ADVANCES AND CHALLENGES OF DECENTRALIZED WASTEWATER TREATMENT IN LATIN AMERICA: A SYSTEMATIC REVIEW 2013–2024

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ABSTRACT

This study presents a systematic review of 57 scientific publications from 2013 to 2024 focused on Decentralized Wastewater Treatment Systems (DEWATS) in Latin America. The objective is to identify the most commonly used technologies and analyze the challenges and opportunities these solutions face in urban, peri-urban, and rural contexts. The findings show that decentralized systems constitute an effective and adaptable alternative to centralized systems, especially in communities with technical, economic, or geographic limitations. Key advantages include low investment and operation costs, technological simplicity, high efficiency in removing organic matter and suspended solids, and strong potential for valuable resource recovery (water, nutrients, and energy). However, significant challenges were also identified, such as design and implementation deficiencies, lack of specific regulatory frameworks, and limited social acceptance in some contexts. Opportunities are linked to their contribution to sustainability, water security, climate change adaptation, and the promotion of circular economies at the local level. The study concludes that decentralized wastewater treatment systems, particularly constructed wetlands, offer a viable pathway toward universal access to sanitation in the region. To achieve scalability, it is essential to strengthen regulatory frameworks, provide technical training, foster community participation, and ensure institutional support that enables their integration into public water and sanitation policies.

Keywords: Decentralized treatment, Wastewater, Latin America, Systematic review

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