June 2006 Susquehanna River Basin Flood Event

The Flood Event

A combination of storm systems moved through central Pennsylvania and the southern tier of New York the last week of June, depositing 8 to 15 inches of rain at some locations. Hydrologic conditions in the Susquehanna basin were already wet from earlier rain events, and the resultant runoff caused flash flooding and river flooding at many locations. The most severe flooding in the basin occurred in the southern tier of New York along the Susquehanna and Chenango rivers, including Conklin, Unadilla, Greene, Binghamton, Vestal, Owego and Waverly, many of which suffered flood levels breaking long-standing records. As an example of the extreme nature of the event, the USGS estimated the recurrence interval at some locations on the Susquehanna Basin in NY:

Susquehanna River at Unadilla, NY	450 Years
Susquehanna River at Conklin, NY	450 Years
Chenango River at Sherburne, NY	500 Years
Chenango River at Greene, NY	Greater Than 500 Years

On the upper mainstem of the Susquehanna River down to Bloomsburg, PA, moderate to major flooding was reported. On the lower mainstem minor to moderate flooding occurred. Some of the eastern tributaries to the Susquehanna River, such as Swatara Creek, reported major flooding. The western subbasins (the Chemung, West Branch, and Juniata basins) reported little or no flooding, and the small contribution of flow from these areas minimized the flooding at locations along the lower Susquehanna River such as Harrisburg, PA, and the Town of Port Deposit, MD.

Forecasts and Response

The initial flood forecasts for the event were based on a storm track that would have concentrated much more rain in the Susquehanna River basin. Ultimately, the storm shifted eastward by 50 to 75 miles, bringing considerably less rain and runoff into the basin. The shift caused significant differences in the river forecasts and flood levels in the lower mainstem Susquehanna River. On average, the forecast lead-time in the Susquehanna Basin ranged from 7 hours to 17 hours.

The flood forecasts prompted emergency response in many counties, including the activation of evacuation plans, flood control levee closures, and installation of temporary berms and other flood control measures. Some specific examples include:

- A temporary floodwall erected in Scranton saved 1,800 homes from being flooded.
- The Lackawanna Emergency Manager evacuated 250 people out of Old Forge, PA.
- A forecast for flood levels at the top of Binghamton's levee prompted an evacuation of 3,000 people from the city.
- A precautionary decision was made to order the evacuation of 200,000 people in the Wyoming Valley, including the city of Wilkes-Barre. Later refined forecasts caused the order to be rescinded. Ultimately, about 60,000 people evacuated the area.
- Over 1,200 people were successfully rescued by emergency responders throughout Pennsylvania.

Damage Assessments

Several communities in the southern tier of New York and northern Pennsylvania were devastated by the record levels of the June 2006 flood event and the heavy and rapid rainfall runoff. Federal disaster declarations cover many counties in the Susquehanna basin, including Adams, Bradford, Columbia, Dauphin, Franklin, Lackawanna, Lancaster, Lebanon, Luzerne, Montour, Northumberland, Perry, Schuylkill, Sullivan, Susquehanna, Tioga and Wyoming Counties in Pennsylvania, and Broome, Chenango, Cortland, Delaware, Madison, Otsego and Tioga Counties in New York.

Damage estimates were still being developed in late July, but it is known that thousands of homes and businesses were severely impacted or destroyed, hundreds of bridges were swept away or left unstable, hundreds of miles of roadways were impacted, and hundreds of millions of dollars in property damage were incurred.

In the Pennsylvania portion of the basin, seven lives were lost during the event. In New York, three people died in the basin; one in Chenango County and two at the collapse of Interstate 88 in Delaware County.

On the positive side, federal flood control structures performed well; two U.S. Army Corps of Engineers flood reservoirs (East Sidney and Aylesworth) stored record volumes of floodwater during the event. No significant problems were reported at any facilities. Preliminary damage prevention estimates total $950 million in the Susquehanna basin ($850 million saved by levees and flood walls, and $100 million prevented by flood control dams). Reductions in flood stages are estimated at 2 to 2.5 feet on the Chenango and upper Susquehanna Rivers, and 1 to 1.5 feet on the Chemung, Lackawanna and mainstem Susquehanna below the confluence with the Chemung.

Looking Ahead

The Susquehanna River Basin Commission has already convened a conference of the members of its Interagency Coordinating Committee to discuss the flood event, the forecasts and responses, and recommendations for improvements. A detailed and comprehensive evaluation of the performance of the Susquehanna Flood Forecast and Warning System will be completed by the end of the year. To assist agency representatives in evaluating and improving the system, SRBC has organized two Community Dialogue meetings, which will occur in mid-August. The meetings will provide a forum for local flood managers to interact with flood forecasters and discuss the June flood event.

Preliminary recommendations of the interagency committee for improvements include:

- Increased internet accessibility for forecast products
- Improvements to use of radar to track observed rainfall
- An investigation of need for new forecast locations and additional or improved gaging
- More frequent updates of river stages and flood forecasts
- Incorporation of the potential range of river stages in forecasts
- Enhanced communication of river data and operations at federal flood control facilities
- Use of mapping technology to better communicate the potential for flood inundation
- Refined techniques for monitoring and forecasting flash-flooding
- Increased public outreach and education related to National Weather Service forecasts