Floodplain Restoration Bank: Improving Water Quality by Reducing Parking Requirements

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Abstract:
Parking lots pose a major threat to water quality nationwide. In the United States, impervious surfaces cover roughly 43,000 square miles with parking lots making up the third largest class of impervious cover (24.8 percent), preceded by buildings (29.1 percent) and roads (28.3 percent) (Frazer, 2005; Tilley & Slonecker, 2006). These large expanses of impervious surfaces are extremely detrimental to water quality because they prohibit infiltration of water into the soil and are a major source of water pollution (Schueler, 1994). Studies have shown that runoff from parking lots is a major source of toxicity in urban stormwater (Greenstein et al., 2004; Pitt et al., 1995; Tilley & Slonecker, 2006, Mahler et al. 2005). When it rains, stormwater washes off parking surfaces collecting an assortment of pollutants (e.g., oils, greases, chemicals, heavy metals, soil, and litter) and transports this contaminated runoff at increased velocities into local water bodies (EPA, 2003). The end result is severely degraded waterways with highly eroded stream banks and contaminated surface waters.

Unfortunately a common problem with current development practices is that municipal off-street parking codes often require the installation of surplus parking. Off-street parking requirements for commercial retailers are typically based on what is considered peak demand – shopping days during the holiday season. Thus, minimum parking requirements for shopping centers are often designed to accommodate cars that may be present during 19 of the 3,000 annual shopping hours (ULI & ICSC, 2000). As a result, enormous amounts of land are continuously converted into large parking lots that sit predominantly empty most of the year.

Upstate Forever, a non-profit environmental organization located in Greenville, SC is working to prevent the construction of excess parking through the Floodplain Restoration Bank (FRB). Using funds obtained from an Environmental Protection Agency (EPA) Targeted Watershed Implementation Grant, Upstate Forever is working in collaboration with the City of Greenville, SC and Furman University to create the FRB. The overall objectives of the FRB are to improve water quality by decreasing the amount of impervious parking areas and generate funds for water quality improvement projects. The FRB will offer developers an incentive to install only the actual amount of parking needed while encouraging the use of pervious pavement whenever possible. Developers wishing to install parking above the minimum spaces required by the City of Greenville Municipal Code will be asked to pay a fee per parking space or use pervious materials for all additional spaces. Developers wishing to install parking above the maximum allowed number of spaces will be asked to pay a fee for installing additional impervious spaces, and a reduced fee for those constructed using pervious materials (Figure 1). The FRB will be managed and operated by the City of Greenville, with funds generated through this program allocated to floodplain restoration and other water quality improvement projects throughout the City and watershed.
The first step in this process has been to confirm appropriate parking ratios per land use for the City of Greenville. Currently the City of Greenville has both a minimum required and maximum allowed number of off-street parking and loading spaces for residential, public and institutional, commercial, service and industrial land uses (City of Greenville, 2008). For the purposes of this project Upstate Forever and Furman University conducted parking occupancy inventories for numerous commercial land-uses across the City using aerial photographic surveys and on-the-ground monitoring. Surveys were performed for approximately 120 commercial parking lots during peak and non-peak hours in order to obtain an accurate estimate of parking occupancy per land use. The data collected from these surveys includes land use code, total number of parking spaces, number of occupied spaces, building square footage, building occupancy, time of survey, and any other miscellaneous information that may influence parking occupancy rates (e.g., road closures, construction activity). The City of Greenville Zoning Department assisted in identifying parking lots representative of such land use categories. Peak and non-peak monitoring times were based on estimates obtained from the City of Greenville Traffic Engineering Department and the 3rd Edition of the Institute of Transportation Engineers Parking Generation studies (ITE, 2004). Preliminary data indicates there is a surplus of off-street parking available in the City of Greenville. The average maximum peak occupancy rates were approximately 57%, 37%, 59%, 45% for retail sales and services, financial institutions, offices, and restaurants, respectively. These results suggest that in Greenville, SC there is the opportunity to reduce the size of parking lots significantly and still accommodate public demand.

Transportation related infrastructure (e.g. roads, parking lots, driveways) accounts for as much as 65% of impervious cover nationwide (Frazer, 2005). The impacts of stormwater runoff from roads and parking lots include: alternation in stream hydrology, increased streambank erosion, and water contamination from increased nutrient and chemical loads. As a result, the construction of excessive parking is a major contributing factor to water quality and quantity problems across the country. Historically parking requirements have been based on automobile dependent, low-density, single use developments (Forinash et al., 2004). Thus, more flexible locally based parking requirements as well as innovative parking solutions are needed to address these critical water resource issues. This project hopes to set the stage for other communities to re-examine their parking requirements so as to facilitate more appropriate parking solutions, better use of developable land, and improved water quality.
References:


http://www.epa.gov/owow/nps/toolbox/other/epa_npa_urban_facts.pdf


The Urban Land Institute (ULI) and The International Council of Shopping Centers (ICSC), 2000. Parking Requirements for Shopping Centers, Second Edition. 2nd ed. Washington DC, ULI.