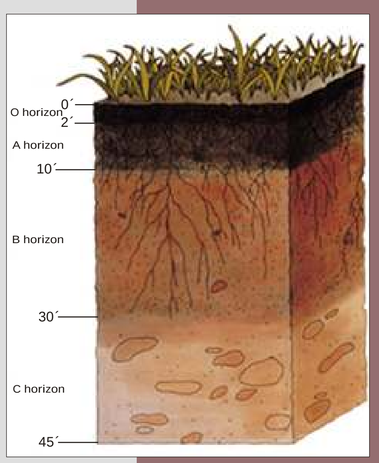
International Year of Planet Earth

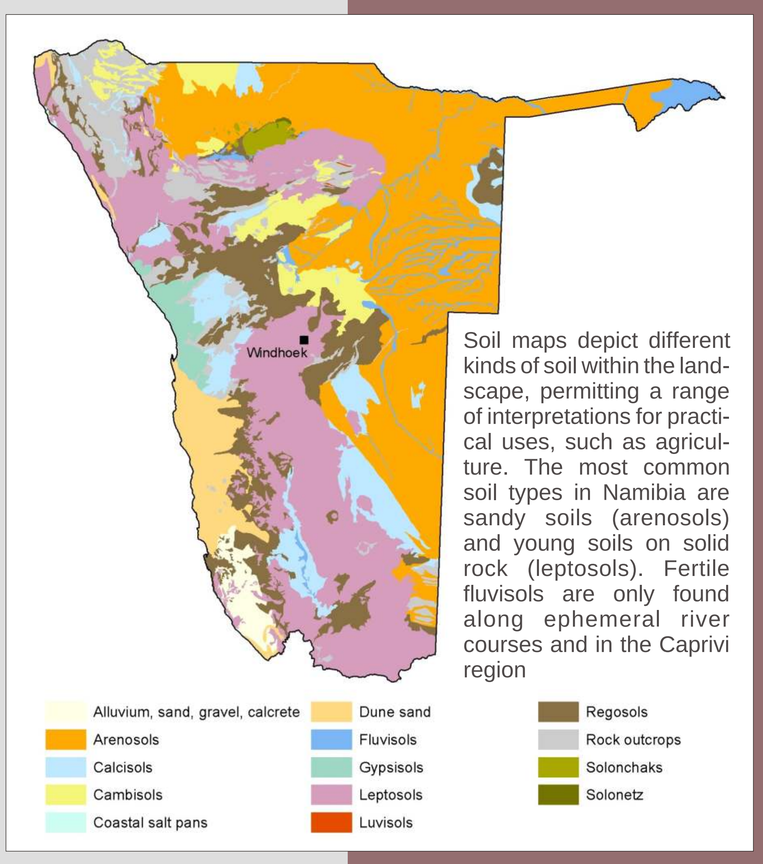
Soil -
Earth´s living skin

Soils are truly wonderful. They are major support systems of human life and welfare. They provide anchorage for roots, hold water long enough for plants to make use of it, and hold nutrients that sustain life – otherwise the Earth's landscape would be as barren as Mars. Soils are home to myriad micro-organisms that accomplish a suite of biochemical transformations - from fixing atmospheric nitrogen to the decomposition of organic matter - and to armies of microscopic animals as well as the familiar earthworms, ants and termites. In fact, most of the land's biodiversity lives in the soil, not above ground.

Different kinds of soil are spread across different landscapes – not randomly but in predictable patterns first identified 125 years ago by pioneering Russian pedologist Vasiliy Dokuchaev (1846-1903) as functions of parent material, climate, relief and living organisms acting over time. People are part of the equation too, and soils, like landscapes, are often manmade.



Schematic soil profile showing different horizons (O - organic horizon, A - surface horizon with increased biological activity B - mineralized or organic-rich subsoil with strongest pedological development within the soil profile ,C - horizon with least pedological development and unweathered lumps of bedrock). Additional horizons may be developed depending on local conditions

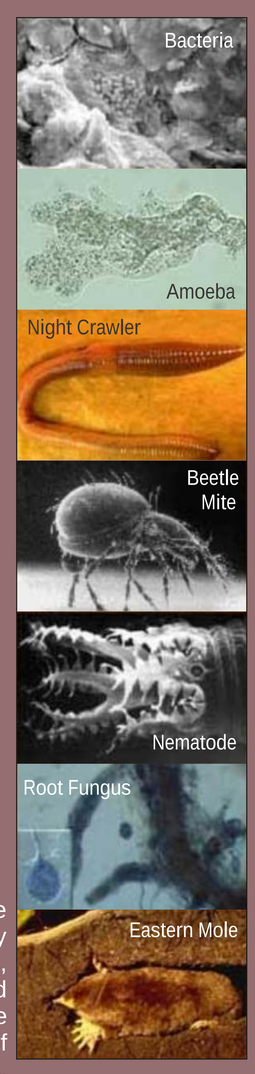


Soil maps depict different kinds of soil within the landscape, permitting a range of interpretations for practical uses, such as agriculture. The most common soil types in Namibia are sandy soils (arenosols) and young soils on solid rock (leptosols). Fertile fluvisols are only found along ephemeral river courses and in the Caprivi region

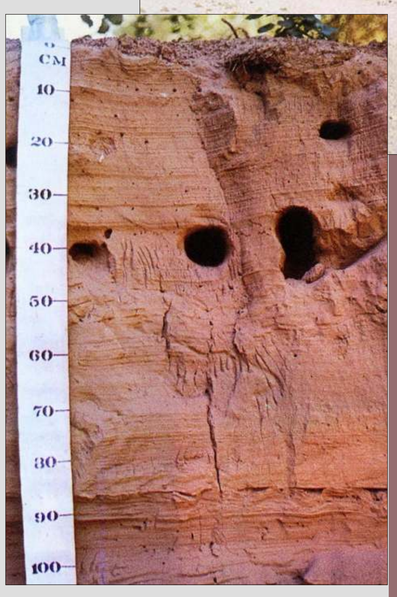
Without Soils, Earth´s Landscape Would be as Barren as Mars

Basic facts about soil

- Soil makes up the outermost layer of our planet and is formed from rocks and decaying plants and animals.
- Soil has varying amounts of minerals, water, air, and organic matter (living and dead organisms).
- Natural processes can take more than 500 years to form 2 centimetres of topsoil.
- Up to 5 tonnes of animal life can live in one hectare of soil.
- Fungi and bacteria help break down organic matter in the soil; earthworms digest organic matter and recycle nutrients.
- Roots loosen the soil, allowing oxygen to penetrate. They also hold soil together and help prevent erosion.
- A fully functioning soil reduces the risk of floods and protects underground water supplies by neutralising or filtering out potential pollutants; they can store as much as 3750 tonnes of water per hectare.
- There are more than 10,000 different types of soil.
- Soil stores 10% of the world's carbon dioxide emissions.



Soils teem with life: without life there can be no soil - which is why Mars for instance has no soils, despite plentiful eroded and weathered bedrock. The above pictures show representatives of the major groups of soil organisms. In arid countries like Namibia, however, the soil contains comparatively little organic material



The most typical soil type of northwestern Namibia is arenosol (above), consisting mostly of medium-grained sand; fluvisol of well-stratified loamy fine sand (left) occurs along river courses, where it is used for various agricultural purposes

As rock layers contain the geological history of a given area through billions of years, so the distinctive horizons of a soil profile allow the reconstruction of the more recent past in landscape development. Also, Earth´s soil is one of our main life support systems and sources of food production. In cultivation districts throughout southern Africa, however, wind and - to a lesser degree - water erosion is an acknowledged problem. This is because of the prevalence of sandy soils (arenosols), high winds, cultivation practices, and low rainfall resulting in low plant biomass production and low soil organic material, which provide soil cohesion. Wind erosion is the loss of fine materials (fine silt and clay) from topsoil in the form of dust. By being depleted of this fine material, the soil loses much of its ability to provide plants with water and nutrients, and thus becomes less fertile. After wind and water have removed the fine particles, a sheetlike surface of rock fragments - such as can be seen in the Namib Desert - remains, which protects the underlying material from further deflation.

Erosion is generally a slow process, yet it is literally costing the earth! The present soil loss in southern Africa is estimated at more than 400 million tonnes a year. Developing countries have to spend billions on fertilizers to replenish degraded soils with the nutrients continually swept away by wind and rain.

While wind erosion is a slow steady process, rarely perceptible on a day-to-day basis, water erosion is usually much more evident, especially in an arid country with heavy seasonal rainfalls like Namibia.
The satellite images below show the Fish River before and during the 2006 flood; on the right streamers of sand, dust and fine soil particles are being blown out to sea by east winds

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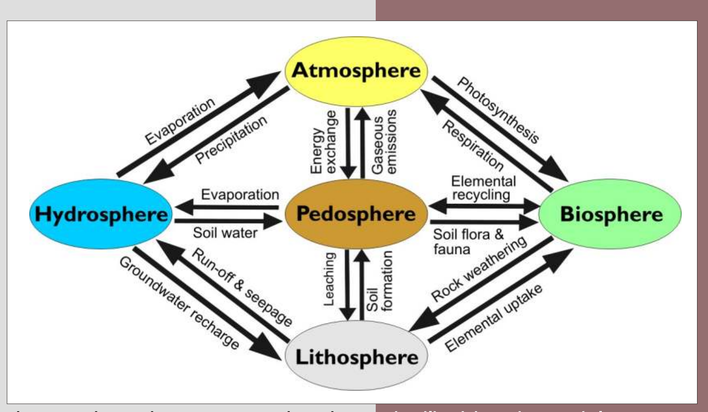

Main interactions between pedosphere (soil), biosphere (plants, animals), lithosphere (rocks), hydrosphere (water) and atmosphere (air)

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