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Hydrology and Earth System Sciences Discussions

Interactive comment on "Virtual industrial water usage and wastewater generation in the Middle East/North African region" *by* S. R. Sakhel et al.

Anonymous Referee #2

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The topic of the manuscript is relevant. High quality quantitative information on industrial water use and water quality impacts of industrial waste water is generally scarce, with available assessments relying on limited and often non/specific information. The choice of the MENA region is adequately explained to be relevant. The relevance of the specific focus in the manuscript, relating water-system impacts of the industrial sector to trade flows with EU27 does not become clear.

The paper is well structured and written in a clear style.

At the conceptual level, the paper is very loose. Where industrial water use is related to water scarcity indicators in the paper, neither water use (or other components in the physical water balance) nor water scarcity are defined in a rigorous way. It is generally unclear whether water use relates to withdrawal from the water system, gross use by

industries or consumptive uses by industry. Water scarcity indicators similarly relate water use to a loosely used term water availability, sometimes phrased as adequate renewable water (3.1.2 even seems to frame water availability as the difference between renewable water and withdrawal; this is very unusual). At various occasions, the ratio of industrial and domestic water use is presented as an indicator (and similar constructs for wastewater), where this value hardly seems interpretable as an indicator of scarcity. A wide body of literature discusses these indicator issues (e.g. on the consideration of return flows), and the paper only very briefly refers to the (only somewhat older) contributions to this literature and does not seriously discusses it.

For the wastewater part, volumetric estimates are given, that are hard to interpret: are they to be considered as positive impact, restricting the net water use of industry, or as a negative impact. Information given on total BOD/COD is much more relevant, but still not an indicator of the impact to the receiving water body; concepts such as the grey water footprint could prove helpful here.

In the methodology of the paper, the sub-division of the industrial sector in sub-sectors is very useful. The selection of sub-sectors is somewhat surprising, giving focus to aggregated revenues and some specific branches only. Water use-intensity of industries is nowhere adopted as a criterion for selection, whereas inclusion of a slaughterhouses based on food-security policies does not seem justified.

The quantification of virtual water / water use and waste water is quite transparently represented in tables with assumptions and extensive listing of the data sources used. The presentation of the methodology focuses on quantifying volumes related to exports to EU27 only but is presumably applied similarly for the entire production. The methodology seems (at times) unbalanced in the level of detail on some subjects and very generic assumptions on others, while some of the information sources are of such a quality that they would need a critical evaluation (e.g. references to internet blogs). In particular the fact that, due to lack of data, European specific water usage and wastewater generation figures are used in a quite generic way, reduces the value-added of the

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current paper.

The presentation of results is not as structured as the rest of the paper. A clear table of water use in industrial production by country and sub-sector, and a similar one for BOD/COD would be a good summary of most marked contribution of the paper. Some of the tables given have a big overlap. The comparisons given to values in literature are valuable, and could be extended by comparisons with data from global assessments (Aquastat, or PNAS paper Hoekstra and Mekonnen, 2012).

The conclusions section of the paper only presents the newly generated insights, supported by evidence presented very briefly. It quickly turns to policy suggestions that are not based on evidence presented, and some do not relate to any of the contents of the paper (e.g. advertisement of tax reductions in particular situations: the paper does not contribute to assessing economic instruments).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 999, 2013.