

Entropy of Egypt's virtual water trade gravity field

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The study investigates the entropy of Egypt's virtual water trade gravity distribution, in order to provide a chart of Egypt's embodied water balance in agricultural trade, in relation to distances with its major counterparties. Moreover, our calculations on the amount of the embodied water traded between Egypt and each of its partners take place according to a combination of available data on the blue, green and grey water footprints as well as the Food and Agriculture Organization (FAO) database of traded amounts per crop type. A study on the virtual water trade gravity, enables us to enrich former related studies (Fracasso 2014; Fracasso, Sartori and Schiavo 2014) via examining Egypt's water supply dependence on the Nile River and if comparative advantages -purely from the side of water quantities- can be identified via recognizing which water footprint categories are particularly high. Additionally, this methodology can comprise -from a fundamental level- a guide for revealing the importance of water footprint types for Egypt's agricultural sector; hence, Egypt's potential comparative advantages, as far as quantitative water endowments are exclusively concerned (without consideration of water or crop prices). Although it is pointed out very correctly by various authors (Antonelli and Sartori 2014) that the virtual water trade concept does not incorporate many important aspects of water supply -such as heavy water price subsidizing- to be used accurately for the identification of comparative advantages, we consider that the purely quantitative examination can provide strong fundamental indications -especially for green and grey water footprints, which are hypothesized to be less sensitive to subsidizing. In overall, this effect can very well provide a primary indication on the organization of the global alimentation trade network (Yang et al. 2006).

The gravity equation used contains water footprint data for the 15 top traded crops and the distances for Egypt's 20 trading partner countries, for a time frame from 1995 to 2013. The calculations -implemented for each country and each crop- display a network that illustrates the gravity of virtual water trade. It is then possible for us to model the entropy of Egypt's virtual water trade gravity field, via the statistical examination of its spatial fragmentation or continuity for each traded crop and for each water footprint type. Hence, with the distribution's entropy we may conduct a targeted analysis on the comparative advantages of the Egyptian agriculture.

Keywords: entropy, virtual water trade, gravity model, agricultural trade, water footprint, water subsidies, comparative advantage

References

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