BOOK REVIEW

WASTE MANAGEMENT IN THE CIRCULAR ECONOMY

BY SUHAIB A. BANDH AND FAYAZ A. MALLA (EDITORS)

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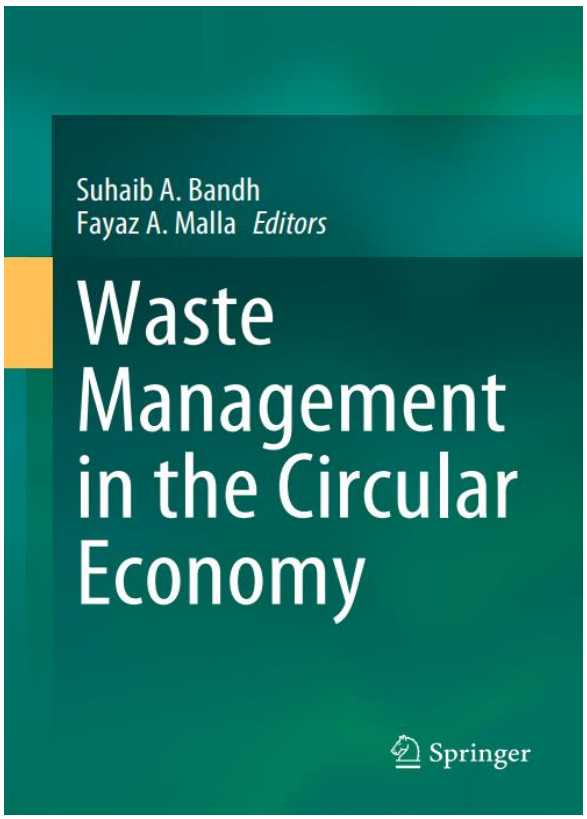

Suhaib A. Bandh is an Assistant Professor in Environmental Science at Sri Pratap College, Cluster University Srinagar, India, with an academic background focusing on climate change, pollution and environmental biotechnology. He has published work in the field of waste management and sustainability, as editor and author of several academic volumes from prestigious publishers including Springer Nature, Elsevier, Taylor & Francis.

Fayaz A. Malla has a PhD in Environmental Science from the Indian Agricultural Research Institute, New Delhi. He has a strong interest in waste management, pollution, and renewable energy and is affiliated with prominent academic institutions. Both editors are actively involved in promoting sustainable development through interdisciplinary research, bringing a valuable combination

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of theoretical and practical expertise in waste management and the circular economy. Their book *"Waste Management in the Circular Economy"* was published by Springer Cham in 2nd January 2024.

This work is a comprehensive and in-depth exploration of the technologies and processes involved in producing energy by treating waste. It serves as a valuable resource on the information and tools needed to select the most sustainable solution for transforming waste into energy, fuel or feedstock under various economic conditions and activities. In addition, there are chapters in the book that deal separately with the valorization of plastic waste (expanded and extruded polystyrene in Brazil, for exemple) and biodegradable waste (the case of the production of renewable solid briquettes) or the redesign of electronic equipment based on the principles of the circular economy. In addition, the authors use various methodologies, including multi-criteria decision-making, lifecycle assessment, multi-objective optimization modes and sustainability assessment, which provide a solid framework for assessing the suitability and relevance of options for transforming waste into raw material, fuel and energy.

The book is a collection of academic contributions by international researchers, focusing on multiple aspects of integrating circular economy principles into waste management (legislation, institutional framework, public policies in the field, business involvement, contribution to meeting Sustainable Development Goals, opportunities for the inclusion of vulnerable groups and other issues).

The volume is structured in 14 chapters, which capture three key themes. One is the theoretical background, consisting of the definition of concepts such as circular economy, waste management, the "3 R" approach, with a special focus on the advantages of this paradigm over the traditional linear economic model and the contribution that an integrated approach to waste management can have for the effective implementation of the circular economy. A second aspect refers to the analysis of the technologies used in waste management and the challenges they generate. Beyond the simple description of waste (organic, electronic, plastics, municipal, industrial), available technologies (biotechnologies, energy conversion or advanced recycling) for implementing the circular economy, the authors explore the key factors influencing the sustainable development of the waste processing industry. Practical challenges such as lack of infrastructure or inadequate regulation are presented. By addressing these factors, the book facilitates the identification of the most appropriate forms of sustainable transition towards a reliable circular economy model.

Case studies and best practices provide international examples of successful implementation of circular principles, including local strategies and national policies, which offer completeness of the circular economy approach to waste management. The authors illustrate the actual applicability of the theoretical models in different geographical and socio-economic contexts.

In terms of originality, we consider that the paper provides a valuable contribution to the literature by its multidisciplinary integration of environmental science, public policy and engineering and its holistic approach to waste as a resource in the circular economy. Focusing on innovation and emerging technologies in the recycling and recovery of various categories of waste, providing concrete examples and best practices at European and international level, gives the work a particular novelty and originality. However, some chapters focus excessively on conceptual aspects at the expense of practical applications or up-to-date empirical data.

In the context of recent years, characterized by the need to implement coherent circular economy strategies, we believe that it would have been appropriate to emphasize the aspects related to impact studies and efficiency assessments of the measures promoted in this field. Also, in a world in which digitization and data analysis have a central place in the economic and social environment, including waste management, the paper does not sufficiently address the emerging technological dimension of this field. Therefore, we suggest as possible directions for further research in this vast field of circular economy to explore the possibilities of integrating digitization and IoT into smart collection and recycling systems, together with the development of standardized indicators to measure circularity at regional or national level and the economic and ecological modeling of circular supply chains.

This book is an invaluable resource for researchers and policy-makers interested in the circular economy and in modeling waste management systems in line with the challenges of the transition to the circular economy. The authors capture the scientific methodology and know-how needed by public authorities, as well as the private sector, to develop strategies for a viable transition to sustainability. In addition, the book is addressed to students, young researchers and practitioners who wish to deepen their knowledge of energy planning and current and future trends in the bioeconomy, biotechnologies and biofuels as alternative fuels. The book contributes significantly to the development of knowledge in the field and to the implementation of sustainable solutions in the current context of climate change and the need to transition towards more sustainable economic practices.

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