

**Delivery of Ecosystem Benefits at the Urban-Suburban Interface:
A Case Study of Flood Protection in the Woonasquatucket River Watershed**

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Urbanization exacerbates flooding by increasing surface runoff and decreasing surface roughness. Restoring wetlands can enhance flood protection while providing a suite of co-benefits such as temperature regulation and access to open space. Spatial modeling of the delivery of flood protection from wetlands can inform decision making across jurisdictions; however accurate modeling can be difficult in an urban watershed due to piping and other land alterations. Given these limitations, we are seeking an analysis of flood protection delivery that is sufficiently detailed that can be performed on a state or regional extent. In the Woonasquatucket River watershed, an urbanizing watershed with its terminus in Providence, RI, we build upon an existing functional assessment of riparian wetlands to develop a complimentary assessment of the provisioning and delivery of a suite of ecosystem benefits. For flood protection, we trace its delivery in the watershed by linking upstream wetlands with the downstream flood-prone areas through stream network analysis. To estimate the extent of the market for the benefit, we identify the population using flood prone areas. Block-level census data has been shown to be too coarse for flood analysis in an urban environment. To improve spatial accuracy of the census data, we dasymetrically map population data with known building locations. This spatial modeling of flood protection delivery can explicitly link communities to ecosystems and their benefits. Results can also be used to identify restoration sites that serve areas in need of flood protection.

Key words: flooding, ecosystem services, watershed, urbanization