



On the Role of Hyper-arid Regions within the Virtual Water Trade Network

James Aggrey (1), Aamena Alshamsi (2), and Annalisa Molini (1)

(1) Institute Center for Water and Environment (iWater), Masdar Institute of Science and Technology, Abu Dhabi, United Arab Emirates (jaggrey@masdar.ac.ae), (2) Department of Electrical Engineering and Computer Science, Masdar Institute of Science and Technology, Abu Dhabi, United Arab Emirates

Climate change, economic development, and population growth are bound to increasingly impact global water resources, posing a significant threat to the sustainable development of *arid regions*, where water consumption highly exceeds the natural carrying capacity, population growth rate is high, and climate variability is going to impact both water consumption and availability. Virtual Water Trade (VWT) — i.e. the international trade network of water-intensive products — has been proposed as a possible solution to optimize the allocation of water resources on the global scale. By increasing food availability and lowering food prices it may in fact help the rapid development of water-scarce regions. The structure of the VWT network has been analyzed by a number of authors both in connection with trade policies, socioeconomic constraints and agricultural efficiency.

However a systematic analysis of the structure and the dynamics of the VWT network conditional to aridity, climatic forcing and energy availability, is still missing. Our goal is hence to analyze the role of arid and hyper-arid regions within the VWN under diverse climatic, demographic, and energy constraints with an aim to contribute to the ongoing Energy-Water-Food nexus discussion. In particular, we focus on the hyper-arid lands of the Arabian Peninsula, the role they play in the global network and the assessment of their specific criticalities, as reflected in the VWN resilience.