The Iowa Flood Center
Report of Activities: February 2012

For Iowans, information is the key to being ready for the next flood. The Iowa Flood Center (IFC) at the University of Iowa is working to provide Iowans with accurate, state-of-the-science-based information to help individuals and communities better understand their flood risks. The IFC was established and funded by the State of Iowa in 2009. It is headquartered at the C. Maxwell Stanley Hydraulics Lab, home to IIHR—Hydroscience & Engineering on the University of Iowa campus. **The IFC's overarching objective is to improve flood monitoring and prediction capabilities in Iowa.** This is being accomplished through a variety of activities, all with the common goal of improving communication of the latest research, information, and technologies to agencies, policy makers, citizens, and other stakeholders.

In its first three years, the IFC has focused on the most promising projects for improving flood monitoring and prediction in the state in a short amount of time. Great progress is being made on these projects. Efforts initiated or ongoing in year three include:

- **The Iowa Flood Information System** (IFIS), which can be accessed through the IFC website (www.iowafloodcenter.org). IFIS is an easy-to-use, Google Maps-based online application accessible to anyone with a computer and an Internet connection. IFIS provides Iowans with up-to-the-minute information on rainfall, stream levels for more than 500 local communities, and more. Armed with this knowledge, officials and property owners can make better-informed choices.
- **Development and deployment of 100 affordable electronic stream sensors**, which measure river and stream levels and transmit up-to-the-minute data to the Center. The sensors are placed on bridges and send information via cell phone to a central database, providing an accurate picture of current stream levels. In partnership with the DNR, the IFC recently completed deployment of a network of 100 sensors across the state, with an addition 25 to be added in 2012 in central Iowa in partnership with the Iowa DOT. Current data from these sensors are available on IFIS (www.iowafloodcenter.org).
- **Ongoing development of high-resolution, web-based flood inundation maps** for Iowa's largest and most flood-vulnerable population centers. Researchers are creating detailed maps to illustrate the extent of flooding under different conditions. This information is available to the public so residents can see how predicted flood levels could affect their property. Interactive maps for Iowa City/Hills, Charles City, Cedar Falls/Waterloo, Des Moines, Cedar Rapids, Mason City, and Elkader are available at www.iowafloodcenter.org/maps. Maps for Ames, Ottumwa, Sioux City, and Spencer are underway, with expected completion in 2012.
- **Development of floodplain maps** for most of Iowa. The IFC is about 18 months into the four-year Iowa Floodplain Mapping Project, funded with $10 million from the U.S. Department of Housing and Urban Development. Working closely with the Iowa DNR and FEMA, the IFC is developing floodplain maps for the 85 Iowa counties declared federal disaster areas after the 2008 floods. Once completed and approved by FEMA, the maps will be available online to guide floodplain regulation and management.
- **Identification of basin boundaries upstream** from many Iowa communities at risk for flooding. This information will help citizens understand how precipitation upstream impacts them. NEXRAD-based rainfall and stream sensor information is included on the map.
- **Development of new soil temperature and soil moisture sensors** that transmit soil conditions to the IFC. This is a current prototype project by IFC researchers. Information about soil conditions will improve the accuracy of IFC flood prediction models.
- **Four projects with faculty members at Iowa State University are complete or nearly complete**. These projects complement other IFC initiatives and will improve future flood prediction models. With funding totaling $300,000, these projects include:

1. A snowmelt prediction model under development to allow flood prediction to be made during periods of rapid snowmelt. Preliminary model tests are conducted for the Squaw Creek watershed near Ames, Iowa. Results are being compared to satellite-based observations of snow cover to verify that snowpack is being properly modeled.
2. A new basin-specific precipitation metric, based upon the concept of water travel times and "traffic jams," was developed to more accurately analyze climatological connections between precipitation and floods.
3. Development of a real-time rainfall forecasting system that will maximize accuracy for warm season heavy rain events responsible for most of Iowa's worst flooding. Several variations of the model have been tested using state-of-the-art validation techniques; ensembles of different model configurations will soon be applied.
4. Continued evaluation of the impacts of different crop and land management systems on the hydrology and water quality of the Raccoon River watershed, including the effects of introducing more perennial grasses within typical corn and soybean rotations. Recent research has also focused on evaluating the effects of projected climate change in the 2050s on the hydrology of the Raccoon River.

- **Coordination of watershed projects** in both urban and rural areas, supported by an $8.8M HUD contract. The projects seek to:
    - Maximize soil water holding capacity from precipitation;
    - Minimize severe soil erosion and sand deposition during floods;
    - Manage water runoff in uplands under saturated soil moisture conditions; and
    - Reduce and mitigate structural and nonstructural flood damage.

  This project is just getting underway, but promises to make significant improvements in several watersheds, while collecting critical data to help design and evaluate new strategies for reducing and/or managing floods.
- **Education of about 20 graduate and undergraduate students** at the UI and ISU who are currently involved in IFC work. These students get hands-on training and research expertise that spans a variety of academic disciplines, preparing them for the complex problems of the future.

Vision for the Future

The new HUD project will allow the IFC to begin using its modeling capabilities to evaluate different flood mitigation strategies. The new stream stage sensor network currently in place, other new sensors under development, and collaborations with Iowa State University will contribute to the development of accurate short- and long-term flood prediction models. As the Iowa Flood Center moves forward on current projects, plans are also being formulated for future projects to benefit Iowans, including the potential expansion of the IFC into a national center (pending a new $25M grant application to the National Science Foundation).

Additional Information

Follow IFC progress on its website: http://www.iowafloodcenter.org. This site provides up-to-date status on IFC projects, with updates and new initiatives coming online regularly. The IFC website is also a portal through which citizens and decision-makers can access important maps, sensor data, and other up-to-the-minute information about the rivers and streams in their communities.

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IIHR Hydroscience & Engineering