Flooding in Illinois

Background
Since the days when humans foraged for food to the industrial revolution and through to modern times, we have sought places that are close to water for drinking, washing, navigating, and natural beauty. But building so close to water can come with a price: FLOODING. Illinois State Water Survey (ISWS) scientists conducted a series of studies on small urbanized watersheds and concluded that the increase in recent flood peaks was due to urbanization and recent increases in extreme weather patterns. As a result, the trend of increasing flood damage will only worsen if we do not make changes to where and how we build in the future.

Traditional Methods
While the traditional method for flood risk reduction has been levees (a man-made linear hill parallel to a river), recent research has shown that levees may cause more prolonged flooding and therefore greater damage than if the levees were not in place. Levees are designed for a specific water height above normal river flow (called flood stage). If the flood stage is higher than the levee or if the levee is weakened by repeated wetting and drying, water will spill over or cut the top of the levee and get trapped on the side the levee was meant to keep dry of flood waters. These trapped waters stay longer and cause more damage than if the levee was not in place and the flood waters could retreat naturally.

Furthermore, the modern sustainable methods for flood risk prevention advocated by ISWS scientists include:
• Hazards Reduction – do not build in the flood plain or do have designated “flood” areas.
• Water Management – green infrastructure and other techniques can help water to infiltrate in urban areas rather than run off and swell urban rivers.

Sustainable Methods for Reducing Damages Caused by Flooding

Flood Hazard Identification and Risk Assessment
One of the easiest ways to prevent flood damage is by not building new buildings in floodplains. The Coordinated Hazard Assessment and Mapping Program (CHAMP) at the ISWS is a Cooperating Technical Partner with the Federal Emergency Management Agency (FEMA). CHAMP collaborates with the Illinois Department of Natural Resources’ Office of Water Resources (IDNR/OWR). The CHAMP team prepares regulatory Flood Insurance Rate Maps that identify river flood hazards and then they take the next step to conduct risk assessments for individual structures along the river. This map and assessment helps governments and individuals in Illinois identify high risk structures and prioritize buyouts.

Stormwater Management
CHAMP has conducted studies to determine watershed-based release rates to maximize the benefits of stormwater retention and detention. They have also used GIS spatial analyses to identify urban areas where ponding is likely to occur. A spatial analyses of land use and characteristics can identify potential sites for placement of stormwater detention, retention, and green infrastructure.

Community Engagement
With the ultimate goal of reducing flood damages, CHAMP staff provide materials and tools to help achieve this objective. CHAMP staff partner with the IDNR/OWR and FEMA to identify Illinois communities that would benefit from updated engineering analyses and mapping services. Once the data is compiled, CHAMP staff engage in ongoing discussions with state and local officials and watershed stakeholders through a series of meetings to discuss flood issues and technical data needs. Local floodplain managers, community engineers and planners, developers, watershed groups, and other stakeholders participate in the meetings, providing additional information and discussing flood issues, technical data needs, and the status of mitigation planning in the watershed.

Research
CHAMP researchers apply the tools and knowledge they glean from preparing flood maps and working with communities to identify research needs. Projects include trends in heavy rainfall events, peak flows, effects of urbanization, stormwater management and mitigation, projected climate change impacts, and detailed hydrologic and hydraulic modeling.