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Water2Invest: Global facility for calculating investments needed to bridge the climate-induced water gap

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Decision makers responsible for climate change adaptation investments are confronted with large uncertainties regarding future water availability and water demand, as well as the investment cost required to reduce the water gap. Moreover, scientists have worked hard to increase fundamental knowledge on climate change and its impacts (climate services), while practical use of this knowledge is limited due to a lack of tools for decision support under uncertain long term future scenarios (decision services). The Water2Invest project aims are to (i) assess the joint impact of climate change and socioeconomic change on water scarcity, (ii) integrate impact and potential adaptation in one flow, (iii) prioritize adaptation options to counteract water scarcity on their financial, regional socio-economic and environmental implications, and (iv) deliver all this information in an integrated user-friendly web-based service.

Global water availability is computed between 2006 and 2100 using the PCR-GLOBWB water resources model at a 6 minute spatial resolution. Climate change scenarios are based on the fifth Assessment Report (AR5) of the IPCC Coupled Model Intercomparison Project (CMIP5) that defines four CO_2 emission scenarios as representative concentration pathways. Water demand is computed for agriculture, industry, domestic, and environmental requirements based on socio-economic scenarios of increase in population and gross domestic product. Using a linear programming algorithm, water is allocated on a monthly basis over the four sectors. Based on these assessments, the user can evaluate various technological and infrastructural adaptation measures to assess the investments needed to bridge the future water gap. Regional environmental and socioeconomic effects of these investments are evaluated, such as environmental flows or downstream effects. A scheme is developed to evaluate the strategies on robustness and flexibility under climate change and scenario uncertainty, and each measure is linked to possibilities for investment and financing mechanisms.

The tool can be used by consultants, water authorities, non-governmental and commercial investors alike to test investment strategies, but could also be used by companies as a vehicle for advertisement water saving or crop water productivity technologies that can be evaluated on their effectiveness on the spot. We show initial results based on a preliminary study on the Middle East and North African region.