Costs of Meeting Water Quality Goals under Climate Change in Urbanizing Watersheds: The Case of Difficult Run, Virginia

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Excess total Nitrogen (TN) loadings have been identified as one of the primary causes of degradation of the Chesapeake Bay. TN is often transported into water bodies via non-point source pollution, runoff from urban environments being an example. Climate change (CC) is expected to increase both mean TN loadings and the interannual variability of TN loadings within the Chesapeake Bay watershed, where increases in TN loading variability are more harmful than mean TN loading increases alone. There is little information regarding how TN loading abatement costs will change under conditions induced by CC.

We used risk programming to estimate the costs of abating interannual TN loadings under CC conditions relative to current climate conditions. Best Management Practices (BMPs) were used to control TN export and higher subsequent control costs. Our analysis did not account for changes in land use and impervious surface. If these changes are included, we can predict there will be more variability abatement was greater than the percent increase in costs for controlling for mean TN loadings. Urban stream restoration was the most cost effective BMP followed by Low Impact Development. Where structural BMPs have long lifespans, policy makers may wish to front-load more BMP implementation today in order to account for increased TN loads in the future.

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