Further information

Web page Soil of the Year
www.boden-des-jahres.de
German Soil Science Society
Working Group Soil Systematics
www.dbges.de; www.bodensystematik.de
Bundesverband Boden
www.bvboden.de
State Geological Surveys of Germany/ad-hoc-AG Boden
www.infogeo.de/ueberuns/boden/mitglieder
Geological Survey North Rhine-Westphalia
phone.: +49 2151 897 586 or 897 437
E-mail: boden@gd.nrw.de
Soil science institutes at universities
and universities of applied sciences

Information material

Federal Environment Agency (Umweltbundesamt)
www.umweltbundesamt.de/publikationen/poster-boden-des-jahres-2015-stauwasserboden
Museum am Schölerberg Osnabrück
E-mail: info@museum-am-schoelerberg.de
CDs about all Soils of the year 2005 – 2015
E-mail: frielinghaus@zalf.de

Patron Soil of the Year 2015

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Pictures

A. Dickhof, M. Dworschak, G. Hornig, G. Milbert, S. Schulte-Kellinghaus (State Geological Survey North Rhine-Westphalia); Soil map: Federal Institute for Geosciences and Natural Resources (BGR)

Imprint

Common action of the Deutsche Bodenkundliche Gesellschaft (DBG), Bundesverband Boden (BVB), Ingenieurtechnischer Verband für Altlastenmanagement und Flächenrecycling (ITVA) and Umweltbundesamt

Shallow root plate of a thrown spruce

Soil damage due to passing over on a field

Meadows, pastureland and adapted management

Surface water gleys are best managed as meadows and pastureland. They are less suitable for agriculture, because they are often too wet for cultivation in spring. When field crops need plenty of water during summertime, are they often too dry. Driving on these soils with machinery during wet phases destroys soil structure and compacts the soil in the long term. Drainage prevents a wet phase, but in consequence humus decomposition increases, carbon dioxide harmful to climate is released and the risk of soil erosion increases.

Pasture on a surface water gley

Sites sensitive to climate

Surface water gleys are sensitive to weather conditions and climate.Increasing numbers of heavy rains result in more frequent wet phases. If climate warming extends the vegetation period, plant water consumption increases, and longer dry periods could occur.
Wet-dry Common Oak-European Hornbeam forests could develop into Beech forests in the long run. During the last 50 years, the vegetation period has already lengthened more than two weeks, and the number of heavy rains has risen.

Loss of yield on a surface water gley

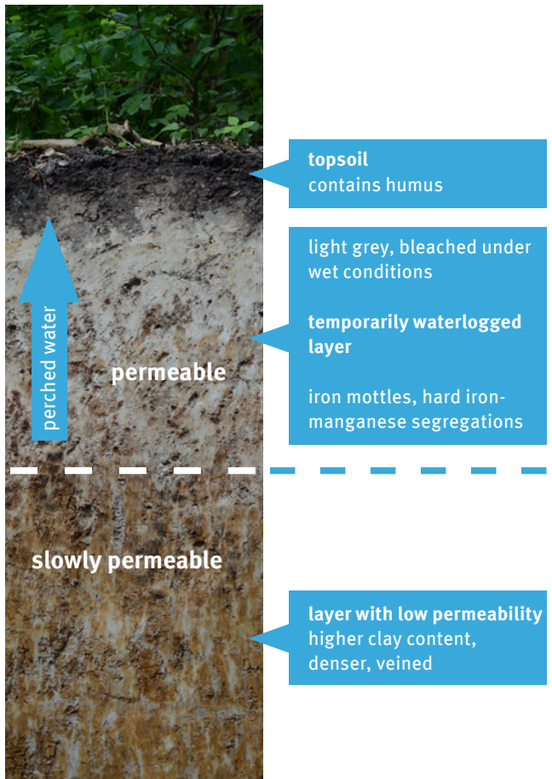
2015

SOIL OF THE YEAR

Surface Water Gley

Soil of the Year 2015
Surface Water Gley

Surface water gley soils form where precipitation water drains away into the underground strongly delayed only. Beneath a well permeable layer that is waterlogged after rainfall, there is a dense layer with low permeability.

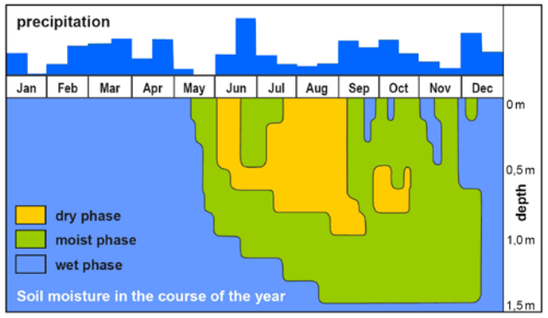


Soil from Kottenforst Forest near Bonn

In the German soil classification, most soils affected by stagnating water belong to the Pseudogleys, those with an extended wet phase to the Stagnogleys. The international classification allocates these soils primarily to the Planosols and Stagnosols.

Wet-dry soils

As a function of the water permeability of the soil, the weather conditions and the water use of the plants, surface water gley soils change between wet, moist and dry phases. These phases may vary in length and may occur several times during the course of a year. This results in temporary excess and temporary lack of soil water. During the wet phases, lack of oxygen adversely affects plant roots and soil organisms. On surface water gley soils only those plant species thrive that tolerate wet soil conditions.



Iron mottles and bleached zones

As soon as the oxygen in the soil is used up during a wet phase, specialised bacteria use iron and manganese compounds as a energy source. These compounds account for the brown colour of most of our soils. They are converted (reduced) to colourless substances soluble in water, so that the soil is bleached. The soluble iron and manganese is relocated within the soil. After drying, iron and manganese will oxidise again and colour the soil red to orange or black, particularly in the inner parts of soil aggregates.

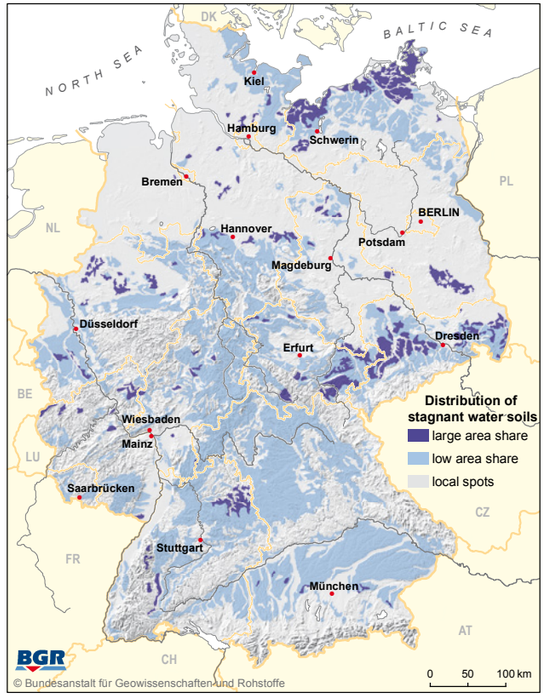
Little by little develops a mottled to veined soil with spots bleached by water side by side with rust-coloured zones. Often form hard iron and manganese segregations, so-called concretions.

Iron mottling in a bleached soil matrix

Iron and manganese segregations

Widely distributed

The overview map shows the distribution of surface water gley soils in Germany. Only large, continuous areas are displayed.



Important for natural balance

Surface water gley soils are unique natural bodies that often provide sites of forest plant communities that prefer changing moisture conditions, e.g. Common Oak-European Hornbeam forests. Pronouncedly wet surface water gley soils are - due to their extreme site conditions - well suited for rare animal and plant communities.

Surface water gley soils store precipitation water that evaporates time-delayed or is consumed by plants. In this way they buffer precipitation peaks. The perched water drains slowly into the groundwater, possibly of close-by groundwater soils, and into water courses or bodies.

Forest and adapted silviculture

Forests adapted to changing moisture conditions can be stable and productive ecosystems that at the same time are ecologically valuable. Tree species tolerating perched soil water are common oak, European hornbeam, ash, black alder and downy birch. Adversely affected are e.g. Norway spruce, larch and beech; they develop only shallow roots in perched water. In dry years drought damage occurs.

After several wet years in a row, roots suffer from lack of oxygen. During storm events, shallow root trees tend to be thrown. Timber harvesting does not harm the soil only during dry phases or in a period with soil frost.

Common Oak-European Hornbeam forest suitable for the site