

Hope, Faith and Love - Rising Above the Rubble of the Aftermath of Natural Disasters

As we near the end of 2011, we at Pegasus-Global reflect on the importance of a quality of life—a cherished gift that so many of us take for granted while others have seen it vanish in an instant in the wake of unforeseen natural disasters. Over the past decade, we have all had to endure the painful news of hundreds and thousands of lives, homes and infrastructure lost in natural disasters around the world. As the skies open up above us, the seas swell around us and the earth shifts below us, we know not what the future holds in store for us in 2012 and beyond. However, what we have learned from the natural disasters that we have faced is despite the devastation that occurred, the citizens that survived of those communities and cities never lost hope, continue to have faith and love where they live. Together, hope, faith and love is a recipe for recovery and rebuilding what has been lost.

It is this rebuilding that we, as corporate executives and program and project managers, must recognize provides an opportunity to not only reconstruct a more secure, a more stable and a more enduring infrastructure, but it allows us the opportunity to meld together the engineering and technical aspects with the needs of society. In doing so, it brings engineers and constructors together in innovative thinking as to how best to design and construct the world's mega and gigaprojects to not only withstand against future natural disasters, but to also meet the needs of society.

The past writings regarding megaprojects have focused on the government desire to *improve* the quality of life, many large public infrastructure projects were often criticized for underestimation of the costs to design and construct merely to get them approved and funded to see them only increase in cost. However, we see the mega and gigaproject design and construction due to natural disasters focusing on a much more fundamental need—reconstruction of the base infrastructure in order to *provide* a quality of life as the population once knew it.

Hurricanes continue to batter the Gulf of Mexico, Caribbean, and Mid-Atlantic regions. Earthquakes have wreaked havoc from Haiti and Japan, to New Zealand and Pakistan. Historical flooding has been seen in China, Australia, and across the United States. Record heat has scorched parts of Europe and Russia. All these massive disasters have occurred since the year 2000, a period in time that has resulted in approximately \$1.15 trillion¹ in total damages from natural disasters. A staggering amount of monetary damages in addition to an incredibly tragic number of lives lost and people displaced. While the term “Megaproject” is typically used to define a massive single-scoped project such as the construction of a new power generation facility, an airport, or a large highway project, we can see similarities in the recovery process from major natural disasters where the various components of recovery can be small, but the overall cost and complexity of recovery makes disaster recovery a megaproject.

¹ EM-DAT – The International Disaster Database, Centre for Research on the Epidemiology of Disaster – CRED (www.emdat.be/database)

Reinsurance giant Munich Re has reported that the first six months of 2011 resulted in \$265 billion in economic losses, eclipsing the previous record of \$220 billion set in the full 2005 year, a year that saw Hurricane Katrina leave New Orleans and much of the Gulf Coast region of the United States in shambles. Peter Hoppe, of the Geo Risks Research/Corporate Climate Center for Munich Re, stated that while trends for earthquakes, tsunamis, and volcanic eruptions are relatively stable, severe weather events are on an upswing, adding there is “*more dates per year during which storms can develop.*” Bob Hartwig, of the Insurance Information Institute, commented that “*we are rewriting the financial and economic history of disaster on a global scale,*” also stating the fact that three of the 15 most expensive events globally have happened since 2010, adding if the series of catastrophic tornadoes that swept through the midwest in the spring of 2011 were taken as a single event, that would make the list as well.²

While the number of earthquake and tsunami occurrences has remained fairly constant, the resulting damages from such events has steadily risen. Highlighted by the Tohoku earthquake and resulting tsunami that struck Japan on March 11, 2011. Estimates from the Government of Japan suggest the material damage alone from this event could surpass \$300 billion³. To help put this enormous sum in perspective, it would fall in between the 2010 GDP of Colombia and Denmark⁴. Faced with such a substantial price tag from damages, governments as well as private organizations have a number of critical decisions to make on how to best allocate the available public funds in order to effectively rebuild and repair after a disaster. Given the impact natural disasters have on an individual level and all the way up to entire nations and regions as a whole, it is imperative that these decisions are made expediently. The traditional process of planning and executing such projects often must be condensed as the very lives and health of the people dependent on the projects is at risk. So the question is asked, what projects get approved? And, what priority, if any, is given amongst the approved projects?

Given the very nature of natural disasters, there are a number of factors that come into play when determining how and what to rebuild or repair. For example, look at a few of the major earthquakes that have occurred worldwide over the last couple of years in the table below.

Comparison of Select Recent Earthquakes ⁵					
Country ^{1,2}	Date ^{1,2}	Magnitude ²	Damages (000 \$) ¹	Deaths ¹	Total Affected ¹
Japan	March 2011	9.0	\$210,000,000	20,319	405,719
New Zealand ³	February 2011	6.1	\$6,000,000	181	301,500

2 “2011 already costliest year for natural disasters” by Miguel Llanos for msnbc.com, July 12, 2011

3 “WRAPUP 2-Japan quake’s economic impact worse than first feared” by Stanley White for Reuters, April 12, 2011 [Note the EM-DAT database referenced in footnote 1 lists damages from this earthquake at \$210,000,000]

4 *The World Fact Book* – Central Intelligence Agency (<https://www.cia.gov/library/publications/the-world-factbook/>)

5 EM-DAT – The International Disaster Database, Centre for Research on the Epidemiology of Disaster – CRED (www.emdat.be/database); USGS – Significant Earthquake and News Headline Archive (<http://earthquake.usgs.gov/earthquakes/eqinthenews/>)

Chile	February 2010	8.8	\$30,000,000	562	2,671,556
Haiti	January 2010	7.0	\$8,000,000	222,570	3,700,000
China	May 2008	7.9	\$85,000,000	87,476	45,976,596
¹ EM-DAT – The International Disaster Database, Centre for Research on the Epidemiology of Disaster – CRED ² USGS – Significant Earthquake and News Headline Archive ³ Note: Similar location to earthquakes in September 2010 (Magnitude 7.0; \$6.5B damages; 0 deaths; 300,002 affected) and June 2011 (Magnitude 6.0; \$4B damages; 0 deaths; 345 affected)					

This small sample of earthquakes demonstrates the range of damages, deaths and people affected that can occur based on where a disaster strikes. As shown in the table, the damages from the March 2011 earthquake in Japan nearly double the total cost impacts of the other earthquakes listed, yet the January 2010 earthquake in Haiti caused a far greater number of deaths, as well as affecting vastly more people. It should also be noted that much of the damage in Japan was a result of the massive tsunami resulting from the earthquake. Clearly the immediate effect of an earthquake, or any natural disaster, will be considerably different depending on where the disaster strikes, but unless it occurs in the most remote regions of the Earth, rebuilding and repair work will have to be done.

Continuing on the case of Haiti’s 2010 earthquake, before the earthquake struck, it is estimated less than 30 percent of the country had access to electric power, those who did often had limited or unreliable access.⁶ Because of the severely underdeveloped state Haiti was in before the disaster, the rebuilding and rehabilitating process inevitably will involve a significant number of new projects instead of simply replacing existing projects. In addition to the underdeveloped status of Haiti, an additional problem being faced is that 33 percent of Haiti’s civil servants were either killed or displaced from earthquake.⁷ Without an effective government and legal system in place, an environment where there are numerous multi-million dollar projects ongoing is ripe for corruption, and unfortunately will often lead to incomplete or inadequate projects. To help combat this problem, a panel co-chaired by former President Clinton was formed to help streamline communication and progress between the international community and the local leaders in Haiti. This panel, called the “Interim Haiti Recovery Commission” (IHRC), was setup to assist Haiti’s recovery by approving all donor and civil society organization funded projects or programs. In a time when Haiti’s government was in a state of disarray, the IHRC has been able to:

- ensure each project aligns with the Haiti Action Plan for National Recovery and Development;
- ensure minimum standards are met and in place;
- monitor the fulfillment of donor pledges;
- and, ensure that no overlap exists between projects.⁸

6 Haiti Reconstruction – Factors Contributing to Delays in USAID Infrastructure Construction, GAO Report (GAO-12-68), November 2011

7 Haiti Reconstruction – Factors Contributing to Delays in USAID Infrastructure Construction, GAO Report (GAO-12-68), November 2011

8 About the Interim Haiti Recovery Commission, IHRC – Frequently Asked Questions, September 2010

The goals and processes used by the IHRC were modeled after a similar commission that was created in Indonesia to aid in that country's recovery from the catastrophic tsunami that struck there in 2004.⁹

One of the international partners in reconstructing Haiti is the U.S. Agency for International Development (USAID) working with the U.S. Department of State. The United States Government Accountability Office (GAO), recently released a report that updates the status of the reconstruction taking place in Haiti that is under their direction.¹⁰ From this report, we can track the \$1.14 billion in funds appropriated to the USAID and the U.S. Department of State by Congress to see exactly which projects have been selected for the rebuilding effort. USAID and the Department of State have allocated \$411.6 million of the \$1.14 billion for infrastructure construction activities through the end of September 2011 (see Table). Nearly half of the funds allocated have gone to two specific sectors, Energy and Health. Within the Energy sector, the GAO Report details that funding is planned to support the rehabilitation of five electrical substations, provide power generation for an industrial park (a key economic catalyst), install electricity distribution to residential customers in the north region, and provide for an additional 15-30 MW of power generation for use by all customer types. From the table above, we see how rebuilding funds have essentially been divided into six sectors. We also can sense that there are two primary drivers behind these sectors, health and economy.

Do the characteristics of Haiti being underdeveloped and historically amongst the poorest nations in the world make their rebuilding process unique and not comparative to what we would see in industrialized nations? We can begin this comparison by looking at the rebuilding process undertaken by Japan following both the March 2011 earthquake and tsunami that struck near the coast of Tohōku, Japan and the January 1995 earthquake that devastated Kobe, Japan. In response to the March 2011 disaster, which includes the additional crisis surrounding the nuclear facility in Fukushima, the Government of Japan has begun implementation of a robust plan expected to cost \$167 billion over the course of five years, Japan's Prime Minister Naoto Kan noted "*this plan takes us beyond immediate recovery to the next stage, full-scale reconstruction.*"¹¹ As far as infrastructure repair is concerned, we can look at the status of the following areas:

- Major Highways¹²
 - 76% shutdown or suspended operations after earthquake
 - Within two weeks, nearly 100% operational
- High-Speed Railway¹³

9 "2 years after quake, Haiti rebuilding effort in limbo as end of panel threatens donor pledges", The Washington Post, November 24, 2011

10 Haiti Reconstruction – Factors Contributing to Delays in USAID Infrastructure Construction, GAO Report (GAO-12-68), November 2011

11 "Japan Proposes Aggressive Recovery Plan" by Hiroko Tabuchi for the New York Times, July 29, 2011

12 "Japan's Recovery Six Months After the Earthquake, Tsunami, and Nuclear Crisis" presentation by Ichiro Fujisaki, Ambassador Extraordinary and Plenipotentiary of Japan to the United States at The Brookings Institution, September 9, 2011

13 "Japan's Recovery Six Months After the Earthquake, Tsunami, and Nuclear Crisis" presentation by Ichiro Fujisaki, Ambassador Extraordinary and Plenipotentiary of Japan to the United States at The Brookings Institution, September 9, 2011

- 100% shutdown after earthquake
- Within 40 days, fully 100% operational
- Major Port Berth (over 14 foot depth)¹⁴
 - 53% repaired as of September 2011
- The Sendai Airport¹⁵
 - Severe damage from earthquake, and entirely submerged from tsunami
 - Flight operations resumed roughly one month after the disaster

We can see that, even though much of Japan's infrastructure was inoperable or severely damaged in this region, they were able to return it near or to pre-disaster levels in a very quick period of time. Contrast this with the recovery in Haiti, where it was reported in January 2011 that only 5% of the 675 million cubic feet of rubble in the capital city of Port-au-Prince has been cleared from the streets.¹⁶ It is clear that Japan is much better equipped than Haiti to recover from a massive disaster. It is common knowledge that Japan is a highly advanced industrial nation; it is also well known that Haiti is a very underdeveloped nation. An initial thought may be that Haiti simply cannot afford the costs of rebuilding their country, but as much as \$11 billion has been pledged in foreign assistance¹⁷, and as we noted in the Comparison of Select Recent Earthquakes table earlier, the estimated damages were \$8 billion. Japan has certainly has its share of major disasters, so it can be assumed the disaster response planning is far more comprehensive than many other nations.

To take a closer look at the disaster response and recovery processes used in Japan, we can look back to the January 1995 earthquake that struck Kobe, Japan. Prior to the 2011 Tohoku earthquake and tsunami, the 1995 Kobe earthquake was the most costly disaster in Japan's history with estimated damages of \$100 billion.¹⁸ The immediate impact of the 1995 earthquake left over 400,000 buildings destroyed, over 200,000 housing units destroyed, and 85% of the region's schools, hospitals, and other major public facilities sustained heavy damage.¹⁹ Japan's central government allocated more than \$58 billion in the first three years to reconstruct basic infrastructure, public facilities, and housing.²⁰ They did more than simply provide funding though; immediately the government implemented a two-month moratorium on rebuilding so ample planning could be accomplished, with projects that offered potential economic growth

14 "Japan's Recovery Six Months After the Earthquake, Tsunami, and Nuclear Crisis" presentation by Ichiro Fujisaki, Ambassador Extraordinary and Plenipotentiary of Japan to the United States at The Brookings Institution, September 9, 2011

15 "Economic Impact of the Great East Japan Earthquake and Current Status of Recovery" report by the Government of Japan, August 2011

16 "Who Failed on Haiti's Recovery?" article by Romesh Ratnesar, Time Magazine, January 10, 2011

17 "Who Failed on Haiti's Recovery?" article by Romesh Ratnesar, Time Magazine, January 10, 2011 [note: only around 10% of committed funds have been spent there as of January 2011]

18 EM-DAT The International Disaster Database, Centre for Research on the Epidemiology of Disaster – CRED (www.emdat.be/database)

19 *1995 Kobe Earthquake 10-Year Retrospective*, report by Risk Management Solutions

20 *1995 Kobe Earthquake 10-Year Retrospective*, report by Risk Management Solutions

receiving priority, this included the widening of roads, the development of parks and open spaces, and in some cases even the demolition of structures that survived the earthquake.²¹ In many ways, the approach used in Kobe was not simply to repair the damages, but to improve the area to have even more potential than what it had pre-disaster, with both the central government of Japan and the local government in Kobe taking an authoritative role in the overall process. Within the first months following the earthquake, the city of Kobe had published a very detailed plan that “*extended on every aspect of earthquake recovery, from helping the elderly to rebuilding the correct infrastructure, but with the overall goal of reconstructing the city of Kobe into stronger safer, and internationally vital city.*”²²

Strong central planning was a critical factor in Japan’s disaster recovery; however in Haiti, with significant losses experienced in their government, the IHRC was created to help fill that role until the Haitian government could resume its role. While progress in Haiti has lagged far behind when compared to the progress made in Japan, one can see how many of the underlying processes are actually quite similar; the need for billions (even hundreds of billions) in funding, the priority received by infrastructure projects, and the central planning utilized to increase efficiency.

After examining the reconstruction process following earthquakes in Haiti and Japan, let us now consider the recovery process utilized in New Orleans following 2005’s Hurricane Katrina, the costliest disaster in U.S. history with an estimated \$125 billion in damages.²³ Reconstruction planning took place at many levels, from the “Bring New Orleans Back Commission” developed under the Mayor of New Orleans, and the “Louisiana Recovery Authority” created by the Governor of Louisiana, to the “Coordinator of Federal Support for the Recovery and Rebuilding of the Gulf Coast region” position created by then President George W. Bush under the Department of Homeland Security.²⁴ The coordinator at the federal level serves to direct information to and from “*the Congress, state and local governments, the private sector, and community leaders.*”²⁵ We see once again how effective communication between the many partners involved in disaster recovery is incredibly important, not only to have success, but to be able to review ongoing or completed projects.

Much attention was given to the failure of the levee and floodwall system outside New Orleans, how it failed to keep out the surging storm waters that caused much of the damage to the city. A bit of a background on Louisiana’s levee and floodwall system is that they were constructed by the Army Corps of Engineers (Corps) beginning in the 1940s, and over the years (basically in response to funds being allocated) grew to compromise roughly 350 miles of earthen levees and

21 *1995 Kobe Earthquake 10-Year Retrospective*, report by Risk Management Solutions

22 *Sound Practice No. 1 – Kobe City Restoration Plan, Rebuilding after the 1995 Great Hanshin-Awaji Earthquake*, report by the Pacific Disaster Center (www.pdc.org)

23 EM-DAT The International Disaster Database, Centre for Research on the Epidemiology of Disaster – CRED (www.emdat.be/database)

24 *Hurricane Katrina – GAO’s Preliminary Observations Regarding Preparedness, Response, and Recovery*, GAO Report (GAO-06-442T), March 2006

25 *Hurricane Katrina – GAO’s Preliminary Observations Regarding Preparedness, Response, and Recovery*, GAO Report (GAO-06-442T), March 2006

concrete floodwalls.²⁶ A review by the Interagency Performance Evaluation Task Force found that the levees and floodwalls failed primarily because they did not perform as a system, which led to gaps in the overall protection scheme, inconsistent levels of protection, and a lack of redundancy.²⁷ The Corps received over \$7 billion in funding from three emergency supplemental appropriations to restore hurricane protections in southeast Louisiana, and was able to repair nearly 169 miles of damaged levees and floodwalls to pre-Katrina levels.²⁸ One problem identified in this process by the GAO is the Corps was rebuilding and constructing flood protection structures without a comprehensive strategy, instead treating each project as essentially a one-time independent project, which risks the same failures that were identified in the hurricane protection system after Hurricane Katrina.

Of the over \$7 billion received by the Corps, approximately \$1.6 billion was appropriated for reinforcement or replacement of floodwalls in the New Orleans area and to raise nearby levees to meet the certification requirements of the National Flood Insurance Program (the 100-year storm standard), in April 2006, the Federal Emergency Management Agency (FEMA) revised flood elevations for the New Orleans area that made the Corps' initial restoration plans inadequate, and also raised the estimated costs of restoration by \$4.1 billion.²⁹ Ultimately, the GAO recommended the Corps make use of an independent body *"to help guide and oversee this process...[ensuring] that the Corps obtains objective and reliable support as it implements these authorized enhancements to the existing hurricane protection projects."*³⁰

From each disaster recovery plan we examined, we see the importance of having clearly defined objectives. In fact, they are the same key points found by the GAO in their 2009 report on Disaster Recovery³¹:

- Develop and communicate common goals to guide recovery.
- Leverage resources to facilitate recovery.
- Use recovery plans to agree on roles and responsibilities.
- Monitor, evaluate, and report on progress made toward recovery.

These characteristics are among those that exist in traditional megaprojects. In disaster recovery there are certainly additional factors not faced in a standard megaproject, the very reason that for disaster recovery to take place there must first be a disaster is foremost among these factors. However, much still is in common in the processes involved, from the way various components must be able to effectively work towards a larger goal, to the controls in place that track

26 *Hurricane Katrina – Strategic Planning Needed to Guide Future Enhancements Beyond Interim Levee Repairs*, GAO Report (GAO-06-934), September 2006

27 *Hurricane Katrina – Strategic Planning Needed to Guide Future Enhancements Beyond Interim Levee Repairs*, GAO Report (GAO-06-934), September 2006

28 *Hurricane Katrina – Strategic Planning Needed to Guide Future Enhancements Beyond Interim Levee Repairs*, GAO Report (GAO-06-934), September 2006

29 *Hurricane Katrina – Strategic Planning Needed to Guide Future Enhancements Beyond Interim Levee Repairs*, GAO Report (GAO-06-934), September 2006

30 *Hurricane Katrina – Strategic Planning Needed to Guide Future Enhancements Beyond Interim Levee Repairs*, GAO Report (GAO-06-934), September 2006

31 *Disaster Recovery – Experiences from Past Disasters Offer Insights for Effective Collaboration after Catastrophic Events*, GAO Report (GAO-009-811), July 2009

schedules and budgets. Much can be learned by studying and applying practices across the two realms that will lead to greater success when taking on both disaster recovery and traditional megaprojects.

As we continue moving forward in life, it is important that we understand the impacts we can have on making the world a better place, even in the aftermath of massive disasters. This starts with an individual sense of striving for improvements, and leads to a collective effort to put these ideas and actions into motion; learning from past experiences so that we are able to contribute and offer the greatest opportunity for success, without hesitation, often on a moment's notice in the case of disaster recovery. Tomorrow's mega and gigaprojects arising from the rubble of natural disasters will be important aspects of the healing process. Looking back and remembering past events and experiences will allow us to move forward together, relying on our hope, faith, and love to continue our growth and both provide and improve a quality of life for all.