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Hurricane Recovery and Community Post-Disaster Planning

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NOAA National Geodetic Survey, Remote Sensing Division

In order to support NOAA's homeland security and emergency response requirements, the National Geodetic Survey (NGS) Remote Sensing Division acquires and rapidly disseminates (within 24 hours of acquisition) spatially referenced imagery to federal, state, and local agencies, and the general public, following a disaster. The imagery provides emergency managers with a broad view of damage and residual flooding to better prioritize their response efforts (it is also useful for the general public as a way to ascertain the fate of their homes and communities). These images can be viewed and downloaded at http://ngs.woc.noaa.gov/eri_page/index.html. Metadata and shapefiles are also downloadable.

In 2008, imagery was collected after Hurricanes Gustav and Ike using a Digital Sensor System mounted on a NOAA Citation Jet (a NOAA Jet-Prop Commander was also flown for Ike).

- Gustav made landfall 70 miles southwest of New Orleans, Louisiana, on September 1, 2008.
    - 1,994 pictures taken September 2-7, 2008.
    - 247,524 hits to the project page in September, 86% from U.S.
- Ike struck the Texas coast on September 13, 2008.
    - 5,546 pictures taken September 14-17, 2008.
    - 16 million+ hits to the project page in September, 96% from U.S.

Lots of preplanning takes place before a flight. The NGS coordinates its activities with the U.S. Department of Homeland Security led Interagency Remote Sensing Coordination Cell, the Federal Remote Sensing Work Group, and NOAA's Incident Coordination Center. Data collection is typically limited to the coasts and ports. The NGS communicates flight plans to OCRM, and specialists then share the information with the coastal program managers and inquire about other needs.

A number of improvements in how NGS collects and disseminates its data have been made since Hurricane Katrina in 2005. Specifically, they acquired the ability to provide image mosaics and georeferenced images, they partnered with Google Earth, and they improved their speed of delivery. More improvements will be made based on lessons learned from Hurricane Ike. Among these lessons were that Internet connections can be unreliable, a large volume of data may require more equipment and support, and better control of the camera settings is needed.

Gary Zimmerer
FEMA Region VI, Project Lead for Coastal Mapping for Louisiana and Texas

Among the products and services offered by FEMA's mitigation directorate are technical assistance, storm surge modeling, and Digital Flood Insurance Rate Maps.

Technical Assistance

Technical assistance offered by the Hazards and Performance Analysis Group includes comprehensive technical analysis, engineering and design, technical reporting, research support, and collection of disaster specific data (e.g., high water marks, wind speed). Mitigation Assistance Teams (MATs) collect critical information on disaster effects. Specifically, they conduct forensic engineering analyses to determine causes of building failure and success and provide recommendations that communities, states, and organizations can take to reduce future damage and protect lives and property in hazardous areas (e.g., improvements in construction codes and standards, designs, methods, and materials used for both new construction and postdisaster repair and recovery).

Data collected is compiled into products, including factsheets, advisory guidance documents, and full-length reports. These products are designed for state and local governments (floodplain managers, emergency managers, code officials, grant applicants, etc.), architects and engineers, contractors and manufacturers, facility managers to help spread the word about what type of building engineering and design works and what doesn't. MATs conducted assessments for Hurricanes Ike and Gustav, but the results have not yet been released.

Among the data the MATs collect is perishable data, such as high water marks. Each high water mark is mapped and recorded on a data sheet, which indicates the type of mark (e.g., still water, wave effect, run up) and location. Any one location could have a variety of marks.

Storm Surge Modeling

Storm surge modeling enhances planning and risk analysis and risk communication. Hurricanes Katrina and Rita changed what we thought about coastal engineering. Most existing studies and maps are old. Coastlines need to be reexamined to consider development changes, subsidence impact, wetlands degradation/accretion, coastal erosion, additional historical storm data, and enhanced topographic data. Modeling is time consuming and requires fast computers.

A number of organizations (U.S. Army Corps of Engineers, universities, engineers, NOAA) are collaborating to conduct storm surge studies in Texas and Louisiana using numerical modeling (ADCIRC) and statistical analysis (JPM-OS). Preliminary storm surge studies are underway in 17 Texas counties.

Digital Flood Insurance Rate Maps

Through its Flood Map Modernization effort, FEMA is transforming the nation's flood maps into more reliable, easier-to-use, and readily available maps. New maps are establishing new building

elevations across the entire coast. FEMA is working on new elevations for the Texas coast in the wake of Hurricane Ike. Additionally, the new storm surge modeling will be incorporated into the new Digital Flood Insurance Rate Maps.

Once the information is created, people need to understand it and then use it. As such, following Hurricane Katrina, FEMA created the Louisiana Mapping Project to explain the process in Louisiana (http://www.lamappingproject.com/).

Jim Albritton
FEMA Region VI Public Assistance

FEMA's Public Assistance Program awards grants to states and local governments and certain private nonprofits to help with response and recovery. Grants are for debris removal, emergency protective measures, and the repair, replacement, and restoration of disaster-damaged publicly owned facilities (and the facilities of certain private nonprofits).
(http://www.fema.gov/government/grant/pa/index.shtm)

In October 2006, the U.S. Department of Homeland Security appropriated money to create a Public Assistance Pilot Program to reduce costs to the federal government, include administrative flexibility, and expedite assistance to state and local governments. Participation is open to states, federally recognized Indian tribes, state agencies, local governments, and other local government entities.
The pilot program, which was launched in June 2007 and will end in December 2008:

- Provides grants on the basis of estimates for large projects up to $500,000 (for debris removal (Category A) and permanent work (Category C-G),
- Provides for an additional 5% cost share to applicants that have FEMA-approved debris removal plans and two prequalified debris and wreckage removal contractors identified prior to disaster (Category A),
- Allows applicants to retain revenue from salvage value of recyclable disaster debris FEMA pays federal share for all eligible work, including sorting) (Category A), and
- Reimburses the straight- or regular-time (in addition to overtime) salaries and benefits of staff performing debris-related activities (Category A).

To date there have been positive results. A report is due to Congress in March 2009.

Greg Pekar
Texas Department of Public Safety Governor's Division of Emergency Management, State Hazard Mitigation Officer

Within the Governor's Division of Emergency Management (GDEM) is the Mitigation Section, which maintains the State Hazard Mitigation Plan, review local mitigation plans, provides hazard mitigation training for local officials, and administers a number of pre- and post-disaster mitigation grant programs for local and regional governments. In the aftermath of major disasters, mitigation staff members assist with the management of disaster recovery operations and coordinate planning for post-disaster mitigation programs with their federal counterparts and local officials. (http://www.txdps.state.tx.us/dem/pages/hazardmitigation.htm)

From the standpoint of mitigation, the best outcome of the recovery process would be minimized coastal development resulting in reduced costs of response, evacuation, and public sheltering. Understanding that this may not be fully achievable, a desired outcome would be coastal construction that is floodplain and wind-code compliant to reduce costs of public sheltering.

In Galveston, Ike's still-water flooding was recorded at 10.5 feet. The base-flood elevation was 11 feet. At a minimum, homes should have been elevated 6 feet above the ground. These homes may have escaped still-water flooding, but likely suffered from wave action. In some instances, homes that were properly elevated did not survive the storm. Initial reports suggest that multifamily development over parking garages would be a much more sustainable way of rebuilding than single-family homes. Specifically, this type of development would include large blocks of greenspace between multifamily buildings set well-back from beach with first floor "flow-through" parking garages and 130 mph wind-code construction. Prestorm population densities would need to be maintained so as not to increase evacuation pressures.

GDEM is working with the General Land Office (GLO) on a buyout program. They are currently looking for nonfederal funds. Another mitigation option is demo-rebuild. It is cheaper to demolish and rebuild a structure than to elevate it. A redevelopment approach that minimizes development by conducting eight demo-rebuilds for every one buyout is under discussion.

Recent code enforcement and floodplain permitting has proven to be successful. The vast majority of the structures lost predated the Flood Insurance Rate Maps and were not elevated. Newer construction is floodplain and code compliant. Nevertheless, they may still be vulnerable because the conditions in place when the floodplain was delineated may have changed. Building permits are being issued in Galveston based on prestorm flood maps. GDEM is worried that homes rebuilt based on the old maps may end up below the new base-flood elevation.

Susan Ivester Rees
U.S. Army Corps of Engineers (Mobile District), Mississippi Coastal Improvements Program, Program Manager

In December 2005, Congress directed the Corps to conduct an analysis and design to address hurricane and storm damage reduction (not protection), salt water intrusion (Lack of freshwater surface flows, shoreline erosion, fish and wildlife preservation, and other water related resource projects in Mississippi in the wake of the 2005 hurricanes. (http://www.mscip.usace.army.mil)

A plan of action to develop a comprehensive plan of improvements was submitted in June 2006. Developed in conjunction with other federal agencies and state and local governments, it included 15 near-term projects recommended to get the coast back to the point where it could begin to recover. All 15 were authorized and funded ($107 million total) by Congress in May 2007. These projects include preserving and restoring wetland and coastal forests, restoring dune systems, restoring lost capacity of bayous and drainage canals, repairing outfalls, modifying shore protection projects, repairing and constructing seawalls, repairing and replacing bridges, replacing stormwater wall braces, restoring the sand beach, and purchasing and removing residences in low-lying areas.

The comprehensive plan for improvements to be made over the next 30-40 years, which is being developed in coordination with the State of Mississippi, was due to Congress by December 31, 2007. The Corps anticipates that it will be delivered to Congress in April 2009. It will contain a number of elements, including:

- Activities for which other governmental entities are responsible (e.g., hurricane risk reduction education, hurricane and storm warning system, hurricane evacuation planning, floodplain management, building codes, zoning codes, and long-term critical infrastructure/facility relocation)—These will require coordination among a number of players from federal, state, and local governments; academia; and nongovernmental organizations.
- Barrier island restoration—This project includes restoring the islands to their pre-Hurricane Camille condition. This will require a significant coordinated effort.
- Homeowner's assistance and relocation (near- and long-term)—Over time, structures and fill will be removed. Properties will be converted to wetlands. Initial resistance from homeowners now giving way to acceptance following Gustav and Ike.
- Moss Point Municipal Relocation Project—This involves moving the government complex out of the floodplain and converting the land back to open space.
- Waveland Floodproofing Pilot—This project involves elevating homes and demonstrating the techniques to the general public.
- Forrest Heights levee—This small levee protects approximately 200 homes in a culturally significant area. It was overtopped during Katrina. The Corps will work the Natural Resource Conservation Service to restore it to provide 100-250 year risk reduction (exceeding its prestorm protection level).
- Coastal forest and wetland restoration—There is a large number of acres of coastal forest wetlands that if restored would take little to maintain environmental benefit and increase in stormwater capacity
- Coast-wide beach/dune restoration
- Submerged aquatic vegetation restoration
- Freshwater diversion—This project aims to restore salinity conditions in the western Mississippi Sound to that of the 1950s, when it was a very productive oyster habitat.