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Evapotranspiration, water demand and water footprint of urban green spaces

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The world's population residing in urban areas grew from 30% in 1950 to about 60% in 2020 and is expected to reach 68% by 2050. As urban areas continue to grow, green spaces in cities are getting ever more treasured. Most cities have adopted strategies to be greener to improve their resilience and livability. To make the best of the benefits offered by urban green spaces, healthy greenness is essential and this means additional water consumption. Water limitation usually results in drying out of green areas in summer, when benefits and services by green spaces are highly demanded (e.g. cooling effect). In the 21st century, vulnerability to water shortage is not restricted to dry regions anymore; water scarcity in the time of need is threatening the livability of cities even in wet regions (i.e. extreme summers in Europe). In this study, we estimate for the first time, to our knowledge, the blue water consumption of urban green spaces. We measure the evapotranspiration of an urban green space using three approaches of in-situ, observational-based and remote sensing, and employ principles of water footprint. We assess the blue and green water footprint of urban greenery to maintain green areas of a city based on their water demand, not the abstracted water or irrigated water. In the case of Adelaide Parklands in Australia, the annual total water footprint is 1114mm, of which 17% consumes in spring, 42% in summer, 27% in autumn, and 14% in winter. The average blue water footprint of the Parklands calculates 0.66 m^3 per square meter per annum. The hot and dry summer causes a high total water footprint compared to the cold and wet winter. This study is transferable to other cities for quantification of blue water consumption of urban green spaces and their water footprint. These findings may help to guide urbanisation priorities to move toward greening cities with no extra pressure on scarce water resources.