training that reflects the linkage between hazard mitigation, community planning, and sustainable development. This does not mean that all public administrators should be cross-trained as emergency managers, but rather that emergency management should be a component of their professional education. It should include a focus on the value of mitigating hazards in a sustainable way as a critical and necessary component to community planning and development generally.

Professional training must broaden the understanding that the assessment of hazard potentials and the mitigation against their potential impact is connected to the making of a series of choices that impact the economic, physical, and social well-being of the community. Given the efforts to refocus emergency management on sustainable hazard mitigation, it is not surprising that the need for such training has been increasingly recognized as a priority in the United States.

At a very basic level, disparities still exist in local emergency management capabilities across the U.S. According to the National Academy for Public Administration (NAPA) (1993), these disparities are directly connected to the lack of emergency management knowledge and the lack of understanding of intergovernmental problems in emergency management. One of NAPA's major recommendations has been to advocate major improvement in emergency management education and training. On a more advanced level, the linkage of emergency management to sustainability and the emphasis on hazard mitigation has accelerated the need for education and training. FEMA has, in response to this need, initiated a higher education project to promote the creation of emergency management programs in colleges and universities. Below is a statement of FEMA's goal with respect to higher education.

One goal of FEMA is to encourage and support the dissemination of hazard, disaster and emergency management-related information in colleges and universities across the U.S. We believe that in the future emergency managers in government, business and industry will come to the job with college education that includes a degree in emergency management. We also believe that in order to build disaster resistant and resilient communities a broad range of college students and professionals need courses that introduce them to hazards, disasters, and what to do about them (FEMA, 2003).

It is encouraging to note that there is a healthy growth of new undergraduate and graduate degree programs in emergency management.

These are designed not only to provide an understanding of the principles and practices of emergency management, but they represent a growing emphasis on hazard mitigation as well. These programs are interdisciplinary in nature. The emergency preparedness and response phase draws heavily from sociological research findings on human and organizational response to disasters. Hazard mitigation and recovery portions of the curriculum draw heavily from the urban planning discipline. Geography, environmental science, and public administration are also contributing disciplines (Reddy, 2000).

PRINCIPLES AND TECHNIQUES OF SUSTAINABLE HAZARD MITIGATION

By the end of the 1990s, the principles and techniques of hazard mitigation were fairly well-established and broadly known in the United States. They begin with a focus on comprehensive emergency planning or comprehensive emergency management (CEM). CEM reflects a switch in the orientation of emergency management, especially during the 1990s and the James Lee Witt regime at FEMA, from preparation for a single hazard or narrowly defined set of hazards toward an all hazards approach. CEM calls for an integrated approach to the management of emergency programs and activities with each element or program fitted into an inclusive framework that encompasses all hazards at all levels of government. It applies to all risks, natural and manmade, and coordinates local, state, and federal actions across the four stages of emergency activity (mitigation, preparedness, response, and recovery).

Hazard mitigation, as we have seen, is focused on the goal of sustainable communities. Disaster planning before a disaster strikes, and/or a planned recovery process after a disaster, can serve as a catalyst for creating more sustainable communities. Resistance to disaster is thus a critical characteristic of a livable and sustainable community. In the past decade, as sustainable hazard mitigation has become a national priority in the U.S., it has been tied to six basic principles (Mileti, 1999).

First, a guiding principle of sustainability is that human activities in any community should maintain and, if possible, enhance environmental quality. In other words, to contribute to sustainability, hazard

mitigation efforts must be linked to natural resource management or its protection.

Second, sustainable communities must define and plan for the quality of life they want for themselves and for future generations. The quality of life, defined in terms of income, health, crime, pollution, disaster, and other risks, is a critical component in the building of sustainable communities. Hazard mitigation planning should be conducted in the context of all other community planning relevant to enhancing the quality of life.

Third, sustainable communities foster local resiliency to and responsibilities for disaster. Each community must take responsibility for identifying, in a comprehensive fashion, its environmental resources and its exposure to hazard risk. This it does not only to prepare to respond to a disaster (remember local governments are usually the first responders), but also to implement the necessary steps to reduce damage and withstand any disaster without significant loss of productivity or quality of life.

Fourth, sustainable communities are tied to vital local economies. This principle suggests that local hazard mitigation must include a diversified local economy that is not easily disrupted by disasters. Sustainable communities are also the product of community planning that insures disaster costs are not shifted to other communities, to at-risk populations within a community, to the atmosphere, or to future generations. This implies effort to calculate hazard risks accurately, distribute their costs fairly, and most importantly the determination to take into account the impact of economic decisions about growth, energy, employment, housing, etc. in relation to sustainability.

Fifth, a sustainable community preserves ecosystems and resources to insure that the cost of today's advances, or the risks they produce, are not passed to future generations. Hazard mitigation in sustainable communities never delays or postpones reasonable action only to pass on increased risk or inevitable disaster costs to future generations.

Finally, the sixth principle of sustainable mitigation emphasizes a consensus building approach involving all people who have a stake in the outcome of hazard mitigation planning activities. The information that can be generated and distributed through this process, the ideas and the sense of ownership that may grow out of broad participation, outweigh the very likely outcome that consensus may be hard to reach. The practical necessity of placing hazard mitigation on the planning agenda of every public and private entity in the community can only contribute to the shaping of a community-wide consensus building effort that elevates sustainability as a primary goal in the broader work of community planning and development.

Just as these six principles have come to be identified with the goal of sustainable hazard mitigation, so too the basic techniques utilized in natural hazard mitigation are well known. These include land use planning, building codes, insurance, warnings, engineering, and new technological approaches (Mileti, 1999). Let us very briefly review these six basic mitigation tools. In so doing, we will emphasize the minimizing of losses form hazards and the connection of hazard resilience to sustainability.

Land use planning involves more efficient use of space. It essentially means development and redevelopment decisions are connected to the preservation or restoration of natural protective features in the community. It also means that disaster resilience is an essential component of local development policy.

Local governments have utilized land use policy in hazard prone areas, but with mixed results. Some have suggested that the absence of federal policy on land use and development in hazard prone areas is a weakness.

Building codes have been widely used to strengthen the built environment in the face of natural hazard risks. Local governments in the U.S. have enacted fairly comprehensive building codes to regulate new construction, and these codes have increasingly reflected hazard mitigation. The model building codes that are readily available and utilized by state and local governments have become more prevalent than custom-drafted codes. These model codes are of excellent quality, but there has been some concern about the quality of the enforcement of these codes. The general concern is that inconsistent or inadequate enforcement efforts have resulted in building codes being less effective than desired. Nevertheless, the awareness that disaster resilient construction is a critical component in sustainable community planning is widespread.

Insurance redistributes losses rather than reducing them. For this reason, it is not really a mitigation measure. But insurance may minimize the disruption that follows a disaster. More to the point, it may encourage people to adopt risk reduction strategies by creating incentives to mitigate as a means of obtaining rate discounts or lower

deductibles.

U.S. flood control policies have emphasized flood insurance, requiring it under some circumstances, in the hope that it would be an effective nonstructural option in the nation's floodplain management. The National Flood Insurance Program was designed to save the government money by using premiums paid by floodplain occupants to fund flood-related disaster assistance. The mandatory flood insurance purchase requirements associated with this program have not always been effectively enforced. Also, critics suggest that insurance may provide individuals with a disincentive to protect their properties against flood damage. The assumption that losses will be covered may work against the initiation of mitigation strategies.

Improvements in prediction, forecast, and warnings are measures that may reduce the loss of life and the injuries associated with natural disasters. They do not necessarily reduce loss to infrastructure or private property. Long-term warnings that identify a threat years or decades off may have an impact on sustainable hazard mitigation as decision makers will have the information and the time they need to design disaster resistant communities. The challenge is to insure that decision makers will take long-term warnings seriously and be proactive in responding to them.

Improvements in the built environment, made possible by good engineering practices, are essential to building sustainable communities. Carefully engineered buildings and structures are not, in themselves, the total answer. To the degree that improved engineering technology encourages more expensive development in high-risk locations, it may lead to a false sense of security rather than real mitigation. Still, engineering codes in the U.S. have evolved to include planning for all natural hazards.

There are a variety of developments in hazard relevant technologies that are available to aid emergency managers in mitigation efforts. Geographic information systems (GIS) have many applications for example. GIS may be used to estimate damage to infrastructure, provide risk information to aid in community land use planning and in building planning, simulate disaster damage to aid in planning, and aid in environmental planning. Computer-mediated communication, remote sensing, decision support systems, risk analysis, all have developed rapidly and show great promise for use in disaster preparedness and mitigation planning.

While technology has advanced, the willingness of some communities to utilize it or their perceived inability to afford it are challenges to be met and overcome. Certainly the potential for GIS and other technological applications in emergency management seems almost unlimited.

The six techniques discussed here are among the most basic and widely used hazard mitigation tools available to a community. Resistance to disaster is a critical characteristic of sustainable communities. It is only through mitigation, planning before a disaster strikes, that sustainability may be achieved. By integrating the concepts of sustainable development into each phase of disaster or hazards planning (mitigation, preparedness, response, recovery), communities can take effective action to eliminate loss of life/property and sustain economic vitality. Hazard mitigation planning, in the context of comprehensive community planning, can help create a safe and sustainable community.

With the progress made in hazard mitigation in the U.S. over the past two decades, and with the growing sophistication of both the principles and techniques associated with sustainable mitigation, it may be tempting to suggest that the effort to make hazard mitigation a national priority has succeeded. To a degree, it has. But we must conclude this analysis with a caution that recent events may interrupt this progress.

CONCLUSION: A NEW CHALLENGE TO SUSTAINABLE HAZARD MITIGATION

With the aftermath of September 11, 2001 and the creation of the Department of Homeland Security (DHS), it is tempting to suggest that emergency management has attained a new level of significance in the U.S. national consciousness. Indeed, the emergence of the profession and the creation of FEMA itself owe much to the national defense mania of the Cold War era. But, if the past is any indication, the national security concerns that periodically increase public awareness and political attentiveness to the emergency management function do not result in a broad commitment of new resources to the full array of possible disasters. Indeed, it might even be suggested that the current national security focus holds as much potential to distract the