Session No. 13

Course Title: Earthquake Hazard and Emergency Management

Session Title: Risk Communication Strategies and Public Outreach

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Time: 180 minutes

Objectives:

13.1 Recognize the importance of successful risk communication in hazard reduction and as part of an overall communication strategy about earthquake hazards.

13.2 Appreciate how risk communication about earthquakes differs from risk communication about other hazards and disasters.

13.3 Understand the need for public outreach and identify lessons learned on how to effectively communicate with the public.

13.4 Describe tools that can be used to effectively communicate risks.

13.5 Identify the main rules for effective risk communication and understand the tools and resources that can be used.

Scope:

Earthquakes and their effects are uncertain and difficult to predict, and the concept of risk is inherent to earthquake hazard management. In recognition of the need to work with and communicate "risks," this series of lectures is designed to introduce the student to the principal concepts involved in the risk communication. The lectures will discuss the importance of risk communication, the unique nature of risk communication, problems that impede communications, tools for communication, and suggestions for communicating effectively to various audiences. Some students already may have some background in risk communication from other courses related to hazard management. Therefore, the topic provides a good discussion of the ways in which earthquake hazards are unique and differ from other natural hazards and how communication about their risks must likewise be different. **The primary objective for the instructor is to have the students understand the basic tools and strategies needed to create or evaluate educational initiatives on earthquakes (or other natural hazards).** A useful set of guidelines is included in the file: Handout 13.3 RiskCommGuide10-01.doc. Also, electronic visuals are included in Session 13 – Electronic Visuals.ppt. A classroom discussion exercise and homework assignment are included as handouts.

Readings:

Suggested student reading:

Nathe, S, Gori. P. Greene, M., Lemersal, E., and , D. Mileti. 1999. "Public Education for Earthquake Hazards," *Natural Hazards Informer*, Number 2, November 1999. available from: http://www.colorado.edu/hazards/informer/infrmr2/infrm2wb.htm#intro.

Davies, Margaret and Heather Allan.2002. "Earthquake Risk Prediction" Division of Risk, Glasgow Caledonian Business School Glasgow Caledonian University Scotland, UK. (included as handout for class discussion.)

Required instructor reading and resources:

Nathe, S, Gori. P. Greene, M., Lemersal, E., and D. Mileti. 1999. "Public Education for Earthquake Hazards," *Natural Hazards Informer*, Number 2, November 1999, , available from: http://www.colorado.edu/hazards/informer/infrmr2/infrm2wb.htm#intro.

Risk Communication Guide for State and Local Agencies. 2001. California Governor's Office of Emergency Services, October 2001. Report is available in the attached file: Handout 13-3 RiskCommGuide10-01.doc.

Tierney, K, J., Lindell, MK and, R.W. Perry. 2001., *Facing the Unexpected: Disaster Preparedness and Response in the United States*, National Academies, Washington, DC: Joseph Henry Press. 2002 available from: http://books.nap.edu/books/0309069998/html/index.html.

Electronic visuals included: [*see Session 13 Risk Communication.ppt*]

13.1 Thinking and decision-making process
13.2 GIS-Based EQ Hazard Map
13.3 Probability Map for Northern CA
13.4 Chart Showing Increasing Probability of Earthquakes in Northern CA

Handouts Included:

Handout 13.1: Class Discussion Assignment 13.1
Handout 13.2: Homework Assignment 13.1
Handout 13.3: Risk Communication Guide for State and Local Agencies

General Requirements:

A key factor in successful hazard reduction is **a thorough understanding of how society (individuals, organizations, governments, etc.) understands the earthquake threat and what can be done about it, and what factors ultimately result in behavioral changes that reduce vulnerability**. Thus, this section begins with a discussion of why education/risk communication is important and then reviews lessons learned about communicating earthquake risk and educating the public on earthquake hazards. Effective approaches are suggested and tips offered for developing and implementing successful earthquake education projects. Case studies and examples give the discussion context and yield a deeper understanding of what works and what does not. A list of information resources on risk communication issues also is provided.

It should be mentioned that risk communication involves communication before, during, and after hazards and disasters. The distinction is that some risk communication has the purpose of **warning**, while other involves **educating.** Risk communication for warning (shortly before, during, and shortly after the disaster) was covered in the Response/Recovery section of these notes. **This section is not concerned with risk communication for the purpose of imminent warning or recovery. Rather, this section is primarily concerned with risk communication for the purpose of educating others on future earthquake threats** (with educational objectives such as encouraging implementation of preparation and mitigation measures and other behaviors that reduce vulnerability).

The instructor may wish to invite a guest speaker with expertise in communicating risk information, such as individuals from a university sociology department or hazard management agency, to give instructions and tips on the unique art of hazard communication. . Alternatively, the instructor may wish to contact personnel from hazard agencies or from a university geography or engineering department of) to present lectures on the use and development of GIS systems for natural hazard management.

Significant portions of the lecture notes were adapted from the following sources:

1. Nathe, S, Gori. P. Greene, M., Lemersal, E., and D. Mileti. 1999. “Public Education for Earthquake Hazards,” *Natural Hazard Informer* Number 2, November 1999.

2. Risk Communication Guide for State and Local Agencies, 2001. California Governor’s Office of Emergency Services, October 2001. Report is available in the attached file: Handout 13-3 RiskCommGuide10-01.doc.

3. Tierney, K. J. 2002. “Risk Communication and Earthquake Hazards: Lessons Learned,” presentation at *Alerting America: Effective Risk Communication - Summary of a Forum*. Washington, DC: The National Academies, October 31, 2002.presentation from: http://dels.nas.edu/dr/docs/tierney6.pdf.

The session should require approximately three class periods, with two being used for lecture and the third for the classroom discussion exercise. The handout for the classroom discussion

should be distributed following the second lecture so that the students can come to class prepared for the exercise. The students will need to be divided up into teams of three or four for the discussion exercise. The homework assignment should be handed out at the end of the last session, and one week is appropriate for completion.

Additional requirements:

Computer and projector for electronic visuals.

Objective 13.1 Recognize the importance of successful risk communication in hazard reduction and as part of an overall communication strategy about earthquake hazards.

(*Note: Major portions of this section were adapted from Nathe, S., Gori, P., Greene, M., Lemersal, E., and D. Mileti. 1999. "Public Education for Earthquake Hazards," Natural Hazards Informer, Number 2, November 1999.*

Requirements:

The content should be presented as lecture.

Remarks:

I. **Earthquake Risk Communication**. **This major section presents issues related to earthquake and risk communication, emphasizing interagency or intra-organization communication techniques.**

II. Importance of Risk Communication – "The Why?"

A. Effective preparedness and mitigation require:

1. A deliberate process of gathering and interpreting information.

2. Mechanisms by which new knowledge is transformed into socially desirable outcomes – **continual risk communication is critical in this effort.**

3. Detecting, evaluating, and understanding earthquake hazards involves a wide range of highly skilled personnel, appropriate technology, and stable infrastructure. Gathering the required data, processing the data, evaluating tolerable risk levels, making decisions, and achieving desired mitigation objectives all require significant interagency, inter-organizational communication, as well as effective communication with the public.

B. **Acquiring knowledge** about specific earthquake hazards through research and scientific studies, and assessing vulnerability and risk are **only the <u>first steps</u> in**

what must be a sequential transformation of information and knowledge to affect desirable social outcomes.

1. The communication of basic and interpreted information to other users and decision-makers requires outreach partnerships and coordination among diverse organizations, industry, and local government agencies.
2. Outreach activities are critical for the uptake of information, contributing to improved coordination for emergency response and incremental improvements in hazard assessment and risk mitigation.

C. **One of the most important factors** determining whether preparedness and mitigation measures are taken is *hazard intrusiveness*, defined as the frequency of thinking about, discussing, and hearing/seeing/receiving information about a specific hazard**.** Even though individuals and organizations may think about hazards after they occur, the salience of the hazard may decline due to more daily concerns unless it is reemphasized continually through interaction.

III. Effective communication also is key to building constituents and advocates. This emphasizes the need and importance of continual risk communication through education and awareness programs.

A. Recent research findings have shown that the manner in which a community is informed of the associated risks before, during, and after an incident, can directly affect whether or not the event is perceived as being handled and managed successfully.

B. Risk communication is a fundamental aspect of risk management. Conveying a message to others, especially concerning risks and threats, must be done by various types of communication such as through an expert, the media or through government officials. Regardless, **without good communication links, there will be poor risk management systems in place and this can be a primary factor of mismanaged disasters or needless panic.**

C. Therefore, risk communication has become a key factor in emergency management programs. Risk communication is becoming more widespread in earthquake hazard management. The hazard management community is responding to media and public inquiries more than ever before.

IV. Benefits of Effective Risk Communication:

A. Improved ability of the community to act on requests for emergency actions (shelter-in-place, evacuation).

B. Improved community perception and understanding of potential risks.

C. Improved community understanding and support of emergency preparation activities.

D. Reduced impact in the event of an emergency or disaster.

E. Decreased potential for legal action by the community to enforce what it considers to be an equitable risk balance (this has occurred).

F. A key point to consider: **if a risk to the community exists, the community deserves to be informed and consulted.** This philosophy not new:

"If we think the people are not enlightened enough to exercise their control with a wholesome discretion, the remedy is not to take it from them, but to *inform* their discretion." **–President Thomas Jefferson**

V. Specific Purposes and Goals for Risk Communication.

A. The purpose of risk communication can vary. The purpose could be to **warn or to inform/educate**.

1. **For warning,** communication is typically related to response/recovery issues and involves communication during or shortly after the disaster. (***This was discussed earlier in response/recovery and is not covered in this series of lectures***).

2. **For informing and educating,** the purpose of communicating is typically to help agencies, organizations, the media, individuals, or communities to understand risk assessment and risk management, form scientifically valid perceptions of the likely hazards, and participate in making decisions about how risk should be managed, to take action to reduce risk, or other behaviors.

B. More specific educational/informational objectives of risk communication are to:

1. **Inform the community.** If a risk to the community exists, the community deserves to be informed and consulted.
2. **Seek input or feedback, which is useful to the agency, from the community.** Often input from the community can help the agency make better decisions. Those who are affected by a problem bring different perspectives to the problem-solving equation.
3. **Clarify the probability and consequences of a potential risk to provide an improved risk perspective for the stakeholder.** Instill a greater degree of comfort by furnishing information about proactive preparedness. Involvement in the process and understanding risk can help the various stakeholders accept risk. If some members of the community advocate

zero risk tolerance, the agency may have to clarify that a certain amount of risk is inherent and cannot be reasonably avoided.

4. **Address an existing controversy or concern of the stakeholder(s).** A good example of effective risk communication is getting the public to accept a controversial destruction of a school building deemed unsafe.
5. **Provide a forum for discussion.** Communication is as much listening as it is speaking. Absorbing criticism, identifying problems or concerns, and letting people "blow off steam" should often be on the agency's list of communication objectives.
6. **Improve** the stakeholders' understanding and **ability to support effective emergency response.**
7. **Satisfy regulatory requirement**s for risk communication related to emergency events.
8. **Build partners and constituents to advocate** program goals.

C. Before the communication process begins, we must ask these questions:

1. Why are we communicating?
2. Who are our target audiences?
3. What do our audiences want to know?
4. What do we want to get across?
5. How will we communicate? How will we listen?
6. How will we respond?
7. Who will execute and/or implement the plans? When?
8. What problems or barriers have we anticipated and planned for?

Objective 13.2 Appreciate how risk communication about earthquakes differs from risk communication about other hazards and disasters.

Requirements:

The content should be presented as lecture. The lecture will be enhanced if the instructor presents electronic slides or overheads of the figures below. The instructor is cued as to when the graphics from the accompanying electronic visual files should be presented.

Electronic Visuals Included:

Electronic Visual 13.1 Thinking and decision-making process

Remarks:

I. The Nature of Earthquake Risk Communication. **The basic principles of risk communication for earthquake hazards generally apply to other natural hazards, but there are important distinctions:**

A. As mentioned earlier, the "audience" (the public, agencies, private sector, public organizations, etc.) typically will have much less experience with earthquakes compared to other disasters, as large earthquakes in urban areas are relatively rare.

B. Unfortunately and dangerously, he earthquake threat is inherently less visible in the minds of most people and inherently more of a "threat" than a tangible disaster experience. Typically, there is more of a "hill to climb" to provide motivational "proof" to help achieve desired behavioral changes.

1. **Most individuals do not identify with earthquakes as well as they do other, more frequent disasters –** the vexed issue of "**frequency versus severity."** For instance, in regions where flooding occurs every year or every few years, the hazard becomes part of the landscape, and projects are sited and designed with this constraint in mind. Conversely, in an area where an earthquake may strike sometime in the next 50 or 100 years, it is more difficult to stimulate interest in vulnerability reduction measures, even though the damage may be much more catastrophic. With so long a time horizon, commitment to capital-intensive measures are difficult to achieve.

2. **Rare or low-probability events of great severity are the most difficult to mitigate, and vulnerability reduction may demand risk-aversion measures that may not be recognized as prudent.** Thus, communities may willingly accept expenditures of $100 million on flood control for a 500-year return period event, but would not consider spending 10 percent of that on earthquake monitoring or mitigation. Some of the differences in risk perception are because we see floods more frequently than we experience large earthquakes.

C. **"Risk" can be an elusive concept that is difficult to communicate;** and yet this concept sits at the center of the earthquake hazard management process. (For our current purposes, we can define ***risk*** as the probability of an earthquake occurring within a given time frame integrated with the probability that damage and losses will occur.). One might argue that the **whole purpose of hazard management is to deal with uncertainty** and so the probabilistic elements of risk can be seen as central to the management function. However, at a pragmatic level, management approaches toward uncertainty create difficulties of interpretation (especially around the vexed issue of the burden of proof) and explanation.

1. **Risk and disaster differ in significant ways.** First, people locate each differently with respect to time. Secondly, each differs with respect to how people acquire knowledge of its characteristics. ***Disasters*** involve the past. The threat that they possess is over (except for relatively quick-following "secondary" disasters such as earthquake aftershocks and tsunamis, which themselves soon become part of the past). This means that knowledge of the details of disaster (when it occurred, where, how many were killed, what one was doing when it struck, etc.) can be obtained through either direct or indirect observation, (e.g., from others including news media).

2. ***Risk*, on the other hand, is about the future. The threat is yet to come.** Hence, the character of events is unknown in their important details. They can only be inferred from past events that are deemed comparable, or estimated by the "experts." Consequently, the social meaning of time is central to the distinction between disaster and risk and to the understanding of risk itself. **When we study earthquake disasters, such as Northridge 1994, we ask people what they did. When we study risk, we ask people what they are doing in the present about an uncertain future** (Tierney et al., 2002).

II. Earthquake hazard management generally requires greater interdisciplinary cooperation and teamwork (and thus, communication).

Detecting, evaluating, and understanding earthquake hazards involves highly skilled personnel.Monitoring and understanding earthquakes, detecting or responding to their effects, assessing their potential damages, evaluating potential losses, and implementing mitigation strategies, etc. all require national facilities and coordination, along with extensive regional (state, local etc.) cooperative efforts. Earthquakes tend to cause widespread damage and they occur with little to no warning. Therefore, they are often more threatening to human life and more taxing on response and recovery efforts. As mentioned earlier, we have less experience with these disasters, although they tend to produce very severe losses. Also, the required mitigation efforts are more involved and need to be more integrated. For instance, even if a building is appropriately designed to be earthquake resistant, a bookshelf stacked high beside a desk can still produce serious injury or death. Accordingly, changes in social behavior, as well as the mitigations of physical infrastructure, are important (Tierney et al., 2002).

A. Research into the psychology of perception and belief indicates that – as counterintuitive as it may seem – **perceived risk does not contribute directly to taking protective action.** Perversely enough, most humans do not behave in accordance with their perceptions or attitudes. That is, a person living in San Leandro, California, may understand the considerable risk from a Hayward Fault earthquake, but may not have done anything to make his or her house resist the ground motions such an earthquake would produce.

B. **Most people do not think in "probabilities." Typically, the human thought process about future events is binary: "it will happen/it won't happen or it will affect me/it won't."** Fancy probability estimates for an earthquake on the San Andreas Fault will not change that. The official probability will be added to other pieces of information, beliefs, and experiences, and may – if accompanied by continuous, credible information over time – inspire some questioning and fact-seeking in the future. (Probabilities, however, are meaningful in many cases for decision-making and setting priorities, probably more for agencies, business, organizations than the public.)

C. Although the rules vary depending upon the specific audience (individuals, organizations, private sector, government agencies, etc.), the "golden rules" of earthquake education generally are:

1. When clearly informed about earthquake risk, people can comprehend the basics and remember what they hear/see/read.

2. When people understand that there is something they can do about reducing earthquake vulnerability, they are more apt to act.

3. People consistently search out more information to validate what they have already heard.

D. Also, people tend to prefer earthquake educational efforts that:

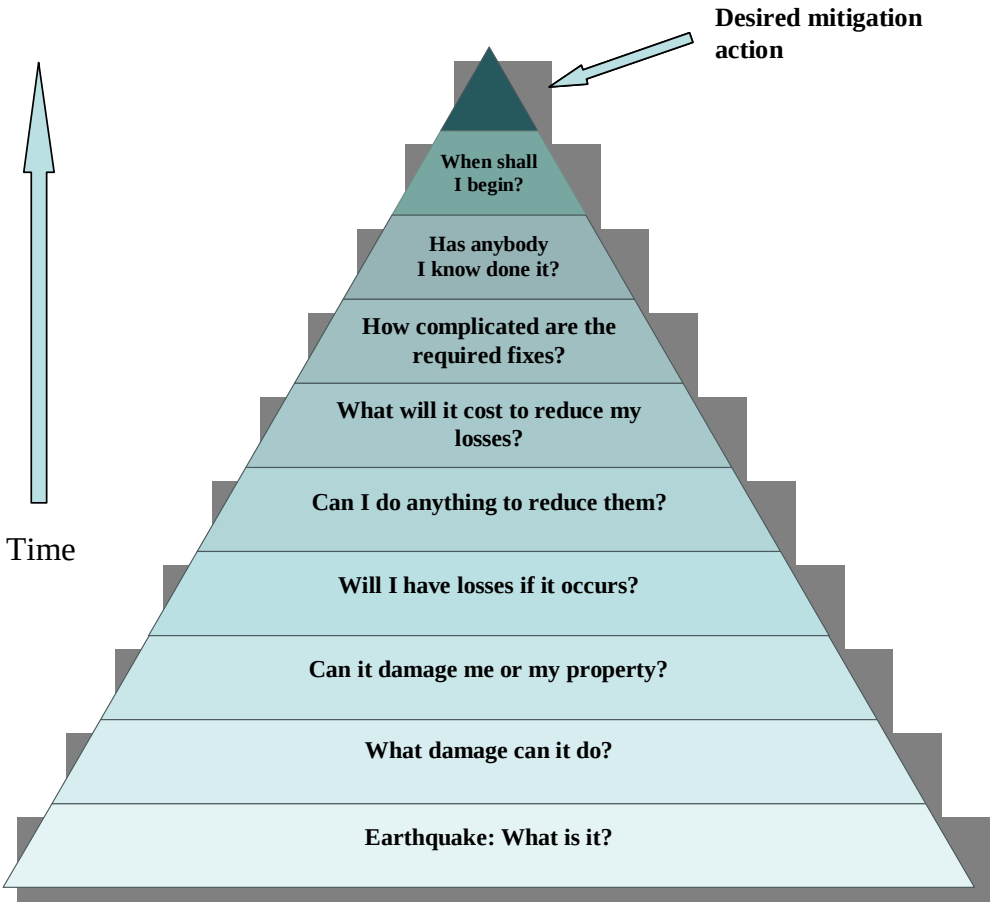
1. Convey scientific and technical information from **credible** authorities.

2. Communicate it clearly.

3. Present it attractively.

4. Disseminate it through various community or professional networks to decision makers.

E. Finally, the evolutionary thinking and decision-making and educational process involved in an individual or organization carrying out a desired earthquake mitigation action based is represented by the following diagram (Visual 13.1). Note that the specificity of the information increases with time. [*Electronic Visual 13.1*]



Visual 13.1 – Continuum of Thinking Provoked by Earthquake Education. Credit: Graphic adapted from Natural Hazards Observer, No. 2, November

III. Process of Risk Communication: "The Who and What?" Components of the risk communication process include *information sources, messages, message channels, and receivers/audiences.*

[Note: Major portions of the following section were adapted from "Risk Communication and Earthquake Hazards: Lessons Learned," presentation by Dr. Kathleen Tierney to the National Academies; see Tierney, K. J., (2002)].

A. Information Sources: It is vital to obtain and communicate credible, accurate information.

1. Policy guidelines, regulations, and education may drive desired/required actions (i.e., mitigation), but if information and knowledge are poor, the process will almost certainly be ineffective. The scientific and related professional societies can assist this process by improving the

communication of risk information to the public, to business and to government decision makers.

2. Information sources related to hazard can be diverse and include friends, family, coworkers, neighbors, mass media, Internet, scientists, government, schools, and the private sector. We must ***consider the fact that our audience will hear messages from many sources; it may be necessary to overcome false perceptions and myths that are not factual***. For instance, earthquake risk in the eastern U.S. is comparable to that in the western U.S., but this is not widely known or understood by most individuals or institutions.

3. Trust and credibility lay an important foundation for successful risk communication; ***it is crucial to establish trust and maintain credibility***.

4. Factors affecting information source credibility include competence, objectivity, consistency, concern, honesty, trustworthiness, usefulness of information, factual correctness, interest of audience, and delivery of message.

5. Factors that reduce/undermine credibility include deceit and dishonesty, misrepresentation, lack of full disclosure, talking over the heads of the audience, arrogance, appearing to be self-serving, inconsistency, and prior rifts with the group or low trust based on past events.

6. Credible spokespersons admit uncertainty, respond to emotions and show care/concern, are competent, and professional in appearance and presentation.

7. For important issues, you may need to hire competent spokesperson, such as credentialed scientist or engineer to assist in communication process.

B. The Message.

1. Message content is a function of who the audience is and what the purpose of the communication is. In general, educational **messages regarding earthquake hazards should explain three critical issues: 1) potential losses, 2) the chances that the losses will take place in a certain amount of time, and 3) how to cut the losses.** This can be thought of as the tripod on which good hazards education rests. Without any of the three legs, an initiative will teeter and ultimately fail.

2. Toward this goal, it is important to:

a. **Be consistent.** Since most people are exposed to information through a number of media and from various sources, it must be consistent in order to be credible. Inconsistent information confuses people and allows them to discount some or all of it. This is especially a problem when different agencies or "experts" provide conflicting information.

b. **Include timely, accurate, credible information**. People attend to information only if it comes from a group or a person they trust. It's important to use various sources to reach all groups in the audience.

c. **Use simple and clear language**. Though credentialed spokespersons are one of the most important sources of information, ***specialists who speak only in the jargon of their discipline will not be effective.*** Authoritative interpreters of technical information should be cultivated, encouraged, and paid well. Fit the specialist to the topic: geologists and seismologists should talk about earth science, engineers and architects should talk about structures, and firefighters and emergency responders should talk about home safety and neighborhood organization

d. Show confidence in the information.

e. Provide information about the anticipated event, including details on likely impacts.

f. Provide geographically-specific information.

g. Tell people what to do and when.

h. Tell people where to go to learn more.

i. **Communicate information frequently!!**

C. Message Channels/Communication Vehicles

1. Message channels (communication vehicles) are varied and include:

   a. Informal communication.

   b. Face-to-face conversations and meetings.

   c. Public forums (conferences, town meeting).

d. Media (radio, TV, newspapers, Internet).

2. Some important keys to remember:

a. Disseminate issues though multiple channels using multimedia.

b. Where possible, use graphical techniques (maps), as opposed to tables and charts (i.e., Risk Communication Tools discussed later).

c. Face-to-face and media-based strategies should complement and reinforce each other.

d. The media are vitally important and have a large responsibility to play in the communication of earthquake hazard information, as they are often the link between the public and the experts. They are sometimes the major force behind distributing information about earthquake warnings and hazard information.

e. Although the media are vital partners, it is important to discourage scare tactics and sensationalism (increasingly used by some media, such as 24-hour TV news programs) that could result in panic and/or the later discrediting of legitimate hazard information.

f. Mass media campaigns alone are not sufficient to influence behavior – they must be reinforced by group and community-based strategies.

g. All mass media are not equally effective for communicating hazard information to all groups.

h. Formal and informal channels interact in the risk communication process and their messages must be consistent. Informal discussion with peers helps people to believe the information and act upon it.

i. Provide a copy of the message/presentation in written form; people prefer to have written material to refer to and think about their risk, as opposed to only hearing/seeing a presentation.

D. Audience/Receivers of the Information – Keys

1. Find out what the audience knows, does not know, and wants to know about a given earthquake risk

2. Tailor information to specific audience needs**.** Consider the diversity, culture, educational level, age, interests, etc. of your audience and create materials and design a presentation that best suits.

3. Tailor the presentation to the level of understanding of the audience. Remember: **the typical audience does not think and talk about risk like engineers and scientists and emergency managers.**

4. Think about risk in multidimensional ways; **understand that risk will mean different things to different people** (insurance companies, home owners, emergency managers, business owners).

5. Remember that the audience will be influenced by emotions (but so are you and the "experts").

6. You should work <u>with</u> audience, not "preach" to them.

IV. The Window of Opportunity – "The When?"

(Note: Major portions of this section were adapted from Nath , S., Gori, P., Greene, M., Lemersal, E., and D. Mileti. 1999. "Public Education for Earthquake Hazards," Natural Hazards Informer, Number 2. November, 1999. by)

A. Research and observation support the "golden rule" of education for hazards:

1. **All of the sophisticated materials and behavior modification techniques do not have the force of one good disaster to change both behavior and public policy, at least in the short term**. Losing something in an earthquake, or knowing somebody who did, has inspired many people and organizations to take protective actions (NHI, 1999). During the well-known "window of opportunity" that opens following a disaster, abundant information from various credible sources in the affected locale will increase the chances for behavior change.

2. However, while people and organizations are more apt to alter behaviors after a disaster strikes, change is most likely when public educators have already worked to make sure the problem is recognized, the solution is known, and some advocates are already in place.

B. Do not wait for the window to open; build a sustained advocacy program beforehand.

C. Not working constantly may result in waiting forever.

D. Take advantage of a window opening someplace else. After the 1995 earthquake in Kobe, Japan, for example, there was fleeting but pronounced interest in earthquake risk in both the Bay Area and Seattle – each with a built environment and setting similar to Kobe. A number of earthquake organizations on the West Coast seized this opportunity to draw comparisons between the Kobe quake and

expected impacts due to local temblors. **Use it while you can, for the window is not open long!**

E. **The fleeting interest wanes.** A population that jams the phone lines requesting earthquake loss reduction information following a recent earthquake one year will not be doing so the next. A **public policy maker's memory and attention span are even shorter than the public's**. Typically, she or he will not keep earthquake **hazard mitigation high on the list of big issues for more than two or three months.**

V. Summary and Key Points:

A. **Establish credible information** sources and obtain information from reliable sources; have experts assist where necessary.

B. **Accept and involve the audience as a legitimate partner.** The goal is to produce an informed audience, not to defuse concerns.

C. **Plan carefully and evaluate your efforts.** Different goals, audiences, and media require different actions. Analyze the audience; learn what works for each situation.

D. **Listen to the audience's specific concerns.** Individuals care as much about credibility, competence, and empathy as they do about risk levels, statistics, and details.

E. **Be honest, frank, and open.** Trust and credibility are difficult to obtain; once lost they are almost impossible to regain.

F. **Coordinate and collaborate with other credible sources.** Conflicts among organizations often makes communication more difficult, especially with the public.

G. **Meet the needs of the *media*.** The ***media*** usually are more interested in simplicity than complexity, danger than safety. Make sure they have what they need to portray the situation fairly.

H. **Speak clearly and with compassion.** Never allow your efforts to prevent acknowledgment of the tragedy of an illness, injury, or death.

I. **Line up multiple credible resources of credible information.** Depending on age, education, class, and ethnicity, different people trust different sources. Some people want to hear about earthquakes from seismologists at the U.S. Geological Survey; others believe only what the Red Cross tells them; still others search for data sources online. It's important to use various sources to reach all groups in the community.

J. **Assume that your audience is diverse; tailor information to the needs of each group.** Some cultural groups choose not to read for information for reasons unrelated to literacy; to reach them, use radio and TV, word-of-mouth, or pictographic images. Use the media that serve multilingual populations.

K. **Use multimedia approach.** Effective hazard management programs should have the staff constantly work the media angles and maintain contact with media personalities. **Use media appropriate to the audience you're trying to reach.**

L. **Make sure the information you present is accessible.**. Have information ready and accessible when someone asks for it. Take advantage of the earlier information sources discussed, seismic safety hints, retrofit directions, guidelines, model ordinances, neighborhood response plans, exemplary policies, and case studies that have been developed in nearly every seismic risk zone by various agencies and organizations. Share materials. Revise them. Adapt them.

M. **Make your approach interactive and experiential.** Engage your audience; do not preach.

N. **Use earthquakes as important learning opportunities.** Send elected officials, government functionaries, corporate officials, school superintendents, various professionals, and community organizers to view earthquake damage and organizational response. Have them report the lessons they derive for their community, business, school district, or practice. Such people typically return from their reconnaissance with better vision and a more active imagination than they had before they left. They have seen the truth and can communicate it to many others. They are motivated to do something, and can frequently infect others with their commitment.

O. **Evaluate your efforts.** Assess the efficacy of your materials and approaches and improve on what works. Use your data to justify continued or increased financial support.

Objective 13.3 Understand the need for public outreach and identify lessons learned on how to effectively communicate with the public.

[Note: major portions of this section were adapted, and in some instances taken directly, from Nathe, S., Gori, P., Greene, M., Lemersal, E., and D. Milet. 1999. "Public Education for Earthquake Hazards," Natural Hazards Informer, Number 2, November 1999.].

Requirements:

The content should be presented as lecture.

Remarks:

I. Public Outreach for Earthquake Hazards - Why Educate the Public about Earthquakes?

A. The goal of most public education efforts is to change people's behavior.

1. Earthquake education attempts to increase protective actions by people, groups, and institutions by presenting information about the hazard and the risk it poses. If done effectively, it fosters uncertainty, causing people to wonder about their environment and to question their safety in it. A good public education project gives people something to mull over and to discuss with friends, family, and colleagues. It induces them to seek more information to answer their questions, and its specialists are there with clear information and answers when the questions are asked. Despite all that, the desired changes in behavior may come years later, if at all (NHI, 1999).

2. Other successful public education campaigns follow this model (of pointing out risks) – **Quit smoking. Fasten your seat belt. Don't litter**. Those famous campaigns all began by showing the risks or problems associated with particular behaviors. They had three things going for them:

   a. They raised questions in the minds of their audiences.

   b. They offered fairly simple answers.

   c. They had authorities available over time to reinforce the message.

B. Generous funding by one or more interest groups helped with the latter. An effective public education program presents a problem and then says how to solve it – over and over again. And, even though public education involves colorful pamphlets, eye-catching posters, and provocative public interest announcements on TV and radio, understanding of the dynamics of human behavior, effective ways to change it, and a systematic approach to carrying it out over time is even more valuable (NHI, 1999).

II. What Methods Have Worked in the Past?

A. Much research has been done, in numerous disciplines, on how human behavior can be changed. However, very little research has been done on whether public education initiatives on hazards are successful in increasing protective actions, although a few efforts have been systematically evaluated.

1. One study in the early 1980s assessed the responses of Los Angeles residents to news coverage of the Palmdale uplift, a rare geological

phenomenon in an area along the San Andreas Fault that was thought, between 1976 and 1979, to be a precursor to an earthquake. Social scientists surveyed hundreds of people to determine where they received their information on earthquakes and how they evaluated what they got. They concluded that scientists and the media should make available credible information regarding an event that arouses widespread curiosity. Otherwise, **when reliable information is not available, rumors fill the gap.**

2. In the late 1980s, another research effort analyzed the effectiveness of a pamphlet in raising awareness of earthquake risk among residents in communities near Parkfield, California. The U.S. Geological Survey had announced that the Parkfield segment of the San Andreas Fault in central California was likely to experience a moderate earthquake between 1986 and 1993. The California Office of Emergency Services mailed a comprehensive pamphlet to residents in the affected area that described the probabilities and the possible impacts of the quake and recommended certain actions to reduce damages. The study evaluated which pieces of information moved residents to take protective action. Some of the findings of the study are now considered **immutable laws of effective public education, as listed below** (NHI, 1999):

   a. Complicated phenomena must be explained in non-technical terms.

   b. Information must come from various, credible sources.

   c. Consistent information should be repeated in many different media.

   d. Messages on TV and radio are somewhat effective, but people like to have a written document to which they can refer as they think about their risk.

   e. Information should tell people what they can do before, during, and after a disaster.

   f. Discussion with peers helps people to believe the information and act upon it.

B. In the early 1990s, a similar study concerned a publication in the Bay Area that explained in lay language the findings of a scientific report on earthquake probabilities (NHI, 1999). Following their release of a (very) technical report, the U.S. Geological Survey thought it wise to explain to the public what it meant and what they ought to do about it (NHI, 1999). In concert with a number of other agencies, a booklet – ***The Next Big Earthquake in the Bay Area –*** was developed and distributed to millions of residents as a Sunday newspaper insert (also see ABAG, 2004). Shortly after, researchers queried a large number of readers about

their responses to the booklet and its information. There were several key findings:

1. **Educational organizations with a high-profile presence in the area over time were more trusted than those without a track record.** educational programs that do not feature specialists, do not adapt the material to their constituents, and take only the grocery bag or mass mailing approach were deemed unsuccessful.

2. This study highlighted the error of assuming a very homogeneous public and advocated tailoring information materials to the many special groups in an area. For example, the approach to, and materials for, middle class homeowners will be different from those for renters, and those for school districts will not be like those for large corporations.

C. A study of public education outside California was undertaken by a professional staff member of the American Red Cross in affiliation with the University of Maryland.

1. The 1992 study of message content and images supported a popular hunch that too **much gloom and doom is just as bad as no information at all** (NHI, 1999)**.** A few well-chosen images of destruction in a presentation have a useful impact on most people early. However, when verbal messages on how to prepare for an earthquake are juxtaposed with photos of collapsed structures, people have trouble dealing with the verbal/visual mismatch. **People tend to remember the visual message more clearly than the verbal, and repeated images of damage sometimes convince people there is nothing they can do about earthquakes.**

2. Coordinated verbal and visual representations of what to do and how are far more effective. **Finding the right mix of information on potential losses and on effective actions is critical to the success of public education.**

D. One last study bears mentioning. It concerned public response to a spurious 1990 earthquake prediction on the New Madrid fault in the Central United States. **The findings confirmed the need for governments and scientists to place accurate information before the public to counter inaccuracies that may be receiving media attention.**

1. When Iben Browning – a scientist, albeit not an earth scientist – predicted a large quake on the New Madrid fault on December 3, countless people believed him and reacted accordingly. The populace in the heartland, which had never been taught much about earthquakes, did not have the analytical tools to question Browning's prediction.

2. Credible scientists and government spokespersons were slow to disagree with Browning, perhaps because they had not learned the lesson of the Palmdale uplift study mentioned above. Once they responded and released accurate information, however, the "prediction" **provided an opportunity for solid public education.**

III. The Window of Opportunity.

As mentioned earlier, during the well-known "window of opportunity" that opens following a disaster, abundant information from various credible sources in the affected locale will increase the chances for behavior change (NHI, 1999). Do not wait for the window to open; build a sustained advocacy program beforehand. Not working constantly may result in waiting forever.

IV. The Process.

Public education is a complicated process on both the delivery and receiving ends. Campaigns must be coherent and collaborative, their information must be credible and understandable, and the information must reach its intended audience. In that statement is a prescription for close cooperation among technical specialists and educators, constant communication among educational organizations, and sophistication and creativity in the message translators and communicators.

A. **Line up multiple credible resources of information.** People respond better to information if it comes from a group or a person they trust. Depending on age, education, class, and ethnicity, different people trust different sources. Some people want to hear about earthquakes from seismologists at the U.S. Geological Survey; others believe only what the Red Cross tells them; still others search for data sources online (NHI, 1999). It is important to use various sources to reach all groups in the community.

B. **Assume that your public is diverse; tailor information to the needs of each group.** For example, the elderly have special needs, so create materials for them that speak to those needs. Do not ignore non-English speakers; write information in their languages or get your materials translated by knowledgeable local speakers of those languages. Some cultural groups choose not to read for information for reasons unrelated to literacy; to reach them, use radio and TV, word-of-mouth, or pictographic images. Use the media that serve multilingual populations.

C. **Use multiple media.** Now that we have had the information technology revolution, the sky's the limit. You can bounce a fact about hazard risk off satellites, insinuate it into electronic data networks, feature it on interactive computer games, add it to distance learning curricula, and project it onto the screen of the nearby theater. Vary your spokespersons as well: today, the Red Cross spokesperson on radio; tomorrow, cartoon characters on TV; next week, a USGS seismologist on the Internet. Effective public education programs should

have the staff to constantly work the media angles and maintain contact with media personalities.

D. **Use media appropriate to the audience you are trying to reach.** The Internet is indeed an effective tool, but it is not used by everyone. For example, text that can be downloaded from your web page is not the way to reach a non-English-speaking or low-income audience. Information for those groups can be disseminated through the community organizations and social service agencies that regularly work with that audience. Conversely, technologically sophisticated packaging gets middle-class, computer-using audiences where they live (NHI, 1999).

E. **Make the information easily accessible.** On an ongoing basis, successful public education works to motivate a few people to do something to reduce risk. Their activities contribute to the slow, incremental process of reaching others as well. You must not frustrate your public! Have information ready and accessible at the time someone asks for it. Keep the materials up to date and translate them, if need be.

F. **Because learning is incremental, information dissemination should be, too.** Organize the information you present to highlight related themes successively. For example, some education organizations or emergency services agencies distribute to participating communities monthly newsletters with reproducible masters on different aspects of earthquake preparedness.

G. **Make your approach interactive and experiential.** We know that adults learn by comparing new information to what they already know, by thinking through and discussing the new concept or practice, and by doing. They do not sit passively and digest everything they hear or read. They do not enjoy lectures. Use models, visual aids, fancy media, and peer group discussions. Engage your audience.

H. **Use earthquakes as important learning opportunities.** Send elected officials, government functionaries, corporate officials, school superintendents, various professionals, and community organizers to view earthquake damage and organizational response. Have them report the lessons they derive for their community, business, school district, or practice. Such people typically return from their reconnaissance with better vision and a more active imagination than they had before they left. They have seen the truth and can communicate it to many others. They are motivated to do something, and can frequently infect others with their commitment.

I. **Never overlook the role of an individual in sparking behavior change.** There are many examples of earthquake “champions” who single-handedly prod and cajole their organizations, schools, neighborhoods, or governments into taking action. These individuals are both tenacious in their efforts to stimulate change

and passionate in their belief that change is necessary. **Finding and motivating such an individual can sometimes be the key to a successful public education campaign.**

J. Build some sort of evaluation component into your campaigns, for yourself and for others. When you assess the efficacy of your materials and approaches, you can revise what does not work. Share that knowledge with other educators, so campaigns across the country can benefit from your experiences. Last, but not least, use your data to justify continued or increased financial support.

K. Finally, if your organization funds a public education program, continue that support over many years. If you run a public education program, keep it highly visible and recognizable in the community. Programs that deliver helpful information over the years see their credibility and effectiveness grow. Do not decrease it by altering missions, or by changing logos or names. Be patient, and understand that good public education is a long haul.

V. The Message.

A. Translate and manipulate information about the earthquake hazard to make it accessible. Reading in the newspaper the technically sophisticated and generally incomprehensible statements of geoscientists, engineers, or actuaries will not give most people an elementary understanding of earthquakes and likely impacts on their lives. Simple language in manageable amounts is absolutely necessary.

B. Keep the information consistent. Educators and emergency managers should work together, across jurisdictions and organizations, to see that messages are similar. For example, numerous organizations – state agencies, the Red Cross, school authorities, and media outlets – in California met in the immediate aftermath of the Loma Prieta Earthquake just to discuss and agree upon the wording all of them would use for the "Drop, Cover, and Hold!" message (NHI, 1999).

C. Package information for the media. One of the hallmarks of an effective public education program is plenty of material on hand when the TV and radio stations start calling and the feature writer from the paper shows up looking for the local angle. For example, if the issue is vulnerable wood-frame housing, provide clear bolting and bracing illustrations the newspaper can run next to its article. Get photos, maps, and checklists ready so the hazard education article makes it in under deadline and gains its rightful place on the front page. As Hamlet presciently observed, "the readiness is all."

D. The message presented to the public should clearly explain the following issues:

1. **Describe potential losses.** Generally, people can't imagine the impact an earthquake could have on their community, their house, or their place of work, so they must be assisted by descriptions of other earthquakes, pictures, scenarios, or computer-based loss estimation maps. The essence of this task is working to overcome the almost universal human tendencies to conclude that it can't happen here or it won't happen to me. The more relevant the description can be to the situation of the audience, the more likely it is that they will attend to it. A good educator can find "the local angle" in any earthquake – even in a far-off land – and work it.

2. **Discuss the odds that the losses will take place in a certain amount of time.** Once people understand that it could, indeed, happen here, they must be further convinced that it may happen to them in the next 10 years, the lifetime of their mortgage, or during their watch. Although almost no one but mathematicians and professional gamblers really understands odds, most people will want to know the likelihood of a quake in an uncomplicated sort of way and in a small number of years. Probability estimates will not, in themselves, motivate people to take action, but the information will assist in creating the uncertainty that is so important to behavior change. Earthquake prediction is a very inexact science, but where geoscientists have some understanding of the behavior of specific faults and the frequency of quakes on them, they should offer these rough forecasts. For this reason, the U.S. Geological Survey updated its probability estimates for earthquakes in the Bay Area on the 10th anniversary of the Loma Prieta Earthquake (NHI, 1999).

3. **Explain how to reduce losses.** A person with a clear picture of his or her possible losses quickly must be offered suggestions and directions for how to reduce them. Without these blueprints, people can fall prey to a fatalistic inertia. Appropriate assistance may take many forms: a how-to video for homeowners on strengthening a wall; evacuation guidelines for a school; a business resumption planning process for a corporation or a city government; encouragement and help from a neighborhood emergency response team; or recommended policy changes for a water system. People can be guided to mitigation in endless ways.

E. **Specify who is at risk in a potential earthquake for both education and planning purposes.** For example, explaining the relative weaknesses of various building types – unbolted wood-frame, unreinforced masonry, non-ductile concrete, multiunit apartments with tuck-under parking – will help people understand they might be injured if they live or work in them. Such information also will help emergency planners anticipate response needs. Beyond physical effects, people should be helped to recognize that they will be economically damaged, socially isolated, psychologically troubled, and just plain inconvenienced. Detail the exact impacts of the earthquake on all groups in the

community, on utilities, on transportation systems, and on governmental and nonprofit organizations responsible for public health and wellbeing.

F. Be clear about the lack of certainty in predicting the incidence and effects of a hazard. Any scenario of a future event is a best guess. Overstating the risk or inflating the probability of a quake or a flood inoculates people against belief just as surely as inconsistency. Predictions of catastrophe strike some people as too extreme to be credible; they terrify others. Neither group will be likely to accept the information as deserving of further questioning or attention. More than one public education project has painted too dire a picture and compromised its credibility (NHI, 1999).

Objective 13.4. Describe tools that can be used to effectively communicate risks.

Requirements:

The content should be presented as lecture. The lecture will be enhanced if the instructor presents electronic slides or overheads of the figures below. The instructor is cued as to when the graphics from the accompanying electronic visual files should be presented.

Electronic Visuals Included:

Electronic Visual 13.2 GIS-Based EQ Hazard Map
Electronic Visual 13.3 Probability Map for Northern CA
Electronic Visual 13.4 Probability Chart for Northern CA

Remarks:

I. Risk Communication Tools – "The How?"

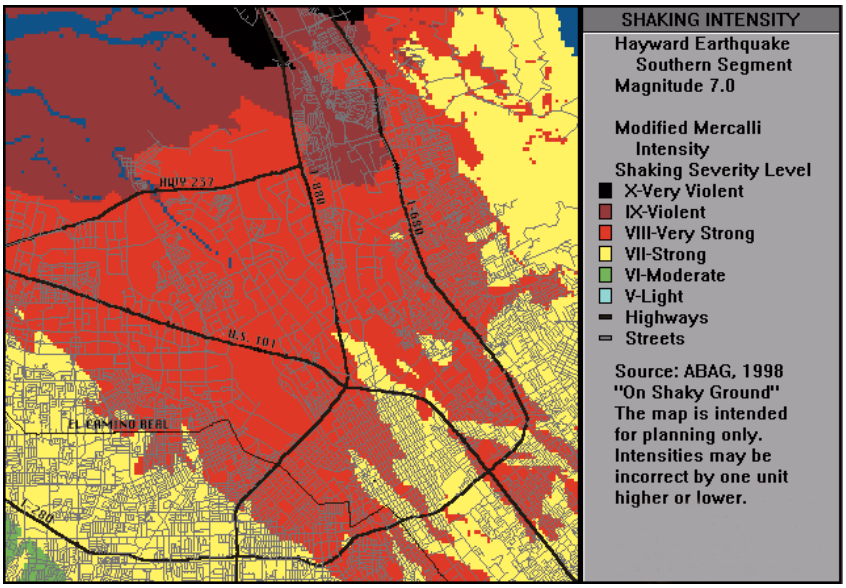
A. The use of graphical and visual tools, such as color maps, can often be more effective in communicating hazard data than tables filled with text and numbers. **In terms of communicating the results of hazard assessments, such as the relative vulnerability across a region, people understand and remember visual data much better than textual data.**

B. Geographical information systems (GIS) are particularly useful hazard tools in hazard management systems. [*Electronic visual 13.2*]

1. **A GIS is system of computer software, hardware and data to help manipulate, analyze, and visually display information that is tied to a spatial location on the earth.** Such systems typically include maps of streets, roads, buildings and other infrastructure, along with geology and other site data. Each of the features on the maps have "attributes" or associated data that can be used in various types of analysis (i.e., building

attributes might include building type, number of occupants, underlying geologic conditions, etc.).

1. **GIS systems can be easily integrated with models that can be used to perform earthquake vulnerability estimates for a number of different earthquake scenarios.** For instance, if the presenter wanted to discuss the estimated intensity of ground shaking during earthquakes along the Hayward Fault in northern California, a GIS system (integrated with the appropriate data and models) could be used to compute and illustrate these data quickly and efficiently. The example shown below was developed for a Magnitude 7 scenario:



Visual13.2 – GIS map showing estimated shaking intensity for a Magnitude 7 earthquake scenario on the Hayward Fault. Credit: ABAG (1998).

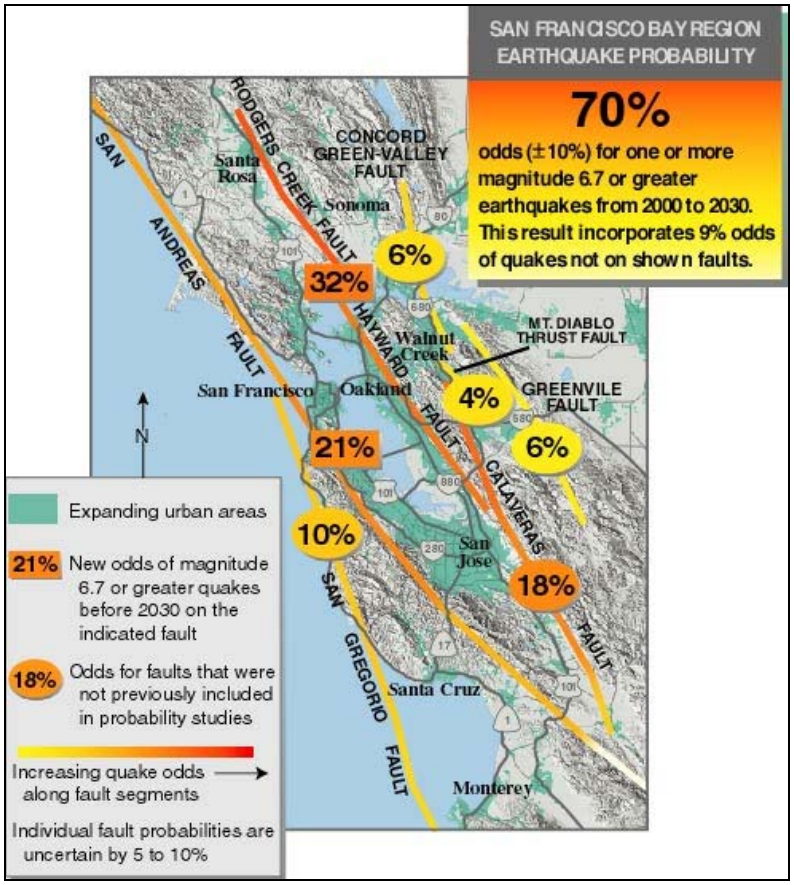
C. As can be imagined, such a map would be much more effective than a table of numbers where the estimated intensities for various areas are simply listed. Not only is the map more powerful than textual data because it creates a visual image, but **the map also allows individuals to better personalize the risk as they can directly see what the effects of the hazard means to them—"I can that see my house falls within the red zone that is predicted to be area of strongest shaking."** As explained earlier, personalizing the risk is an important factor that determines whether the individual or organization is likely to take the recommended preparation or mitigation action.

D. Although not a focus of this section, it should be mentioned that GIS systems are invaluable tools for emergency and recovery as well as planning. An excellent paper summarizing the use of GIS systems in hazard communication is included in the background reading material for these course notes.

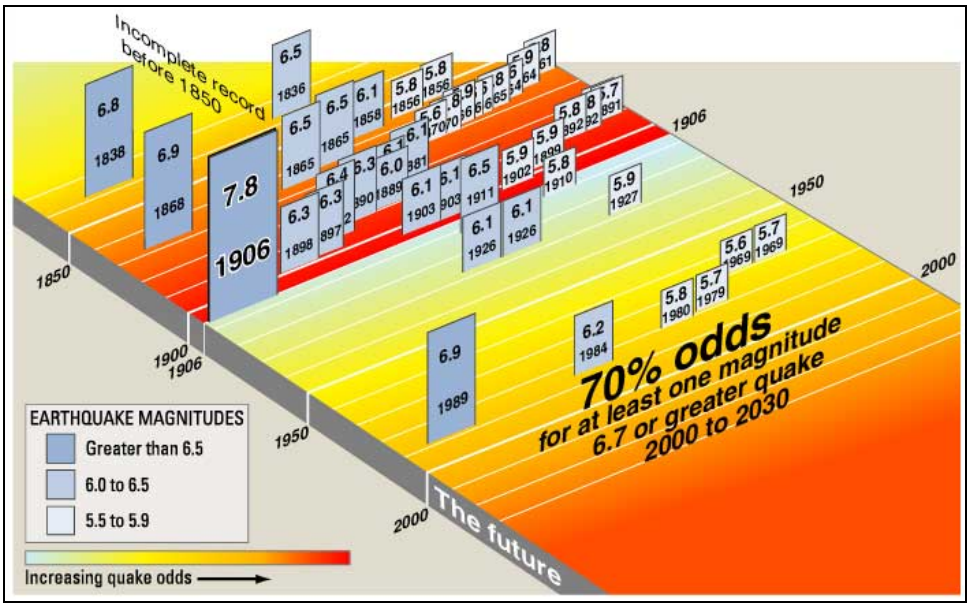
II. Finally, probability concepts increasingly are being used by emergency managers and other nonscientists in communicating hazard information, including educational program designed for the public. *[Electronic visuals 13.3, 13.4]*

A. Because uncertainty (and thus "risk" and "probability") is inherent to earthquakes and earthquake hazard management, probability can be a useful tool in communicating the relative likelihood of hazard events or outcomes. For instance, earthquake loss assessment computer programs now routinely include economic models that integrate the probability that earthquake will occur with the probability that a particular level of ground shaking will occur at a specific site and the probability that a certain level of damage will occur in a particular structure for that level of shaking.

B. Again, it is important to recognize that **most people do not think in terms of probability, but rather in a binary (yes/no) fashion**— "it will either occur or it will not." It must be stressed that probability simply indicates the relative likelihood of an event or set of outcomes in a given time period. This concept is essential for prioritization of mitigation resources and development of a hazards reduction plan that first addresses the most critical issues and areas in the region. A good example in the use of probability to communicate the relative level of hazard to the public is shown in the two figures below:



Visual 13.3 – Map showing relative probability of earthquakes over the next 30 years along major faults in the Bay area of northern California. Credit: USGS.



Visual 13.4 – Graph illustrating the increasing probability of earthquakes along major faults in the Bay area of northern California. (Increasing probability with increasing time is due to the steady buildup of seismic strain energy from tectonic plate movements that is released abruptly in an earthquake.) Credit: USGS.

Objective 13.5 Identify the main rules for effective risk communication and understand the tools and resources that can be used (including information).

Requirements:

The content should be presented as lecture and discussion. The class discussion should be handed out here for the students to be prepared for discussion during next period. The homework assignment can be handed out here or during next period.

Handouts Included:

Handout 13.1 Class Discussion 13.1
Handout 13.2 Homework Assignment 13.1

Remarks:

I. Future Needs and Considerations.

A. As explained earlier, a key necessity for designing an effective earthquake education program to encourage mitigating actions is an understanding of the factors that most influence individuals, organizations, and governments to take the desired actions. **There is an urgent need to improve/develop communication tools to move people to action. It is important to continually reinforce risk issues by continuing the involvement of credible, gifted, scientific and engineering communicators who can address non-scientific/non-engineering audiences.**

B. Although we are learning more from recent case histories about which communication strategies work and which do not, this field of research is still relatively young and much research is needed to better understand the process. To date, too little research has been devoted to the study of social behavior and responses regarding earthquake disasters (or any disasters for that matter). In addition to more research, **there is a need for long-term public education campaigns to help engender a "culture" of disaster preparedness on a nationwide basis using the HAZUS model as a baseline** (*HAZUS is a computer-based loss estimation system developed by FEMA to estimate losses in hazard events. This will be discussed more in Session 14*)**.** Toward this end**, it is vitally important to capture and document mitigation success stories where possible.**

C. Agencies concerned with hazard management should employ innovative strategies such as using pollsters to identify ways to market seismic safety and mitigation. There also may be benefit in forming partnerships with other organizations (even those in the private sector) that have proven marketing skills to help deploy loss reduction strategies. Finally, **it would be beneficial to develop models that express the economic benefits of mitigation, as these data would**

increase the effectiveness of the communication process and likelihood of mitigation actions.

[*Handout 13.1 Class Discussion, divides students into teams of three or four, so remind them to come to class prepared to conduct class discussion next period.*]

[*Handout 13.2 Homework Assignment, can be handed out here or following class discussion next period.*]

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