

The Impact of Superstorm Sandy on Water Quality in Vermont



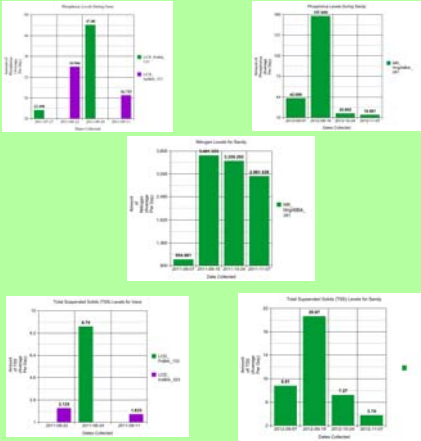
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Supporting Data



Background

This past summer, the team attended a week of summer training at Vermont EPSCoR Streams Project. The training was located at St. Michael's College in Colchester, VT. While there, the team, along with other high school student from around Vermont, learned how to collect and preserve water samples, upload and interpret data. The team also learned about how different nutrients affect the environment.

Site description

The stream Hungerford Brook that the team collected data from is located in Saint Albans, Vermont. The stream is in the Missisquoi River Basin. Hungerford Brook travels under a paved side road, surrounded by farm land, in a rural area.

Hypothesis

Hurricanes would affect the quality of the water by increasing the amount of nutrient levels in the water.

Experimental Design

The team compared the values of Phosphorus, Nitrogen, and Total Suspended Solids (TSS) before and after Hurricane Sandy at Hungerford Brook in Swanton, VT. The team hypothesized that the storm would increase the levels of chemicals at the river site. The experiment was conducted continuously between August 13 and November 07, 2012. The team performed five water collection trials and each trial involved three water samples for both total Phosphorus, Nitrogen, and TSS. Data collected during 2011 Hurricane Irene was analyzed for comparison purposes.

Pictures



*All Pictures Taken By Dana Maria Dezotell

Sandy Data from Sept. 07- Nov. 07, 2012

Site Code	Location	Type	Date Collected	Replicate	Phosphorus (µg/L)	Nitrogen (µg/L)	TSS (mg/L)
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-09-07	1	41.516	899.481	6.83
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-09-07	2	45.806	1170.228	6.15
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-09-07	33	38.974	792.533	13.45
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-09-19	1	162.536	3532.950	20.00
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-09-19	2	157.945	3444.944	20.00
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-09-19	3	153.353	3496.166	22.00
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-10-24	1	19.475	3328.496	3.07
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-10-24	2	16.618	3259.753	16.03
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-10-24	3	26.312	3489.627	2.71
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-11-07	1	19.583	3170.511	0.80
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-11-07	2	16.773	3195.205	1.41
MR_HngfrdBrk_281	St. Albans, VT	Riffle	2012-11-07	3	20.586	2578.901	0.90

Irene Data from Aug. 22 - Sept 11, 2011

Site Code	Location	Type	Date Collected	Replicate	Phosphorus (µg/L)	TSS (mg/L)
LCD_IndBrk_323	Essex, VT	Riffle	2011-08-22	1	31.095	1.83
LCD_IndBrk_323	Essex, VT	Riffle	2011-08-22	2	29.763	2.42
LCD_IndBrk_323	Essex, VT	Riffle	2011-08-22	3	44.040	2.02
LCD_IndBrk_323	Essex, VT	Riffle	2011-09-11	1	24.635	1.30
LCD_IndBrk_323	Essex, VT	Riffle	2011-09-11	2	23.122	1.90
LCD_IndBrk_323	Essex, VT	Riffle	2011-09-11	3	31.417	1.70
LCD_PoBrk_133	Potash Brook-Farrell St.	Riffle	2011-07-27	1	20.363	0.00
LCD_PoBrk_133	Potash Brook-Farrell St.	Riffle	2011-07-27	2	24.633	0.00
LCD_PoBrk_133	Potash Brook-Farrell St.	Riffle	2011-08-24	1	46.661	1.20
LCD_PoBrk_133	Potash Brook-Farrell St.	Riffle	2011-08-24	2	19.088	1.30
LCD_PoBrk_133	Potash Brook-Farrell St.	Riffle	2011-08-24	3	34.054	0.52
LCD_PoBrk_133	Potash Brook-Farrell St.	Riffle	2011-09-06	1	88.097	24.40
LCD_PoBrk_133	Potash Brook-Farrell St.	Riffle	2011-09-06	2	100.544	20.80
LCD_PoBrk_133	Potash Brook-Farrell St.	Riffle	2011-09-06	3	99.389	10.74

Data: Sandy

All the values pertaining to the Phosphorus, Nitrogen, and Total Suspended Solids were analyzed before, during, and after the time of the two different storms. It was found that the values are relatively in the same range, for each site, before the peak of the storm for Vermont. Two days before the storm's peak, the values started increasing, and then they dramatically increase during the storm. After the storm, the values of both Phosphorus and Nitrogen decrease slowly over time. The values of TSS remained a high level for a longer period of time, decreasing much slower than other nutrients. The amount of micrograms of Nitrogen per liter of water increased from 899.481 before Hurricane Sandy to 3532.950 µg/L after the storm. The TSS increased from 6.83 to 22.0 mg/L. The Phosphorus increased from 41.516 to 162.536 mg/L.

Data: Irene

Hurricane Irene's data was collected at the Indian Brook and Potash Brook in Vermont. The team observed the same effect on water quality on stream after Hurricane Irene. The phosphorus levels increased from 20.363 before the storm to 100.544 mg/L after. The TSS increased from 1.20 to 24.40 mg/L. Nitrogen level was not measured during the trials in 2011.

Conclusion

Hurricanes affect water quality by dramatically increasing the amounts of Nitrogen, Phosphorus, and TSS during the peak of the storm. Once the storm passed, the values slowly decreased but they didn't reach the initial values before the storm in one month.

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