Passaic River Symposium VII
Environmental Management for a Sustainable Passaic

**Increasing Flood Mitigation Through the use of Bonus Capacity of Drinking Water Reservoirs**

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The ability of drinking water reservoirs to retain runoff from storm events may allow them to be used as flood mitigation infrastructure. These reservoirs are not typically considered for flood mitigation, but conscripting them for flood mitigation creates a flexible water resource system and may provide a simpler and more inexpensive solution to flooding than alternative methods. The process of determining the potential viability of drinking water reservoirs for flood mitigation utilized DEMs to determine the watershed boundaries and NLCD to determine land use. The runoff volume from precipitation events was modeled using the curve number method. The runoff volume was compared to the bonus capacity (the difference between the maximum and normal capacities) of the reservoir. Additionally, discharge and flood height data from a river gage downstream of the reservoir was used to determine if the absorption of that volume of water by the reservoir would change the amount of flooding downstream of the reservoir. Runoff from the 5-year storm could be absorbed by the bonus capacities of five of the six reservoirs, while runoff from the 10-year storm could be absorbed by the bonus capacities of Lake Tappan, Greenwood Lake, and Lake Hopatcong. Runoff from the 50- and 100-year storms could not be absorbed by any of the six study reservoirs. Installation of permeable pavement was modelled by reducing the curve number values of developed lands upstream of each reservoir by 37 or 50 percent, depending on the starting curve number values in the watershed. Permeable pavement was only able to reduce runoff from the 50-year storm for Lake Tappan to within the reservoir’s bonus capacity, due to the high percentage of developed land within Lake Tappan’s watershed. Two of the six study reservoirs, the Wanaque Reservoir and Lake Hopatcong, were shown to have the capability to absorb enough runoff to mitigate flooding downstream during high precipitation storm events such as 2011 events Hurricane Irene and Tropical Storm Lee. The Wanaque Reservoir and Lake Hopatcong historically have both shown to have similar available storage space amounts to absorb comparable flood volumes. With proper modification and more flexible management strategies, these reservoirs may be used more effectively for flood mitigation.