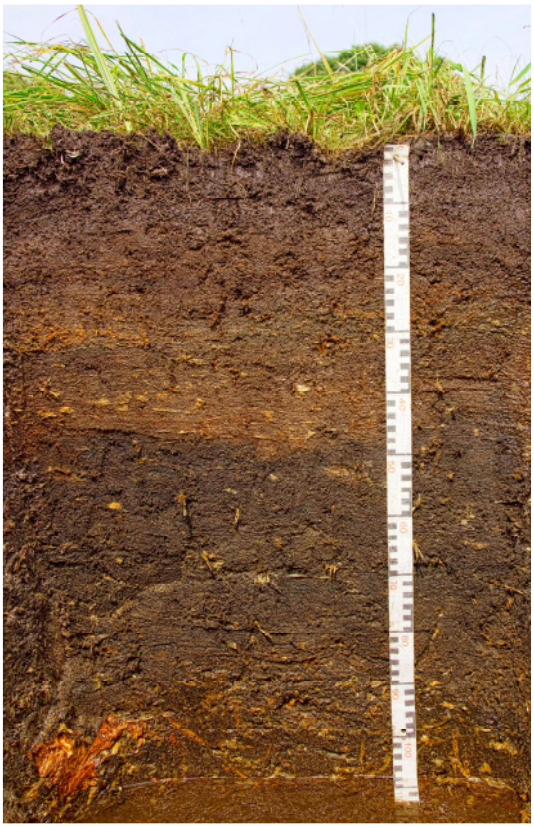
German Action Soil of the Year

Drainage of fen soil anno 1960

Reed peat, little decomposed

Manifold flora

Soil of the Year 2012 – Fen Soil

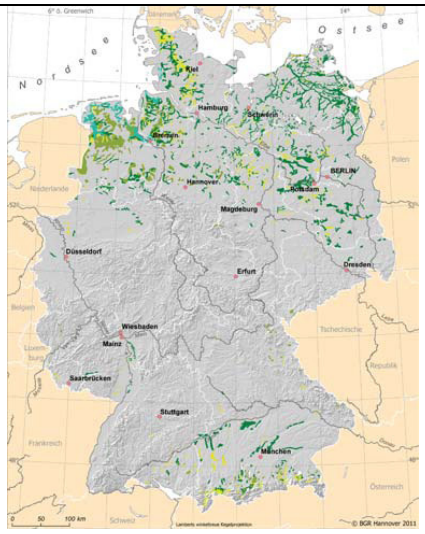


Pasture land use today

Nature-orientated fen soil

Manifold fauna

Measures of gas emissions



Distribution of Fen Soils in Germany (BGR, Hannover 2011)

Core sample with peat soil about lime mud

Proposal and material preparationl: Prof. Dr. Jutta Zeitz, Dr. Dieter Kühn, Dr. Albrecht Bauriegel, Prof. Dr. Vera Luthardt, Dr. Jana Chmieleski, Dr. Patrick Lantzsch, Dr. Sabine Hahn, Dr. Axel Behrendt, Dr. Beate Gall gemeinsam mit dem Curatorship Soil of the Year
Fotos: D. Devecioglu, J. Zeitz, M. Zauft,

Characteristics

According to the World Reference Base (WRB 2007)
Fen Soils are classified as Histosols

Characterization of peats

Peat soils contain more than 30% organic material Typically, they show a dark-brown to black color. Depending on their conservation status, the peat-forming plant residues are more or less visible to the naked eye. The subsoil of peat soils often consist of glacial deposits like sand, silt, loam, and clay or of lacustrine deposites. Depending on their parent material, lacustrine sediments are white (lime mud), olive green (liver mud from algae), or dark brown (clay mud).

Formation and spatial distribution

Fen soils mainly develop in groundwater-influenced lowlands or along rivers and lakes. On a global scale, they are typical for cool and humid climates of the northern hemisphere where excessive water occurs. In Germany fen soils cover a surface of approx. 1 million hectares. Most of the fen soils with connected areas up to 30 000 ha are situated in Schleswig-Holstein, Lower Saxony, Mecklenburg-Western Pomerania, Brandenburg, Bavaria, and Baden-Württemberg. Usually, the development of the fen soils is initiated by a paludification process at high groundwater level or increasing sedimentation into lakes. In paludification mires, dead plant material accumulates under water saturation and air exclusion.
In terrestrialization mires, the peat lies on the bottom of a water body above organic or mineral lacustrine sediments, called muds. The peats of fen soil areas are formed of dead roots, branches, leaves and sprouts of sedges, reeds, mosses, elders, willows, or other swamp plants. Decomposition of the organic material is slow and incomplete. A peat body only increases a few millimeters per year, directed to the water surface and/ or the lake center. The peat increase occurs from the bottom to the top. In the peat layer thickness exceeds 30 cm, it is classified as a fen soil (Histosol).

Functions and use of fen soils

From an ecological point of view natural fen soils are highly valuable. Only conformists, mostly rarities, exceptional animal and plant specialists like the large copper, cotton grass and sedges are adapted to the high water contents and special nutrient conditions.

Thick fen soils contain up to 2000 tons of carbon per hectare. Worldwide they are the greatest carbon storages per areal unit. Further, fen soils are important archives of nature and civilization. They conserve former vegetation and climate conditions as well as traces of settlements and a former use.

For more than 1000 years, peat has been used as solid fuel, medicine, and fertilizer. Until the 1950s, peat digging was carried out industrially. Also bog iron, a formation in fen soils with iron-rich groundwater infiltration, and lime mud were excavated until the beginning of the 20th century. Today organic material from peat is obtained for medical use and potting soil on very few sites in Germany.

Because of their rare occurrence, in Germany intact close to nature fen soils have been put under nature conservation.
Fen soils are often used für agriculture, forestry, or human settlements. Prior to this, they had to be drained by ditches or drainage systems which seriously and often irreversibly change the peat properties. With different intensity, most fen soils in Germany are presently used as pasture land. In Brandenburg, most of the fen soil areas (about 211 000 ha)re used as pasture land, for example.

Environmental threats on fen soils

Drainage is the main threat on fen soils since dry peat shrinks and the peat soil surface collapses. Oxic conditions in peat soils foster the decomposition of the organic matter and mineralization of the peat. Nutrients and green-house gases like carbon dioxide (CO_2) are released and peat soils change from a carbon sink to a carbon source. Climate change can also lead to desiccation and destruction of fen soils. Intensively used peat soils can release up to 40 tons CO_2 per hectare and year.
For conservation and permanent protection of intact fen soils carefully elaborated development strategies are needed.

Further information

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*Ad-hoc AG Boden der Bundesanstalt für Geowissenschaften und Rohstoffe sowie der Staatlichen Geologischen Dienste der Länder: www.bgr.bund.de

*Deutsche Bodenkundliche Gesellschaft, AG Bodensystematik:, www.dbges.de

*Bundesverband Boden: www.bvboden.de

*Bodenkundlich orientierte Institute an Hoch- und Fachschulen sowie Geologische Landesämter der Bundesländer

Material about the peat soils (posters, flyers, in German language)

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CD-ROM "Soil of the Year" (2005 – 2012)

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