

MEMORY

THE ARCHIVE OF THE ANTHROPOCENE

Soils preserve the history of the landscape and the people who live there. They will reveal to future generations how good our current stewardship of the planet has been.

In wine there is truth – and there is terroir too: the special character created by the unique combination of the microclimate and soil at a particular location. The flavours created by the sun and the nutrients stored in the soil unfold in wine; they are the taste of the soil. Viticulture is one of the oldest forms of farming, and the carefully managed soils in vineyards are a detailed archive of human history. The soil bears witness to the history of the landscape and its people.

Soil is a window to the past. Pollen grains and plant remains, or the degree of decomposition in minerals that make up the soil, reflect the climatic conditions of former times. We can reconstruct the evolution of landscapes by examining sediments, especially those resulting from human-induced erosion. Such traces shed light on the dramatic twists and turns in the history of civilization.

Soil profiles and debris deposits reveal how overuse and deforestation led to devastating floods in Central Europe in 1342. Around 13 billion tonnes of soil was eroded, according to the geographer Hans-Rudolf Bork of the University of Kiel. The resulting harvest losses caused famine, which was followed by the deaths of one-third of Europe's population through the plague. The Black Death resulted in the return of the forests.

The type and composition of soils allow us to draw conclusions about how the land was used and managed in the past. "Amelioration" leads to better yields; "degradation" to worse. Such changes can be dramatic. At the time of the Roman Empire, wide swathes of Europe were deforested: in

the Apennines in Italy, the Peloponnese in Greece, plus parts of Spain. The demand for wood for burning and building caused erosion so extreme that the landscape, climate and soils in these regions are still disfigured.

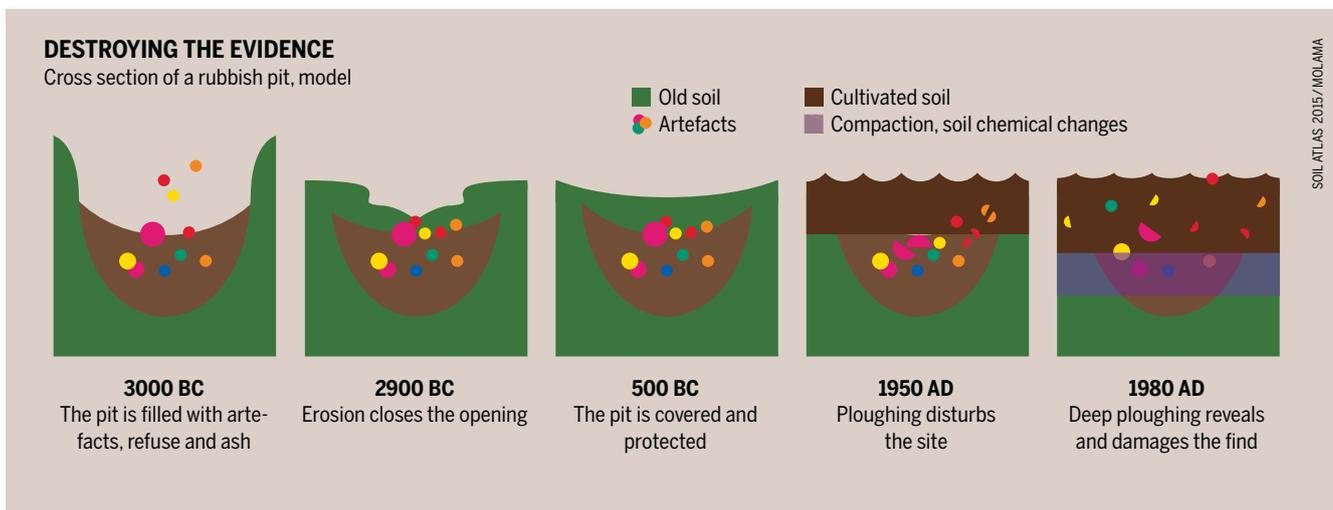
Around the world, the impact of cultivation is so severe that the original characteristics of the soil are difficult to discern. They are known in the jargon as "anthrosols". In infertile, sandy parts of the Netherlands, northern Germany and Denmark, generations of farmers cut away a layer of topsoil and vegetation, carried it to their stables and used it as livestock bedding. After it had been enriched by the animals' dung and urine, the farmers spread it as fertilizer on surrounding fields. This practice began in the Middle Ages and lasted until the advent of mineral fertilizer in the 1930s. Its traces can still be seen in the soils and vegetation of the affected areas.

Another mediaeval practice was to plough strips of land using a single-sided plough, pulled by a team of oxen. The plough turned the soil over to the right. Over time, repeated ploughing created a wavelike ridge-and-furrow pattern that can still be seen on land that has not been ploughed since.

War also leaves its scars on the soil. Landmines prevent farmers from working their fields: the population leaves and the land is left fallow for years on end. Military training grounds, often heavily contaminated, are left to themselves; they develop a rich biodiversity that is the subject of a special field of research.

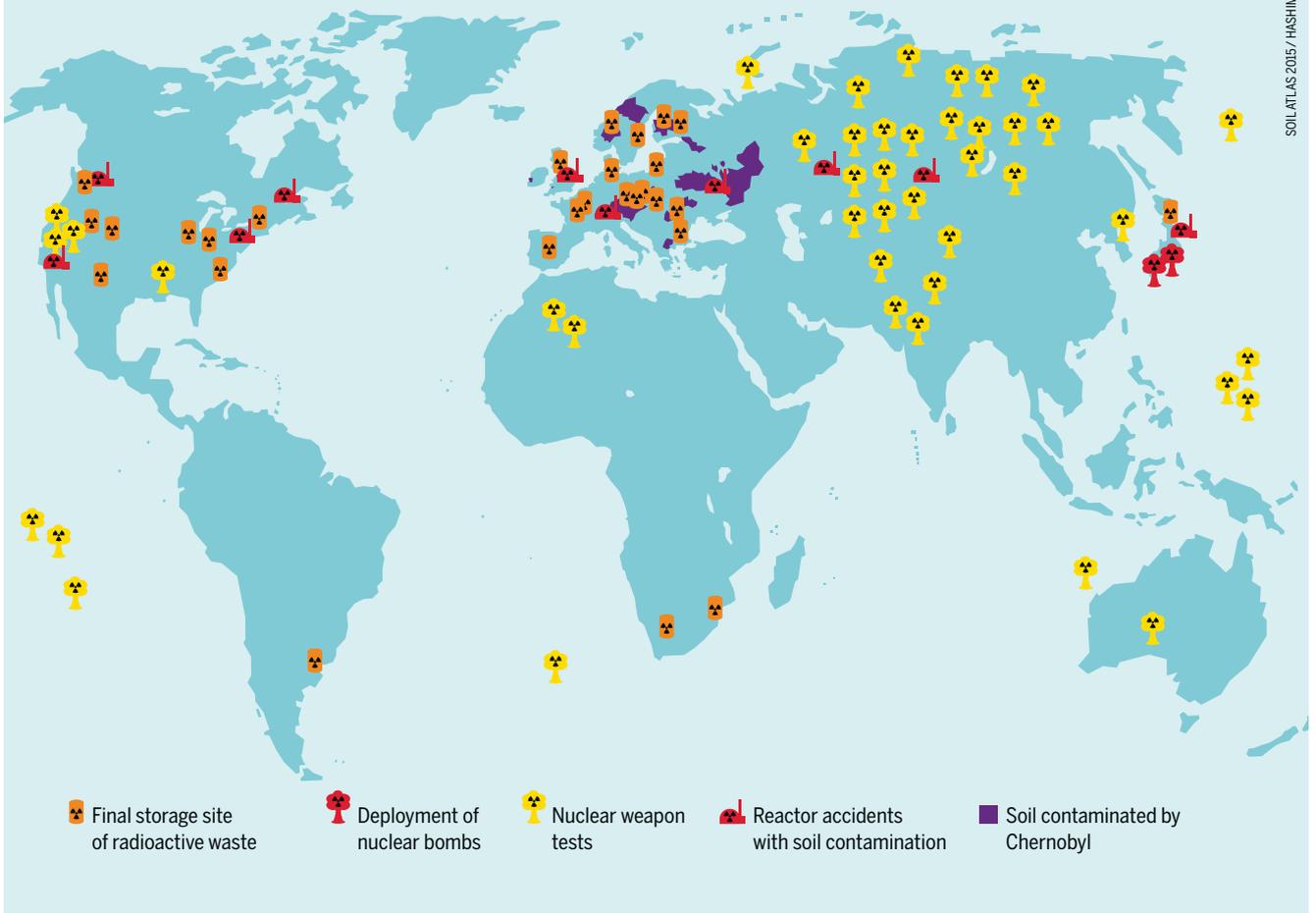
Soil reflects human history. Charcoal remains allow archaeologists to estimate the number of inhabitants of an

Over the ages, civilization has left its mark on the soil. Archaeologists race against time to unearth secrets before they are destroyed



RADIANT FUTURE

Atmospheric and underground radioactive contamination of soil, selected, 1945–2013



area. Fragments of everyday objects reflect daily life and trade patterns. Grave goods reveal cultic practices. Shell middens along the coast attest to the eating habits and lifestyles of the people, and show the rise and fall of the sea level and the location of the coastline.

In 2000, the Nobel chemistry laureate Paul Crutzen used the word “Anthropocene” at a scientific conference, he only wanted to remind his colleagues that humans have long been a significant factor in geology. However the term stuck. No one doubts that humans have left their traces everywhere, and that our conscious or unconscious transformation of entire ecosystems is likely to be irreversible.

Future generations will see this especially in urban soils. The change in the biological and chemical composition, as well as the physical structure of these urban soils is more pronounced here than anywhere else. They are true “anthrosols”. “Technosols”, on the other hand, are soils that consist mainly of artificial materials such as concrete, glass and bricks, as well as construction debris, rubbish and industrial waste of various types. The anthrosols and technosols, the soils of the Anthropocene, reflect the geological impact of humanity. Experts are still arguing about whether, and how, the Anthropocene will be visible in future rock strata. In the case of shale-gas fracking, the injection of carbon dioxide and subterranean nuclear tests, the question has already been answered. ●

An unacceptable legacy: radioactive waste from nuclear power will still be here tens of thousands of years from now

Nature returns to minefields. But farmers risk their lives and their livestock because they have nowhere else to grow crops and pasture animals

