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REVIEW OF BIOGAS PRODUCTION AND BIO-METHANE POTENTIAL OF FISH SOLID WASTE AND FISH WASTE

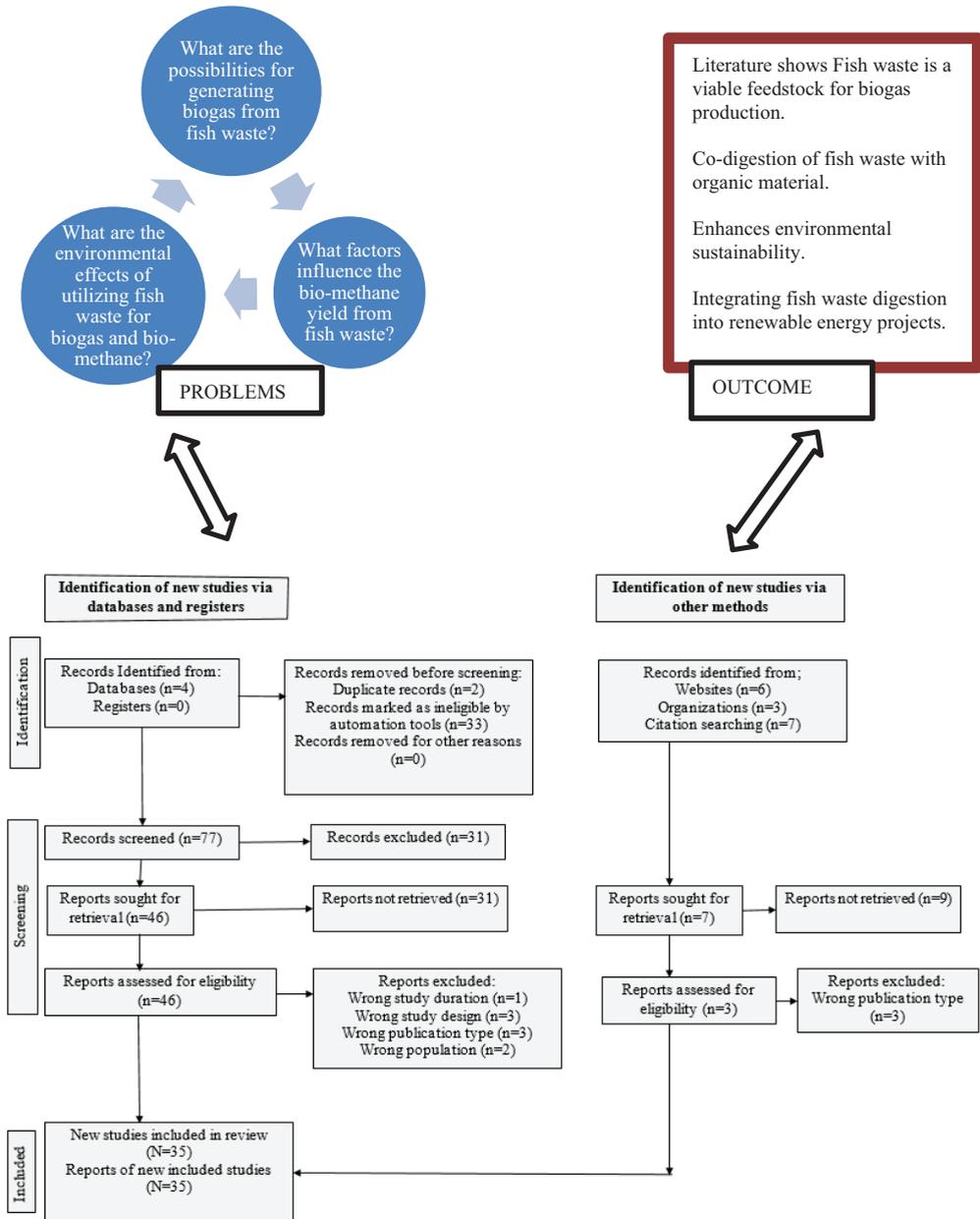
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Abstract – The growing amounts of fish waste from South Africa’s fishing and aquaculture sectors pose environmental challenges and present opportunities for renewable energy production. South Africa’s current energy mix heavily relies on coal, with renewable sources representing only a fraction of the total supply. The country’s waste management is also constrained by the large volumes of organic waste sent to landfills, increasing greenhouse gas emissions and pollution. The review synthesizes findings from various studies on the anaerobic digestion of fish waste, assessing its feasibility, efficiency, and ecological advantages as an energy source. Fish waste, high in proteins and lipids, shows promise as an effective feedstock for biogas production, particularly when co-digested with other organic materials to improve microbial activity and methane output. However, the variability in results across studies highlights the need for standardized methodologies and consistent reporting, as differences in study designs and digestion parameters affect outcomes. Key limitations identified include the heterogeneity in research approaches, inconsistent biogas yield reporting, and a lack of thorough sustainability evaluations, which hinder the generalizability of findings. The review recommends further empirical studies to optimize the anaerobic digestion of fish waste tailored to South Africa’s specific context. The methodological quality of the reviewed studies supports a JBI Grade B recommendation, indicating moderate promise for fish waste as a renewable energy resource. In conclusion, fish waste represents a valuable yet underutilized resource for renewable energy that aligns with South Africa’s energy and waste reduction objectives. Expanding biogas production from fish waste could help decrease reliance on fossil fuels, reduce greenhouse gas emissions, and divert organic waste from landfills. Policymakers and energy practitioners are urged to explore fish waste digestion within the renewable energy framework. At the same time, future research should focus on optimizing co-digestion processes and addressing logistical and regulatory challenges. This review lays the groundwork for future research and policy efforts to harness fish waste for sustainable biogas production.

Keywords – *Bioenergy; fish waste digestion; just energy transition; renewable energy; sustainability*



PRISMA FLOW DIAGRAM showing the reviewed literature search process

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