



## ***Investigation:** What is a 100-year flood, and what damage will it cause?*

**Learning Goals:** To use real USGS stream gage data to understand the concept of a 100-year flood, and to map the extent of a 100 year flood in a town.

**Grade Level:** Created for a college freshman class, but can be taught to high school.

**Source:** This exercise was developed by Benjamin Laabs of SUNY Geneseo, and is published as part of the SERC Resources for teaching quantitative skills. This exercise is developed for a river in Minnesota, but can be easily adapted to a local stream for more relevance.

<http://serc.carleton.edu/NAGTWorkshops/intro/activities/22350.html>

An additional SERC lesson on the mathematics of flood measurement is here:

<http://serc.carleton.edu/quantskills/methods/quantlit/RInt.html>

**Application:** This can be part of an earth science or environmental science class. It will require some background on the hydrogeology of flooding, as well as map reading of topographic maps. Students will download USGS stream gage data, and use Excel to create a plots, draw best fit lines, and make predictions. Therefore, it is also a good lesson in the use of Excel as a tool for science.

The concept of a 100-year flood is an important one for city planners, potential land-owners, etc. Students will gain an understanding of the mathematics of the calculation, as well as the human impacts of floods. Because they use real data, students also get an appreciation of the uncertainties of predictions.

- 1) Students will access the USGS stream gage data online, and download a record of at least 60 years for the river of interest.
- 2) Following detailed instructions students will create a graph of the largest annual flood for at least 60 years, and use that graph to calculate the expected level of a 100-year flood, or any other flood of interest.
- 3) Students then use a topographic map to overlay the 100-year flood level on the town.
- 4) Discussion can be framed around the impacts of floods, the probability of flooding, the mathematics of probability, or the effects of climate change on flood frequency and size.

### **USGS Current Water Data for the Nation**

