

Characterizing and quantifying links between water, energy, and food consumption in a water-poor, energy-rich city; Adelaide, Australia. By Margaret Shanafield*, Okke Batelaan, and Sundar Subramani *Margaret.Shanafield@flinders.edu.au

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Abstract

More than half of the world's population are urban dwellers, and this percentage is on the rise. Therefore, understanding the links between water, energy, and food requirements of cities plays a critical role in determining global resource consumption. Adelaide is a mid-size, coastal Australian city in Australia with a population of almost 1.3 million inhabitants. With its plentiful access to wind and solar energy, the Adelaide region has one of the highest rates of renewable energy production in the world, and access to additional, conventional energies supplies from other parts of the Australian network. However, the water supplies in this region are theoretically limited, as groundwater depletion is already occurring in the food production areas surrounding the city, and municipal water supplies rely heavily on the fully allocated Murray River system.

Objectives

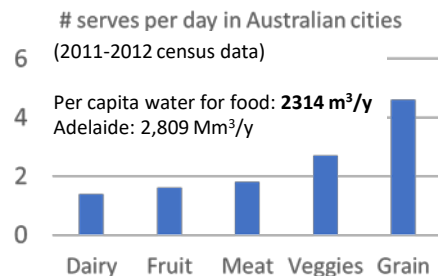
To quantify links between **water**, **energy**, and **food** consumption at the city scale, and to understand how consumption in these sectors is changing in time.

Methods

The data for this study has been obtained from available online resources, though industry reports, census data, and literature values. Water for food and energy footprints have been taken from Mekonnen and Hoekstra (2011), Mekonnen et al (2015) and Spang (2014).

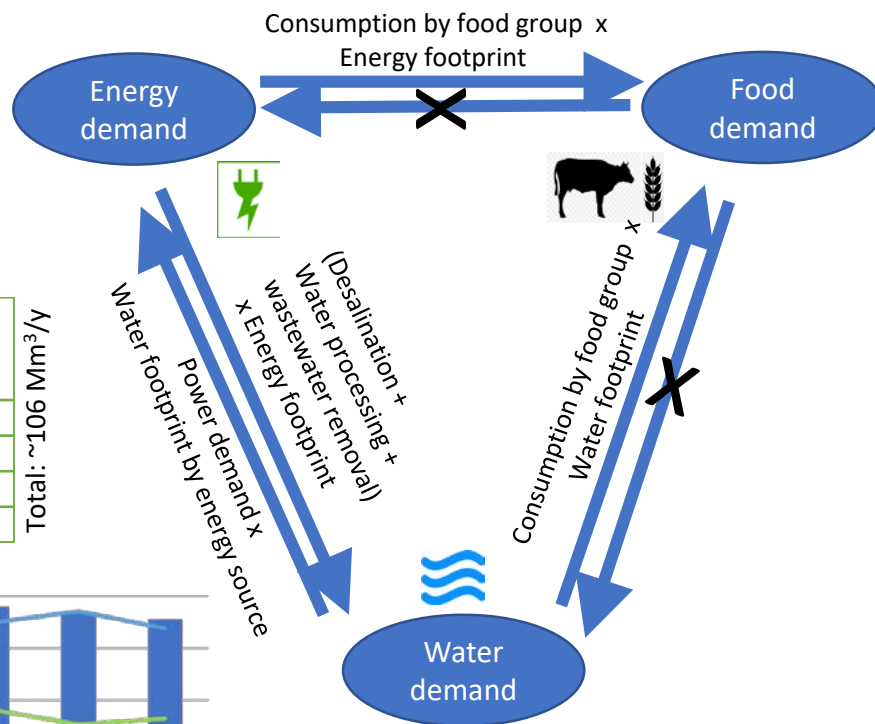
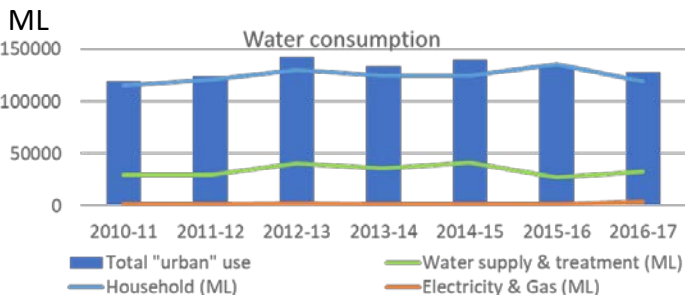
Results

Population of Adelaide: 1.3 M people



	PJ Consumed 2016-2017	Water Footprint (Mm ³ /y)
Oil	106.65	15.0
Coal	30.47	52.9
Gas	137.12	33.9
Renewables	30.47	<4.3

Total: ~106 Mm³/y



Conclusions, considerations, and ongoing work

1. **>10 x more water is "consumed" in the urban center through food consumption than by the other sectors.** 2. At the city scale, household water use is a major contributor to water demand; but use has not changed over the past decade. 3. It's challenging finding annual energy consumption for Adelaide (instantaneous is available, as is production). 4. The diet of Adelaide residents not significantly different from national habits (last surveyed 2011-12). 5. 77% of SA live in Adelaide; therefore some data for state can be used at city-scale. *Calculation of final links and trends is ongoing!*

Acknowledgments

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