

[Read Full Report](#)

Date: Jan. 23, 2009

Contacts: Jennifer Walsh, Media Relations Officer

Luwam Yeibio, Media Relations Assistant

Office of News and Public Information

202-334-2138; e-mail <news@nas.edu>

FOR IMMEDIATE RELEASE

MORE ACCURATE FEMA FLOOD MAPS COULD HELP AVOID SIGNIFICANT DAMAGES AND LOSSES

WASHINGTON -- Significant loss of life, destroyed property and businesses, and repairs to infrastructure could be avoided by replacing Federal Emergency Management Agency flood maps with ones that contain high-accuracy and high-resolution land surface elevation data, says a new report from the National Research Council. The benefits of more accurate flood maps will outweigh the costs, mainly because insurance premiums and building restrictions would better match the actual flood risks. Coastal region flood maps could also be improved by updating current models and using two-dimensional storm surge and wave models.

Flood maps are used by FEMA to set flood insurance rates, regulate floodplain development, and inform those who live in the "100-year" floodplain of potential hazards, and they require continuous maintenance and revision due to land development and natural changes to the landscape. FEMA's Map Modernization Program of 2003 to 2008 resulted in digital flood maps for 92 percent of the continental U.S. population, most of whom live in areas that had outdated maps or no maps at all. However, after a \$1 billion investment, only 21 percent of the population have maps that meet all of FEMA's data quality standards.

For this reason, FEMA and the National Oceanic and Atmospheric Administration asked the Research Council to examine the factors that affect flood map accuracy; assess the costs and benefits of producing more accurate maps; and recommend ways to improve mapping, communication, and management of flood-related data. In response, the committee that wrote the report collected and analyzed information on selected streams in Florida and North Carolina and on the economic costs and benefits of creating new digital flood maps in North Carolina. Information from the North Carolina Floodplain Mapping Program, which has high-accuracy topographic data and maps for nearly the entire state, allowed the committee to compare new and traditional mapping methods among three distinct topographical regions: mountains, rolling hills, and coastal plains.

The costs for improving flood maps would come from collecting, updating, modeling, and analyzing the flood-related data; increasing construction of property and businesses; losing land to development; updating regulations; and informing the public of changes. The committee found that these costs would be outweighed by benefits of more accurate flood maps, including reduced loss of life, property, and businesses; more efficient planning and response for emergency services; and preservation of natural functions of floodplains. In addition, better maps would provide more reliable measures of flood hazard, which would enable more targeted land-use regulations and structures to be insured at appropriate levels. Maps that include estimates of the height flood water will rise or exceed during a 100-year flood provide significantly more benefits than those that do not.

FEMA commonly produces maps using data from the U.S. Geological Survey National Elevation

Dataset (NED), which is developed from airborne and land surveys. However, map accuracy would be increased by updating and generating information using high-accuracy topographic data, such as that generated by "lidar," which measures elevation using aircraft-mounted lasers, the committee said. For the three topographical regions studied, differences in ground elevation measurements by lidar and NED were about 12 feet, with the lidar heights measuring both higher and lower than the NED. These differences significantly affect predicting the extent of flooding, the committee stated. Overall, the total areas of floodplains defined from lidar and from the NED were similar in two study regions and differed in shape by 20 percent in one study region. As lidar data coverage is sparse, FEMA should increase collaboration with federal, state, and local government agencies to acquire lidar data throughout the nation.

While improvements to inland flood maps can focus on harnessing available technology, coastal flood maps could be improved by employing better models that enhance understanding of the coastal flooding process. The committee recommended improving the accuracy of base flood elevations by replacing FEMA's one-dimensional model for calculating wave heights, which was introduced in the 1970s, with a two-dimensional wave model. Further enhancements could come by coupling this with a two-dimensional surge model and including models that account for erosion processes, effects on structures, and variations in elevation.

FEMA's transition to digital flood mapping also provides opportunities for better informing the public of flood hazards and risks through maps and Web-based products, the committee noted. To adequately convey risk, the maps and products must show where the flood hazard areas are located and the likely consequences of flooding, such as damage to houses or coastal erosion. Additionally, floodplain residents should know how their land elevation level compares with various possible flood heights, which will offer a finer discrimination of potential risk. Currently, maps that show only floodplain boundaries imply that every building in a designated flood zone may flood and every building outside the zone is safe.

The National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council make up the National Academies. They are independent, nonprofit institutions that provide science, technology, and health policy advice under an 1863 congressional charter. Committee members, who serve pro bono as volunteers, are chosen by the Academies for each study based on their expertise and experience and must satisfy the Academies' conflict-of-interest standards. The resulting consensus reports undergo external peer review before completion. For more information, visit <http://national-academies.org/studycommitteprocess.pdf>. A committee roster follows.

Copies of [MAPPING THE ZONE: IMPROVING FLOOD MAP ACCURACY](#) are available from the National Academies Press; tel. 202-334-3313 or 1-800-624-6242 or on the Internet at [HTTP://WWW.NAP.EDU](http://www.nap.edu). Reporters may obtain a copy from the Office of News and Public Information (contacts listed above).

#

[This news release and report are available at [HTTP://NATIONAL-ACADEMIES.ORG](http://national-academies.org)]

NATIONAL RESEARCH COUNCIL

Division on Earth and Life Studies
Board on Earth Sciences and Resources
and
Water Science and Technology Board

COMMITTEE ON FEMA FLOOD MAPS: ACCURACY ASSESSMENT AND COST-EFFECTIVE

IMPROVEMENTS

DAVID R. MAIDMENT (CHAIR)
Professor of Civil Engineering, and
Director
Center for Research in Water Resources
University of Texas
Austin

DAVID S. BROOKSHIRE
Professor of Economics
Department of Economics, and
Director
Science Impact Laboratory for Policy and Economics
University of New Mexico
Albuquerque

J. WILLIAM BROWN
Assistant City Engineer, and
Director
Environmental Engineering Bureau
City of Greenville
Greenville, S.C.

JOHN DORMAN
Director
Geospatial and Technology Management Office
North Carolina Division of Emergency Management
Raleigh

GERALD E. GALLOWAY JR.*
Glenn L. Martin Institute Professor of Engineering
University of Maryland
College Park

BISHER IMAM
Adjunct Associate Professor
Department of Civil and Environmental Engineering, and
Senior Researcher
Center for Hydrometeorology and Remote Sensing
University of California
Irvine

WENDY LATHROP
President
Cadastral Consulting LLC
Bala Cynwyd, Pa.

DAVID F. MAUNE
Senior Project Manager
Dewberry and Davis
Fairfax, Va.

BURRELL E. MONTZ
Professor and Director of Graduate Studies
Department of Geography, and
Associate Director

Center for Integrated Watershed Studies
Binghamton University
Binghamton, N.Y.

SPENCER ROGERS
Extension Specialist
North Carolina Sea Grant
Wilmington

KAREN L. SCHUCKMAN
Instructor in Geography
John A. Dutton e-Education Institute
College of Earth and Mineral Sciences
Pennsylvania State University
University Park

Y. PETER SHENG
Professor of Coastal and Oceanographic Engineering
Department of Civil and Coastal Engineering
University of Florida
Gainesville

JUAN D. VALDES
Professor and Head
Department of Civil Engineering and Engineering Mechanics, and
Professor
Department of Hydrology and Water Resources
University of Arizona
Tucson

RESEARCH COUNCIL STAFF

ANNE LINN
Study Director

* Member, National Academy of Engineering