy, less outrage is likely.
- **Morality**. Some types of risk cause moral outrage beyond that expected by their incidence – such as child molestation.
- **Familiarity**. Familiar risks tend to cause less outrage than more exotic ones.
- **Memorability**. A memorable event such as a tsunami makes the risk easier to imagine and thus seem more risky.
- **Dread**. The effects of some risk factors are far more dreaded than others. For example, people dread Alzheimer's more than most diseases.
- **Diffusion** in time and space. A rare event that kills lots of people causes more outrage than an event that kills smaller numbers, but on a regular basis. A good example is nuclear power accidents versus car accidents.

(Amendola 2001).

It is important to accept outrage factors not as distortions, but a normal part of risk perception. Our mental "risk space" consists of both hazards and outrage factors. There is a tendency for the public to pay too much attention to outrage, and for experts to pay too little attention to it. It is useful to separate the two when developing risk management strategies.

2. Expert vs. Lay Constructions

Risk assessments constructed by experts tend to differ from the risk perceptions of the general public. Experts are likely to consider their own perspective as being purely objective and to negate the average citizen's ability to understand it. It is true that when "common sense" and science conflict, people often reject the science (Sterman 2008). It is useful to recognize that each of these perspectives reflects unique experiences (Clarke and Short Jr. 1993). Citizens' risk perceptions are affected by the norms of the groups with which they identify, just as the risk assessments of the experts reflect the norms of their associates. It's about competing social and subjective rationalities that involve values, emotions and power rather than pure instrumental rationality (Horlick-Jones 2005; Zinn 2008). Citizen risk perceptions may not reflect object reality as defined by experts (although even they construct their risk perceptions) and may not follow logical rationality, but they influence behavior nonetheless. "Risk, it is widely argued is a social construct, and the public's conception is every bit as valid as that of scientists, perhaps more so" (Perhac Jr. 1998, p. 236). In fact "local (direct) knowledge provides a more compelling frame of reference than others' expertise" (Weber and Word 2001, p. 488).

In essence they are speaking two different languages. Lay risk perception is based on a wider framing of topics, considerations and agendas. It reflects personal experiences and circumstances, and is highly influenced by context, including interpersonal networks (Maibach 2008). Professional expertise may reflect the science but often lacks local and practical knowledge. While these worldviews tend to differ, one researcher observed that the expert and lay patterns of reasoning are not that different, but each accounts for its reasoning and actions differently (Horlick-Jones 2005).

3. Values, Feelings and Power

There is no neutral way to talk about risk. Risk assessment, including what levels are acceptable, is about competing social and subjective rationalities. It is concerned with values and social differentiation rather than instrumental rationality (Zinn 2008). It is about what is important, and it is therefore hard to separate "hard" facts

from "soft" values (Horlick-Jones, Sime, and Pidgeon 2003). "Citizens are well informed with regard to personal choices if they have enough understanding to identify those courses of action in their personal lives that provide the greatest protection for what they value at the least cost in terms of those values" (National Research Council 1989, p. 27). It has been suggested that *Probability + Values = Real Risk* (Tinker and Galloway 2008).

Some experts consider affect (risk as feelings) as another heuristic influencing risk perception (Marx, Weber, et al. 2007). There is general agreement that feelings play a strong role in decision-making. We process information using two qualitatively different systems: analytically or cognitively, and experientially (which includes emotions) (Lowenstein, Hsee, et al. 2001). While analytic processing relates the current situation to more formal processing such as statistical probabilities, experiential processing relates it to memories of our own or others' relevant experiences (our mental models). We anticipate the feelings involved as a result of different outcomes. Something associated with bad feelings tends to be avoided as a choice, for example, even if the objective evidence supports it. For example, people may be told that flu shots are extremely unlikely to cause illness, but they may avoid them anyway based on a bad experience in the past. It has been found that decisions made about risk are largely insensitive to changes in probability (Lowenstein, Hsee, et al. 2001). For example, people often buy life insurance without asking about probabilities – they are seeking peace of mind. Lottery promoters highlight the pleasure associated with anticipation of beating terrible odds. Thus, emotions tilt many decisions against the objective evidence available about the level of risk.

As discussed, it is common to weigh evidence gained from experience over that gained through description (experiential over analytic). An interesting phenomenon happens with rare events, however. In the case of decisions made based on description alone, people tend to overweight the probability of rare events. However, when they are making choices based on personal experience, they are likely to underweight the probability of rare events since it is highly unlikely that they have personally experienced a rare event unless they happen to have experienced it (Hertwig, Barron, et al. 2004).

Power is an important factor in how risk is defined, and what levels are acceptable (Slovic 1999). "The public's judgments about risk and safety do not develop in a vacuum; rather, the public is influenced by organizational strategies that seek to frame risks in ways that benefit corporate and institutional actors" (Tierney 1999, p. 226). Tierney, a sociologist, calls for a more skeptical approach that looks at how risk is imposed on those with less power and resources, such as the tenants of unsafe buildings or minorities living with environmental hazards. "Governments at all levels seek to foster growth, even if that growth is accompanied by higher levels of risk. Similarly, regulations that might reduce risks find few governmental champions if those regulations run counter to powerful economic interests" (Tierney 1999, p. 234). Information is not value-free and can be considered a tool of power. "Governments and large monopolies have a virtual monopoly on technical

information because such information is expensive to collect. However, they do not have such a monopoly on the political, ethical and other issues surrounding risk acceptability" (Penning-Rowsell and Handmer 1990).

4. Risk Attitude

Some analysts separate risk attitude from risk perception as a driver of behavior (Pennings and Grossman 2008). Both are content specific, but the former refers to a general consistent disposition toward risk. Attitudes can range from extreme risk aversion to risk seeking. Some people are more conservative when it comes to taking chances. Gambling provides a good example of this; some people love it, even become obsessed with it, while others cannot stand to lose, and thus avoid taking chances. Differences can be linked to culture, experience and perhaps even to physiology (Ripley 2008). As examples, males tend to be more risk seeking (culture, perhaps some biological link) and older people tend to be more risk aversive (experience, perceived vulnerability).

Emergency managers are well aware that some citizens in their communities will always take precautions while others will likely not evacuate, for example, under any conditions. Some motorcycle riders wear helmets, others do not. The job of safety experts would be easier if differences in safety practices and avoidance behaviors could be attributed to inadequate risk perception. Then the goal would be clear – communicate the risk adequately and people are likely to protect themselves. While risk communication is a key factor in improving risk behavior, it is not always sufficient. A small minority, even when it perceives risk adequately, will be more likely to accept it, perhaps even seek it. On the positive side, some psychologists would argue that risk attitude is a disposition, not a static trait (Bandura 1999). According to the social cognitive theory of personality, dispositions are personal factors such as self-beliefs, aspirations and expectations that regulate behavior but are not descriptors of all behavior. This should give some hope to those trying to influence recalcitrant risk seekers.

5. Using Theory to Understand Risk Perception

Not surprisingly, research has lead to the development and testing of numerous theories and frameworks related to the development of risk perception. Attempts at over-arching paradigms to explain risk behavior have met with the same kind of difficulties faced by social scientists looking for grand theories of human behavior in other areas. However, the process has produced several perspectives that can be useful when designing risk communication processes and materials, including the

psychometric model, cultural risk theory, the mental models approach and the social amplification framework.[1]

a. Psychometric Paradigms

Much of the seminal work on risk perception has occurred in psychology by Paul Slovic and associates (Slovic 2000) . The development and testing of psychological dimensions quantitatively dominates much of the risk literature. The most common model theorizes that a person's rating of riskiness in making decisions is a linear function of its value on several psychological dimensions including: voluntariness, dread, control, knowledge, catastrophic potential, novelty, and equity – a combination of outrage and hazards discussed earlier. This framework was used in a project seeking to explain how people perceive risk from natural hazards. Nine dimensions were tested, including likelihood to die, degree of scientific knowledge available, knowledge of decision-maker, level of fear, perceived recurrence rate, predictability, expected change in risk level, and willingness to move into a hazard area provided the living conditions were an improvement (Plattner, Plapp, and Hebel 2006). In an activity where participants were asked to rate each factor on a five-point scale the list was reduced to the following important factors affecting natural hazard risk perception: voluntariness, reducibility of risk, knowledge and experience, endangerment, subjective damage rating and subjective recurrence frequency.

b. Cultural Risk Theory

Developed by anthropologist Mary Douglas and associates (Douglas and Wildavsky 1982) this perspective focuses on the importance of the cultural context in which risk perceptions are formed. Our sense of being is predominantly local, tied to place and grounded in shared interpretations and knowledge. Cultures develop their own schema for looking at the world, such as fatalism, hierarchy, individualism and egalitarianism, that influences their approach to danger. In one study, for example, Chinese have been found to be less risk aversive in financial matters than Americans (Vanhorenbeech 2008). Ethnic background has been shown to influence how risk and traumatic events are interpreted. In the U.S. minorities tend to approach risk differently (Dake 1992; Ng 2005) and to use different coping strategies (Morrow 1997). This suggests the need for in-depth qualitative methodologies to capture the essence of the cultural context in which risk decisions are being made.

[1] For an insightful review of these different paradigms, see Breakwell, Glynis M. 2003. *The Psychology of Risk*. Cambridge University Press.

c. Mental Models Approach

One conceptual framework that seems to fit risk assessment well is the mental models approach. This paradigm has been suggested in many contexts and usually involves some schema to bring expert mental models and lay mental models into congruence around the topic of interest (Morgan, Fischhoff, et al. 2002; Vari 2004). A mental model is the small scale or model of reality that each of us carries in our head. We map a mental representation of how things are, what the effects of certain actions will be and so on. This model is acquired over time though social interactions and experiences. When it fits the situation, we run that model in our mind and use it as a lens through which we arrive at perceptions or evaluate new information (Jungermann, Schütz, and Thüring 1988).

> If the organism carries a small-scale model of external reality and of its own possible actions within its head, it is able to try out various alternatives, conclude which is the best of them, react to future situations before they arise, utilize the knowledge of past events in dealing with the present and future, and everyway to react in a much fuller, safer, and more competent manner to the emergencies which face it (Craik 1943).

Mental models are useful in applying memory to new tasks. However, there is a tendency to ignore new data that doesn't fit our model, and to seek out data that does.

d. Social Amplification of Risk

The Social Amplification of Risk Framework (SARF) is a systematic way to conceptualize how the technical assessment of risk is amplified or attenuated by psychological, social, institutional, and cultural processes (Pidgeon, Kasperson, and Slovic 2003). It has been developed largely through the work of Kasperson and associates. "Signals about risk are processed by individual and social amplification stations, including the scientist who communicates the risk assessment, the news media, cultural groups, interpersonal networks and others (Kasperson et al. 1988, p. 177). A risk event changes over time as each element in the ripple process occurs and interacts with other elements (Kasperson et al. 2003). This amplified (or attenuated) risk perception then results in a behavioral response.

SARF has been used to explain why people sometimes view low-consequence/high probability risk and high-consequence/low-probability risk as identical. For example, the media focus on unusual events, giving them far more attention than

their incidence would seem to warrant. This, in turn, amplifies them and attenuates more common events with less dramatic consequences, such as the danger from radon in homes. In another example, the media attention given to the last hurricane is likely to affect response to the next one. A similar concept is "social rationality" which helps describe instances when public worry is high regarding events that could wreak broad social and cultural damage (Clarke and Short Jr. 1993; Perrow 1984). The SARF is sometimes used in attempts to bring the public's perception more in line with that of the experts.

Issues of trust and blame are key to both amplification and attenuation efforts. Trust is not a unidimensional construct, rather it is highly contextual and complex. A key factor in risk management is the extent to which the manager and/or communicator is known and trusted by the targeted stakeholders. "…the efficacy of any communication will be driven by the extent to which the communicator is trusted" (Breakwell 2007, p. 243). Trust is slow to develop, but can be lost quickly through negative events.

To summarize, risk perception is a dynamic process that takes place in changing landscapes. People need information about the scientific nature of the risk, and they need it in ways they can understand. This is essential, but not sufficient, however, to understanding risk perception. It is a social construction highly influenced by values, feelings and past experience. The hazard itself is only part of the equation. The extent to which it is considered a threat depends on a host of factors that influence outrage, such as whether exposure is voluntary, equitably distributed, can be controlled, is familiar, is dreaded and is diffused over time and space. Several theoretical perspectives can help us understand risk perception. Each can be useful in explaining risk perception and informing those who are trying to encourage effective risk behavior.

D. Risk Behavior

A better understanding of how coastal risk is perceived is a crucial step in becoming more effective coastal risk communicators and managers. Accurate risk perception, however, does not ensure effective prevention, mitigation or defensive action. Promoting effective risk-related behavior involves understanding not only how perception occurs, but how people make decisions, particularly decisions made under stress.

1. Making Decisions About Risk

The process of making a decision can be broken down to four steps: 1) perceiving the situation; 2) considering possible courses of action; 3) calculating which is in your best interest; and 4) taking action. While the most attention is usually given to step three, perhaps we should be paying more attention to the first one. This is particularly obvious in the current economic crisis as pointed out by David Brooks in a recent column in the *New York Times* (Brooks 2008). Many economic experts had faulty perceptions of how the mortgage credit system worked.

Making decisions about anything is a complex cognitive process. This is particularly true when risk and uncertainty are involved and the stakes are high. In order to simplify the decision process we rely on intuition, on heuristics or "rules of thumb," that allow us to sift through data and decide where to direct our attention. These are usually effective, but they can lead to severe and systematic errors. One way to think of these heuristics is as "cognitive illusions" similar to optical illusions (Nicholls 1999).

Several types of heuristics in risk decision-making have been described in the literature (Amendola 2001; Nicholls 1999; Tversky 1974).

- **Framing effect**. How an issue is described strongly affects how its associated risk is evaluated. For example, people react differently when faced with gains rather than losses. People tend to be conservative when offered gains and adventurers when faced with losses (Nicholls 1999). This is a common source of error in citizen surveys where question wording sets up the frame of reference. For example, asking someone how they feel about a 1 in 3 chance of winning versus asking them how they feel about a 2 in 3 chance of losing will likely result in different answers even though the odds are the same.

- **Representativeness**. We look for something similar to compare it to when trying to understand a new idea.

- **Anchoring and adjustment**. We tend to evaluate things from some starting point and that point can have a large effect on the results. An increase in numbers from 5 to 10, for example, will be looked at differently than an increase from 0 to 5.

- **Underweighting of base rates**. The neglect of prior probabilities in judging the probability of events is common.

- **Overconfidence**. People tend to be overconfident about their estimates.

- **Added information bias**. Contrary to what we might expect, it turns out that more information is not always helpful and does not necessarily lead to

the right actions (Moser 2007). It can confuse and detract from effective judgment.

- **Inconsistent intuition**. People tend to put too much reliance on intuition and it can be faulty (compared to more objective evidence) and inconsistent. For example, people tend to see themselves as facing less risk than the average person, and this can prompt greater risk taking (Fischhoff, Bostrom, and Quadrel 1993).

- **Hindsight and confirmation bias**. People tend to overestimate the degree to which they would have predicted an outcome. A good example is when hurricanes change course and the "Monday morning quarterbacks" claim they knew it would.

- **Belief persistence**. People tend to weigh more heavily evidence that is presented first (primacy). Also, once a belief is established, it is very difficult to change. Inertia may lead people to ignore evidence that contradicts this held belief. Therefore, it is important for risk communicators and managers to get involved early in the process before beliefs set in.

Recognizing these common heuristics or cognitive illusions is an important first step in developing risk management strategies. Of course, it is essential that the experts assess the extent to which their own decisions are being affected by the same heuristics.

It is false to think of risk choices as being between two mutually exclusive options in which a person chooses one level of risk over another (Green, Tunstall, and Fordham 1991). There are often several alternate paths that must be weighed, and how they are weighed will be different for different people. "Decision-makers don't choose among risks but among alternatives, each with many attributes, only some of which concern risk (National Research Council 1989, p. 50). Once the information is obtained people will decide whether the degree of risk is acceptable. "To be precise, one does not accept risks – one accepts options that entail some level of risk among consequences. Whenever the decision-making process has considered benefits or other (non-risk) costs, the most acceptable option need not be the one with the least risk" (Fischhoff 1989). This is not easy to determine. To further complicate matters, risk decisions are usually made under conditions of uncertainty. An example of this is when an elderly woman decides to ignore an evacuation order because she is more afraid of the known health risks of evacuating to a shelter than the possibility of being hurt or killed by a hurricane.

2. Dealing With Uncertainty

The role of uncertainty in decision-making is complicated, yet crucial. In reality people deal with uncertainty all the time, just as they deal with risk daily. "Uncertainty in risk is probably the only certainty to expect" (Breakwell 2007, p. 43). Risk is involved in all our important decisions including environmental risk, health risk and relationship risk (Leiserowitz 2007). We never require certainty when making these decisions. For example we buy fire insurance even if we have never experienced a fire. Why? Sometimes it is because our mortgage bank requires it, but often it is just because everyone buys it. It's routine. We're following social norms.

There are many applications in which being able to understand with some certainty how people deal with probability is advantageous. The most common example is climate and weather forecast uncertainty. How to express the probabilities associated with various forecasts in ways that the public is likely to interpret adequately is a thorny problem. Meteorologists are currently paying serious attention to this issue (National Research Council 2006a). Another example is the extent to which people are misled by the concept of a 100-year flood prediction. A frequent suggestion is to replace this type of statement with the annual percent chance of flooding (Taylor 2008).

There is some evidence that people prefer to communicate uncertainties with probability expressions (such as slight, moderate, etc.) rather than with numbers (Weber and Hilton 1990). This creates obvious problems of vagueness and interpretation. There is no clear model for interpreting verbal probability expressions. Context has a major effect on how people interpret probabilities. The outcomes are influenced by the base rate, the severity of what's being predicted, and whether the outcome is desirable or not (Weber and Hilton 1990). Uncertainty tends to increase the influence of *a priori* beliefs, thus increasing the unpredictability of interpretation (Vaughan 1995). Since people are thought to use similar mental processes when comparing verbal and numeric statements of uncertainty, Weber and Hilton (1990) suggest working to promote numerical probabilities as the most efficient way to increase accuracy in the risk communication process. This controversy remains prominent in hazards-related fields.

3. Using Theory to Understand Risk Decisions

Economists have developed and tested numerous hypotheses related to how people weigh options and make decisions. Several have implications for coastal risk communication and management. At the risk of being over-simplistic, a brief

description of Expected Value, Expected Utility, and Prospect theories follows, as well as a brief discussion of Conjoint Expected Risk.

a. Expected Value Theory

This obvious explanation argues that rational decisions are based on what is expected from the choices. It's a simple benefit analysis. People are most likely to make the choice that provides the greatest expected value. However, there are many examples, such as decisions under risk, where this simple explanation fails to explain the outcomes.

b. Expected Utility Theory

Expected Utility Theory is a slight modification of the Expected Value theoretical perspective. The expected usefulness of the outcome is weighted by its probability (Kahneman and Tversky 1979). One problem with this theory is that there is a tendency to under-weight outcomes that are less probable and to overweight ones that are more certain (certainty effect). For example, people will choose insurance plans with no deductibles even when the coverage is less. It's the equivalent of a dollar now versus the possibility of two dollars later and is often rejected even when the odds are quite good. Economists refer to this as "hyperbolic discounting" and it tends to frustrate their efforts to explain economic decisionmaking. On the other hand there is some evidence that people will purchase flood insurance once they understand the nature of the risk (Attanasi and Karlinger 1979). This would support Expected Utility Theory.

c. Prospect Theory

Here value refers to gains and losses rather than to final assets. The chance of each outcome is multiplied by a decision weight based on the expected impact of the outcome. "Decision weights measure the impact of events on the desirability of prospects, and not merely the perceived likelihood of these events (Kahneman and Tversky 1979, p. 280). Following this perspective, we would expect rare events to receive more weight than they perhaps should if the impact would be dramatic, such as a catastrophic hurricane. This fails to explain why so many people do not evacuate when there is a possibility of dire consequences.

d. Conjoint Expected Risk

Various versions of the models above have been tested over the last twenty years. An interesting example for our purposes uses five dimensions: probability of gain, loss and status quo, and expected benefit and harm. A version of this model explained financial and health risk decisions better than the psychometric risk perception model (Holtgrave and Weber 1993). This suggests that a balance sheet approach that presents people with both pros and cons of a risk decision may be a better way to communicate risks than just emphasizing only the pros *or* cons. The risk manager needs to bear in mind that noncompliance may be a result of the person's judgment that the perceived costs of complying with a warning or request outweighs the perceived benefits (Edworthy and Adams 1996). Understanding the risk may lead to its acceptance, and a decision against the recommended behavior.

E. Risk Acceptance and Response

Once people have perceived the nature of the risk, and understood the probability of being affected, they must decide whether to accept it or to take action to avert its effects. By now I have belabored the point that other factors are involved in risk decisions. Fortunately, considerable data have been collected on additional factors that influence the extent to which a given risk situation is accepted. Many of these factors are related to those discussed previously in relation to outrage.

Table 1. Effects of Risk Characteristics on Risk Perception

Greater Acceptance of Risk	Less Acceptance of Risk
Voluntary	Coerced or imposed
Has clear benefits to individual	Has little or no benefit
Under the individual's control	Controlled by others
Fairly distributed	Unfairly distributed
Open, transparent, and responsive risk management process	Secretive, unresponsive process
Natural hazard	Manmade or technological hazard
Statistical and diffused over time and space	Catastrophic
Message generated by trustworthy, honest, and concerned risk managers	Message generated by untrustworthy, dishonest, or unconcerned managers
Affects adults only	Affects children
Familiar	Unfamiliar or exotic

Adapted from Covello (2008)

These echo many of the factors that differentiate hazard from outrage in the earlier discussion of risk perception. They help explain why risk assessments, such as flood risk, made from authorities or from outside the community without understanding the local context are frequently contested or rejected. Top down campaigns that use a heavy-handed approach to try to convince people that they or their property are at risk are not likely to succeed, and may be resented. “Rather than viewing publics as passive receivers of expert knowledge, they might better be depicted as active citizens who evaluate the multiple sources of knowledge to which they are exposed and who often have valid and useful lay knowledge” (Burningham, Fielding, and Thrush 2008) If included in the risk assessment process, citizens are more likely to accept the results, and to perceive their risk effectively.

It takes time to collect qualitative data on a community, but a critical factor in risk management is the extent to which the managers understand the cultures and context in which they work. “In methodological terms it has become increasingly clear that questionnaire-based research alone does not capture the complexity of risk perception in specific hazard locations; suggesting that methods more sensitive to context are needed” (Horlick-Jones, Sime, and Pidgeon 2003).

Worry is a good predictor of motivation to act (Maibach 2008). But it has been shown that worry is a finite resource. That is, there is just so much we can worry about before emotional numbing sets in. Concern with one thing will lower concern with another (Marx et al. 2007). As previously discussed, providing more information may not always be helpful. Too much data can cause overload, increase anxiety and make it harder to reach decisions. This may be particularly true with the elderly and perhaps with some minorities. In one study providing additional options was more likely to increase worry among foreign-born, Hispanic and African-American citizens than others in the community (Lasker 2004). Thus, it is important for risk managers not to over-warn, or even to over-communicate, but to choose carefully the information they communicate.

Often people get the message, but have more pressing issues to think about. Their options may be limited due to barriers such as insufficient economic or human resources. They may not see viable options.

Ending this section on a rather negative note, in the context of hazard warnings, even when people understand the risk, and understand their choices, they may not heed warnings for a number of reasons, including:

- A personal tendency to be less risk aversive;
- Other priorities may take precedent;
- Other signals may contradict the warning;
- An aversion to following authority;
- Lack of the physical or mental capacity to respond;

- Tendency to not be worried until they experience a negative outcome.

On a positive note there is evidence that the greater the perceived risk, the more likely people are to support proactive government management of hazards (Gerber and Neeley 2005). So reality can make a difference!

F. Risk Communication and Management

Keeping America's coasts and coastal inhabitants safe is a responsibility shared by managers and policymakers fulfilling many different roles – from public officials to citizen volunteers, from transportation officials to safety officers, from coastal zone managers to emergency managers. The work in this regard is not easy. As gleaned from the literature, how citizens, business leaders, developers and others perceive risk, understand the probabilities, compare the implications against other gains and losses, consider their values, examine their options – and decide whether to accept risk or take actions to reduce its effects – varies across cultures, communities, households and individuals. Risk management is a complicated process that involves more than just communicating the level of danger (as perceived by experts) and educating the public on its possible effects. This alone is not an easy task, but it's a small component of the process needed to promote effective risk management. For this reason I am synthesizing the literature related to risk communication together with sources about risk management. Risk communication is such an important part of risk management that it is difficult to separate the two.

Dealing with hazards has always been part of the human condition. "For centuries, different mechanisms have been used for anticipating, responding to, and communication about hazards – as in food avoidance, taboos, stigmas of persons and places, myths, migration, and so forth" (Gurabardhi, Gutteling, and Kuttschreuter 2004). However, the concepts of risk management and risk communication as now used are relatively new. In the early 1980's scholars began studying how the public assesses risk as a foundation for managing public reaction to certain risks such as nuclear power. The term risk communication first appeared in the literature in 1984. From the outset communication has always been an indivisible part of risk management.

Central to both processes is knowledge about the targeted constituency and how it currently understands and feels about the hazard in question (Plattner 2005). The problems associated with public lack of understanding is well illustrated in the case of climate change (Sea Grant News 2008). Experts often provide information without knowing what lay people understand. If they over-estimate they will be talking over their heads and if they under-estimate they will appear to be talking down to them. Information on educational level is important when designing written warnings and materials; most tend to be written at too high a reading level for much of the intended population. It cannot be assumed that the targeted group

has access to or knows how to use the latest technology. As an example, in one study it was determined that most of the public could not interpret a GIS map (Zarcadoolas, et al. 2007). Further, in today's diverse communities there are likely to be many cultures that need to be understood.

A community-based approach is more likely to be successful in changing risk-related behavior. Risks are shared and experienced collectively. "The way risks are perceived within the communities influence the range of actions undertaken to reduce them" (Flint and Luloff 2005, p. 408). People look to their social networks for information and guidance, particularly their trusted sources. An effective way to change risk behavior is by facilitating community interaction to address the issue.

The risk management process should begin with an in-depth assessment of the stakeholders affected by the hazard (Sandman 2003). This requires mixed methods of research. Quantitative surveys (closed questions such as multiple choice, true or false) are an effective way to gather certain kinds of data. However, they are heavily influenced by the way questions are worded, the base rate given, terms with different meanings to different cultures, and so on (Fischhoff, Bostrom, and Quadrel 1993). Ethnography is needed to adequately evaluate what people are thinking and to understand the daily circumstances of their lives. For this reason qualitative data collection, such as field observations, in-depth interviewing and focus groups, are an essential first step in risk communication. It is important to get a sense of the intuitive states regarding the risk involved – of the mental models of stakeholders.

1. Types of Communication Tasks

Risk communication tasks have been divided into four general types according to their primary objective or intended effect:

1) Information and education;
2) Behavior change and protective action;
3) Disaster warnings and emergency information;
4) Joint problem solving and conflict resolution

(Covello, von Winterfeld, and Slovic 1986).

Regardless of the objective or goal, messages need to be developed according to the socioeconomic and cultural contexts in which they will be received. These affect how issues are framed or defined, how various aspects are weighted, and how interactions are planned (Vaughan 1995). "By including too much content, or flattening content to make it more acceptable to all potential recipients, the message may become ineffective or may not appeal sufficiently to action" (Vanhorenbeech 2008). Some communication experts believe it is not the role of scientists to tell people what to do, but rather to provide the few necessary facts about their risk and options, i.e. to be a "non-persuasive communicator" (Fishhoff 2008). This implies that choosing what to communicate requires knowledge of the situation and target population.

Once a coastal manager has a basic understanding of the objectives and the targeted community, realistic strategies are needed, including how to interact with the stakeholders. As previously discussed, trust and credibility are crucial to the process (Peters, Covello, and McCallum 1997; Vaughan 1995; Wisner 2006). This can be particularly important, and difficult, in poor and minority communities. Some of the tendency to distrust arises from their knowledge that they probably bear more risk than others. It has been suggested that experts acknowledge equity and justice issues early in the process (Tuler, Webler, and Finson 2005; Vaughan 1995). Similarly, it is important to recognize strong emotions, such as fear and anger, and how stress can make cognitive processing difficult (Tinker and Galloway 2008). Dealing with emotions up front seems to work best. Acknowledging uncertainties and unknowns builds credibility.

In essence communities should be seen as networks of dynamic, multidirectional opinion and information (Bell, Gray, and Haggett 2005; Heath 1997). Linear one-way communication is not effective. It takes time and effort but the evidence supports the importance of engaging stakeholders in the process from the beginning. Getting stakeholders cognitively involved, including assisting with risk assessment, is a key strategy in effectiveness. "The public must be continually involved – not only as recipients, but also as contributors" (Rosenbaum and Culshaw 2003). Involvement promotes buy-in (Tuler, Webler, and Finson 2005). Local community leaders can assist with the process. It has been found useful to provide citizen groups with expertise that they then share with the community (Peters, Covello, and McCallum 1997). "Partnerships are essential to creating the human relations needed to damp the social amplification of minor risks – as well as to generate concern where it is warranted" (Fischhoff 1995). Enlisting the support of other credible groups and institutions as partners is a wise strategy.

Experts, usually from a government agency, are often required to inform the public about a particular risk, such as nuclear power. The typical mode is through community meetings where they stand in front of members of the community and "give them the facts." Scientists are not trained to be communicators and they quickly run into trouble (Weber and Word 2001). It's not unusual for an expert to get annoyed and overact to the public's concerns (Lanard 2003). Refuting false statements can serve to reinforce them (Maibach, Roser-Renouf and Leiserowitz 2008). On the other hand it is better to publicly acknowledge their beliefs in an understanding way before starting to carefully lead them toward realistic attitudes and actions related to their safety and wellbeing. It is important to treat audiences with fairness, honesty and respect (Sandman 1987).

The risk communication literature offers an abundance of ideas and judgments for making an impact with messages. The format and tone of materials can make a difference. Commands and directives are not very effective (Smith, et al. 1990). Broadly based risk communication may be ineffective because people differ in their conceptual representation of risk beliefs (Tonn, et al. 1990), as well as their

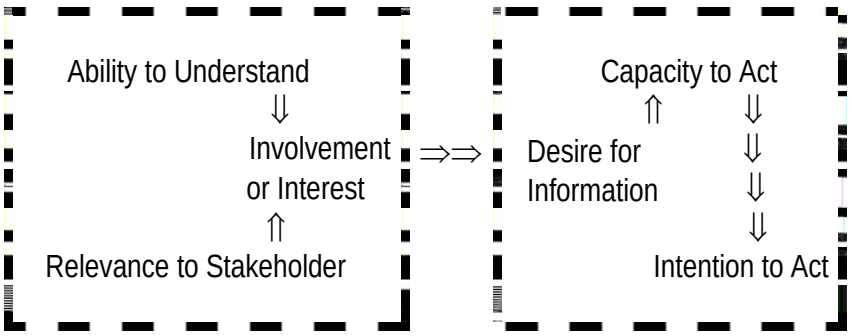
interests, values and circumstances. Effectiveness depends on the development of arguments based on the values, interests and needs of the targeted audience. Thus, it is important to target separate messages to specific stakeholders – not the general public (Sandman 2003). An effective paradigm might be the audience segmentation analysis used by Maibach, Roser-Renouf and Leiserowitz (2009) to address the issue of climate change. Research on public attitudes led to the identification of six different audiences that they labeled the Alarmed, the Concerned, the Cautious, the Disengaged, the Doubtful, and the Dismissive. Reaching each segment calls for a tailored communications and educational program, and some are likely unreachable.

Using the concepts of hazards and outrage, Sandman (2008) suggests a paradigm for developing risk management strategies according to levels of each. In the case of a risk with high hazard potential but limited public concern (outrage), a typical situation related to hurricane risk, he advocates Precaution Advocacy. In order to reach apathetic audiences, he suggests the following actions, including many discussed previously:

- Know your audience;
- Personalize the message;
- Have clear, concise, short messages;
- Appeal to their values, needs, social norms;
- Appeal to emotions, including fear;
- Provide an action they can do;
- Recognize their barriers;
- Stress the benefits;
- Promote gradual buy-in;
- Start with the easiest;
- Use trusted messengers.

The goal of most risk communication is action. The following diagram adapted from Earle and Cvetkovich (1990) illustrates how risk message evaluation leads to effects, including the capacity to act.

Figure 1. Risk Communication Model



MESSAGE EVALUATION FACTORS

MESSAGE EFFECT FACTORS

A combination of the ability to understand and personal relevance leads to interest and involvement that in turns leads to a desire for information. Then, if options are available to the receiver, the result should be an intention to act. "Successful risk communication programs are likely to be those in which increased information is linked to an enlarged capability to act upon that knowledge" (Kasperson 1986, p. 278). Giving people guidance and choices about their options is a crucial part of the process (Sandman 2008). This paradigm was somewhat supported by a study which indicated greater attitude-action consistency when subjects had higher levels of what they called elaboration likelihood which was a combination of involvement and need for cognition (Verplanken 1990). This sounds much like what teachers would refer to as "readiness."

Educational materials for the public have been developed for many natural, environmental and technological hazards, as well as health issues. They can be found on a multitude of websites, including those of the National Weather Service, the Federal Emergency Management Agency, the American Red Cross, and the Centers for Disease Control. It is important that materials be carefully matched with the audience related to reading level, values and knowledge. This is often not the case. For example, the materials on county emergency management websites in one state were found to be unsuitable for use with low income minorities (James, Hawkins, and Rowel 2007). One suggestion was that materials be packaged not by hazards, but by users – a public-specific view (Mileti 2006). It is also important that messages be tested prior to widespread application and evaluated regularly to see if they are accomplishing the objectives (Coppola and Maloney 2009).

It is well acknowledged that information alone does not lead to action. In a study of campaigns promoting household hurricane preparedness information alone was insufficient (Mileti and Peek 2002). The more successful campaigns had simple clear messages that specified what was at risk, how severe and probable was the risk and what can be done to reduce the risk or losses. These messages needed to be communicated often using a variety of media and interpersonal channels and trusted messengers.

Guidelines for developing warning messages and other risk communication materials are abundant. One example is the edited book, *Designing Health Messages* (Maibach and Parrott 1995). The guidelines consistently stress being short and brief. One interesting suggestion is the 27/9/3 template – limit a flyer or warning notice to 27 words, 9 seconds, and 3 messages (Covello 2007). Apparently under low stress the brain processes information in linear order, at average grade level, and can hold 7 messages at a time. Under high stress, however, it processes information based on primacy or recency, processes information at average grade level minus 4, and can only hold on average 3 messages. Therefore, it is important to choose a few messages with the highest potential impact.

Public disaster preparedness campaigns present a special set of challenges. It is important to recognize that they encompass far more than distributing a brochure or designing a website. In a recent book, *Communicating Emergency Preparedness*, the authors emphasize the importance of a step-by-step, carefully crafted process. "While it may be possible to hastily design, produce and release individual risk information products and messages, these poorly aimed "hip shots" rarely achieve any measurable change in public behavior in the absence of a greater strategy" (Coppola and Maloney 2009, p. 13).

Materials and ideas for communicating with the public are available from most of the major government agencies, such as the Environmental Protection Agency (EPA) (1988), Association of State Flood Plain Managers (2008), and the U.S. Department of Health and Human Services (2002). EPA (1988) has published the following list:

Seven Cardinal Rules Of Communication

1) Accept and involve the public as a legitimate partner.
2) Listen to the audience.
3) Be honest, frank and open.
4) Coordinate and collaborate with other credible sources.
5) Meet the needs of the media.
6) Speak clearly and with compassion.
7) Plan carefully and evaluate performance.

An interesting book, *Communicating Science* (Laszlo 2006) provides other advice on how to communicate science orally to the lay public.

Suggestions for Oral Presentations

1) Start with a real life situation.
2) Build a story.
3) Use illustrations.
4) Use a personal tone as though talking to a family member.
5) Carefully choose a few points to drive home.
6) Plan your talk – and then throw away most of your material!

2. Social Marketing

The social marketing movement that applies commercial marketing practices to the public sector holds promise for promoting coastal risk management goals. In social marketing the objectives promote "social good" rather than financial gain. Typically, this methodology is used to accomplish specific behavioral goals with specific audiences in relation to a specific topic. It is more than just the general use of

business techniques in a public project, but refers to a focused approach toward tangible results. Effective social marketing is more than just advertising and promotion. A quote from a book by Kotler and Lee designed to teach government employees to use a social marketing approach describes its scope:

> It involves a customer (citizen-centered) approach, one that will help address citizen complaints, alter their perceptions, and improve your performance. It is a disciplined approach, requiring you to develop a formal plan by conducting a situational analysis, setting goals, segmenting the market, conducting marketing research, positioning your brand, choosing a strategic blend of marketing tools, and establishing an evaluation, budget, and implementation plan.
>
> (Kotler and Lee 2006, p. 13)

Community-Based Social Marketing (CBSM) focuses on collective involvement and is particularly suitable for promoting social change. This approach has been used by government agencies to promote a variety of goals including the healthier school cafeteria diets, energy-saving appliances, seat belt use, organ donation, reduction in water use, and weight reduction. In California the LEAN Project is a major CBSM initiative directed at improving the diets of low-income families (www.CaliforniaProjectLean.org). Since it is especially effective in areas where there are barriers to be reduced, CBSM fits the natural hazards situation well (McKenzie-Mohr N.D.). A CBSM initiative has been successful in promoting wildfire mitigation in California (Steinberg 2008). The program enlists neighborhoods, provides education from credible sources, provides explicit directions and guidance on what to do, and has rewards and incentives. Social marketing was used by the Virginia Coastal Management program to promote water quality (Coastal Services Center 2007). In particular, the campaign's goal was to keep people from using spring fertilizer that pollutes the bay. The promoted benefit was crabs and the theme was "Save the Crabs – then Eat Them." It was a perfect example of using a positive instead of a negative (guilt) incentive.

Several books are available (Kotler and Lee 2006; McKenzie-Mohr 1999), providing examples and guidelines such as the following 12 principles for managers planning a social marketing program in the public sector:

1) Take advantage of prior and existing successful campaigns.
2) Start with target markets most ready for action.
3) Promote single, simple, doable behaviors – one at a time.
4) Identify and remove barriers to behavior change.
5) Bring real benefits into the present.
6) Highlight costs of competing behaviors.
7) Promote a tangible object or service to help target audiences perform the desired behavior.
8) Consider non-monetary incentives in the form of recognition and appreciation.

9) Have a little fun with messages.
10) Use media channels at the point of decision making.
11) Get commitments and pledges.
12) Use prompts for sustainability.

(Kotler and Lee 2006, pp.187-213)

It is easy to perceive how these principles could be used to accomplish goals such as responsible land use practices and evacuation decisions. However, even in goal-directed projects the importance of the process cannot be over-emphasized – the process of working with the targeted community as partners where possible in evaluating the issues, identifying the possible solutions, and working together to accomplish them (Zimmerman1987; Flint and Luloff 2005).

I would simplify this list into these priorities:

1) Know your audiences – their circumstances, values, resources, and available options;
2) Target your messages to specific stakeholders;
3) Present the least amount of information necessary to make the point;
4) Promote their assets such as the skills they already possess in dealing with uncertainty;
5) Build trust – trusted messengers are more likely to be believed.

The risk manager who wishes to adopt a social marketing approach will have no difficulty getting assistance. Many related educational programs and materials are available on the Internet, including a national training website at the University of Florida (http://hsc.usf.edu/medicine/ntcsm/TLM/index.htm). Many social marketing consultants offer their services to agencies, and there are advertising agencies who specialize in using social marketing techniques to promote beneficial health and safety.

G. Summary

The resilience of coastal communities depends on policies and practices that promote sustainable development, including the ability of the built and natural environment to respond and recover from natural hazards. Coastal risk managers are in a unique position to influence policies and practices to that end. To be effective, however, they must be good managers and skilled communicators.
It has been the goal of this paper to illustrate that they do not have to "reinvent the wheel" in this regard, but can apply the results of several decades of research and practice related to risk perception and communication.

III. GUIDANCE FROM THE FIELD

A. The Experts[2]

To further explore some of the issues identified from the literature, interviews were held with two experts in risk analysis and risk communication from academia, Dr. Edward Maibach, Director of the Center for Climate Change Communication at George Mason University and Dr. Howard Kunreuther, Co-Director of the Risk Management and Decision Processes Center at the Wharton School. Several risk communication consultants from the private sector were interviewed also, including Peter Mitchell of the Salter>Mitchell, Dr. Peter Sandman, a preeminent crisis communication consultant, and Dr. Susanne Moser of Susanne Moser Research and Consulting, as well as Research Associate, Institute of Marine Sciences at the University of California – Santa Cruz.

Maibach has extensive experience using and teaching the social marketing approach to elicit behavior change. He emphasizes that social marketing is so much more than just communication. However, communication is an important part of it, and is often poorly done.

> So much of what is done under the guise of public communication is so ineffective because most of it is frankly bad communication. It's expert driven communication with a lot of gobbledy-gook, a lot of jargon, a lot of attention to the things that experts believe target audiences need to learn, and very little attention to what the target audience already knows and believes.

When trying to change behavior through social marketing, there are two separate components that can effect change – people and context. He feels that changing the latter is often the most effective way to change behavior. "I really feel strongly that structural components are far more important than the people-based components." It's often easier to change the attributes of place. He provided an example of the structural approach.

The Road Crew project developed by Dr. Michael Rothschild in rural Wisconsin uses an innovative approach to address drunk driving. Extensive qualitative work identified young hard-working agricultural males as the primary cause of drinking-related traffic accidents. They typically congregated at local bars every night after work. In talking with them it was clear that they enjoyed this and were not about to quit it. So, Rothschild decided to look for a structural change to affect the targeted

[2] The experts and best practice spokespersons interviewed for this project were given a copy of the report and agreed to have their names and contact information included, but did not serve as formal reviewers for the report.

behavior change – reduction in drunk driving. He convinced the state to create a ride service that for a nominal cost would pick them up, ferry them between bars and take them home at the end of the night. "This is a perfect social marketing example because it filled an unmet need. It gave these guys a way to party without taking unnecessary risks. It's wildly successful. Road fatalities are down." The program has now expanded to 36 communities. (See www.roadcrewonline.org.)

Dr. Maibach also emphasized the use of opinion leaders. "We know so much about how influential the few are over the actions of the many." Research shows that when you take the time to identify and approach them, they tend to say yes and can be used to convince other members of their communities. You find out who you can succeed with and hopefully they're a large enough group such that they eventually change the social norm."

The labor-intense part of social marketing is the upfront research to identify and understand targeted audiences. Maibach is convinced that social marketing can be effective in addressing climate change issues. As discussed earlier, he recently participated in a project that segmented the public according to its interest and attitudes related to global warming into six distinct groups, each requiring a unique approach. (See Global Warming's "Six Americas", http://research.yale.edu/environment/uploads/SixAmericas2008.pdf.)

Evaluation is one of the most difficult parts of social marketing. It's not always possible to measure behavior change. More often the assessment revolves around knowledge of the campaign, hits on a website, and/or self-reported behavior change. However, he cited the campaign headed by Dr. Philip Palmgreen at the University of Kentucky to convince children not to use marijuana as an exemplar of good evaluation techniques. There were cross-sectional surveys in two communities over time, allowing for trend analysis. This program is a good example of how Public Service Announcements (PSAs) can be used effectively. (See http://pn.psychiatryonline.org/cgi/content/full/36/8/14.)

When asked to address the hurricane surge issue, Maibach believes research is needed on how to mount a communication effort that will cause people to take hurricane threat seriously, so that over time they will change the patterns of coastal development. He acknowledged the competing goals of keeping citizens safe versus economic interests, but believes that a well-informed populace who really understands the issues can change the dynamics. "I personally believe it's vastly more important that our hurricane-related work focuses much more on helping communities wrestle with this issue productively rather than helping us develop a better evacuation plan."

Dr. Howard Kunreuther also advocates a structural approach. His work focuses on insurance and how it can be used as a tool to promote resilience to hazards. With Michel-Keerjan Erwann he has just released a book on this topic, *At War With the*

Weather: Managing Large-Scale Risks in a New Era of Catastrophes (Kunreuther and Erwann 2001).

> Two principles are guiding our analysis. *Principle 1* is that insurance premiums should reflect risk. You need to give people a signal for safety so they know how hazardous an area is. A risk-based premium provides that signal, but it also encourages investment in cost-effective mitigation measures. If you do something to make a house or your property safer you should get a premium reduction…*Principle 2* relates to equity and affordability. Those who deserve special treatment and face high insurance premiums should receive some kind of subsidy.

When asked how he might approach the surge issue, Kunreuther acknowledged that it was difficult to get people living along the coasts to acknowledge the danger. "We don't want to imagine it. If you're living on the coast and you're thinking about good times, you don't want to think about it…People don't want to think about it because that would mean they should do something about it." It's difficult to get people to acknowledge a low probability event, even if the implications are catastrophic. He suggests putting it into context, comparing the risk with other risks they acknowledge. When discussing probabilities, he suggests using a longer horizon. For example, instead of telling people there's a 1 in 100 chance that a flood is going to occur next year, telling them that if they're living here for 25 years there's a greater than 1 in 5 chance that they'll have at least one flood. Kunreuther also emphasizes the importance of targeting campaigns to different groups, such as the elderly. "You want to get the best bang for the buck."

Moving on to interviews with risk communication consultants, the messages are similar. Peter Mitchell of Salter> Mitchell is a leader in the use of social marketing to elicit change, particularly in the public health arena. He directed the highly successful Florida "truth" campaign to encourage young people not to smoke. More recently, his firm is responsible for the truly unique approach to changing behaviors that can spread pandemic flu; washing hands, coughing into a tissue or your elbow, and staying home from work when you're ill. Their "Fifth Guy" campaign uses humor and social norms to promote change. (See http://www.5thguy.com/.) In addition to very funny media spots, people are given ways to change the behavior of the Fifth Guy. Their website is used as a way to promote interaction – an important stage in social marketing.

Mitchell believes that to be successful, you do not focus on the risk. "Unless risk is imminent, you're going to be hit by a hurricane tomorrow, risk tends to be one of the least powerful determinants of behavior. A longer term risk that may or may not happen doesn't tend to move people to action." His strategy is to take risk and break it down into the behaviors that would lessen it; then do research on what it would take to change those behaviors and develop campaigns or interventions accordingly. They don't run negative campaigns. For example, the smoking campaign was not

negative about smoking. It prompted youth to not let themselves be used by companies that promote smoking. “If you’re down on the negative thing, that’s a much harder fight than being up on the positive thing.”

Salter>Mitchell designed the Chesapeake Bay campaign mentioned earlier designed to improve the bay by encouraging people not to fertilize their lawns in the spring when the runoff can do the most damage. Their approach led to the “Save the Crabs … Then Eat Them” campaign. It was a multimedia, targeted campaign with lots of prompts, including signs in lawns, restaurants, garden shops, and public places. They promoted a special lawn service. They promoted the social norm associated with pride in your home and neighborhood by promoting membership in the Chesapeake Club. The funding ended before they were able to develop the level of partnerships they advocated with fertilizer companies, home supply stores, and local garden clubs, but the project may be extended in the future.

The Salter>Mitchell website (www.saltermitchell.com) provides a wealth of information and ideas related to “marketing for social change.” They break the process down into 4 stages: Understand, Interrupt, Interact and Engage. The first stage requires the most time and energy. They use focus groups, observations and other qualitative methods, followed by more quantitative surveys, to learn about the targeted audience before designing the program. “There’s a lot of involved…that should be one take-away to the NOAA people.” When programs skip the initial investment in research, Mitchell said, they make it difficult to design an effective intervention. Strong interventions rely on unexpected insights drawn from good research; bad ones are born of preconceived notions and bad assumptions.

“There’s a lot of labor involved…that should be one take-away to the NOAA people.” Mitchell later expanded on the need for a large investment, particularly on the front end, toward understanding the issue and the population you are targeting, followed by regular assessments as to whether the message is reaching it – and having the desired effect.

Mitchell also looks for ways to change the structure. “There needs to be an integrated approach that really uses existing infrastructure and people who are already communicating to these people… I would say there’s infrastructure we’re not thinking about…What if the MLS [Multiple Listing Service] carried something about your potential related to hurricanes? Had some sort of ranking. When I’m buying a house, that’s a good time for me to be thinking about hurricane risk.”

Dr. Peter Sandman began our interview by saying that the people working with hurricanes are actually very successful. "One of the things people who work with hurricanes tend to forget is that you're actually doing very well. The majority of people usually evacuate…You're our poster child for success."

As discussed in the literature review, Sandman is best known for his paradigm: *Risk = Hazard + Outrage*. The way people approach a given risk goes beyond the danger associated with the hazard itself to include the level of emotions it raises. In the case of hurricanes the outrage (concern, dread, fear) is relatively low considering the degree of death and destruction that can occur. For that type of risk he advocates a group of strategies he labels Precaution Advocacy that focus on increasing the outrage factor. (See www.psandman.com/col/watchout.htm.)

An important point Sandman makes is that if you want to change someone's mind or emotions about something, it is important to first acknowledge their current state.

> When you're talking to people who are misinformed, there's a two-step process for reeducating them. Step one is to tell them what they already think, and to validate that it is reasonable to think that. And then step 2 is to take them on a journey from their current opinion to the opinion you want them to hold…The more aggressively you say Y to someone who believes X, the more aggressively they are saying X to themselves… You tell me I'm not a jerk to believe X….My reading of the evidence is that most people are immune to persuasion that doesn't acknowledge their starting position."

In the case of hurricanes, he says it is a mature field that already knows the three or four or five erroneous beliefs that get in the way of evacuation. "You mention that they are widespread. You demonstrate that you don't think they are foolish. And then you take them on a journey to what you want them to think instead…Validate their reasons for not evacuating. Represent it as a tough call. "

Acknowledging their current situation requires knowing it. In other words the first step is to study the reasons people have for not evacuating. What categories do they fall into? Do they not leave because they don't understand the danger? Or have they considered it and decided to stay? The example he gave is the elderly woman who elects to stay in her high-rise apartment because she doesn't think the storm is likely to kill her, but she doesn't understand the situation she would be left in after the storm. In this case new knowledge is needed. Then you have those who understand the danger but refuse to focus on it because they don't know much they can do about it. All of these experts mentioned the importance of understanding the barriers people face. Sandman says, "There's an efficacy problem. It's unkind to make vivid in people's mind a risk against which there are no precautions."

Dr. Susanne Moser emphasized the barrier issue as well, and how it cannot be addressed until you know your audience. "The audience is everything…knowing

how they think about an issue or care about it. What their values are, a little bit about their lives... One of the big disconnects I find is that a message about risk must be connected with very practical information on how to turn that concern into a behavior, an action that can make the situation better... something that's within their power to do." Know the things that get in the way of action. "The broad brush campaigns that say the same thing to everyone are probably not as effective." There are different sub-populations, for example, who do not evacuate. She says the kids who bring in the beer kegs for a hurricane party require a different approach than the elderly who don't want to leave their home for security reasons.

An interesting tactic she suggested in relation to the elderly was that instead of targeting them directly, work through others who care about them such as their grandchildren or caregivers. "The trusted messenger. Opinion leaders are really, really important."

She mentions the period after a hurricane or hurricane threat as being a teachable moment. Not so much trying to scare people with scenes of the devastation that may have occurred, but instead sending a positive message about those who did leave, such as praising people for listening to the messages and working well together, and preventing deaths. Make others feel they were behaving against the social norms. Similarly, she suggests emphasizing the opportunity to link with others in your community, to work together for your mutual safety.

B. Best Practices

The bottom line for this project was to apply knowledge gained from the literature and from the expert interviews to the communication challenges faced by coastal managers and communicators. Rather than "reinventing the wheel" it made sense to examine some "best practices" public information campaigns to see how their techniques might be used to communicate coastal risk messages, such as the dangers of surge. To this end spokespersons for several public information campaigns or programs were interviewed, including representatives from the University of Wisconsin Extension Shoreline Restoration Project, the National Weatherization Program of the National Association for State Community Services Program, *Thank You Ocean*, and the federal *EnergyStar* program. The last set of interviews was with representatives of information campaigns directly related to hazards, including the Federal Alliance for Safe Homes (FLASH), Firewise, the National Weather Service's *Turn Around Don't Drown* program, historical flood markers in the City of Lewes, Delaware, and the hurricane education and outreach program of Pinellas County, Florida.

A social marketing campaign currently taking place in northern Wisconsin to restore lakeshore habitat was featured in the *Environmental Communication & Social Marketing* newsletter (http://ecsm.uwex.edu/pdfs/EC&SMNewsletter-sp-

su09.pdf). The project is directed by Dr. Jack Haack of the University of Wisconsin Extension Service with Dr. Bret Shaw providing a social science perspective. The goal is to get homeowners on the banks of two lakes to preserve (or replace) the natural habitat, that is, to stop "weedwacking" and mowing down to the shoreline.

The project is closely following the tenets of social marketing. An assessment was made of each property and they were categorized into three groups according to the condition of their shoreline. The least disturbed and moderately disturbed were targeted. Focus groups were held and surveys conducted to learn what the benefits and barriers were and several were addressed. People were concerned about being able to see their grandchildren swimming, so it was suggested that they use low-growing vegetation. They were concerned about ticks so it was suggested that mulch paths be put in as a deterrent. They enjoyed the wildlife on the lake so the project emphasizes that aspect. They were told about possible tax incentives. Once issues were understood, the marketing campaign began. It is a multifaceted approach using many prompts, such as a newsletter, flyers, maps, a Youth Journal for the grandchildren to document their experiences at the lake, etc. They have partnered with local nurseries to provide discounts for appropriate natural vegetation.

They are using an emerging social norm approach. For that reason, Haack says they decided to focus on the low-hanging fruit. "Let's change the social norm as much as we can. I've seen on some lakes there is a social norm that is more natural. They seem to get that ethic from their neighbors." He wonders how many would have to change to begin to establish a new norm. "What do we need? 10%, 30%, I don't know. If we need 80% we're not going to get there." They're working with several homeowners to establish models to showcase. Haack says that one thing he's learned thus far is the importance of two-way communication.

Dr. Bret Shaw has been involved in the research on the Shoreline Restoration project in order to understand the people and their issues. "Once we knew what their perceived problems were, we offered solutions for how to address them while still accomplishing the goals of having a more natural shoreline." He emphasized the need to compromise. "I think there is the feeling in the natural resources community that we want everyone to let things go natural. One of the things we found was that some people wanted it to be more controlled or engineered." They are working with them to use native plants and shrubs to get some of the same benefits.

Shaw thinks that Community-Based Social Marketing is often over-simplified and has become a "buzz word." He feels there is a lot about CBSM that is intuitive and is supported by research, but he's not convinced that it's always necessary to follow a specific formula. He is concerned about evaluation. The gold standard would be

changes in the shoreline, but that could take a long time. In the meantime outcome measures are level of participation and self-reports. He cautions that this is only in the middle of the first year of a multiyear effort.

The Ocean Takes Care of Us, Let's Return the Favor …

The *Thank You Ocean* campaign has pulled together about 100 non-governmental agencies in California that are concerned about the ocean. What began as a meeting to promote The Year of the Ocean evolved into a campaign to promote better behavior related to the ocean. It uses a positive approach, emphasizing all the things people like about the ocean, or get from it. Several videos were produced, using grant funds and partnerships. (See http://www.thankyouocean.org/.) People are asked to commit – to join social networks, to pledge to do 10 things to "return the favor" to the ocean and to engage in the cause. When asked how he might do things differently, the project director, Matthew Stout, Communications Director for NOAA Office of National Marine Sanctuaries, said he would engage media sponsors and corporations as partners at the beginning. He hopes that by partnering with corporations like Patagonia they can have a much greater impact.

The goal of the *EnergyStar* program is to reduce greenhouse gas emissions through greater energy efficiency. According to Maria Vargas, the Brand Manager for this program at EPA, it is probably best known for its "Change a Light, Change a World" campaign encouraging the use of CFL light bulbs. That program has now evolved into one with a broader focus, "Change the World, Start with EnergyStar." Their programs have many facets, including public service campaigns using multimedia, community outreach through a bus tour, and thousands of partnerships with retailers and manufacturers. Incentives include coupons, as well as energy savings. She emphasizes the importance of working locally. "In order to do CBSM you have to have a commitment that's real. You have to understand the norms, not only of consumers, but the communities in which they live. Actionable items. Clear messaging. All of that." People are asked to commit by signing a pledge on the Internet. (See www.energystar.gov.) She emphasizes the importance of starting small, doing the groundwork to get to know the targeted audience and the issues, and to find out what motivates them to change. You have to get them to care about the issue. Vargas used the example of the Crying Indian campaign against pollution in the 1970s as one that struck an emotional cord with the public (http://www.youtube.com/watch?v=m4ozVMxzNAA).

One public information program receiving a great deal of attention now is the National Weatherization Program that pays for low-income homes to be made more

energy efficient. The program has been in existence for 20 years but has received renewed attention as part of the economic stimulus package. They partner with state and local agencies to identify needs and get the work completed. According to the Director of Weatherization Services for the National Association for State Community Services Program, Robert Scott, they do some advertising and local site demonstrations, and are responsible for a website which serves as a primary way of getting the message out. An interesting feature of the website is the many ideas and materials there to help their partners promote the program. (See www.waptac.org.)

The final five interviews were hazard-related. The best-known program is the Federal Alliance for Safe Homes (FLASH) program. According to its director, Leslie Chapman-Henderson, they are very committed to using CBSM. "We started out strictly in the awareness business and we felt very good about ourselves until we realized that's not enough. Awareness is the starting point. The next level is enabling and supporting people to achieve a change."

You have to change the knowledge base – provide good information in interesting and understandable ways. They rely on their website, mass media materials, and outreach programs to do this. The website has an extensive collection of information presented in multiple ways and for multiple audiences (www.flash.org). There is an active outreach program working with partners to reach desired audiences. Their largest success story is the *Storm Struck* exhibit at Disney World, an interactive attraction that teaches about hurricane home safety in an interesting and engaging way. She emphasized the importance of repeated messages from a variety of sources. They take a positive approach, talking about families that survive, things that worked – focusing on success stories. They work with the Salter>Mitchell to design their social marketing campaigns.

The Firewise program is sponsored by the National Fire Protection Association to get people to take precautions against wildfires through the use of fire resistant materials and construction methods, and through planned landscapes that keep flammable materials away from structures. It stresses providing people with information, and then promoting behaviors that can make their home safer. An interesting part of the Firewise program is that it focuses on the community.

According to Michele Steinberg, the Firewise Community Support Manager, "the power of what we're able to do with Firewise is we're basing it on both physical fire science research and social research." They emphasize that in

order to be safe your neighbor has to take action as well. They stress neighbor-to-neighbor efforts, "getting whole neighborhoods to do this work." A community can be designated a Firewise Community if they take certain actions, including having Firewise Days to promote brush clearing and other fire protection actions. When they qualify they are given street signs announcing their status. "On the social research side of people adopting new behavior, the theory of diffusion is that you're going to have a few innovators out there that are going to get gung-ho about this, but if they don't have a way to spread it, it will die." People can report their actions on the national website (www.firewise.org), and join a social network.

The Firewise program uses a social marketing approach. At the beginning there were workshops and focus groups to identify benefits and barriers. They soon learned that people wanted landscaping for privacy and to reduce noise, as examples. They have learned that it's a slow process breaking down these barriers little by little. Steinberg stresses the importance of being honest with people and respecting their concerns. They show photos of positive examples. They stress the benefit of getting to know your neighbors, building your community. The success of the program is measured by the number of Firewise communities (476) and the high retention rate since communities must renew each year.

One of the best-known hazard-related initiatives is the *Turn Around Don't Drown* campaign of the National Weather Service. I learned from Walter Zaleski, Warning Coordination Meteorologist in the Southern Region Headquarters that the program is the result of a local initiative. The slogan was suggested by a firefighter during a Sky Warn workshop. They brought together a small team to get local support, then regional and then national. Zaleski explained that that's the way initiatives typically percolate up in the NWS. "A lot of this is common sense and a catchy slogan has been a very effective way to have people remember that this is a hazard." It's now on the website of every local NWS office. They have partnered with FLASH to produce educational and other outreach materials. He cautions against having materials at too high reading levels. "Not that you're dumbing it down but what you're doing is taking highly technical information and making it understandable for the bulk of the population." They partner with the Texas Public Works Department to produce road signs, and with the media to get the word out. Some of their materials target specific drivers, such as men driving pickup trucks (http://www.srh.weather.gov/tadd/). Their website has success stories – emphasizing the positive. In talking about the surge issue, Zaleski felt the promotion of risk-reducing evacuation behavior was much more difficult. "For one thing, if you even start thinking about this, and accepting it as a possibility, you could be walking away from your home and you wouldn't be coming back to it."

Tom Iovino's initiatives are an excellent example of an effective public information program at the local level. He is a Communication Specialist assigned to work with the Pinellas County (FL) Emergency Management Agency. I had been at one of his presentations at the National Hurricane Conference and was impressed by his enthusiasm and the quality of his work. Their website is equally impressive. (See http://www.pinellascounty.org/emergency/). Iovino uses a wide assortment of media, materials and demonstrations to promote hurricane safety. He has developed several videos to get people's attention. One of his most effective means, however, is a 24-foot high storm surge banner that he takes out into the community where a fire truck raises it vertically and then Iovino asks people to stand in front of it. This personalizes the message. He follows this with information about the specific storm surge threat where their homes are located. He targets his presentations to specific groups such as parents, teachers, and children. "Marketing to the children is an excellent way to reach adults, to modify behavior in homes." Lately he has been promoting the idea of personal responsibility. "We are independent people. We can do this on our own, and here are some of the tools you need to get ready." In order to get people to understand why they should respond to an event, such as a hurricane, with a low probability of affecting them, he uses other examples such as driving with your seat belt on. The odds are you are not going to have an accident, but you use it anyway. "All I care about is saving lives. I'm interested in people having an adventure story to tell – and not at a funeral."

The final interview resulted from someone telling me that the town of Lewes, Delaware had recently put up markers designating the level of historic floods. I knew that efforts to do this had not been successful in many communities because economic interests did not let them remain, fearful that they would have a negative effect on commerce. That was not the case in Lewes.

Dr. Wendy Carey from the Delaware Sea Grant Program was involved in the project from its onset. As a member of the town's mitigation planning team (an initiative that began with Project Impact), she assisted with the design of the signs and the logistics of getting them placed. The survey datum and high water information came from the state Department of Natural Resources and

Environmental Control. The Lewes Board of Public Works installed them. The signs are placed in several areas denoting past flood levels for that area and showing photos of what the flooding looked like. Carey says that similar signs have also been put up in neighboring towns. "In Delaware the communities are all very much involved in promoting education and awareness of storms and hazards and emergency preparedness."

IV. SUMMARY

There was a great deal of consistency between findings in the literature review and the experiences reported in the interviews. Most of the programs used a social marketing approach. While they varied somewhat in emphasis, they had much in common, including the following suggestions:

- Know your audiences – their circumstances, values, resources, and available options;
- Focus on a specific behavior;
- Target your messages to specific stakeholders;
- Use a positive approach;
- Begin with the easiest audience and use them to change social norms;
- Present the least amount of information necessary to make the point;
- Promote their assets such as the skills they already possess in dealing with uncertainty;
- Build trust – trusted messengers are more likely to be believed.

Each of these suggestions was mentioned in the risk literature, as well. While the literature comes from a wide array of disciplines and fields, the commonalities were striking when it came to implications for risk communicators. A Social Marketing approach seems particularly well suited to coastal hazards campaigns. There is no need for the coastal manager to "reinvent the wheel." There are numerous sources of social marketing strategies, including books, workshops and a wealth of information on the Internet. It should be emphasized that a social marketing approach is labor-intense. It requires a great deal of though and effort, especially at the beginning, but the evidence from the literature and from the interviews is compelling. If providing good information alone has not been sufficient to promote resilient behavior, perhaps it's time to try a new approach.

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APPENDIX

Coastal Services Center Risk Communication Project Interviewees

1. Wendy Carey
   Delaware Sea Grant College Program
   University of Delaware
   Project/Topic: City of Lewes Flood Markers

2. Leslie Chapman-Henderson
   Federal Alliance for Safe Homes (FLASH)
   Project/Topic: Social Marketing of Home Safety

3. John Haack
   University of Wisconsin Extension
   St. Croix Basin Natural Resources Educator
   Project/Topic: Shoreline Restoration Project

4. Tom Iovino
   Communication Specialist
   Pinellas County Emergency Management
   Project/Topic: Hurricane Education and Outreach Program

5. Howard Kunreuther
   Celia Ye Koo Professor of Decision Sciences & Public Policy
   Co-Director, Risk Management and Decision Processes Center
   Wharton School
   University of Pennsylvania
   Project/Topic: Use of Insurance as a Structural Approach

6. Edward Maibach
   Professor, Department of Communication
   Director, Center for Climate Change Communication
   George Mason University
   Project/Topic: Social Marketing Experience and Expertise

7. Peter Mitchell
   Salter>Mitchell
   Project/Topic: Various Social Marketing Campaigns, including 5th Guy Campaign

8. Susanne Moser
Director, Principal Scientist
Susanne Moser Research and Consulting
Research Scientist
Institute of Marine Sciences
University of California – Santa Cruz
Project/Topic: Communication and Behavior Change
Extensive Expertise in Social Marketing

9. Peter M. Sandman
Risk Communication Consultant
Project/Topic: Expertise in Risk Communication

10. Robert Scott
Director of Weatherization Services
National Association for State Community Services Program
Project/Topic: Weatherization Public Information Program

11. Bret Shaw, Assistant Professor
Department of Life Sciences Communication
University of Wisconsin Extension
Project/Topic: Shoreline Restoration Program

12. Michele Steinberg
Firewise Communities Program Manager
National Fire Protection Association
Project/Topic: Firewise Public Information Campaign

13. Matt Stout
Chief of Staff/Communications Director
NOAA Office of Marine Sanctuaries
Project/Topic: Thank You Ocean Campaign

14. Maria Vargas, Brand Manager
Environmental Protection Agency
Change a Light, Change the World Campaign
Project/Topic: Energy Star Program

15. Walt Zaleski, Warning Coordination Meteorologist
Southern Region
National Weather Service
Project/Topic: Turn Around Don't Drown campaign