Instructor Notes for Session No. 2

Course Title: Catastrophe Readiness and Response

Session Title: Comparison of Disaster and Catastrophe Response Planning

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Learning Objectives

By the end of this session (readings, lectures and exercises) the student should be able to:

2.1 Describe two differences between disaster and catastrophe planning
2.2 Describe the etiology of events in a catastrophe
2.3 Identify three past catastrophes and the factors that made them catastrophes
2.4 Identify commonalities between different catastrophes (e.g. they're all different, but there are commonalities.
2.5 Describe trends leading toward future events and discuss hypothetical future catastrophic events and their potential affects on modern society

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Session Overview

This unit is designed to bring reality to the conceptual definition of catastrophe in Session 1, by way of three topic discussions:

- A description of many of the ways in which catastrophes and disasters are categorically different from each other;
- A description of several historical catastrophes, and;
- A description of several potential future catastrophes.

Please note that we have provided more examples of both past and future catastrophes than you may want to, or have time to present in the classroom, so you will have to choose what makes most sense for your environment and student audience.

The suggested readings are:

- Bissell, et al: Long-Term Global Threat Assessment: Challenging New Roles for Emergency Managers. (Appendix 1)
- Travis J: Hurricane Katrina: Scientists' Fears Come True as Hurricane Floods New Orleans. Science, 9 September 2005, Vol 309, pp. 1656-1659.
- Cooper C, Block R: Disaster: Hurricane Katrina and the Failure of Homeland Security. 2006, New York, Times Books.

- Federal Emergency Management Agency: NMSZ Catastrophic Earthquake: Memphis Scenario. 2008, Washington, DC (Note, exact title needs to be checked)

The Bissell and FEMA readings are the core readings for this unit; the others add considerable depth and the reality that comes with recent history. All of these readings provide both crucial information and reinforce the concept that catastrophic events have antecedents that can be identified and, in some cases, mitigated. At the very least, students should come away from the readings and discussions with the concept that the causal factors leading to many catastrophes can be recognized early enough to plan and prepare for responses that are based on the realization of the hypercomplex character of catastrophes.

Slide-by-slide Comments and Notations

Session 2 Introductory Slide

Instructor should remind the students that most experience with catastrophes has been historical and outside of the United States. For this reason many of the examples will come from outside of the country, but the principles pertain across borders. Students should not expect to be knowledgeable about catastrophes, because these events are infrequent. They should, therefore, enter into this unit with open minds.

Principles of Disaster Response Planning – 1 and 2

These two slides review principles and steps that upper division and graduate students in EM should already know. There is no need to belabor the points here, but a quick review is needed in order to juxtapose the following slides on catastrophe response planning. Be sure to emphasize the assumptions.

Catastrophe Response Planning – 1

Now we start the process of examining how catastrophe response planning differs from disaster response planning.

- One of the barriers to considering and planning for catastrophic events is the common mindset that your hazards assessment should focus only on those hazards that are resident in, or particular to the jurisdiction. Many of the hazards likely to result from global climate change cross many jurisdictions and are not particular to any of them. Pandemics are emblematic of events that know no boundaries.
- Most preparedness work has historically focused on rapid-onset events. Many of the historical and future catastrophic events, however, are characterized by a relatively slow onset, even though their actual human toll often supersedes most rapid-onset events. Several slow-onset events are presented in the next sections on past and future potential catastrophes in order to drive this point home. Planning for response to slow onset events presents some advantages logistically, but may require a radically different approach in terms of politics and policies.

Catastrophe Response Planning – 2

This slide makes the point in three different ways that planning and preparedness for catastrophes needs to be a multi-jurisdictional, multi-level effort.

Catastrophe Response Planning – 3

Here are two more points that break the mold of routine emergency response planning.

- The very definition of catastrophe indicates that national resources are stretched or overwhelmed. In the United States we do not normally plan for assistance to come in from outside of the country, but catastrophes are of such magnitude that such considerations must be taken in the planning process.
- The extreme character of catastrophes, including the very fact that pan-jurisdictional, and even pan-national response may be required, means that planning will only be effective if it focuses on the requirements of the specific event type. For example, while planning for response to a pandemic and catastrophic earthquake may have some similarities, the destructive effects and technologies needed to respond are so different from each other that significantly different approaches are needed.

Catastrophe Response Planning – 4

The major point in this slide is that many of the upcoming probable causes of catastrophes are only effectively understood through the findings of on-going scientific work. Familiarity with the sciences, therefore, takes on a much more important role than has previously been assumed in emergency management.

Student Exercise 2-1

The suggested student exercises spread throughout this unit are provided as examples of the kind of discussion or interaction we think would help students work with and internalize the material just covered.

Past and Future Catastrophes: Their Etiologies and Challenges

This portion of Unit 2 moves from abstract concepts to the realities of historical examples of catastrophes as well as likely future threats. We include the word "etiologies" in the title of this section of the unit as an attempt to broaden the multi-disciplinary vocabulary of emergency management students. The word "etiology" comes from the fields of public health and medicine, and means the causes of, and typical pathways of a disease or other pathological state. As such, this is a very useful term for emergency managers looking into the future, who can envision calamities as pathologies with distinct causes, pathways, and consequences. In medicine, knowledge of the etiology of a pathology helps bring understanding regarding where successful interventions can be made.

Middle Ages Black Plague

The Black Plague is an example of a catastrophic event that radically changed European and world history, and is thought of by many historians as a seminal event in changing the role of governments vis a vis the well-being of their citizens. Prior to the Plague few western governments (such as they were) saw themselves as responsible for

protecting their publics from anything except human invaders. Over the many decades of the Black Plague, governments began to engage in both prevention and relief activities, clearly a progenitor of both modern public health and emergency management. For more on this, please see Benedictow, Ole Jørgen: The Black Death 1346-1353: The Complete History. Boydell & Brewer, Ltd, 2004, ISBN: 0851159435.

In this first slide about the Black Plague, it is worth pointing out that the catastrophe was the result of a slow-onset event caused by the introduction of an element that was previously unknown to that society. The same could happen today.

Middle Ages Black Plague – 2

The consequences of this catastrophe are virtually unimaginable in today's social consciousness…loss of up to 70% of the population?

Middle Ages Black Plague – 3

Note in this slide the introduction of mitigation and prevention activities, even though the etiology of the pathogen was not at that time understood.

Little Ice Age in Europe

This was a slow-onset event of 3.5 centuries duration. The effects for any particular locality differed over the years and they differed also from region to region, but they were serious. For more information, please see The Little Ice Age: How Climate Made History. Fagan, Brian: Basic Books, 2000. ISBN: 0465022723

Little Ice Age in Europe – 2

It may be worth noting to students that, while modern society has better heating and food distribution systems, we are just as dependent on favorable weather to grow crops as we were in the 1600s. One of the paradoxical potential sequelae of climate change, as reviewed in the assigned reading, is a rapid-onset ice age, which would likely make it quite difficult to support agriculture and other life-support activities affecting 300 million Europeans. For more about this, please see Appendix 2: An Abrupt Climate Change Scenario and Its Implications for United States National Security, by Peter Schwartz and Doug Randall, on contract to the US Department of Defense, 2003.

Little Ice Age in Europe – 3

Class discussion. In discussing this question, students should be reminded that mass transportation of food over great distances had not yet been developed in 1816. The U.S. was just recovering from the War of 1812. Given limited means, what could governments have done? What potential innovative actions can we see now in hindsight that people could not see clearly in 1816?

Irish Potato Famine

Instructors who are unfamiliar with this tragedy might wish to read up on it in Black '47 and Beyond: The Great Irish Famine, by Cormac Ó Gráda (1999, Princeton University Press, ISBN 13: 978-0-691-07015-5). This catastrophic event was a

combination of natural insult (the potato fungus) and poor decisions made by both the English rulers and the Irish peasants.

Irish Potato Famine – 2

Note that prior to the onset of the blight, Ireland had been occupied by England, and virtually all land was forcibly transferred from Irish farmers to new English landlords, essentially making Irish farmers peasants without land rights. The new landlords demanded the planting of wheat and oats crops for export to England, diminishing the land available for Irish agricultural self-sufficiency, thus placing the Irish population in a position of significantly enhanced vulnerability.

Irish Potato Famine – 3

In this slide, students see that the potato blight was confounded by British demands and mismanagement, as well as even more increased pressure from nature in the record-cold winter.

Irish Potato Famine – 4

In this slide we see that the affected Irish population made both reasonable and deadly poor decisions in their desperation. Huge numbers of starving peasants left the country by whatever means was available, often to North America or Australia as indentured servants, with a significant percentage of them dying while underway. Those who remained behind made the fatal mistake of once again planting potatoes as their primary subsistence crop. Students may read into this history some conclusions about the willingness or ability of desperate populations to make rational decisions and take helpful actions to enhance their own survival in situations of catastrophic losses. The effects of malnourishment on brain function are well known and may be considered when making decisions regarding response and recovery operations for populations facing starvation.

Irish Potato Famine – 5

The numbers presented in this slide are both horrendous, and, at the same time only barely describe the suffering from this event. The suggested class discussion questions hit squarely at the human element in converting this natural disaster into a true catastrophe.

The 1918-19 Influenza Pandemic

The difference between an epidemic and a pandemic is that the epidemic has limited geographical reach, while a pandemic has worldwide spread (even if not all regions are affected equally). Influenza is a viral disease that typically has annual outbreak cycles, with each year's outbreaks generally affecting people who had no previous experience with that particular version of the virus (or one similar to it). The virus that caused the 1918-1919 pandemic was genetically different enough that virtually no one had immunity to it. The disparity in fatality numbers is due to the poor recording of death statistics in many countries at that time, exacerbated by the destruction and disorganization that resulted from World War 1.

1918-19 Influenza Pandemic – 2

For more information on this catastrophe, please see Flu: The Story of the Great Influenza Pandemic of 1918 and the Search for the Virus that Caused It. Kolata, Gina: Simon and Shuster, 2001. ISBN: 0743203984.

1918-19 Influenza Pandemic – 3

In the United States, clinical care facilities were rapidly overwhelmed, as were also mortuaries and morgues. Alternate care sites were set up in several East Coast cities, but throughout the country many people chose to suffer at home rather than go to a huge ward of the very sick. Many jurisdictions in the country established social-distancing rules and forbad gatherings of people. Some jurisdictions also attempted, some successfully, to isolate themselves entirely from outsiders. Note that some characteristics of life in the U.S. during that time enabled people to do what might be very difficult or even impossible today, namely, essentially isolate oneself from outsiders during the peaks of the disease. During that time period food came from nearby, and many, if not most people had stores of food they had "canned" from their own gardens. The economy was more organized around local production and consumption, making it more robust in face of vast worker absences or deaths. Today's economy is much more centralized and interdependent, with widespread use of "just in time" delivery models of crucial resources. This makes the entire economy much more vulnerable to disruptions in critical functions, which is exacerbated by a very large percentage of the population not having a self-sufficient storage of basic foodstuffs. It is not inconceivable that a pandemic could result in widespread hunger and a significant temporary disruption of the monetary economy, in addition to the already horrendous suffering and loss of human life.

Hurricanes Katrina and Rita

While it is, perhaps, debatable as to whether Hurricane Katrina and its aftermath qualify as a catastrophe, we add it here as a large event with many catastrophe-like characteristics, one that resides in the collective memory. It is important that students read the Cooper book on Katrina prior to this discussion in order that they may gain an organized understanding of the various causes of the response going so badly, including the overwhelming character of some aspects of the events, poor understanding by federal authorities of their own planning documents, poor relationships between levels of government, poor local preparedness, power plays and interference with incident command at many levels, and misunderstandings among the public as to what government would or could do.

Katrina and Rita – 2

This slide indicates 2 of the ways in which these storms had catastrophe-like characteristics.

Katrina and Rita – 3

It is important to note in this slide that, in NOLA, local decisions made a huge difference in difficult the situation would ultimately become.

Katrina and Rita – 4

Katrina hit 4 states and the federal response to all 4 was confused, at least initially. However, in Mississippi, Texas and Alabama the response coordination became increasingly better, whereas it did not in Louisiana for quite some time. This demonstrates the importance of that middle level of response…the state…in bringing about a well-coordinated response.

Katrina and Rita – 5

One of the characteristics of catastrophes is that they have long-term effects, one of which is that many catastrophes will provoke significant out-migration.

Katrina and Rita – 6

This discussion is intended to have two effects:

- It will push students to apply theoretical constructs related to catastrophes to a real event about which there is significant information, and
- It will help students to start to comprehend the level of complexity of catastrophic events. You can help them achieve this by encouraging the students to discuss how many facets of social and economic life were affected by the 1-2 punch that was Katrina and Rita.

2.4 Potential Future Catastrophes – Sea Level Rise

This section starts the discussion of potential future catastrophes. We present here only a few of the numerous potential events. The focus in this section is to:

- Familiarize students with some of the event types whose causal factors are already in progress and visible,
- Get students used to thinking of catastrophes that have a continuum, including, for many, a lead-on time that allows for mitigation and preparedness, and
- Expose students to the reality that hypercomplex events also have hypercomplex etiologies, and that understanding those etiologies provides opportunities for intervention at various points both pre- and post event onset.

Sea level rise is an excellent example of a slow-onset event, which we can see now underway in the daily news.

Sea Level Rise – 2

Sea level rise is both a direct threat and an indirect one. This slide addresses the two direct threats…the ocean will flood areas that are currently populated, and it will contaminate the ground water of many areas that are close to the new coast line but not yet flooded. In the first case populations will have to migrate or drown; in the second they will lose significant agricultural productivity in a world that is already moving toward food inadequacy. Island countries are particularly hard hit, as many of them are low-lying and have no where else to go. If authorities can manage peaceful out-migration to another country, the loss of the island might be a significant inconvenience, but if peaceful migration is not allowed, the situation could become catastrophic. More than 300 million people are estimated to live within the 1-meter flood zone. Please note

that many European planning agencies are now setting their planning targets based on the assumption of a 5-meter (15+ foot) sea level rise.

Sea Level Rise – 3

An indirect result of sea level rise is that storm surges will have deeper reach into populated areas. This comes at a time when climatologists are predicting increasingly powerful storms. This raises the fear that Katrina-like events could become commonplace. Either way, mass population relocation will be an inevitable result of the sea level rising, and it won't just be people moving around within their own countries.

Drought and Desertification

This is another natural event that we can see coming…the process is already underway and is well documented. Photos from sites of new desertification can really help students see this as a reality.

Drought and Desertification – 2

This is a problem in many parts of the world, and, if Darfur is any example of the human response to drought and desertification, conflicts over increasingly scarce arable land may prove as dangerous as starvation. The rapid loss of underground aquifers adds to the consequences of drought, in many places removing future options to irrigate land that is dry on the surface. The drought in the American Southwest could lead to radical relocation.

Drought and Desertification – 3

From a global perspective, climate change-generated drought in the American Midwest could prove far more catastrophic than the loss of Lake Meade, because hundreds of millions of people around the world directly or indirectly depend on grains from the American breadbasket, even in normal times. As global warming decreases crop yield in many parts of the world, each source of grains will become that much more important. What skills do emergency managers have that could help contribute to efforts to minimize the effects of drought and desertification?

Drought and Desertification – 4

Population relocation is a recurring theme when one studies catastrophes. This slide presents an opportunity for students to recognize that some of the challenges brought by catastrophes, such as mass population movements, can stem from many different kinds of event. When we start to recognize the similarities between event types we can start the process of devising plans that can serve numerous scenarios. There is a session later in this course devoted entirely to mass relocation.

Global Pandemic

The scenario of a pandemic presents a real challenge to both senior and student emergency managers. This is partly because emergency managers tend to have shallow understanding of the science behind disease control. The scenario also runs counter to the more frequent disaster events, in which some outside force damages physical structures and hurts humans in the process. In the pandemic situation, the physical

infrastructure is not destroyed, but humans are the locus of damage. The pandemic session later in this course helps students learn more about the basics of disease control, and suggests meaningful ways in which emergency managers can contribute to improving the outcome from a pandemic.

Global Pandemic – 2

One of the challenges in a pandemic is that the functioning of the human-built organizational infrastructure will be severely effected, including perhaps some basics like the transport and distribution of food and other basic commodities. The medical system we depend on to take care of sick people will be rapidly overwhelmed, making it necessary to make really tough choices. It is not inconceivable that even basic public safety and security will become challenged.

Global Pandemic – 3

This slide helps illustrate the enormity of impact that a pandemic could have, meant to impress students with the reality that pandemics represent a threat type that must be taken seriously, and which can only be successfully addressed with a high degree of cooperation between scientific disciplines and the helping and public safety professions. For the class discussion question, you may want to refer to Bissell RA: "Public Health and Medicine in Emergency Management". Chapter in *Disciplines and Disasters in Emergency Management: The Convergence and Divergence of Concepts, Issues and Trends from the Research Literature.* David McEntire, ed. John Wiley and Sons, 2007.

New Madrid Mega-Earthquake

It is important that the students read the assigned reading on the New Madrid scenario, as it will provide an important anchor here and plays a key role later in the course. This scenario is one of FEMA's major planning points for catastrophic preparedness in the United States and has been vetted from many angles as being quite realistic. We believe all EM students should be familiar with this scenario before they graduate!

New Madrid Mega-Earthquake – 2

What converts this event into a catastrophe is the combination of the size of the event (magnitude), the lack of appropriate building codes or building designs, and the important roles the area plays in the national transportation network and economy.

New Madrid Mega-Earthquake – 3

The core message in this slide is that the damage and disruption would be so widespread that 1) the entire country would be affected, and 2) local mutual aid compacts would be of little use. Response would require a different kind of thinking and unconventional approaches to logistics.

New Madrid Mega-Earthquake – 4

In this slide we see some of the core characteristics of a catastrophe: health impacts well beyond regional capabilities, economic impacts that have both national and international consequences, and damage that is so severe that people migrate out of the

region in order to survive. Students should start looking at this scenario from the perspective of ALL the resultant needs that would have to be addressed, ranging from basic survival resource provision, to health care, social services, monetary and economic systems, law enforcement, transportation, energy supplies, and, among everything else, prioritization. An instructor could choose any one of these issues for deeper discussion in order to illustrate the "hypercomplexity" of catastrophes.

New Madrid Mega-Earthquake – 5

This discussion is designed to push students to consider the on-the-ground local emergency manager perspective. The question is left vague ("when faced with such a catastrophe") on purpose, so that the instructor or students can address it from either the perspective of an event that has just occurred, or an event for which emergency managers are still in the planning/preparedness stages.

2.5 Factors Common in Catastrophes

With this summary of factors common in catastrophes, we want to take the students back up to the conceptual level. This summary should help students internalize their own working definition of "catastrophe", and begin to realize what a gargantuan task it is to prepare for and respond to such events. The points made in this final section of Unit 2 also provide excellent material for exam questions!

Perhaps the most important two points on this slide are the ones that break the stereotypes of sufficient government leadership in any kind of event, and that high-impact events are of the rapid-onset type.

Factors Common in Catastrophes – 2

All three points in this slide point to the need for emergency management, as a profession, to start thinking and working well outside of the parameters that have become "normal" in the last 25 years or so, if we are going to be useful in protecting our populations in the face of upcoming catastrophes.

Factors Common in Catastrophes – 3

The first point on this final slide for this section cannot be overemphasized. If emergency managers are going to serve a role of bringing order to hypercomplex events, they will need to be conversant with at least a basic level of the sciences that inform us of the etiologies of the phenomena that lead to catastrophes. The second point seems self-evident but is needed anyway, making sure that students recognize that we cannot expect good results to come out of poor response management.

Session 2 Class Exercise and Class Exercise Questions

Split the class into working groups of 5 to 7 students each. If time is short, you may want to choose selectively among the questions for students to address.