



POST-IRENE SUSPENDED SEDIMENT, ALKALINITY AND METAL DYNAMICS IN THE SCHOHARIE AND MOHAWK RIVERS

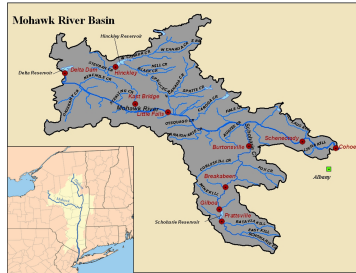
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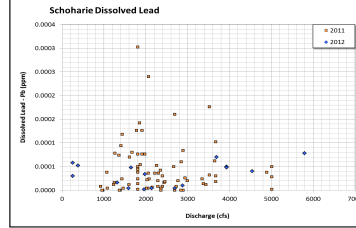
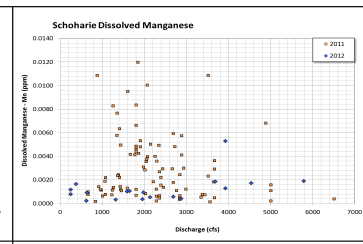
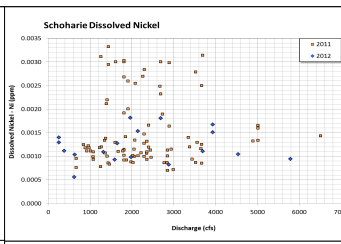
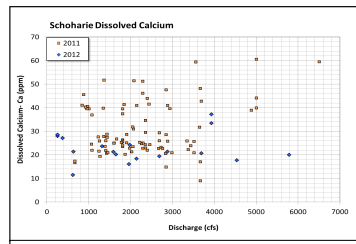
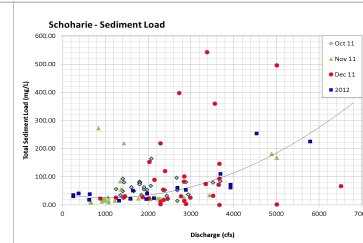
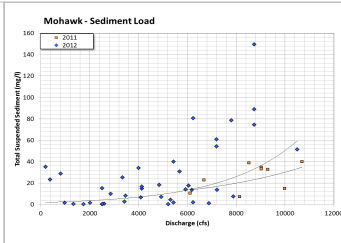
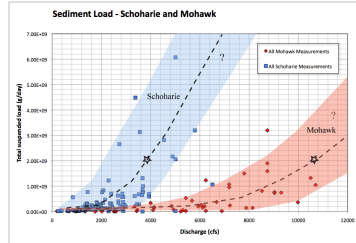
Abstract

As hurricane intensity has increased over the past few decades, most likely as a response to climate change, reports have concluded that this will increase the export of terrigenous organic matter in rivers, and potentially impact the water quality and biogeochemistry of lakes and coastal systems. To better understand the effects of large storm events on watersheds, daily water samples have been collected from the Mohawk River in Schenectady and the Schoharie Creek at Burtonsville, during key periods post Hurricane Irene, an event which devastated the Mohawk Valley Watershed. These samples were analyzed for total suspended sediments (TSS), alkalinity, and trace metals to show the extent of processes taking place in the watershed, such as contaminations and chemical weathering. The end-result of this study shows records of post hurricane remobilized sediments and metals, and their decay through time. Analyzing not only the after effects of the storm, but as well as the recovery of the effected watershed, gives an indication of the overall impact of these types of large storm events.



Methods

Daily water samples (250 mL) were collected from the Mohawk River at the Mohawk Boat House in Schenectady and from the Schoharie River near the Schoharie River Center in Burtonsville. The samples were refrigerated until analysis, then shaken and sonicated to fully resuspend sediments. The samples were then filtered over pre-combusted and pre-weighed Whatman GF/C glass fiber filters (nominal porosity = 0.7 µm), and then dried in the filter holders inside an oven set to around 60 °C. Once completely dried out after at least 24 hours, the filters were re-weighed again in order to determine the Total Suspended Material (TSM) daily load. Roughly 50 mL of the remaining filtered water samples were then used to determine the Total Alkalinity through the use of a Metrohm automated titrator. Roughly 2.5 mL of the remaining filtered water samples were also used in the final step in order to determine dissolved metal concentrations using the Union College Geology department's ICP-AES. *Daily discharge data were obtained from the USGS website.



DID HURRICANE IRENE CONTAMINATE OUR WATER?

- There are noticeable elevated concentrations for a few dissolved metals after the storm in the Schoharie River.
- None however reach any EPA limit standards
- Possible reasons could be elements released from sediments during bank failure, restoration construction work along the river, debris washed into the river from the storm, re-introduction of buried "junk" and sediments, or simply due to greater precipitation rates compared to 2012.

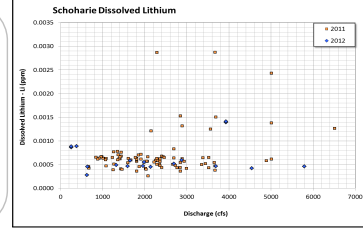


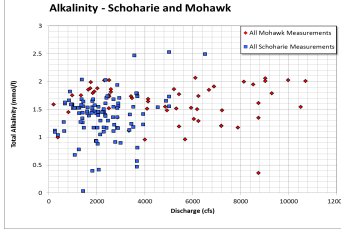
Table 1. USGS-S River Water Certified Reference Material for Trace Metals

Element	Cd	Co	Cr	Pb	Pt
Mean	10.00062	0.00079	0.00141	0.00007	0.00041
sd	0.492626	0.00007	0.00021	0.000003	0.00003
RSD	4.95	8.44	5.16	6.05	4.23
CV	19.5	0.00045	0.00433	0.00003	0.00004
CV%	95.2	166.1	95.2	81.66	75.43

*Uncertified, data in ppm

Table 2. EPA Water Quality Standards

Element	Limit (ppm)	Standard
Lead (Pb)	0.015	National Primary Drinking Water Regulation (NPDWR)
Lead (Pb)	0.065	National Recommended Water Quality
Nickel (Ni)	0.47	National Recommended Water Quality
Manganese	0.05	National Secondary Drinking Water Regulation (NSDWR)



CONCLUSIONS

- The sediment load for the two rivers does not seem to have changed much over the last two years following Hurricane Irene, except for sediment peaks in December 2011.
- Significant contribution of sediment from the Schoharie River to the Mohawk River.
- Dissolved trace metal show elevated levels for some elements in 2011 compared to 2012 for the Schoharie River. However, they are all below EPA standards.
- The alkalinity of the two rivers also did not seem to be greatly affected by the storms.

Photo taken Monday Aug. 29, 2011 by Will Waldron / Times Union

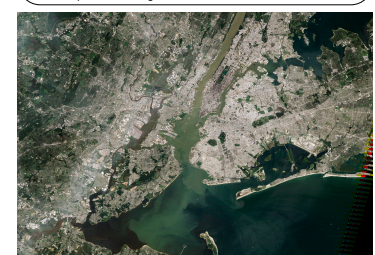


On August 28th, 2011 Hurricane Irene devastated Upstate NY. In the picture above, an aerial shows the extent of flooding from Irene in the Mohawk River in Schenectady N.Y. The pictures below show the damages to river banks and the restoration construction that followed.



Rocky Creek Sediment Accumation in E. Schoharie, Schoharie NY, 12 March 2012. Heavy machinery in the Mohawk Channel (Armenian Street) on 11 Dec. 2011. Photo by Steve Babinovic.

The Mohawk River happens to be a chief tributary to the Hudson River and ends up discharging into the New York Harbor, which is one of the largest harbors in the world and brings billions of dollars to the region's economy [Port Authority of NY/NJ 1995]. Deposition of Hudson River sediment into the New York Harbor interferes with navigation lanes and requires millions of dollars to be spent annually in dredging operations to remove sediment and maintain shipping lanes [Wall et al. 2008]. Information on the amounts of sediment discharged from the Mohawk River and other Hudson tributaries, along with the relation between watershed delivery and estuary sediment transport found in studies similar to Wall et al. [2008], should help efforts to manage the harbor.



USGS/NASA Earth Observatory, Landsat data from Earth Explorer (EOS) 31 August 2011.

References

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Acknowledgements

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