

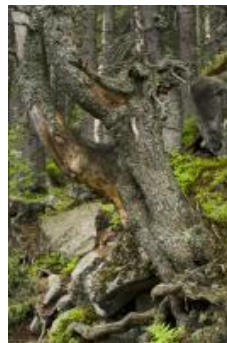
Introduction. Why does the forest still exist? - Europe

If you look at Europe from Space, through a digital eye of a satellite, you would notice a seemingly solid structure formed of vast, dark green woodland. When you compare our continent to all the others on our globe, then you become aware that Europe is actually an island in the forests of the world. It is an island where the total area of forests not only manages not to decrease (which is the predominant fact on the whole planet), but since the XVIII century it has increased. It is a place where the relations between woodlands and society continue to evolve, turning its back on demands for mass raw material and focusing more on the ecological aspects such as the protection and conservation of ecosystems and landscapes. It is a trend which is moving away from the typical aspects of timber production in forests. This is a privilege that only a quite wealthy society such as the European can afford. In the poorer parts of the World, the pressure to increase the agricultural acreage at the expense of forests is fuelled by the millions of starving people who use wood to survive on a daily basis.



Europe and its forests

At first glance, the forests of the old continent appear to form a single blanket, but look closer and you will find the local and regional differences in the most complicated and complex of ecosystems. The boundaries between the woodlands can be distinguished, from the northern and mountain spruce forests, endless terrain of pine forests, multi species forests on highlands and mountains, long stretches of riparian forests, Mediterranean evergreen bushes of macchia, to the small remains of ancient forests. All types of forest are distinct, whether it's the different type of tree species growing in them, the abundance of flora and fauna, the fertility of the habitat, the way the land has been managed and the history of the forestry in one area, which over the years has sometimes been administrated by several countries.



Mountain forest and deadwood

The forests of the old continent are diverse in terms of the composition of species, the acreage they take up and the history of their management, but they are also becoming much more similar to each other when it comes the functions they play in the modern world, their role in the landscape and their expectations towards society. In the course of our journey through the European forest we will examine the variety and we will try to find the strong bond linking the management of the forest and their functions.

This voyage will cover not only the many countries of Europe but it will also be a look to the past. It will start in the Mediterranean cradle of our modern civilization and continue towards the north according to the chronological order of settlement in Europe. We will see just how the history of our economy has left a lasting mark on the forest resources in nature. The first traces of settlement are 8000 years old and come from southeastern Europe, whereas the findings in the northern part of the continent are almost 6000 years younger. Oak and cedar forests died out in the medieval times (in those days people called for their protection). The first signs of people consciously managing the forests of Western Europe are dated at the middle of the last millennium. In northern Europe only some forests were managed by man for the last 200-300 years. Many of them escaped the exploitation phase of industrial development in the era of smelting iron ore, and began to manage them right from the principle of providing a sustainable forest, one that also gives steady income. The journey northwards will also have a different dimension, as we will be following the footsteps of the withdrawing distant glacier, passing through woodland areas of contrasting climate growing conditions, as well as the geological age of the soil surface, from the oldest to the youngest.



Boreal spruce forest, raw postglacial landscape

We will therefore follow the course of history of the European civilization but also against the clock of the time of nature, watching forests that resemble their old ancestors, which grew during the severe post glacial climate. Let's begin our journey through the forests and centuries...

Where is the forest? Forest area as a result of historical changes - Europe

For the vast majority of Europe's terrain, forest vegetation is a target for succession in nature. If we abandoned the way in which we use our land today, then the forest area would take up around 90 % of the continent, excluding only the highest mountain areas above tree border

line, travelling sand dunes on the sea coast, big river valleys and their proximity and man-made concrete jungles. Within the borders of our continent the only thing that could compete with our forest are the endless steppes, stretching from across the Asian plains to the north of the Caspian and Black Seas, where the insufficient amount of rain water prevents the growth of woodland environments. Woodiness is a figure, which is obtained by comparing the area occupied by forests with the total land area (usually without the area covered by water), and is drastically different in Europe. The more mountainous and less inhabited the country has the higher the level of woodiness. The presence of forests in today's landscape is a result of limiting settlement in history due to the unavailability of terrain (mountain and swamp forests), a climate not suited for farming, less fertile soil (poor coniferous forests), or deliberate decisions made by the rulers (hunting grounds). The Mediterranean landscape of southern Europe indicates that pastoralism is the main factor that has limited the reproduction and development of forests, which were cut down for timber and fuel. They were destroyed and burned down to make way for farmland. The unveiled soil on the slopes of mountains was prone to erosion, rainfall gradually washed away the most fertile layer (which was formed by the forest), until it became absolutely barren. The degraded land, which was later covered in bush, could only be used for sheep and goat herding. They effectively ate all the rebirth of a tree and stood in the path of the forest returning to its natural habitat. In this way, 90 % of all primary forests of the European civilization disappeared.



Macchia - evergreen shrubs, which replaced the oak forests of the south, destroyed by man in the cradle of civilization, or the pinewoods

In the later history of settlement, which made its way towards the north, people preferred the fertile soils in valleys and on plains as farmland and less accessible slopes and wetlands as meadows and pastures. The main changes in the woodiness of European countries come at the turn of the XVIII and XIX centuries, when mining and the railway were undergoing intensive development. It was a time of when new forms of industry evolved by using up huge amounts of timber. Trains became a new and convenient form of transporting the wood, making it independent of the waterways used for floating down timber. The mass deforestation was also caused by the development of the paper and textile industries, which used to wood in chemical processing.



“Forest” in Europe does not always mean the same thing – old trees in the Augustów Forest (Michał Orzechowski) and thicket with single trees (e.g. Mediterranean area)

The forest cover in certain countries in Europe ranges from 70 % in Scandinavia (Finland), to 7 % in Ireland. That gives an average of 35 % in Western Europe and 47 % for the whole of the continent. But is this a good reflection of the role the forest has in the landscape of each country? The level of high forest exists when the land is inaccessible for forest growth and when the human population is low. Forest for example takes up the rugged interior of Norway, whilst the people reside on the coast (3/4 of them in cities). Moreover the figures of woodiness are sometimes not made up of forests in the full sense. In Italy, where the forest cover is 29 %, only ¼ are woods with high trees. The rest are either forest plantations (timber producing and also cork and chestnut), forest grown for firewood, macchia and bush areas with a low percentage of tree species. It's a similar situation in the other Mediterranean countries, where the climate, soil and most importantly history (including settlement), have pushed the forests into inaccessible areas, unsuitable for growing crops or vineyards. The upland and mountainous countries (Slovenia, Alpine countries) have a higher level of forest cover because of their mountain slopes, where the forest has a soil protective function, becoming a barrier for mud slides and avalanches. They also help in times of increased rainfall. The crown of a single large tree can retain an amount of 500 litres. If a slope is covered in a multi-layered forest, then the mineral soil is fed a limited amount of water and is distributed in a steady way. Undergrowth also slows down the speed of the water flow, which helps prevent floods in river valleys. Depending on how intensive the rainfall is, it is said that the forest stops 85 % of all the water. This is the main reason of such high woodiness in mountainous countries.

On the other hand we have countries with a very low level of forest cover (e.g. United Kingdom and Ireland – around 10 %), which were covered by dense deciduous forests (and coniferous in Scotland). To this day, only several fragments of these natural forests have remained, such as oak and beech forests (south England and highland Wales), pine (Scotland), or cork oak and laurel (Cornwall), all of which are treated as natural monuments. Other forest areas are occupied by secondary coniferous woodlands, used mainly for production.

Countries in Western and Central Europe are very similar in terms of quantity and species structure of forests. The woodiness is at a level of 30 %. Native species are the most dominant, but there is a large group of highly productive, fast growing trees (especially various species of pine and spruce), which was created by the XIX century need for fast grown and harvested timber. Despite the long history of settlement and the turbulent times, some of the woods have kept grandeur there, resembling the ancient forests of Europe. This was caused mainly by the rulers using isolated forest areas for hunting. Hunting was not just

entertainment, but also provided stocks of meat, hence the large extent of the hunting areas. It allows us to enjoy today the beauty of these fertile lowland forests, like the crown jewel, Białowieża Forest in Poland and Belarus and also one of the oldest forests to be protected for hunting, New Forest in Hampshire, Great Britain (since the XI century).



Forests often occupy land unusable for agriculture (forest on a sand dune) - there have resisted the pressures of colonization. (Michał Orzechowski)

Whose is the forest? Ownership of forests has an influence on there quality and availability - Europe

Among European nations we can single out three groups of countries with a different percentage of public forests. We must keep in mind that the quality and availability of forests is not only caused by ownership, but also by forest area per capita and the population density. The largest amounts of private forest are in the hands of the Scandinavian countries (Norway, Sweden and Finland), and also France and Austria (up to 80 % private forest land). In this group the share of public forests does not exceed about 30 %, although it is difficult to talk about any strict restrictions on public access to forests, in addition to specific local solutions. On the other side of the scale are Ukraine and Belarus, where the government is in charge of all the forests. In the rest of the countries the public forests are at a level of 70 - 80 % (Poland, Czech Republic, Switzerland), or 50 – 60 % (Hungary, Lithuania, Slovakia). Access to forests is usually limited in countries with less forest cover and with greater culinary traditions related to the fruits of the forest. Such restrictions are applied in countries like Italy, where the social pressure was so strong that picking mushrooms, chestnuts and other “gifts of the forest” has been linked to the ownership of the forest, treated as his own yard or agricultural crop.



Private forests - production function - or state subsidies (Michał Orzechowski)

The ownership of forests plays a role in shaping the security of forestry, helping pro ecological activities, promoting the conservation of the environment. A dominant owner (usually a state) can afford not to make profit out of forestry in order to keep the society happy. It is much harder to fund private owners, in order for them to agree to give up their personal gain for the development of non-production functions, recreational, or ones resulting from the needs of nature conservation. Large areas belonging to one property, managed by one unit, can be much easier protected from, for example, harmful effects of strong winds, by creating appropriate spatial structures between neighbouring tree stands. Creating a network of observation points can also prevent large fires from breaking out.

Another important aspect is the possibility of planning and realization of actions aiming to change the composition and structure of tree strands in greater forest areas. The reconstruction of the tree strands is an action going beyond the prospect of real money in one or two decades. The durability and importance of these reconstructed tree strands is not easy to convert into money.



Only the large owner (the state) can afford to resign from the production function on valuable natural forest areas (conservation tree strands, reserve) (Michał Orzechowski).

What is a forest? The wealth and diversity of forest in Europe - Europe

Plant formations in Europe have a parallel layout and are quite different. Their structure is influenced by the oceanic climate in the western part of the continent, and the continental

climate in the east. The European forest vegetation has found convenient conditions in which it can evolve, south of the arid tundra of the Arctic. It begins with a stretch of scrub and rare birch forests. This type of vegetation can be found on the Scandinavian Peninsula and in Russia. Further south you will find the taiga, made up of conifers, such as spruce and pine, to a lesser extent fir and birch. Moving closer towards the equator, we are likely to spot more and more deciduous species: aspen, fewer elm, alder, maple and lime. Further to the south the taiga zone passes into deciduous and mixed forests of oak, beech and other species. In Western Europe, which doesn't stretch that far to the north, you won't find a taiga zone, but you will find unique forest vegetation along the Atlantic coast (the coasts of west Norway, Great Britain, Ireland, western Spain and Portugal), such as moors with beeches and oaks, which later cross over to the characteristic forests of the region, along with the milder climate. On the shores of the Mediterranean and in southern and central parts of the Iberian Peninsula we can find typical Mediterranean vegetation, dominated by sclerophyllous, eternal green thicket, formed after the destruction of forests. Apart from the meridional position, also the elevation of the area has an influence on the composition of the forest. In Europe we can find woodland much higher up in the south (Bulgaria 2300 meters above sea level), then in the north (Scotland 500 meters above sea level).

The original European vegetation has been transformed in a result of economic activity, especially in the central and southern part of the continent. This event has occurred in a much lesser scale in the north and north eastern part. In the British Isles natural vegetation covers only 10 % of the land (these are not only forests, but also heath land and bog), whilst in northern Scandinavia and Russia these figures are at 90 %. However, these are areas unsuitable for agriculture because of their climate.



Multi-species forest on a mountainside (Michał Orzechowski)

The wealth of species in the forests depends on the geographical position, but also on the strategy used in managing them over time. In the last 200 years, European forestry has preferred mono specific conifer tree strands (mainly spruce and pine), which resulted in reducing the area of mixed and deciduous forests. Currently, thanks to reconstruction of the types of tree strands, forest area, which is suited to its habitat, is growing. Across Europe, mixed forests cover about 14 % of forest area. The largest shares of this type of tree strands are found in Malta (60 %), Czech Republic (56 %), Latvia and Estonia (above 40 %). Mono specific coniferous forests dominate because of natural consequence (climate and soil), mainly in northern countries (Scandinavia) and in mountainous areas (Austria, Germany, Switzerland).



Production spruce forest (Michał Orzechowski)

Coniferous species sometimes dominate because of forest-economic decisions. In Great Britain and Ireland, a large share of coniferous species is the result of long-term forest policy, which backed the cultivation of sitar spruce - an alien species to the flora of Europe. Deciduous species play a greater role in the countries situated in the south of the continent: Serbia, Bosnia and Herzegovina, Croatia (80 %), Hungary and Italy (70 %).

A way to measure the resources of the forest is to find the abundance of tree strands, which can be calculated by taking the amount of cubic metres of wood and comparing it to the area (hectare). The volume for this is usually taken from wood suitable for processing, excluding the thinner branches. The abundance in the forests of Europe is varied. In a single tree species stands it will depend on the age, the composition and structure of the species, the density of the forest and so on. The wealth in the continents is on average below the level of 200 m³/ha. Ireland, Greece and Spain, are all below 100 m³/ha. In the alpine countries these numbers are much greater due to the high rainfall and large tree strands of fir and spruce. In Austria it amounts to 309 m³/ha, Slovenia and Germany - around 280 m³/ha. Forests in Slovakia and the Czech Republic are achieving an average of about 260 m³/ha, also because of the domination of hill and mountain forests. The average for Europe is about 140 m³/ha.

For the intensity of forest production to be sustained, there needs to be an assets volume increase. Thanks to this income we have the knowledge of how much can be gained in the planned cuts. You are actually not permitted to acquire the entire gain, accumulating supplies, leaving an annual increase of 30-40 %. The tree strands where the growth is at the highest level are situated in western and central Europe (5 m³/ha per year). The main factors limiting growth are: a short length of the growing season in northern Europe and drought in southern Europe, while speeding up the growth opposite factors: longer growing season increasing towards the south and the higher amount of rainfall associated with the milder maritime climate in the west.

Among all the forests in Europe one can find areas whose goal was to provide firewood. The tree strands containing species meant for regrowth, consisting of high forest with thin trees, have a large capacity of sprouting from a cut down tree, and rarely exceed 30 years old. Being forests used for strictly production based functions; they are usually treated as forests of a lower category. They are located mainly in southern Europe - in France (7 million hectares), Italy (3.5 million hectares) and Greece (over 2 million hectares). Forests with high tree trunks that arise from seeds and seedlings, are the most valuable category. The age structure of these forests is distinguished by different age classes (20 years). In these structures, the largest

areas are occupied by trees between 20-80 years old (II-IV class). This is a result of afforestation after World War II, which took place in the central part of the continent, due to changes of borders and ownership of land. In Europe there are 13 million hectares of growing forests, which are older than 100 years. And they will continue to do so because of the restrictions enforced by environment protection and social pressure. An even distribution of age classes is present in Switzerland, Luxembourg, Czech Republic, Finland and Norway. Ireland stands out among the countries with an irregular age structure of tree strands, where over 20 % of forest are cover in crops and greenwoods under the age of 10 years. This is a result of afforestation funded by the European Union. Countries in a similar situation are Portugal, Austria and Denmark. On the other hand in Germany, the percentage of the youngest age group is extremely low, which is a result of breeding behaviour and also the preferred renewal of forest diversity with the use of the older tree strands. For example, the felling age of a pine in the Nordic countries ranges from 110 to 180 years, in Central Europe from 80 to 120 years, 60 - 70 years in Hungary and in the countries bordering the Atlantic Ocean up to 50 years (which is also a sign of the growth rate of species).



Forest with deadwood

The geographical location of a country has an affect on the richness of the fauna and flora in forests. The diversity in species is clearly growing in the south of the continent. The European forests are made up of around 150 species of trees, all with very different amounts of participation. The largest area is occupied by different types of pines, spruces, beeches, firs and oaks. Depending on the location of the country, there can be an amount between 200 and 2000 vascular plants. The largest number of them is found in the countries in the south and east, and lowest in the north of Europe. The problem for some of the forests is the large amount of alien species. In the countries of the North West, “imported” species take up an of average 15 % of forest areas, but in some countries this percentage is much higher (Ireland, Denmark, Iceland, Great Britain, Hungary, the Benelux countries). In the group of foreign species, we can also include species that grow well beyond their natural habitat. Among the species of conifer one should first mention spruce, Sitka spruce, Douglas fir, and several species of pines. Non-native species among the deciduous trees include red oak, robinia and different poplar species. When the moisture and thermal conditions are favourable, eucalyptus tree occupy large areas of forest (Spain, Portugal). Some of the foreign species considered to be invasive, have established themselves in the sustainable forest ecosystems of Europe and are occupying new areas. These include: robinia – black locust (*Robinia pseudoacacia*) and black cherry (*Prunus serotina*), and in the south-east *Ailanthus altissima* (Slovenia, Albania).



Robinia forest

Forests are home to half of the mammal species of Europe. Their number depends on the location and history of the countries economy and it varies - from 20 to 96. The largest group of mammal species live in the forests of south-eastern Europe and the Czech Republic, Slovakia and Lithuania. Also in the Czech Republic and Slovakia, but likewise in Austria, Poland, Scandinavia and Lithuania we can spot a great amount of nesting bird species in forests (over 100). Significantly fewer (60) nest in the forests of Germany, Italy and the Benelux countries.

Man and forest

Forest management and nature conservation - Europe

Forests in Europe are usually saved in areas unsuitable for agriculture. There is also a small representation of forests, which are untouched by human hand. Natural forests (that are not affected by man) were recognised as 4 % of all forests of Europe, although the definition of naturalness varies in different countries. Most of them grow in places difficult to access in northern Scandinavia, northern areas of the European part of Russia, the Alps and the Balkans. In all, 12 European countries have a share of natural forests above 1 % of the total forest area. Most of these forests are located in Sweden (16 %). On the other hand, in European forestry there is not a great amount of entirely unnatural plantation. There are some exceptions. The countries that excel in the field of plantation crops are the ones, who have a well-developed culture of foreign species (Spain, Turkey, United Kingdom and Ireland, France and Portugal). Forest plantations do not exist at all in Finland, Germany and Austria. In the definition of plantations crops the most important component is the purpose for which they were founded - fast timber production. A significant aspect of this is soil care, which includes fertilizing, maintaining regular spacing between trees, pruning, etc. Forests, which consist of a species requiring light, may resemble plantations crops in the early stages of their life. However, even if they are planted in concrete distances from one to another and in poor species compositions, in the course of the subsequent care they will loose their regular arrangement of planting. Random factors and the intentional decisions of foresters will make these stands become semi-natural creations. In Central Europe growing of Scots pine (*Pinus sylvestris*) can change its species composition by enriching with oaks (thanks to the birds - jays) and birch (wind). High forests have more time for this, because the period of their life is 2-4 times longer than plantations crops.

As a result of afforestation in the period after World War II and also earlier tendency to propagate pine and spruce, large forest areas grow on fertile habitats. They require reconstruction in order to increase the participation of deciduous trees and firs. This conversion is carried out in at least two ways. In younger tree stands of II-III age class, species resistant to shadow are introduced under the pine. In a few decades they will take over the rule by removing the previous generation. Old tree stands, which are incompatible with the terms of habitat and the ones, which do not let the light through to the forest floor, are reconstructed by cutting. The type and size of felling is matched to the demands of the introduced younger generations.



Effect of group or gradual cutting, lots of species

Revaluation of the role of European forests forced managers to use management methods, which do not lead to a temporary removal of all old trees. Cutting groups, partial, completed on small areas of irregular shape are partly a response to social expectations - of the total forest protection. The same applies to resignation of complete cutting during the change of generations of tree stands and also significantly reducing their acreage, although these are not actions resulting from economical reasons. In tree stands requiring light, which grow in poor habitats, abandonment of outright cuts will not be entirely possible. Even with the use of natural regeneration from seeds left over, species requiring light can not grow too long in the shadow - you will need to remove the old generation of forest.



Reconstructing tree stand, pine or spruce, and in the bottom layers fir and beech

Despite the different social restrictions in timber production, the demand for wood is increasing in all the European countries. The European Community is faced with a dilemma.

How to support ecological forestry in their area and also meet the growing demand for wood? Is the purchase of raw materials from outside of Europe the proper solution? With the high cost of transport, for it to be profitable, it must be produced on plantations or in a way that has no respect for the environment. By protecting the forests in our home country we contribute to the degradation of wood in other, poorer regions of the world. One type of solution is a more rational approach to the multifunctional forest management at local level. An expression of this rationality is the system for certifying the origin of wood raw material. Products with this certification are a guarantee of proper procedures during the entire cycle of production, transportation and processing.



Wood

The European forest is shielded by around 90 different forms of protection of forest areas. The first models that should be named here are the National Parks and nature reserves (with a different regime of protection). Other forms include areas of protected landscape forests of aesthetic value. Trying to compare the area occupied by different types of nature protection between the countries on our continent can prove to be hard task, because the importance of these forms can be different. These forms are usually supported by the protective function of forests. The functions of these forests unite Europe, their terminology and methods of dealing with forest conservation - are clearly distinct. Some of the forests that protect the water and soil in central Europe have a raised felling age or restricted usage. Sometimes the economy in “normal” high forests (mountains of Italy), is even more restricted, i.e. to cutting down single trees. The area of forests under strict protection should not be the hallmark of the quality of the protection of natural resources, and differs from 1-2 %, rising to over 10 % (Slovakia and Portugal), and up to 24 % in Liechtenstein. Strict protection rules give the chance to observe and sustain the processes occurring in isolated ecosystems. In other situations (in which we are likely to be found), it leads to significant changes in the ecosystem of the forest.



Natura 2000, Birds

The answer to this diversity of forms of protection and the ineffective conservative protection (one without human intervention) is a programme covering the whole of Europe – Natura 2000. The program is based on the creation of a European Union common system of nature protection areas. The bases for action are two EU Directives: the Birds Directive and Habitats Directive. The aim of Natura 2000 is to preserve certain types of natural habitats and species, which are considered rare and endangered across Europe. This should lead to social acceptance, because the programme does not exclude the economical use of the land lying inside its borders. The countries taking part are obliged to maintain the areas in at least a non-deteriorated condition. The programme will consist of designated areas: Special Protection Area (SPAs) and Special Areas of Conservation (SAC), which apply protective regulations tailored to the needs and threats to protected species and habitats. These areas are determined independently by each country and reviewed by the European Commission. The existence of Natura 2000 areas involves several obligations. Projects that may affect the state of the area have to assess the impact (before being given permission for to this project). If there is a case of negative impact then there must be a form of compensation for the natural ecosystem. Area supervisors are required to prevent any deterioration of the status of habitats or populations of birds. They are also obliged to proactive protection, securing the desired state of protected habitats and species. It ought to be noticed, that the protection of birds and natural habitats should result also in protection of other ecosystem components. About 20 % of Europe's land area is within the borders of Natura 2000, in which forests play the most important role.

What will the forest be like? Future and threats - Europe

As far as written documents date back to the beginnings of forestry, there have been signs of the production cycle being disrupted: the mass emergence of insect pests (gradations), natural disasters and freak climate changes – drought, strong winds, floods and severe frost. Fungal diseases, which area now stable and cover a large area, are just one of the signs of modern times, as is the afforestation of former farmland. Seedlings which are deprived of their mycorrhizal fungi are falling prey to parasitic pathogenic fungi.



Melolontha melolontha



The decay of an ash forest

The gradation of harmful insects may have been, in part, influenced by man, who led to the accumulation of prey base in the form of large areas of monospecific habitats of similar age. With the balance of the forest ecosystem disturbed and with the lack of sufficient ways to self defend (predatory insects, insectivorous birds), the population of these harmful insects could rapidly develop, leading to a state of disaster. The largest pest gradation in the history of European forestry – the Nun Moth (*Lymantria monacha*) from the years 1978-1984 in Poland, covered about 1/3 of the total forest area of the country. These kind of disaster situations need to be fought with chemical weapons, which is expensive and not impartial to the environment. According to the rule that says it is better to prevent than cure, it is better to care for the balance in these forest ecosystems than to counter attack the effects. The climate changes that have been observed in the past decades are increasing the risk of an insect gradation recurring, from a species that had not yet been known to be economically important. In the years 2005-2007 in central Europe large amounts of oak trees were dying because of the larvae of jewel beetles (*Agrilus*), which until then were considered a rare species.



The forest after a hurricane.

Among abiotic factors, which are independent of the living world, the wind has the most powerful effects. Strong winds, which can brake or knock down trees over large areas, invade European forests regularly with increasing frequency. Particularly heavy losses are caused by wind in mountain areas, dominated by man-made spruce forests. Mixed forests are much

more resistant to these kinds of conditions, especially if they consist of species which are suited to the local conditions, such as beech and fir forests.

Fire is another factor gaining in importance. Forest fires are increasing the strength of their devastating impact not only in the warm and dry southern countries but also in other regions of Europe. The reason of this is a mixture of several factors: lower forest humidity (dehydration), rising average air temperatures, the declining health of forest stands and their greater penetration by humans. Forests which aren't a healthy, with open crown, let more light into the undergrowth, thus helping further development of ground vegetation, especially grass. After they dry, they become easily gobbled up by fire.

Despite numerous threats the future of the European forests is bright. Their total land area is growing. There is a stable increase of contributions of the old forests in the population, which make the landscape more attractive. Society continues to put pressure on the state to abandon the productive functions of forests, or at least to reduce them. European programs are being created to protect and support forestry and woods. The forests of Europe are changing, but all the stars in the sky are indicating that it will be a change for the better.



A young tree, a young forest, a hope for the future...