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Planning for the efficient use of water in circular economy systems as an environmental strategy for the sustainability of processes

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INTRODUCTION

Within the framework of compliance with the National Circular Economy Strategy (ENEC), sustainable production and consumption initiatives are established in Colombia with efficiency in the use of materials, energy and water. The recoverability of ecosystems is proposed through technological innovation, collaborative alliances between public-private entities and academic sectors, the issuance of legal tools that promote the circularity of the flow of materials, water and energy flow that guarantee these aspects and their cultural, support, regulation and supply services (ENEC, 2019)

The Colombian economy fell by 0.45% in 2019 due to the country's low productivity, lack of innovation, increase in unemployment rates, the demand for natural resources and with them the exhaustion of the sources of supply of raw materials required in linear economic processes, total factor productivity (ENEC, 2019). The Colombian linear economic model characterized by excessive requirements for raw materials, water, energy, generation of Greenhouse Gases -GHG-, solid waste, biomass and discharges drives the country to innovation and implementation of sustainable business models that respond to the principles of sustainable development and compliance with development goals. In the country, the flow of water as an internal movement of productive activities represents the availability of the resource taken directly from water sources, groundwater and the use of rainwater. The water supply in Colombia is threatened by increasing scarcity and high demand in the different production processes.

Previously, it was identified that the linear discharge management model addressed in the resolution 631 of 2015 standard is configured as a limited model, not very measurable, and without surveillance, monitoring and control instruments, a fundamental indicator to analyze the country's performance in the management of water resources. (MADS, resolution 631 of 2015)

Based on the above, the purpose of this research work is to determine if the wastewater use model established in resolution 1256 of 2021 issued by the Ministry of Environment and Sustainable

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Development, Colombia is applicable in the legal, institutional and economic context of the country within the framework of the circular economy.

MATERIALS AND METHODS

The following premises were taken as a starting point: (a) the regulations associated with the management of discharges in Colombia have been insufficient to guarantee the minimization of the associated environmental impacts, so (b) it is necessary to evaluate the way to migrate from the linear management model to the circular economy model, in fact, (c) the Agricultural Sector as a pilot test, it presents a potential for migration through recirculation processes, being an example of viability to be replicated in Colombia.

The methodology established for the development of the premises raised is the deductive method of research that included qualitative, quantitative and experimental analyses. The work is developed in three moments; First, a search for information on the Colombian legal framework associated with the management of discharges, which includes the different legal, political and tariff instruments issued in order to identify the insufficiencies that led to accentuate the environmental impacts derived from their inadequate management. Second, a compilation of figures on the generation of discharges in different productive sectors to Finally, to analyze the potential of recirculation in the Agricultural sector, as a pilot test of migration from the linear management model to the circular economy model as a planning and sustainability strategy in the use of water resources in Colombia.

RESULTS

The aqueduct and sewerage service warns that this concept of linear economy developed, that is, it is captured, treated, used, polluted, cleaned or purified and returned or discharged to the different water bodies, must change depending on the amount of water available in the system, in relation to the above, It is pertinent to adopt a model that allows the optimization of the use of water resources.

By virtue of the above, strategies are established to leverage sustainable measures of the productive sector to the ENEC, such as mechanisms for the comprehensive management of the circular economy, innovation in production chains, issuance of regulatory tools that promote technological innovation, minimization and reduction of raw materials, the recovery of solid waste and discharges.

The use and reuse of domestic wastewater (ARD) promoted with the issuance of resolution 1256 of November 23, 2021 is part of the value chain of water flow in Colombia. The recirculation and reuse of ARDs as an integrating mechanism for the environment, society and the economy aims to promote production cycles and material cycles through sustainable cities, eco-efficient industrial parks, and their

contribution to the reduction of the water footprint and environmental impacts. (MADS, Resolution 1256 of 2021)

Within the framework of the circularity of water flow, the reuse of liquid waste generated by domestic activities (ARD) and even those from some low-impact industrial sectors (ARnD) seek to give a sustainable use to consumption because it is once again incorporated into the production system without the need to look for new sources of supply.

Resolution 1256 as an instrument of circularity contributes to making treatment systems more self-sustainable, since, if wastewater treatment becomes a priority on the agenda of entrepreneurs, and municipal Wastewater Treatment Plants (WWTPs), effluents that comply with the concentrations established for chloride parameters, sodium, nitrates, free cyanide, conductivity among other variables. This standard regulates specific wastewater quality parameters for agricultural use, including first contact. (MADS, Resolution 1256 of 2021)

The agricultural sector consumes 43.1% of the total water per year, around 16 billion cubic meters of water are used for the agriculture of different crops, with the instrument issued it contributes to the goals of reducing GHG by 51% by 2030, carbon neutrality by 2050, the sustainable development goals. The strategic water flow line articulates the efficient use of water resources with the potential for use, reuse and recirculation of approximately 54% of the country's urban wastewater by 2022 and 2023.

FINAL CONSIDERATIONS

The challenge for Colombia arises in economic incentives, reduction of fees and taxes, promotion of the optimization and innovation of wastewater treatment systems in the different economic sectors, and urban treatment plants that guarantee compliance with the quality and quantity of treated wastewater with the potential for reintegration, as well as the promotion of industrial ecoparks that allow the symbiosis of dumping as a source of supply reliable and safe.

Keywords: Circular economy, Wastewater, Sustainable agriculture, Economic incentives.

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