

# Present and future potential groundwater recharge from precipitations over France

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Quantifying the future renewable groundwater resource is a key point for water managers in the context of climate change. A method to estimate potential groundwater recharge from precipitation has been developed and applied over France for that purpose.

A gridded water budget model was developed to compute the effective rainfall with a spatial resolution of 8x8 km, at a daily time step. Three different water budget methods were included to assess uncertainties associated to the model design. We then elaborated a method to split the effective rainfall between runoff and infiltration, relying on a GIS built parameter called IDPR. This distributed parameter relates to the drainage density and hydrological network. We calculated the river baseflow index (BFI) using the Wallingford method over more than 350 French monitored river basins. Assuming that BFI represents the groundwater contribution to surface flow in a river basin, it can be used to estimate the mean infiltration coefficient over the considered basin. A relationship between the calculated BFI and IDPR spatial average calculated over the 350 river basins was established. It thus allowed estimating a spatially distributed infiltration ratio. The potential annual recharge was defined as the product of this ratio with the effective rainfall previously calculated. Hence, present and future recharge maps for France were generated to assess the impact of different climate change scenarios.