

Effects of Land-Applied Biosolids on Surface-Water Nutrient Yields and Ground-Water Quality in Orange County, NC

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Abstract. The practice of applying biosolids from municipal wastewater treatment plants to agriculture fields is becoming more commonplace across much of the Piedmont and Coastal Plain of North Carolina. The impact of land-applied municipal biosolids to agriculture fields on the delivery of nutrients, bacteria, metals and emerging contaminants to surface water and ground-water resources is largely unknown. The U.S. Geological Survey and North Carolina Division of Water Resources partnered through the Non-point Source Grant 319 Program on a study of paired agricultural watersheds in Orange County that is designed to better understand the transport of nutrients, metals, bacteria and emerging contaminants from biosolids application fields to groundwater and surface water. Results will be useful for developing and implementing Total Maximum Daily Loads (TMDLs) for nutrient-impaired watersheds and to provide a scientific basis for evaluating the effectiveness of current regulations. In order to characterize the impact of land-applied biosolids on groundwater and receiving surface water, the study addressed the following elements: 1) assess the offsite transport of nutrients and bacteria in groundwater and overland runoff from the biosolids application fields to receiving streams, 2) compute and compare surface water nutrient and bacteria yields for both a watershed with biosolids land application and a nearby watershed without biosolids application, 3) conduct chemical analysis of biosolids and soil from agriculture fields with and without biosolids application and 4) perform preliminary evaluation of organic wastewater compounds as potential indicators of constituents derived from wastewater treatment plant biosolids in surface water and groundwater.