# **Land of France**

France lies near the western end of the great Eurasian landmass, largely between latitudes 42° and 51° N. Roughly hexagonal in outline, its continental territory is bordered on the northeast by [Belgium](https://www.britannica.com/place/Belgium) and [Luxembourg](https://www.britannica.com/place/Luxembourg), on the east by [Germany](https://www.britannica.com/place/Germany), [Switzerland](https://www.britannica.com/place/Switzerland), and [Italy](https://www.britannica.com/place/Italy), on the south by the [Mediterranean Sea](https://www.britannica.com/place/Mediterranean-Sea), [Spain](https://www.britannica.com/place/Spain), and [Andorra](https://www.britannica.com/place/Andorra), on the west by the [Bay of Biscay](https://www.britannica.com/place/Bay-of-Biscay), and on the northwest by the [English Channel](https://www.britannica.com/place/English-Channel) (La Manche). To the north, France faces southeastern England across the narrow [Strait of Dover](https://www.britannica.com/place/Strait-of-Dover) (Pas de Calais). [Monaco](https://www.britannica.com/place/Monaco) is an independent enclave on the south coast, while the island of [Corsica](https://www.britannica.com/place/Corsica) in the Mediterranean is treated as an [integral](https://www.merriam-webster.com/dictionary/integral) part of the [country](https://www.britannica.com/topic/nation-state).

## **Relief**

The French landscape, for the most part, is composed of relatively low-lying plains, plateaus, and older mountain blocks, or massifs. This pattern clearly predominates over that of the younger, high ranges, such as the [Alps](https://www.britannica.com/place/Alps) and the [Pyrenees](https://www.britannica.com/place/Pyrenees). The [diversity](https://www.merriam-webster.com/dictionary/diversity) of the land is typical of Continental Europe.

Three main geologic regions are distinguishable: the skeletal remains of ancient mountains that make up the Hercynian massifs; the northern and western plains; and the higher young fold mountains in the south and southeast, including the Alps and the Pyrenees, with their attendant narrow plains. Much of the detailed relief can be attributed geologically to the varying differences in the resistance of rocks to erosion. A great deal of the present landscape detail is due to glaciation during the [Pleistocene Epoch](https://www.britannica.com/science/Pleistocene-Epoch) (about 2,600,000 to 11,700 years ago). France lay outside the range of the great ice sheets that [descended](https://www.britannica.com/dictionary/descended) upon the northern part of [Europe](https://www.britannica.com/place/Europe), so the direct sculpting of the land by ice was restricted to the Alps, the Pyrenees, the [Vosges](https://www.britannica.com/place/Vosges-massif-France), Corsica, and the highest summits of the [Massif Central](https://www.britannica.com/place/Massif-Central). Just outside these glacial areas, in what are known as periglacial lands, repeated freezing and thawing of unprotected surfaces modified slopes by the movement of waste sheets (formed of shattered bedrock), producing very much the landscape that exists today. Pleistocene periglacial action generated the sheets of the fine windblown *limon*, or [loess](https://www.britannica.com/science/loess), that is the basis of the most fertile lowland soils, and it possibly also created the [Landes](https://www.britannica.com/place/Landes-region-France), a sandy plain in southwestern France. The development of river [terraces](https://www.britannica.com/dictionary/terraces) (flat, raised surfaces alongside valleys) was another characteristic of periglacial action.

# **The** [**Hercynian**](https://www.britannica.com/place/Variscan-orogenic-belt) **massifs**

The physical structure of France is dominated by a group of ancient mountains in the shape of a gigantic V, the sides of which form the two branches of [Hercynian folding](https://www.britannica.com/place/Variscan-orogenic-belt) that took place between 345 and 225 million years ago. The eastern branch [comprises](https://www.merriam-webster.com/dictionary/comprises) the Ardennes, the Vosges, and the eastern part of the Massif Central, while the Hercynian massifs to the west [comprise](https://www.merriam-webster.com/dictionary/comprise) the western part of the Massif Central and the Massif Armoricain.

These highlands are composed of resistant metamorphic, crystalline, and sedimentary rocks from the [Paleozoic Era](https://www.britannica.com/science/Paleozoic-Era) (about 540 to 250 million years ago), the last including coal deposits. They share the common characteristic of repeated planation, or flattening. Some variety is provided by subsequent deformation and faulting, such as in the ridge-and-valley areas of the Massif Armoricain, where upland surfaces are deeply carved by valleys in dramatic fashion.

## **The** [**Ardennes**](https://www.britannica.com/place/Ardennes-region-Europe)

The [Ardennes](https://www.britannica.com/place/Ardennes-region-Europe) massif is an extension, from [Belgium](https://www.britannica.com/place/Belgium) into France, of the great Rhine Uplands, [characterized](https://www.britannica.com/dictionary/characterized) by rocks of slate and quartz from the Paleozoic Era. Differential erosion of Paleozoic rocks has produced long ridges alternating with open valleys crossed by the Sambre and Meuse rivers.

## **The** [**Vosges**](https://www.britannica.com/place/Vosges-massif-France)

The Alpine earth movements produced a great upswelling along the line of the present upper Rhine, leaving the [Vosges](https://www.britannica.com/place/Vosges-massif-France) with steep eastern slopes that descend to a rift valley containing the plains of [Alsace](https://www.britannica.com/place/Alsace) and Baden; on the west the upland descends rather gently into the scarplands of [Lorraine](https://www.britannica.com/place/Lorraine-region-France). The Vosges reaches its maximum elevation in the south, near the [Alps](https://www.britannica.com/place/Alps), where crystalline rocks are exposed; the highest summits are called *ballons*, and the highest is the Ballon de Guebwiller (Mount Guebwiller), with an elevation of 4,669 feet (1,423 metres). To the north the Vosges massif dips beneath a cover of forested sandstone from the [Triassic Period](https://www.britannica.com/science/Triassic-Period) (about 250 to 200 million years ago).

## **The** [**Massif Central**](https://www.britannica.com/place/Massif-Central)

The [vast](https://www.britannica.com/dictionary/vast) plateau of the [Massif Central](https://www.britannica.com/place/Massif-Central) covers about 33,000 square miles (86,000 square km), or some one-sixth of the area of the [country](https://www.britannica.com/topic/nation-state). The Massif Central borders the Rhône-Saône valley on the east, the [Languedoc](https://www.britannica.com/place/Languedoc) lowlands on the south, the Aquitaine Basin on the southwest, and the [Paris Basin](https://www.britannica.com/place/Paris-Basin) on the north. The planation that occurred following the creation of the Hercynian belt removed the ancient mountain chains, but the block was uplifted under the impact of the Alpine mountain-building movements, with a steep descent on the east and southeast, nearest the Alps, and a gentle decline under the later sediments of the Aquitaine Basin to the west and the Paris Basin to the north. Much of the western massif, notably [Limousin](https://www.britannica.com/place/Limousin-region-France), consists of monotonous erosion surfaces. The centre and eastern parts of the massif were much fractured in the course of the Alpine movements, leaving behind upthrust blocks, of which the most [conspicuous](https://www.merriam-webster.com/dictionary/conspicuous) is the [Morvan](https://www.britannica.com/place/Morvan), the forested [bastion](https://www.merriam-webster.com/dictionary/bastion) of the northeastern corner of the massif. Downfaulted basins filled with sediments from Paleogene and Neogene times (i.e., about 65 to 2.6 million years ago), such as the Limagne near the city of [Clermont-Ferrand](https://www.britannica.com/place/Clermont-Ferrand) in south-central France, were also formed. Faulting was associated with [volcanic activity](https://www.britannica.com/science/volcanism), which in the central part of the region formed the vast and complex structures of the massifs of Cantal and Monts Dore, where the [Sancy Hill](https://www.britannica.com/place/Sancy-Hill) (Puy de Sancy), at 6,184 feet (1,885 metres), is the highest summit of the Massif Central. Farther west, on the fringe of the Limagne, is the extraordinary [Chaîne des Puys](https://www.britannica.com/place/Chaine-des-Puys), whose numerous cinder cones were formed only about 10,000 years ago and still retain the newness of their craters, lava flows, and other volcanic features. Numerous mineral springs, such as those at [Vichy](https://www.britannica.com/place/Vichy) in the central [Auvergne](https://www.britannica.com/place/Auvergne) region, are a [relic](https://www.britannica.com/dictionary/relic) of volcanic activity.

The eastern and southern portions of the massif, from the Morvan through the [Cévennes](https://www.britannica.com/place/Cevennes) to the final southwestern termination of the massif in the Noire Mountains (Montagne Noire), are marked by a series of hill masses that overlook the lowlands of the [Rhône](https://www.britannica.com/place/Rhone-River)-[Saône](https://www.britannica.com/place/Saone-River) river valley and the *région* of Languedoc-Roussillon; at least one of these uplands, [Beaujolais](https://www.britannica.com/place/Beaujolais-ancient-province-France), has become famous for the grapevines grown at its foot. Between the hill masses lie infolded coal deposits at locations such as [Alès](https://www.britannica.com/place/Ales-France), Decazeville, [Saint-Étienne](https://www.britannica.com/place/Saint-Etienne-France), and Blanzy (Le Creusot) that are of more historical than contemporary importance. To the southwest the rocks of the massif are overlain by a great thickness of limestones (*causses*) from the [Jurassic Period](https://www.britannica.com/science/Jurassic-Period) (about 200 to 145 million years ago). Lacking in surface water and little populated, this portion of the massif is crossed by rivers that trench dramatic [gorges](https://www.britannica.com/dictionary/gorges), notably that of the Tarn. Extensive cave systems bear remains of prehistoric art, such as that of Pêche-Merle in the Lot valley and the [Lascaux Grotto](https://www.britannica.com/place/Lascaux) in the Vézère valley.

## **The** [**Massif Armoricain**](https://www.britannica.com/place/Armorican-Massif)

The [Massif Armoricain](https://www.britannica.com/place/Armorican-Massif) is contained mostly within the *région* of [Brittany](https://www.britannica.com/place/Brittany-region-France) (Bretagne), a peninsula washed by the [Bay of Biscay](https://www.britannica.com/place/Bay-of-Biscay) on the south and the [English Channel](https://www.britannica.com/place/English-Channel) on the north. The massif continues beyond Brittany eastward and across the Loire to the south. It is much lower than the other Hercynian massif; its highest point, the [Mont des Avaloirs](https://www.britannica.com/place/Mont-des-Avaloirs), on the eastern edge of the massif, attains an elevation of 1,368 feet (417 metres). [Alternating](https://www.britannica.com/dictionary/Alternating) bands of Paleozoic sediments and granitic rocks give the massif a generally east-west grain, particularly expressed in the headlands and bays of its rugged coast

# **The great lowlands**

## **The** [**Paris Basin**](https://www.britannica.com/place/Paris-Basin)

Between the [Ardennes](https://www.britannica.com/place/Ardennes-region-Europe), the [Vosges](https://www.britannica.com/place/Vosges-massif-France), the [Massif Central](https://www.britannica.com/place/Massif-Central), and the [Massif Armoricain](https://www.britannica.com/place/Armorican-Massif) lie the sedimentary beds that make up the [Paris Basin](https://www.britannica.com/place/Paris-Basin). Alternating beds of limestones, sands, and clays dip toward the central Paris Basin, their outcrops forming concentric patterns. Especially to the east, erosion has left the more resistant rocks, usually limestones, with a steep, outward-facing scarp edge and a gentler slope toward the centre of the basin. The central Paris Basin is filled by rocks from the Paleogene and Neogene periods, mostly limestones, that form the level [plateaus](https://www.britannica.com/dictionary/plateaus) of regions such as [Beauce](https://www.britannica.com/place/Beauce), [Brie](https://www.britannica.com/place/Brie-region-France), [Île-de-France](https://www.britannica.com/place/Ile-de-France-region-France), [Valois](https://www.britannica.com/place/Valois), and Soissonnais. This area is mostly covered with windblown *limon*, which is the basis of an excellent loamy soil. The limestone levels overlap in sandwich formation. Eroded remnants of higher formations have been left behind as isolated hills called buttes, perhaps the most famous of which is in Paris—the Butte de Montmartre, on which is one of the city’s most famous districts. Sandy areas adjoining the limestone formations bear forests, such as the Forest of [Fontainebleau](https://www.britannica.com/place/Fontainebleau), southwest of [Paris](https://www.britannica.com/place/Paris). In the east, in the regions of [Lorraine](https://www.britannica.com/place/Lorraine-region-France) and [Burgundy](https://www.britannica.com/place/Burgundy), are Triassic and Jurassic rocks; among the scarps the Moselle Hills are noted for their *minette*, low-grade [iron](https://www.britannica.com/science/iron-chemical-element) ore. In the extreme southeast the Jurassic limestone [Plateau](https://www.britannica.com/dictionary/Plateau) de [Langres](https://www.britannica.com/place/Langres) forms the watershed between the [Seine](https://www.britannica.com/place/Seine-River) and Rhône-Saône river systems; it is crossed by major routes linking Paris with the south. The eastern basin includes the chalk [country](https://www.britannica.com/topic/nation-state) of [Champagne](https://www.britannica.com/place/Champagne-region-France) and the [Argonne](https://www.britannica.com/place/Argonne) massif. In the western part of the Paris Basin, scarps in the Jurassic and Cretaceous rocks of [Normandy](https://www.britannica.com/place/Normandy) are not prominent. The chalk plateau is trenched by the lower Seine in a course marked by spectacular meanders and river cliffs. The plateau surfaces are frequently mantled by clay-with-flints and other residual deposits, producing heavy soils with much forest, grassland, and orchard cultivation. Farther north the wide chalk plateaus of [Picardy](https://www.britannica.com/place/Picardy) and [Artois](https://www.britannica.com/place/Artois) are generally covered with *limon*, which provides for a rich agriculture; many stretches of magnificent white chalk cliffs line the English Channel coast.

## The Flanders Plain

In the extreme north the French boundary includes a small part of the Anglo-Belgian [basin](https://www.britannica.com/dictionary/basin). Coastal sand dunes protect the reclaimed marshes of French [Flanders](https://www.britannica.com/place/Flanders-medieval-principality-and-historical-region-Europe) from invasion by the sea.

## **The** [**Alsace**](https://www.britannica.com/place/Alsace) **Plain**

East of the Paris Basin is the Alsace Plain, bordered by the Vosges on the west, the Saône basin on the southwest, the [Jura Mountains](https://www.britannica.com/place/Jura-Mountains) on the south, the [Rhine River](https://www.britannica.com/place/Rhine-River) on the east, and [Germany](https://www.britannica.com/place/Germany) on the north. The terrace and foothills bordering the Rhine are covered with soil-enriching *limon*. Alluvial fans, which are laid down by tributaries emerging from the Vosges, and much of the floodplain of the Rhine and its major tributary, the Ill River, are forested. The Sundgau region of the Alsace Plain, which lies between the Jura and the Ill River above [Mulhouse](https://www.britannica.com/place/Mulhouse), is another great [alluvial fan](https://www.britannica.com/science/alluvial-fan) [overlaying](https://www.britannica.com/dictionary/overlaying) impermeable clays, which hold up numerous lakes. The Rhine River and its tributaries continue to deposit thick sediments on the floodplain. The river is canalized, to the considerable detriment of the [water table](https://www.britannica.com/science/water-table) on both sides.

## The Loire plains

Toward the southwest the Paris Basin opens on a group of plains that follow the [Loire valley](https://www.britannica.com/place/Loire-Basin). The hills of this area, such as the limestone plateaus of the [Touraine](https://www.britannica.com/place/Touraine) region and the crystalline plateaus of the [Anjou](https://www.britannica.com/place/Anjou) and Vendée areas, are cut by the broad valleys of the Loire and its tributaries. The middle Loire valley, which varies in width from about 3 to 6 miles (about 5 to 10 km), is famous for its châteaus and its scenic beauty.

## **The Aquitaine Basin**

The Loire countryside links with the [Aquitaine](https://www.britannica.com/place/Aquitaine) Basin of southwestern France through the gap known as the Gate of [Poitou](https://www.britannica.com/place/Poitou). The Aquitaine Basin is much smaller than the Paris Basin, and, while it is bounded in the south by the [Pyrenees](https://www.britannica.com/place/Pyrenees), in the northeast it runs into the low foothills of the Massif Central. The slopes of both the Pyrenees and the Massif Central decline toward the central valley of the [Garonne River](https://www.britannica.com/place/Garonne-River). The Aquitaine Basin lacks the clearly marked concentric relief of the Paris Basin. In the north it has limestone and marl plateaus cut by the fertile river valleys emerging from the Massif Central. The southern low plateaus were mostly filled by a mass of rather ill-defined Paleogene and Neogene sands and gravel called the *molasse*, stripped off the rising Pyrenees. The foot of the central Pyrenees is marked by a remarkable series of confluent alluvial fans forming the Lannemezan Plateau. The [Landes](https://www.britannica.com/place/Landes-region-France), an area lying between the Garonne and Adour rivers to the west, has a surface that consists of fine sand underlain by impermeable iron pan, or bedrock. The area, once covered by heath and marshes, is now reclaimed and planted with maritime pine. South of the wide, deep Gironde estuary, the [Bay of Biscay](https://www.britannica.com/place/Bay-of-Biscay) coast is lined by enormous sand dunes, behind which are shallow lagoons.

# **The younger mountains and adjacent plains**

## [**Pyrenees**](https://www.britannica.com/place/Pyrenees), Jura, and Alps

The [Pyrenees](https://www.britannica.com/place/Pyrenees), whose foothills shelter the picturesque Basque countryside, [constitute](https://www.merriam-webster.com/dictionary/constitute) the most ancient of the more recently formed mountains in France. They stretch for more than 280 miles (450 km), making a natural barrier between France and [Spain](https://www.britannica.com/place/Spain). Their formation, which began in the [Mesozoic Era](https://www.britannica.com/science/Mesozoic-Era) (about 250 to 65 million years ago), continued in the Paleogene and Neogene periods and perhaps even in the beginning of the [Quaternary Period](https://www.britannica.com/science/Quaternary) (i.e., from about 2.6 million years ago). The central and highest part of the barrier is composed of a series of parallel chains with only a few, difficult-to-reach passes that have sheer drops at each end. A section of the mountain chain centring on Mont Perdu (Spanish: Monte Perdido) was named a [UNESCO](https://www.britannica.com/topic/UNESCO) [World Heritage site](https://www.britannica.com/topic/World-Heritage-site) in 1997.

The [Jura Mountains](https://www.britannica.com/place/Jura-Mountains), extending into [Switzerland](https://www.britannica.com/place/Switzerland), are composed of folded limestone. The northeastern part of the Jura, which has the most pronounced folding, is in Switzerland. The highest point, however, is [Mount Neige](https://www.britannica.com/place/Mount-Neige) (5,636 feet [1,718 metres]), in France.

The French [Alps](https://www.britannica.com/place/Alps) are only a part of the great chain that extends across [Europe](https://www.britannica.com/place/Europe), but they include its highest point, [Mont Blanc](https://www.britannica.com/place/Mont-Blanc-mountain-Europe) (15,771 feet [4,807 metres]). These [majestic](https://www.britannica.com/dictionary/majestic) mountains were formed in a series of foldings during Paleogene and Neogene times. They include the two greatest regions of permanent snow and glaciers in Europe. The northern Alps are relatively easy to cross because of the numerous valleys created by the movement of glaciers. The relief of the southern Alps is much less orderly, and the valleys, which were not affected by glaciation, form narrow and winding gorges. Like the Pyrenees, the Alps form a natural barrier, dropping sharply down to the [Po River](https://www.britannica.com/place/Po-River) plain in [Italy](https://www.britannica.com/place/Italy).

## **The southern plains**

Between these young mountains and the ancient [Massif Central](https://www.britannica.com/place/Massif-Central) is a series of plains, including those of the Saône and the Rhône rivers, which extend southward to the great triangular delta of the Rhône on the Mediterranean coast. Its seaward face, the [Camargue](https://www.britannica.com/place/Camargue) region, [comprises](https://www.merriam-webster.com/dictionary/comprises) a series of lakes, marshes, and sand spits and includes one of Europe’s important wetland nature reserves. West of the Rhône delta the [Languedoc](https://www.britannica.com/place/Languedoc) coastal plain is broad and rather featureless; behind its sand-spit coast are several formerly mosquito-ridden lagoons, now part of a resort complex. At the southwestern end the foothills of the Pyrenees reach to the rocky coast of the [Roussillon](https://www.britannica.com/place/Roussillon) region. East of the Rhône delta the lowlands are more fragmentary; in the [Côte d’Azur](https://www.britannica.com/place/Cote-dAzur) region the Alpine foothills and the ancient Maures and Esterel massifs reach to the Mediterranean, forming the [coves](https://www.britannica.com/dictionary/coves), capes, and harbours of the [country’s](https://www.britannica.com/topic/nation-state) most famous tourist and retirement area, the French [Riviera](https://www.britannica.com/place/Riviera). [Corsica](https://www.britannica.com/place/Corsica) is also highly regarded for its natural scenery. A number of the island’s peaks reach over 6,500 feet, and parts of it are under wild forest or covered with undergrowth called maquis.

## **Drainage of France**

The river systems of France are determined by a major divide in the far eastern part of the [country](https://www.britannica.com/topic/nation-state), running from the southern end of the [Vosges](https://www.britannica.com/place/Vosges-massif-France) down the eastern and southeastern edge of the [Massif Central](https://www.britannica.com/place/Massif-Central) to the Noire Mountains, the southwestern promontory of the massif. This divide is broken by occasional cols (depressions) and lowland corridors, notably the [Langres](https://www.britannica.com/place/Langres) [Plateau](https://www.britannica.com/dictionary/Plateau), across the Jurassic outer rim of the [Paris Basin](https://www.britannica.com/place/Paris-Basin). Along the divide originate most of the rivers of the larger, western part of the country, including the Seine and the [Loire](https://www.britannica.com/place/Loire-River). Other major rivers include the Garonne, originating in the [Pyrenees](https://www.britannica.com/place/Pyrenees), and the Rhône and the Rhine, originating in the [Alps](https://www.britannica.com/place/Alps).

## **The** [**Seine**](https://www.britannica.com/place/Seine-River) **system**

The main river of the Paris Basin, the [Seine](https://www.britannica.com/place/Seine-River), 485 miles (780 km) in length, is joined upstream on the left bank by its tributary the Yonne, on the right bank south of [Paris](https://www.britannica.com/place/Paris) by the Marne, and north of the city by the [Oise](https://www.britannica.com/place/Oise-River). While the Seine has a regular flow throughout the year, there may be flooding in the spring and, occasionally more severely, during the customary fall-winter peak of lowland rivers. Efforts have been made to reduce flooding on the Seine and its tributaries by the building of reservoirs. A number of islands dot the Seine along its meandering, generally westward course across the central Paris Basin and through the capital city itself. One of these, the Île de la Cité, forms the very heart of the city of Paris. Eventually the river enters the [English Channel](https://www.britannica.com/place/English-Channel) at [Le Havre](https://www.britannica.com/place/Le-Havre).

## **The** [**Loire**](https://www.britannica.com/place/Loire-River) **system**

The [Loire](https://www.britannica.com/place/Loire-River), the longest French river, flows for 634 miles (1,020 km) and drains the widest area (45,000 square miles [117,000 square km]). It is an extremely irregular river, with an outflow eight times greater in December and January than in August and September. Rising in the Massif Central on Mount Gerbier-de-Jonc, it flows northward over [impervious](https://www.merriam-webster.com/dictionary/impervious) terrain, with many gorgelike sections. Near [Nevers](https://www.britannica.com/place/Nevers) it is joined by the Allier, another river of the massif. Within the Paris Basin the Loire continues to flow northward, as if to join the Seine system, but then takes a wide bend to the west to enter the Atlantic past [Nantes](https://www.britannica.com/place/Nantes) and [Saint-Nazaire](https://www.britannica.com/place/Saint-Nazaire). The Loire is artificially joined to the Seine by several canals. The river’s torrential flow, a hindrance to navigation, covers its floodplain with sand and gravel, which has commercial importance. The river is also a source of cooling water for a chain of [atomic power](https://www.britannica.com/science/nuclear-energy) stations near its course, which has raised concerns among environmentalists, as have various [dam](https://www.britannica.com/dictionary/dam) projects along the river. [UNESCO](https://www.britannica.com/topic/UNESCO) designated the valley, between Sully-sur-Loire and Chalonnes, a [World Heritage site](https://www.britannica.com/topic/World-Heritage-site) in 2000.

## **The** [**Garonne**](https://www.britannica.com/place/Garonne-River) **system**

The [Garonne](https://www.britannica.com/place/Garonne-River), in the southwest, flows through the centre of the [Aquitaine](https://www.britannica.com/place/Aquitaine) Basin. It is the shortest of the main French rivers, with a length of 357 miles (575 km), and it drains only 21,600 square miles (56,000 square km). Its outflow is irregular, with high waters in winter (due to the oceanic rainfall) and in spring, when the snow melts, but with meagre flows in summer and autumn. Its source is in the central Pyrenees in the Aran (Joyeuse) Valley in [Spain](https://www.britannica.com/place/Spain), and its main tributaries, the Tarn, the Aveyron, the Lot, and the Dordogne, originate in the Massif Central. With the exception of the Gironde estuary, which is formed by the [confluence](https://www.merriam-webster.com/dictionary/confluence) of the Garonne and the Dordogne and is fully penetrated by the sea, the whole network is generally useless for navigation and is filled with powerful, rapid, and dangerous currents.

## **The** [**Rhône**](https://www.britannica.com/place/Rhone-River) **system**

In eastern France the direction of the main rivers is predominantly north-south through the Alpine furrow. The [Rhône](https://www.britannica.com/place/Rhone-River) is the great river of the southeast. Rising in the Alps, it passes through [Lake Geneva](https://www.britannica.com/place/Lake-Geneva-lake-Europe) (Lac Léman) to enter France, which has 324 miles (521 km) of its total length of 505 miles (813 km). At [Lyon](https://www.britannica.com/place/Lyon-France) it receives its major tributary, the Saône. The [regime](https://www.britannica.com/dictionary/regime) of the Rhône is complex. Near Lyon the Rhône and its important Isère and Drôme tributaries, draining from the Alps, have a marked late spring–early summer peak caused by the melting of snow and ice. While this peak is generally characteristic of the river as a whole, it is considerably modified by the contribution of the Saône, of the [Durance](https://www.britannica.com/place/Durance), and of some tributaries in the Mediterranean south as a result of the fall-winter rainfall peak. Thus, the powerful Rhône has a remarkably ample flow in all seasons. The course of the river and the local water tables have been much modified by a series of dams to generate power and to permit navigation to Lyon. The Rhône also supplies cooling water to a series of atomic power stations. West of the Rhône the Bas Rhône–Languedoc canal, constructed after [World War II](https://www.britannica.com/event/World-War-II) to provide irrigation, has proved to be an essential element in the remarkable urban and industrial development of [Languedoc](https://www.britannica.com/place/Languedoc). East of the Rhône the Canal de [Provence](https://www.britannica.com/place/Provence-region-France) taps the unpolluted waters of a Rhône tributary, the Durance, supplying [Aix-en-Provence](https://www.britannica.com/place/Aix-en-Provence), [Marseille](https://www.britannica.com/place/Marseille), [Toulon](https://www.britannica.com/place/Toulon), and the coast of Provence with drinking water and providing [impetus](https://www.merriam-webster.com/dictionary/impetus) for urban expansion. At its delta, beginning about 25 miles (40 km) from the Mediterranean, the Rhône and its channels deposit significant amounts of [alluvium](https://www.britannica.com/science/alluvium) to form the [Camargue](https://www.britannica.com/place/Camargue) region.

## **The** [**Rhine**](https://www.britannica.com/place/Rhine-River) **system**

The [Rhine](https://www.britannica.com/place/Rhine-River) forms the eastern boundary of France for some 118 miles (190 km). In this section its course is dominated by the melting of snow and ice from Alpine headstreams, giving it a pronounced late spring–summer peak and often generally low water in autumn. The Ill, which joins the Rhine at [Strasbourg](https://www.britannica.com/place/Strasbourg), drains southern [Alsace](https://www.britannica.com/place/Alsace). The Rhine valley has been considerably modified by the construction on the French side of the [lateral](https://www.britannica.com/dictionary/lateral) [Grand Canal d’Alsace](https://www.britannica.com/topic/Grand-Canal-dAlsace), for power generation and navigation. The eastern Paris Basin is drained by two tributaries, the Moselle, partly canalized, and the Meuse; the former reaches the Rhine by way of [Luxembourg](https://www.britannica.com/place/Luxembourg) and [Germany](https://www.britannica.com/place/Germany), and the latter, as the Maas (Dutch), reaches the Rhine delta at the [North Sea](https://www.britannica.com/place/North-Sea) by way of [Belgium](https://www.britannica.com/place/Belgium) and the [Netherlands](https://www.britannica.com/place/Netherlands).

## **The smaller rivers and the lakes**

North of the [Artois](https://www.britannica.com/place/Artois) ridge, a number of small rivers flow into the Escaut (Flemish and Dutch: Schelde) to reach its North Sea estuary through Belgium. The Somme rises in northwestern France and flows a short distance into the English Channel, and in the southwest the [Charente](https://www.britannica.com/place/Charente-River), rising in the western [Limousin](https://www.britannica.com/place/Limousin-region-France) plateau, and the Adour, rising in the central Pyrenees, flow into the Atlantic.

The French hydrographic system also includes a number of natural lakes of different origin. There are the lakes in depressions carved out by glaciation at the western [periphery](https://www.merriam-webster.com/dictionary/periphery) of the Alps, such as the lakes of [Annecy](https://www.britannica.com/place/Annecy) and Bourget, the latter being the largest natural lake entirely within France. Others occur on the surfaces of ancient massifs and include the lakes of the Vosges. Some lakes are caused by structural faults and are lodged in narrow valleys, as are the Jura lakes. There are also lakes of volcanic origin, such as those in the Massif Central (crater lakes and lakes ponded behind lava flows), and regions scattered with lagoons or ponds, either created by coastal phenomena, as on the [Landes](https://www.britannica.com/place/Landes-region-France) (Atlantic) and Languedoc (Mediterranean) coasts, or caused by [impervious](https://www.britannica.com/dictionary/impervious) terrain and poor local drainage, as in the [Sologne](https://www.britannica.com/place/Sologne) plain. Major artificial lakes include the Serre-Ponçon reservoir, on the Durance River in the Alps, and the Sarrans and Bort-les-Orgues reservoirs, both in the Massif Central.

# Soils of France

On a broad, general scale, virtually the whole of France can be classified in the zone of brown forest soils, or [brown earths](https://www.britannica.com/science/brunisolic-soil). These soils, which develop under [deciduous forest](https://www.britannica.com/science/deciduous-forest) cover in temperate climatic conditions, are of excellent agricultural value. Some climate-related variation can be detected within the French brown earth group; in the high-rainfall and somewhat cool conditions of northwestern France, carbonates and other minerals tend to be leached downward, producing a [degraded](https://www.britannica.com/dictionary/degraded) brown earth soil of higher acidity and lesser fertility; locally this may approach the nature of the north European podzol. The brown earth zone gives way southward to the zone of Mediterranean soils, which in France cover only a limited area. They are developed from decalcified clays with a coarse sand admixture and are typically red in colour because of the upward migration of [iron](https://www.britannica.com/science/iron-chemical-element) oxides during the warm, dry summers. These soils can be quite fertile.

Over large areas of France, soils have developed not directly from the disintegrated bedrock but from the waste sheets created by periglacial action. These may provide a particularly favourable soil material; most notable is the windblown *limon* that [mantles](https://www.britannica.com/dictionary/mantles) the Paleogene and Neogene limestone plateaus of the central [Paris Basin](https://www.britannica.com/place/Paris-Basin) and the chalk beds to the northwest, the basis of the finest arable soils of France. The quality of the soils depends heavily upon the origin of their waste sheets; sand spreads derived from the granites of the Hercynian massifs, for example, provide only poor soils. The bedrock, however, is not without influence. Soils developed over clays are likely to be heavy and wet, although not necessarily infertile, as in the Jurassic clay and chalk vales of the eastern Paris Basin. Limestone and chalk enrich soils with lime, which is generally favourable, but there is a marked north-south contrast. The limestone areas of southern France tend to be swept almost bare of soil by erosion; the soil then collects in valleys and hollows. The soils of the higher mountains are naturally stony and unfavourable.

Finally, human action is an extremely important factor in soil quality. As soon as the original forest was cleared, some modification of the soil was inevitable. Generally, farmers through the ages have maintained or improved soil quality by draining and manuring; especially noteworthy were the activities of Flemish peasants who virtually created their soil out of a marshy wilderness. Not all human intervention has been as successful, however. For example, the [degradation](https://www.merriam-webster.com/dictionary/degradation) of brown earths under heath in western France is not a natural feature but the product of human clearance and grazing practices. Large-scale arable cultivation with no use of animal manure is leading in places to soil degradation and soil erosion.

# **Climate of France**

The climate of France is generally favourable to cultivation. Most of France lies in the southern part of the temperate zone, although the subtropical zone [encompasses](https://www.merriam-webster.com/dictionary/encompasses) its southern fringe. All of France is considered to be under the effect of oceanic influences, moderated by the [North Atlantic Drift](https://www.britannica.com/place/North-Atlantic-Current) on the west and the [Mediterranean Sea](https://www.britannica.com/place/Mediterranean-Sea) on the south. Average annual temperatures decline to the north, with Nice on the Côte d’Azure at 59 °F (15 °C) and [Lille](https://www.britannica.com/place/Lille) on the northern border at 50 °F (10 °C). Rainfall is brought mainly by westerly winds from the Atlantic and is characterized by cyclonic depressions. Annual precipitation is more than 50 inches (1,270 mm) at higher elevations in western and northwestern France, in the western [Pyrenees](https://www.britannica.com/place/Pyrenees), in the [Massif Central](https://www.britannica.com/place/Massif-Central), and in the [Alps](https://www.britannica.com/place/Alps) and the Jura. In winter eastern France especially may come under the influence of the continental high-pressure system, which brings extremely cold conditions and temperature [inversions](https://www.britannica.com/dictionary/inversions) over the cities, during which cold air is trapped below warmer air, with consequent fogs and urban pollution. The climate of France, then, can be discussed according to three major climatic zones—oceanic, continental, and Mediterranean, with some variation in the [Aquitaine](https://www.britannica.com/place/Aquitaine) Basin and in the mountains.

## The oceanic region

The pure [oceanic climate](https://www.britannica.com/science/marine-west-coast-climate) prevails in the northwest, especially in [Brittany](https://www.britannica.com/place/Brittany-region-France). It is characterized by its low annual temperature variation, with [Brest](https://www.britannica.com/place/Brest-France) having an average temperature in January of 43 °F (6 °C) and in July of 61 °F (16 °C); by its extreme humidity and [moderate](https://www.britannica.com/dictionary/moderate) rainfall (35 inches [890 mm] of rain falling through the year), accompanied by cloudiness and haze; by the frequency and sometimes the violence of the west winds that blow almost constantly; and by large variations in the weather, which can change several times a day. This oceanic climate is somewhat modified toward the north, where the winters are cooler, and toward the south, where, in the Aquitaine Basin, the winters are mild and the summers warmer. There is also less rainfall, although at [Toulouse](https://www.britannica.com/place/Toulouse-medieval-county-France) great summer storms are quite frequent.

## **The continental region**

The plains of the northeast are particularly affected by a [continental climate](https://www.britannica.com/science/continental-climate). The city of [Strasbourg](https://www.britannica.com/place/Strasbourg) has the greatest temperature range in France. Winter is cold, with an average of 83 days of frost and with snow cover for several weeks, although the weather is often sunny. In summer, storms cause maximum precipitation in the region in June and July, although total rainfall is comparatively light.

The climate of the [Paris Basin](https://www.britannica.com/place/Paris-Basin) is somewhere between the oceanic and the continental. The average yearly temperature is 53 °F (11 °C) in [Paris](https://www.britannica.com/place/Paris). In addition, the relatively light annual rainfall (23 inches [58 cm]) follows a pattern of moderately heavy rain in spring and early summer and autumn, as in the oceanic countries, but the maximum amount of rain falls in summer, with storms of the continental type. In summer, spray irrigation is needed for crops in the continental climatic region and the Paris [Basin](https://www.britannica.com/dictionary/Basin).

## **The Mediterranean region**

In the southeast the [Mediterranean climate](https://www.britannica.com/science/Mediterranean-climate) extends over the coastal plains and penetrates the valley of the lower [Rhône River](https://www.britannica.com/place/Rhone-River) as far as the [Montélimar](https://www.britannica.com/place/Montelimar) area. It affects the southern Alps, the southeastern slopes of the [Cévennes](https://www.britannica.com/place/Cevennes) and the Noire Mountains (in the Massif Central), and the eastern Pyrenees. The latitude and the proximity of the warm Mediterranean Sea contribute to mild winters, with an average temperature of 47 °F (8 °C) in January at [Nice](https://www.britannica.com/place/Nice) and with only a few days of frost. Precipitation is heavy and tends to fall in sudden downpours, especially in the autumn and spring, whereas summer is nearly completely dry for at least three months. In coastal [Languedoc-Roussillon](https://www.britannica.com/place/Languedoc-Roussillon), annual rainfall totals can be as low as 17 to 20 inches (430 to 500 mm). It is a [unique](https://www.britannica.com/dictionary/unique) area because of its clear skies and the regularity of fine weather. This area is also subject to the violent north winds called the [mistral](https://www.britannica.com/science/mistral), which are peculiar to southern France. The winds are caused by high-pressure areas from central France that move toward the low-pressure areas of the [Gulf of Genoa](https://www.britannica.com/place/Gulf-of-Genoa). Permanent irrigation systems are characteristic of the Mediterranean lowlands.

The Aquitaine Basin is intermediate between the oceanic and the Mediterranean climates. Winters tend toward the oceanic type, but springs and summers are warm, although less arid than in the Mediterranean zone.

The mountains have varied climates. West-facing slopes in the Pyrenees have some of the highest precipitation figures in France. Snow cover stays from December to the end of April above 3,000 feet (900 metres) and is [perpetual](https://www.britannica.com/dictionary/perpetual) above 9,000 feet (2,700 metres) in the Alps and 10,000 feet (3,000 metres) in the Pyrenees. Locally, the contrast between the sunny south-facing valley slopes (*adrets*) and the shaded north-facing slopes (*ubacs*) can be of great importance for land use and settlement, while some intermontane basins can have quite advantageous climates as opposed to that of the surrounding peaks and plateaus.

# **Plant and animal life**

## **Plant life**

. Vegetation is closely related to climate, so that in France it is not surprising that there are two major but unequal divisions: the [Holarctic](https://www.britannica.com/science/Holarctic-region) province and the smaller Mediterranean province. Most of France lies within the Holarctic biogeographic vegetational region, characterized by northern species, and it can be divided into three parts. A large area of western France makes up one part. It lies north of the [Charente River](https://www.britannica.com/place/Charente-River) and includes most of the [Paris Basin](https://www.britannica.com/place/Paris-Basin). There the natural vegetation is characterized by oak (now largely cleared for cultivation), chestnut, pine, and beech in uplands that receive more than 23.6 inches (600 mm) of annual rainfall. Heathland is also common, as a predominantly man-made feature (created by forest clearance, burning, and grazing). Broom, gorse, heather, and bracken are found. South of the Charente, the [Aquitaine](https://www.britannica.com/place/Aquitaine) Basin has a mixture of heath and gorse on the plateaus and several varieties of oak, cypress, poplar, and willow in the valleys. On the *causses* of the [Massif Central](https://www.britannica.com/place/Massif-Central) and on other limestone plateaus, broom, heath, lavender, and juniper appear among the bare rocks. The vegetation of eastern France, [constituting](https://www.merriam-webster.com/dictionary/constituting) a second part of the Holarctic division, is of a more central European type, with trees such as [Norway](https://www.britannica.com/place/Norway) maple, beech, pedunculate oak, and larch; hornbeam is often present as a shrub layer under oak. The various high mountain zones form a third Holarctic part; with cloudy and wet conditions, they have beech woods at lower elevations, giving way upward to fir, mountain pine, and larch but with much planted spruce. Above the tree line are high mountain pastures, now increasingly abandoned, with only stunted trees but resplendent with flowers in spring and early summer.

The second major vegetation division of the [country](https://www.britannica.com/topic/nation-state) lies within the [Mediterranean](https://www.britannica.com/plant/Mediterranean-vegetation) climatic zone and provides a sharp contrast with the plant life elsewhere in France. The pronounced summer drought of this zone causes bulbous plants to die off in summer and encourages xerophytic plants that retard water loss by means of spiny, woolly, or glossy leaves; these include the evergreen oak, the cork oak, and all the heathers, cistuses, and lavenders. Umbrella, or stone, pine and introduced cypress dominate the landscape. The predominant plant life of the plateaus of [Roussillon](https://www.britannica.com/place/Roussillon) is the maquis, [comprising](https://www.merriam-webster.com/dictionary/comprising) dense thickets of drought-resistant shrubs, characterized in spring by the colourful flowers of the cistuses, broom, and tree heather; in most areas this is a form that has developed after human destruction of the evergreen forest. A large part of [Provence](https://www.britannica.com/place/Provence-region-France)’s hottest and driest terrain is covered by a rock heath known as garigue. This region is a principal domain of the vineyard, but lemon and orange trees grow there also. At elevations of about 2,600 feet (790 metres), as in the [Cévennes](https://www.britannica.com/place/Cevennes), [deciduous forest](https://www.britannica.com/science/deciduous-forest) appears, mainly in the form of the sweet [chestnut](https://www.britannica.com/plant/chestnut). At elevations of 4,500 feet (1,370 metres) this gives way to a subalpine [coniferous forest](https://www.britannica.com/science/coniferous-forest) of fir and pine.

Forest covers 58,000 square miles of France (15,000,000 hectares), which is more than a quarter of its territory. Most forests are on the upland massifs of the [Ardennes](https://www.britannica.com/place/Ardennes-region-Europe) and [Vosges](https://www.britannica.com/place/Vosges-massif-France) and within the Jura, [Alps](https://www.britannica.com/place/Alps), and [Pyrenees](https://www.britannica.com/place/Pyrenees) mountain chains, but [extensive](https://www.britannica.com/dictionary/extensive) lowland forests grow on areas of poor soil, such as that of the [Sologne](https://www.britannica.com/place/Sologne) plain south of the [Loire River](https://www.britannica.com/place/Loire-River). The planted forest of maritime pine covering about 3,680 square miles (953,000 hectares) in the [Landes](https://www.britannica.com/place/Landes-region-France) of southwestern France is said to be the most extensive in western [Europe](https://www.britannica.com/place/Europe). Increasingly, forests are less a source of wood and more a recreational amenity, especially those on the fringe of large urban agglomerations, such as [Fontainebleau](https://www.britannica.com/place/Fontainebleau) and others of the [Île-de-France](https://www.britannica.com/place/Ile-de-France-region-France) region.

## **Animal life**

The fauna of France is relatively typical of western European countries. Among the larger mammals are red deer, [roe deer](https://www.britannica.com/animal/roe-deer), and wild boar, which are still hunted; the [fallow deer](https://www.britannica.com/animal/fallow-deer) is rather rare. In the high Alps are the rare chamoix and the reintroduced ibex. Hares, rabbits, and various types of rodents are found both in the forests and in the fields. Carnivores include the fox, the genet, and the rare wildcat. Among [endangered species](https://www.britannica.com/science/endangered-species) are the badger, the otter, the beaver, the tortoise, the marmot of the Alps, and the [brown bear](https://www.britannica.com/animal/brown-bear) and the lynx of the Pyrenees. Seals have almost entirely disappeared from the French coasts. While French bird life is in general similar to that of its neighbours, southern France is at the northern edge of the range of African migrants, and such birds as the flamingo, the Egyptian vulture, the black-winged stilt, the bee-eater, and the roller have habitats in southern France.