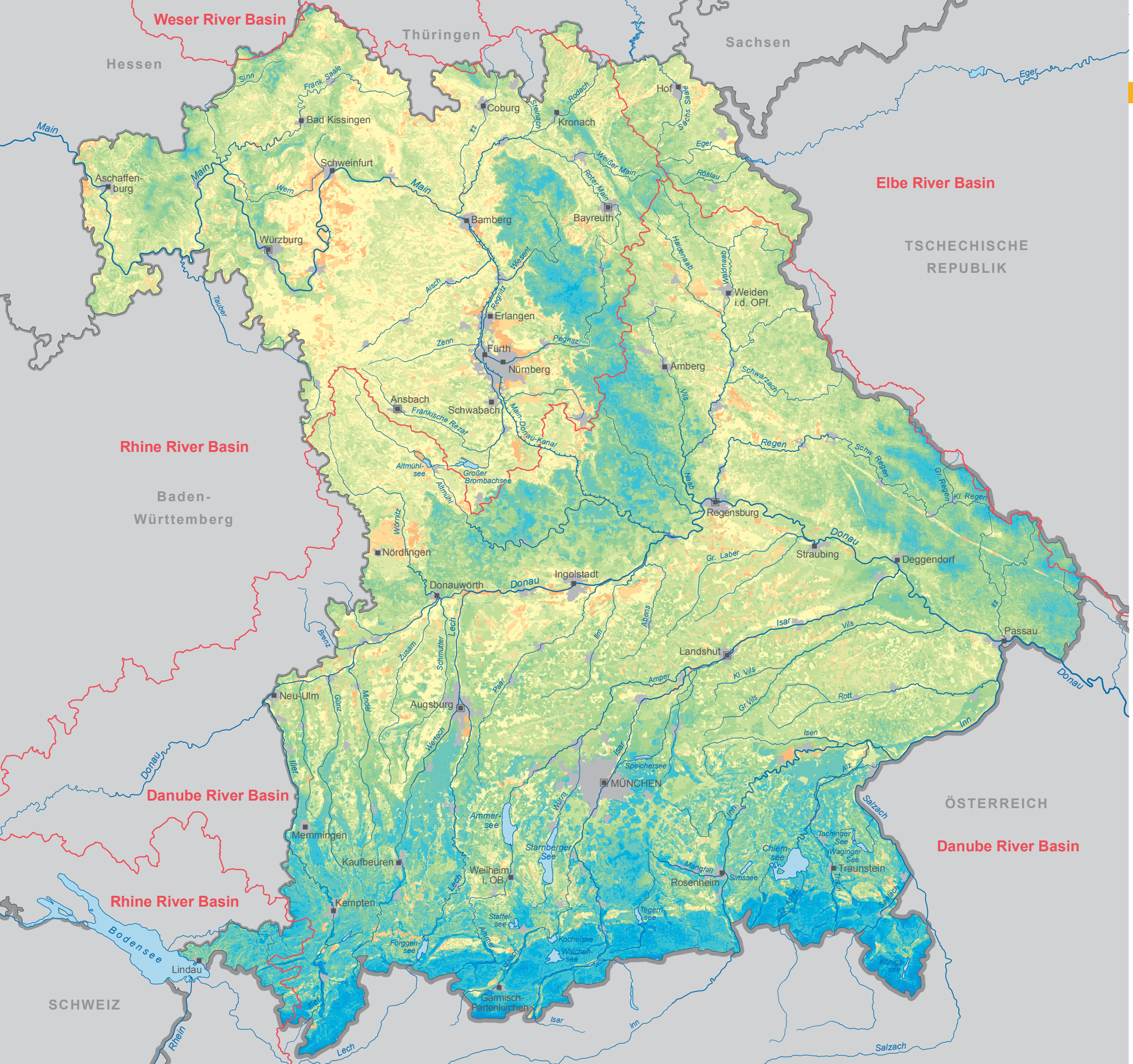

Bavarian Environment Agency

Water

Average Annual Groundwater Recharge from Precipitation in Bavaria 1981-2010

1:1250000

Groundwater recharge in mm/yr

- ≤ 25
- > 25 - 50
- > 50 - 100
- > 100 - 150
- > 150 - 200
- > 200 - 250
- > 250 - 300
- > 300 - 400
- > 400 - 600
- > 600 - 800
- > 800 - 1000
- > 1000

- Main watershed
- District capital
- City
- Urban area
- National border
- State border

0 50 km

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Thematic geodata: The map presents the groundwater recharge from precipitation as a result of discharge (difference of precipitation and evapotranspiration as a result of the soil water balance model GWN-BW) and baseflow-index. Due to methodological reasons, modeled data for urban areas are excluded from the map. River basins: DLM1000 W (Länderarbeitsgemeinschaft Wasser, Federal Environment Agency), Version: September 2012

Topographic geodata: DLM1000, © GeoBasis-DE / BKG 2013 (Data modified)
Urban areas based on Vektor 500, 2011, © Bayerische Vermessungsverwaltung

Status: March 2018

Bavarian Environment Agency

Maps for Water Management

Average Annual Groundwater Recharge in Bavaria 1981-2010

1 General

The annual groundwater recharge from precipitation is described as the residual water balance component of precipitation minus actual evapotranspiration and fast lateral runoff components. Thus, changes in precipitation and/or actual evapotranspiration directly affect the total amount of groundwater recharge. In extreme cases, actual evapotranspiration exceeds precipitation, resulting in a negative water balance. This effect may be observed at e.g. forested areas and along river floodplains characterized by shallow groundwater tables. On an annual basis, catchment groundwater recharge is approximately equal to dry weather flow (baseflow Q_B). Groundwater recharge is an important measure of the natural regeneration capacity of the groundwater resources. The map “Average Annual Groundwater Recharge from Precipitation (1971-2000)” was published in 2009 both, individually and as a contribution to the map series HK500 (Hydrogeological Map of Bavaria 1:500 000).

2 Methodology

Averaged annual groundwater recharge from precipitation is calculated from discharge (please refer to map “Average Annual Discharge in Bavaria 1981-2010”) and Baseflow-Index. The Baseflow-Index describes spatially distributed relevant direct runoff components (e.g. surface runoff, interflow) and acts as a reduction factor for discharge. For further information please refer to the methodological notes of the map series HK500. Possible lateral discharge between single model elements is not taken into account. The spatial distribution corresponds to 105 000 individual areas used in the soil-water balance model. The average annual groundwater recharge is represented here on a 200 m × 200 m grid. Due to methodological reasons, modeled data for urban areas are excluded from the map.

3 Interpretation

Averaged over 30 years, the groundwater recharge sum for Bavaria is 216 mm/yr (or l/m²), which corresponds to 22 % of average annual precipitation. The values vary between ≤ 25 mm/yr in the region east of Würzburg and ≥ 800 mm/yr in the Bavarian Alps. For the Bavarian part of the Main River Basin, the average groundwater recharge is 143 mm/yr. For the Bavarian part of the Danube River Basin it totals 244 mm/yr. Comparing northern and southern Bavaria (north/south of the Danube), groundwater recharge sums are 168 mm/yr and 275 mm/yr respectively. The spatial distribution of groundwater recharge is basically governed by the distribution of discharge and Baseflow-Index.

4 Notes Concerning the Use of the Map

The values for average annual groundwater recharge presented here are the result of soil-water balance simulations for the whole of Bavaria, with considerable differences of the input data in terms of quality. Therefore, this map represents a large scale overview, which allows regional conditions to be described in a manner that is appropriate for the scale 1:1 250 000. The use of values for individual grid cells is not valid for methodological reasons.