

# SEISMIC RISK REDUCTION SPARKS COMMUNITY RESILIENCE

**A. Chakos**

*Project Director, Kennedy School of Government, Taubman Center for State and Local Government, Harvard University, Cambridge, Massachusetts USA  
Email: arrietta\_chakos@ksg.harvard.edu*

## **ABSTRACT:**

The consequences of complex urban disasters can provide an impetus for U.S. communities to improve the built environment, increase social capacity and adopt sustainable development practices. Given the potential benefits, questions arise about the current state of the nation's seismic hazard mitigation: Despite the technical ability to reduce risk, why do jurisdictions typically defer such action? Can policy interventions focus policymakers on prudent risk reduction and recovery investment? Examining the seismic hazard mitigation efforts of American cities and regions sheds light on these issues. Communities can take protective measures to ensure sustainability that call for adoption of progressive public policies; employ innovative fiscal instruments to fund capital upgrades; and, address the adaptive challenge faced by political and citizen leaders to safeguard cities and residents. Few do. Active political and practical engagement from all levels of government—local, state and federal—must be factored into the mitigation calculus. Research initiatives, like Harvard University's "Acting in Time," program and the ongoing recovery in America's Gulf Coast region point to the crucial need for policy and practice as sparks for community recovery and resilience.

**KEYWORDS:** Seismic hazard mitigation, community resilience

## **CONSEQUENCES OF URBAN DISASTERS**

The impacts of large-scale disasters—flooding in the American Midwest, Myanmar's cyclone or the Sichuan earthquake—cause human suffering that can conceivably be lessened with prudent advance efforts. Disaster risk reduction, though, isn't typically a mainstay of government and communities as they more immediate problems like widespread economic shocks and unpredictable political conditions. The impacts of large-scale events include potential loss of life and other casualties, damage to structures and lifelines, and direct and indirect economic losses. But as we regard the aftermath of landscape-scale disasters and their catastrophic consequences, we see it is crucial for decision makers to accept the responsibility their constituents give them to safeguard community well-being.

We have only to watch the evening news to see the consequences of natural disasters and understand the urgent need to act. As populations rise in hazard-prone regions, losses from earthquakes, tornadoes, floods and hurricanes increase significantly. We can soften disaster consequences by pre-event investment in strengthening communities, as seen in the Multihazard Mitigation Council's 2005 study.<sup>1</sup> The study findings show that for every dollar spent to increase community safety in retrofits or other protective measures, almost four dollars in post-disaster response and recovery costs are saved. That dramatic figure is a compelling motivator for communities to invest in safety initiatives; yet, typically local and state government budgets do not include safety allocations to reduce community risk. There has widely been a gap in the knowledge transfer needed about risk reduction between the academic/technical community and political officials. This gap results in the general under-investment to reduce

risk, build community capacity and address infrastructure vulnerability. Communities beset by pressing crime, education and social service needs allocate scarce funds to alleviate problems at hand, with little regard for the consequences of future, uncertain natural disasters.

Other aspects on this issue are explored in “Obstacles to Clear Thinking About Natural Disasters: Five Lessons for Policy.” Harvard University Professor Richard Zeckhauser and co-authors Alan Berger and Carolyn Kousky cite barriers to effective risk reduction as often-unintended outcomes of sketchy (or absent) planning assumptions.<sup>ii</sup> We see that not enough attention is directed to understanding disaster risk and how to prudently reduce its potential impacts in advance of disaster.

## **PRE-EMPTIVE COMMUNITY ACTION**

Response to and recovery from hazardous events are the high costs we pay for ill-advised development. Such practice exacts a toll from public and private budgets when disasters strike without pre-event mitigation:

“Hazard mitigation is sustained action to reduce or eliminate the risk to human life and property from hazards. Long-term mitigation is related to, but different from, the immediate actions taken to prepare for, respond to, and recover from a disaster that is impending or has occurred. Mitigation can take the form of physical, bricks-and-mortar projects or of planning and community education.”<sup>iii</sup>

Godschalk’s definition offers a useful perspective of risk reduction, capturing the contrast along the disaster continuum of mitigation, preparedness, response and recovery. This definition is a useful research framework for examining how to craft an adaptive damage prevention strategy to encourage responsible development.

Despite, however, the typical under-investment, communities have acted in advance of disasters to enhance community resilience through strengthening the built environments and by encouraging responsive community networks. Given the rising costs of disasters in the U.S. and the technical knowledge to better prepare, localities and regions have developed programs to lessen disaster risk before they are in harm’s way. The move to community resilience gains headway in the US—especially in earthquake-prone regions.

## **HARVARD UNIVERSITY’S ACTING IN TIME INITIATIVE**

Harvard’s Acting in Time (AIT) initiative looks to focus faculty, staff and the professional community in partnership with the Kennedy School and the larger university for a better understanding of how to address “consequential public problems:”

“The hope and expectation is that by bringing together scholars of different backgrounds along with practitioners, we will be able to learn more about the qualities of analysis, governance, policy design, democratic institutional structure, information, political mobilization, and leadership that can lead to effective and timely action.”<sup>iv</sup>

The project was launched by David Ellwood, the Kennedy School’s dean, in 2007 as a way to generate solutions to the most challenging of public problems like large-scale disasters; addressing distant risks, like global warming; public health emergencies like pandemic; and, the crisis in health care.

An initial AIT project examines response to and recovery from large-scale natural disasters, with the objective of “how to mobilize resources quickly and efficiently” to meet a community’s disaster needs. Led by Professors Herman “Dutch” Leonard and Arnold Howitt, the research team has concentrated substantial efforts in the recovery

of New Orleans' Broadmoor neighborhood with AIT's Senior Fellow, Doug Ahlers. Their work has been a vital partnership with local residents affected by Hurricane Katrina and its devastating impacts on the city, bringing together university researchers, graduate students and neighbors to rebuild homes and craft recovery strategies.<sup>v</sup>

### ***Advanced Recovery Efforts—San Francisco, California***

The latest addition to AIT's research agenda is an innovative partnership with the City of San Francisco, California where the seismic threat is serious. The U. S. Geological Survey estimates a 62% probability of a M6.7 or greater earthquake in the San Francisco Bay Area before 2032. Disaster loss estimates project possible economic loss of 6—36% of the city's private building stock, and upwards of 18—40% loss in the commercial and industrial sector. Further loss projections include a possible 28% of city households having to relocate after a major earthquake; potential economic impacts include loss of upwards 237,000 jobs.<sup>vi</sup>

Such sobering information prompted local officials to re-think local recovery and reconstruction planning. Innovative and forward-thinking alliances were formed with the business community to more fully understand and prepare for the city's recovery and functional restoration in the aftermath of a damaging earthquake. Harvard's Leonard and Ahlers encouraged this effort after their experiences in New Orleans. The AIT team, with San Francisco's City Administrator Ed Lee and project director, Daniel Homsey, conferred with an interdepartmental working group on the Phoenix 2.0 plan that guides the staff project. Core to the continued success of the project is the development of fruitful and effective links in the community through the Neighborhood Empowerment program. San Francisco's Phoenix 2.0 objectives are part of a comprehensive, multidisciplinary planning approach to create a disaster reconstruction and recovery plan in advance of a major regional disaster. The City is currently updating its Community Safety Element in the General Plan and has a local hazard mitigation plan in place.

Harvard's faculty and staff team will conduct an action research project focused on The City of San Francisco's community recovery project. The AIT crisis management faculty team will link economics, infrastructure, and urban planning/community engagement expertise, together with practitioner and research capacity. Project activities include advising the City on the development and implementation of disaster reconstruction and recovery policies; public mobilization efforts; community engagement partnerships; and, strategies to sustain ongoing recovery planning and readiness efforts. The AIT effort looks at how best to embed advance recovery strategies into San Francisco's ongoing preparedness, response and mitigation improvements. "Baking in recovery," in the project parlance, is the primary objective for the newly launched project proposed by AIT's Leonard:

"What we're doing is trying...to build the infrastructure in San Francisco in advance so there will be what we're calling a 'platform for accelerated recovery'—a set of elements that we put in place in advance, that will allow the City of San Francisco to move quickly toward recovery..."<sup>vii</sup>

San Francisco and the AIT team will use the hard-won disaster recovery lessons from the New Orleans Broadmoor project and apply them in the pre-disaster phase with the new California initiative.

### ***Brief Overview of San Francisco's Seismic Safety Efforts to Date***

San Francisco has accomplished significant pre-disaster mitigation, compared with many jurisdictions in Northern California. Past disasters galvanized Bay Area cities to prepare for disasters and to reduce risk. The 1989 Loma Prieta and the 1994 Northridge earthquakes galvanized local resolve to strengthen disaster readiness efforts. The community has used disaster anniversaries and disasters in other regions as reminders about the need for community safety and disaster readiness. The 100<sup>th</sup> anniversary of the 1906 San Francisco earthquake prompted a widespread information campaign about the continuing need for disaster readiness and the necessity for long-term approaches to risk reduction and recovery. Many community briefings were held about hazard mitigation, seismic

safety legislation, and disaster exercises for schools, neighbors and senior officials. These actions raised public awareness that sustained support for major community safety improvements.

The City has long been involved with seismic risk reduction. The 1989 Loma Prieta earthquake caused significant regional damage, alerting the Bay Area to seismic safety gaps. San Francisco continues to improve seismic safety through coordinated solutions including a strong public/private partnership with the technical community. The city partners with the engineering community to inventory vulnerable buildings, works with the U.S. Geological Survey to map natural hazards and calls on regional associations to assist with seismic policy development.

The community has retrofitted essential service facilities and has progressive building codes to address seismic risk. San Francisco's continued focus on risk reduction and revitalization of its Community Action Program for Seismic Safety (CAPSS) <sup>viii</sup>to quantify seismic risk in the built environment are noteworthy. Another initiative underway is a unique public/private sector effort with the San Francisco Planning and Urban Research Association (SPUR) called "The Resilient City" aimed at defining performance-based design and adopting new risk-based standards.

In the mid-1980s, San Francisco instituted a program to reinforce building parapets, followed by a program to strengthen unreinforced masonry buildings. Both programs grew from observations of earthquakes that had recently struck. Since the 1989 earthquake, efforts to improve the municipal building stock included retrofit of schools (funded partially by state and local monies); upgrading local fire stations and local government buildings like libraries and city hall (funded with federal and local funds). In addition, the local community instituted, Neighborhood Emergency Response Teams (NERT), to link neighborhood responders. Local efforts were prompted by availability of state and federal seed funding for retrofit; willingness of local voters to approve bond measures for school upgrades; incentive of state measures to encourage retrofit; and a small core of vocal advocates. The various funding measures from the local and regional level in addition infusions of federal funding have provided the fiscal stability that enables the City to make long-term, incremental measures sustainable.

State and federal safety requirements also spurred mitigation in the Bay Area, and were incentives for San Francisco's first seismic safety ordinances. But the 2001 dissolution of FEMA's Project Impact and the September 11 attacks signaled a change in federal policy that many cities followed. Some regional cities steered preparedness into an emergency response direction with the shift from natural hazards to anti—terrorism measures after 2001. San Francisco, however, managed a reasonable balance between the necessities to be prepared for all kinds of emergencies while attentive to the necessity to also effectively address natural disaster risk. The City is an active participant and lead in the Urban Area Security Initiative and Metropolitan Medical Response System programs, while maintaining seismic safety mitigation efforts. Local champions, technical experts and vocal community members have kept the issue alive with support and resources from the City's staff and elected officials.

### ***Regional Resources Support Local Work***

Abundant technical resources for mitigation and preparedness in Northern California assist policy and implementation assistance for government. Resources like the Bay Area Earthquake Preparedness Program, Association of Bay Area Governments, the Earthquake Engineering Research Institute, and the Applied Technology Council worked with San Francisco and other Bay Area cities to an unusual extent. Their staff and members donate *pro bono* support on risk analysis and safety policies. These expert professionals frequently serve as the region's mitigation champions and have helped bridge the knowledge gap between the technical and government circles.

The Bay Area, in general, has successfully generated political will about risk reduction judging by numerous regional and local bond taxes that pay for seismic upgrades for the regional subway, the Bay Area Rapid Transit system and regional water systems. Northern California support for state school bond measures that fund earthquake structural retrofits for schools has such strong voter support that these measures were successfully approved in statewide elections, countering southern California counties' lower voter approval rates. California's experience with the 1906 earthquake and subsequent major seismic events led to active legislative responses to

disasters. The state legislature tackles safety issues and addresses mitigation on a consistent basis. A recent example of this is the passage of the 2006 state bond measure to fund Delta levee upgrades, conceived when the failure of the New Orleans system in 2005 sparked concern about California's levees.

This greater regional atmosphere that encourages seismic safety awareness and action through interjurisdictional programs and technical assistance from academic institutions such as Stanford University, San Francisco State University, the University of California, Berkeley as well as Harvard University. Astute City officials have leveraged these associations with the technical community to good effect as seen in the progressive safety efforts that endure in San Francisco and neighboring cities like Berkeley and San Jose.

Three fruitful activities fuel San Francisco's ongoing success: activating community participation in electoral approval for safety improvements; obtaining widespread engagement in ongoing readiness activities; and steady enforcement of building and safety codes to good effect. All told, these locally generated readiness achievements make San Francisco a ready test case for the advance recovery project.

## CONCLUSION

Communities that plan for disasters and attendant recovery exhibit unconventional and adaptive leadership as characterized by Dr. Ronald Heifetz in his book, Leadership Without Easy Answers.<sup>ix</sup> Some California communities, like San Francisco, have risen to the leadership challenge as defined by Heifetz through identifying the environmental risks they face and shifting from solely traditional and technical solutions to a more expansive and inclusive problem-solving approach. Local champions working in government or advocating from the community demonstrate that active political engagement is a crucial success factor evidenced by voter-approved municipal tax measures that fund seismic safety improvements in schools and buildings deemed earthquake risks. Disaster risk mitigation and recovery are not simply technical problems. Expertise to significantly reduce seismic risk is widely available, and structural engineering solutions are important, but not sole, elements of the readiness solution. The more serious challenge is to demonstrate to communities and their authorities that mitigation is in the community's best interests and that strengthening community resilience depends on a myriad of social, economic and political responses as well. Successful innovation relies on engaging the larger population in the development of answers that make local, ecological sense. The example we see in San Francisco confirms it is possible to do just that.

These cities can be characterized as "positive deviants," from the norm as they respond differently from communities that do little or nothing. This term stems from the research and practitioner experience of Jerome and Monique Sternin at Tufts University who examine systemic change in a new way:

"The process we advocate seeks to bring the isolated success strategies of those "positive deviants" into the mainstream. ... The key is to engage the members of the community you want to change in the process of the discovery, making them evangelists of their own conversion experience."<sup>x</sup>

The Sternins' notion of "positive deviance" is a useful tool when looking at the communities that work steadily to reduce risk. San Francisco, and neighboring San Jose and Berkeley, seized opportunities for disaster safety solutions that their neighbors ignored, using existing, untapped, resources to their advantage.

### *Next Steps—The Living Laboratory*

As the project moves forward, next steps include developing the consultative process between the AIT and the San Francisco stakeholders comprised of the City's interdepartmental staff team, business community, neighborhood groups and the non-profit agency sector. This may likely result in unusual approaches for the academic side of the

project as used in the Broadmoor project. The community and municipal partners will lead, in great measure, the research agenda to define what post-disaster recovery should look like in San Francisco.

The City's dynamic perspective on sectoral partnership in the recovery planning brings together a wide array of active partners. This flies in the face of standard command-and-control emergency planning, but is a model used to good effect in post-disaster Kobe and New Orleans. Community-generated efforts, when supported by government, prove to be more sustainable than planning efforts imposed by outside consultants or government "experts." A successful example informing the San Francisco program is the recovery of the Broadmoor neighborhood in New Orleans. The Broadmoor Improvement Association collaborates with academic, corporate and philanthropic partners in its rebuilding efforts while remaining the lead in the planning process.

The Acting in Time initiative in San Francisco will model its efforts on those achieved in post-Katrina New Orleans. With this project, however, the AIT team will be on the ground before the disaster strikes helping to build the framework for a community recovery that makes local sense. The matrix of protective factors for community resilience offer a compelling living laboratory for recovery planning that could serve as a replicable model and innovation for local governments to emulate.

## REFERENCES

The City of San Francisco. (2008). City Administrator's Office, Phoenix 2.0 Preliminary Project Plan.

Earthquake Engineering Research Institute. (2006). "Bay area best practices in earthquake risk reduction" survey. [www.eeri.org](http://www.eeri.org) & [http://www.quake06.org/quake06/best\\_practices.html](http://www.quake06.org/quake06/best_practices.html) Oakland, CA USA

Godschalk, D. (2007). Mitigation. In W. L. Waugh & K. J. Tierney (Eds.), *Emergency Management: Principles and practice for local government*, Second edition. ICMA Press. 87—112. Washington, D.C. USA

Heifetz, Ronald. (1994) *Leadership without easy answers*. Belknap Press, Harvard University Press. 69—100. Cambridge, MA USA

John F. Kennedy School of Government. (2007). Harvard University. Belfer Center for Science and International Affairs, *The Broadmoor Project, The Broadmoor Guide for Planning and Implementation*.

John F. Kennedy School of Government Dean's Office. (2006). Harvard University. *Acting in Time initiative*. <http://www.hks.harvard.edu/about/admin/offices/dean/ait>.

Multihazard Mitigation Council. (2005). *Natural hazard mitigation saves: An independent study to assess the future savings from mitigation activities*. National Institute of Building Sciences. Volume 1—findings, conclusions, and recommendations; & Volume 2—An independent study to assess the future savings from mitigation activities/study documentation. Washington, D.C. USA.

Pascale, R. T. & Sternin, J. (May 2005). *Your company's secret change agents*. Harvard Business Review. 1—10. Cambridge, MA USA

Zeckhauser, R., Berger, A., & Kousky, C. (forthcoming). *Obstacles to clear thinking about natural disasters: Five lessons for policy*. In J.M. Quigley, & L.A. Rosenthal (Eds.), *Risking house and home: Disasters, cities, public policy*. Berkeley Public Policy Press. Berkeley, CA USA

- 
- i Multihazard Mitigation Council, Chapter 7, p.1
- ii Berger, Kousky and Zeckhauser, pp. 8--14
- iii Godschalk, p. 90
- iv <http://www.hks.harvard.edu/about/admin/offices/dean/ait>
- v The Broadmoor Guide for Planning and Implementation
- vi City of San Francisco, Phoenix 2.0 Preliminary Project Plan, p.1
- vii Herman “Dutch” Leonard, Harvard University interview, June 2008,  
[http://www.hks.harvard.edu/news-](http://www.hks.harvard.edu/news-events/publications/insight/management) events/publications/insight/management
- viii Earthquake Engineering Research Institute; Best Practices database
- ix Heifetz, p. 69—100. Chapter 4, “Mobilizing Adaptive Leadership,” is a primer on mobilizing community and social change.
- x Pascale & Sternin, p.1