

Advances in Waste Management and Resource Utilization

4th International Conference on Sustainable Waste Management 2025

Abstract Book

Proceeding of the International Conference on
Sustainable Waste Management

12th - 14th September, 2025



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Sustainable Waste Management and Resource Valorization Strategies for Kolkata Leather Complex

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Abstract

The Kolkata Leather Complex (KLC), is one of the India's largest leather production facilities, it faces critical environmental challenges due to the generation of huge volumes of hazardous liquid and solid wastes during leather production process. Each tonne of rawhide produces 600–870 kg of solid waste and 30–35 m³ of wastewater, comprising of high pollutant loads of BOD (2000–3500 mg/L), COD (4000–8000 mg/L), TSS (1000–2500 mg/L), and chromium (100–300 mg/L), all of which are in excess of permissible limits. The study thus aims to investigate the impacts on soil, water, and public health while presenting an innovative circular economy-based approach. The study also quantifies pollutants like sodium sulphide, sodium formate, ammonium sulphate, and chrome sulphate. The study employs a mixed methods approach combining field surveys, laboratory simulations, and technological modeling. Waste segregation and characterization are followed by valorization methodology, such as enzyme-based hydrolysis for recovery of protein and collagen (70–80% efficiency) and alkaline methods for chromium recovery (90–95% efficiency). IoT-based sensors monitor the real-time parameters including pH, BOD, and chromium levels, creating a data-driven mechanism for compliance and process optimization. Activated carbon derived from leather waste provide an alternative cost-effective filtration, enabling alignment with central pollution control board (CPCB) guidelines and SME capacities. The integrated recovery technologies led to the reduction of hazardous discharges by 70–90% and solid waste by 40–50%, while producing value-added products like biofertilizers, animal feed, and reusable chemicals.

Keywords: Leather; Waste; BOD; Chemicals.