GREEN ARMOR AND CUL DE SAC CORRIDORS

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ABSTRACT

Water quality is a critical conservation issue worldwide and in the United States. Nutrient loading as a result of nonpoint source not only degrades freshwater habitats due to eutrophication, but is causing dead zones in such important commercial fishing grounds as the Gulf of Mexico and the Chesapeake Bay. One technique for mitigation of nonpoint source pollution is the establishment of forested riparian buffer strips, which have long been used to prevent erosion and runoff in agricultural landscapes. Given the recent boom in suburban and urban sprawl, however, it is also important to consider a forested buffer's ability to protect surface waters as the surrounding landscape changes from agricultural to residential.

In highly managed agricultural and residential landscapes, these forested corridors along streams may represent a majority of the forested land cover, and indeed may be the only "natural" habitats present. If we are interested in maximizing native biodiversity in all of our environments, then understanding how best to protect it in these fragments and corridors is imperative. Invasive exotic plants displace native plants and disrupt local food chains, thus negatively impacting local native biodiversity. Because most invasive plants are edge specialist or generalist species that thrive in disturbed habitats, we wished to investigate how far into a forested riparian corridor invasive plants can remain dominant, as these habitats suffer from high rates of disturbance and an abundance of edge area.

In 2007 and 2008, we surveyed 39 corridors of varying widths throughout the White Clay Creek watershed of Pennsylvania and Delaware. Using three transects at each site, the relative abundances of invasive and native plants were measured as percentages of ground cover through the corridor from the surrounding landuse inward to the stream bank. Linear regression of data collected in 2007 shows a strong negative trend in invasive plant cover with increasing distance from the corridor edge ($R^2 = 0.333$, $P<0.001$). Data from 2008 are still being processed, but preliminary analyses support the findings from 2007 showing that invasive plant density is strongly curtailed by 60 m from the buffer edge and even more so by 100 m.

At the same time we wished to measure the efficacy of these corridors as buffers against phosphorus loading. Analyzing soil cores from across the same transects used for measuring invasive plant cover, most of the P migrating from the surrounding land use appears to be sequestered quickly, but a more refined, fine-scale sampling protocol is required to adequately determine the relationship between corridor width and P buffering. This is currently under way.

In addition to their capacity to protect surface waters from nutrient pollution and to act as refugia for native species in highly managed ecosystems, forested riparian corridors also have intrinsic cultural value as greenspace. Traditional greenspaces in planned residential communities tend to lack native species and provide little habitat for wildlife. While many of the species capable of persisting within the patches and corridors provided by leaving forests along waterways may be common and the resulting ecosystems are far from pristine, they are still valuable within our communities capable of increasing society's familiarity with nature and their likelihood to act in its favor.