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# Using National Financial Incentives to Build Local Resiliency: The U.S. Disaster Mitigation Act

**Kenneth C. Topping**

Topping Associates International  
504 Warwick Street, Cambria, CA 93428, U.S.A.  
E-mail: kentopping@aol.com  
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The U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) which requires adoption of multi-hazard mitigation plans as a precondition of local government eligibility for federal pre-disaster and post-disaster hazard mitigation grants. Its underlying purpose was to encourage local governments to systematically plan for reducing risks and future disaster losses before requesting federal grants to execute hazard mitigation projects. This paper examines the DMA 2000 legislation, its purposes, and the responses to it by state and local governments. Among other things the paper: 1) describes DMA 2000 statutory requirements, 2) assesses overall participation by region, 3) uses the State of California as a case study to examines hazard mitigation plan compliance issues, and 4) explores long-term implications of this broad national effort to use financial incentives to increase local resilience. By early 2009, 18,783 locally adopted hazard mitigation plans had been approved by FEMA. Although community resilience outcomes cannot be truly assessed without further research, the magnitude of this response implies substantial long-term local capacity building benefits within the U.S. This experience should also be the subject of comparative research regarding parallel efforts elsewhere.

**Keywords:** DMA 2000, FEMA, resilience, mitigation, response, recovery, repetitive losses, top-down vs. bottom-up governance, Local Hazard Mitigation Plan, LHMP

## 1. Disaster Impacts and Repetitive Losses

Over the past several decades, the number of disasters has increased in the U.S. as well as worldwide. Risks and vulnerability related to hazards such as earthquakes, landslides, droughts, floods, and wildfires are increasing due to population growth in hazardous areas. As disaster costs have escalated, governments, financial institutions, and insurance companies are focusing renewed attention on hazard mitigation by which to avoid disaster losses [13].

## 2. Designing National Loss Reduction Programs

This paper addresses two central questions related to experience in the U.S. under the Disaster Mitigation Act of 2000 (DMA 2000):

- 1 Is it possible to develop effective national financial incentive systems that promote hazard mitigation planning which enhance disaster resiliency within local communities?
- 2 To what extent can such efforts then be used in the future to promote best practices in hazard mitigation in the U.S., and possibly elsewhere?

The intent of DMA 2000, passed by the U.S. Congress in October 2000, was to reduce repetitive disaster losses by encouraging localities to undertake multi-hazard mitigation planning as a precursor to execution of hazard mitigation projects. Rather than relying on a strictly regulatory approach where federal agencies would direct lower level governments to undertake local mitigation projects, this law included a mixture of “top-down” and “bottom-up” strategies. The “top-down” aspect reflected federal government performance requirements for preparation of local multi-hazard mitigation plans. The “bottom-up” strategy encouraged development of innovative local multi-hazard mitigation planning best practices to be identified and disseminated by the Federal Emergency Management Agency (FEMA) for possible application in other parts of the U.S.

## 3. Mitigation and Resilience

Mitigation is one of four basic functions of disaster risk reduction, also known as disaster management. The other three functions include preparedness, response, and recovery. All four functions are interconnected. *Mitigation* is commonly defined as “sustained action to reduce or eliminate long-term risk to human life and property from natural and human-caused hazards [4].”

*Mitigation* essentially means reducing risks to acceptable levels through long-term alteration of the physical environment such as strengthening structures to with-

stand earthquakes, limiting development in floodplains, or minimizing fire risk through more fire-resistant construction. A joint study by FEMA and the American Planning Association (APA) has further described mitigation as “...fundamentally a loss prevention function characterized by planned, long-term alteration of the built environment to ensure resilience against natural and human-caused hazards...” referencing FEMA mitigation project assessments showing approximately four dollars of losses avoided for every dollar invested in mitigation [10, 7, 9].

By contrast, *preparedness* means making specific preparations before a disaster for what to do in a disaster, for example, knowing how to respond, where to go, who to contact, what food and supplies to have on hand, emergency communications measures, where to evacuate people, and how to provide food and shelter for victims.

*Response* means actions taken to respond to the disaster once it has happened, for example, rescuing survivors, conducting mass evacuation, feeding and sheltering victims, and restoring communications, etc.

*Recovery* means restoring people’s livelihoods through restoration of essential transportation and public services, repair of damaged facilities, restarting economic activity, and creating new opportunities for the future through long-term reconstruction and community improvement [11].

Preparedness, response, and recovery are sequential. Mitigation can happen any time, but preferably should happen before a disaster to reduce potential losses.

Disaster *resilience* is broadly defined in the opening editorial for this special issue as the capacity of a community to: 1) survive a major disaster; 2) retain essential structure and functions; and 3) adapt to post-disaster challenges of transforming community structure and functions to meet new challenges. Emphasis is placed on building such capacities before a disaster when a greater opportunity exists to create long-term sustainability of physical, social, economic, and environmental structures and functions. Waiting until after a disaster to pursue mitigation and preparedness strategies invites undue losses and reduces opportunities for long-term resilience and adaptation to post-disaster circumstances.

#### **4. National Financial Incentives for Gaining State-Local Cooperation**

The U.S. is very large and politically decentralized, with a federal system involving 50 state governments. Rights and responsibilities at each level of government are protected by the U.S. Constitution and state constitutions. With the exception of enforcement of established federal powers as well as rights guaranteed to all citizens by the U.S. Constitution, the federal government generally avoids taking a “top-down” directive approach in securing state and local government cooperation to achieve national goals. Instead, it often uses financial incentives to encourage state and local government cooperation.

A common form of financial incentives are grants-in-aid enabling states and localities to undertake efforts for which money would otherwise be scarce. An effective example is the National Highway System, which had its largest growth in the years shortly after World War II, whereby federal funds were made available to states and localities in return for cooperation in the development of interstate, state and local highways.

In recent decades this financial incentive approach has been extended to natural hazard mitigation. An initial effort was the National Flood Insurance Program (NFIP) authorized by the National Flood Insurance Act adopted by the U.S. Congress in 1968. The NFIP provided federally backed flood insurance to home and business owners throughout the country, with lowered rates in localities providing higher levels of flood mitigation. Through this system, the NFIP has provided reinsurance for flood insurance sold by private companies, issued the Federal Emergency Management Agency (FEMA) floodplain maps, and authorized rate reductions for home and business owners relative to the level of local government mitigation compliance. Flood insurance costs can be reduced by as much as 45% from maximum rates in communities where greatest compliance is gained in response to nine different performance measures.

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) of 1988 – the basic U.S. disaster management law – extended the financial incentive approach by offering grants to states and local governments under the Hazard Mitigation Grant Program (HMGP) for post-disaster hazard mitigation to reduce future losses. Additionally, mitigation grants were extended to localities wishing to restore or replace disaster-damaged infrastructure through the Public Assistance (PA) Program funds for strengthening facilities beyond pre-disaster levels.

Subsequently, the NFIP was amended by Congress in 1994 to include the Flood Mitigation Assistance (FMA) program which required local preparation of flood hazard mitigation plans as a precondition for requesting flood mitigation grants. The Stafford Act was amended in that same period to require states to prepare State Mitigation Plans as a precondition for receiving federal hazard mitigation grant funds.

#### **5. The Disaster Mitigation Act of 2000**

The Disaster Mitigation Act of 2000 (DMA 2000) moved beyond the previous mitigation efforts by creating a nationwide multi-hazard planning program for states and local governments to serve as a foundation for both pre-disaster and post-disaster mitigation project grants. DMA 2000 amended the Stafford Act to: 1) require states and localities to prepare multi-hazard mitigation plans as a precondition for receipt of HMGP and other project grant funds, and 2) establish a competitive Pre-Disaster Mitigation (PDM) Program promoting mitigation plans and project grants before disasters occur. Local govern-

ment units included under the provisions of DMA 2000 were cities, counties, towns, townships, special districts, and school districts, as well as Native American tribal organizations. DMA 2000 also required that Local Hazard Mitigation Plans (LHMPs) must be updated every five years for local governments to maintain eligibility for mitigation project grants.

An underlying reason for adoption of DMA 2000 was the growing volume and severity of losses from natural disasters during the 1990s, aggravated by widespread unplanned local development. Its purpose was to reduce preventable disaster losses in the future by encouraging both states and local governments to consider natural and human-caused hazards in planning for future development. States were already required under earlier amendments to the Stafford Act to prepare and adopt State Mitigation Plans as a precondition of receiving grant funds. For the first time, DMA 2000 required local governments to assess hazards, vulnerability, and risks and to identify and prioritize natural hazard mitigation actions as a planning framework for future mitigation projects for which grant funds could be requested.

## 6. Promoting Local Mitigation Plans

A key theme of DMA 2000 centered on creating systematic risk and vulnerability evaluation methods for application at the local level. DMA 2000 emphasized interdisciplinary efforts to assess natural and manmade hazards to reduce risks of disaster losses to acceptable levels. It focused local mitigation planning efforts on reducing potential disaster losses through measures reducing local hazard, risk, and vulnerability. It also directed local plans on prioritizing actions in line with mitigation objectives.

To promote this approach, FEMA prepared a series of general guidebooks during 2001 and 2002 to encourage state and local governments to undertake mitigation planning. During 2003 and 2004, FEMA held regional workshops for emergency managers, planners, engineers, and local officials, encouraging state emergency management officials to be active in the promotion of such events.

Special federal regulations supplementing DMA 2000 (44 CFR 201) were issued to provide detailed standards and regulatory guidance for state and local multi-hazard mitigation planning compliance. FEMA also prepared: 1) a "Blue Book" elaborating on the DMA 2000 regulations and providing examples of best practices for local jurisdictions to follow in preparing LHMPs, 2) a series of "How To Guides" including detailed instructions on best methods for analyzing hazards and preparing LHMPs, and 3) a "FEMA Crosswalk" by which plans could be measured for adequacy in relation to the detailed regulations [5, 6]. According to the Blue Book, local mitigation planning could be undertaken on a single jurisdiction, multiple jurisdiction, countywide, or regional basis. Whether singly or jointly conducted, FEMA required direct participation, selection of mitigation strategies, and formal adoption by each jurisdiction involved. FEMA

also required an open public involvement process, documentation of participation by local stakeholders, and opportunities for public comment on the draft LHMP before adoption.

A key interest of FEMA was creation of an interface between mitigation plans and other local plans, especially comprehensive general plans (also known as master plans). Benefits of integrating mitigation plans with local comprehensive community plans included reduction of conflicts with existing plans, more efficient execution of LHMP strategies and actions, and improved FEMA coordination with state and other local agencies. To encourage these connections, compliance criteria included a variety of related factors such as compatibility of LHMPs strategies and actions with community goals, legal authority to meet LHMP objectives, local ability to implement LHMP strategies and action, enforcement of codes and regulations, technical feasibility, local financial capability, cost-benefit analysis of proposed solutions, completeness of solution (e.g., minimal, substantial, or total), and priority level of the hazards addressed.

An initial deadline for completion of state plans under DMA 2000 was May 2005. States not completing their plans by this deadline faced FEMA denial of state and local hazard mitigation grant project funds until such plans were approved. Negative incentives for local governments not securing FEMA approval of their LHMPs included: 1) potentially long post-disaster delays in receiving HMGP and other grant funds, and also 2) possibility of greater disaster losses in the absence of mitigation projects. For those local governments which were aware of their vulnerability, the prospect of delayed post-disaster receipt of mitigation project grant funds might serve as an incentive to undertake mitigation planning at an earlier stage.

This consequence was reported by professionals familiar with the 2003 San Simeon earthquake recovery in Paso Robles, California, where LHMP completion followed the disaster and preceded receipt of funds. It was reinforced on a larger scale after Hurricane Katrina in 2005. Anecdotal reports from FEMA disaster workers suggested that Gulf Coast localities that had not yet undertaken mitigation planning were required to submit and gain FEMA approval of LHMPs before receiving post-disaster funds.

## 7. Progress to Date

What progress has been made under DMA 2000 in preparation of local hazard mitigation plans across the U.S.? One measure of progress is the number of LHMPs approved by FEMA since inception of the program. Another measure is level of compliance of LHMPs with federal guidelines.

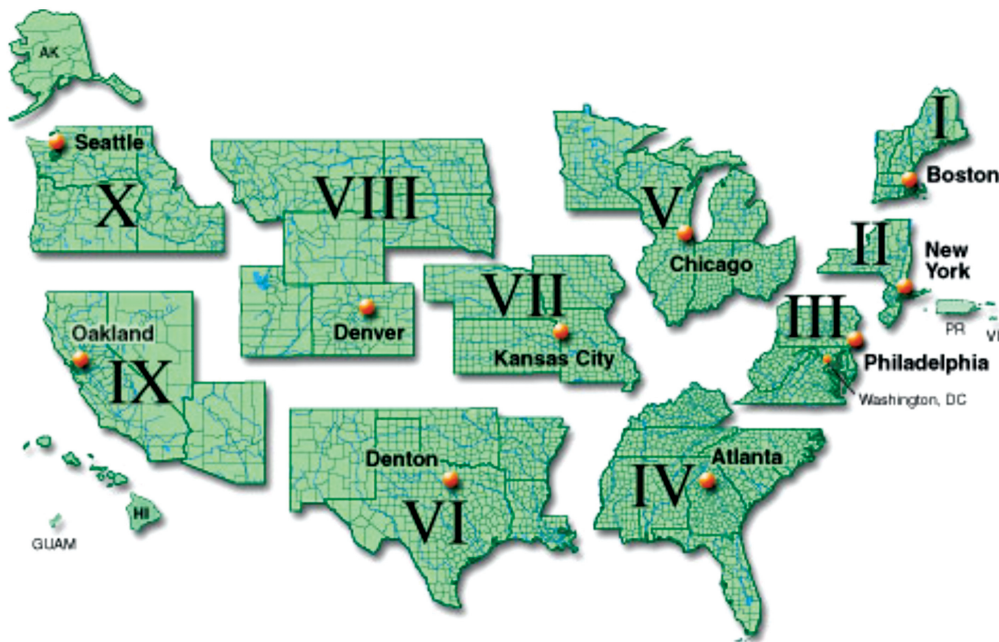
Preliminary observations related to both progress measures are discussed below. It is important to acknowledge that discussion is limited to measures of progress in LHMP participation as well as compliance levels with FEMA criteria. Note that this paper does not describe direct measurements of the effectiveness of local haz-

**Table 1.** FEMA-approved LHMPs and local government units.

FEMA Regional Office	Number of FEMA-Approved Plans Jan. 31, 2009	Number of Local Government Units*	% of Local Government Units with Approved Plans
Region I, Boston	1,119	3,772	29.7%
Region II, New York	1,053	4,786	22.0
Region III, Philadelphia	2,272	6,641	34.2
Region IV, Atlanta	3,216	9,182	35.0
Region V, Chicago	4,353	23,466	18.6
Region VI, Denton	2,159	9,652	22.4
Region VII, Kansas City	1,445	12,267	11.8
Region VIII, Denver	1,376	9,696	14.2
Region IX, Oakland	899	5,206	17.3
Region X, Seattle	872	4,808	18.2
Total	18,783	89,476	21.0%

\*Does not include tribal organizations

Sources: FEMA, 2009; Census of Governments, 2007



Source: FEMA, January 2010

**Fig. 1.** FEMA regions in the U.S. and its territories.

ard mitigation plans or projects in community resilience building. No systematic nationwide assessment of DMA 2000 effectiveness has yet been done. The paper concludes with suggestions for needed further research.

**7.1. Number and Distribution of LHMPs**

**Table 1** shows that by January 31, 2009, FEMA had approved 18,783 LHMPs. **Table 1** indicates a widely varying distribution of FEMA-approved plans between FEMA regions, shown on **Fig. 1**.

The largest number of approved plans in any region was 4,353 in FEMA Region V, (Chicago), although the percent of local governments with approved plans in that region (18.6%) was below the nationwide average. The lowest number of 1,119 approved plans was found in Region I (Boston), although it had a higher-than-average per-

centage (29.7%) of localities with approved plans when compared with other regions.

**Table 1** provides a general measure of participation as indicated by percentages of FEMA-approved plans in relation to actual numbers of local government units in FEMA regions. Highest participation rates were found in Region III, Philadelphia, with 34.2% plan approvals, and Region IV, Atlanta, with 35.0% plan approvals. However, these two regions had lower actual numbers of approved plans (2,272 and 3,216, respectively) than Region V, Chicago, which had 4,353 approved plans and 23,466 local governments (18.6%). The lowest percentages of FEMA-approved plans in relation to local government units were found in Region VII, Kansas City (11.8%), and Region VIII, Denver (14.2%). These regions also had lower numbers of approved plans (1,445 and 1,376 plans, respectively).

**Table 2.** Local governments covered by DMA 2000.

Type of Jurisdiction	Number	Percent
Counties	3,033	3%
Cities	19,492	22%
Towns or Townships	16,519	18%
Special Districts	37,381	42%
School Districts	13,051	14%
Tribal Organizations	562	< 1%
Total	90,038	100%

Source: U.S. Census Bureau, 2007; Bureau of Indian Affairs, 2005

Such variations may reflect the effects of population, urbanization, and disaster occurrences. Regions I, III, and IV, for example, are heavily urbanized and populated states along the Gulf Coast and Eastern Seaboard, where recurring hurricanes may tend to raise the level of disaster awareness and hazard mitigation interest. By contrast, states within FEMA Regions VII and VIII are more sparsely populated and less urbanized.

Regional variations may also reflect the mix of types of local governmental units within FEMA regions. **Table 2** provides a breakdown of the types and numbers of local governments in the U.S. covered under DMA 2000 [3, 14]. Also identified in **Table 2** as “local” governments are Native American tribal organizations which tend to primarily provide local services though legally considered sovereign nations. **Table 2** indicates that tribal organizations together comprise less than 1% of all local governmental units covered by DMA 2000.

Note: this analysis does not address other variables which may affect participation rates among FEMA regions. Such variables may include the role of states in promoting local participation in the LHMP process, the numbers of multi-jurisdictional LHMPs within FEMA regions, or variations in the structures of local governments within states, though this is touched on briefly below. These and other variables deserve attention in future studies.

## 7.2. Assessing Numerical Progress

In **Table 1**, it may initially appear that the total number of 18,782 FEMA-approved LHMPs represents a relatively modest percentage (21%) of all local governmental units covered by DMA 2000. However, DMA 2000 makes no distinctions between the different types of local governments covered (as shown in **Table 2**).

These types can be classified as: 1) general purpose local governments, including cities, counties, towns, and 2) special purpose local governments, including special districts and school districts. General purpose local governments together represent a combined total of 39,044 cities, counties and town, comprising 44% of all local governments covered by DMA 2000. Special purpose governments represent a combined total of 50,994 special districts and school districts, comprising 66% of the total. Special purpose local governments often have boundaries which overlap those of cities, counties, and towns, providing single services such as water, sewers, parks and

schools within the same communities. Thus, despite existence of a relatively few very large special districts such as the Port Authority of New York and New Jersey or the Metropolitan Water District of Southern California, it is misleading to characterize special purpose governments as generally equal in status to cities, counties, and towns. The latter are at the heart of American community life, and constitute the foundation of democratic governance. This principle should be recognized by FEMA in LHMP administration.

In assessing participation progress, it is instructive to compare the FEMA-approved LHMP total of 18,782 to the total number of 39,044 cities, counties, and towns identified in **Table 2**. This reveals that actually close to half (48%) of U.S. communities are covered by approved plans. This is a more realistic comparison than the preceding measure of 21% of all units covered by DMA 2000 having FEMA approved LHMPs. However, since the overlaps between boundaries of special districts, school districts, cities, counties, and towns with FEMA-approved LHMPs have not yet been systematically studied, this indicates an appropriate area for further research.

In any case, it is important to note that all of these LHMPs came into existence after passage of DMA 2000 and the inception of this program. Most were prepared during the first five-year planning cycle from 2004 to 2009. An early study of DMA 2000 activity indicated that by July 2005 there were 5,763 FEMA-approved LHMPs [12]. By January 2009, however, an additional 13,019 LHMPs, or 70% of the total, had been approved. Many LHMPs were prepared either directly at local expense or with limited grant support.

Now a new five-year update cycle is beginning and it is expected that most local governments which participated during the first five-year cycle will update their plans for FEMA review and approval. In addition, it is reasonable to expect that during the next five-year cycle more local governments are likely to prepare LHMPs for FEMA review for the first time and the total number of LHMPs submitted to FEMA will grow as they seek eligibility for mitigation project grant funding.

## 7.3. Assessing Plan Compliance

Another measure of DMA 2000 progress is the general quality of LHMPs. No systematic study assessing the implementation of LHMPs and related mitigation projects under DMA 2000 has been undertaken on a nationwide basis. However, a study of the quality of FEMA-approved LHMPs prepared in California from 2005-2007 is of interest.

A study was conducted by the California Polytechnic State University-San Luis Obispo City and Regional Planning Department of 436 LHMPs approved by FEMA as of January 1, 2007. The study covered single and multi-jurisdictional mitigation plans adopted by over 500 California local governments. It was part of a larger project to help the Governor’s Office of Emergency Services prepare the *2007 State of California Multi-Hazard Mitigation*

*Plan* [4]. Findings are reported in Chapter 6 of the *2007 State Plan* and an Addendum Report published in December 2008 [2].

The *2007 State Plan* was adopted by the Governor's Office of Emergency Services (OES) in October 2007 and designated by FEMA as an Enhanced State Mitigation Plan in December 2007. This designation assures eligibility for extra amounts of mitigation funding for California after future disasters. Only 8 other state plans have such designations. The *2007 Plan* describes how California has organized to implement hazard mitigation programs to strengthen the state's resilience in the face of future disasters and outlines future disaster loss reduction goals, strategies, and actions. It provides guidance for hazard mitigation activities, highlighting partnerships among local, state, and federal organizations as well as the private sector [4].

The review of California LHMPs suggested that local plans generally complied with FEMA Blue Book and other standards and that local government participation was substantial. Based on plan content reviews using these detailed criteria as well as findings from an online questionnaire survey (317 local jurisdictions or 57% response), some positive aspects of California LHMPs included substantive citizen participation, consistency in prioritization of identified hazards, use of best available data on hazards from federal and state sources, adherence to "best practices" for vulnerability assessment, and adoption of mitigation measures reflecting local hazard profiles. A large majority of those surveyed viewed the planning process positively, with 85% stating that LHMP preparation and adoption was beneficial for their local government. [2].

Although all FEMA-approved plans met minimum FEMA plan compliance standards, considerable variation was found. For example, there was a lack of consistency between local governments in defining and categorizing hazards. Hazard-ranking schemes varied between plans, and methods were sometimes inadequately documented. Also, LHMPs insufficiently identified future land use and development trends and how they affected hazards and risks, as required by FEMA. Little or no connection was shown between LHMPs and local comprehensive general plan safety elements required under California law. Many LHMPs included proposed action lists dominated by emergency response and preparedness rather than mitigation actions. Multi-jurisdictional plans showed minimal effort on the part of individual local governments. Also, LHMPs had little linkage to other state or local plans [2].

In seeking to understand why deficiencies existed, plan analysts surmised that FEMA approvals were undertaken largely by emergency managers with little background in land use planning, and that the rush to move so many plans through the FEMA approval process led to the compromising of Blue Book and other plan compliance standards referred to above in Section 1.5. These observations merit further consideration in future research.

Also deserving further consideration are several trends which emerged in plans with high levels of compliance

in relation to FEMA standards. Plans judged as having a higher level of compliance had been reviewed by formally established local advisory bodies and had been prepared with substantial stakeholder engagement, whereas plans with lesser levels of compliance barely met minimum citizen participation criteria. Moreover, plans with high levels of compliance tended to be financially supported with federal Pre-Disaster Mitigation (PDM) Program funds, and prepared with consultant assistance. Additionally, communities with plans with high levels of compliance generally had higher socio-economic status indicators, suggesting that poorer communities had fewer resources to invest in LHMP preparation. Also, single-jurisdiction plans generally had higher levels of compliance than multi-jurisdiction plans, perhaps because such plans provided lesser incentives for individual localities to measure up to federal Blue Book and other criteria [2].

Such factors, both negative and positive, should be evaluated in future LHMP compliance and quality research. Some have been addressed in an ongoing review of LHMP preparation in California under a new contract between Cal Poly and the California Emergency Management Agency (formerly OES) to prepare the State of California 2010 Multi-Hazard Mitigation Plan. A training manual is being prepared by the California Emergency Management Agency (Cal EMA) to be used in workshops designed to encourage local governments to prepare LHMP updates of higher quality in relation to FEMA guidelines during the next five-year cycle. This LHMP quality improvement effort by Cal EMA is supported on a broader basis through FEMA initiatives to encourage plan improvements.

One such initiative is the FEMA funded study currently being concluded by APA which focuses on the federal requirement to integrate LHMPs with other local, regional, and state plans [10]. Its primary purpose is to help educate local governments in the benefits from integrating local hazard mitigation planning with ongoing comprehensive planning. The most important benefit of mitigation plan integration with other plans is seen as improved implementation. Other benefits include avoidance of conflicting outcomes resulting from uncoordinated planning and creating improved mitigation outcomes through plan synchronization. Other benefits include better pre- and post-disaster decision making, formation of partnerships between planners and emergency managers, expansion of external funding opportunities for local governments, and facilitation of post-disaster recovery. Due for publication in 2010, this study will provide "how-to" guidance on this particular issue [10].

During future five-year update cycles, opportunities will exist for FEMA to encourage improvements in LHMP compliance and quality on a nationwide basis through systematic and clear communications with state and local governments regarding desired improvements. In this regard, there is a substantial opportunity to strengthen the role of states in overall plan quality improvements.

#### 7.4. The Role of the States in Promoting Guidance

Potentially, the states can play an important role in improving LHMP quality by providing stronger guidance to local governments. A review of 30 state hazard mitigation plans by University of North Carolina (UNC) researchers revealed that state plan quality has improved in the last decade [1]. The study used both FEMA and other plan quality criteria based on prior studies at UNC. It concludes, however, that there is considerable room for improvement. For example, the UNC study of state mitigation plans concurs generally with the California LHMP study by concluding that most plans have not effectively integrated land use planning into hazard mitigation planning. One of its main recommendations is for states to complement the strong emergency management perspectives of the plans with strong land use planning perspectives [1].

The greatest challenge to effective implementation of DMA 2000 is the ongoing question of how to integrate land use planning with hazard mitigation planning. This is especially important with regard to the vast number of existing communities that have been created with insufficient attention to hazard mitigation during past development, as well as the communities which are growing in naturally hazardous areas, such as floodplains, earthquake fault zones, wildland fire areas, and landslide prone areas. This is particularly true for placement of housing as well as for critical infrastructure facilities, such as emergency operations centers, hospitals, or water and wastewater pumping stations. Planners are generally aware that placement of such land uses in hazards zones should be avoided. Through its guidelines FEMA encourages state and local governments to prepare mitigation plans integrated with land use plans which minimize risks of housing and critical infrastructure losses through more careful placement or relocation to safer areas.

After a major disaster, however, land use changes are difficult to accomplish because of absentee ownership of land, lack of financing for redevelopment, and disagreements over the nature of redevelopment [11]. Experiences following catastrophic disasters such as the 1995 Hanshin-Awaji earthquake in Kobe, Japan, demonstrates these realities especially in situations where land tenure is complicated by overlapping land ownerships, parcel leases, and building leases on single parcels [8].

One obstacle to effective mitigation is the human tendency toward psychological denial of risks, hazards, and vulnerability whereby citizens choose to ignore obvious threats to their well-being with the hope that such threats do not actually exist or that mitigation is too expensive in the short term. This common perspective does not acknowledge the much greater costs of disaster loss and reconstruction. Part of the problem in applying land use mitigation measures is the difficulty of promoting safety when short-term economic values are given greater consideration by community stakeholders.

FEMA has begun to more strongly encourage states to emphasize integration of land use planning into hazard

mitigation planning. The FEMA-APA plan integration study provides a useful start in this direction by emphasizing the importance of connecting mitigation plans with comprehensive plans, which generally include land use, as well as other local plans [10]. The extent of compliance should be an object of further research.

#### 8. General Observations

DMA 2000 reflects a policy attempt to balance between top-down and bottom-up planning. To the extent that it represents a locally tailored, rather than nationally standardized approach, it can be useful in encouraging local political leadership to support mitigation efforts. How well can this particular national strategy for encouraging local mitigation planning be implemented within the United States? Part of the answer depends upon the clarity of top-down guidance provided by national and state governments, balanced in turn by the extent of bottom-up choice and creativity allowed local governments in tailoring flexible mitigation planning approaches to specific local needs. Another part of the answer may involve the consistency of implementation of state and local mitigation strategies among various FEMA regions. If regional staffs provide differing interpretations of FEMA Blue Book and other guidance, then plan compliance outcomes may vary.

To answer such questions definitively systematic nationwide assessment of DMA 2000 performance – both mitigation plan quality and actual project outcomes – will be needed. This research framework should take into account preceding questions such as

- 1 Greater knowledge about the role of states
- 2 Positive and negatives outcomes of state and local hazard mitigation plans
- 3 Impacts of variations in overlapping government structures within states
- 4 Local integration of land use planning with hazard mitigation planning
- 5 Measures of performance linking legislation to local actions increasing resilience
- 6 Outcomes of mitigation projects on actual community resilience improvements.

Such future assessments should also take into consideration variables of urbanization, population, numbers of disaster events, nature of risks and vulnerabilities.

#### 9. Conclusions

This paper has shared the U.S. Disaster Mitigation Act experience. The extent to which DMA 2000 can make a major difference in reducing preventable, repetitive disaster losses in the U.S. and beyond remains to be determined

over a longer period of time. This paper attempts answer to the two central questions asked at the beginning as follows.

- 1 *Is it possible to develop effective national financial incentives systems promoting hazard mitigation planning which enhances disaster resiliency within local communities?*

The answer to this question is that yes, it is possible to establish national financial incentives systems promoting hazard mitigation planning, as evidenced by 18,732 LHMPs approved by FEMA by January 2009. However, the real question which must be answered over time will be “how effective is local hazard mitigation planning in promoting actual disaster resiliency?” This should be assessed through systematic nationwide research.

- 2 *To what extent can such efforts then be used in the future to promote best practices in hazard mitigation in the U.S. and possibly elsewhere?*

Answers to this question will depend partially on outcomes from future nationwide research in answer to Question 1, and on comparative international research between the U.S. and other countries. Such comparative research must be carefully designed to take into account differences in governmental structure with regard to centralized vs. decentralized power.

A shortcoming of this paper is that reference is absent to strategies used by other countries for promoting local community resilience. The question of whether DMA 2000 mitigation planning can be adapted for use in other countries and the corresponding question of whether resilience strategies can be adapted from other countries for use in the U.S. needs systematic research, taking into account differing geography, cultures, incentive systems, types of government, and other variables.

One lesson applicable for most countries, however, is that it is important to build effective national, sub-national, and local administrative systems which purposefully and consistently promote development at the local government level of capacity for improved disaster mitigation, preparedness, response, and recovery practices which prevent or reduce future repetitive disaster losses.

**References:**

- [1] Phillip Berke, Gavin Smith, and Ward Lyles, “State Hazard Mitigation Plan Evaluation and Model Practices,” Center for the Study of Natural Hazards and Disasters, University of North Carolina, Chapel Hill, NC, August 31, 2009.
- [2] Boswell et al, “Local Hazard Mitigation Planning in California A Report on the Implementation of LHMPs under DMA 2000,” State of California Multi-Hazard Mitigation Plan Addendum Report, Prepared for the California Governor’s Office of Emergency Services, December 2008.
- [3] Bureau of Indian Affairs, Web Site, [www.doi.gov/bureau-indian-affairs.html](http://www.doi.gov/bureau-indian-affairs.html)
- [4] California Governor’s Office of Emergency Services (OES), 2007 State of California Multi-Hazard Mitigation Plan: [http://hazardmitigation.oes.ca.gov/plan/state\\_multi-hazard\\_mitigation\\_plan\\_shmp](http://hazardmitigation.oes.ca.gov/plan/state_multi-hazard_mitigation_plan_shmp)
- [5] Federal Emergency Management Agency, “Multi-hazard Mitigation Planning Guidance Under the Disaster Mitigation Act of 2000,” March 2004.

- [6] Federal Emergency Management Agency, “State and Local Mitigation Planning how-to guides,” Various dates for ten guides from 2001 to 2003, available online, in print, and as CD ROM. Washington, D.C.: FEMA.
- [7] Multihazard Mitigation Council, “Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities,” Washington, D.C.: National Institute of Building Sciences, 2005.
- [8] R. Olshansky, L. Johnson, K. Topping, “Post-Disaster Redevelopment: Lessons from Kobe and Northridge,” Final Report, NSF Award No. CMS-9730137, July 11, 2003.
- [9] Adam Rose et al., “Benefit-Cost Analysis of FEMA Hazard Mitigation Grants,” Natural Hazards Review, November 2007.
- [10] Schwab et al, “Integrating Hazard Mitigation into Community Planning,” (forthcoming, 2010).
- [11] Jim Schwab, with Kenneth C. Topping, Charles D. Eadie, Robert E. Deyle, and Richard A. Smith, “Planning for Post-Disaster Recovery and Reconstruction,” PAS Report Number 483/484. Chicago: American Planning Association, 1998.
- [12] Kenneth C. Topping, “A New Approach to Earthquake Disaster Risk Reduction Planning in the U.S.: Lessons from the Disaster Mitigation Act of 2000,” Proceedings, Second Asia Conference on Earthquake Engineering, Manila, 10-11, 2006.
- [13] U.N. International Strategy for Disaster Reduction (ISDR), “Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters,” World Conference on Disaster Reduction, 18-22 January 2005, Kobe, Hyogo, Japan.
- [14] U.S. Census Bureau, “2002 Census of Governments,” <http://www.census.gov/govs/>



**Name:**  
Kenneth C. Topping, FAICP

**Affiliation:**  
President, Topping Associates International

**Address:**  
504 Warwick Street, Cambria, CA 93428, U.S.A.

**Brief Career:**  
1986-1990, Planning Director, City of Los Angeles, California  
1991-1997, Principal, Topping Jaquess Consultants, Pasadena, California  
1997-2001, General Manager, Cambria Community Services District, Cambria, California  
2002-2004, Visiting Professor, Center for Research in Disaster Reduction Systems, Disaster Prevention Research Institute, Kyoto University, Kyoto, Japan  
2004-present, President, Topping Associates International, Cambria, California  
2004-present, Lecturer, California Polytechnic University, San Luis Obispo, California  
2006-present, Project Director, California Multi-Hazard Mitigation Plan Revision Project

**Selected Publications:**

- “Planning for Post-Disaster Recovery and Reconstruction,” American Planning Association and FEMA, PAS Report 483/484, 1998. Co-authored with J. Schwab et al.
- “Rebuilding Communities Following Disaster: Lessons from Kobe and Los Angeles,” Built Environment, Vol.32, No.4, November 2006. Co-authored with R. Olshansky and L. Johnson.
- “Toward a National Disaster Recovery Act of 2009,” Natural Hazards Observer, January 2009.
- “Integrating Hazard Mitigation into Local Planning,” American Planning Association and FEMA (forthcoming). Co-authored with J. Schwab et al.

**Academic Societies & Scientific Organizations:**

- American Planning Association (APA)
- Board of Directors, Journal of Disaster Research
- College of Fellows, American Institute of Certified Planners (FAICP)
- Earthquake Engineering Research Institute (EERI)