

Session No. 12

Course Title: Social Dimensions of Disaster, 2nd edition

Session 12: Building Effective Warning Systems

1 hr.

Objectives:

- 12.1 Describe the methods and findings from one experimental study of disaster warning systems
- 12.2 Identify seven key functions that comprise the evaluation-dissemination subsystem within all disaster warning systems
- 12.3 Identify one typical community organization that might perform each of the seven key functions for at least two disaster agents, e.g., tornado, flood, terrorist attack, etc.
- 12.4 Describe in general terms the functioning of an integrated disaster warning system for at least two disaster agents, e.g., hurricane, tornado, terrorist attack, etc.

Scope:

This session provides students with an opportunity to apply current research studies and basic principles of sociology to the design of effective community warning systems.

Readings:

Student Reading:

Sattler, David N. and Amanda L. Marshall. 2002. "Hurricane Preparedness: Improving Television Hurricane Watch and Warning Graphics." *International Journal of Mass Emergencies and Disasters* 20:41-49.

Professor Readings:

Rogers, George O. 1989. "Communication of Emergency Warning: A Cyclical Process." *Disaster Management* 1:23-32.

Background References:

Rogers, George O. and John H. Sorensen. 1988. "Diffusion of Emergency Warnings." *The Environmental Professional* 10:281-294.

Lindell, Michael K. and Ronald W. Perry. 1987. "Warning Mechanisms in Emergency Response Systems." *International Journal of Mass Emergencies and Disasters* 5:137-153.

General Requirements:

Overheads (12-1 through 12-6 appended).

Student Handouts (12-1 through 12-4 appended).

See individual requirements for each objective.

Objective 12.1 Describe the methods and findings from one experimental study of disaster warning systems.

Requirements:

Start this session with the first student exercise and proceed with lecture material specified below.

Use Overheads 12-1 through 12-3.

Remarks:

I. Introduction.

A. **Exercise.**

1. **Remind** students of exercise procedures.
2. **Divide** class into four groups and assign student roles.
 - a. Chair.
 - b. Reporter.
 - c. Timer.
3. Announce time limit: 3 minutes.

B. **Display** Overhead 12-1; "Workshop Tasks".

1. Group 1 – In the Sattler and Marshall (2002) study, what four experimental treatments were used?
2. Group 2 – In the Sattler and Marshall (2002) study, what were the key findings regarding hurricane watch graphics?
3. Group 3 – In the Sattler and Marshall study, what were the key findings regarding hurricane warning graphics?
4. Group 4 – What are the major components of a hurricane warning system?

C. **Start** discussion.

D. **Stop** discussion.

E. **Explain** that the report from Group 4 will be delayed until later in the session.

II. Sattler and Marshall (2002) study.

A. **Group 1 report** (2 minutes) (four experimental treatments).

B. **Elaborate** as necessary.

1. Four types of experimental treatments.
2. Refer students to Figures 1 and 2 (p. 44).
3. Treatment 1 – Graphics **currently used** for **hurricane watch**.
4. Treatment 2 – **Enhanced** graphics for **hurricane watch**.
5. Treatment 3 – Graphics **currently used** for **hurricane warning**.
6. Treatment 4 – **Enhanced** graphics for **hurricane warning**.

C. Group 2 report (2 minutes) (findings regarding **hurricane watch**).

D. **Display** Overhead 12-2; “Findings: Hurricane Watch Graphics”.

E. **Elaborate** as necessary.

1. **Review** study **participants** (p. 43).
 - a. 91 males; 287 females (n = 378).

- b. Students enrolled at College of Charleston, Charleston, South Carolina.
2. **Findings:** group that received **enhanced graphics** for hurricane watch were: (p. 46)
- a. More **accurate** in their **awareness** of the time prior to landfall.
 - b. More likely to **take action**.
 - c. More likely to take the situation **seriously**.
- F. Group 3 report (2 minutes) (findings regarding hurricane warning).
- G. **Display** Overhead 12-3; “Findings: Hurricane Warning Graphics”.
- H. **Elaborate** as necessary.
- 1. **Highlight:** questionnaire used to collect data (p. 45).
 - 2. **Findings:** Group that received **enhanced graphics** for hurricane warning were: (p. 46).
 - a. **More accurate** in their **awareness** of the time prior to landfall.
 - b. **More likely** to **understand** that a warning **means** to finish **preparations**.
 - c. **More likely** to **understand** warning **means** to go to a **safe location**.
 - d. **More likely** to take situation **seriously**.

Supplemental Considerations:

The **key message** of this section is to demonstrate an **application** of social research within the context of disaster warning systems. The example study is focused on a very specific detail. Students can then be **guided** toward a **broader theoretical context** in the next section. By starting with a study that is very specific and easy to understand, students can better grasp the **value** and **contributions** of social research for the emergency management profession. Some professors might wish to expand this section through guided discussion of the possible **relevance** of the study design for **other hazards** such as flood or tornadoes. What types of research designs would be required?

Objective 12.2 Identify seven key functions that comprise the evaluation-dissemination subsystem within all disaster warning systems.

Requirements:

Use Overhead 12-4.

Remarks:

- I. Group 4 report (2 minutes).
- II. Seven key functions.
 - A. **Explain:** within all disaster warning systems, there is a **critical subsystem**, i.e., the evaluation-dissemination subsystem.
 1. **Failure** to accomplish any of the seven functions, results in an **ineffective** warning system.
 2. **Different** community organizations accomplish each of the seven functions.
 3. **Integration** of all participating organizations is required if the warning system is to be **effective**.
 - B. **Display** Overhead 12-4; “Seven Key Warning Functions”.
 - C. **Illustrate** and describe each function; **integrate** material from Group 4 report.
 1. **Detection:** How will the hazard be detected?
 2. **Measurement:** How will the hazard be measured?
 3. **Collation:** How will the data be collated?
 - a. Use example from hurricane.
 - b. **Contrast** to riverine flooding, i.e., multiple readings from rain and stream gauges.
 4. **Interpretation:** How and who will interpret the collected measurements?
 - a. National Hurricane Center.
 - b. Water engineers and other experts for flooding.

5. **Decision to warn:** Who will make the decision to warn threatened populations?
 - a. Research has documented that this function is a common failure (Drabek 1986, pp. 121-125).
 - b. Prior to the threat, **consensus** must be reached regarding who will make the decision to warn.
6. **Message content.** Remind students of the message writing exercise completed in Session 9, entitled “Understanding Disaster Warnings.”
7. **Dissemination.** Who and how will the message be disseminated to the public?
 - a. Discuss role of media.
 - b. Discuss role of emergency services personnel, e.g., police and fire.

Supplemental Considerations:

By extending discussion from the specific example study into the **theory** of warning systems, students can be guided in a step-by-step process. Use of the Overhead can permit brief discussion of each function. Given the assigned readings, examples from a hurricane would most easily apply as a source of illustrations. Some professors may choose to **expand** this section through **student generated examples** of each function. The **key messages** are: 1) all system functions must be accomplished, and 2) multiple agencies and organizations typically are involved in the performance of each function.

Objective 12.3 Identify one typical community organization that might perform each of the seven key functions for at least two disaster agents, e.g., tornado, flood, terrorist attack, etc.

Requirements:

Overhead 12-5.

Student Handouts 12-1 through 12-4.

Remarks:

I. Introduction.

- A. **Exercise.**
 - 1. **Remind** students of exercise procedures.
 - 2. **Divide** class into four groups and assigns student roles.
 - a. Chair.
 - b. Reporter.
 - c. Timer.
 - 3. **Announce** time limit: 5 minutes.
 - B. **Distribute** appropriate Student Handouts to each of the four groups.
 - 1. Group 1 – Flash flood problem.
 - 2. Group 2 – Tornado problem.
 - 3. Group 3 – Hazardous materials problem.
 - 4. Group 4 – Hypothetical terrorist problem.
 - C. **Start** discussion.
 - D. **Stop** discussion.
- II. Group reports (reporter will read **problem** and **conclusions**).
- A. Group 1 – 2 minutes.
 - B. Group 2 – 2 minutes.
 - C. Group 3 – 2 minutes.
 - D. Group 4 – 2 minutes.
- III. Community agencies.
- A. **Display** Overhead 12-5; “Exercise: 4 Disaster Events”.
 - B. **Compare** and **contrast** group reports.
 - C. **Highlight**.

1. **Common agencies** identified for each function.
2. **Distinctive agencies** reflecting disaster agent.

Supplemental Considerations:

Through the exercise, students can be guided to realize the **complexities** and **potential pitfalls** in any community warning system. By **applying** the broad theory to a series of specific disaster agents, students will understand the composition of organizations who might participate in the performance of each function. The **objective** of the section is to provide students with a **general understanding**, not specifics. By contrasting multiple hazards, the professor could easily expand the section if desired.

Objective 12.4 Describe in general terms the functioning of an integrated disaster warning system for at least two disaster agents, e.g., hurricane, tornado, terrorist attack, etc.

Requirements:

Use Overhead 12-6.

Remarks:

- I. Integrated disaster warning systems.
 - A. **Display** Overhead 12-6; “Integrated Disaster Warning Systems”.
 - B. **Review** the components listed.
 1. **Perceived threat.**
 2. **Formal warning system.**
 - a. 7 functions: multi-agency.
 - b. Detection-evaluation subsystem.
 3. **Warning message.**
 4. **Response subsystems.**
 - a. **Explain:** there are hundreds or thousands of subsystems in any community; each is functioning **simultaneously** and may provide information and feedback throughout the warning process.

b. Types of response subsystems:

- 1) Individuals.
- 2) Groups (e.g., family).
- 3) Organizations (e.g., school, private sector).
- 4) Community (e.g., emergency, political).
- 5) Extra-community (e.g., NWS, State EM; Federal).

5. Feedback loops and adaptive actions.

- a. **Example:** hotel manager hears warnings and orders staff to begin the “boarding up” process. This action stimulates employees to check with families regarding possible evacuation.
- b. **Example:** tourists are in a shopping mall and see shopkeepers taking protective actions. These behaviors stimulate inquiries and return to hotel. Upon arrival tourists ask hotel staff for evacuation guidance.

II. Discussion and elaboration.

- A. **Use illustrations** from student reports from prior section, i.e., community organizations.
- B. **Explain:** the components listed in Overhead 12-6 comprise a **general theory** that is **applicable** to all disaster agents.
- C. **Ask students:** “If we switched to a hurricane, like those you read about in our last session, i.e., Bertha and Fran, what illustrations come to mind for each component of this systems model?”
- D. **Ask students:** “Based on your reading to date, what are some illustrations of failure or ineffectiveness in the disaster warning systems?”
- E. **Conclusions:**
 1. **Basic theory** must **guide** warning system **design**.
 2. **Critiques** of specific disaster responses can be **guided** by using the integrated model.

3. **Application** of general theory is an **art practiced** by emergency managers.

Supplemental Considerations:

Some professors may wish to use a **recent disaster** event as an illustration for this section. Student interest could be **enhanced** if this was done. The key **message** is that **general theory must guide application** if a warning system is to be effective. Examples of **success** and **failure** within a single case illustration or across several different hazard types will enrich student understanding of the **wide applicability** of the systems model. Some professors may wish to review and incorporate the recommendations made by Lindell (2003) for improving local all-hazard warning systems, e.g., content, channels, sources, training, etc.

Course Developer References:

- I. Drabek, Thomas E. 1999. *Disaster-Induced Employee Evacuation*. Boulder, Colorado: Institute of Behavioral Science, University of Colorado.
- II. Heath, Sebastian E. 2002. "The Public and Animal Health Considerations of Pet Ownership in Disasters." *Journal of the American Society of Professional Emergency Planners* 9:58-63.
- III. Lindell, Michael K. 2003. "Principles of Effective Warning Systems." *IAEM Bulletin* 20 (February):1,6,8.
- IV. Lindell, Michael K. and Ronald W. Perry. 1987. "Warning Mechanisms in Emergency Response Systems." *International Journal of Mass Emergencies and Disasters* 5:137-153.
- V. Mileti, Dennis S., Thomas E. Drabek and J. Eugene Haas. 1975. *Human Systems in Extreme Environments*. Boulder, Colorado: Institute of Behavioral Science, University of Colorado.
- VI. Rogers, George O. 1989. "Communication of Emergency Warning: A Cyclical Process." *Disaster Management* 1:23-32.
- VII. Rogers, George O. and John H. Sorensen. 1988. "Diffusion of Emergency Warnings." *The Environmental Professional* 10:281-294.
- VIII. Sattler, David N. and Amanda L. Marshall. 2002. "Hurricane Preparedness: Improving Television Hurricane Watch and Warning Graphics." *International Journal of Mass Emergencies and Disasters* 20:41-49.