

Article

Emergency Managers Confront Climate Change

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Received: 18 July 2011; in revised form: 12 August 2011 / Accepted: 15 August 2011 /

Published: 19 August 2011

Abstract: Emergency managers will have to deal with the impending, uncertain, and possibly extreme effects of climate change. Yet, many emergency managers are not aware of the full range of possible effects, and they are unsure of their place in the effort to plan for, adapt to, and cope with those effects. This may partly reflect emergency managers' reluctance to get caught up in the rancorous—and politically-charged—debate about climate change, but it mostly is due to the worldview shared by most emergency managers. We focus on: extreme events; acute *vs.* chronic hazards (floods *vs.* droughts); a shorter event horizon (5 years *vs.* 75–100 years); and a shorter planning and operational cycle. This paper explores the important intersection of emergency management, environmental management, and climate change mitigation and adaptation. It examines the different definitions of terms common to all three fields, the overlapping strategies used in all three fields, and the best means of collaboration and mutual re-enforcement among the three to confront and solve the many possible futures that we may face in the climate change world.

Keywords: emergency management; environmental management; climate change adaptation; resilience; sustainability

1. Introduction

Emergency managers will have to deal with the impending, uncertain, and possibly extreme effects of climate change. Yet, many emergency managers are not aware of the full range of possible effects, and they are unsure of their place in the effort to plan for, adapt to, and cope with those effects. This may partly reflect emergency managers' reluctance to get caught up in the rancorous—and

politically-charged—debate about climate change, but it mostly is due to the worldview shared by most emergency managers.

The literature regarding climate change is replete with discussions linking climate change and risk assessment, risk management, disaster prevention, and disaster response [1-4]. All of these activities are integral to what an emergency manager does every day, yet these discussions do not really address the plight of the emergency manager (especially local emergency managers) in managing all of this. A few examples will illustrate this point.

The Integrative and Collaborative Climate and Energy Initiative in South Florida is a coalition intended to develop adaptation and mitigation strategies to prepare for and mitigate climate change effects. This is a collaborative effort with stakeholders at the national, state, and local levels. Their program description includes a few references to emergency management, but no greater weight is given to it than to any of the other adaptive strategies discussed [5].

A 2007 survey of local emergency management organizations in Australia mentions climate change only once [6]. A slightly earlier study of land use planning and risk mitigation notes that the problem of impending climate change was raised by study respondents (but not by the study authors), and it discusses the matter as a land use issue, not an emergency management one [7].

Global Warming, Natural Hazards, and Emergency Management [8] describes a number of hazard mitigation efforts in communities (Wilmington, NC; Deerfield Beach, FL; Freeport, NY, USA) using FEMA Hazard Mitigation Grants to mitigate various types of hazards (mostly floods and hurricanes). As useful and instructive as these case studies are, they took place in the 1980s and up to 2002, and the actions were not strictly driven by climate change. These efforts involved extensive community involvement, with emergency managers as but one of the many stakeholders taking part in the process.

The *World Disasters 2010 Report* specifically links local adaptation to climate change with disaster risk reduction and calls particularly for adaptation and disaster risk reduction that meets the needs of the urban poor. However, Table 6.3 of the document (“Examples of climate change and disaster preparedness goals and actions”) identifies 30 actions—grouped into Water Supply, Storm/flood-water Management, Public Health, Energy, and Transportation—that are well outside the purview of most local emergency management organizations (pp. 125-129 [9]). A 2010 review of the Italian emergency management system mentions climate change only in three brief, widely-separated paragraphs [10].

As a counter-example, the Province of Ontario Canada notes the need to increase its adaptive capacity and has specifically included emergency management in its planning for dealing with climate change effects: “Climate change is a crucial variable to be accounted for in the ongoing development of Hamilton’s Emergency Management Program” [11]. Even the *Stern Review* notes that “Improving disaster preparedness and management saves lives, but it also promotes early and cost-effective adaptation to climate change risks” (p. 491 [12]). A guidebook for governments preparing for climate change specifically mentions including emergency management in the planning group [13]. A recent article urges that emergency management perspectives and input be specifically incorporated by policy makers in planning for climate change [14].

All of these examples evoke a number of questions. Do emergency managers have a solid knowledge base and a clear understanding of how climate change will impact their daily work? How do emergency managers assimilate, organize, and make effective use of all of the information available on climate change effects? What are the roadblocks (institutional and experiential) that may frustrate

the best application of the emergency management process to climate change adaptation? And finally, how do emergency managers meld the techniques of both emergency management and environmental management to enhance the community's ability to cope with climate change?

There are relatively few studies or surveys that address the attitudes and perceptions of emergency managers e.g., [15-17]. They concentrate, for the most part, on emergency managers' demographics, educational attainment, length of experience in the field, attitudes toward professionalization of the field, and on the cultural and institutional barriers that they may face in carrying out their duties. These studies only indirectly address the issues raised in this article. I have been an active practitioner in the field of emergency management for more than 30 years. My observations about how emergency managers view the world are based on that experience and upon discussions I have had with emergency managers throughout the U.S. and in other countries.

2. Definitions

Before we go too much farther, some definitions would come in handy here.

2.1. Mitigation

According to the *Emergency Management Glossary of Terms*, *mitigation* consists of activities that reduce or eliminate the probability of a hazard occurrence, or eliminate or reduce the impact from the hazard if it should occur [18]. Emergency managers are generally comfortable with this definition, and they have begun to accord it the same importance in their world as preparedness and response.

In the environmental management field, *mitigation* includes not only preventing impact but also reducing the magnitude, protecting critical areas/resources, restoring what gets damaged, and/or creating equivalent resources to replace what was lost. It is a bit more expansive concept and can include: avoiding the impact by not taking a certain action; minimizing impacts by limiting the degree or magnitude of the action; rectifying the impact by repairing or restoring the damaged resources and compensating for the impact by replacing or providing substitute resources.

For climate change, *mitigation* means only one thing: "An anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases" [19]. That is, mitigation consists of actions taken by individuals, corporations, or governments to reduce the greenhouse gas emissions in order to minimize their effects on global climate change. It is important not to confuse this with adaptation, which is much closer to what emergency managers mean by mitigation. In point of fact, emergency managers are generally not in a position to take a leadership role in climate change mitigation.

2.2. Adaptation

I have used the IPCC definition for this paper: "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" [20].

2.3. Adaptive Capacity

“Adaptive capacity is the ability or potential of a system to respond successfully to climate variability and change, and includes adjustments in both behaviour and in resources and technologies” [19]. This term refers to a society’s ability to adapt to changing climatic conditions, whether by reducing harm, exploiting beneficial new opportunities, or both. This ability to adapt, whether to changing climate or other new circumstances, is in part a function of a society’s level of wealth, education, institutional strength, and access to technology.

Elements of adaptive capacity include: abundant natural resources and economic surplus; strong governmental or social institutions guided by good governance and transparency; robust infrastructures; experience with natural disasters; and (perhaps most important) strong social protection and social transfer mechanisms. All of these elements are beneficial and desirable in themselves. They make it easier for a community or a society to adapt more easily to any kind of changing condition. Experience in coping with natural disasters is especially important in that the community can (and should) learn from that experience and be in a better position to deal with future disasters.

The nature and the extent of a society’s development heavily influence both its degree of vulnerability to climate risks and its capacity to adapt. Important aspects of the adaptation discussion are the inherent characteristics and institutions of a society or community that provide stability, encourage innovation, and allow it to meet new challenges and changing circumstances.

2.4. Resilience

One often sees the terms *resilience* and *adaptive capacity* conflated or used interchangeably. *Resilience* refers to the ability of a community to remain strong or unharmed, and/or to be able to quickly and effectively recover from a disaster’s impact upon its infrastructure, economy, social and natural environment. Both adaptive capacity and resilience are related to and depend upon the amount and diversity of social, economic, physical, and natural capital available. They depend on the social networks, institutions, and entitlements that govern how this capital is distributed and used [21,22]. Resilience includes an element of learning from past experiences and applying those lessons to future plans and activities. Put another way:

Resilience captures what should underpin holistic risk management. By this we mean a paradigm that includes adaptation to climate change, hazard mitigation and sustainable human development Resilience does not focus on what is missing in a crisis (needs and vulnerabilities) but on what is already in place (resources and adaptive capacities) (p. 71 [3]).

With these definitions and caveats in mind, we can examine how emergency managers see the world and their place in it.

3. The Emergency Manager’s World View

A report prepared for the Rockefeller Foundation enumerates some of the policy issues communities may face in dealing with climate change effects:

These communities may need changes in strategies and policies related to land use planning and zoning regulations, environmental laws, building codes, tax/insurance incentives such as business interruption insurance and homeowner's insurance, and coastal wetlands rehabilitation. In addition, communities may need to review and change water resources strategies and flood plain management ... communities with combined sewer systems may face an increase in sewage overflows and associated waterborne disease outbreaks as a result of flooding (pp. 12-13, [23]).

A local Emergency Manager who takes this list of requirements seriously would have to coordinate with city and county planning departments, zoning boards, Federal and state environmental protection agencies, state and local building code enforcers, state and local legislative bodies, private insurance companies (and the state Insurance Commissioner), the US Army Corps of Engineers, drainage and water utilities/districts (which may be independent government or private entities), and state and local health departments. Emergency managers who try to make and foster a wide range of relationships such as these can find themselves running up against jurisdictional barriers, not to mention limits on their time and resources.

Emergency managers differ in jurisdictional affiliation, background, educational specialization, level and type of experience, exposure to different hazard sets, and many other characteristics. Yet they generally share an outlook and mindset that may make climate change less salient for them. Elements of that mindset include:

- A focus on extreme events—hurricanes, extensive floods, severe winter storms, earthquakes, technological disasters.
- An “all-hazards” approach to preparing for disasters—climate change may be just one more to add to the list, neither more nor less important than the others.
- Concentration on acute *vs.* chronic hazards (serious floods *vs.* slow-growing and persistent droughts).
- A shorter event horizon (5 years *vs.* 75–100 years).

O'Brien, *et al.* [3] states “Although the all-hazards approach to risk management concentrates on the near future, typically up to 10–15 years, with established institutions and capacities it may be possible to stretch out the model to accommodate the much longer time horizons for climate change: 50–100 years”.

This rather overstates the ability of emergency managers and emergency management organizations to see more than a few years into the future. For them, the “near future” is much less than 10–15 years.

- A shorter planning and operational cycle—depending on circumstances, the cycle of Mitigation, Preparedness, Response, Recovery could take as little as 2–5 years. Full recovery from a large disaster can take decades, but much of the long-term recovery process is taken over by elected officials, planning commissions, special recovery planning commissions. Generally speaking, the emergency management planning and operational cycle is tied to the much shorter budget cycle.

Emergency managers are constrained by the boundaries of this worldview. The emergency manager's consistent focus is “Will current plans, actions, and mitigation make things better during the next flood (storm, earthquake, hurricane, *etc.*)?”

An interesting debate has arisen in the emergency management field regarding the nature of climate change and its impact on how emergency managers operate:

- “Climate change is a wholly new threat/hazard and thereby requires a unique set of responses.”
- “Climate change only makes existing hazards worse (in terms of severity, duration, geographic spread, *etc.*) and does not require special or novel adaptations.”

Regardless of which side one favors in this debate, it is quite clear that climate change poses a considerably enhanced set of problems for emergency managers. Packed within this debate is a more salient question: When does “emergency” become “business as usual”? When problems move from being acute hazards to being chronic conditions, where will emergency managers concentrate their efforts and resources? What will emergency managers be expected to do, what will they be responsible for, when the extreme and the unlikely become normal and commonplace?

Emergency management plans and programs are based on a Hazard Identification and Vulnerability Analysis (or equivalent) that is prepared for a specific community or geographical area. Thus, historical experience of hazards and disasters drives emergency managers to focus on certain hazards, with a certain frequency, and certain expectations regarding what is likely to happen. This in turn drives decisions on funding, staffing, and resources. Can we rely on past experiences as a guide to the future where climate change is concerned?

As climate change alters the magnitude and frequency of extreme events it is important to recognize that coping and response mechanisms and economic planning for disasters, based on past vulnerabilities, may no longer suffice for what is to come. Indeed, in many countries, these existing mechanisms are already insufficient of the current level of vulnerability (p. 9, [24]).

Climate scientists are comfortable with the issue of uncertainty in research results, and they address it specifically in all of their models and analyses. The wide range in estimates of possible climate change effects, timing, intensity—not to mention the lengthy time scale over which these might happen – are of great interest in scientific debates. Emergency managers, however, must deal with budget and planning processes that require hard numbers and clear (sometimes spuriously so) predictions. Emergency managers will find it difficult to make planning and investment decisions regarding adaptation to climate change when faced with questions for which there are, as yet, few clear and definitive answers. For example:

- Will we have floods or droughts?
- Will it be too hot or too cold?
- Will there be higher intensity rain storms over a shorter period of time?
- Will extreme weather events happen more often with less time (for recovery) in between?

Uncertainty will also play into adaptation decisions in the private sector, as people weigh the costs and benefits of investment in climate-proofing the built environment. Stern points out that “there will be little financial incentive for developers to increase resilience of new buildings unless property buyers discriminate between properties on the basis of vulnerability to future climate” (p. 467, [12]). On the other hand, how will prospective purchasers or developers factor in a 100-year flood (or other extreme weather event) if they plan to occupy the property for only 5–10 years?

I asked 10–12 of my colleagues in emergency management around the US (public and private sector), “What are you—as an emergency manager—doing about climate change?” Their responses generally fell into the following types:

- “Hmmm...interesting question. I should think about that.”
- “I haven’t got time – I’m worried about next flood season.”
- “I haven’t got the budget (staff, resources, mandate, etc.) to deal with climate change.”
- “The Department of _____ is responsible for that.”

I make no claim that this is a representative sample, but these answers are illustrative of the position that emergency managers often find themselves in: climate change is either somebody else’s problem or an issue that will have to wait for a later date to be addressed.

4. Adaptation vs. Economic Development

The emergency management function in a community does not exist or operate in a vacuum. It is part of the community’s life, economy, and development. It contributes to, and is supported by, the level of socio-economic development enjoyed by the general society in which it is embedded. Thus, emergency management will find itself somewhere within the range of adaptation activities bounded by two distinct approaches to coping with climate change: adaptation or sustainable economic development.

Adaptation Approach—adaptation is carried out in response to the observed and experienced impacts of climate change on society (including ecosystems). These responses ensure that the vulnerability to the impacts is reduced. This in turn ensures that less is lost each time a climate-related hazard occurs, which means risk is reduced and development can be more sustainable.

Sustainable Economic Development Approach—development processes help reduce vulnerability to climate change. By reducing the vulnerability, impacts of climate hazards are also reduced, as there is less sensitivity and exposure to the hazards. This translates into a process of adaptation to climate change [25].

Figure 1 illustrates the continuum bounded by these two approaches and shows how emergency management fits within the types of activities involved. The emergency management function has traditionally focused squarely on the two middle blocks, seeking to enhance the ability of the community to respond to disasters and emergencies by building planning and response capability, by training and education, and by gathering and using the most current and credible information on risks, hazards, planning methods, and response processes. It is vital that emergency managers make every effort to incorporate information on climate change effects into their plans and procedures.

Emergency management, environmental management, and adaptation will succeed in such measure that they contribute—individually and in concert—to the development and improvement of institutions, resources, and infrastructures within the community.

5. The Emergency Management—Environmental Management Nexus

The disciplines of environmental management and emergency management share many of the same concepts, issues, processes, and concerns. Parts of environmental management include risk assessment, hazard identification, spill response, and emergency/contingency planning—all activities that are central to the practice of emergency management. Other parts of the field address such issues as water quality, protection of flora and fauna, and general health of the ecosystem—all of which may be affected by decisions and actions taken in the pursuit of emergency management.

Integration of both preparedness and environmental considerations into the adaptation to climate change effects can exploit the considerable overlap between environmental management and disaster management. Planners and practitioners in both fields must recognize that the overall objectives of these fields implicitly promote sustainable communities. Sustainability should be considered both prospectively (in sustainable development planning and adaptation) and retrospectively (in response and recovery). Areas of fruitful interaction between the two disciplines include:

- Identifying enhancements to environmental assets/resources that support adaptation (e.g., enhancement of ecosystem elements, habitats);
- Identifying development options for environmentally sensitive areas that may serve to mitigate future disaster damage (e.g., creation, enhancement, or preservation of wetlands, mangrove swamps, and coral reefs for flood mitigation);
- Identifying and reconciling the tradeoffs between environmental enhancement opportunities and disaster-resistant construction and development practices (e.g., siting of dikes/levees; identification and pre-approval of waste disposal methods/sites);
- Identifying development techniques and practices that contribute to both environmental quality and long-term survivability (e.g., siting of industrial sites; stricter environmental management requirements for environmentally-risky facilities) [28].

Both environmental management and emergency management can contribute concepts, skills, processes, and worldviews that will make significant contributions toward maximizing the effectiveness of climate change adaptation efforts. The two disciplines can cooperatively seek solutions that will enhance environmental quality as well as meet the needs of disaster preparedness and recovery by identifying and implementing strategies that combine disaster risk and vulnerability reduction, post-disaster recovery, environmental sustainability, and community survivability.

6. A Seat at the Table

It is vital that emergency managers take an active part in all aspects of planning for and implementing climate change adaptation. Disaster preparedness is, after all, one (of many) accepted adaptation strategy. For emergency managers, mitigation and adaptation are essentially the same thing—there is no need for a radical shift in thinking or concept. Emergency management should be

part of the adaptation conversation—perhaps most effectively in the scoping phase—to help identify synergies and multiple positive outcomes. Emergency management insights and recommendations would be equally important in the post-disaster recovery phase, helping to establish criteria for what gets rebuilt or restored where and in what manner. This would be most useful in defining and establishing a “new normal” that meets both adaptation and preparedness requirements.

Emergency managers can be most supportive of efforts toward enhancing resilience and sustainable development, and emergency managers would certainly support so-called “no-regrets” adaptation strategies—adaptation programs and activities that enhance development and emergency management goals even if climate change effects never happen. These all do (or could) increase a community’s ability to recover from, or be less affected by an extreme event. While specific adaptive projects would not be ignored or rejected by EMs, those that contribute to a greater capacity or resilience would be favored.

Emergency managers would also favor “mainstreaming” *i.e.*, integrating emergency management goals, objectives, and initiatives into overall community planning and development. This is often more a matter of funding than philosophy—funds are limited, and multiple-use (or multiple-benefit) projects would receive the most support from decision-makers. In addition, multiple-use projects can expand the pool of stakeholders and/or politicians whose standing in the community may be enhanced by promoting them.

There are certainly barriers to the most effective interaction of emergency managers in the climate change adaptation discussion. Funding mechanisms and budget cycles do not encourage the long (or wide) view necessary for effective planning and engagement in the adaptation process, especially in the context of uncertainties inherent in climate change projections. Emergency managers are generally not consulted by the agencies that develop environmental regulations, land-use regulations, or building codes, even though all of these would be instrumental in furthering adaptive strategies. Emergency managers tend to focus on infrastructure and the built environment while climate change remains within the purview of environmental protection agencies.

Also, it is not clear that emergency managers are perceived as stakeholders in the process of adaptation planning and implementation. This is no doubt due to the way that local governments have formed and developed over the years, and to the way that emergency management organizations have grown up within them.

That various local political systems evolved without reference to the problem of climate change is inherently obvious. They have not always evolved even in reference to existing and widely recognized public policy challenges, such as air pollution, groundwater protection, or regional transportation efficiency. Planning thus faces a serious challenge almost everywhere in the United States in finding ways to coordinate meaningful responses to the need to reduce the potential impacts of climate change. Some of the methods of mitigating those impacts fall directly within the realm of one local government or another; others may require a good deal of political persuasion and regional cooperation in order to make a difference [8].

Although regional planning initiatives have begun to gain traction in the emergency management community, obstacles remain to the effective integration of emergency planning into the general model of planning activities at the state and local levels.

The biggest [obstacle] is that both FEMA itself and the state agencies that handle emergency management duties and relate to FEMA in the national chain of command have grown up in a culture built originally around civil defense and, subsequently, around emergency response. Historically, only a modicum of interdisciplinary communication has taken place between these people and urban and regional planners, who have concerned themselves more with land use, urban design, transportation, and economic development, and only occasionally, or under the pressure of unexpected events, with natural hazards [8].

Still, there is hope. One may be forgiven a muted cheer when Satterthwaite says:

... there is also an obvious need to draw on the “disaster-preparedness” community of scholars and activists who have transformed our understanding of what causes disasters and the extent to which “natural” disasters are preventable (because the actual disaster is so much to do with inadequate planning and infrastructure and lower-income groups having no alternative but to live in high risk areas). It is surprising that they have not had a more central role in [climate change] adaptation, given how much they can contribute to understanding the possibilities and constraints on adaptation that reduces risks from disasters [29].

7. Conclusions

Reaction to climate change remains largely in the purview of the environmental (and political) community. Climate change is not (or at least not yet) a primary emergency management concern—effects, yes; causes, no. Emergency managers deal with acute, not chronic, problems, and they generally do not deal directly with underlying problems/issues related to climate change adaptation and sustainable development. Emergency managers would support climate change adaptations, but they would not generally take the lead.

How, then, do we foster the convergence of emergency management, environmental management, and climate change adaptation? Practitioners in all three disciplines must recognize that their interests and goals overlap—the preservation and continuity of ecological, human, and built environments to the maximum extent in the face of climate effects. Practitioners must demand an equal and substantive role in comprehensive planning for climate change adaptation, and they must equally strive to eliminate artificial distinctions among emergency planning, environmental planning, and comprehensive planning.

A United Nations Environment Programme report specifically links environmental degradation, development effects, and disasters and notes that:

... the role of environmental managers in disaster reduction, response or recovery has so far been ad hoc. Likewise, disaster managers have given little attention to the environmental aspects of their work and should regularly be engaged in environmental programs as partners....Key options for improving how institutions address environment and disaster-related issues include fully engaging environmental managers in national disaster risk management mechanisms, and incorporating risk reduction criteria in environmental regulatory frameworks [30].

This statement is an excellent starting point, and it needs to go farther. All comprehensive planning, land-use planning, and economic development strategies must include, and be informed by,

considerations of climate change adaptation, emergency management, and environmental management.

From the emergency manager's viewpoint, I would assert that funds and resources invested in adaptation to extreme events (floods, hurricanes, tsunamis, heat waves, *etc.*) will produce more adaptive benefits, more quickly, and for more people than investment in long-term adaptation to chronic problems (drought, sea-level rise, *etc.*). Taking a wider view, mainstreaming of adaptive strategies (including preparedness goals and needs) into development efforts and pursuing "no-regrets" adaptive strategies may be the best and most cost-effective path to success. Doing so could lead to immediate benefits and could thereby lend credibility to longer-term adaptive efforts.

The concepts and practices of environmental management, emergency management, and adaptation overlap significantly, and the intersection of these three areas clearly is where true resilience lies.

Acknowledgements

Portions of this paper were presented at the IDER Conference in Florence, Italy on 14 April 2011 and at the Partners in Emergency Preparedness Conference in Tacoma, WA, USA on 26 April 2011. I am grateful to the participants in both conferences for their comments and suggestions in improving this paper.

Conflict of Interest

The author declares no conflict of interest.

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