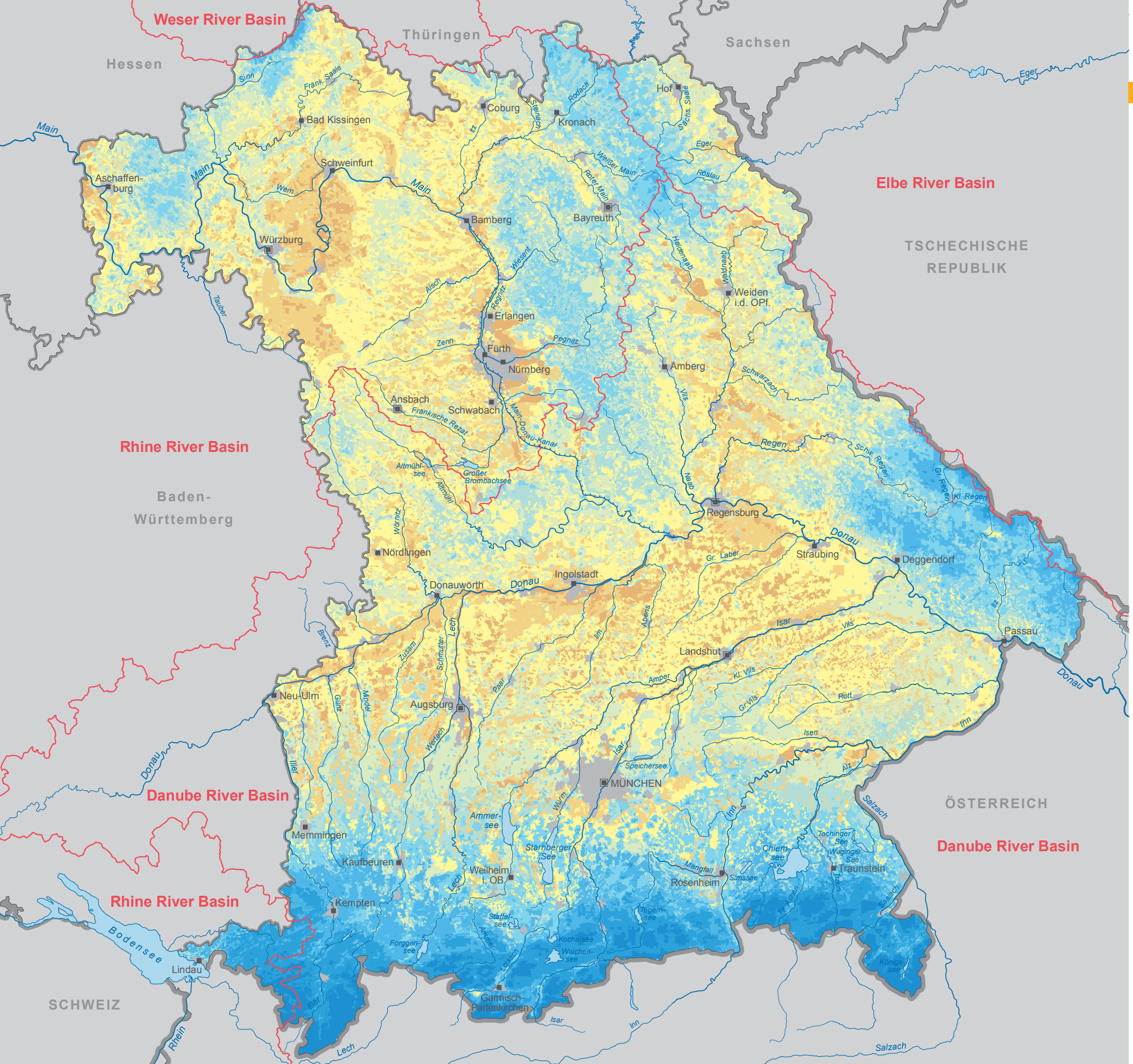

Bavarian Environment Agency

Water

Average Annual Discharge in Bavaria 1981-2010

1:1250000

Discharge in mm/yr

- ≤ 100
- > 100 - 200
- > 200 - 300
- > 300 - 400
- > 400 - 500
- > 500 - 700
- > 700 - 1000
- > 1000 - 1500
- > 1500

Main watershed

District capital
City
Urban area

National border
State border

0 50 km

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Thematic geodata: The map presents the difference between the water balance parameters precipitation and actual evapotranspiration (results of the soil water balance model GWN-BW). 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

Status: March 2018

Bavarian Environment Agency

Maps for Water Management

Average Annual Discharge in Bavaria 1981-2010

1 General

The average annual catchment discharge is an important component of the water balance. It can be directly determined with a recording gauge at the catchment outlet. Alternatively, it is calculated from the difference between mean annual precipitation and actual evapotranspiration. As a consequence, the total discharge describes the effective precipitation, which is defined as the non-evaporating proportion of total precipitation. Changes in precipitation and/or actual evapotranspiration directly affect the total amount of discharge. In extreme cases, actual evapotranspiration exceeds precipitation, resulting in a negative water balance. This effect can be observed during periods of low precipitation at e.g. forested areas and along river floodplains that are typically characterized by shallow groundwater tables. The total discharge also serves as the basis for large-scale determination of groundwater recharge (please refer to map “Average Annual Groundwater Recharge in Bavaria 1981-2010”).

2 Methodology

Averaged annual discharge is determined from the difference between the water balance components precipitation and actual evapotranspiration. Possible lateral discharge between single model elements is not taken into account. The precipitation used is based on the REGNIE grid (please refer to map “Average Annual Precipitation in Bavaria 1981-2010”), which is derived from measured data. The actual evapotranspiration is a direct result of the applied soil-water balance model GWN-BW (please refer to map “Average Annual Actual Evapotranspiration in Bavaria 1981-2010”). The simulated discharge was validated using data from 158 recording gauges. The spatial distribution corresponds to 105 000 individual areas used in the soil-water balance model. The average annual discharge 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 discharge sum for Bavaria is 421 mm/yr (or l/m²). The values vary between ≤ 100 mm/yr in the region east of Würzburg and ≥ 1 500 mm/yr in the Bavarian Alps. For the Bavarian part of the Main River Basin, the average discharge is 310 mm/yr. For the Bavarian part of the Danube River Basin it totals 457 mm/yr. Comparing northern and southern Bavaria (north/south of the Danube), discharge sums are 341 mm/yr and 521 mm/yr, respectively.
The spatial distribution of discharge is basically governed by the precipitation distribution, resulting in the similar observed pattern in both maps. The influence of actual evapotranspiration is mainly reflected by small-scale discharge variabilities, as a consequence of varying soil and land-use types.

4 Notes Concerning the Use of the Map

The values for average annual discharge presented here are the result of soil-water balance simulations, 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.