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Mapping groundwater recharge in Vilnius urban and peri-urban area (Lithuania)

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Urban sprawl is decreasing the groundwater recharge by sealing the soils. In several cases, this expansion occurs where soils have the highest quality and infiltration capacity. Soil sealing destroys the soil functions and reduces drastically the capacity to store water and regulate floods. The objective of this work is to map groundwater recharge capacity in Vilnius urban and peri-urban areas (urban atlas). To model groundwater recharge capacity, we used several variables such as lithology, geomorphology, slope, topographic wetness index, river network, tectonic faults, topographic position index, soil sand content and depth, precipitation, and land use. The model was validated using soil clay content. Drainage and tectonic faults density were calculated using the line density tool. Data was reclassified and overlaid applying the fuzzy overlay method. The results showed that the areas most urbanized and located in steeper slopes have the lowest values of groundwater recharge capacity. On the other hand, flat areas in sandy soil areas had the highest capacity. The model had an acceptable validation performance ($r^2=0.52$).

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