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Assessment of water resources potential of Ceará state (Brazil)

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A methodological approach and results on water resources assessment in large areas are described with the case study of Ceará State (148,016 km2, northeast Brazil), where the scarceness of water resources is one of the main challenges in territorial planning and development. This work deals with the quantification and the mapping of water resources potential, being part of methodological approaches applied to the quantification of hydric diversity and geodiversity. Water resources potential is here considered as the sum of the hydric elements rainfall, groundwater specific discharge, water reservoirs, and river hierarchy. The assessment was based in a territorial organization by drainage sub-basins and in vector maps generated and treated with GIS software. Rainfall, groundwater specific discharge and hydrographical data were obtained in official institutions and allowed the construction of the annual mean rainfall map for a forty year period (1974-2014), the annual mean groundwater specific discharge map for a thirty-four year period, and the river and drainage basin hierarchy maps. These delivered rainfall, groundwater specific discharge, water reservoirs and river hierarchy partial indices expressed on quantitative maps with normalized values distributed by level 3 drainage basins. The sum of the partial indices originated the quantitative map of water resources potential index and by the Gaussian interpolation of this quantitative data a map of hydric diversity in Ceará state was created. Therefore, the water resources potential index is higher in 4 regions of the state (Noroeste Cearense, Zona Metropolitana de Fortaleza e da Zona Norte, Vale do Jaguaribe and Zonas Centro-sul e Sul Cearense). The index is low or very low in the whole region of Sertões Cearenses, confirming the important role of climatic features in hydrological diversity. Water resources management must consider technical tools for water resources assessment, in the line of other methods for quantitative assessment of natural features either biotic or abiotic. These results quantify water resources and their distribution in a large region with important climatic differences. They constitute a basis for the knowledge of regional issues concerning water needs, flood and droughts events and even engineering solutions for water resources management.