

# Forest- Man

Forest and man` - a topic imbued with emotion, especially in Germany, where it was once heavily influenced by legends and fairytales. Today, people have a rather idealized view of the forest as a 'lonely wilderness'. In actual fact, man has changed and influenced the forest for thousands of years. This has resulted in a diverse cultural landscape: changing it from a primitive forest into a cultural forest.

## **Forests in Germany- access for all**

In Germany today, there are 231 people per square kilometre. People go to the forest approximately 1.5 billion times each year in order to walk, collect mushrooms, jog, hunt, cycle and enjoy the fresh air. In contrast to many other European countries, the German population is privileged to be able to enjoy the forest for free. Even private forest owners are obliged to grant the public access to their forests.

## **Protected area– Recreational space–Industrial area**

In Germany, which is one of the most densely populated countries in the world, more than 90 per cent of forests are protected or fulfil important protective functions<sup>1</sup>. These include areas which are protected by the Nature Conservation Law such as national parks and conservation areas as well as areas which are protected by the Forestry Law such as water and soil conservation forests. Furthermore, the European natural habitat (flora and fauna) conservation areas, which are of worldwide significance, are included.

## **Germany: Land of beech trees**

Germany has a global responsibility for the protection of the beech forest ecosystem. Its beech forests form a significant part of the total beech area in the world; Germany accounts for a quarter of the potential total area of beech forest. Simultaneously, constituting 15 per cent of Germany's total forest area, beech is not only the most important native hardwood but also one of the principal commercial and industrial timbers.

## **German beech: also popular abroad**

Other parts of the world have also discovered European beech. In many countries, this German wood is used as a substitute for tropical timber. Light beech is popular for furniture. Furthermore, many articles of daily use such as brushes or spoons are made using beech. In recent years, the world has increasingly started to discover German oak e.g. for furniture and parquet flooring.

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<sup>1</sup> Holzabsatzfonds 2007, Waldbild

# Forest Facts and Figures

## Forest area

Germany is one of the most forested countries in the European Union. Approximately 11.1 million hectares, 30% of the German landscape, is covered in forest.

In contrast to most other continents, forested areas in Europe are not under threat. In fact, they are expanding in Germany. During the last four decades, forested regions increased by approximately 1 million hectares. Deciduous and mixed forests constitute 73%.<sup>2</sup>

## Types of tree in Germany

There are 72 types of tree in Germany's forests. 26 deciduous and 7 coniferous types of tree are used commercially. The most important types of tree are spruce (28 %), pine (24%), beech (15%) and oak (10%). Furthermore, the coniferous trees larch and fir as well as the Neubürg Douglas fir and the deciduous trees maple, ash, cherry, alder, birch, acacia, lime, walnut and poplar are all significant in the forest<sup>3</sup>.

## The forest provides work

The forestry workforce is made up of approximately 98,000 employees<sup>4</sup>. In addition, there are around 1.3 million forest owners with their employment requirements. They all look after the forest and take care of the paths and recreational areas in the forest, thereby providing an important service to the community. Their efforts are only rewarded through the sale of timber: the revenue is approximately 1.8 billion Euros per year in Germany<sup>5</sup>.

## Who does the forest belong to in Germany?

### Private forest:

The largest proportion of German forests is divided up among 1.3 million private owners. The majority belong to small private owners, whose forests are less than 5 hectares.

### Trusteeship forest:

These forests are in the process of being transferred back from state ownership in the former German Democratic Republic. They are gradually being privatised.

### National forest:

These forests are owned by individual German states or the Federal Republic of Germany. The proportion of forests owned by the Federal Republic is now almost entirely confined to military exercise areas.

### Municipal forest:

These forests are owned by cities and local authorities. They are, generally, important recreation areas for the community.

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<sup>2</sup> BMELV 2007, Unser Wald

<sup>3</sup> BMELV 2004, Bundeswaldinventur 2

<sup>4</sup> Wald-Zentrum Uni Münster 2005, Clusterstudie Forst- und Holzwirtschaft Deutschland

<sup>5</sup> Holzabsatzfonds 2007, Waldbild

# Forestry Today: Economic Management modelled on Nature's Example

Forester owners and foresters in Germany rely on the natural cycles of the forest ecosystem in order to remain as close as possible to natural forest management. This results in healthy forests which complement their environment as well as cost-effective working methods.

## **Forest conversion for diversity**

Forest management, using natural methods, involves felling single trees rather than chopping down whole areas. By using this method, sunny areas are produced inside the forest. Old and young trees grow alongside each other and, through the promotion of selected trees, foresters also boost the diversity of tree types. Consequently, the rich composition of natural forests provides more habitats and ecological niches than uniform forests with their trees of the same age. Purely coniferous forests, which were mainly planted out of necessity during both World Wars, are gradually being replaced by natural, stable mixed and deciduous forests: The forests are being converted.

Forest conversion is one of the largest projects in the history of German forestry. In these times of climate change natural forests, which are clearly more resilient with regard to storms, drought and disease, are of special significance. With 73%, Germany has reached a sizeable quota of deciduous and mixed forest, which will rise further in the future<sup>6</sup>.

## **Systems of Certification for Sustainable Forest Management**

A certificate in forestry is reliable evidence of sustainable forest management. More than 50 forestry certification programmes now exist worldwide. The PEFC (Programme for the Endorsement of Forest Certification) and FSC (Forest Stewardship Council) are the two largest internationally renowned forestry certification systems. In Germany, approximately 8 million hectares (out of approximately 11 million hectares) are endorsed by the PEFC and FSC as sustainably managed forests.

In order to send a clear signal that the persistent destruction of the world's forests is unacceptable, the German Government has decided that evidence must be provided that future timber products originate from environmentally friendly and socially responsible forest management. PEFC and FSC certificates will be accepted as proof thereof.

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<sup>6</sup> BMELV 2007, Unser Wald

## **Diversity – implemented sustainably**

In the German forest, we encounter our very own Central European biological diversity. It is estimated that, in total, up to 14,000 species of animals and plants, among which over 3,000 are types of fungi, are native to natural forests. Furthermore, there are countless microorganisms. All of these things populate German forests and create a complex biocoenosis. A spoonful of forest soil plays host to more organisms than there are people living on Earth.

Forest management creates diversity: The diverse structures of naturally sustained deciduous forests, with their young and old trees, light and shade, wet and dry areas, and countless habitats are often no longer to be found in the open, cleared, fertilized cultivated landscape.

These species-rich forests have always been used by man and they are an important factor in the economy. For almost 300 years, German forestry has been guided by the principle of sustainability, a term which has been coined by German forestry.

### **What is sustainability?**

The concept of sustainability has its roots in German forestry. The background to this was the rapid spread of a timber shortage in the 1700s. Towards the end of the Middle Ages, stocks of timber were rapidly diminishing. Hans Carl von Carlowitz recognized this problem, thereby becoming the founder of sustainability. In his tract of 1713, the Saxon Oberberghauptmann first wrote that the amount of timber permitted to be taken from the forest must be matched by the amount which could be grown again,

What sustainability means today: Each generation and every society must find their own solutions. They should not be permitted to burden future generations and societies in other parts of the world. Ecology, economy and social development should be in step with one another.

## Conservation in the Forest

German forests fulfil important protective functions for the air, soil, water, climate and diversity of species – they are, in most cases, sustainably managed. Some forested regions are totally appropriated from human usage – the forest can then develop without any human influences. In ‘tomorrow’s primitive forests’, natural succession and developmental phases should be able to unfold perfectly and undisturbed.

‘Nature remains as intended in’

Four Forest National Parks: Hainich, Eifel, Bavarian Forest, Kellerwald- Edersee <sup>7</sup>	50,000 Hectares
716 Natural Forest Reserves <sup>8</sup>	31,000 Hectares

Comparable studies of primitive forests and cultivated forests show that cultivated forests have a higher proportion of rare plants and animals. In order to promote these species, which are dependent on timber in the decomposition stage, the Forestry Office have developed various programmes, which should boost the quantity of old and dead trees. Dead wood in the forest is another important prerequisite for the acquisition of a forestry certificate.

### Dead wood means life

It is a success story of natural silviculture that German forests have become mixed and, generally, older and richer in composition over the past 20 years. Even in cultivated forests, increasing numbers of old trees are remaining untouched until the end of their natural life. In Germany, there is approximately 12 m<sup>3</sup> of deadwood, left standing or lying on the ground, per hectare. This is left to decompose.<sup>9</sup> Hole-nesting birds and expert wood decaying species find their habitat here. The state and EU promote the increase in old trees and deadwood by compensating private forest owners for their loss in income from this timber.

### Diversity of species is promoted

99% of foresters in Germany use neither pesticides nor fertilizers. Many insects, soil organisms and endangered plant species can only find conditions necessary for their survival in the forest. This is especially true of those species which require locations which are lower in nutrients i.e. which are not affected by mineral fertilizers. In various species protection programmes the German Forestry Office promotes the protection of endangered species such as wood ants, bats, wood grouse or orchids. Furthermore, rare species of trees, such as wild fruit or yew, as well as primitive forms of forest use are specifically promoted by the Forestry Office.

<sup>7</sup> [www.nationalpark-hainich.de](http://www.nationalpark-hainich.de), [www.nationalpark-eifel.de](http://www.nationalpark-eifel.de), [www.nationalpark-bayerischer-wald.de](http://www.nationalpark-bayerischer-wald.de), [www.nationalpark-kellerwald-edersee.de](http://www.nationalpark-kellerwald-edersee.de)

<sup>8</sup> [www.naturwaelder.de](http://www.naturwaelder.de), Stand 17.3.08

<sup>9</sup> BMELV 2004, Bundeswaldinventur 2

### **Preservation and use of genetic diversity**

A high level of genetic diversity is a prerequisite for long-living place-bound organisms like trees, so that they can continually adapt to environmental influences. National and state forestry gene resources are maintained for this purpose. This entails the protection of genetically valuable forest resources, the establishment of seed plantations, the storing of seeds, pollen and tissue in gene banks and further research into forest genetic resources.

## **Climate change – how does this affect the forest?**

Climate change with its extreme weather conditions also leads to changes within the forest. Trees come into leaf earlier and often lose their leaves later. In Europe, leaf development, blossom and ripeness are earlier by an average of 2.5 days per decade. With rising temperatures in the mountains, trees find their way to higher ground. The natural forest boundaries are slowly rising in the Alps. With temperatures rising, pathogens, insects and fungi are adapting faster than the trees as higher temperatures and longer vegetation periods mean that pests are able to reproduce more frequently each year. Moreover, they are mobile and are able to change their propagation area more quickly than plants.

### **Particularly affected in Germany: the spruce**

Of all the main tree species in Germany, the spruce is the most affected by climate change. It prefers a moist, cool habitat and is, therefore, sensitive to heat and dryness. Since the fast growing spruce is frequently cultivated outside its natural habitat, it is already stretched to the limit in many areas. Furthermore, the spruce is particularly vulnerable to the indirect effects of climate change such as insect infestation and storms. This is of economic significance as the spruce is the most cultivated species of tree in Germany.

Somewhat less susceptible is the beech tree. As it is generally cultivated to suit the habitat, it is only at risk in places which are too dry. Oaks, pine trees and Douglas firs are less vulnerable. The increased cultivation of Douglas firs, which are clearly well suited to the consequences of climate change but which are not native to Germany, is being discussed at great length at the present time.

Mixed forests are generally less at risk than coniferous forests. Most notably, the conversion from purely coniferous forests into mixed forests with deciduous trees, which began decades ago, proved itself to be a success when faced with storm Kyrill in 2007 and the exceptionally hot, dry summers of 2003 and 2005. German forestry has already begun to manage the forest in preparation for greater risks. This entails preserving, for the future, as much diversity as possible with regard to indigenous species of trees, forest composition and types of forests, in order to be best prepared for every eventuality.

# Sustainability through forest hi-tech

The amount of timber which can be sustainably used in German forests is determined with the assistance of the so-called Forest Management Plan, which is conducted every ten years. The forest assessor calculates the ratios of particular tree types, the age distribution, growth and timber stocks. Using this data, it is possible to evaluate how past measures have affected the forest and, subsequently, what measures should be taken over the next decade. Of course, this planning takes into account the current operational, protective and recreational functions of the forest. The Forest Management Plan guarantees the systematic, sustainable management of forests in Germany.

## **GPS reduces the workload**

Faced with rising costs, forestry relies increasingly on hi-tech solutions. Harvesting machines, the so-called harvesters, are employed when thinning out. The trees are automatically weighed when harvested. The site for a storage area for the harvested timber can be precisely determined using the Global Positioning Systems (GPS).

Furthermore, the Regional Forester is able to record the data pertaining to all of the logs using a hand-held computer. Information about the logs, such as type of wood, length and diameter plus the GPS coordinates of the timber harvest is recorded on the spot using mobile terminals. Different logs can be quickly dispensed to retail outlets, according to their type, length and quality

## **Satellite assisted dispatch**

Transport of the timber from the forest also relies on technology. Digital maps, which cover the whole German forest road network, are crucial. Using these maps, the driver can simply call up the best route to the designated storage area by inputting the GPS coordinates. Navigating by GPS helps reduce many wrong turns onto forest roads which could be difficult to negotiate. Thanks to new technology, instruction by forestry personnel concerning the stacks of timber is no longer necessary.

## **Wood – environmentally friendly**

In comparison to mineral and fossil raw materials such as iron, aluminium or oil, wood has fundamental advantages: it continues to grow where we live, the wood industry has been safeguarded against any crisis in Germany, it creates regional employment and its use boasts a fantastic life cycle assessment.

As trees grow, they absorb carbon dioxide from the air and create wood from carbon. The sun provides the energy for this. Once the wood has been used, burning or rotting emits the same amount of CO<sub>2</sub> into the atmosphere. This provides a far-reaching climate neutral carbon cycle.

The sustainable use of forests supports the aims of climate protection in many respects: forests with the right ratio of young trees absorb environmentally unfriendly CO<sub>2</sub>, thereby clearing the atmosphere from greenhouse gases. The use of timber as a building and construction material augments this carbon storage effect. By using timber to construct houses or by choosing wooden furniture, everybody can play their part in climate protection.

Moreover, wood can be used as a substitute for other building and construction materials, whose manufacture, use and disposal is more harmful to the environment e.g. aluminium, steel and concrete. It can be used as a substitute for fossil fuels, thereby further diminishing the output of greenhouse gases.

## **Timber Industry – an Underrated Giant**

**Two cubic metres of timber are replenished every second in German forests.** That amounts to over 90 million newly grown cubic metres of timber per year. Only about two thirds of this timber is used. With 3.4 billion cubic metres, Germany has a larger supply of timber than, for example, Finland or Sweden. Moreover, as a result of sustainable forest management, forested regions in Germany have grown by 9% since 1961.

**The timber industry is thriving.** The forest and timber industries in Germany are not only important for climate protection, nature conservation and our recreation but they also play an important economic role. The business sector of the forest and timber industries employs around 1.3 million people, comprises over 185,000 enterprises and makes annual profits of 180 billion Euros. The German forest and timber industries have more employees than the car industry and a higher turnover than the electrical and the mechanical engineering and construction industries.

### **Timber – important for rural small and medium-sized businesses**

The timber trade comprises not only a few large timber, wood pulp and paper industries but a very large number of small and medium-sized enterprises e.g. sawmills, the timber trade, the furniture trade and the prefabricated building industry as well as carpentry and cabinet making. For the most part, these are self-run family businesses, which are located in rural, structurally weak regions.

## Forest Diversity Generates Diverse Use

Wood is a natural product and is, therefore, very versatile. The location and age of the harvested tree affects the form and appearance of the different types of timber. This results in a very wide range of biological, chemical, technological and visual characteristics of wood, which can be fully utilized: There is the correct timber and the correct type of timber for each product. At the same time, new operational procedures and technical innovations enable timber to be employed for a wider range of uses and to and develop further uses.

Type of tree	Particular characteristics	Potential use	Pictures showing how wood is employed
Spruce	- Relatively light Strong and flexible	- Timber for building and construction - Woodchip - Paper	Roof truss, newspaper
Fir	- Similar to the spruce - No resin - Resistant to acids and alkalis	- Manufacture of containers for the chemical industry - Sluices - Water wheel buckets, - Timber for building and construction	Water wheel bucket?
Pine	Strong and flexible	- Profiled timber - Panels - Wooden furniture - Doors, floors - Laminated boards	Item of furniture
Douglas fir	- Distinctive stripes - Unaffected by atmospheric conditions	- Predominately: External design  - Interior fixtures	Terrace flooring
Larch	- Heaviest and hardest German wood - Unaffected by atmospheric conditions	- Timber for building and construction for bridges, hydraulic engineering and mining	Old Alpine timber house
Beech	Tough and abrasion resistant Easy to work with	- Furniture, parquet flooring and plywood As well as - Interior fixtures	Furniture
Oak	Very firm and flexible and very resistant to wear and tear	- Furniture, parquet flooring, , panelling, stairs - Extremely durable wood for hydraulic engineering (stakeposts e.g. in Venice) and ship building - Wine casks	Wine flask, Venice
Lime	Soft, not very resistant to atmospheric conditions	- Wood for carving for altars and religious statues	Wooden statue of Mary

# Timber is hi-tech

The concept of timber, as a material for construction and fuel, is nothing new. However, wood is now being used in more unexpected ways: from aerospace technology to the textile industry and the car industry. Current research into timber has made it possible to sometimes turn wood into liquid form, make it as hard as metal or as flexible as rubber.

Cellulose is a fundamental component of wood, from which chemical products such as viscose fibres, cellophane, enamel or wallpaper paste can be manufactured. Wood has even more potential applications: alcohols, phenols and many other chemical products can be obtained from wood. As raw materials become increasingly scarce in the future, wood will become even more important for the chemical industry as a substitute for petroleum products.

## **Newly developed materials and products open up new potential for wood:**

### **Viscose: woollen clothing**

Viscose is a product made from wood. It was previously also known as 'rayon'. As well as clothing, bedding is manufactured from, for example, 100% native beech. Viscose is treated in a similar way to wool. The characteristics of viscose fibres can, however, be more easily technically manipulated,

### **Wood welding**

Wood welding is a technology, in which ultra sonic waves cause a plastic spike to vibrate so much that it is liquefied and penetrates the wood's pores. This type of bonding is extremely durable. This leads to totally new prospects for timber: Bonding metal and wooden components, which until now had a drying time of 20 minutes for the glue, now has a 'waiting time' of only 20 seconds when using the welding method.

### **Thermally Modified Timber**

Thermally Modified Timber (TMT), also called thermoplastic wood, is manufactured using thermal treatment methods. The durability of the wood is enhanced by thermal treatment so that, for example, beech, which is not naturally resilient with regard to atmospheric conditions, can be used externally in the same way as more resistant teak.

### **Wood-Plastic-Composites**

Wood-Plastic-Composites, WPCs, are made of wood and synthetic plastics and additives. Using thermal treatment methods and pressure, they can be moulded in the same way as (petroleum-) plastics. In comparison to the petroleum-based products, WPCs use cost-effective and sustainable raw material. In contrast to solid wood, they are easier to manipulate and moisture-resistant. Floor coverings for outside areas and the furniture and car industries are just some examples of where WPCs are used.

### **Liquid fuel from wood**

Leftover wood is one source which can be used to manufacture Biomass-to-Liquid fuel. At present, the different manufacturing procedures are still very expensive and, when set against conventional heating methods, the use of wood is less energy efficient.

## **Wood man**

Quality of life is enhanced by using wooden products in everyday life. They are our future because they release us from dependence on fossil fuels, protect the climate and provide for our wellbeing.

We sleep in wooden beds and enjoy warm wooden floors and hot showers, powered by wood heating systems. We enjoy the feel of viscose on our skins, without even being aware of its origins. The aroma of our morning coffee wafts over from an ash table, bread and smoked salmon from the wooden stove spoils us with its aroma of beech. Where would we be without the morning paper? How would we have newspapers without the wood we obtain by forest thinning? Even taking the dog for a walk along forest transport paths is made possible by forestry.

Without wood, how could we relax of an evening in our sauna manufactured from water-resistant thermally modified wood? And is there anything better, than sitting beside the fire with a glass of oak-matured red wine listening to a violin concert? Classical music without wood? Unthinkable! The whole scenario played out in a timber-framed house with the perfect living environment? Unbeatable!

Cellophane, parquet flooring, pencils, bricks, tool handles, terraces, blouses, yoghurt pots, wall insulation, sailing yachts, wallpaper paste, carts, rocking chairs, doors, windows, elephant houses, beds, vehicle floor panels, pellets, mobile phone fascias, living room cupboards, wooden spoons, wine casks, snowboards, roof trusses, cardboard boxes, summer houses, books, pianos, warmth, feeling: Everything is wood – wood is everything.

**Sustainable use of wood in Germany  
good for people,  
good for the climate,  
good for nature.**