Strategies for Sustainable Management of Water Resources in Mexico

Topic: Addressing Resource Challenges in a Globalized Economy II
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The economic challenges surrounding water resources include not only attention to the growing competition over water for food, energy, manufactured goods, and domestic uses but also ensuring that the appropriation of water for human uses is environmentally sustainable. With pressures from population growth, improved material standards of living, and climate change, these challenges will only intensify. This paper synthesizes the results of several empirical studies of water scarcity in the Mexican economy to identify and quantify the roles of four adjustment mechanisms instrumental for water sustainability: tradeoffs between appropriation from surface and groundwater sources; tradeoffs regarding two types of technological alternatives, namely rainfed vs. irrigated agriculture and, in the latter case, irrigation technologies of varying efficiencies; and modifications in patterns of inter-regional trade in food products. From a methodological perspective we conclude, first, that the modeling framework must impose numerically realistic estimates of water endowments. Second, the competition for water among distinct economic activities must be explicitly represented. Third, the choices among alternative technologies for water-intensive activities, in particular the production of food or the generation of electric power, must be endogenous. Fourth, the economic model needs to be conceptualized as a transparent combination of theory-based relationships, an explicit logic for parameterization, and exogenous scenario assumptions. The paper draws on, and augments, several studies of 13 hydro-economic regions comprising the Mexican economy, each characterized by the availability of water (and other factors of production), environmental constraints, production technologies, and consumption demand.