

Evaluating the Impact of Urban and Agricultural Runoff Mitigation Utilizing Waste Valorization for Nutrient Absorption

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Urban and agricultural runoff contain nutrient loads that impact surrounding waterways and environmental systems. Nitrate, ammonium, and phosphate are classified as nutrient impairments around the state. During rain or irrigation events, fertilizers from lawns or croplands are transported to local tributaries where nutrients can accumulate. Best management practices for fertilizer application and runoff collection can be used to mitigate the loss of nutrients, but alternative options are being studied to absorb nutrients at the source. A diverse industrial landscape in Louisiana provides opportunities for the waste valorization of non-hazardous industrial waste (casting sands, fly ash, rice husk, sugar cane bagasse, etc.) to absorb nutrients before leaching into waterways. Each material used in the study has a chemical characterization to correlate nutrient uptake. This study conducts microscale isotherms to provide insight into the absorption and desorption dynamics of waste materials for suitable biosorbent material. After building the framework, the scale can be increased to see trends in nutrient absorption and feasibility for larger volumes of waste. The trials are ongoing, but preliminary results show materials with high iron and aluminum provide high sorption for phosphate, while cellulose-based waste has the ability to absorb nitrate. The continued study will overlap chemical characterization components with microscale isotherms to determine the most suitable waste material composition for edge-of-field sorption. Linearity of the micro- and macro-scale trials will also be monitored to show large-scale applications for readily available non-hazardous waste.