

Executive Summary - Hurricane Katrina and New Orleans

Hurricane Katrina was a Category 5 hurricane (Category 3-4 upon landfall) that hit the southern United States on August 29th, 2005. Strong winds and flooding have inflicted destruction on several states, including Louisiana and Mississippi, hitting New Orleans particularly hard. The geography of New Orleans places it between the Mississippi River to the south and Lake Pontchartrain to the north, with large area of the city lying below the sea level. In order to keep the water out, a system of levees, canals and pumping stations was implemented in the early 20th century. These flood protection measures proved to be insufficient in the wake of Hurricane Katrina, with levees being breached in more than 50 locations, resulting in 80% of the city being inundated (Christian, 2007). The hurricane has caused an estimated \$125 billion in damages with 1,800 people losing their lives (National Climatic Data Center, 2006). Slow response and lack of leadership by all levels of government led to disorganized evacuation and slow rescue efforts, with vulnerable members of the public being disproportionately affected. Federal Emergency Management Agency (FEMA) has failed to lead a coordinated rescue and supply mission in attempts to follow irrelevant official protocols. Their efforts led to inefficient and even counter-productive results, as they turned away aid, left available transportation unused and hampered the efforts of firefighters, police and emergency workers.

Multiple associations, led by the Interagency Performance Evaluation Task Force (IPET), have undertaken engineering reviews and identified three underlying causes for the levee failures. First, New Orleans is subject to significant differential soil settlement, making vertical reference points inconsistent and unreliable. Different parts of the levee system have used different vertical monuments, which led to some levee sections being barely above the water level. Second, the design of the flood protection system did not use conservative safety factors or storms of sufficient intensity to calculate the required level of protection. Lastly, the bulk of the levee-canal system has been constructed at the outset of the 20th century and has not been updated on par with the city growth.

While technological causes of the disaster were well-explored, the underlying political decisions that led to the flooding infrastructure being neglected were not well analyzed. The vulnerability of New Orleans to severe impacts of a strong hurricane was well known since the founding of the city in 1718 (Christian, 2007). However, the politicians have not paid a required level of attention to this problem, partly due to it having little effect on securing more votes in the absence of an actual disaster. They were motivated by short term political gains and neglected their duty to the public.

In the aftermath of the flooding of New Orleans by Hurricane Katrina, several lessons can be learned to minimize the damages from similar events in the future:

- Regularly inspect levees and assess the flood protection system as a whole to ensure that it offers the required level of protection, as meteorological models evolve and become more accurate.
- Develop an emergency response plan with clearly defined roles and responsibilities of different levels of government and agencies. Practice the response regularly.
- Ensure that engineers and other competent people are involved in development of an emergency response plan. Engineers should also have a stronger voice in the decision making process, particularly when it relates to upkeep of public welfare.

Engineers are in a great position to take a leadership role in implementation of flood protection, preparations of emergency response plans and rescue operations. Engineering method of problem solving can be applied to coordinate city development policies with the required flood protection. Organizational and management skills can be utilized to ensure the effective use of resources to minimize the impact to the public. Ethical codes and guidelines will emphasize the commitment to preserve public safety. An important objective of the engineering profession should be to strengthen its discourse and diversify beyond the technical realm. This would enable a more prominent presence of engineers within the decision making apparatus and give them more power to preserve public welfare.