

The Coastal Risk Atlas – A Conceptual Discussion

U.S. natural disaster losses are estimated to be between \$10 billion and \$50 billion annually and are concentrated along the Nation's coasts. Coastal areas are particularly susceptible to the catastrophic impacts of hazards. Between 1992 and 1997, 71 percent of the federally declared disasters in the U.S. occurred in coastal states or territories. The destructive potential from natural hazard events is rising dramatically due to increasing development in coastal areas. Rapid, sprawling growth in coastal areas has the obvious consequence of increasing human exposure to natural hazards. The U.S. has an expansive and diverse coastline that supports a disproportionate percentage of the Nation's population. The 451 coastal counties contain just over 50 percent of the U.S. population, yet account for approximately 20 percent of the total U.S. land area. During the last decade, 17 of the 20 fastest growing counties were located along the coast. In addition, 19 of the 20 most densely populated counties in the Nation are coastal counties, as are 16 of the 20 counties with the largest number of new housing units under construction.

The National Oceanic and Atmospheric Administration's (NOAA) Coastal Services Center (CSC) recently developed the Community Vulnerability Assessment Tool (CVAT). CVAT is an informational aid, distributed on CD, designed to assist communities in their efforts to reduce hazards vulnerability through strategies relating to awareness, education and mitigation. This product contains a methodology that helps State and local governments determine and prioritize their localities' vulnerabilities to coastal hazards. Physical factors such as the location of critical facilities and infrastructure relative to high-risk areas, the distribution of vulnerable populations such as the elderly, poor and under-insured, significant environmental resources, and the vulnerability of primary economic sectors are included as issues for consideration.

Although well accepted with over 2,000 copies distributed, this work showed that a significant hurdle to successful application in study areas is the lack of comprehensive and up-to-date coastal data and the difficulty of accessing and analyzing these data with modern analysis tools including the Internet and Geographic Information System (GIS) approaches. Also, many

localities lack the necessary resources to collect pertinent data. Thus, key goals of the CRA are to provide both easy access to the needed data and an automated means by which users can successfully use these data for completion of vulnerability assessments.

Beyond local vulnerability assessments however, the CRA will provide researchers, policy makers, coastal zone managers, planners, etc. with an access portal to specific coastal hazards data and metadata. Because the diverse types of data necessary to answer specific hazards related questions may currently exist in any number of different locations, the CRA seeks to link users to needed data via a single location, the National Coastal Data Development Center (NCDDC).

The coastal environment varies dramatically at the regional scale, making estimates and predictions of coastal behavior at a National scale difficult. The Nation's diverse coastal environment includes rocks and cliffs, islands, beaches, spits, dunes, coastal wetlands, mangrove areas, river mouths, deltas, plains, headlands, and bays. At the regional level, a variety of studies are available focusing on the rates, timing, probability, location, and intensity of coastal responses of the various environments to forcing hazards. This type of resource information can be catalogued and referenced for use in similar environments when making hazard mitigation and planning decisions.

Information related to coastal storms will be initially emphasized because of their dominant importance as coastal hazards. Portions of the CRA will incorporate and synthesize information from numerous sources including government agencies such as NOAA, U.S. Geological Survey (USGS) and the Federal Emergency Management Agency (FEMA), university research results, and special studies. Information will be provided on probabilities and risks associated with coastal storms. It will integrate risk data on multiple hazards including meteorological events such as hurricanes, tropical cyclones and severe extra-tropical storms. Also, data will be provided on historical hazard events and their impacts on coasts. In addition to capturing the information on episodic hazard-inducing events, historical information will be incorporated for chronic and long-term hazard-inducing factors such as water level changes, shoreline changes, and El Niño effects.

To complement the historical information, the CRA will also incorporate the results of various hazard impact models. Outputs from many models such as flooding and storm surge models can provide valuable risk information for use in local decision making. Initially, the effort will focus on incorporating model output as information data layers with an eventual goal of running real-time model scenarios through the CRA. Similarly, observational data will be used to provide historical perspectives with an eventual goal of providing access to real-time or near real-time observational data utilizing NCDDC information technologies.

A critical element in defining hazard vulnerability is understanding the physical environment and how it responds to the forces imposed by hazard events. Yet another component of this project will focus mainly on the coastline's physical characteristics. Baseline, geologic, oceanographic, and atmospheric data are important information resources in considering vulnerability to coastal storms. Together, these data can be used to assess and anticipate coastal responses to hazards. Biological and ecological data also will be included so that hazard caused biological and ecological effects can be determined as part of subsequent vulnerability assessments.