

How Land-Use Efficiency Affects Nitrogen Loading in NC Watersheds

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The quality of sanitary infrastructure affects excess nutrients from wastewater and runoff into local watersheds. This problem is an environmental concern for developed and developing areas. Thus, understanding the relationship between urban development and nutrient loading can better equip municipalities to effectively implement stormwater mitigation and watershed stewardship. This paper used nitrogen data obtained from the Jordan Lake Nutrient Management Study, coupled with Census population data, to assess the severity of nutrient loading across local watersheds. The relationship between population and nutrient loading was investigated in regional watersheds in the Piedmont of North Carolina. In addition to this nutrient data, block group data and parcel data were examined in evaluating the effect of urban development on local watersheds. As development density varies across geographies, watersheds with higher degrees of urbanization were thought to have increased levels of nutrient loading because of higher populations. Results suggest that nitrogen loading increases with dense development per unit area basis. However, per capita nitrogen loading is actually highest at low development intensity which is consistent with urban sprawl. A theme of this research is centered on the following questions: is there an optimal ratio between population and nutrient loading in a given area that can inform urban development standards? What indicators are best predictors for land use efficiency, as defined within the scope of this project? This paper seeks to investigate possible recommendations to this question as it pertains to urban development.