



## **Integrated vulnerability assessment on water availability in the Arab region**

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Vulnerability is a concept used to express the complex interaction between climate change effects and the susceptibility of a system to its impacts. The conceptual framework includes three vulnerability components as defined by the IPCC: (a) exposure, representing climate change impacts, (b) sensitivity, concerning the natural and physical environment that is particularly susceptible to climate change, and (c) adaptive capacity, representing mankind's ability to adjust to climate change. As part of the Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR), water availability was evaluated using indicators representing the three vulnerability components coupled with GIS methods to develop a vulnerability map for the entire region.

The integrated mapping methodology entailed a multi-step process which combines indicators that characterize the three vulnerability components, applies weights to each indicator, and utilizes geometric aggregation to develop a vulnerability map (ESCWA et al., 2017). Indicators are categorized into dimensions, which are also weighted, to help maintain balance between indicators. Due to varying magnitudes and units of measurement, prior to aggregation, indicators were normalized and classified using a common scale. For water availability, 6 exposure indicators, 11 sensitivity indicators, and 19 adaptive capacity indicators were selected.

The results reveal nearly equal areas of moderate and high vulnerability, relative to the Arab region. At mid-century (2045-2065), 43% (RCP4.5) to 52% (RCP8.5) of the study area predicts high vulnerability. Values increase slightly at end-century (2081-2100), where 48% (RCP4.5) to 57% (RCP8.5) of the study area indicates high vulnerability (ESCWA et al., 2017). Areas with high vulnerability include the upper Nile Valley, the south-western Arabian Peninsula, and the northern Horn of Africa, partly due to low adaptive capacity. These areas of least developed countries (LDCs) largely adversely impact water availability for pastoralists and livestock. Conversely, areas with relatively low vulnerability include the Tigris-Euphrates basin and the lower Nile Valley, areas of high population density. Trend analysis indicates the largest increases in vulnerability from mid- to end-century are located near coastal areas, including the Red Hamada basin and the eastern Murzuk basin, partly due to a surge in maximum length of dry spell.

### Reference:

United Nations Economic and Social Commission for Western Asia (ESCWA) et al. 2017. Arab Climate Change Assessment Report – Main Report. Beirut, E/ESCWA/SDPD/2017/RICCAR/Report.