Virtuosity and inefficiencies of the global virtual water trade (with application to Italy)

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The current trade of agricultural goods, with connections involving all continents, entails for global exchanges of "virtual" water, i.e. water used in the production process of alimentary products, but not contained within. Each trade link translates into a corresponding virtual water trade, allowing quantification of import and export fluxes of virtual water.

The assessment of the virtual water import for a given nation, compared to the national consumption, could give an approximate idea of the country's reliance on external resources from the food and the water resources point of view. A descriptive approach to the understanding of a nation's degree of dependency from overseas food and water resources is first proposed, and indices of water trade virtuosity, as opposed to inefficiency, are devised. Such indices are based on the concepts of self-sufficiency and relative export, computed systematically on all products from the FAOSTAT database, taking Italy as the first case study. Analysis of time series of the self-sufficiency and relative export can demonstrate effects of market tendencies and influence water-related policies at the international level.

The goal of this approach is highlighting incongruent terms in the virtual water balances by the viewpoint of single products. Specific products, which are here referred to as "swap products", are in fact identified as those that lead to inefficiencies in the virtual water balance due to their contemporaneously high import and export. The inefficiencies due to the exchanges of the same products between two nations are calculated in terms of virtual water volumes. Furthermore, the cases of swap products are investigated by computing two further indexes denoting the ratio of virtual water exchanged in the swap and the ratio of the economic values of the swapped products. The analysis of these figures can help examine the reasons behind the swap phenomenon in trade.