Seeing the Invisible Water: Direct vs. Indirect Use in Poland's Economy (EEIO 2020)

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Abstract

In water-stressed Poland, the largest "user" of water is often invisible: the supply chain. Seeing beyond on-site withdrawals is therefore essential to understand where conservation efforts will bite the most. An Environmentally Extended Input–Output (EEIO) model is constructed for 2020 (latest available data) that links national IO accounts with sectoral withdrawal data via a product-to-sector mapping. Direct water use (on-site withdrawals) and indirect water use (upstream requirements embodied in inputs) are computed from the Leontief model to obtain an economy-wide water footprint tied to production and final demand. Marked concentration of withdrawals is observed: Electricity, gas and steam accounts for 5,171.7 hm^3, Manufacture of chemicals and chemical products for 313.1 hm^3, and Manufacture of paper and products for 102.6 hm^3, together comprising 94.2% of industrial use. Indirect effects dominate at the macro level, constituting 65.3% of total water use. At the sectoral level, indirect use exceeds direct use in 27 of 59 sectors, while 32 sectors are direct-dominant; within the Electricity sector, the indirect component is roughly twice the direct, indicating strong upstream propagation. Manufacturing as a whole contributes 10.8% of withdrawals but displays pronounced heterogeneity driven by a few water-intensive branches. By jointly quantifying direct and indirect components, high-leverage nodes, especially power, chemicals, and paper, are revealed where efficiency improvements, input substitution, and cleaner technologies can deliver outsized savings. For policymakers, the results support targeted, least-cost interventions (e.g., sector-specific standards, water pricing, and energy-transition planning) that internalize upstream water burdens and prioritize actions with the greatest system-wide impact.

Keywords: Input Output Models, water use, direct/indirect effects, water footprint