

A GIS STUDY OF FLOW PATTERN AND FLOODING IN THE MOHAWK RIVER BASIN

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Rivers have had a major role in the shaping and development of the United States. The Mohawk River along with Erie Canal facilitated trade activities and fueled the growth of river towns such as Schenectady. The Mohawk River runs mainly from west to east New York where it confluences with the Hudson River. The Schoharie Creek is one of the Mohawk's major tributaries. Figure 1 shows a digital elevation model (DEM) as a backdrop of the Mohawk River, the Schoharie Creek, and the major bodies of water in the vicinity.

The flooding of the river and the associated damage to towns and infrastructure facilities along its path have been a constant source of concern in the management of this vital resource. Flooding occurs when the water level is higher than normal and overflows. There are two types of flooding which have had a major impact on the Mohawk River. These two types are "free water" and "break-up". They differ not only in time of the year that they occur but in the method of flooding as well. "Free water" occurs in late summer and early fall, and involves heavy precipitation due to the hurricane season. Break-up events happen in the winter and early spring. These events are attributed to an increase in temperature, heavy rains and melting snow. Ice jamming worsens this type of flooding. Ice jamming, or ice damming, is when water builds up behind a blockage of ice. This blocks the passage of water and the rise of water level to the extent that the river overflows its banks.

Although there are a number of locations that experience this occurrence almost annually,

the Stockade area in Schenectady is an excellent case in point. There are two major factors that contribute to this annual hazard. The first is the Stockade's low elevation with reference to the surroundings, and the second being its location at a relatively sharp bend in the river path (Figure 2).

Figure 3 shows the slope in degrees of the terrain surrounding the stockade. From the color ramp it is evident that the area continuously subjected to the hazard of flooding has the lowest slope whereas neighboring areas have significantly steeper slope.

Figure 4 shows the normal storage capacity (in acre-feet) for the dams on the Mohawk River and the Schoharie Creek. Figure 5, on the other hand, shows the maximum storage capacity (in acre-feet) for the dams on the Mohawk River and the Schoharie Creek. Under normal flow conditions, dams along the Mohawk and the Schoharie Creek are designed for amounts of discharge that are typical for the flow pattern throughout the year. However, in emergency conditions, such as flooding due to heavy rain, the maximum dam storage capacity may be reached, and it is on average about 50% higher than that of normal storage capacity.

Figure 6 illustrates the drainage area (in acres) for the six major dams on the Mohawk River. These dams are Vischer Ferry, Crescent A, Crescent B, Crescent C, Erie Canal Lock 17, and Delta Dams. The figure shows that the largest drainage areas are those of the dams at the confluence of the Mohawk with the Hudson River.

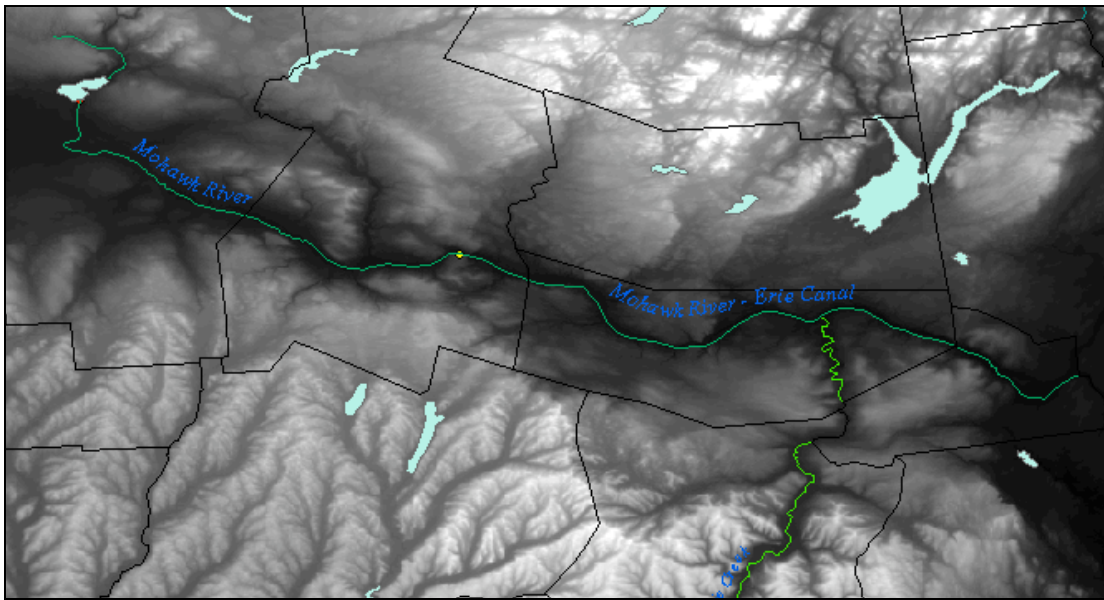


Figure 1. The Mohawk River and the Schoharie Creek.

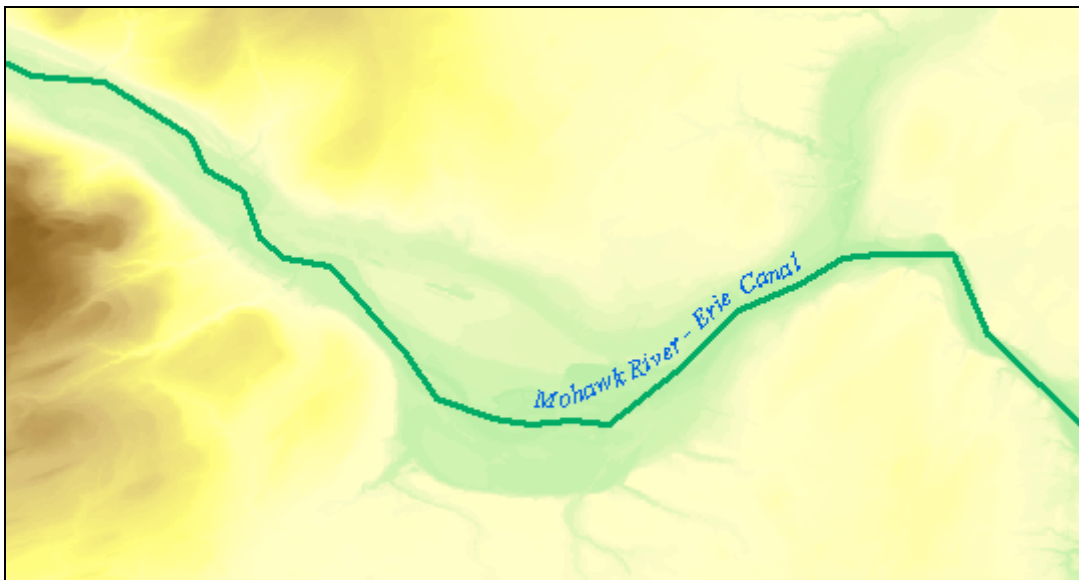


Figure 2. Bending Mohawk River section at the historic Stockade town.

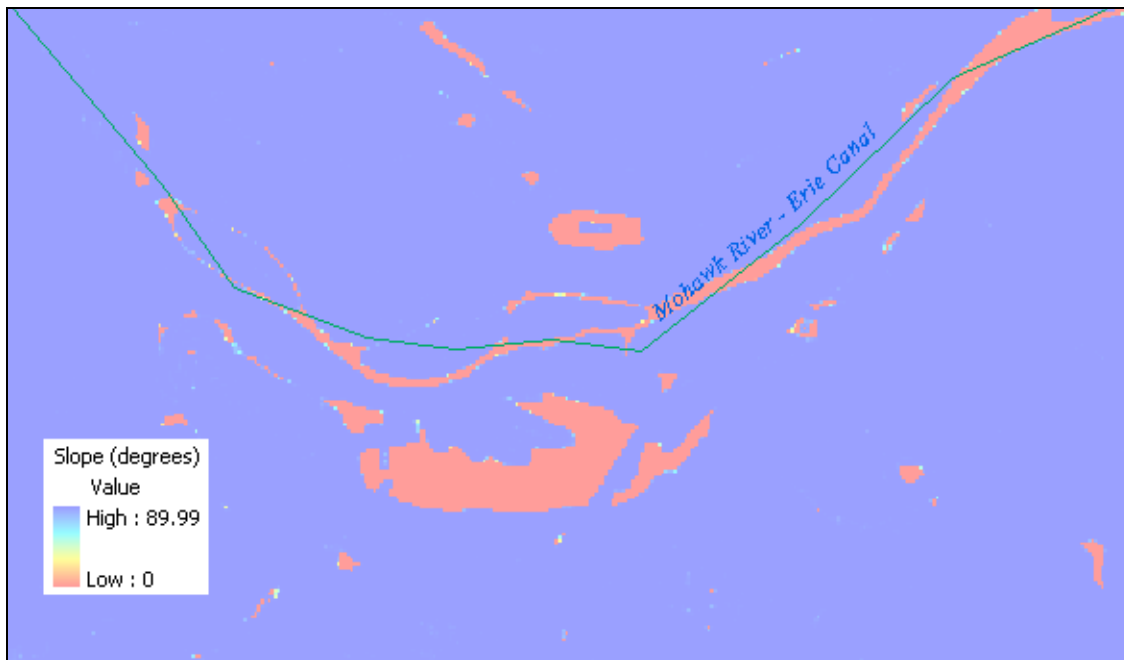


Figure 3. Slope (in degrees) of the terrain surrounding the Stockade.

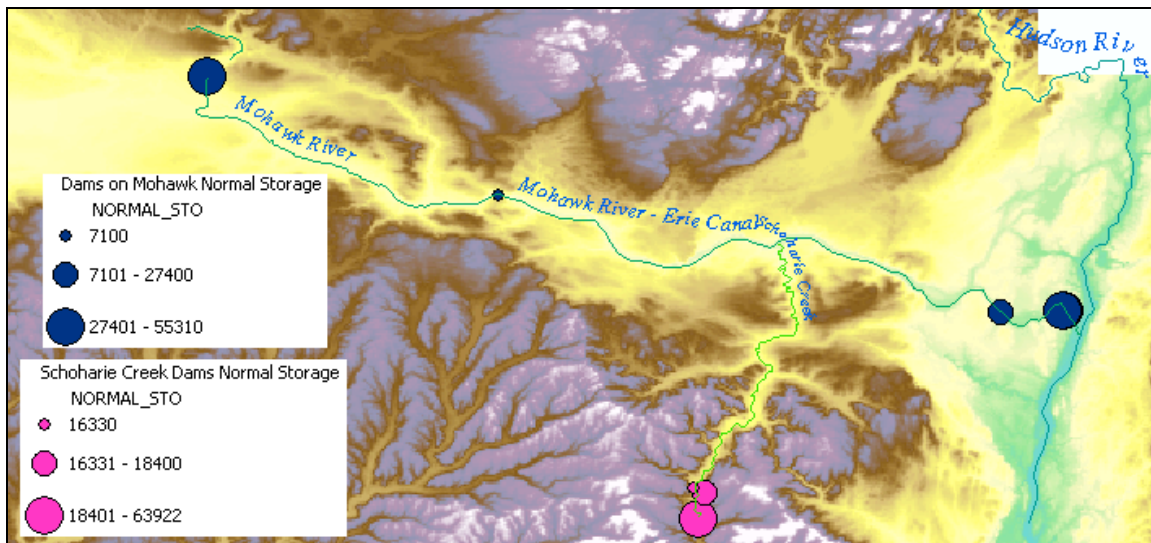


Figure 4. Normal storage capacity (in acre-feet) for the dams on the Mohawk River and the Schoharie Creek.

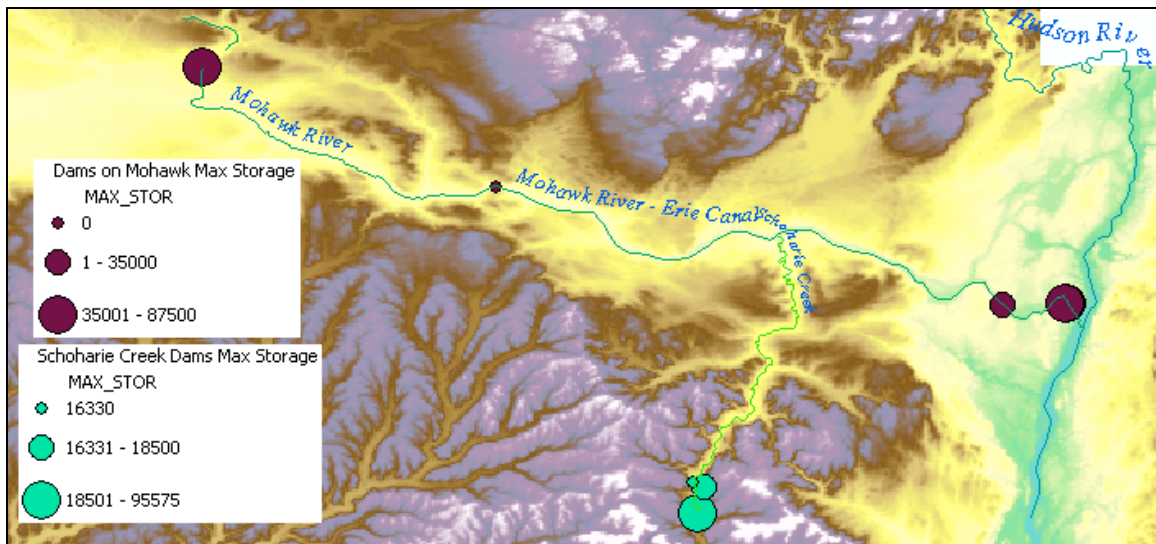


Figure 5. Normal storage capacity (in acre-feet) for the dams on the Mohawk River and the Schoharie Creek.



Figure 6. Drainage area (in acre) for the dams on the Mohawk River.

References

<http://seamless.usgs.gov/>
<http://www.nationalatlas.gov/>