

An Economic-Hydrological Approach for Brazil and the Northeast Region through the Input-Output Matrix

Topic: Input-Output Accounts (3)

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Currently, there is intense debate about the challenges of combining economic issues with environmental sustainability. This is because economic development has been characterized by the increasing use of environmental resources and has generated consequences that limit the scope of sustainable development. Water is a scarce resource, even for a country like Brazil, which has about 12% of the planet's available fresh water (ANA, 2022). On the other hand, about 80% of Brazil's water resources are in the Amazon, and the remaining 20% are unevenly distributed among the other regions (ANA, 2022). Considering this scenario, the Northeast region is even more problematic, given the territory's susceptibility to drought, with arid soil and low rainfall, which together contribute to the scarcity of water resources (EMBRAPA, 2012). On the other hand, the region has a high population density with more than 54 million inhabitants and the largest number of municipalities (IBGE, 2022). Thus, the water balance, depending on natural and anthropogenic factors, shows a greater indicator of scarcity in the supply and quality of water provided. Therefore, the water issue is very relevant for the Northeast region. The availability of natural resources is such an important and essential issue at the global level that the United Nations Statistical Commission has approved a standardized methodology to be used by countries, called the System of Environmental Economic Accounting (SEEA). One of the components of this system is the measurement of water, considering the inflow and outflow of these resources from the environment for economic activities. Thus, this measurement aims to analyze the flow between water supply and demand in various sectors of the economy, as well as to assess its impacts on the use and disposal of the resource based on indicators of pollution, water depletion, and changes in water quality. Therefore, this article aims to assess the sectoral impacts of water resource use in the Northeast region of Brazil, which is characterized as the Brazilian region with the most acute water scarcity over time. To this end, the Input-Output Model was combined with recent data from the Environmental Economic Accounts for Water (CEAA) published by the Brazilian Institute of Geography and Statistics (IBGE) in order to assess the total effects (direct and indirect) that each productive sector has on the environment. The Input-Output Matrix for the Northeast (MIP-NE) used was regionalized from the 2015 Matrix for Brazil, the most recent available from the IBGE. The input-output matrix used for Brazil (MIP-BR) was for the year 2015, prepared and published by IBGE (2020) and aggregated into six economic sectors (1. Agriculture, livestock, forestry, fishing, and aquaculture; 2. Extractive industries; 3. Manufacturing and construction; 4. Electricity and gas; 5. Water and sewage; 6. Other activities). The MIP-NE was estimated based on the MIP-BR. The water resource use matrix also refers to the year 2015 and contains five sources of water withdrawal (surface water; groundwater; soil water; rainwater collection and sea water), and four destinations for the disposal of these water resources (surface water; groundwater, soil water and sea water). The results indicate that the electricity and gas sector was primarily responsible for the withdrawal and return of water to the environment. It can be concluded that the limited number of economic sectors incorporated into the MIP-NE and their respective environmental data do not allow for a more in-depth economic-environmental analysis. Thus, a greater amount of information from economic and environmental accounts associated with an interregional input-output model between different Brazilian regions would yield more accurate results. It is a fact that an economic-environmental analysis for Brazilian regions is still in its infancy, due to the limitations of the available databases. However, it is becoming increasingly essential as a tool for achieving sustainable development, especially in a poor region with water scarcity such as the Northeast.