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To What End: Resilience, Tradeoffs, and the Lessons of Katrina

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> Modern industries are handling the forces of nature on a stupendous scale….Woe to the people who trust these powers to the hands of fools! Then wealth is destroyed, homes are overwhelmed, and loved ones killed. John Wesley Powell, "The Lesson of Conemaugh" (North American Review, August 1889: 156)

The storm was not a surprise. We could see it coming. In August 2005 Hurricane Katrina was strong and massive as it approached the Gulf Coast and New Orleans. We knew that rising seas, sinking lands, and the loss of the wetlands and barrier islands that historically had buffered our cities and towns made us increasingly vulnerable to storms. We even knew, if we were paying attention, that it would overwhelm some of our levees and pumps leaving some of our neighborhoods flooded and our outlying areas devastated. We knew that. But we also believed some things.

We believed that, bad as it might be, the levels of flooding, in New Orleans at least, would be limited to a few feet and most likely a few days. We believed that the levees and flood walls would hold and that the City would clean up, mop up, and move ahead with life as it always had. After all it had happened before – at least 38 times hurricanes have reached New Orleans – and besides, this is America and we do not let our engineering and public rhetoric get bested by nature. We believed that. We were wrong.

The aftermath of Katrina, and its sister storm Rita, left us, the nation, and even much of the world stunned. How could such a thing have happened? What lessons did it teach? More importantly, have any lessons been learned? There will probably never be final answers to those questions but a few important things are already clear.

Hurricane Katrina happened because it was inevitable. Storms are a natural part of this landscape the same way fires are to prairies and forests. We could not have prevented Katrina and will not be able to prevent the next storm. The death, destruction and dislocation that resulted from the storms are a different matter. They were not so inevitable. It was not a hurricane that wrecked New Orleans but rather a combination of trade-offs, compromises and decisions that turned powerful natural events into human tragedy. This is the central lesson, the central tragedy of Katrina.

New Orleans, like most major port cities, was a hard bargain with nature from the get-go, but a bargain that had to be made. Its vulnerabilities to storms, flooding and disease were appreciated by its founders but more than offset by its strategic and commercial value. The city grew and prospered as a result of its proximity to the Gulf of Mexico and the Mississippi River and the attendant risks were managed through its infrastructure, architecture, and grit. Without the benefit of federal flood protection or flood insurance the city grew to greatness, its population reaching its zenith of nearly 650,000 in the early 1960s.

Ironically, the seeds of Katrina's destruction of New Orleans were sown in large part by federal and local programs and public works projects intended to spur economic development and provide flood protection. Concerns about how navigation channels, oil and gas activity, drainage projects, and levees might degrade wetlands or increase flood risk were trumped by the prospect of growth and economic gain. Public funds were used to build levees around wetlands to induce development instead of increasing the protection

for existing neighborhoods. State and federal involvement in the flood and property and casualty insurance business induced people to build and live in places and in ways that would have been unthinkably risky before.

In short, people were in harm's way because it was, in effect, policy to put them there – the unintended but very real result of compartmentalized planning and decision making married to a pronounced practice of overestimating benefits and undervaluing risks and costs. Nowhere is this clearer than in the case of the hurricane protection system surrounding New Orleans.

Hurricane protection for New Orleans, and as a responsibility of the U.S. Army Corps of Engineers, is a fairly recent development. New Orleans has had levees on the Mississippi Rivers since the time of French settlement. For most of its history, New Orleans was open to periodic hurricane flooding. By concentrating its development on higher ground and by elevating structures the city not only survived but thrived. Storms still came, but flood waters would drain, buildings would dry out, losses would be mourned and life would go on.

Growth pressures fueled land reclamation projects in the 1930's along the shores of Lake Pontchartrain that drew residential development to the lake front and effectively created a levee, but it was one with houses on top of it, not one to protect what was behind it.

Things changed dramatically in 1965 when Hurricane Betsy hit, the storm against which all others would be measured until Katrina. The flooding in some neighborhoods was much like that in Katrina. The response was anything but. In those days the nation's appetite for public works was much greater than it is today and President Lyndon Johnson spurred Congress to authorize a massive federal hurricane protection system for the entire New Orleans area that would guard it against the worst storm that might reasonably be expected. That was thought to be what we would now call a once in 200-300 year storm event[1]. It turned out that something very different was built.

The system that was built – the system that failed – was the product of political and budgeting compromises, the failure to adapt to changing conditions and knowledge, and human error. That system, combined with the shifting of risk made available by the flood insurance program, led to changes in expectations and behavior. Low-lying areas were drained and developed, homes were built on slabs instead of being elevated, and less water resistant building materials were employed. The importance of natural defenses and individual and local responsibility were largely lost. After all, the federal government was providing protection and shouldering most of the burden. The perverse result of this was a city that gained protection but lost resilience. The net effect was a city at higher risk.

The notion that decades of work and billions of dollars actually exacerbated risk is not an easy thing to accept. Harder still is the fact that the tens of billions of dollars that have been committed to patching the failed system and rebuilding the devastated communities since Katrina could have the same effect if important changes don't occur in the way protection, resilience, and community vitality are approached. First and foremost, before embarking on any flood or storm protection effort it is crucial to ask two questions: How safe do we want to be? What values do we want to enhance or secure in the process? The failure to ask these questions or to slough the answers, as happened in New Orleans, can be the difference between vitality and calamity.

Admittedly, these are very subjective questions, but life is a subjective undertaking. The suggestion, often made, that we can or should leave these matters to objective scientists and engineers is a dodge. The best of our objective knowledge can inform our judgments and define our tradeoffs but they cannot set our purposes or make our decisions for us. This is particularly so when the key decisions are not technical in nature, but rather are legal or policy matters. This is what makes New Orleans's Katrina experience so instructive. But to understand the lesson, one first needs a little history.

The vulnerability of New Orleans to hurricanes was well known. The Army Corps of Engineers had begun studying protection options pursuant to a Congressional study authorization in 1955[2]. Those plans, still under development, took on a level of importance and urgency when Hurricane Betsy struck in 1965. Shortly thereafter, Congress directed the Army Corps of Engineers to develop

a hurricane protection plan for the New Orleans region to combat a "hurricane that may be expected from the most severe meteorological conditions reasonably characteristic in the region"[3]. Roughly speaking, that meant a storm equivalent to a Category 3 storm on the Saffir-Simpson Scale or, as noted earlier, a once in 200-300 year event. Hurricane Katrina, a Category 3 storm at landfall in Louisiana, was in the range of storms that New Orleans was supposed to be protected against. Leaving aside the very real possibility of negligence and human error, the fact that those constructed protections not only were overwhelmed but failed is less a matter of having the know-how to have built a more robust and resilient system than it was of not having the will and wisdom to build that system.

Such a system is more than a network of levees, gates and pumps. It is a purposeful and methodical approach to living with water that includes wetland conservation and restoration, land use controls, evacuation plans, adaptation to changing conditions (e.g., sea level changes and improved knowledge), and finally levees, gates, and pumps. There is nothing really new here. The importance of wetland and barrier buffers, flood-proofing, and land use planning and regulation were clearly recognized in the 1966 report of the Task Force on Federal Flood Control Policy and President Lyndon Johnson's message transmitting the report to Congress[4]. While urging greater federal involvement in flood protection, President Johnson wrote, "I cannot overemphasize that very great responsibility for success of the program rests upon State and local governments and upon private property owners in hazard areas. *The key to resolving the problem lies, above all else, in the intelligent plan for and State and local regulation of use of lands exposed to flood hazard.*" (Emphasis added)[5].

Despite that clear awareness, the prospect of levees spurred more development in low, wet areas and the construction of unelevated structures and the use of unresilient building materials. The over reliance on structural flood protection actually created new vulnerability and each year that passed without a major storm fed a growing belief, a complacency, that all was well and life inside the levees could go on without worry. Indeed, prior to Hurricane Georges (1998) New Orleans was not a place to evacuate from but a place to evacuate to.

In and around New Orleans the appearance of protection had become confused with the fact of protection. That was never an intentional deception, it was one arrived at gradually through a series of compromises, tradeoffs, and mistakes. Rainwater flooding concerns trumped storm flooding risks. The need for land use controls and hurricane building codes were trumped by the desire for low-cost, quick housing and the assumption that the levees had eliminated the risk. Wetland conservation and restoration were trumped by economic development and private property rights pressures. And the need to adapt to improved knowledge about hurricanes, sea level rise, and coastal land loss was trumped by the pressure to build what had been planned and politically promised. The idea that just building something was better than nothing was irresistible. The foolishness of those tradeoffs is as apparent now as were the lessons of the Johnstown flood (Conemaugh) to John Wesley Powell[6]. But the pressures that led to them were predictable, just as it is predictable they will recur.

Indeed if there is one common theme in humankind's reaction to great disasters it is the tendency to try to become ignorant of their lessons as quickly as possible. That instinct may have had utility in a distant past when human society had a more passive relationship with nature, but it is dangerous folly today. New Orleans is a portent of the challenges that face many places. We can muddle along, content to be victims of change, or we can use the best of our abilities – our science, our engineering, our laws, arts, ethics, and our policies – to be purposeful managers or stewards of change. There is scant middle ground. The central lesson of this tale is that the tradeoffs we make matter and there is hell to pay when we get it wrong. It is lesson well taught. Whether it is a lesson well learned remains to be seen.

There is at least some evidence it is being learned. Wetlands restoration and accommodating sea level rise are now broadly recognized as essential components of flood protection and the sustainability of the region. The state has recognized the need for smarter land use choices and has adopted a state-wide building code.

The Mississippi River-Gulf Outlet has been deauthorized. The Army Corps of Engineers has shifted from providing a levee system with a high protection target (against 1-in-300 year events) with a low confidence level to a lower level of protection (1-in-100 year events) with a higher confidence factor.

Much more will be needed however. The real proof will come when the hard choices are made about which communities will get higher levels of protection – and when. It will come when the decisions are made whether to fully commit to conserving and enhancing Louisiana's coastal wetland landscape. It will come when land use planning is made a priority with the force of law. And it will come when the state and the nation decide to develop and implement effective strategies for contending with climate change and rising seas.

None of this will be easy, but neither will it be easy to live with the consequences of standing pat. At stake in Louisiana and elsewhere is the fundamental tradeoff question: Are we as a people willing to make the laws, polices, investments, and commitments necessary to give ourselves a shot at a vibrant and sustainable future? The stakes are high and time is shorter than many think.

End Notes

1. United States Government Accountability Office, Statement of Anu Mittal, Director, Natural Resources and Environment on Lake Pontchartrain and Vicinity Hurricane Protection Project, Sept. 28, 2005. GAO-05-1050T.
2. PL 71, 84th Congress, 1st Session (1955).
3. Flood Control Act of 1965, PL 89-298, referencing Chief of Engineers Report in House Document 231, 89th Congress.
4. House Document Number 465, 89th Congress, 2nd Session (1966).
5. Id.
6. "The Lesson of Conemaugh", Maj. J. W. Powell, North American Review, August 1889.

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