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S.C. Floods 2015-16: Lessons Learned

Meteorology

- **Heavy rainfall events, or “rain bombs,” are becoming more common.** The amount of precipitation in heaviest storms increased by 27 percent from 1958 through 2012, according to a report from the National Science and Technology Council.
- **The terms describing the historical chance of flooding can be confusing.** When hydrologists say the volume in rivers and streams has reached the 500-year flood level, that doesn't mean such a flood will happen only once every 500 years. Instead, it means such a flood has a 0.2 chance of happening any year. In South Carolina, some regions experienced 500-year floods in 2015 and again in 2016.
- **Pay attention to weather forecasts.** Precipitation forecast models are more accurate than ever, and they provided early warning that more than 10 inches of rain would fall in 2015 and 2016 floods.
- **Storm surge is powerful.** The wall of water four to six feet deep created as Hurricane Matthew neared the state pushed sand hundreds of feet inland on Hunting Island and Edisto Beach.
- **Storm surge is capricious.** Though the Hurricane Matthew surge measured 6.2 feet in the Charleston Harbor, the peak arrived at low tide and caused much less damage than it would have six hours earlier or later at high tide.

Community planning

- **The movement of water in watersheds can be complex, and development can impact it in unexpected ways.** Runoff studies done for construction projects near both the Pepperhill and Shadowmoss subdivisions in Charleston County have indicated the projects wouldn't contribute to increased flooding, but those areas have flooded more often since the construction.
- **Flooding solutions can be costly.** The city of Charleston has spent, or pledged to spend, \$235 million on stormwater improvement projects from 1990-2020. Flooding in the past two years was less severe in areas where the projects have been completed.
- **Low-impact development designs can help.** The Fox Hollow subdivision on James Island features homes built on raised crawl spaces along a slight berm, with porous road pavement and a stormwater detention swale across from the homes. Those homes didn't flood in 2015 or 2016.
- **Improvements in mapping technology can aid flood response and community planning.** The National Oceanic and Atmospheric Administration's National Water Model was launched in August 2016, crunching more data than ever before in a flood model. The resulting flood predictions after Hurricane Matthew in 2016 were more accurate than the October 2015 flood predictions.
- **Home buyout programs should focus on neighborhoods, not individual houses.** Horry County used Federal Emergency Management Agency funds to buy frequently flooded properties after Hurricane Floyd in 1999. County officials now realize the most

effective uses of those funds were when several homes were bought in one area and the property transformed into water-retaining wetlands. Those areas flooded less severely in 2015 and 2016 than the areas where only a few scattered homes were bought and torn down.

- **More river gauges would help flood planning and response.** The 2015 flooding spotlighted the lack of river gauges for long stretches in Williamsburg and Georgetown counties. Gauges are expensive to install and maintain. The U.S. Geological Survey would like more gauges, but it adapted between the 2015 and 2016 floods to come up with a better system of deploying temporary gauges when flooding threatens an area.

Flood recovery

- **People want to help flood victims.** The response to the 2015 flood in terms of donations of goods and services was overwhelming. Emergency officials reacted by designating local groups as donation clearinghouses. Local leaders also made connections with the most effective national charity organizations in 2015 that helped when they were hit again in 2016.
- **Flood insurance isn't just for those in designated flood zones.** In the North Charleston area, about 40 percent of homeowners who filed federal flood claims in 2015 lived outside zones where flood insurance is required by mortgage lenders.
- **The federal aid available for recovery for homeowners without flood insurance is minimal and qualifying for it is difficult.** Federal Emergency Management Agency payouts to the uninsured in South Carolina after the 2015 flooding averaged \$3,169, and only 28 percent of applicants qualified.

Life-or-death decision

- **Turn around, down drown!:** It's not just a safety campaign slogan. The majority of the 24 deaths during the 2015 and 2016 floods in South Carolina happened after people drove into flooding on streets.