Modeling Sediment Load in Oneida Creek using Dynamic Watershed Simulation Model (DWSM)

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Background image courtesy of: http://nortoncd.com/images/watershed_model.gif
Our Study Site on Oneida Creek
Sediment Data collection at our sampling site

- Teledyne ISCO 6712 Sampler with 720 Submerged Probe Flow Module
Sediment Samples collected in 2009
Sediment Samples collected in 2007, 2008

2007 (Sept – Nov)

2008
Collecting Rainfall Data from our site using a Rain Gauge

- Spectrum Technologies Tipping Bucket Rain Gage (Catalog # 3665R)
- Spectrum Technologies WatchDog Data Logger 450
Rainfall Data from our site using a Rain Gauge

- Total for 4 days: 0.38 in
Rainfall Data Online: CoCoRaHS

- A unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow). By using low-cost measurement tools, stressing training and education, and utilizing an interactive Web-site, our aim is to provide the highest quality data for natural resource, education and research applications.

- The National Oceanic and Atmospheric Administration (NOAA) is a major sponsor of CoCoRaHS.
Rainfall Data from CoCoRaHS sites within or near Oneida Creek Watershed

- Total for the 4 day rain event: ~ 1.39 in

<table>
<thead>
<tr>
<th>Station -&gt;</th>
<th>NY-MD-2</th>
<th>NY-MD-5</th>
<th>NY-OD-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/26/2009</td>
<td>0</td>
<td>7am</td>
<td>0</td>
</tr>
<tr>
<td>5/27/2009</td>
<td>0.58</td>
<td>6am</td>
<td>0.57</td>
</tr>
<tr>
<td>5/28/2009</td>
<td>0.17</td>
<td>6am</td>
<td>0.34</td>
</tr>
<tr>
<td>5/29/2009</td>
<td>0.62</td>
<td>11am</td>
<td>0.24</td>
</tr>
<tr>
<td>5/30/2009</td>
<td>0.02</td>
<td>7am</td>
<td>0.22</td>
</tr>
</tbody>
</table>

1.39  1.37  1.48
Rainfall Data Online: NOAA

The precipitation data are quality-controlled, multi-sensor (radar and rain gauge) precipitation estimates obtained from National Weather Service (NWS) River Forecast Centers (RFCs) expressed as a 24-hour total, and is displayed as a gridded field with a spatial resolution of roughly 4x4 km.
Daily Gridded Precipitation Data from NOAA

<table>
<thead>
<tr>
<th>Precipitation, in</th>
<th>Color</th>
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<tbody>
<tr>
<td>0.21 - 0.23</td>
<td></td>
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<tr>
<td>0.24 - 0.29</td>
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<tr>
<td>0.30 - 0.36</td>
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<td>0.37 - 0.40</td>
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<td>0.41 - 0.51</td>
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<td>0.52 - 0.68</td>
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<tr>
<td>0.69 - 0.89</td>
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<tr>
<td>0.90 - 0.97</td>
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<tr>
<td>0.98 - 1.06</td>
<td></td>
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<tr>
<td>1.07 - 1.12</td>
<td></td>
</tr>
</tbody>
</table>
Measured data for rain event to be modeled using DWSM

Discharge and Sediment concentration for 5/26-30, 2009 rain event
DWSM

- Each subwatershed is represented by two overland areas and a channel segment
DWSM Input

Channel Slope Calculation

Percent slope
0.0025
0.0033 - 0.005
0.0051 - 0.0069
0.0072 - 0.0093
0.0094 - 0.0112
0.0114 - 0.0133
0.0135 - 0.0154
0.0156 - 0.0175
0.0175 - 0.0194

Slope Calculation

Curve Length Calculation

Curve Number Calculation
**DWSM output**

**** MODEL RESULTS ****

WATER BUDGET
TOTAL RAINFALL AT EACH STATION
STATION # RAINFALL (INCHES)
  1   1.3900

TOTAL WATERSHED RUNOFF = 9.5592 INCHES

SUMMARY OF RESULTS
***RUNOFF SIMULATION***
TOTAL COMPUTED OUTFLOW = 62061.289 AC FT
COMPUTED PEAK OUTFLOW = 61782.719 CFS
COMPUTED TIME TO PEAK OUTFLOW = 28.250 HOURS

***SEDIMENT TRANSPORT SIMULATION***
TOTAL COMPUTED SEDIMENT DISCHARGE (YIELD) = 517951.031 TONS
COMPUTED PEAK SEDIMENT DISCHARGE = 24925.111 lbs/sec
COMPUTED TIME TO PEAK SEDIMENT DISCHARGE = 28.250 HOURS
DWSM prediction for 5/26-30, 2009 event

- Outflow (cfs)
- Time (x15min)

Graph showing outflow and sediment concentration over time.
Future Plans:

• Calibration of the model parameters
• Validation of the model using other peak flow events in 2009
• Further collection of sediment load samples during peak flow events in 2010, expanding collection sites to upstream locations
• Model total sediment yield for year, season