Water-Centric Circular Economy Strategies in Agricultural Sector: Assessing the Impacts on Water Quality and Water Balance at the Catchment Scale

Integrated management of water, energy, food, and ecosystem components is important since these components are significantly interlinked. Water, energy, food security, and ecosystem health should be planned jointly so that Sustainable Development Goals (SDGs) can be achieved. The nexus approach will contribute to the implementation of SDG 2 (Food), SDG 6 (Water), and SDG 7 (Energy), in particular. The concept of circular economy has been considered as an effective solution to the global crises such as the increasing demand for resources, environmental degradation, climate change and scarcity of resources especially water, energy and food. As mentioned in the UN 2030 Agenda, the transition from linear to circular economy is one of the necessary policies to focus on. Especially the water crisis, which has been felt predominantly in the last century, brings water-oriented circular economy scenarios to the forefront. Water-centric circular economy strategies are put forward as a solution as they reduce water withdrawals and ensure that the full value of water is utilized. The significance of agricultural activities and the scarcity of water resources, especially during summer months, influenced the choice of the study area, which is the downstream of Porsuk Dam, belonging to the sub-basin of Porsuk Watershed in Western Anatolia, covering 10,825 km^2. The agricultural sector plays a significant role in exacerbating water scarcity in this region. Therefore, it is crucial to focus on the agricultural sector when implementing water-centric circular economy practices. This study aims to evaluate the impact of water-centric circular economy practices on the local ecosystem, specifically assessing water balance and water quality at a catchment scale. By developing water-centric circular economy models in the agricultural sector, the study aims to observe changes in water quantity and quality. Circular economy scenarios will be evaluated using the SWAT+ model, comparing water quantity and selected water quality parameters with the base scenario. The objective is to understand the effects of transitioning to a circular economy on the local ecosystem, addressing the research gap in directly measuring the effects of water circularity on the local ecosystem. Through this evaluation, a better understanding of the potential benefits and implications of circular economy practices in agriculture can be gained, offering insights into mitigating water scarcity and improving overall water resource management. This study's findings will contribute to the broader goal of integrated management and sustainable development, aligning with the

principles of the SDGs and the necessity for joint planning among water, energy, food, and ecosystem components.

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