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Use of decision theory tools for qualification of the lands of the Community of Madrid

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Assuming the goal of getting aids for valuation or classification of a wide collection of types of soils or lands of a given region from soil science profiles or data sets obtained for each land to determine soil quality and suitability for uses such as farming, forestry or conservation, the authors started with a CM study containing a comprehensive official collection of soils of the Community of Madrid CM, sets of attributes and a SQ classification for general agrologic aptitude goal based on minimum requirements for soil attributes using traditional methods. From that study they took a soil database of 122 land profiles including values or qualifications for the set of attributes used for SQ classification {mean annual precipitation, vegetative period, mean summer temperature, mean winter temperature, USLE-C for tolerable soil losses, actual erosion, soil sealing and crusting risk, drainage, flooding, soil water storage, effective depth, compaction, permeability, pH, organic matter, cation exchange capacity (CEC), carbonates, electric conductivity (saturated), ESP (exchange sodium percentage), rock fragments in surface horizon, stones, and slope} and borrowing techniques from Decision Theory or Operational Research OR they defined by weighted addition of normalised valuations of a comprehensive subset of attributes through attribute valuation functions AVF a Quality Index QI in nominal range (0,1). That index appeared as complementing the SQ classification, and to synthesize both results they elaborated a new method reducing the QI of each land to a Combined Quality Index CQI considering some minimum requirements. For that inspired in an ELECTRE TRI OR method that uses a fuzzy sets format they compared the attribute values used in QI method to two class of threshold for each attribute, a starting U and a worse absolute V, and reduced the precedent QI towards a CQI value in range (0,1) corresponding

to a (SQ) class if the attribute value was worse than the class attribute U in a fraction depending of how near it was from the corresponding V, obtaining finally a CQI that incorporates additive valuation on all the IQ attributes and minimum conditions inspired in SQ classification through the set of threshold values U and V. The results were appropriate to aid in the CM case study to qualify the soils for general agrologic purposes in territorial planning, and in further studies the method could be extended to different regions with other goals for valuation, but that would require obtaining adapted sets of lands and attributes, and definition of adequate AVF and thresholds.