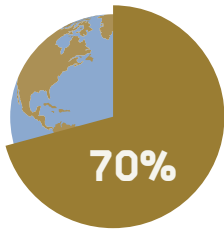




TOPIC: SOIL AND SOIL RESEARCH

SOILS OF THE EARTH

The soil is our most important basis for life:

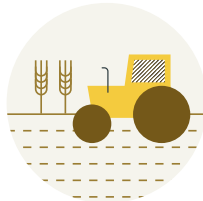


More than 70% of the global ice-free land surface is used by humans. About 37% of it is used for agriculture. (IPCC)



More than half of the 36 million hectares of land in Germany is agricultural land and secures our food supply. (uba)

THE MAIN SOIL FUNCTIONS



SECURING OUR FOOD SUPPLY:
95% of the food worldwide is produced directly or indirectly from soil



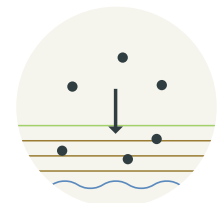
CLIMATE INFLUENCE:
There are complex interrelationships between soil and climate. Climate changes influence the soil, and changed soil conditions affect the climate.



WATER STORAGE AND FLOOD PROTECTION:
The pores of the soil allow water to be transported quickly to deeper layers or to be stored. Soil releases rain water with a delay, thereby ensuring water supply for plants and reducing the risk of flooding.



PROVIDING DIVERSE HABITATS:
for animals, plants, fungi and bacteria. The number of living beings in a handful of soil exceeds the number of the world's population.

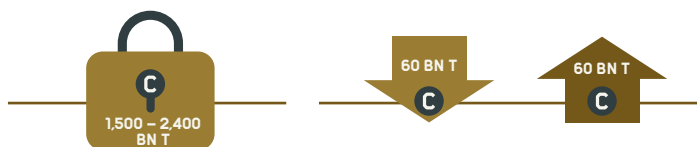


FILTERING OF IMPURITIES:
Soil filters, neutralizes and binds chemical bonds. As a result, they enter the groundwater with a delay or to a reduced extent.

ROLE OF SOILS IN THE GLOBAL CARBON CYCLE

SOURCE AND SINK

Soil is an important element in the global carbon cycle and counteracts global warming. It is the biggest carbon store on land, surpassing all the forests on earth.



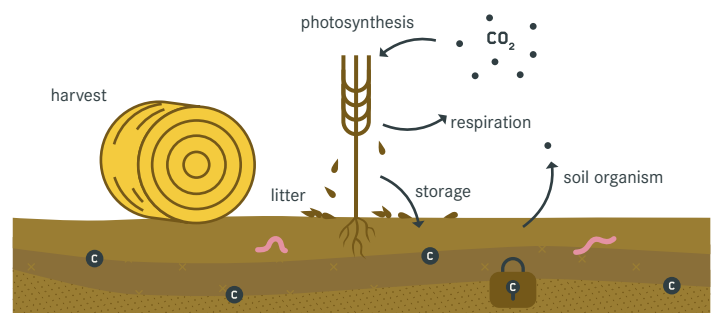
Between 1,500 and 2,400 billion tons (t) of carbon (C) are stored in the soil. (eskp)

Each year, soils absorb about 60 billion tons of C and release a similar amount. This differs depending on the type and management of the soil.

Soils can therefore become a source or sink of greenhouse gases depending on the difference between absorption and release.

THE CARBON CYCLE SOIL

With the help of photosynthesis, plants absorb CO₂ from the atmosphere. About half returns to the atmosphere through the plant's respiration. The other half is either harvested or enters the soil in the form of organic compounds via litter and roots. Some of it is stored, while others are decomposed by soil organisms and thus reenter the atmosphere.

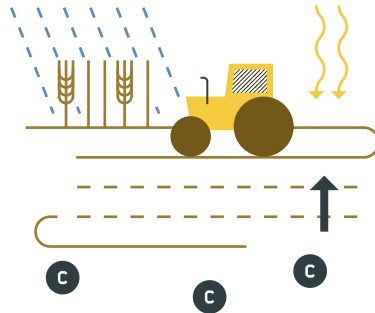




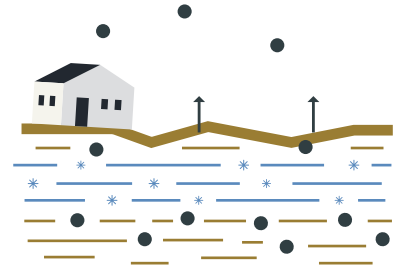
EFFECTS OF CLIMATE CHANGE



Climate change leads to additional stress on soils, thereby threatening livelihoods, biodiversity, human and ecosystem health, infrastructure, and food systems.



Higher temperatures and lower precipitation lead to a reduction in plant-available water and therefore to crop losses. Additionally, more carbon is released from the soil.

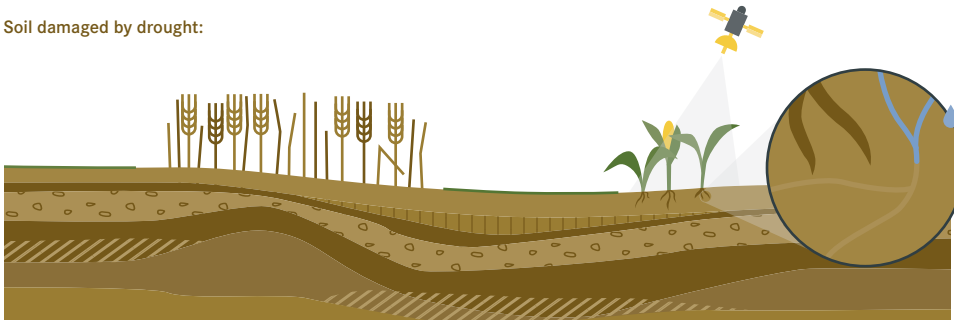


Nearly a quarter of the world's land area is permafrost, and about 25% of the world's soil carbon is bound in permafrost soils. Because of climate change, these are melting and leading to the release of large amounts of CO₂ and methane.

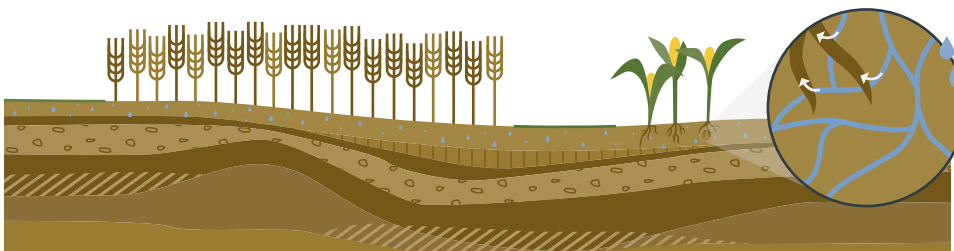
HELMHOLTZ' RESEARCH: AGRICULTURE AND WATER QUALITY

Soils differ on a small scale in their sensitivity to climate change and their suitability for alternative land use concepts. Using machine learning methods, Helmholtz scientists link high-resolution remote sensing data with information on geology, soil distribution and land use to provide high-spatial-resolution soil information. This enables them to develop location-specific adaptation strategies for sustainable agriculture.

Soil damaged by drought:



Soil with adapted irrigation and resistant crops:



INFO

The team of the project "Agricultural and Aquatic Systems" is researching the risk of drought on agricultural soils in order to develop local adaptation strategies for different climate scenarios based on local soil characteristics.

Would you like to know more?

Helmholtz Centre for Environmental Research – UFZ

Prof. Dr. Hans-Jörg Vogel
Head of the Department of Soil Systems Research and the BonaRes Center for Soil Research.
eMail: hans-joerg.vogel@ufz.de

Dr. Mareike Ließ
Head of the working group Pedometrics
eMail: mareike.liess@ufz.de

In addition to this project, there are many other projects on soil research in the initiative. We are happy to provide information and mediate.
eMail: redaktion@helmholtz-klima.de

FROM: DEZEMBER 2020

HELMHOLTZ CLIMATE INITIATIVE

Markgrafenstraße 22, 10117 Berlin

An initiative of the Hermann Helmholtz Association of German Research Centres

Copyright: Tanja Hildebrandt | Helmholtz Climate Initiative

www.helmholtz-klima.de