Calculating distances to ideal points

An assessment of the census blocks that are prioritized for investment is obtained through multicriteria evaluation of the distance of each census block from an “ideal point,” or utopian state, defined by a set of decision criteria and based on the relative importance of each criteria for the water authority. Formally, we calculate a distance , such that:

,

where is the distance to the ideal point of census block j with respect to decision and system ; is the criterion weight of criterion related to system ; is the normalized value in a census block of the attribute corresponding to criterion , with respect to infrastructure system and decision ; is the departure of an alternative from the ideal point for a criterion; , , , , and are indices for criteria, census blocks, action, time, and infrastructure system, respectively. In Equation 1, the standardized score, , represents a judgment about the importance of an observable stimulus (census block attribute value) in the water authority’s decision.

Given that the variables representing the criteria are continuous and interval- and ratio-scaled, these scores are obtained by means of value functions (Beinat 1997), which transform the natural scale of a criterion to a [0, 1] value scale (1 represents the most undesirable state and 0 the most desirable state).