

Editorial

Editorial for the Special Issue “Circular Economy Strategies for Sustainable Development: Applications and Impacts”

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1. Introduction

The severe extraction of fossil resources and the extreme degradation of natural capital to attend to the increasing demands of production and consumption has generated a surplus of waste and emissions, the final destination of which is commonly landfills. Currently, the average temperature on Earth is already about 1.1 °C higher than it was in the late 1800s, and emissions continue to rise. To keep global warming lower than 1.5 °C (as requested by the Paris Agreement) emissions need to be reduced by 45% by 2030 and reach net zero by 2050 [1]. Nevertheless, the latest trends show that the actual commitments made by governments fall far short of what is expected. The combined current national climate plans for all 193 Parties to the Paris Agreement would lead to a sizable increase of almost 14% in global greenhouse gas emissions by 2030, compared to 2010 levels [2].

Apart from all of the environmental impacts associated with these events, they also represent a major bottleneck in the production chain and create new challenges for sustainable development and society in general. Circular economy has been proposed by the European Commission and other regulatory agencies and leading entities as a tool to enhance sustainability and its ambitions, including the attainment of carbon neutrality and promoting the efficient use of resources while keeping them in the economy at their highest value for the longest amount of time [3–6]. Within the myriad of possible alternatives to approach these issues, all of the domains concerning society as a whole should be considered, namely the environmental, economic, social, and technical spheres [4].

This Special Issue aims to show different aspects promoting the transition from the traditional linear economy to a circular ecosystem. Within this view, the economy is decarbonized, biodiversity is maintained, and natural resources are restored, while a more resilient and balanced society is enforced.

2. Motivation

The continuous and excessive production of goods and the expanded services offered to attend to society’s requirements have led to an impasse in the environmental reservoirs and in the availability of non-renewable resources [5,6]. Mass consumption with no restrictions to the end use has had devastating effects, as reflected by the waste arriving along our shores. Indeed, the pollution generated while seeking to satisfy today’s needs is another factor contributing to an announced destruction scenario, where biodiversity is endangered and social dissimilarities are enlarged. Some of the ongoing changes in the Earth’s climate systems are already considered irreparable, implying a state of planetary emergency [7].

Nine planetary boundaries have been defined as safe operating spaces for humanity, supporting the long-lasting and thriving development for generations to come. Currently, more than half of these boundaries have already been crossed, compromising this safety zone and the overall wellbeing of the planet: two of these planetary boundaries are situated in an “uncertainty zone”, while three are considered as having a high risk level, reinforcing the threat for large-scale abrupt and irreversible changes [8]. A catastrophic situation may escalate from a cascade of tipping points, with multiple earth systems reaching a point of



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no return. The loss of the West Antarctic ice sheet and the losses in the Amazon rainforest as well as the extensive melting of permafrost and other key components of the climate system are close to cross critical thresholds that will lead to steep and irrevocable changes, with the main responsibility being attributed to climate change.

These are the main challenges that our biosphere and communities face in the upcoming decades, and immediate action needs to be taken to reverse their progression. Hence, it is imperative to act fast, with unparalleled changes being taken to limit the climate change catastrophes and guaranteeing sustainable development from now on.

3. Background and Contents

Circular economy appears as a response to the need to create a cohesive and flourishing society. It guarantees sustainable development and promotes the regeneration of resources in a safe and clean environment [9]. Specific circular strategies include designing longer-lasting products, enhanced services, and business models (among other approaches); calling upon alternative reusable, repairable, and recyclable options to lower fossil-based resource consumption; and using bio-based materials and more energy-efficient processes to emit less or no CO₂ emissions. These contribute to limiting the pollution of natural systems and restoring biodiversity, as resource recirculation in value cascades or repurpose routes are applied instead of end-of-life scenarios [10]. Decarbonizing the economy and decoupling growth from intensive consumption are the ultimate goals to achieve sustainability and a more resilient society [9].

This Special Issue is dedicated to original full-length works, reviews, and case study applications describing circular economy schemes as well as their impacts in the environment and in society as enablers of a healthier environment, a balanced humankind, and the successful achievement of sustainable development.

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