Shifting Boundaries
Assessing the Impacts of Urbanization on the Reedy River and Lake Conestee
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I. Introduction / Lit Review

The Reedy River, which flows through Greenville, SC, was originally dammed in 1830 and re-constructed in the 1890s, resulting in a lake at the city’s dam. The lake was created to supply the mill and power the mill side to side, and was later used for the city’s water supply and flood control. The pollution in the river upstream of the dam was downstream from a growing number of industrial businesses and residents in the city in the late 1800s and into the twentieth century. The rapid growth and development increased amounts of impervious surfaces from which rains and storms would run off and into the river, and variations in flow of the river over time changed the channel of the river near the lake. The industrial history of Lake Conestee makes it a unique “watershed-centered Brownfield” site, which was purchased in 2000 by a non-profit organization and made into an educational and recreational park known as Lake Conestee Nature Park (Kyle & Hargett 2002). The river upstream and downstream from the lake contained many brickworks that used to build brick and frame houses for mills and mills towns, adding the industrial growth of Greenville and the city’s war efforts of the time. A study conducted by Harpel and Wolfe (2002) investigated channel formation conditions in Lake Conestee sediments using the Targeted Fishfield Assessment determined that Lake Conestee was bastardized by dam construction and use, wastewater treatment operations, and development of the watershed before the implementation of the Clean Water Act of 1972. Harpel and Wolfe (2002) make observations from aerial photograms dated from 1942 to 1999 on the changing characteristics of the river channel, noting the filling in of the lake with sediment followed by channel formation at the northeastern edge of the lake which was then also filled, causing meandering and channel formation in the southeast region. In his article “Lakescapes and Riverscapes” (2004), Dr. Allen from the University of Michigan School of Natural Resources and Environment explains how land use, such as agriculture, urban, forest, mining, and industries has changed over time in different regions of the world. The ways these changes have affected nature and the responses. The changing river channel in conjunction with the changing population and land use over time makes Lake Conestee Nature Park (LCNP) an ideal site for geomorphological investigation. In 1999, the Manu LCNP, has served to protect the lower reaches of the Reedy River from water and sediment toxins, pollution, and flooding. Analyzing the anthropogenic effects of urbanization in Greenville on the Reedy River can provide information vital to the conservation and management of the river, the Conestee dam, and Lake Conestee Nature Park. This study investigates the geomorphology of the Reedy River in the vicinity of Lake Conestee Nature Park, specifically, addressing historical changes in the river since 1800. If increasing urbanization, population, and industrialization intensify river morphology, as previous studies have suggested, then a pattern should be seen between these activities and geomorphologic changes in this reach of the Reedy River.

II. Methodology

Topographic maps were selected as the best way to generate a reproducible boundary of Lake Conestee at different years. The historical topographic maps were downloaded at every available year that was detailed enough in the study area. They have coordinate maps were converted from a GeoTIFF to a point/TIF using Global Ranges, allowing their spatial information to be read and understood by ArcMap. Aerial photographs collected from the government documents department of USDA’s library in Columbia, SC were of low resolution and sporadic. In dates available, they were obtained. 1983 Census data available online for Greenville County, and there existed population data for each decade from 1790 to now, however the only data available to me on industry was from 1840 and was therefore also omitted from this study. From the information I could access, I used ArcMap and Excel to create maps and tables looking for trends between population and channel and lake changes. By hand tracing the features on the topographic maps, I was able to digitize them and create new layers of the shapes of the lake and river at the different years.

III. Results and Discussion

The largest visible change in the lake, showing the greatest amount of modernization, is seen between 1957 and 2013, however this time span is shorter than generally reported. A map was used for trend analysis. As stated in the Greenville County Comprehensive Plan, Greenville County has a long history of consistent and steady growth, and the number of new residents added each decade has usually increased in population between decades, there are no significant patterns or jumps that could be used for geomorphology analysis.

IV. Conclusions and Future Research

The eight changes in population increase per decade since 1900 and the dramatic topographic changes in the river channel and lake boundary over such large and inconsistent time intervals are not consistent with each other or significant enough to make conclusions about the effects of population and urbanization on sedimentation of Lake Conestee and channel shifting of the Reedy River in what is now Lake Conestee Nature Park. The tremendous lake boundary change between 1997 and 1983 however; does make it clear that the natural morphology was enhanced or accelerated, and more data should be collected to make an assessment on the changes. All changes are affected by the primary factors contributing to such drastic changes. Information on industry and engineering along the river, as well as more frequent usage of riparian areas and urbanization, must be collected to help to see trends and significant patterns between urbanization and geomorphology of the study area.

V. References / Data Sources

USGS Topographic Maps, U.S. Census data obtained from http://historicalmaps.nationalgeographic.com/sap/

VI. Acknowledgements

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Figure 1. Location of Lake Conestee and surrounding two drainages within the study area in relation to the City of Greenville.  

Graph 1. U.S. Census data on total population in Greenville County every decade from 1900 to 2010 is represented by a bar graph. The trend is a steady increase.

Graph 2. This bar graph utilizes the same U.S. Census data on total population from Greenville County used in Graph 1. The graph represents numeric population increase, which is the increase in population from one decade to the next. Trends and anomalies are easier seen here.

Figure 3. This map offers a comparison of the four maps each one showing the land use in the study area at different time frames (1957 (A), 1983 (B), 1997 (C), and currently (D)). Boundaries were created using topographic maps from the cited year, and can be compared to show how the river upstream of Conestee Dam, as well as Lake Conestee, have changed over time. The echo of the Reedy River shifts slightly, but maintains relatively the same channel pattern and direction over the four maps. The most obvious changes occur in the presence and paths of streams and the shape of the lake. The lake decreases significantly in size over the time scale, and the presence of Brushy Creek is inconsistent. The Baseasin is World Topographic Map from ESRI Online.

Figure 2. The four maps above form a time-scale showing the boundaries of the study site in 1938 (A), 1957 (B), 1983 (C), and currently (D). Boundaries were created using topographic maps from the cited year and can be compared to show how the river upstream of Conestee Dam, as well as Lake Conestee, have changed over time. The echo of the Reedy River shifts slightly, but maintains relatively the same channel pattern and direction over the four maps. The most obvious changes occur in the presence and paths of streams and in the shape of the lake. The lake decreases significantly in size over the time scale, and the presence of Brushy Creek is inconsistent. The Baseasin is World Topographic Map from ESRI Online.

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