A JUSTICE-BASED DECISION SUPPORT TOOL FOR INTEGRATING STORMWATER BMPS IN NUTRIENT REMOVAL IN FLORIDA

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Stormwater runoff is a significant contributor to nutrient pollution, leading to water quality degradation and ecological imbalances. The management of stormwater runoff and nutrient pollution faces significant challenges due to inadequate assessment tools for evaluating nutrient loads across multiple watersheds at the state level and the absence of an open-source tool that can comprehensively assess the effectiveness of stormwater Best Management Practices (BMPs) in nutrient removal while incorporating environmental justice (EJ) considerations. To address these challenges, we developed an innovative online statewide tool that identifies areas where BMP planning needs to be prioritized to address environmental disparities resulting from high pollutant loads intersecting with disadvantaged communities, alongside tracking pollutant loads after various BMP implementations. In doing so, we estimated pollutant loads including total phosphorus (TP), total nitrogen (TN), biochemical oxygen demand (BOD), and total suspended solids (TSS) from urban land use in 1378 HUC-12 watersheds across Florida using EPA's pollutant load estimate tools (PLET), which calculates loads based on factors such as land use, septic systems and wastewater discharge, soil characteristics, and precipitation. To integrate BMP implementation with EJ considerations, an equity index was developed to identify tiers of sociodemographic disparities using racial/ethnicity metrics (e.g., % black, % Hispanic, etc.) and socioeconomic metrics (e.g., median household income, educational attainment, etc.). We then investigated the effectiveness of 28 urban stormwater BMPs in reducing pollutant loads and estimated post-BMP loads for each watershed. Hotspots of nutrient pollution were primarily identified in coastal areas, with residential land use as the main contributor. Miami-Dade, Broward, and Hillsborough counties had the highest sociodemographic disparities. In addition, central and southern Florida exhibited a disproportionate exposure of disadvantaged communities to pollutant loads. The developed online tool contributes significantly to holistic watershed management by features including visualizing the distribution of nutrient pollution loads across state watersheds, identifying areas with high pollutant loads intersecting with disadvantaged communities, and quantifying pollution load reductions post-BMP implementation. This research promotes equitable outcomes and empowers stakeholders in Florida to adopt sustainable and inclusive practices for water quality improvement.

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