

How much water does the forest need?

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Climatic water balance

The phenotype of forests and the growth performance of forest trees depend on the total water balance of the site. This article presents what factors play a role.

Whether in an area the amount of water required for an undisturbed growth is sufficient can be seen in the first step of the climatic water balance. If this is negative, water shortage is to be expected during normal years. If it is positive, then no shortage of water can be expected. This applies particularly for time period when the daily average is above 10 °C: the growing period. Outside of the growing period, the rainfall fills the soil water storage and the excess rain contributes to the groundwater formation and feeds streams and rivers. Maps displaying the climatic water balance for Germany are available.

Forest ecologically effective precipitation

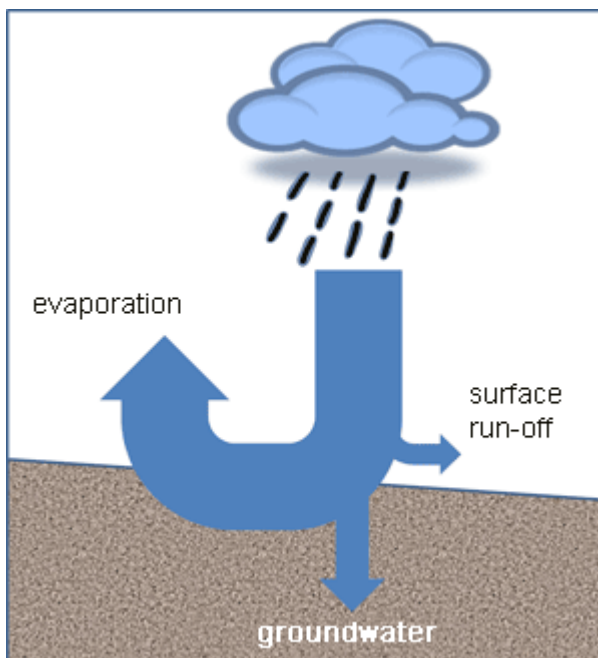


Fig. 1: Water balance scheme.

As part of forest sites survey, the total water balance of every forest area is described. In the first step, the wwN is determined during the real growing period. This is the

precipitation minus the interception at the relevant location. In the next step, the forest soils are divided into terrestrial, water saturated and groundwater soils and are presented separately. Afterwards, the total water balance for the three soils groups are derived separately.

Usable water field capacity

For terrestrial soils the usable water retention capacity is regarded as an important component of the total water balance. The water supply at each site is made up of the parts of w_{wN} and nFK . During the growing period the amount of water required for forest vegetation can be assumed with an average of 3 mm per day. More precise extensive values could not be calculated up to now even with sophisticated water balance models. The total water balance can be described as the juxtaposition of water supply and water required. If the water supply is greater than the demand, the forest growth is not affected by water shortage during normal years. Areas are assigned total water balances levels from very dry to very fresh, depending on how pronounced the excess or lack of water is.

Levels of total water balance

Water saturated soils are divided according to the depth of the damming body and the duration of the wet phase in the total water balance levels humid, semi-humid, moderately semi-humid, stagnant-fresh and semi-dry. In groundwater areas, the total water balance depends mainly on the average groundwater table and is described using the water balance levels from wet to fresh [2]. The influence of rainfall as a component of the total water balance in these areas is low. For soils shaped by groundwater and backwater, the nFK can also be calculated up to the height of the average groundwater table or to the dam body as supplementary information.

Sources

1. STAKA, 2005: Mitteilungen des Vereins für Forstliche Standortskunde und Forstpflanzenzüchtung, Nr. 43: Waldökologische Naturräume Deutschlands. Herausgeber: J. Gauer, E. Aldinger, S. 324
2. STAKA, 2003: Forstliche Standortaufnahme. Begriffe, Definitionen, Einteilungen, Kennzeichnungen, Erläuterungen. IHW-Verlag, Eching, 6. Auflage, S. 352