Participatory Bayesian Network modelling of climate change risks and adaptation regarding water supply: Integration of multi-model ensemble hazard estimates and local expert knowledge: supplemental document

1. CHARACTERIZATION OF THE CASE STUDY AREA IN STEP 1 BASED ON INTERVIEWS AND LITERATURE

In step 1 (Sec. 3.1 in the manuscript) a characterization of the case study area was conducted based on interviews and literature. It is–exemplarily–given below:

Among all world regions, the Mediterranean is most likely to be exposed to a decrease of water resources due to climate change hazards (e.g., [1]). Climate change is expected to exacerbate existing water scarcity, with decreasing per-capita water availability due to both population increases and ongoing agricultural development. The Medjerda river basin (Fig. 2 in manuscript) is shared between Tunisia and Algeria (16,300 km^2 and 7,700 km^2, respectively). It is a highly managed basin and exemplifies the typical problems of semi-arid Mediterranean catchments [2]. Precipitation is of high inter-annual and spatial variability. Mean annual precipitation at Ghardimaou station is 450 ± 135 mm/yr (1965–2005) [2]. The Tunisian part of the basin has a population of about 1.4 million [3, 4], while the rocky Algerian side is sparsely populated. The Medjerda is Tunisia's principal river accounting for about 80 % of its surface water resources and supplying water for 5.5 million people, more than half of the Tunisian population [5]. There are eleven dams with a current capacity of 1,200 Mm^3 [3], including the largest reservoir in Northern Africa, the Sidi Salem reservoir (capacity 555 Mm^3) [5]. Another seven reservoirs are planned or under construction and are expected to add another 300 Mm^3 of water storage capacity [3]. Relevant water quantities (about 300 Mm^3/yr [6]) are transferred out of the basin through the Cap Bon Canal, supplying water to the capital Tunis and the second largest Tunisian city Sfax as well as to the Sahel region and north-eastern Tunisia for agricultural irrigation and artificial groundwater recharge [7]. On the Algerian side, the largest reservoir is the Ain Dalia reservoir (capacity 82 Mm^3) [8], supplying several smaller cities with drinking water [9]. Land use is dominated by irrigated agriculture, permanent grassland and livestock [3, 9]. In Tunisia, most of the Medjerda's water is used for irrigated agriculture (84 %) and drinking water (10 %) [2]. The irrigated area on the Tunisian side has drastically increased from 49,000 ha in 1987 to 245,000 ha in 2001 [2]. The most common irrigation method is surface irrigation [10]. Treated reuse water is used to irrigate about 460 ha of agricultural lands, constituting less than 1 % of total irrigation water demand [11, and own calculations]. Water is an important economic factor in this highly managed basin which is already operated close to its maximum capacity, making it especially vulnerable to any future climate change hazards.

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