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Generational Hazards

How the embrace of the latest component of America's all-hazards disaster philosophy can reshape the mission of homeland security and help save our Republic from its most insidious threat...ourselves

Patrick J. Massey

ROMA VITAE

Rome. For nearly a thousand years it was the hub of a dynamic, sprawling, highly organized, multi-continent empire. To those on the periphery of this empire (and to most within it), Rome seemed eternal and utterly indestructible. Yet, it collapsed. Why? While historians provide us with innumerable theories regarding the reasons for Rome's decline and ultimate fall, all of these can be lumped into one of two categories: "external factors (Rome was killed by outsiders) and internal factors (Rome killed itself)."¹

For centuries Rome was besieged by barbarians (for many of us, our ancestors) along its frontier. Ultimately, and for a variety of reasons, the state's ability to defend itself was overwhelmed. Internally, the empire faced a series of self-inflicted crises, chief amongst them being economic stagnation brought about by massive government spending and borrowing, along with social turmoil, corruption, and environmental degradation in the form of deforestation and soil loss.² One does not need to be a social scientist to see the many parallels between the external and internal threats faced by Rome and those faced by the United States today. Of course America is not Rome, but there are remarkable similarities between our two empires: our soft-power and global cultural appeal, our hard-power of military might, a republican government, similar spatial extent, the multi-ethnic nature of our society, and the general feeling of exceptionalism that pervades our national psyche.

So what can the fall of Rome teach us? Are there any lessons for today's homeland security officials in the threat matrix faced by ancient Rome? Perhaps the overarching lesson is that to prosper, great societies must acknowledge and manage both external *and* internal threats. To simply focus on one while ignoring the other is a recipe for disaster. Today, the homeland security official is focused squarely on the near-term external threats facing America – the natural, technological, and terrorism-induced hazards that define our discipline's present-day rule-set. The purpose of this essay is to argue that we need to create a new, broader homeland security rule-set: one that includes at its core both external hazards as well as the internal, self-generated, long-term "generational hazards" that also threaten our nation's future. In short, we must not only save America from the barbarians, but we must also save it from ourselves.

THE ENEMY WITHIN

The primary goal of homeland security is to protect America from emergency-related threats, especially those that have the potential to be immediately

catastrophic.³ These threats, the focus of the homeland security discipline, are inherently external in nature; or more precisely, they are threats that are *done to us*. Earthquakes, terrorist bombings, hurricane-induced flooding – each of these threat hazards are afflicted upon us by outside forces. While we can protect against, prepare for, and mitigate these hazards, we are, ultimately, passive victims of their wrath. These external hazards are the traditional “all-hazards” of natural, technological, and terrorist threats that are the *sine qua non* of the homeland security discipline.

However, like Rome, many of the most insidious threats facing our country are not immediate but long-term, and are not external, but internal. In other words, our nation is not only threatened by hazards that are done to us, but is also vulnerable to a number of threats that we *are doing to ourselves*. I consider these internal, self-generated threats “generational hazards” because, unlike a terrorist attack or a hurricane in which the effects are immediate, generational hazards are created by present generations but take many decades to metastasize before finally reaching a disastrous end-state that impacts future generations.

What are these internal generational hazards? While any list of long-term internally-spawned threats to our country is subjective, there is a growing body of evidence, based on current data and likely trends, which points to four major generational hazards that pose a potentially catastrophic risk to America’s future economic and social stability. These are: (1) the enormous and growing indebtedness of America’s federal treasury, (2) global warming, (3) an inferior mathematics and science educational system, and (4) decaying physical infrastructure. In addition, a strong case can be made for the inclusion of several other long-range threats in the generational hazards category: the mass-privatization of government services (leading to the increase of decision-making authority amongst those with minimal allegiance to the public good); over-reliance on foreign energy sources (with the concomitant national security problems that entails); and the dual demographic pressures of collapsing birth-rates among native-born Americans, leading to a rapidly aging population and significant population increases fueled by massive immigration to the United States from predominately developing countries. Figure 1 below summarizes the relationship between the current all-hazards threats and the long-term generational hazards threats.

Hazard Term	Threats	Source	Temporal Impact	Societal Impact
Traditional “All-Hazards”	Major – Terrorism (nuclear, radiological, bio-agent, chemical, high explosives) or Natural (flooding, earthquakes, hurricanes); Other – Wildfires, hazardous materials, tornados/windstorms, winter storms, drought, social disturbances	“External” – What is done to us	Urgent	Deaths and/or physical injury, significant negative impacts to regional and/or national economy; social destabilization
Emerging “Generational Hazards”	Major – Soaring federal fiscal and current-accounts debts, global warming, inferior mathematics/science/engineering education, decaying physical infrastructure; Other – Mass-privatization of government services, foreign energy dependence, demographic pressures of low birth-rates/aging population and mass-immigration	“Internal” – What we do to ourselves	Belated	Significant negative impacts to national economy/living standards; social destabilization

Figure 1. Catastrophic Threats to the United States

THE GENERATIONAL HAZARDS

By no means inclusive of all the long-term internal threats to our nation’s future, the threats discussed below represent (in order of criticality) the four most pressing generational hazards facing the United States.

1. The Soaring Federal Fiscal and Current-Account Debts

America’s national debt is slated to grow more than \$3 trillion, to \$11.2 trillion, between now and 2010. The annual interest payments on our national debt in 2010 will cost \$561 billion, about the same as we spend on national defense each year. And this massive debt has been accrued *before* the baby-boom generation begins to retire and starts collecting Social Security payments in 2008 and Medicare benefits in 2011. Added to this is America’s deepening dependence on

foreign capital to fund our deficit spending. This massive trade deficit – \$800 billion per annum – led Dr. Fred Bergsten, the director of the Peterson Institute for International Economics to state that “the huge and growing international trade and current account imbalances, centered on U.S. external deficits and net debtor position, represent the single greatest threat to the continued prosperity and stability of the United States and world economies.”⁴

However, the current total national debt figure reflects only what the federal treasury currently owes on money already borrowed; it does not include what the federal government has promised to pay Americans in entitlement benefits in future years. Factoring in future entitlement obligations like federal pensions, Medicare, and Social Security, our national debt soars to over \$59 trillion dollars. If we wanted to put aside enough money today to cover these promises it would cost each American household \$516,000. If present trends continue, within just twenty years 100 percent of the federal budget will go to fund only three things: net interest on the national debt, Social Security, and Medicare/Medicaid payments. That means no money for an army or navy, no money for a Department of Justice, or national parks, or homeland security, or any of the thousands of other federal discretionary programs.⁵

Of course, such fiscal recklessness plays directly into the hands of our enemies, as Osama Bin Laden was quick to point out in his November 2004 video statement released by *Al-Jazeera*: “As for the (U.S.) economic deficit, it has reached record astronomical numbers estimated to total more than a trillion dollars [the U.S. National Debt in 2004 was actually close to \$7 trillion]...we are continuing this policy in bleeding America to the point of bankruptcy. Allah willing, and nothing is too great for Allah.”⁶

Douglas Holtz-Eakin, director of the Congressional Budget Office has been quoted as being “terrified” about the budget deficit in the coming decades.⁷ Robert Rubin, the former U.S. Treasury Secretary, says we are confronting a “serious day of reckoning” and warns that America is not immune to a third-world-style economic crisis.⁸ But it is David Walker, the current comptroller general of the United States who cast the most dire warning about America’s fiscal profligacy when he stated, during Congressional testimony, that “continuing on our current fiscal path will gradually erode, if not suddenly damage our economy, our standard of living, and *ultimately even our domestic tranquility and our national security.*” (emphasis added)⁹

2. Global Warming

Global warming is an agreed-upon fact.¹⁰ At 380 parts per million (ppm) the amount of carbon dioxide (CO₂) currently in the atmosphere now far exceeds the limits ever experienced since our modern human ancestors first roamed the earth several hundred thousand years ago. And this matters because the amount of CO₂ in the atmosphere is directly related to the planet’s average temperature. Barring a miraculous change in public policy, we are on a glide-path to see CO₂ concentrations reach about 430 ppm by the early 2020s. At this stage the effects of global warming will unquestionably be felt as extreme weather events noticeably intensify. Severe droughts, more intense rains, and stronger and more frequent hurricanes will all impact our continent. Without significant reductions

in CO₂ emissions, atmospheric concentrations will exceed 550 ppm by mid-century. At this stage, many scientists believe the melting of the Greenland ice-sheet is a real possibility which would create a twenty-foot rise in sea-level elevations.¹¹ Further increases of CO₂ could accelerate the melting of the West Antarctic ice-sheet, creating even more dramatic sea-level increases.

Even discounting the direct negative economic impacts of global warming to the built environment, especially along America's densely populated coasts, an even greater impact to our country may come in the form of human migratory pressures as people flee climate change-impacted regions across the globe. From southern and central Asia, through the Levant and Middle-East, south to the Sahel and sub-Saharan Africa, and across large swaths of Latin America, areas of the planet already under great stress due to natural resource limitations may be unable to cope with sudden changes to the environment upon which they are directly dependent for their daily survival. This may fuel a negative feedback loop in these regions; disruptions to natural resource extraction brought about by climate change may exacerbate ethnic/tribal strife and civil wars which in turn may make human existence in these regions not just tenuous but impossible. Faced with such circumstances, it is not unreasonable to envision massive human migrations from these stressed regions to the United States and other advanced nations. Such migratory pressures may, one day, make us nostalgic for our current border security challenges.

3. Failing Math, Science, and Engineering Education

In 2001, Senators Hart and Rudman convened a group of national security experts and professionals to outline the gravest near- and long-term threats to America's national security. Near the top of the list were the gross inadequacies in our country's science and engineering (S&E) and mathematics education.¹² America was once a leader in S&E education; not any more. Today, over 78 percent of S&E doctoral degrees awarded annually are earned outside of the United States. And of those that were earned in U.S. universities, 57 percent were awarded to foreign-born scholars.¹³

The Hart-Rudman Commission states that "the capacity of America's educational system to create a 21st century workforce...is a national security issue of the first order. As things stand, this country is forfeiting this capacity."¹⁴ The National Science Foundation is equally glum: "Unless more domestic college-age students choose to pursue degrees in critical science and engineering fields, there is likely to be a major shortage in the high-tech talent required by the U.S. defense industry, key federal research and national defense agencies, and the national laboratories."¹⁵ In short, the nation is on the verge of a downward spiral in which current shortages will lead to even more acute future shortages of engineers, scientists, and competent teachers. The Commission concludes:

The inadequacies of our (scientific) systems of research and education pose a greater threat to U.S. national security over the next quarter century than any potential conventional war that we might imagine (emphasis added). American national leadership must understand these deficiencies as threats to national security. If America does not stop and reverse negative education trends – the general teacher shortage, and the

downward spiral in science and math education and performance – it will be unable to maintain its position of global leadership over the next quarter century. The word ‘crisis’ is much overused, but it is entirely appropriate here.¹⁶

4. Decaying Physical Infrastructure

“Over the past two decades, we have stopped thinking about elements of our physical infrastructure as national security assets. In fact, increasingly, it seems that we have stopped thinking about infrastructure altogether.”¹⁷ So says Stephen Flynn in his book *Edge of Disaster*. America’s infrastructure – roads, ports, electric grid, dams, flood control systems, water and wastewater systems – used to be the envy of the world. No longer. For example, in just one category alone, water supply infrastructure, the Congressional Budget Office (CBO) estimates that “current funding from all levels of government and current revenues generated from ratepayers will not be sufficient to meet the nation’s future demand for water infrastructure.”¹⁸ This shortfall amounts to about \$11 billion annually, and because of it our nation runs the risk, over the next twenty years, of “reversing the public health, environmental, and economic gains of the past three decades” since the passage of the Safe Drinking Water Act.¹⁹

But such bad news is not confined to our water systems. One in three urban bridges is “structurally deficient,” meaning it is closed or restricted to light vehicles because of deteriorated structural components. More than 3,500 dams in the United States are unsafe and in need of major rehabilitation in order to continue to provide water supply, irrigation, flood control or hydro-power services. Car and truck travel on our nation’s roads has doubled in the past thirty years and is estimated to increase by two-thirds more in the next twenty years, yet capital outlays would have to increase 42 percent to reach the \$92 billion level necessary just to maintain our current road system. In another sort of negative feedback loop, if America’s infrastructure is allowed to deteriorate further this will only act to retard future productivity and economic growth, leaving less money available to repair/replace infrastructure and further hindering economic growth. It will also leave our critical infrastructure less resilient to the effects of future terrorist attacks and natural disasters.²⁰

THINGS CHANGE – THE PROFESSION ADAPTS TO MEET NEW THREATS

A decade ago, “homeland security” as a professional discipline or even as an operational mindset did not exist. Today it is a massive enterprise employing hundreds of thousands and costing our government billions of dollars annually. But “homeland security” is merely the latest iteration of the civil preparedness profession that had its genesis in the opening days of the Cold War.

Discounting the dawn of our country and the security issues along our frontier, the first post-World War II phase of homeland security (1955-1985), “civil emergency preparedness” (or simply civil defense), was characterized by efforts to protect American citizens from the effects of nuclear war with the Soviet Union. Mass evacuation and sheltering of citizens to enable them to survive the consequences of large-scale radiological contamination was the overriding

priority of the U.S. government at the time. The second phase of homeland security (1986-2000) was “natural hazards,” when the threat of nuclear war vastly subsided with the demise of the Soviet Union and coincided with a significant increase in the scope and frequency of natural disasters in the U.S. It was during this time that the profession of “emergency management” emerged with an emphasis at the federal level on recovery and mitigation programs. The third phase (2001-2005), “terrorism preparedness,” was ushered in with the attacks of 9/11 and the formation of the Department of Homeland Security. Recognizing the huge potential loss of life and negative economic impacts caused by catastrophic terrorist attacks, the profession once again changed focus to concentrate on terrorism preparedness while paying limited attention to the consequences of natural disasters. The fourth phase (2006-2010), “all-hazards,” was an acknowledgement that there is a commonality in the preparedness and response to mega-disasters and that the terrorism-centric focus of homeland security, at the expense of natural hazards preparedness, was oversold as the pendulum swung back towards the center, requiring homeland security professionals to concentrate on natural, technological, *and* terrorist hazards.²¹

While the above phases are a very simplistic overview of a complicated progression, the point is that *there has been a progression*: as the threats to our country have changed, the institutions managing these threats have changed to meet them. From nuclear attack to floods and earthquakes to terrorism to all-hazards, the civil preparedness and disaster management profession in the United States has periodically changed its priorities and operational direction to meet the latest and most pressing threats to the nation. Now as the possible senescence of American civilization in the coming decades is looming as a result of internally-generated economic, social, and environmental threats, it is time for the fifth phase of homeland security, “generational hazards,” to emerge as an operational component of the discipline.

Beginning in the early years of the next decade, the data will become ever harder to ignore. America’s fiscal profligacy, the effects of climate change, failing infrastructure, loss of technological leadership brought about by inferior math and science education, and the further fracturing of civil governance will begin to emerge as hard realities, not just futuristic theories. It is at this time that homeland security officials will have to decide what to do: remain fixated on emergency-response related threats, or begin to broaden their discipline’s scope to encompass the “other” catastrophic threat-set – generational hazards.

SOFT POWER AND THE BULLY PULPIT

Unlike preparation for the traditional “all-hazards” threats of natural, technological, and terrorism disasters, with which the homeland security official is directly charged, the generational hazards outlined above are ultimately political problems requiring political solutions. Since most emergency management and homeland security officials are civil servants and not elected officials, what then can they realistically do to solve these generational hazards?

While it is true that homeland security officials have no hard power to directly address generational hazards, they do wield considerable soft power to affect government policy. For instance, what if The Adjutants General (TAGs) of the

United States were to issue a signed declaration stating that America's exorbitant and growing current-account and fiscal debt is a metaphysical threat to America's long-term security every bit as real as the threat posed by al-Qaeda and terrorism? Would this solve America's debt crisis? No, but it would likely cause quite a stir and would help to ratchet up the pressure on our political leaders to start making the tough choices to get our financial house in order. And what if the TAGs were to follow up this declaration with a concerted educational and media campaign? Lectures, television news interviews, newspaper editorials, congressional testimony; such an effort would add tremendously to the seriousness of the debate.

Similar efforts to underscore the threats by any or all of the generational hazards could be undertaken by the National Emergency Management Association (NEMA) or the International Association of Emergency Managers (IAEM) or any of the professional disciplines associated with homeland security. Universities with emergency management or homeland security degree programs could include the discussion and study of generational hazards in their courses. Homeland security officials at all levels of government could discuss the threat posed by generational hazards when addressing community groups or as part of hazard education and outreach campaigns. They could also form partnerships with advocacy groups and non-governmental organizations that are busy trying to address gen-hazard threats. While none of these efforts would directly solve the problem of generational hazards, they would help in positioning these threats on a par equivalent to the Global War on Terrorism; that is, a multi-decade generational struggle for the very future of our civilization. Such positioning would help to serve as a catalyst for change not only at the governmental policy level, but also at the individual and family level.

Many would argue that the use of the bully pulpit and the soft power of homeland security officials to call attention to our country's mounting generational hazards is at best mission-creep and at worse mission-folly. After all, homeland security officials get paid to deal with terrorist and natural disaster threats, not budget deficits or carbon sequestration. Others may argue that the theory has merit, but that the current all-hazards homeland security duties of grants management, regional coordination, planning, training, and exercising is already overwhelming and leaves little time to focus on extravagant gen-hazard crises beyond their immediate control. Still others may acknowledge the looming threats posed by generational hazards, but are leery of the potential politicization of homeland security which entering the realm of generational hazards may tangentially entail. But what is the alternative? What if our image of a strong America is merely a thing of the past?

If one is truly concerned with the long-term security of our country, can one simply ignore an entire category of mounting threats because it does not fit neatly into the current "all-hazards" box? Homeland security cannot be everything. But it can be, and it must be, more than it is. This is not to infer a diminution in our ability to protect against, prevent, and respond to acts of terrorism, but simply a recognition that the threat-matrix and "all-hazards" rule-set we are operating under must be expanded to include generational hazards. At stake is not merely

the continuance of our super-power status, but possibly the very survival of our Republic.

LESSONS FROM THE WRONG WAR – THE IMPORTANCE OF UNDERSTANDING THE STRATEGIC LANDSCAPE

For decades leading up to the commencement of the Iraq War there was a vocal minority of military officers and analysts who were deeply concerned with the organizational focus of the United States military. Despite the population explosion in an increasingly urbanized third world, the rise of independent non-state fighting forces, the ascendancy of religious-inspired terrorism, and the profusion of desperately poor, failed nation-states, the United States military remained obtusely focused on peer-to-peer conventional military operations – air superiority, naval dominance, tank battles in the countryside – while paying scant attention to counter-insurgency and nation-building/civil affairs operations. Why? How is it that so many intelligent, dedicated, professional people got it so wrong?²²

Perhaps it was the influence of military contractors; after all there is not much profit to be made in equipping a comparatively low-tech, land-centric military. Perhaps many military personnel just put counter-insurgency operations in the “too hard” box; it is easier to concentrate on what you know and do well than to re-invent yourself for a mission akin to Vietnam, a war the military would just as soon forget. Maybe others simply did not see it as their job to rebuild nations; someone else could worry about that. Or maybe it just was not sexy enough; fighter planes are cool, water purification systems not so much. Perhaps others were just so busy they did not have the time to stop, think, and truly re-assess the strategic situation. Maybe those strategists with the worst ideas simply had the better PowerPoint presentation. Or perhaps it was just simple bureaucratic inertia and the very human propensity to fight the last war. For whatever reason, despite the decades following the end of the Cold War, during which the American military could have reorganized itself to prepare for the new strategic situation, it instead found itself largely unprepared for the hard, sustained, meat-grinder counter-insurgency and civil war in Iraq.

Like the American military, could it be that homeland security officials, by focusing exclusively on natural and terrorist hazards, are similarly misaligned with the current strategic landscape? Could it be that we too are missing the larger historical arc? The reasons that some homeland security officials might give for not engaging in the generational hazards debate are the same reasons that many senior military leaders gave for not engaging in the counter-insurgency/nation-building debate. It’s too hard! It’s not my job! I’m too busy!

Simply recognizing the strategic landscape and the challenges inherent within that landscape is not the end state. We must be committed to taking action. The fact is the military must do conventional warfare *and* counter-insurgency/nation-building. To simply focus on one and ignore the other is a recipe for failure. Similarly, the homeland security official must focus on the conventional threats of terrorism and natural disasters *and* the slow-moving catastrophes of generational hazards. To focus on the former while ignoring the latter will likewise carry dire consequences for our nation’s security.

THE BOWL IS FILLING WITH WATER

Admiral Thad Allen, remarking on the chief cause of the federal government's lackluster response to Hurricane Katrina, said that "we failed to recognize the tipping point when the levees failed and the New Orleans bowl began to fill with water."²³ Up to that stage, Hurricane Katrina was a manageable problem. But when the levees were breached, a manageable problem quickly became a social and economic catastrophe.

Bio-defense, nuclear materials detection, border and port security, intelligence analysis, emergency preparedness and response, and all the disciplines to protect against, prevent, respond to, and recover from natural and terrorist disasters are all incredibly important. These are the bread-and-butter issues of the homeland security official – and they matter. But looming on the horizon are other threats to our country; threats that we have created ourselves. While not as obvious as hurricanes or radiological terrorism, the generational hazards our nation faces in the coming decades pose a mortal threat to the stability and security of our nation every bit as lethal, if not more so, than religiously-inspired terrorism or the next big quake.

Like a mega-disaster event, warring armies, or a compromised ecosystem, the cumulative impacts of multiple stressors upon any system, if not acknowledged and fastidiously addressed, will ultimately result in a tipping point at which the system suddenly degenerates into a chaotic state and from which it is unable to recover. America's social stability is not guaranteed by divine providence. Like Rome in the third century A.D., the United States may face a point in 2030 or 2050 when the cumulative stressors of internally-spawned generational hazards may reach a tipping point and overwhelm our society's ability to cope with the stress.

The goal, therefore, is to keep each of the generational hazards from reaching this tipping point in the first place. But in order to do this, we must first recognize that the "bowl is filling with water." The levees holding back our national debt, greenhouse gas emissions, poor math/science training, and the other generational hazards have already been breached. Like responding to an incipient flood disaster, gaining a shared common operational picture of the threat posed by these generational hazards is the first step in crisis avoidance. The second step is to take action. This is where we, as homeland security officials, will need to make a choice: ignore the problem because it is not in our job description or step forward, take a risk, and help lead the response. The choice is ours.

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- ¹ Cullen Murphy, *Are We Rome? The Fall of an Empire and the Fate of America* (New York: Houghton Mifflin, 2007), 32.
- ² *Ibid*, 31.
- ³ Department of Homeland Security, *Interim National Preparedness Goal* (Washington, D.C.: Department of Homeland Security, March 31, 2005), 5.
- ⁴ C. Fred Bergsten, *The Current Account Deficit and the U.S. Economy* (Washington, D.C.: Peter G. Peterson Institute for International Economics, February 1, 2007), <http://www.iie.com/publications/papers/paper.cfm?ResearchID=705>.
- ⁵ The preceding data were provided by David Walker, Comptroller of the United States, in his presentation, "Saving Our Future Requires Tough Choices Today," delivered at Syracuse University, April 4, 2007. Refinements to the data provided by Mr. Walker were taken from Dennis Cauchon, "Rules Hiding Trillions in Debt," *USA Today*, May 29, 2007.
- ⁶ CNN, "Bin Laden: Goal is to Bankrupt U.S.," *CNN-online*, November 1, 2004, <http://www.cnn.com/2004/WORLD/meast/11/01/binladen.tape/index.html>.
- ⁷ Quoted by Richard Wolfe in "A Fiscal Hurricane on the Horizon," *USA Today*, November 14, 2005, http://www.usatoday.com/news/washington/2005-11-14-fiscal-hurricane-cover_x.htm.
- ⁸ Peter G. Peterson, *Running on Empty* (New York: Farar, Strauss and Giroux, 2004), xiii.
- ⁹ David M. Walker, Comptroller General of the United States, "Long-Term Budget Outlook, Deficits Matter – Saving Our Future Requires Tough Choices Today." Testimony before the Committee on the Budget, House of Representatives (Washington, D.C.: U.S. Government Accountability Office, January 23, 2007).
- ¹⁰ There is a "very high confidence" that global warming is occurring and it is being caused by man, quoted in the International Panel on Climate Change, *Summary for Policymakers* (Cambridge: Cambridge University Press, 2007), 3.
- ¹¹ Joseph Romm, *Hell and High Water, Global Warming – the Solution and the Politics* (New York: Harper Collins, 2007).
- ¹² United States Commission on National Security/21st Century, *Phase III Report, Road-Map for National Security: Imperative for Change* (Washington, D.C.: Government Printing Office, February 2001), 39.
- ¹³ National Science Board, "Science and Engineering Indicators-2004," NSB-04-07 (Arlington, VA, 2004). Historically many of these foreign-born engineering PhDs would remain in the U.S., but as opportunities increase in their homelands (namely China and India) many are returning home.
- ¹⁴ Commission on National Security, *Phase III Report*, 40.
- ¹⁵ National Science Foundation, "Retirements and Demographic Shifts," *Overview, 2004*, <http://www.nsf.gov/sbe/srs/seind04/co/cos1.htm>.
- ¹⁶ Commission on National Security, *Phase III Report*, 41.
- ¹⁷ Stephen Flynn, *The Edge of Disaster* (New York: Random House, 2007), xxii.
- ¹⁸ U.S. Congressional Budget Office, *Future Spending on Water Infrastructure* (Washington, D.C.: Government Printing Office, January 2003).
- ¹⁹ American Society of Civil Engineers, "Report Card For America's Infrastructure: 2005," <http://www.asce.org/reportcard/2005/index.cfm>.
- ²⁰ Just prior to the publication of this essay, on August 1, 2007, a 1,000 foot section span of the Interstate 35-W bridge in Minneapolis collapsed nearly sixty feet into the Mississippi River, killing thirteen motorists. While the exact cause of the bridge collapse has yet to be determined,

investigators are in general agreement that faulty bridge design coupled with fatigue and corrosion are likely variables. In a very visceral way, this calamity underscores the argument made in this section.

²¹ Of course not everyone is in agreement that “homeland security” should include an “all-hazards” approach. The *National Strategy for Homeland Security* is focused solely on anti-terrorism efforts and does not even mention natural hazards.

²² For a great discussion of the U.S. military’s intellectual battle in the 1990s regarding its future strategic operational focus see Thomas Barnett, *The Pentagon’s New Map* (New York: G.P. Putnam’s Sons, 2004), 59-106.

²³ Admiral Thad Allen (Commandant, U.S. Coast Guard). Overheard by the author on a teleconference call, January 2006.