

Exploring the Economics of Urban Water: Valuation, Recycling, and Sustainability

Topic: Input-Output Analysis: Sustainable Production and Consumption Policies - IV

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Global trends on population, urbanization, and localization of economic activities suggest that the global economy increasingly becomes urbanized, both in developed and developing countries. A highlight of this process is that the dynamic interactions among metropolitan zones, medium cities, small cities, and rural locations are becoming increasingly complex and intertwined. One of the most outstanding features of this complexity has to do with the way in which these economic entities appropriate water as an essential material input. In other words, the degree to which hydrologic cycles are intervened is dependent on the urbanization process occurring in local watersheds. This paper explores the conceptual and theoretical understanding of the economics of water as an essential economic and ecological input for both social activity and ecological sustainability in the context of the urbanization process. The premise of this exercise is that economic models at different scales (national, regional, or local) should be capable of capturing the fundamentals of water's appropriation at different degrees of urbanization, so as to be able to assess alternative solutions to unsustainable situations. This paper presents an input-output model of an urban economy embedded in a highly urbanized water basin with the aim of exploring the interdependencies among hydrologic sustainability, competing economic uses, and the generation, treatment and reuse of wastewater under alternative scenarios of water availability. The model is formulated as a linear program based on the Rectangular Choice-of-Technology model and includes a set of equations representing the urban management abiding to mass-balance principles and capacity constraints of the urban infrastructure. While the model is aimed at empirical analyses of urban economies in different latitudes, the present paper presents a numerical example for a scenario analysis as a proof of concept. The findings measure and clarify the economics of water by distinguishing production costs, commodity prices and scarcity rents and highlight the important roles of treatment technologies, water infrastructure, and administrative arrangements as the foundation for a functioning governance adequate for the sustainability of urban water.