

Abstract

Kenya's municipalities are experiencing rapid urbanization, which has led to a significant increase in the generation of organic waste, particularly from slaughterhouses, open-air markets, and wastewater systems. Poor management of this waste contributes heavily to environmental pollution, public health hazards, and greenhouse gas (GHG) emissions. This study investigates sustainable pathways for managing municipal organic waste, with a focus on waste-to-bioenergy and waste-to-biofertilizer solutions as integral components of climate action. This research emphasizes the untapped potential of anaerobic digestion and composting technologies to convert slaughter and market wastes into valuable energy and agricultural inputs. It also examines the role of decentralized treatment systems in mitigating methane emissions and enhancing urban sanitation. Grounded in Kenya's policy context and supported by recent literature; the study outlines the technical, institutional, and financial barriers to adopting circular waste strategies. It proposes a multi-stakeholder approach involving local governments, private sector actors, and development partners to implement scalable, low-carbon solutions. The paper concludes with targeted recommendations aimed at improving source segregation, promoting decentralized biogas and composting systems, enforcing wastewater treatment regulations, and unlocking climate finance opportunities. These strategies, if well-executed, could transform Kenya's urban waste landscape into a driver of green growth, public health, and environmental sustainability.