On the economic analysis of wastewater generation and treatment: the Mexican case

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Like many other developing countries, Mexicoâ€™s appropriation of water is used mainly to irrigate agricultural fields, with 77% of total yearly withdrawals, while industrial and household uses account for the rest. Production of wastewater, then, is divided between diffusive agricultural runoff, usually not accounted for in official statistics, and point generation of industrial and household flows, which are classified as municipal flows for urban centers and non-municipal for industries located in non-urban locations. The capacity for water treatment in Mexico has been increasing steadily over the last decade, but it is still clearly insufficient: at least 40% of the combined municipal and non-municipal wastewater production goes back to waterways untreated, while agricultural runoff, which contributes with the largest volumes to wastewater, does not receive special treatment at all, in part due to its diffuse nature. To ameliorate the associated degradation of water ecosystems, the risks to public health, and the contribution to water scarcity altogether, the Mexican government is investing US$ 1B to bring online two massive treatment plants located in two of the most compromised water basins in the country.

This paper makes use of an existing model and database for thirteen hydro-economic regions of the Mexican economy (LÃ³pez-Morales and Duchin, 2015) to incorporate wastewater treatment activities into the World Trade Model with Rectangular Choice of Technologies (WTM/RCOT, Duchin and Levine 2012). This approach builds upon a recent implementation of the WTM/RCOT for water treatment in the global economy (Cazcarro et al. 2015), and describes its relationships with associated literature, including Leontief (1970), Duchin (1985), and Nakamura and Kondo (2002). In particular, the work by Cazcarro et al. (2015) estimated the global economic costs of treating different volumes of wastewater set exogenously to the model, while the present study aims at estimating them endogenously by establishing the actual physical capacities of existing and of new treatment plants. Two scenarios are designed for comparison purposes: a Baseline with the existing nation-wide treatment capacity and a Policy scenario, in which treatment capacities for the regional economies installing the new plants are expanded. The relaxation of treatment constraints in these regions produces economic gains due to reduced pollution, scarcity, and water withdrawals, and the exercise compares these to the construction costs.

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