EGU21-14587, updated on 17 Jan 2022
https://doi.org/10.5194/egusphere-egu21-14587
EGU General Assembly 2021

The Water Gap Risk Index – a novel approach for spatially distributed and sector-specific water scarcity risk calculations in urbanized catchments

Mehmet Umit Taner, **Dimmie Hendiriks**, Lieke Huesken, Niels Mulder, Diana Morales Irato, Marta Faneca Sànchez, Maaike van Aalst, and Sophie Vermooten
Deltares, Delft, The Netherlands

An increasing number of mega-cities, such as Cape Town, Lima, and São Paulo, are confronted with increasing droughts as well as an increase in water demand. Inevitably, this leads to increasing pressure on the available water resources and associated risks and economic impact for the water-dependent sectors (eg. drinking water supply, industry, energy production, agriculture, nature) and different user groups within the sectors (eg. low, middle- and high-income households, self-subsistence farmers, large farms). To address these problems and to develop targeted mitigation strategies, risk analyses are required that quantify the impact of water scarcity on the various sectors and users-groups in different parts of the catchment.

Here, we present the Water Gap Risk Index (WGRI) that quantifies water scarcity and its impacts on a variety of economic sectors and user groups. The WGRI provides a normalized score to reflect high spatial and temporal variability typical for urban catchments that apply to different settings and problems. Index calculation involves the combination of unmet water demand and its characteristics with socioeconomic aspects related to vulnerability and exposure. The Water Gap term quantifies water system performance over a defined time period taking into account the frequency, persistence, and severity of unmet water demand. Vulnerability metrics provide a score for each sector and user-group separately using context-specific vulnerability indicators of each sector and user-group.

In the novel WGRI special attention is paid to the vulnerability of different water user-groups, based on their socio-economic status level (expressed in income, consumption, or other indicators) and respective water use. We consider that 1 liter of water does not have the same utility for different user groups, based on the principle of the diminishing marginal utility curve. As a result, the impact of water scarcity and mitigation measures will also play out differently for these different user groups.

The novel WGRI is being applied in the context of the WaterLOUPE approach[1], to the catchment of Sao Paolo, Lima, and Chennai.

[1] https://doi.org/10.5194/egusphere-egu2020-20505