



European industrial water use: a new dataset with high spatial and sectorial detail

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One of the most important components of the water balance in terms of water scarcity modelling is an accurate quantification of water abstractions by water using sectors. Data availability for this topic is sadly strikingly limited, most notably for the industry sector. Due to the lack of data, many global and continental scale modelling studies rely on relatively outdated water use datasets with coarse resolution which generally treat the industry sector as a single unit. The lack of spatial and sectorial detail hurts the local relevance and applicability of these large-scale models to the point that results might be meaningless for regional policy support, especially because economic assessments of potential water allocation policies require the separation of economic activities with different water use behavior and water productivity (industrial production per unit of water). With this work, we aim to solve this knowledge gap for Europe by providing a pan-European dataset with regional relevance of water use and water productivity values at the highest sectorial and spatial detail possible. We gathered industrial water use data from national statistical offices and other organizational bodies, separating ten different industry subsections of the NACE classification (Nomenclature of Economic Activities). Where data was not adequately available from national databases, we used complementary figures from EUROSTAT (official database of the European Commission). Then we used national GVA (Gross Value Added) to calculate water productivity values per country for all industrial subsections. As a final step, we used a database with locations and production records of nearly 20,000 individual industrial activities to proportionally distribute the national water use values for each industry section to roughly 1200 regions in Europe. This resulted in a pan-European dataset of water use at regional level and water productivity at the national level for ten industry sections based on state of the art data. We used this data set to make scenarios of future water use based on GVA projections and extrapolation of water productivity values. Results show high heterogeneity amongst countries and sectors but differences in water use behavior between industry sections can be clearly identified. Additionally, we found that the aggregated water use totals for the entire industry sector that we obtained often differ substantially from values reported in European and global datasets. Although the accuracy of the dataset is highly uncertain due to the use of many assumptions, it is still a vast improvement on any pan-European industrial water use datasets up to now. We argue that due to the lack of suitable alternatives this dataset of present industrial water use based on sectorial water productivity estimations should be the starting point of European scale water demand studies. Furthermore this method can be used to extrapolate water use in data scarce countries to expand the dataset to other continents.