An Introduction to the Rocky Branch Watershed

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For Geography Graduate Student Field Orientation

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Background: Rocky Branch Creek (RBC) drains a small urban watershed including Five Points and much of the USC campus to the Congaree River in Columbia, SC. As an urban watershed, it is largely built out with impermeable surfaces covering approximately half the surface area. Consequently, infiltration rates are very low, stormwater generation is rapid and a high percentage of rainfall, floods are frequent, and water quality and aquatic habitat are seriously impaired. Flooding of RBC has been a growing problem with an increase in the magnitude and frequency of floods that have caused substantial damage in Five Points, the USC Engineering complex near Whaley and Main Streets, and in the Assembly Street area. In short, this stream has serious problems and is in need of restoration.

Figure 1. View to east towards Barnwell St. in the upper RBC subwatershed known as the Greg St. Basin. These impermeable surfaces inhibit natural infiltration and generate much stormwater that is rapidly delivered to Five Points downstream.

Lower RBC: In the fall of 2011, a proposal for the City of Columbia to sell the old baseball stadium and surrounding lands generated a large public outcry. This galvanized the community to form the Rocky Branch Watershed Alliance (RBWA) to study flooding and water quality in the basin and to advocate for wise management by City and County governments. The Alliance was successful in postponing sale of the land for a few months until a new hydrologic and hydraulic study could be conducted by AMEC Environment and Infrastructure, Inc., a private engineering consulting firm. The AMEC report summarized the available hydrologic and hydraulic (H&H) information available, although it did not develop new hydrologic data or models. Their hydraulic analysis of the 0.01% probability (100-yr recurrence interval) flood identified the abandoned railroad culvert between Bluff Road and Olympia Park as creating backwater upstream as far as Assembly Street. Removal of this culvert would lower floods upstream, although it would pass flood waves downstream causing flooding in Olympia Park due to the constriction by the Olympia Avenue Bridge, which would need to be enlarged. They recommended further study for removing the culvert and enlarging the culvert under Olympia Avenue.

The City of Columbia recently signed a contract approving sale of the old baseball stadium to developers who plan to fill much of the 100-year floodway with a parking lot. This is permissible by FEMA regulations because the hydraulic studies by AMEC found that the parking lot will not raise flood stage under existing conditions; that is, under the presently impaired conditions with the Bluff Road railroad embankment impeding flows. AMEC representatives informed my at a City hearing in June that hydraulic model runs indicate that the

parking lot of the development will increase 100-year flood stages as much as ~0.20 ft above the levels they would reach if the Bluff road culvert is removed. The increased flood levels caused by infilling of the floodway will not reach much above Assembly, so these changes in hydraulics have no bearing on flooding in Five Points area. According to the contract, the developers are purportedly committed to instigating flood reduction measures, presumably removal of the Bluff Road RR culvert and enlargement of the Olympia Avenue culvert. The City of Columbia has also purportedly devoted ~$500,000 for other improvements to reduce flooding in RBC.

While piecemeal hydraulic improvements such as the Bluff Road culvert removal are needed, the long-term reduction of flooding in RBC will require reductions in storm-water generation (hydrology) in addition to hydraulic changes. This is particularly true in the Five Points area, which has a long history of flooding due, in large part, to increases in stormwater runoff as urban infilling resulted in increasing areas of impervious surfaces upstream. Rain water cannot seep through impervious surfaces, so it runs off rapidly to ditches, storm sewers, and channels. Considerable progress has been made in urban hydrology in understanding the importance of impervious surfaces to flooding and water quality. Watershed studies have shown, not only that impervious surfaces cause increased flooding, but also that when the percentage of impervious surfaces exceeds 10%, substantial reductions begin to occur to water quality and aquatic habitats. A 2008 masters thesis in the MEERM program of USC by John Wooten measured the percent impervious surface area for RBW using 2007 Pictometry imagery (high resolution aerial photographs). Wooten found that almost 50% of the surface area of the basin was covered by impervious materials including roads, buildings, and parking lots.

Mitigation of urban effects on hydrology is possible through *low-impact development* (LID) or *green infrastructure* that encourage infiltration of rainwater. A green infrastructure pilot study, including permeable asphalt, infiltration chambers, and rain gardens, is currently being applied in the Shandon neighborhood of the Gills Creek watershed to the east of RBW. These methods should be encouraged in the RBW methods to reduce floodwaters. Moreover, a combination of incentives and regulations is needed to encourage LID and discourage rampant paving of surfaces.

Several opportunities exist for urban improvements that depend upon wise development and restoration of RBC. RBC has become a serious liability in terms of flood risk and public health. Urban streams can be a community asset. River restoration would allow the potential assets of RBC to be realized. A greenway from the Congaree River to Martin Luther King Park has long been seen as a possible means of linking Five Points to many miles of existing pedestrian and bicycle paths of the Three Rivers Greenway in Columbia and West Columbia:

http://www.sciway.net/sc-photos/richland-county/three-rivers-greenway.html
http://www.scgreatoutdoors.com/park-westcolumbiariverwalk.html

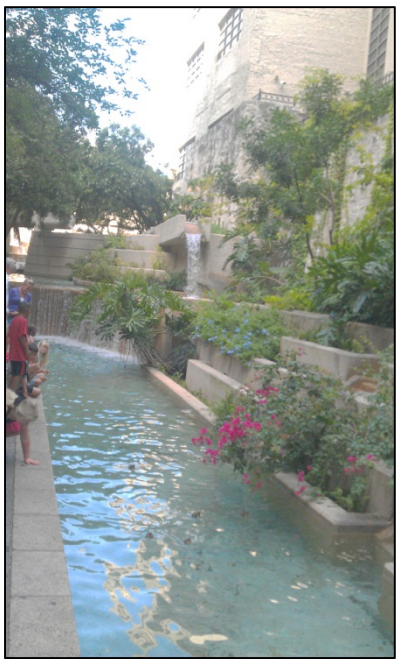

Figure 2. San Antonio River Walk. People come from all around the world to sip fine wines next to an urban stream.

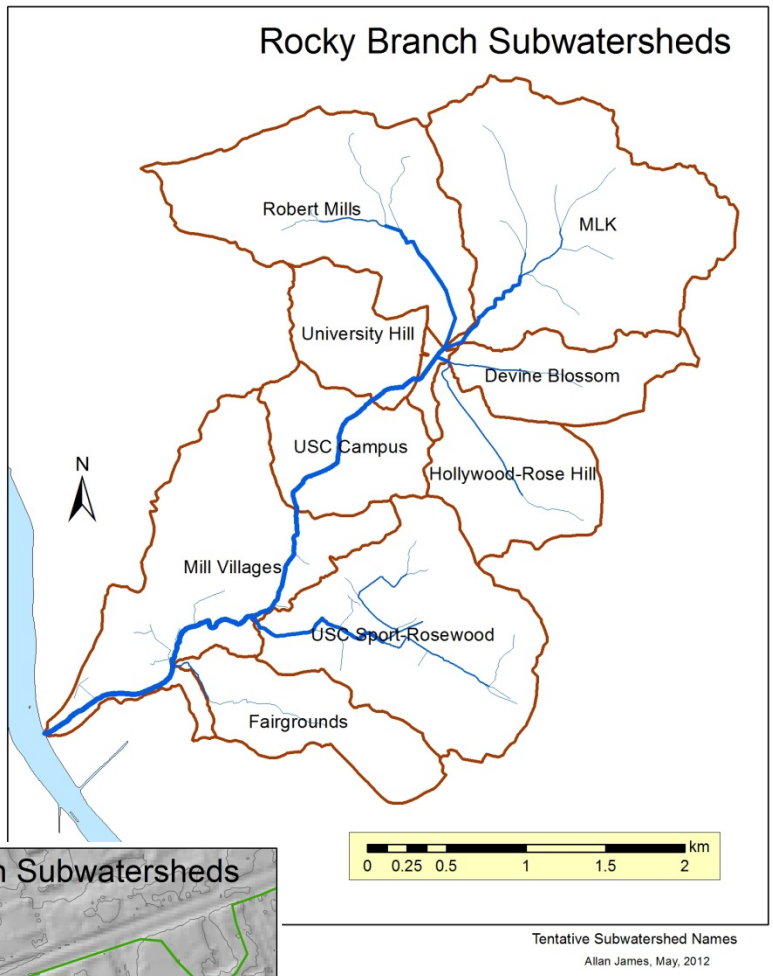

Figure 3. Subwatersheds of RBW. Divides derived from USGS LiDAR data.

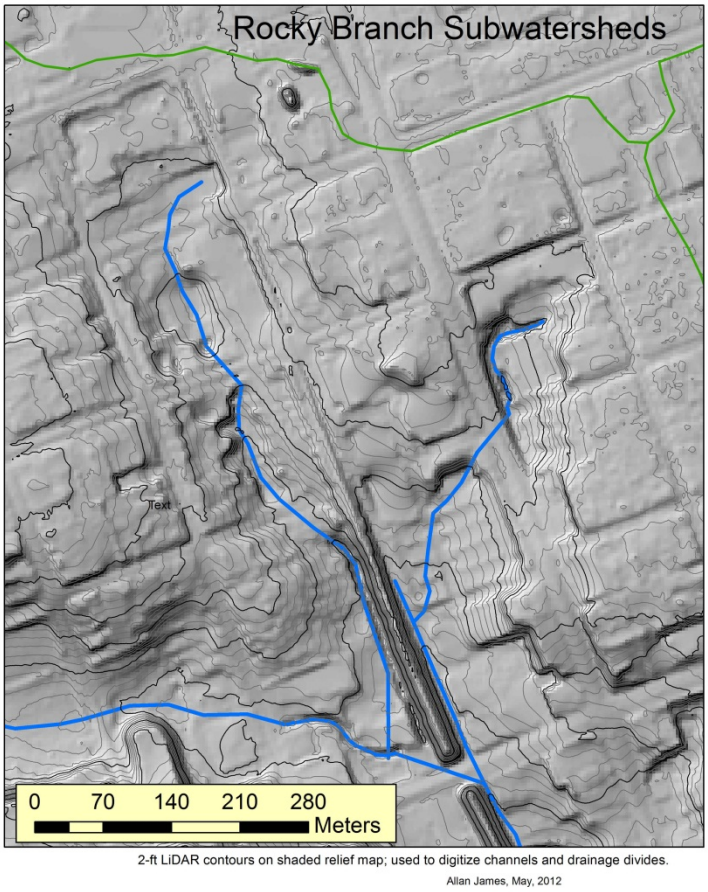

Figure 4. Gregg St. Basin in upper RBW showing channel and divide delineations with combination of LiDAR contour and shaded relied map.