GEOSPATIAL ANALYSIS FOR SWINE CAFOS AND STREAM WATER QUALITY CORRELATION STUDY

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Concentrated Animal Feeding Operations (CAFOs) are the confinements of animals for more than 45 days during a growing season with no vegetation. There are close to 15,500 CAFOs around the United States with an astounding 2,514 located in North Carolina (NC) alone and most of them being swine CAFOs. Most of the swine CAFOs within NC are in Duplin and Sampson County. Very nature of a CAFO is harmful to the immediate environment as well as organisms higher up the food chain and especially, the low gradient topography creates serious environmental issues like stream water contamination. The waste from CAFOs are periodically applied to "spray fields" of Bermuda grass or feed crops and washed away to streams to contaminate it. Two contrasting watersheds were chosen based on the presence of swine lagoons. These watersheds have the USGS gauging stations at their exit points. Grove Creek watershed in Duplin County with 23 swine lagoons, six of which are within 100m of a stream. The watershed in Durham County has only one swine lagoon. A soil analysis of both watershed suggested that the watershed with only one CAFO has large percentage (77%) of well-drained soils making it more vulnerable for contaminant transportation to the streams. Grove Creek watershed with more CAFOs has a better soil types, i.e., 38% well-drained and 36% poorly drained soil. Water quality data was downloaded from the USGS gauging stations and averaged for 5 years period, and were spatially compared for both watersheds. It was observed that watershed in Durham County was more impaired for DO, TN, TP, Nitrate, Nitrite, and CO2, explaining that the presence of swine CAFOs may not be responsible for this impairments in the nearby streams. However, the watershed with more CAFOs were impaired for pH, organic nitrogen, ammonia, , and especially, fecal coliform. As the fecal coliform is a bigger water quality concern and it is directly related to CAFO outputs, our spatial analysis confirmed that presence of swine lagoons closer to streams if not managed properly might create water quality issues in the stream. Higher impairment in the watershed with only one CAFO was attributed to comparatively higher slope gradient, higher percentage of well-drained soil, and more urban land cover. This study is being intensified with the inclusion of more spatial data. A Soil and water Assessment Tool (SWAT) models are being developed for water quality analysis.

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