

# Urban Reforestation as Reclamation: Exploring Effects of Forest Development on Plant Community Structure, Water Quality, and Soil<sup>1</sup>

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**Abstract:** Urbanization dramatically impacts ecosystem structure and function in both terrestrial and aquatic systems. Forests and other terrestrial ecosystems are cleared for development, and forest remnants suffer from the effects of fragmentation, including significant pressure from competitive introduced species and soil quality impairment. Similarly, aquatic systems are impacted by altered hydrologic regimes driven by impermeable surface area, alongside water quality impairments. Reforestation of key urban areas may present an opportunity to address some of these issues. To this end, tree planting events are increasingly popular for both community engagement and ecological improvement. However, the long-term success and development of community-planted forests is not well understood. This study evaluated plant community structure and soil characteristics for a chronosequence of 20 reforested urban sites planted as part of the Reforest the Bluegrass program in Lexington, KY. In addition, streamwater quality was assessed for four sites with streams. Plant community surveys suggested that forests are developing on these sites: older sites have a diverse canopy of native trees, as well as a shaded understory. However, invasive species are abundant in the understories of some sites, demonstrating the need for ongoing management of these sites. Soil data do not demonstrate strong trends with time since planting but suggest that these sites all have appropriate soil conditions for growth and development of native forests. Finally, water quality data for some sites demonstrate significant reductions in nitrate concentrations between upstream and downstream sampling locations (upstream and downstream of the reforested reach), suggesting that reforestation may significantly improve water quality. Taken together, these results demonstrate that community-planted trees can develop elements of forest structure over time, and that these developing forests can significantly influence the ecosystem as a whole. These data also provide a robust baseline to evaluate ongoing forest ecosystem development into the future.<sup>3</sup>

**Additional Keywords:** Urban and community forestry, Reforest the Bluegrass, new forests, forest ecology, restoration ecology.

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  3. This work was performed at sites in Lexington, KY, near 38°02'46.0"N 84°29'49.4"W.