**Supplementary material**

Fig. S1. Volumetric climate graphics of El-Fayoum depression weather station and irrigation. Inside (right), include the total amount of water considering both irrigation and precipitation; and outside (left) as no agricultural activities only the precipitation is considered. (Tm), monthly mean temperature; (ET₀) potential evapotranspiration; (ARᵢ) Aridity index.
Fig. S2. Levels of generalization of Almagra model for each soil input factor. The green boxes represent the subclass of the three soil factors that considered in the improvement scenario evaluation.
Fig. S3. Soil suitability according to Almagra model outputs. A: suitability classes, B: suitability subclasses with a subscripted number that represents the digit of limiting factors as salinity, sodium saturation, drainage, calcium carbonate content, useful depth, texture, and profile development. C: soil limitation degree.
Fig. S4. The adjacent south west of Qarun Lake (a) compared with the southeast part (b).