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# Circular Bioeconomy: A Review of Empirical Practices Across Implementation Scales

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## Abstract

The paper reviews empirical research on monitoring and modelling the bioeconomy, focusing on its transition towards sustainability. The paper addresses the complexity of this transition, including environmental and social risks. It highlights the need for decision support tools at macro (national-global), meso (regional-citizen) and micro (product-firm) scales. The research identifies major shortcomings, such as the uneven distribution of sustainability indicators and the lack of standardised monitoring frameworks and proposes a comprehensive agenda to improve the life-cycle perspective, visualise trade-offs and monetise externalities. Behavioural insights play a crucial role in addressing these challenges, particularly in understanding consumer perceptions, designing effective incentives and promoting transparency through certification schemes.

**Keywords:** Bioeconomy, Circular economy, Sustainable transition, Bioeconomy indicators, Life cycle management

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