Katrina Impact Assessment:  
A Review of NOAA’s Interactive Mapping Service

The Katrina Impact Assessment Project is a joint effort by the NOAA National Coastal Data Development Center (NCDDC), the Mississippi Department of Marine Resources (MDMR), the Naval Research Laboratory-Stennis (NRL), and the Department of Marine Sciences, University of Southern Mississippi-Stennis. The goal of the project is to “assess and monitor the environmental and physical impact of Hurricane Katrina on the ecosystems and infrastructure of the Mississippi Gulf Coast” [NOAA KIA]. A key feature of this project was the creation of an interactive, GIS-based, mapping service that allows for the combination of demographic and hazard data. This paper will describe the background and context for the mapping service, explain the website’s functionality and analysis tools, relate the perceived impacts and benefits of the tool, and discuss the future direction of the project.

Background and Context

To help establish the context for the Katrina Impact Assessment interactive mapping service, it is instructive to provide an overview of the general organization of the National Oceanic and Atmospheric Administration (NOAA). NOAA is an agency of the U.S. Department of Commerce that is focused on the conditions of the oceans and the atmosphere. According to its webpage, NOAA’s mission is “to understand and predict changes in the Earth’s environment and conserve and manage coastal and marine resources to meet our nation’s economic, social and environmental needs” [NOAA]. NOAA is comprised of six branch services, one of which is the National Environmental Satellite, Data, and Information Service (NESDIS), which aims to provide global environmental data so as to “promote, protect, and enhance the Nation's economy,
security, environment, & quality of life.” [NESDIS]. The NESDIS is then host to four main data centers focusing on climate data, geophysical data, oceanographic data, and coastal data. The latter center, the National Coastal Data Development Center (NCDDC), has a mission to “support ecosystem stewardship by providing access to the nation's coastal data resources” [NCDDC]. NCDDC seeks to integrate a wide range of coastal data and provide this combined data to interested persons through the Internet. The Katrina Impact Assessment service was the direct result of the NCDDC and is a specific example of an integrated information source. Other NCDDC projects are illustrated in Figure 1.

Within NOAA, GIS is used frequently because decision-makers have learned that the information provided with a GIS helps not only to analyze data, but also simply to visualize and present information to the public in a meaningful way. Two preceding NCDDC GIS-based projects help to further illuminate the background and context of the Katrina Impact Assessment service. NCDDC developed the Community Vulnerability Assessment Tool (CVAT) (see Figure 2), which was designed to help communities understand their hazard vulnerability and take steps to reduce it.
CVAT was appreciated in coastal communities, but in many cases, a severe lack of current and comprehensive coastal data prevented the tool from being used effectively. To address this information gap, NCDDC undertook a subsequent project: the Coastal Risk Atlas (CRA). The CRA is intended to assist coastal communities in their “hurricane preparedness efforts by providing the data and methodology necessary to conduct vulnerability assessments” [CRA]. Data provided includes hazard model output information (such as storm surge, maximum winds, and flood elevation levels), demographic data, and land use data. However, not only is NCDDC helping to provide this coastal data, they are also striving to provide on-line tools for analyzing the data. These analysis tools focus on using mapping technology to pull together diverse geographical data sets for comparison and assessment. Figure 3 shows a selection of data that is available for an area along the Mississippi coast.

Figure 3  CRA Mapping for Bay St. Louis, Mississippi
For those who were not aware of the CRA until after Hurricane Katrina, the tool provides sobering insight into the level of detailed knowledge of the vulnerability of these coastal communities. This new insight illustrates Jim Schwab’s comment that “the aftermath of one disaster is the prelude to the next.” Now is one of the “teachable moments” when innovative tools such as the CRA can be publicized so that reactive websites, such as the Katrina Impact Assessment are needed with diminishing frequency.

**Nature of the Application**

The Katrina Impact Assessment website visually displays the environmental and physical impact of Hurricane Katrina on coastal Mississippi. This is done with an interactive mapping service that offers a common, geospatially referenced view of recent observations. Some examples are post-Katrina survey data, photogrammetry, and satellite imagery such as LIDAR and LandSat. The data provided couples demographic information with Katrina related hazards, such as inland flooding. Analysis of storm debris and point source pollution from wrecked vessels, industrial sites, and septic systems is also being conducted.

The interactive map service is available for all three of Mississippi’s coastal counties: Hancock, Harrison, and Jackson. The maps are Internet accessible for those who have Javascripting. A description and picture of the Hancock County interactive map (Figure 4) are shown below as an example:

“Interactive mapping for Hancock County, MS includes 64 Post Hurricane Katrina near one-foot resolution black and white aerial photos flown on September 2, 2005. The imagery spans from the Hancock County beaches to just north of Interstate 10. Ancillary data sets include the local transportation network, landmarks, base layers, and Federal Emergency Management Agency (FEMA) Post Katrina damage and impassable routes”.

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Figure 4 Interactive Katrina Impact Assessment Mapping for Hancock County, MS

The interactive map gives simple, visual data such as landmarks (e.g. schools, hospitals, and airport) high water marks, surge contours, level of damage (see above), and Category 1-5 impact. Individuals can find specific addresses and conduct their own local damage assessment with the interactive mapping data. The GIS Table of Contents is clearly laid out with layers of data that can be turned on or off. These interactive maps are appropriate for use by those who have minimal experience with GIS.

What information can the viewer gain from these maps? Of course, users are able to see a wide variety of impact data as described above and also listed in detail in the appendix. The site also offers the option to locate an address using geocoding. Additionally, the mapping service identifies boat launch locations and allows users to hyperlink to before and after images of that launch (see Figure 5).
Another important feature of the website is that it has a very detailed collection of metadata. Figure 6 illustrates how this metadata is listed and accessible. Metadata allows users to understand the source of the data and the context for its use.

**Benefits to Society**

The primary intention and benefit to society of the Katrina Assessment Project is to provide information to the public on the quantitative and spatial extent of the impacts of Hurricane Katrina. While the project staff does not have access to detailed information on the characteristics of the people using the mapping service to gather information, they do know that the site has had an enormous number of hits. NCDDC representatives have attempted to conduct
active outreach to ensure that the community is aware of their mapping resources. For example, they have set up display stations in local malls and also given demonstrations at local high schools. For the most part, residents were very interested in the site and said they would look at it at home. There is also reason to believe that local businesses, such as insurance companies, have also been utilizing the NCDDC mapping projects.

Along with providing a vast information source, the Katrina Impact Assessment also acts to provide transparency within the governmental agency. In our conversations with program staff, they indicated that they essentially post all available data that they have. In this age of strict national security, it can be disheartening to always be told that information is not available due to security concerns. The fact that the NCDDC has, in fact, posted the majority of available information speaks to their commitment to providing truly unbiased technical information that can be used to benefit a wide variety of people. One exception that the analysts mentioned to us was that they waited until the situation stabilized before uploading the derelict boat dataset so as to avoid potential looting.

While the primary benefits are the provision of a vast amount of data and improved agency transparency, the program analysts seem to also hope that a secondary effect of the programs will be to build the capacity for local communities to understand their vulnerability and take steps to plan for their own hazard mitigation.
Future of the NCDDC Projects

New information is continually being added to the website, though, to what extent depends on the availability of new data. For the Katrina site, there are no immediate plans to add any new GIS layers. There are, however, plans to add recovery pictures that have been taken since the storm. The program analysts expect to leave the Katrina Impact Site up for about another year. Also, the CRA is in a growth state, with plans to integrate a number of new layers into the maps. Some of the new data sets include: environmental sensitivity, the USNG (United States National Grid), and active tropical storm tracks. Along with these new data sets, there are plans to introduce geocoding, similar to in the Katrina Impact Assessment site, to allow people to input an address or latitude/longitude pair to zoom into. Overall, GIS applications are well received within NOAA, however, the degree to which they will continue to be established is still not clear [Jason Stradtner, personal communication].

Conclusion

Providing this level of detailed information for interpretation directly by local communities is essential if these coastal communities are ever to have a comprehensive understanding of their level of vulnerability. Also, it is critical that these communities are able to use this information to engage in a planning process that will take measures to protect their community and plan for disaster mitigation. Without such a wealth of information, the planning process may well be impossible.

However, is just providing information enough? As we learned from the previous CVAT and CRA projects, this wealth of information has been available to communities before Hurricane Katrina, and unfortunately, it appears to have taken a disaster of this magnitude to call attention to the availability of resources to support disaster planning. While NCDDC has a direct
focus on information provision, perhaps a beneficial future direction for the organization would be to focus on outreach efforts to local individuals and community governments to ensure their awareness of these innovative mapping services.
References


NOAA webpage. Available at: www.noaa.gov; accessed March 5, 2006.

NOAA CRA website. Available at: www.ncddc.noaa.gov/cra; accessed March 6, 2006.

NOAA KIA webpage. Available at: www.ncddc.noaa.gov/Katrina/; accessed March 6, 2006.