

Modeling Pakistan's flooding

October 8 2010



Residents flee the rising floodwaters in Pakistan. Credit: Cornell University

The catastrophic flooding in Pakistan, which began with the annual monsoons towards the end of July 2010, has affected nearly 62,000 square miles -- or one fourth of the entire surface of the USA and Alaska. Six million are homeless. Eight million children are at risk of disease. More than 1,600 are dead already. Flood waters have washed away entire towns, thousands of miles of roads and railways, and damaged the infrastructure of a large portion of the country. Thousands of health facilities are destroyed and rising waters have inundated crop-producing areas, threatening a food crisis. The Pakistani government now struggles to rescue and provide aid to millions -- while still fighting with militant Islamist forces in many of the hardest-hit regions.

To help Pakistani authorities cope, a new Dept of Homeland Security Science and Technology Directorate [computer model](#) is being used by hydraulic engineers at the U.S. Army Corps of Engineers (USACE) -

Engineer Research and Development Center (ERDC) Coastal and Hydraulics Laboratory (CHL) and forwarded to their counterparts in Pakistan. Under S&T's Infrastructure and Geophysical Division the new computer model simulates the flooding, estimates the total drawdown of the floodwaters, and predicts how long it will take the waters to recede. DSS-WISE (Decision Support System – Water Infrastructure Security) incorporates and integrates thousands of data points – from historical, geographical, economical, and satellite info – and paints a current picture and prediction scenario to help with Pakistan's disaster efforts.

The flooding scenarios are set up with a GIS (geographic information system)-based user-friendly pre-processor. DSS-WISE provides two-dimensional accurate predictive maps of flood arrival times, flood depths and velocities for the specified scenarios. The results provided by the numerical model (CCHE2D-FLOOD) can be directly imported onto a GIS environment to be displayed as maps and overlaid on various types of satellite imagery and background maps.

Flood simulations carried out by ERDC-CHL cover very large areas and the simulation times are relatively long (more than a month). The simulations are aimed not only for the propagation of the flood during the rising period but also for predicting the time required for the flood waters to recede. That is where the extremely robust algorithms implemented in DSS-WISE, which take into account wetting and drying, prove their worth.

The model was developed for S&T by researchers at the National Center for Computational Hydroscience and Engineering (NCCHE) at The University of Mississippi (UM). The model is the product of a research project of the Southeast Region Research Initiative (SERRI), a program funded by the DHS S&T. S&T's Mike Matthews is the program manager. The feedback given to S&T by the ERDC-CHL personnel while using the DSS-WISE software is extremely valuable to the

NCCHE-UM researchers (<http://www.ncche.olemiss.edu/>) who are preparing for the next phase of model development through sponsorship from SERRI (<http://www.serri.org>).

Pakistan's flood disaster has given a demanding workout to the DSS-WISE software," says Matthews, " but, it has proven it can provide accurate and timely predictions even under very challenging modeling requirements."

Provided by US Department of Homeland Security

Citation: Modeling Pakistan's flooding (2010, October 8) retrieved 23 April 2024 from <https://phys.org/news/2010-10-pakistan.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.