Mediterranean scrub

Introduction

This type of environment is characterized by warm dry summers and mild rainy winters. This remarkably influences the vegetation, which is therefore characterized by low, woody, evergreen plants with a sclerophytic type of structure, that is, with small and hard leaves that are suited to resist the summer draught.
For this reason the Mediterranean scrub is also called “sclerophyl forest” (*skleros* = hard, *phyllon* = leaf).
Total annual rainfall is approximately 250-500 millimetres and occurs mainly in the winter months. In summer the mean monthly temperature is often higher than 20°C and in this biome, in winter it very rarely freezes.

The biome

Mediterranean scrub in the world

The most typical Mediterranean scrub area is the Mediterranean basin, but it can also be found in other regions of the world: California, Central Chile, the southern tip of South-Africa and Southern Australia.

The Mediterranean

In the Mediterranean basin, the scrub has been remarkably attacked by tamed animals. In particular, goats do not have a specialised diet, so they can feed on any type of vegetation, supplying milk, wool, meat and hides. They need very little water and can even climb on trees to reach for food.
In the Mediterranean region, there are areas with an exceptional concentration of biodiversity and a high density of endemic species, the so-called *hot spots*. In Italy, these areas are in Sicily and Sardinia.
The problem with all these areas is that in the dry season there is nothing to protect plants from indiscriminate pasturing. Farmers do not stock up on fodder for the season and so animals keep pasturing even when the plants are not in their growing season, which results in the formation of poor and sparse vegetation. This vegetation is further affected by fires, since during the dry season everything is dry and easily flammable because of many species containing high amounts of volatile oils.

California

In California, the Mediterranean scrub is called *chaparral* and is an area of thorny shrubs rich in birds and other vertebrates, especially in the rainy season; during the hot summer, many birds and the largest herbivores migrate to more favourable areas. The mammals living in the chaparral are: terricolous squirrels and kangaroo rats, animals that store seeds in their lairs. The important function of these seeds is to preserve water since they take up the steam sent out by these small mammals as they breathe in their lairs. Largest animals include collared peccaries, that look like pigs but are smaller and also omnivores; common antelopes, which are very good runners; mule deer, which are very numerous, while the number of wolves, grizzlies and mountain lions is decreasing with time. Number one among birds is the runner cock, related to cuckoo, although without the latter’s parasitic habit of the nest; it is not good at flying but runs fast and feeds on reptiles and rodents.

Australia

In southern Australia, the scrub is called *mallee* and consists of half-dry scrubland. This habitat houses many granivorous birds and a few frugivorous ones (i.e. that feed on fruits). Granivorous birds include Australian pheasants, birds that do not hatch their eggs by sitting on them, but build up a mound of earth and lay their eggs onto it. The cock-pheasant is in charge of checking the temperature of the eggs by adding or removing soil from the mound. There are also many carnivorous birds, such as many species of falcons, goshawks, owls, little owls and butcher birds.

Chile

In Chile, there is the *matorral*, inhabited by such small mammals as the degu, a rodent which is as the same size as a mouse and has sharp nails with which it digs the ground in search of roots and tubers. Guanacos seem to have been living here once.

Plants of the Mediterranean scrub

The Mediterranean scrub may be divided into tall scrub, with well-developed trees that can provide shade and humidity to the undergrowth, and short scrub, made up of impassable shrubs and bushes, called garrigue.
This biome contains evergreen broad-leaved and aciform trees, including: holm oaks, arbutuses, olive trees, laurels, carob trees, pine trees, junipers, cypresses and others. It also includes shrubby plants, for instance rock roses, mastic trees, myrtle and rosemary. The most typical plants are those that can stay in a dormant, i.e. resting, state during the hot summer, to sprout and grow in colder autumn temperatures. Autumn germination can take place only after a mild wet season, during which the seed becomes “acclimatised”. Later on, the seed will bloom and bear fruit in the warmth of springtime. A different strategy is implemented by geophytic or bulb plants: these perennial plants resist the summer heat through their underground bulbs and tubers, as many liliaceous plants do.
Shrubs may be evergreen or shed their leaves during the driest seasons. Many plants contain scented aromatic substances which deter animals who feed on them and, in some instances (for instance the Californian artemisia) these substances prevent competing plants from sprouting and growing.

Animals in the scrub

At present, the scrub that surrounds the Mediterranean basin certainly hosts fewer animals because of the long history of man’s local activities: in other parts of the world, this biome houses, instead, many animals. Here one can find wild boars, roe deer, deer, squirrels, wolves, foxes, badgers, rodents, tortoises, lizards and many species of birds. Animals living on ground include snails, insects and earthworms, and twice a year they have to cope with two seasons in which they have to stop all activity: the winter cold (hibernation) and the summer dryness (aestivation). In early summer, the insects living on ground and the other small animals move many centimetres deep down, where they find the conditions they need to overcome the summer dryness before the autumn rains arrive. Other animals cope with daytime dryness by being active at night.

Mediterranean biodiversity

Mediterranean vegetation is very important as the habitat of a wide variety of wild and farm animals. Particularly important in the Mediterranean is its high number of endemic vegetal species which make up approximately 50% of the total number of plants living in this environment. Southern Italy is the southernmost limit for many species living all over Europe, for instance beeches, oaks and silver firs. During the ice age, the southern regions must have acted as “sheltering areas” for these species, from which they spread again to the rest of Europe. This is why southern Italy is a great store of biodiversity whose importance is now recognised all over the world.

Carob tree

Carob trees (*Ceratonia siliqua*) also live in the scrub. Carob trees can be used to control erosion, preserve the soil and reclaim lands, while supplying carobs as fodder. Carobs have always been used in many different ways: as animal fodder (especially horses), brewed into alcohol drinks or as thickeners (carob flour) in the food industry. Carobs can also be eaten as picked; sometimes, they have been toasted and used as ersatz coffee. A peculiarity of this plant is that its seeds are extremely hard and, above all, all have the same shape and weight. The people of the eastern basin of the Mediterranean know about this peculiarity of the seeds and so they used them as units of weight for gold and gems; basically they put gold or gems on one scale pan and the seeds of the keration (as the Greeks called them) on the other. This is why gold, diamonds or other precious stones are still weighed in carats and not in grams.
Because plants grow slowly, the wood is mainly used as firewood and for crafts. A particular woody product is heather log, used to make pipes.

Aromatic perfumes

Honey-making is very important: arbutus honey is one of the most sought-after honeys.
In addition, the Mediterranean scrub is a great store of cooking herbs.

Rosemary

One example is rosemary (*Rosmarinus officinalis*), an aromatic shrub whose height varies from few centimetres to 1.50 m, with small green and neat leaves. It can commonly be found in the scrub near the sea. The whole plant secretes a type of oil that gives off a pleasant resinous scent, which in France is used in perfumery to make eau de Cologne. Its twigs steeped in alcohol can be used to treat joint and muscle pains. Rosemary is commonly used as a spice in roasts, sausages, rice and traditional cakes.

Myrtle

Myrtle leaves (*Myrtus communis*) have been used since Roman times to flavour meat; interestingly, the bologna sausage, Mortadella, takes its name from the popular name with which this plant is often known, Mortella, just because it used to be flavoured with its leaves. When crushed or ground, the leaves of this shrub give off a pleasant orange-like scent, due to the presence of myrtenol, a balsamic oil. Myrtle leaves are still used to produce an essential oil, which is used not only in perfumery, but also in medicine for its balsamic and disinfectant virtues. Its black-bluish berries ripen on the plant in late summer and in Italy they are used to make an excellent dessert wine. The ancients used them to produce a sort of wine and a type of oil that they used in medicine as an astringent. Distilled myrtle water is used as a toiletry under the name of angel or angelic water.

Pine tree

The pine (*Pinus pinea*) is mainly grown for its nuts and timber: pine nuts are used in confectionery and to make typical dishes. The resin produced from pine nuts is used to make tar and pitch and pine wood is used to make beams and in shipbuilding. The tree is also used to make cellulose pulp.

Origins of the Mediterranean basin

In the Cainozoic age, the area of the Mediterranean sea was a huge ocean that slowly shrank into a few secondary basins. The main one then turned into the Mediterranean Sea. This was caused by the African and Eurasian continental plate moving closer to each other. The powerful thrusts coming from the south caused the sediments built up at the bottom of the ocean to raise, thus originating the mountain ridges of the Atlantis, the Pyrenees, the Alps, the Balkans and Asia minor. During the late Miocene, the ancient ocean became an internal sea, even if different from today's Mediterranean sea. During the Pliocene, the Mediterranean Sea dried up. The geological phenomena associated with this period, such as the opening of huge fractures, volcanic activity, the raising of coastal areas, etc., prompted the formation of the ecological and geographical complexity of the Mediterranean region. This phase boosted the expansion of salt-resistant plants (Halophytes of the genera: *Limonium, Salicornia, Arthrocnemum, Salsola, Artemisia*) and the appearance of small and sparse species whose adaptability to particular conditions made them develop quickly. In the end, today's Straits of Gibraltar broke up because of the earth's crust moving, and the water of the Atlantic sea flew into the Mediterranean basin. The current configuration of this basin came into being approximately five million years ago.

Man and the biome

Mediterranean agriculture

Olive trees are the native arboreal species that is most commonly grown in the region of the Mediterranean scrub and is of remarkable importance in its inhabitants' economy. Nevertheless, another two originally native species should be mentioned for their use: cork oaks and carob trees.
Other important plants that are grown here are cereals, pulse vegetables, fruit trees, vegetables and salads. Oil and wine are the most important produce on which the economy of scrub areas is based. **Cork oak**
Cork oak forests are closely related to the climatic conditions of some Mediterranean areas. These forests have scattered populations forming agro-silvi-pastoral systems which are extremely rich in flora and fauna. In particular, the native flora, very rich in aromatic and medicinal species, may increase the value of cork oaks. Many vegetal species

growing in this forest, because of their variety and long blooming period, supply bees with excellent supplies. Cork is collected only from trunks, and its production has remarkably increased over the last few years; the new cork oak forests actually cover almost 120,000 hectares.

Olive trees

Olive trees, probably native to Syria, were brought to Asia minor, Egypt, Greece, Italy and other Mediterranean countries. By growing this tree, man has remarkably expanded the geographical distribution of this plant, which can now be found from the centre-south of France to pre-Saharan areas. The Mediterranean species, *Olea europea*, consists of two subspecies: oleaster or wild olive (*Olea oleaster*) and cultivated olive (*Olea sativa*). Cultivated olive trees are bigger than wild olive trees, approximately 4 to 12 metres tall, and can reach 20 metres tall if they find their ideal climate and soil. Their trunk is big, their branches are rounded, smooth and thorn-less, their foliage is generally well developed and soaring. Olive twigs are flexible and sometimes dangling, their leaves are lanceolate, green and hairless on top, bright white at the bottom. Cultivated olives are big, fleshy, rich in oil, but fewer than in wild olive trees and in any case much fewer than their flowers.

The myth of olive trees

The ancients used to say: the Mediterranean begins and ends with the olive tree, to signify the deep and extremely close relation between this plant and its geographical area, regarded as an organised unit, well distinguished from the cold and wet provinces which began in the north and the desert and dry areas of the south and east. Grown since the antiquity and worshipped by the Greeks (as the legend goes, it was Athena who planted the first olive tree in Greece), in many cultures it is one of the symbols of peace. In Jewish religion, olive oil was used in sacred rites: prophets and kings were anointed as a sign of investiture.

Breeding

In Mediterranean scrub areas, there generally is a marked difference between harsh winters and long hot summers. This natural condition forces shepherds to use high pastures during the summer and to move to milder climates, which are therefore closer to the sea, during the winter.

This migration led to the development of a peculiar breeding culture: transhumance. Even if there are many historical and geographical differences among the different breeding systems, transhumant culture is common and similar in all those countries that are related to the Mediterranean. It can be defined as a breeding model based on the alternate and periodical movement of flocks between two regions with different climates.

Breeding mainly concerns sheep and goats; cattle only to a certain extent.

Tourism

A source of wealth that is becoming more and more important is tourism. The climate and beauty of the sights of this ecosystem attract many holiday-makers, especially in the warmest months. The tourism sector is developing so much as to become a potential danger for the environment.

Human impact

Over-pasturing

One of the main causes for the drying of the soil is excess pasturing. It occurs when the pressure of the pasturing activity on an area exceeds what that area can bear. The soil, deprived of its vegetal covering, is more sensitive to atmospheric agents. As a consequence, it dries up in the summer and is washed away by winter rains. Unfortunately, people often resort to fire as a quick way to obtain pasturelands. This involves the deterioration of the garrigue and steppe Mediterranean scrub areas.

Desertification

Desertification is a process of degradation with regressive alterations of the water cycle, of the fertility of the soil and of the biodiversity of ecosystems. In Mediterranean scrub areas, especially in the Mediterranean basin, deep economical

and social changes have been taking place since the Fifties which led to leave the countryside, to change the use of the soil, to increase the demand for water and to urbanise rural and coastal areas. These territorial exploitation phenomena have increased the gravity of erosive processes and degradation and desertification risks. In particular, deforestation and the loss of the vegetal covering cause the soil to lose much of its ability to retain water, so this impoverished soil is no longer productive.

Fires

In these regions, where the summer climate is dry and parched, fires are frequent and natural; fires may be caused by spontaneous combustion or by a flash of lightning of a summer storm.
Because of the many fires, the vegetation contains many fire-resistant plants, such as cork oaks, or plants whose germination is even promoted by fires (pyrophitic plants, such as, for instance, plants of the genus Tuberaria) or plants that quickly recover after fires, such as holm-oaks. Animals have also adjusted to live in different habitats and can quickly repopulate recently burnt areas.
Nevertheless, fires are becoming more and more frequent because of man's presence. Fires caused by man can be arsons (purposefully set fires) or caused by carelessness (a lit cigarette thrown away, a bonfire not completely extinguished, etc.). Fires destroy entire woodlands and are dangerous to men and animals.
In Italy, there are thousands of fires every year: a total of 8,595 fires took place in 2000, which covered a total surface of 114,648 hectares, 58,234 of which were woodlands; over the last ten years, 700,000 hectares of woodland have been damaged by fires (with a peak of 115,000 hectares in 1993).

What to do

Fire, fire!

The Civil Defence suggests some sustainable behavioural rules to prevent fires:
• do not light fires near wood, flammable liquids in general, fuels, paper and garbage
• pay attention to signs showing danger of fires or prohibiting fires
• If you light a fire in a place where it is allowed, make sure it is out before you go away.
In case of fire:
• when sighting a fire, always inform the people in charge (carabinieri, police, the Fire Brigade, the State Corps of Forest Rangers, the Consortium of Municipalities of the mountain area ….), specifying any useful detail that will be asked
• learn how to use fire extinguishers.
Near a fire:
• move away; don't forget smoke is dangerous for your airways
• cover your nose and mouth with a damp handkerchief

Fire-fighting

When a fire is reported, the Centro Operativo Aereo Unificato (COAU) of the Civil Defence located all over the territory and region concerned uses aeroplanes and helicopters to try to 'stem' the fire. Any point of the country can be reached within 60/90 minutes from take-off. Fire prevention can be addressed and improved through the use of satellite detection systems, which sometimes have already been used. Such systems can monitor fires on wide regions at low costs, even in distant areas. Satellite detection may advantageously help to control fires: forecasting, detection, assessment of effects and drawing up of maps of burnt areas, riskiest areas, etc. Nevertheless, although it is an effective service, if the weather conditions are unfavourable or if there are too many fires which have not been promptly reported, men and

means may not be enough. Only through the co-operation of every one can the damages of this frequent phenomenon be limited.

Fighting desertification

Agenda 21 was established as a result of the 1992 Rio Summit and it's a set of actions to undertake at a local level to solve the global problems of our planet, combining economic development with environmental protection and social growth. On December 26, 1996 entered into force the United Nation Convention which suggests international cooperation initiatives; the common goal is enhancing productivity of cultivated lands and provide for their recovery, conservation and for the sustainable management of soils and hydric resources.
Specific projects are under examination for given areas, involving local population, restoring precious traditions and reassessing the role of rural communities to avoid decay of these lands. Moreover, if in the past there was a tendency to find technical solutions, nowadays the problem as a whole is analyzed, as it's produced by continuous growth population but also political and socio-economic causes. On a global scale, various UN agencies deal with desertification and among these are FAO (Food and Agricolture Organization), IFAD (International Fund for Agricultural Development), United Nations Development Programme (UNDP), World Meteorological Organization, UNEP (United Nations Environment Programme), UNESCO (United Nations Educational, Scientific and Cultural Organization).