

# Soils

**Extract from France's 2021 Environmental Performance Review**



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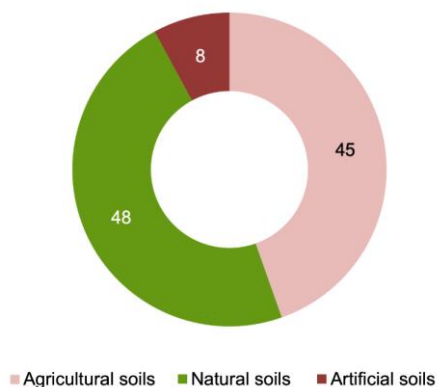
Soils are essential for healthy natural ecosystems and the supply of natural resources. They are subject to multiple pressure that threaten to undermine the ecosystem services they provide. Satisfying housing and infrastructure needs and the need for natural resources leads to soil sealing and the extraction of raw materials that have a direct irreversible impact on soils.

## SOILS AND PLANNING

In France, 8% of land is used artificially, either soils are sealed (infrastructure, parking, buildings) or heavily impacted by human activity (extraction of materials, landfills, artificial green spaces, sports equipment) – (Figure 1). This area is constantly increasing.

Extraction of non-metallic minerals in France reached 374 million tonnes (Mt) in 2019 or 5.6 tonnes per capita. That is 95% of France's domestic consumption of these minerals. The foreign trade balance is only 17 Mt: imports of 42 Mt minus 25 Mt exports. The minerals extracted (gravel, sand, slate, sandstone, granite, etc.) are mainly used for construction, with a majority of gravel and sand (Figure 2).

**Figure 1: Breakdown of physical land occupation in 2018 (average 2017-2018-2019)**  
In %

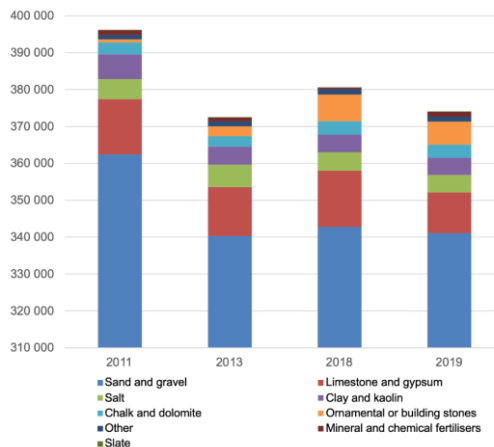


*Note: The Teruti survey was reviewed in 2017. The results for the years 2006-2015 have been recalculated according to the new calculation method. Estimates for 2017, 2018 and 2019 are provisional.*

*Scope: France.*

*Source: Agreste-Teruti. Treatment: SDES, 2021*

**Figure 2: Non-metallic minerals extracted from French land**  
Millions of tonnes



*Scope: France.*

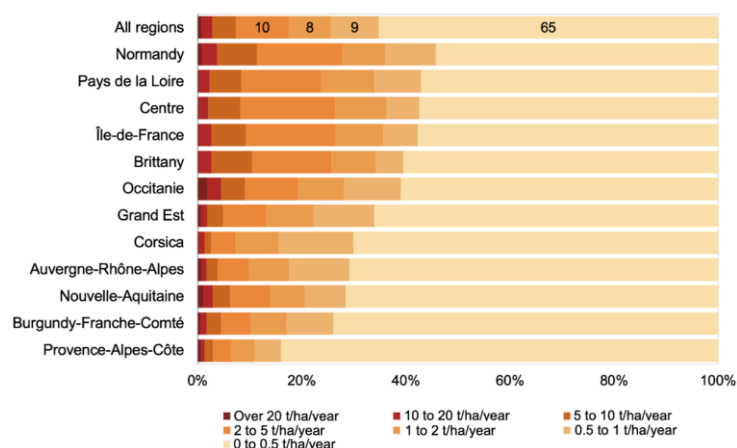
*Sources: Unicem; INSEE; SDES. Treatment: SDES, 2021*

## SOILS AND AGRICULTURE

Soils provide the basis for biomass production. Materials from agriculture (wheat, sugar cane, fruit, fodder, straw, etc.), intended for human use (consumption, seeds, industrial uses, processing) or animal use (food, litter), constitute the second flow of materials extracted in France, with 232 Mt, or 3.4 tonnes per capita extracted in 2019.

1.5 tons of land per hectare are lost on average each year due to run-off. The situation is aggravated by the intensification of agriculture, overgrazing, deforestation and soil sealing. Erosion disrupts soil biodiversity, decreases yields, deteriorates water quality and potentially generates mudflows (Figure 3).

**Figure 3: Breakdown of areas affected by soil loss due to soil erosion**  
In %



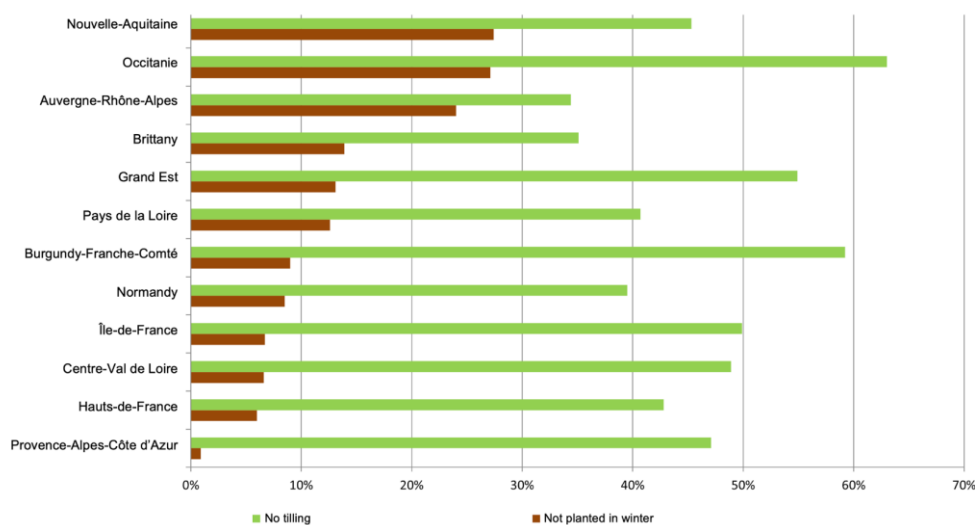
Note: this breakdown is based on 2010 data.

Scope: Metropolitan France.

Source: BRGM, 2010, according to Cerdan et al., 2010. Rates and spatial variations of soil erosion in Europe: A study based on erosion plot data. Geomorphology 122 (2010) 167 – 177. Treatment: SDES, 2013

In 2020, field crops covered 44% of the utilised agricultural area (UAA), one third of which is sown in the spring. Tilling aerates the soil and improves fertilisation, but it also affects soil structure and soil biodiversity, accelerating carbon removal and nitrogen leaching. Soil conservation techniques, including no tilling, used on 47% of the area under crop cultivation reduce these impacts but risk increased soil compaction, weeds and insects, leading to possible recourse for pesticides (Figure 4). The growth of winter plant cover which precedes 61% of spring crops limits soil erosion and nitrate leaching, possibly improving energy recovery.

**Figure 4: Breakdown of areas not planted in winter and not tilled in 2017**  
In %



Scope: area of crops in metropolitan France

Source: Agreste, Pratiques phytosanitaires en grandes cultures en 2017. Treatment: SDES

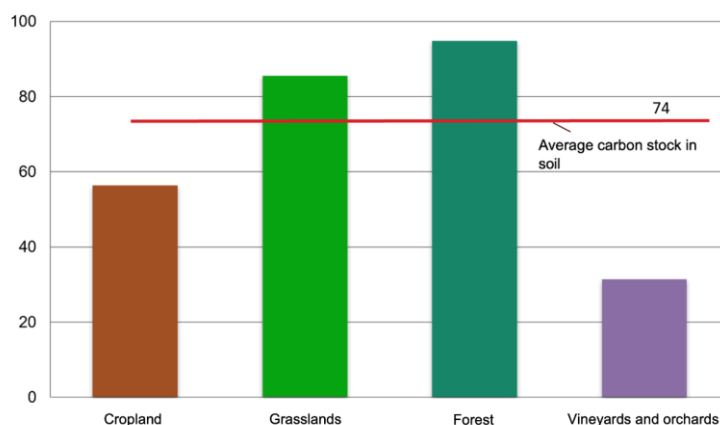
### THE ROLE OF SOIL IN CARBON STORAGE

Soil is a carbon sink that helps to mitigate climate change. Around the world, the first metre of soil below the surface contains two to three times more carbon than the atmosphere and three to seven times more than plant life. The soil in metropolitan France (excluding Corsica) contains 6.91 gigatons of organic carbon, over half of which is in the first 30 centimetres under the surface.

Carbon stock varies with land use. Certain changes in use (conversion of crops to grassland or forests) or agricultural practices (supply of urban sludge, livestock manure, no-tilling) improve storage (*Figure 5*).

**Figure 5: Average organic carbon stock according to land use**

In tonnes/hectares



*Note: this breakdown is based on 2012 data.*

*Scope: Metropolitan France.*

**Source:** *Gis Sol, 2013, Meersmans et al., 2012. A high-resolution map of French soil organic carbon. Agron. Sustain. Dev.*

*DOI 10.1007/s13593-012-0086-9. Treatment: SDES, 2013*

### SOIL POLLUTION

Despite bans since the 1990s, some substances from transport and agricultural spreading pollute durably. For example, over 90% of diffuse lead contamination comes from vehicle traffic. In metropolitan France, soil subjected to intensive cultivation or breeding also contains high levels of lindane (insecticide or pesticide) despite it being banned since 1998.

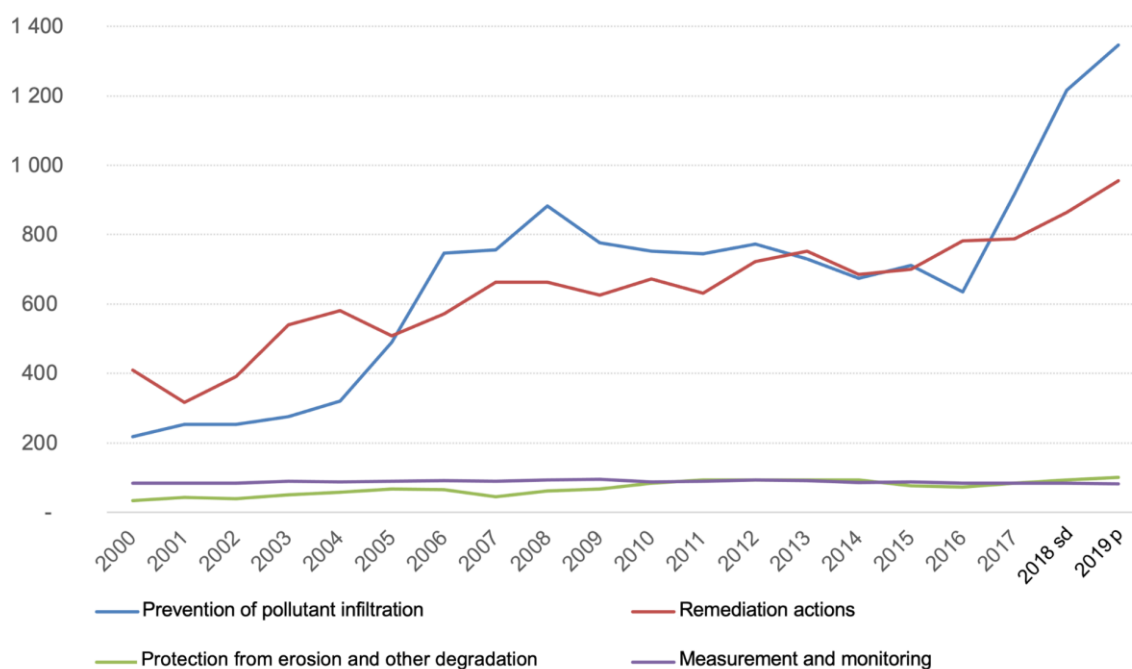
Despite being banned from sale in the French West Indies since 1993, the insecticide chlordecone has caused durable pollution of soil in banana plantations and contamination of natural ecosystems. Due to the persistence of pollution in the soil, 25% of the UAA in Guadeloupe and 40% in Martinique, the population is at risk through ingestion of contaminated water or food. In mid-2021, just over 9,500 sites and soils were identified as being polluted by France's historical industrial activity. Half of them are in former mining regions. This pollution is the result of either the uncontrolled release of pollutants or accidents or bad containment.

### EXPENDITURE FOR PROTECTION AND REMEDIATION OF SOIL AND WATER

In France, actions to protect soils and water bodies are mainly undertaken by government, local authorities and the business sector. In 2019, €2.5 billion, or 4.6% of environmental protection expenditure, was earmarked for the protection and remediation of soils and water bodies. Spending was broken down as follows: prevention of pollutant infiltration (54%), cleaning up soils and water bodies (38%), actions against soil erosion and the proliferation of blue-green algae blooms (4%), and measurement and monitoring of the condition of soils and aquatic and marine water (3%). Expenditure allocated to the protection of soils and water bodies increased less in 2019 after two years of strong growth: 10.0%, after 20.6% in 2018 and 19.1% in 2017 – (Figure 6). Aid for the conversion and maintenance of organic farming and subsidies for the competitiveness and adaptation plan for farmland was the main driver of expenditure increases.

**Figure 6: The main actions for the protection of soils and water bodies**

In current million euros



sd = semi-definitive; p = provisional data

Scope: France.

Source: SDES, satellite environment account, 2021. Treatment: SDES, 2021

### FOR MORE INFORMATION

- *Sols et environnement, chiffres clés - Édition 2015*, SDES, Repères, November 2015, 108pp.
- *Rapport sur l'état de l'environnement en France – Édition 2019*, Rapport synthétique. Part 1: État de l'environnement en France en 2019. Chapitre Sol - Notre-environnement
- *Évaluation du taux d'artificialisation en France : comparaison des sources Teruti-Lucas et fichiers fonciers*, SDES, Datalab, August 2019, 60pp.
- Groupement d'intérêt scientifique Sol - Gis Sol