

From Lumberjills to Wooden Wonders

**A miscellany of interesting facts about
trees, wood, forests and their
connection to everything else**

By Mikael Grut

Wimbledon, England, 2017

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Acknowledgements

This book would not have seen the light of day if my daughter Vicky Grut had not helped me knock its far-flung material into shape, and assisted me throughout with valuable advice; she also suggested the title. My wife's enthusiasm for my task spurred me on. Many friends contributed interesting information, often on subjects on which there are no written sources: Shelton Davis, Harry Haigh, Nancy and Don Johnson, Christian Keil, Robert Leffingwell, Ralph Pemberton, Joanne Petrie and Simon Rietbergen.

I also wish to thank Methuen Drama, an imprint of A&C Black Publishers Ltd, for allowing me to quote from Anton Chekhov's 'Uncle Vanya', translated by Michael Frayn; and Dr Alison Sheridan at the National Museum of Scotland for providing me with information on the Ballachulish figure.

Abbreviations and Terms

* (asterisk)	'see that entry'
billion	thousand million
cf.	compare
CO ₂	carbon dioxide
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
ha	hectare (10,000 m ² ; 2.471 acres)
m	metre (3.28 ft.)
m ²	square metre (m ² ; 10.76 sq.ft.)
m ³	cubic metre (m ³ ; 35.3 cubic feet)
NE, NW, SE, SW etc.	north-east, north-west, south-east, south-west etc.
NGO	non-governmental organisation
spp.	species (plural)
sq. km	square kilometre (km ² ; 100 ha, 0.386 sq. miles)
ton	= tonne = metric ton = 1,000 kg = 2,205 lb
conifer = softwood	
broadleaved = hardwood = non-conifer	
deciduous = leaf-shedding	

Preface

This book could hardly be more timely. In 2009 the world's politicians, negotiators and administrators prepared for the Copenhagen Conference in December of that year to develop an international agreement replacing the Kyoto Protocol and seeking ways of reducing the threats of climate change.

At the same time the politicians, the non-governmental organizations, the media and the public at large have come to recognize the significant role that forests, woodlands and trees play in the processes of macro- and micro-climatic stabilization. In addition these forests, both natural and planted, contribute to the supply and quality of water for humans, livestock and wildlife; the maintenance and improvement of soils, and the conservation of the biological diversity of countless plant and animal species. These ecological benefits are additional to the commonly recognized socio-economic values of employment and income generation from the production of wood, fuels, food and pharmaceuticals.

The increasing awareness of forest-related issues in the last decade has prompted the publication of many books, scientific papers and official reports that deal with individual or collective aspects of these roles of forests and trees. However, Mikael Grut's contribution is not simply another one of these publications. It is a collection of descriptions and definitions of more than five hundred terms and subjects selected by the author as interesting to himself but clearly of global interest. It covers truly a miscellany of facts and for most of them it includes historically fascinating facts and relationships.

To take just two subjects from the first letter of the alphabetical arrangement, did you know, for example, that the alder tree provided the red-paint used by Lapp people or that the former capital of Kazakhstan was named Almaty or 'Father of apples' after the many apple trees there? These and the hundreds of other facts in this book make fascinating reading for a wide audience; it is the sort of book that can be dipped into at random for simple enjoyment or searched systematically for hard information on specific topics.

I have known the author of this book, Mikael Grut, for many years as a professional colleague working with national and international agencies in many developing countries. He has always brought his wide knowledge, experience and interest to the task of forest management in a wide range of forest types and socio-political conditions. His gentle approach to politicians, managers and local communities alike has been a fundamental asset in the preparation and conduct of projects of different types. His writing is always immaculate as demonstrated in this book; overall it shows his total dedication to the management of our natural resources and to his desire to share historical facts and traditions in a highly readable manner.

Professor Jeffery Burley, CBE
Director-emeritus, Oxford Forestry Institute
2011

Introduction

This was published as a book in 2012 (ISBN 978-1-907741-10-4), but it is now out of print. For an explanation of the title, see the entries on 'Lumberjills' and 'Mosquito' below. The book was written for entertainment.

Alphabetic Entries

Acid rain

Sulphur dioxide and nitrogen oxide produced by burning oil and coal react with gases in the atmosphere to produce sulphuric acid and nitric acid which come down as acid rain, often in another country. As the soils of both the northern coniferous forests and the moist tropical forests are generally acid already, i.e. have a pH below 7, the result of acid rain is to reduce the productivity of such forests, besides harming the fish in the lakes. On the other hand, alkaline soils, often derived from limestone, may be improved by acid rain making their pH more neutral. The acid rain problem of the 1970s has been largely overcome by reducing the emission of the offending gases.

Acoustic properties of trees

Trees can reduce noise in two ways:

1. By their sound-*absorbing* or muffling capacity; and
2. By the fact that 'white noise' like the rustling of tree leaves, e.g. of species like poplars, *masks* other sounds.

Adirondack Forest Preserve

Created in 1892. These 810,000 ha of spruce, hemlock, pine and hardwoods in the Adirondack Mountains in northern State of New York are today thought of as pristine wilderness, but this area was in fact largely deforested during the 19th century for farming and to produce charcoal for the steel industry. This shows two things: how resilient forests

can be, and how the so-called virgin forests have in fact often been influenced by man, even early man. Cf. *Amerindian forestry* and *Shenandoah National Park*.

Aeneas of Troy

Before the Trojan hero Aeneas, reputed ancestor of the Romans, cut trees to build the fleet that carried him to Italy, he obtained permission from the goddess Cybele, a nature goddess of Phrygia* in Asia Minor.

Afforestation

‘Afforestation’ means the establishment of a forest on an area from which forest has for a long time, or always, been absent. The more unusual term ‘arborisation’ means increasing the number of trees in an area, but not necessarily in the form of forest: it could also be in the form of windbreaks or single trees. Afforestation and arborisation can be by means of natural or artificial regeneration, and the latter can be by planting or sowing.

Afromontane forest

Closed temperate rain forest occurring from sea level (so the suffix ‘-montane’ is sometimes a misnomer) near the towns of George and Knysna* in the Western Cape Province, South Africa, to an elevation of up to 3,000 m in East Africa.

Agent Orange

A variant of the herbicide 2-4-5T. Used as a defoliant during the Vietnam war. According to a 1995 report by the World Bank, ‘Bombs, herbicides, and the use of heavy machinery destroyed about 4.5 million ha of forest’ in Vietnam during the 1961-75 war. Agent Orange formed the bulk of the more than 55,000 tons of chemical defoliants dropped on the states of former Indochina during this war. Its use led to many birth defects in Vietnam. A study in 2003 showed that Agent Orange still contaminates livestock and fish eaten by Vietnamese. It was an early example of chemical warfare.

The use of Agent Orange is contrary to the international law of war which stipulates that weapons whose effects outlast the conflict should not be used.

See also the entry *Warfare and trees*.

‘Age of Wood’

The centuries before 1750 are sometimes called the ‘Age of Wood’, as the 19th century is called the ‘Age of Coal’ and the 20th century is called the ‘Age of Oil’. In all three cases it is the main source of energy which has given rise to the appellation. In Europe and North America it was especially the smelting and forging of iron for which huge quantities of wood were consumed, and this led to a virtual wood famine in some countries, including Britain. When, in the second half of the 18th century, people learnt how to use coal instead of wood and charcoal in the furnaces and the forges, the pressure on the forests was alleviated, and the Age of Wood passed into the Age of Coal.

The Stone Age, too, could justifiably be called the ‘Age of Wood’, because wood was then not only the main source of energy, but also the main material for building and tool handles, although it is the stone implements which have survived. See also *Iceman*.

Agony shoots

Suppressed beeches, before they die, cover themselves over and over again with epicormic shoots (shoots which emerge from dormant buds on the surface of a tree), sometimes called ‘agony shoots’ because they give the impression that the tree in its death agony tries to save itself by means of such substitute shoots.

Agroforestry, agro-silvo-pastoralism and silvo-pastoralism

These terms mean a combination of forestry with agriculture and/or grazing on the same piece of land. Forest grazing has always been important, and it still is in places like the Forest of Dean in SW England; in the Navajo Indian Reservation in the American West; in the savannas of the tropics; and in some very heavily thinned stands of radiata pine in New Zealand. Pig-feeding used to be very important in the oak and beech forests of Europe (see *Pannage*).

Agriculture under forest trees is found in widely spaced poplar plantations of Europe, under the savanna trees of the tropics, and in the case of the cacao, coffee and bananas grown under the trees of the tropical moist forest. The slash-and-burn* agriculture which existed in northern Europe until fairly recently (see *Sweden*), and which is still the predominant form of agriculture in many parts of the tropics, is a form of serial agroforestry where periods of agriculture are followed by periods of bushfallow*.

Agroforestry is sometimes used as a Trojan Horse for deforestation. I remember visiting a forest reserve in Ghana where some civil servants had been given permission to practise agroforestry in part of the reserve, but agriculture was more profitable than forestry so the forest had been converted to almost pure agriculture, with only a symbolic tree left here and there. Cf. *Dehesa*, *Farmed parklands* and *Montado*.

Air pollution

Air pollution was a serious problem in forestry already in the 19th century in the heavily industrialised areas of what is now the Czech Republic and other parts of central Europe. Foresters at the time ascribed it to the sulphur in the industrial smoke, and asked the authorities to impose emission standards, but to no avail.

Resistance to air pollution is a particularly important characteristic in tree species used in urban forestry, where car fumes and, in summer, ozone have replaced coal smoke as the main pollutant. The following species are reputed to be particularly resistant to air pollution: London plane (*Platanus acerifolia*), black locust (*Robinia pseudoacacia*), Corsican pine (*Pinus nigra var. maritima*), maidenhair tree (*Ginkgo biloba*), tree of heaven (*Ailanthus altissima*), and honey locust *Gleditsia triacanthos*).

Cf. *Acid rain*, *Carbon dioxide*; *Forest damage*, *forest death*; *Global warming*, and *Ozone*.

Alamo

Alamo, the name of many towns and rivers in Spain and the Americas, including the town in Texas where the 1836 battle between Mexicans and ‘Anglo’ settlers took place, means ‘poplar’ in Spanish.

Alder (*Alnus spp.*)

Often grows along water courses. The nitrogen-fixing properties of alder make it a soil-improving species, and the natives in the mountains of Taiwan traditionally planted *A. formosana* on exhausted land in order to restore its fertility. The European (common or black) alder sheds its leaves in autumn when they are still green and rich in nitrogen, and this nitrogen then enriches the soil in the form of leaf mould and other forest litter*.

European alder is indigenous to Britain, and to a very wide area from Ireland in the west to Siberia in the east, and from Scandinavia in the north to North Africa in the south.

It is the only indigenous nitrogen-fixing tree in Britain. It grows fast, produces a good timber, but is underused. It could be used in the flood plains, instead of the new urban developments which are so often foolishly placed there.

The blood-red paint formerly used by the Sami (Saami, Same, Lapp) people to paint images on their *noaidi* drums was made by chewing alder bark. *Leppä* is an old Finno-Ugric word which means both ‘alder’ and ‘blood’, and it is still used in the sense of ‘blood’ in certain Finnish dialects and place names.

In Washington DC the American alder is used as a street tree.

Alle(l)opathy

Alleopathy or ‘allelopathy’ is the ability of certain plant species to exude chemical substances which are inimical, or occasionally beneficial, to other plants, generally of other species. That is part of the struggle among plants for soil, water, nutrients and light. The ground under eucalypts, for example, tends to be very bare, and this is thought to be due not only to the voracious water consumption of these trees, but also to alleopathy. It is a jungle out there, and trees, too, wage their own form of chemical warfare.

Allemansrätt (Every Man’s Right)

In Sweden everybody has access to the forests, whether they are privately or publicly owned, and everyone has the right to pick wild berries, flowers (other than of protected species), mushrooms, fallen branches, and litter; but not to remove anything from a living tree, nor to leave rubbish. This right is a remnant of the custom that prevailed everywhere in Europe before the feudal period. Today the old feudal rights or restrictions of the landowners are being rolled back in Europe, and the forests are once again being opened up to ordinary people, but in the case of privately owned forests this opening-up is generally associated with compensation paid by the government to the private owners, as is the case in Denmark, for instance.

As a child growing up in Sweden I made full use of Every Man’s Right by roaming freely in the forests and picking blueberries, lingonberries and mushrooms, never encountering a fence, and with no idea of whose land I was on.

Almaty

Almaty, formerly Alma-Ata, was until the late 1990s the capital of Kazakhstan. In the Kazakh language ‘Almaty’ means ‘Father of apples’, the name being derived from the many apple trees in the area. The Ascension Cathedral, built in 1907, is the second tallest wooden building in the world (see also *Kerimäki* and *Saint Peter and Paul Cathedral*). It survived the 1911 earthquake with minimal damage, as wooden buildings often do because they are less rigid than buildings built of stone or concrete.

Amerindian forestry (North and South America)

Already before the European settlement, the Native Americans had profoundly affected the North American forest, mainly through their policy of frequently burning it in order to improve game habitat, facilitate travel, reduce insect pests, remove cover for potential enemies, enhance conditions for berries, and to drive game. Today the Native Americans are generally cautious forest managers. I saw this when some years ago I visited the forests of a Reservation in the American West, and the forester in charge explained their management policy to me. There is a Native American saying that ‘forests belong partly to the dead [because of burial grounds and sacred sites], largely to the living, but mostly to the unborn’. In the preparation of management plans for the Navajo National Forest on the border between Arizona and New Mexico, for example, the question is not so much which management option will yield the highest profit, but more what the forest will look like in the future. See also *Menominee forest*.

In South America too, the Amerindians have treated the forests more gently than the peoples of Africa, Asia and Europe. The Amerindians were the only mainstream people who were willing and able to live *in* the forest, and not just chipping away at its edges. Indigenous people modified the moist tropical forests of Central and South America by encouraging species which yielded fruit, nuts, medicines, and valuable woods like that of *Cedrela spp.*, as I saw in the forest around the ancient Maya ruins at Las Milpas in Belize. In a way they were forerunners of the modern view of the forest as a resource rather than an impediment. Some North and Central American tribes would ask the trees’ forgiveness before they felled them. See also *Civilization, forest*.

Amsterdam Bos (*Amsterdam Forest*)

Urban forest established outside Amsterdam during the depression of the 1930s to create jobs, which it did at that time, and to provide recreation, which it does now. When the first

plantings were felled, people got very upset, and the managers of the forest subsequently estimated that the resulting revenues did not compensate for the public's distress, so felling of mature stands was discontinued, although thinnings continue and are accepted by the public.

The managers of the urban afforestation in the new town of Milton Keynes*, England, have drawn inspiration from Amsterdam Bos. Cf. *Forest recreation*.

‘Ancient woodland’

British expression for semi-natural woodland which has been under that vegetation cover continuously for at least 400 years in England and Wales, or since 1750 AD in Scotland. Such woodlands are listed in the Nature Conservancy Council Inventory of Ancient Woodlands. In Britain the Woodland Trust* tries to buy up valuable ancient woodlands if they come onto the market. See also ‘*Old growth forest*’.

Annual ring

Where trees are subjected to a period of hardship each year, during which they do not grow, e.g. a dry or cold season, the cells formed just before this season (summerwood or high density wood) are denser and darker than the ‘springwood’ (or low density wood), and together the two bands form an annual ring. In some parts of the humid tropics where there is not a well defined dry season, there are no annual rings either. In others, where there are frequent short dry periods, several rings may be formed in one year.

Ants

Some species of acacia trees in East Africa live in symbiosis with ants: the ants protect the trees against browsers and even kill competing seedlings around the trees, and in return the trees provide them with certain foods.

Aranyakas

Aranyakas (Sanskrit for ‘books of the forest’ or ‘books studied in the forest’) are Vedic texts from 800-600 BC. They were intended to be studied by hermits who had retired to the forests, or by students who were instructed by teachers in the seclusion of the forests.

Arboglyphs

Arboglyphs are letters and drawings carved on trees. The American writer J. Mallea-Olaetxa has spent more than two decades studying and recording such carvings – made in many languages – in the American West. Most of them were made by Basque immigrant shepherds, and the arboglyphs provide us with information about their solitary lives.

Arboretum

Systematic collection (botanical garden) of different species of trees, laid out individually or in plots. An arboretum containing trees of only one genus might be called after that genus: e.g. a collection of pine species would be a ‘pinetum’.

Arboriculture

The growing and tending of individual trees, rather than of forests. The word is derived from the Latin *arbor*, meaning tree. Most arboriculturists work with park, garden and street trees. See *Urban forestry*. Conventional foresters like trees with thin branches and straight stems, whereas arboriculturists like the opposite, big crowns and stems with a bit of character, not too straight.

Ardennes

The Ardennes or Ardenne is a well wooded highland plateau in SE Belgium (mostly), NE France and western Luxembourg. The Latin Name was *Arduenna Silva*, in which ‘Arduenna’ is thought to be of Celtic origin, and *Silva* is Latin for ‘forest’. Julius Caesar described it as the biggest forest in Gaul. In spite of the difficult terrain, the Ardennes have been the scene of many battles, during the French Revolution, the Franco-German War, and World Wars I and (‘The Battle of the Bulge’) II. The trees are full of bullets and shrapnel, which ruin saw teeth and other wood processing machines.

Ark of the Covenant

Rectangular wooden box which in biblical times contained the two tablets on which the Ten Commandments were inscribed. It is not known what happened to it, although the Church of Ethiopia claims to possess it. In Exodus 25:10-22 there are very detailed instructions for how the ark should be constructed, and in Exodus 37:1-9 there is a detailed report on how it *was* constructed.

Ashdown forest

Ashdown forest, owned by the East Sussex County Council, became the ‘Hundred Acre Wood’ where A.A. Milne’s characters Winnie the Pooh, Tigger and Eeyore lived. It has an area of about 2,600 ha and it is situated between Tunbridge Wells and Haywards Heath.

As(h)wattha

The sacred tree of Hinduism. See Chapter XV of the Bhagavad-Gita, ‘Devotion to the Supreme Spirit’:

‘There is a fig tree
In ancient story,
The giant Ashwattha,
The everlasting,
Rooted in heaven,
Its branches earthward:
Each of its leaves
Is a song of the Vedas,
And he who knows it
Knows all the Vedas.’

The Ashwattha has been compared to the Yggdrasill*.

Askr and Embla

In Norse mythology Askr (meaning ash tree) and Embla were created by the gods from tree trunks found on the sea shore, and they became the first human beings, the equivalents of the Bible’s Adam and Eve. ‘Asker’ is still used as a first name in Scandinavia.

Assart

‘Assart’ is an old English word for forest clearing, from the French agricultural term *essarter*, meaning ‘to grub up’. The Medieval English court records are full of references to fines paid by peasants for assarts in the king’s forests. It seems to have been like a payment for a licence, for once the payment had been made the peasant was left in peace to harvest the crop on his clearing.

Ballachulish figure

A figure of a woman, carved of alder with inset quartz eyes, from between 800 BC and 400 BC, unearthed in 1880 near the village of Ballachulish in west Scotland. Now in the collections of the National Museums of Scotland. When found, the statue was 1.44 m high, but it has since shrunk. It is sometimes called the Ballachulish ‘goddess’, but it is not known if it had religious significance.

Since 1840 about half a dozen anthropomorphic wooden carvings have been found in Britain and Ireland, and they have been dated to between ca. 3000 BC (older than the pyramids!) and ca. 350 BC. Most of them were made of oak, alder or yew.

Balzac, Honoré de

The French writer Balzac (1799-1850), always interested in business, discusses the economics of poplar-growing in his novel *Eugénie Grandet*. He was once involved in a forestry-related venture, namely the growing of briar wood in Corsica for the making of pipes.

Banditry

Unfortunately there is sometimes a symbiosis between forests and banditry, with forests protecting bandits and other evil-doers, and the mere presence of bandits protecting forests. See *Katyn forest*.

Bangladesh

Bangladesh is the only country which has planted vast areas to mangrove, an awkward job as it has to be done in water, usually muddy, using flat-bottomed boats. The purposes of these plantations were coastal protection, wood production (mangroves provide excellent poles and firewood), and — interestingly — to accelerate the trapping of the silt which is brought down into the delta by the Ganges and Brahmaputra rivers, i.e. to encourage a more rapid accretion of the coastline. The soil losses in the Himalayas and elsewhere in the upstream catchments, mainly in India, Nepal and Bhutan, are thus turned into new land in Bangladesh, showing that one man’s loss can be another man’s gain, except that a more rapid soil loss upstream usually goes together with more flooding downstream.

Cf. *Tsunami and Water, trees and forests*.

Barbecue

The taste of barbecued meat varies according to the species of wood used. In Kansas City, for example, famous for its barbecued meat, they prefer the wood of the pecan tree (*Carya illinoensis*), which, significantly, is also used for smoking meat; whereas in Texas they prefer mesquite (*Prosopis spp.*) and oak (*Quercus spp.*).

The word 'barbecue' comes, via Spanish, from the Haitian Taino (Arawakan Indian) word *barbaca*, meaning wooden frame on posts.

Baseball bats

A particularly good wood for making baseball bats is that of white ash (*Fraxinus americana*), which is widespread in eastern North America, from the Gulf of Mexico to SE Canada.

Beam

The word 'beam' originally meant 'tree'. The word has the same origin as the German *Baum* and the Dutch *boom*. The word also occurs in the species name 'hornbeam'.

Beaver

The beaver (*Castor spp.*) is a forest animal which fells saplings and even big trees for its building of dams, islands and lodges, as well as for its food of buds and inner bark (cambium). As the forests of Europe were cleared for agriculture, the beavers almost disappeared, although their number is now increasing again. In 2006 a pair of Eurasian beavers was reintroduced into Scotland as a trial.

Beehive-shaped or corbelled stone buildings

Beehive-shaped traditional stone buildings are found in many parts of the world where there is a scarcity of wood. With such buildings the roof and the walls are held in place by lateral opposition and gravity, without the need for timber. Examples are the *clocháns* of Ireland, the *brochs* of Scotland, the *trulli* of Puglia or Apulia, the *girna* of Malta, the *nuraghi* of Sardinia, and the corbelled stone houses in the Hantam Karoo area of the Northern Cape, South Africa.

Belize

The country of Belize originated as a forest logging concession. By treaties signed in 1763, 1783 and 1786, Spain granted British subjects the privilege of exploiting logwood (*Haematoxylon campechianum*, from which a black dye was derived) in specified areas of what is today Belize, although Spain retained sovereignty over the area. During the wars of independence in Latin America the area somehow became British, although that is still contested by Guatemala next door. The majority of the people speak Spanish at home, but the official language is English. First it was called British Honduras, then Belize after the river that flows through it. Today Belize's coat of arms contains a picture of a mahogany tree.

The area which today constitutes the country of Belize was once part of the Mayan empire, and it then probably had a higher population density. Cf. *Civilization, forest*.

'Beyond the pale'

'Outside the bounds of acceptable behaviour' (Oxf. Dictionary). 'Beyond the palisade*' would have been more meaningful, a 'palisade' being a fence made of wooden pales, poles or stakes. The historical origin of the expression is the 'pale of settlement' in 18th century Russia, separating the areas where Jews were allowed to live, from other areas; and in 12th century Ireland to separate areas where the English rule was most secure from those where it was less secure.

Białowieża forest

A remnant of the primeval forest of mixed conifers and broadleaved species which once covered the great North European plain. Situated on the border between Poland (63,000 ha) and Belarus (75,000 ha), it has been designated a 'biosphere reserve' by UNESCO. The European bison (wisent), a forest animal, survives here. Until recently it was also the home of the European wild horse, the tarpan, which has been re-introduced in a 'back-bred' form.

The meeting in December 1991 between the presidents of Russia, Ukraine and Belarus, at which it was decided to disband the Soviet Union, took place in a hunting lodge on the Belarus side of Białowieża forest.

Biggest trees

The biggest of all living things in bulk, though not in height, are the trees of the species *Sequoiadendron giganteum* on the western slopes of the Sierra Nevada range in California. The biggest of the big trees in volume is the ‘General Sherman’ in the Sequoia National Park, which has a circumference of 31 m at breast height (i.e. a diameter of 9.9 m), a height of 83 m, and an estimated weight of 6,200 tons.

Big trees in general are recorded by the *Tree Register of the British Isles* and, in the United States, by the *National Register of Big Trees*.

Biodiversity

A contraction of the words ‘biological diversity’. A rich gene pool is to the advantage of humankind, especially now that gene-splicing has become possible. Some species which today seem pretty useless, may one day prove invaluable. Monterey pine (*Pinus radiata*) was one such species: a small unimpressive wind-gnarled pine in its home in the Monterey peninsula in California, where its poor performance is probably due to a reduction in rainfall over the millennia, it grew wonderfully straight and fast, and produced an excellent wood, when planted in Chile, New Zealand, Australia and South Africa.

Biomass

The biomass on an area of land is the total dry weight of living tissue on it, i.e. the weight of stems, branches, twigs, leaves, bark and roots. The total biomass of mature temperate broadleaved forests is about 190-380 tons per hectare, of which about a fifth is underground. Cf. *Carbon dioxide*.

Birling (logrolling)

A North American outdoor sport developed by the lumberjacks who used to float the logs downstream: two opponents stand on a floating log and spin it around so as to make the competitor fall off.

Black Death

Analysis of pollen and leaf remains from lake beds in Europe indicate that the Black Death (1347-51) was followed by an increase in forest areas, as trees sprang up on the abandoned

farms. It has been suggested that this in turn led to the ‘Little Ice Age’ in Europe from the beginning of the 16th until the middle of the 19th century because the new trees absorbed so much carbon dioxide – in the same way that an increase in CO₂ leads to the reverse effect: global warming*.

Black Forest, Arizona

A remarkable area of petrified trees, about 170 million years old, situated in the Petrified Forest National Park, which in turn is situated in the ‘Painted Desert’, south-east of the Grand Canyon. Cf. *Petrified Forest Park, Lesbos*.

Black Forest (*Schwarzwald*), Germany

Germany’s largest continuous forest. Situated in the south-west of the country, east of the Rhine River and of the city of Freiburg, in the *Land* of Baden-Württemberg, it occupies an area of about half a million hectares. According to the Institute of Forest Growth at the University of Freiburg the average volume of wood per ha in the forest in 1996 was higher than at any previous time since measurements began a hundred years ago. So much for ‘forest death’ (*Waldsterben*).

Cf. *Bombing*.

‘Blockhead’

The word ‘blockhead’ for ‘stupid person’ comes from the wooden ‘heads’ on which wigs used to be placed when not in use.

Bodger (chair bodger), bodging

‘Bodging’ means to work green (wet) wood. It dates back to the iron age. A ‘bodger’ or, to use the full name, ‘chair bodger’, is a Buckinghamshire term for a chair-leg turner, especially those working for the furniture industry in High Wycombe*. Sometimes these artisans did the bodging in the forest, using a temporary contraption for wood-turning: a springy tree like a young birch would be bent and a string tied from its top to the earth, becoming like a vertical lathe. For more information, visit the Local History and Chair Museum in High Wycombe.

Bog oak

Local name for the oak, yew and pine logs found in the peat of the Fens in Cambridgeshire, from the time after the last ice age when this was dry land covered by forests. Since then the sea level has risen by more than 100 metres – more than a metre per century, more than it is expected to rise during this century – and the Fens have become a wetland. The bog oaks are being studied by the Great Fen Project.

Bokstav

The Scandinavian word for ‘letter’ (of the alphabet) is *bokstav* (Swedish variant), which means ‘beech staff’, presumably indicating that beech wood was once used for writing-tablets; the runes, with their angular form and straight lines, look as if they had been developed from and for inscribing in wood. Cf. *Vindolanda writing tablets*.

Bombing

During the second world war, both sides considered bombing the enemy’s forests. After the war had broken out in the autumn of 1939, but before the vast bombing of British and German cities had begun, a member of the House of Commons in London suggested that the Royal Air Force should set the Black Forest ablaze with fire bombs. The Air Minister, Sir Kingsley Wood, said in an agitated voice: ‘Are you aware of the fact that it is private property? Next you will ask me to bomb Essen!’. How things changed.

On the other side of the world the Japanese bombed the forests of Oregon in 1942, hoping to set off vast forest fires and force the American government to withdraw some of its fleet to defend its Western Coast. The bombs did start some forest fires, but not big ones.

Bonsai

The bonsai miniaturization of trees is caused by an unfavourable environment, natural or man-made. The word is Japanese, but the art of bonsai originated in China more than a thousand years ago. Some of these awe-inspiring miniature trees can be hundreds of years old. Most are conifers. Sometimes they are grown from young trees already dwarfed by inhospitable growing conditions, at other times they are grown from normal seedlings. But in both cases the bonsai effect is achieved by radical methods of root pruning and the use of a nutrient-limited growing medium. The United States National Arboretum in Washington DC has a magnificent bonsai collection. In Swaziland, African hawkers along

the main road north of Mbabane in the 1990s began selling bonsai-like plants taken from the bleak and inhospitable mountain crests in that area.

Boom, bust, and deforestation

In some developing countries, deforestation decreases during times of economic boom, such as in Brazil in the 1970s, because slash-and-burn agriculture in the forest is a very hard way to earn a living, and a factory job is much preferable; and it increases during times of economic downturn, as in Brazil in 2008 and in South-East Asia in the late 1990s, because people unable to find other work turn forest into farms in search of survival . Cf. *Deforestation*.

Boreal forest

The huge boreal forest is located in the northern latitudes of North America, Northern Europe and Siberia, south of the tundra and north of the belt of broadleaved forests. Most of the latter have now been cleared, generally for agriculture. Because of its relative homogeneity and its proximity to the main industrial areas of the world, an enormous wood industry has been developed on the basis of the boreal forest, which consists mainly of conifers like pine and spruce, but with an admixture of birch, aspen and some other non-conifers. As there was a fairly recent (in geological terms) land connection between northern Europe and northern North America, many of the animal species in the boreal forest are the same in the two continents, e.g. the elk or (US) moose (*Alces alces*), the grey wolf (*Canis lupus*), the lynx (*Felis lynx*) and the reindeer (*Rangifer tarandus*). Cf. *Taiga*.

Botanical names and classification

A botanical name consists of the name of the genus, written with a capital initial letter, and the name of the species, both in Latin. E.g., *Pinus sylvestris*, Scots pine. A group of genera form a ‘family’, and a group of families an ‘order’, and so on up the taxonomic tree until we reach the ‘phylum’ and then the ‘kingdom’ or ‘realm’. The names of the genus and the species are written in italics, because they are in a foreign language, Latin.

Names of plants are constantly being changed. Botanists can be divided into the ‘splitters’ who argue that an existing species should be reclassified as two, and the ‘lumpers’ who argue that two existing species are in fact one. The rate of change is likely

to increase in the future as DNA analysis allows classification according to descent rather than floral characteristics – see *Linnaeus*.

Bow and arrow

Wood was the material used for early mankind's most important technological breakthroughs: the kindling of fire, the bow, the wheel, the plough and the man-made dwelling.

The bow was invented more than 30,000 years ago, when modern man had already appeared on the world stage. It is shown in the rock paintings in Cueva de los Caballos near Albocácer in eastern Spain. Early bows were always made from wood. Only later were materials like bone and steel also used. During the Stone Age, arrows in northern Europe were usually made from the wood of ash, hazel or pines.

In the medieval period, the favourite material for the 'English' longbow, which was probably invented in Wales, was yew. This wood was relatively plentiful in Britain because it had been a holy tree to the Celts during pre-Christian times and was then adopted by Christians as a churchyard tree, although the best yew wood for the longbows was actually imported from Spain. The longbows were made from the part of the yew trees which contain both sapwood and heartwood. The former was used on the outside (convex side) of the bow, because sapwood is an excellent resister of tension, whereas the heartwood was used on the inside (concave side) of the bow, because it is an excellent resister of compression. In 1982, 138 English medieval longbows were found in very good condition in a sunken ship from the early Tudor age, and they greatly increased our knowledge about that weapon.

Brazil

The country was named after brazilwood, *pau-brasil*, *Caesalpinia echinata*. The name of the wood, and thus of the country, is derived from the Portuguese word *brasa*, meaning 'live coals', referring to the red dye derived from the wood.

French traders in search of brazilwood trespassed on the young Portuguese colony, which led to the French establishing a colony called *Antarctic* (sic) *France* near where Rio de Janeiro is situated today. It took two years, 1565-67, to expel them. Dyewood was a serious business in those days when cheap synthetic dyes were not yet available— see also *Belize*.

Bread-baking

In the Mediterranean region pine branches are considered the very best fuel for baking bread. That is why one sees so many pines there which have been deprived of nearly all their branches, leaving only a small tuft of a crown, even in areas where fuelwood is not normally used any more.

Broadest trunks (stems), Trees with

Not counting the composite stems of certain tree species like aspen, banyan and yew, the biggest diameters — over 11 m — have been recorded for the baobab tree (*Adansonia digitata*) of Africa.

Broceliande

Magical forest in Brittany, mentioned in the legends of King Arthur; visited by the knight Sir Gawaine.

Buddha

The crucial events of the life of the Buddha, Siddhartha Gautama, were closely related to trees. He was born under an asoka or sorrowless tree (*Saraca indica*). He ate his last meal before his great enlightenment seated under a banyan tree (*Ficus benghalensis*). The remainder of that day he spent in a grove of sal trees (*Shorea robusta*). In the evening, then seated under a pipal (peepal) or asvattha tree, now known as a bodhi or bo tree (*Ficus religiosa*), he attained enlightenment, after which he spent the rest of the night in deep meditation under the tree. ‘Thus was Buddha enabled to retain possession of the tree with all its knowledge and wisdom.’ That was at Gaya, in the state of Bihar, where there is today the temple of Mahabodhi, much disputed between Hindus and Buddhists.

When Buddha felt death approaching, he lay down on a couch between two sal trees in the park Upavattana near the town in Uttar Pradesh which is today called Kasia. When asked why he preferred to die in a park and not in town, he said that he considered the park more eternal.

A saying attributed to Buddha is: ‘A tree is a wonderful organism ... it gives shade even to those who wield an axe to cut it down’.

Bukovina

Territory in SE Europe between Moldavia, Transylvania and Galicia, and belonging partly to Romania and partly to Ukraine. The name ‘Bukovina’ means ‘the land of beech woods’ in Ukrainian (*Bukovyna*).

Bulwark

The word ‘bulwark’, i.e. a defensive wall, is derived from the word meaning the ‘bole’ of a tree.

Bunyan, Paul

Giant lumberjack of American folklore. The subject of poems by Robert Frost and Carl Sandburg, and an operetta by W.H. Auden and Benjamin Britten. According to the legend, Paul Bunyan lived in the forests of northern Minnesota. He was taller than the tallest trees, and lakes formed in his enormous footprints. He had a crew of other giant loggers, all called Elmer, and he had a pet ox called Babe.

Burning

Small controlled fires are sometimes run through forests in order to encourage regeneration, and to forestall the build-up of inflammable material and consequent catastrophic wild fires. Sometimes the forest is cleared and burnt for agriculture or grazing, permanent or temporary (‘shifting’). See *Amerindian forestry*, *Fire* and *Slash-and-burn shifting cultivation*.

Bushfallow

The reason why trees and bushes improve the fertility of abandoned agricultural land more than non-woody vegetation (see *Agroforestry* and *Swidden*) is that the roots of bushes and especially trees reach deeper soil layers into which the nutrients from the top soil have been leached by the warm tropical rains. These nutrients are brought up to the soil surface again by the woody vegetation, and deposited as leaves and other forest litter. In effect, the trees and bushes act as ‘nutrient pumps’. When the farmers eventually come back to the

same piece of land for a new cycle of cultivation, they cut the vegetation, allow it to dry, then burn it, and cultivate in the ashes, which contain many of the minerals which have been brought to the surface, besides adding nitrogen to the soil. Slash-and-burn* agriculture makes use of this 'nutrient pump' effect.

Buttresses

The lower parts of the stems of many rain forest species develop buttresses reminiscent of the flying buttresses which support the walls of the medieval cathedrals. They serve to stabilise these trees, which can be very tall, and which often have shallow root systems because the nutrients are concentrated to the upper soil layer.

Cable television

The making of ditches for the laying of television cables has done great harm to the roots of city trees. It is estimated that about half the broadleaved trees in Britain are in urban areas, and many of these have died or will die as a result of such ditching. The laying down of these cables has been the second biggest engineering project in Britain after the Channel tunnel, and yet an environmental impact study was not required before it could go ahead, because it was classified as a 'utility' and as such exempt from that requirement. Some cabling companies have employed arboriculturists. The National Joint Utilities Group in 1995 issued guidelines for trenching in general (not just by cable companies) near trees, but they are voluntary guidelines.

Caledonian Forest

The '(Great) Caledonian Forest' once covered an estimated 1.5 million hectares, i.e. much of the Highlands of Scotland. It was the westernmost outlier of the vast European boreal forest which once stretched from the Urals to Scotland. Remains of stumps found in the peat bogs show that the Caledonian Forest consisted of both conifers and broadleaved trees. The farmers cleared the land for agriculture and then the lairds cleared away the farmers and put sheep and deer on the land. Today less than 1% of the forest remains. It is difficult to re-establish, because the soil has changed. Another problem is heavy grazing by deer. Since 1989 the 'Trees for Life' project has been restoring part of the Caledonian

Forest in the Glen Affric area in the north-central Highlands. The long-term aim of this project is to restore 150,000 ha, i.e. about a tenth of the estimated original area.

Today the forest relic consist mainly of relatively open forests of Scots pine (*Pinus sylvestris*) in the high valleys, surrounded by often snow-covered bare mountains. It is the largest tract of old forest in Britain, with individual trees having an age of up to 300 years. Most of the large mammals which once roamed the forest — including bear — are gone; the last wolf was shot in 1743. Species today include the Scottish wildcat and the pine marten.

Deforestation in Scotland made the Scottish Parliament pass a series of anti-deforestation laws from 1424 onwards, gradually raising the penalties until in 1587 the offence of ‘wilfully destroying trees’ was punishable by death. Cf. *Scotland*.

‘Campfire’

Name of an approach or programme developed in Zimbabwe whereby the villages around a national park or game park can share in the revenues from that park. This approach naturally makes local people more interested in participating in the protection of the park. Most of the revenues are derived from the animal resource by means of hunting or photo safaris, but they could also be derived from the tree resource by means of timber, fuelwood, charcoal, and building poles.

In East Africa, where total protection of the fauna is attempted, instead of sustainable use as in Southern Africa, the vegetation sometimes gets devastated, especially by the elephants, and the animals suffer and die of hunger.

Carbon dioxide (CO₂), carbon credits, carbon sequestration

Growing trees *absorb* carbon dioxide (CO₂), one of the greenhouse gases which contributes to global warming and associated flooding of low-lying areas, whereas rotting or burning trees *emit* CO₂. A plantation therefore sequesters CO₂ as long as its growing stock (biomass) increases, and after that it keeps it locked up. Conversely, deforestation* followed by burning or rotting of wood releases carbon back into the atmosphere. In fact, net deforestation accounts for almost a fifth of all the CO₂ emission in the world. The CO₂ content of the world’s atmosphere has been increasing over the millennia, a process which accelerated with the agricultural revolution and its associated tree-felling about ten

thousand years ago, and then accelerated even more with the Industrial Revolution and the burning of fossil fuels.

Forests are the largest carbon sinks on land after the rocks, and the country with by far the largest forest carbon sink is Russia. Most of that carbon is stored in the soil in the form of peat and roots.

Carbon credits, or ‘certified tradable permits of carbon sequestration’, or ‘certified tradable offsets’, or ‘carbon offsets’ — like many new subjects, its terminology is still fluid — are credits for carbon sequestration or emission reduction. Already in 1997 a Costa Rican afforestation organisation sold credits for 200,000 tons of carbon to Norway (which has introduced a carbon tax) for US\$10 per ton, i.e. for a total of US\$ 2 million. The cost of reducing the carbon emissions of Norwegian industries would have been much higher than US\$10 per ton of carbon. Of course the emitted carbon could also have been sequestered by treeplanting in Norway itself, but that too would have cost much more than US\$10 per ton, considering the higher labour cost and slower tree growth in Norway.

In order to qualify for carbon credits, a plantation or a forest conservation scheme must have carbon sequestration as its primary function. On the other hand logged forests can sequester more carbon than unlogged forests, because in the latter the trees sooner or later fall over, rot and emit CO₂, whereas in the logged forests the old trees are converted to forest products, many of which have a long life ahead of them before they too rot or burn. Some form of commercial management is therefore beneficial in the long term.

A school of thought in the developing countries has it that the West’s preaching about forest conservation is a neo-colonialist plot to ensure that its own output of carbon dioxide is absorbed. However, the West’s preoccupation with the forests of the developing countries predates the global warming scare.

Cf. Energy plantations, Global warming, Ice ages.

Castanets

Castanets are traditionally made from wood, although ivory, metal, terracotta, and mother-of-pearl have also been used. Castanets figure in ancient Egyptian art, e.g. in the rock tombs of Meir and the reliefs at Gizeh, and also in the art of classical Greece. They are used in Indian folk dancing, in China, in Japan, and in many other countries, but today we tend to associate them with Spanish dancing.

The word ‘castanet’ is derived from the Spanish word *castaña*, meaning ‘chestnut’, either because they are sometimes made from chestnut wood or because they look somewhat like the chestnuts. The favourite wood for making castanets in Spain today is *Dalbergia retusta* from Central and South America. Like most woods it has many vernacular names, but the most common among guitarists is ‘granadillo’ or ‘grenadillo’. The dust of granadillo wood can cause dermatitis in some people. Other woods used for making castanets in Spain today are: boxwood (*Buxus spp.*), walnut, beech, acacia, sandalwood, cherry-wood, chestnut and ebony (but the latter is rather brittle).

Cattle

Like pigs*, cattle are forest animals. Archaeological evidence from the Middle East suggests that cattle and pigs were domesticated simply because the first farms were carved out of woodland. To this day, in countries like Nepal, leaf fodder for cattle is collected mainly in the forests, and in Rwanda cattle are sent in to graze in the forest during the dry season.

Celtic religion

Celtic religion, art, and poetry were permeated by tree imagery well into the Christian era. The word ‘druid’ means ‘Knowing (or finding) the oak tree’. The name is related to the old Greek word for tree, *drus*, and to the word ‘dryad’, for forest nymph. Several kinds of tree or wood were considered to have sacred properties, and the letters of the alphabet and the months of the year had tree connotations.

The druids decorated their altars with holly (*Ilex aquifolium*) leaves in winter. Mistletoe was also sacred to them, and in that context it is interesting that another semi-parasitic plant, the liana *Spiropetalum heterophyllum*, is held sacred by villagers in the highforest zone of SW Ghana. The Romans destroyed the sacred groves of the Celts because human sacrifices took place there.

Cerrado

The tropical savanna* which covers about 200 million hectares in central Brazil. It is richer in species than the African savanna. In fact, it is said to be home to 5% of the world’s animal species and 30% of Brazil’s. Today it is being increasingly converted to farmland

to feed the world, which also provides jobs for the burgeoning population. Some UK environmentalists want to dissuade the supermarkets from buying food produced in the cerrado.

Certification (green label, eco-label)

Out of the anxiety about tropical deforestation in the 1980s arose the idea of forest certification. A production forest would be inspected and, if the inspector found that it was being managed according to good forestry practice, it would be certified as such, and consumers could buy the wood from that forest with a clear conscience. There are a number of different definitions of what constitutes ‘good forestry practice’. The most important is the one developed by the Forest Stewardship Council (FSC). That Council has in turn accredited a limited number of firms and NGOs to carry out the inspections and to decide if the forest in question is being managed in accordance with the FSC Code. Once a forest has been certified, it will be inspected about twice a year, often without warning, to ensure that there has been no backsliding. If a country has a good forest law, and good law enforcement, there is no reason why *all* the forests in that country could not be certified in one fell swoop. However, deforestation problems are generally found in developing countries, and although most such countries have good laws, few have a good record of law enforcement — a weak state is almost part of the definition of underdevelopment. The vogue for deregulation during the 1980s and the 1990s (which led to the financial and economic crisis which began in 2007), and for development agencies to work with NGOs rather than with governments, has not improved the situation. Forest certification will therefore probably have to proceed on a forest-by-forest or firm-by-firm basis, although that adds enormously to the cost.

Unfortunately, consumers in America worry less about deforestation than those in Europe, and in East Asia consumers worry even less, and are unwilling to pay more for certified forest products. This means that the owners of the forests which supply these markets have little incentive to pay for certification.

Cévennes

The name *Cévennes*, for the mountain range in southern France, signifies ‘forested slopes’, although today much of the forest is gone.

Chablis

The French word *chablis* means a forest windfall. It is also the name of a well-known white wine from near the town of that name some 160 km south-east of Paris. As it is an area where close to the surface there is a layer of clay which is difficult for the tree roots to penetrate, resulting in shallow soils, it is indeed quite likely that the vineyards were established on old forest windfalls.

Charles II and Oak Apple Day

The ‘Royal Oak’ is an old oak tree in Shropshire, in which Charles II is said to have hidden from Cromwell’s forces in 1651 after the battle of Worcester. Cromwell’s soldiers were looking for him, and a royalist officer, William Carlis, suggested that he should hide in a tree. As Charles II later told Samuel Pepys:

‘Of which proposition I approving, we went and carried up with us some victuals for the whole day, viz., bread, cheese, small beer, and nothing else, and got up into a great oak that had been lopped some three or four years before, and being grown out again very bushy and thick, could not be seen through, and here we stayed all the day... While we were in the tree we saw soldiers going up and down in the thicket of the wood, searching for persons escaped.’

The original Royal Oak was killed by souvenir hunters who hacked away branches to take home. Killed by tourism you might say. However, another oak grew up next to it, from one of its own acorns, and that is today’s Royal Oak.

Oak Apple Day (also known as Arbour or Shick-Shack Day) is an old English festival on 29 May, still celebrated in some areas, which originated in 1660 to commemorate Charles’s above-mentioned narrow escape nine years earlier in the oak tree near Boscobel House. The actual ‘oak apple’ is the largest of the many galls to be found on oak trees.

Charter of the Forests

If Magna Carta addressed the relationship between England’s king and barons, the Charter of the Forests in 1217 spoke much more directly to the common people, giving them back their traditional rights to graze their cattle and pigs in the forests, and to collect wood for their own use. After the Norman conquest of England in 1066 King William had retained much of the old Anglo-Saxon law, but had introduced an oppressive new forest law,

keeping the peasants out of the forests upon which they depended for their livelihood. Successive kings had arbitrarily created more and more Royal Forests, which were royal hunting reserves with or without trees. The Charter of the Forests ‘disafforested’ many of these Royal Forests. This meant they were taken out of the king’s ownership, and made more accessible to commoners.

This charter remained very important for the next four or five hundred years. With the advent of capitalism and its stress on private ownership it was watered down, and some of the commons were enclosed, but officially it was valid until 1971 when the ‘Wild Creatures and Forest Law’ was passed. Only two copies of the original Charter of the Forests still exist, in the cathedrals of Lincoln and Durham.

Chateaubriand, François-Auguste-René de, 1768-1848

French diplomat and author; wrote that ‘forests precede civilizations, deserts follow them’.

Chekhov’s *Uncle Vanya*

In Chekhov’s play *Uncle Vanya*, 1896, the country doctor Astrov several times extols the virtues of forests in almost modern ecological terms, and deplores the ‘unnecessary’ use of wood as a fuel and for building. In Act One he says: ‘You can burn peat in your stoves, and build your outhouses of brick. I’ve no objection, anyway, to cutting the forests to meet our needs, but why destroy them? The Russian forests are ringing beneath the axe; thousands of millions of trees are perishing; the habitats of animals and birds are being laid waste; rivers are dwindling and drying up; marvellous landscapes are vanishing beyond recall; and all because man in his idleness hasn’t sense enough to bend down and pick up his fuel from the earth.’ [...] ‘Only a reckless barbarian would burn that beauty in his stove, and destroy what we cannot replace.’

It is clear that wood was still an important fuel at that time in Russia, as elsewhere. Interestingly, today it has become more ecologically correct to leave the fossil fuels in the ground and to burn wood, because wood is almost carbon neutral.

In Act Three Astrov speaks despairingly of the deforestation going on in the southern part of European Russia at the time, and says that the destruction brings no economic improvement or benefit to these ‘sick and hungry men’ who ‘instinctively, blindly, grasp at anything they can use to relieve their hunger and warm themselves, and who destroy it all without thought for the morrow’. The same is true today in many

developing countries in the tropics where most deforestation is done by small farmers in the search of land for survival – see *Deforestation*. (The quotes are from Anton Chekhov's *Uncle Vanya*, translated by Michael Frayn, published in 1987 by Methuen London Ltd.)

Chernobyl

The Chernobyl nuclear disaster in 1986 contaminated more than seven million hectares of forest in Belarus, Russia, and Ukraine. The radio-isotopes locked up in wood from this region could be redistributed over an even wider area in the case of a forest fire. Between 1992 and 2011 there were more than 1,000 wildfires in the Chernobyl Exclusion Zone, the 30 km radius area around the nuclear plant. Firefighters from the Chernobyl Forestry Enterprise fight these fires at considerable long-term risk to their health.

Chesterfield

The pronounced twist in the spire of the 14th-century parish church St Mary and All Saints in Chesterfield, Derbyshire, is due to a misalliance between wood and lead. The timber in the interior has warped over the centuries due to the intense heat inside the lead-covered spire, which today leans more than 2.5 m from the perpendicular. Local folklore has a quainter explanation, namely that the tower got twisted when it turned in amazement to watch a virgin bride enter the church, and that the spire won't straighten out unless one day it sees another virgin bride.

China

Unexpectedly, China has more forest than either Congo-Kinshasa or Indonesia. Its forest varies from boreal* in the north to tropical in the south. Besides the very considerable natural forests, there have been enormous afforestation schemes, although in the early stages they were often marked by more enthusiasm than expertise, with the result that the success rate was very low.

Chipko movement (India)

The 'tree-hugging' (the word *chipko* means 'to embrace') movement in the Himalayas in the 1970s and 1980s where the local people, especially the women, hung on to the trees in order to prevent loggers from felling them. In the Himalayas much of the animal fodder is

cut in the forests. ‘Tree-hugger’ has become a rather derogatory, or at least patronising, term for a radical forest conservationist.

Christmas trees

The Christmas tree tradition is thought to have originated in Germany in the 8th century when an English missionary suggested that the sacrifices to Odin’s holy oak should be replaced by a fir tree dedicated to Christ. By some accounts the Christmas tree is in the final resort symbolic of Yggdrasill, the universe tree of Norse mythology. Martin Luther is credited with the idea of using candles on the Christmas tree. The first Christmas trees in modern times were used in Switzerland, south Germany and Denmark (1808). By the mid 19th century the custom had become popular in Britain thanks to the influence of Queen Victoria’s husband, Prince Albert.

Christmas tree growing is a highly specialised skill. It is horticulture rather than forestry. One of the things that the grower is trying to achieve through breeding and judicious pruning is the cone shape traditionally associated with Christmas trees. Denmark is one of the biggest producers in the world of both Christmas trees and decorative coniferous foliage, much of it for the huge German market.

The Caucasian fir (*Abies nordmanniana*) is the preferred species for Christmas trees in Europe. Norway spruce (*Picea abies*) used to be the traditional choice for Christmas trees, but that species does not retain its needles long in modern centrally-heated homes; in Scandinavia, for example, the Christmas tree is not supposed to be discarded until Hilarymas Day on the 13th of January, i.e. twenty days after Christmas. The Caucasian fir looks similar and is now widely grown for this important market.

Civilization, forest

The European civilization was never forest-based, unlike the Sanskritic (see *Aranyakas*), Maya, Khmer (e.g. Angkor Wat) and even Japanese civilizations are said to have been. Even in north Europe, where forests predominated, the earliest centres of culture were in the few treeless areas: Brittany, whose temples are older than those of Egypt; Salisbury Plain in England, the west coast of Ireland, or Gotland in Sweden. The Roman legions campaigning in Germany were terrified of the forests, and with reason – see *Teutoburg Forest*. Even to the Germanic peoples the forests which surrounded them were something outside their settlements, something to be cleared for agriculture. The Bantu cultures in

Africa are also anti-forest, the forest for them, as for the early Europeans, being something to be cleared for farming, and something feared.

The Mayan and Khmer civilizations are the only sophisticated cultures which managed to establish themselves on the poor soils of the moist tropical forest zone. Both were based on intricate irrigation systems. In Belize only about one seventh of the area is cultivated today, but it is believed that a much higher proportion of the land was cultivated in the Maya times, and that today's vast open pine woodlands were induced by over-cultivation followed by repeated fires. One problem in the humid tropics is usually that the soil is leached of nutrients, acid and poor, but the old Maya lands are mostly on limestone, which counteracts soil acidity. Cf. *Amerindian forestry*.

Close-to-nature forestry

Close-to-nature silviculture and forest management was developed in central Europe at the end of the 19th century, and is becoming popular again, especially in state forests where biodiversity and outdoor recreation are important production goals besides profit. It makes sense, but nature is subtle and sometimes we misinterpret it.

Cloud forests

High-altitude rain forests in cool areas with particularly high rainfall, mists and drizzle, either in the tropics or in temperate zone. The trees are generally gnarled and stunted, held back by fog, wind and low summer temperature, and there is a profusion of lichens and mosses. Cf. *Bonsai*, *Dartmoor rain forest* and *Tree limit*.

Commons

In Anglo-American property law 'commons' are areas of land for use by the public. In Europe, until the second half of the 19th century, commons were for the use of the long-established residents in the immediate vicinity, a place where they could graze their animals and obtain wood. As such they were like a safety net for the poor.

The use of the commons was usually well regulated. In England it was the Manor Courts that decided how much produce each user could draw from the common, and when. The lord of the manor had the right to the timber and the minerals, while the commoners had the right of 'pannage' (acorns and beech nuts for the pigs), 'hedgebote' (wood for fences), 'housebote' (wood for their own buildings), and 'estovers' (fuelwood). When

these rights broke down at the end of the 19th century, together with the old agricultural system of which it had been part, it led to widespread discontent.

Community forestry

Community forestry is known as ‘rural forestry’ in Kenya, ‘village forestry’ in Tanzania, ‘social forestry’ in India, ‘collaborative forestry’ in Ghana, or ‘participatory forestry’ in many other countries. Government forestry departments were traditionally paramilitary, repressive, policing organisations, trying to excluded the people from the government-owned or at least government-controlled forests. However, there have been several reasons for seeking the cooperation of local people in recent times. In the first place, with regard to existing forests in developing countries, governments are no longer able to protect such forests against the increasing pressures from farmers and loggers (see *Deforestation*), so the local people are being asked to help protect the forests, and in return they are allowed to share in the benefits.

A second type of community forestry is when farmers in the developing countries are encouraged to plant trees. For example, people who cannot afford to buy fuelwood traditionally *collect* it; there is no way that forestry departments could afford to grow and give away fuelwood to these people, and in any case why should the rest of the population subsidize the farmers in this way, so instead they are encouraged to grow their own fuelwood. That is being done by providing them with subsidized seedlings and free extension services. In both these cases the participation of local people is thus sought. Cf. *Free-growing trees*.

Comoros

Although less than 3% of the land area of the Comoro Islands off the east coast of Africa is forest, and although about a fifth of the plants and animals in these forests are endemic, i.e. they occur nowhere else on earth, none of the forests have protected status, and between 1990 and 2005 almost 60% of them disappeared. Forest conservationists around the world: please pay attention! See also *Shade trees*.

Confucius (K’ung-fu-tzu, ‘Master K-ung’)

Chinese teacher, philosopher and political theorist, 551-497 BC. At the beginning of his career he was in charge of state parks. At his birthplace, Ch’ü-fu in today’s Shantung

Province, there is a ‘Confucian Forest’, open, bright, and full of atmosphere, with tombstones of distinguished practitioners of Confucianism through the millennia.

Conifer, coniferous

A botanical classification synonymous with ‘softwood’. Cf. *Hardwoods*.

Cooling effect of trees

The cooling effect of trees, which is so obvious to anyone who enters a grove of trees on a hot summer’s day, is due not only to their shading effect, but also to the evapotranspiration from the leaves. A mature oak can absorb 10 times the heat produced by a 1 kW electric heater. Put differently: it has a cooling effect equal to that of 5 average air-conditioning units.

Coppice, coppicing

Silvicultural system in which the crop originates mainly from the tree stumps after felling, in the form of coppice shoots. The practice was very common in Europe when fuelwood was the main production objective of the forests. Many such coppice stands were not reconverted to timber-producing high forests until the second part of the 20th century. In Westonbirt* Arboretum there is an area of hazel which has been coppiced for 600 years. In Southern Africa eucalypt pulpwood and mine props are produced by coppicing.

In Europe the coppice rotations generally varied from 7 to 20 years. The ecologists like the coppice system, which they claim increases biodiversity. From the aesthetic point of view, however, it has nothing to commend it.

Corsica

Corsica and Cyprus are the only Mediterranean islands which still have considerable forest resources, in contrast to Sicily and Sardinia, for example, where deforestation is very advanced. The Corsican Pine (*Pinus nigra* var. *maritima*) reaches huge dimensions in the forests of the interior. In England too, where it is widely planted, it has reached a height of 46 metres and a diameter of 1.44 metres. In France, the wood from the Corsican forests has a reputation for warping, and the metropolitan French wickedly say that in Corsica *il n’y a que le bois qui travaille* – ‘only the wood works (warps)’.

Crannogs

Artificial islands in Irish and Scottish lakes, serving as fortified sites for small settlements, constructed between 700 BC and 1000 AD but inhabited until the 16th century, and generally built on a substructure of brushwood and logs, and with log palisades. The name is derived from the Irish word *crann*, meaning tree or beam.

Cybele

A pine tree played an important role in the Oriental cult of Cybele or Cybere or Agdistis or the 'Great Mother of the Gods', which was one of the main cults of the Roman Empire until it was ousted by Christianity. According to legend, Attis, the god of fertility and the lover of Cybele, castrated himself as an act of repentance after having been unfaithful to her, and he bled to death under a pine tree. At Cybele's annual festival (March 15-27), a pine tree would be felled and brought to her shrine, where it was honoured as a god and adorned with violets representing the blood of Attis. Cf. *Virgin of the Pine*.

Dante's *Inferno*

Before Dante's *alter ego* entered the inferno he passed through a dark forest, *una selva oscura*, 'a savage forest, so dense and rugged, which even in memory renews my fear'. There were no torments there, although the forest was inhabited by a leopard, a lion and a she-wolf. Later, on the mountain of Purgatory, he stepped into a very different forest, an ancient one, an earthly paradise, 'the divine forest, so dense and alive'. Here again we see man's ambivalence towards forests, this mixture of fear and delight mentioned in the Introduction to this book.

Progressing downwards through ever more awful regions of hell, towards the devil himself, he eventually encountered those people were who had been 'violent against nature', a group only slightly better than those who were guilty of 'unnatural lust', but worse than the 'squanderers' (bankers?). The punishment for those who had been violent against nature was to be burned on hot sands.

Daphne (in Greek legend)

Nymph who, when pursued by Apollo, was 'saved' by being changed into a laurel tree.

Dartington Woodlands, Devon, England

Dartington Hall Foundation was always in the vanguard of new thinking, not only in the arts. In the 1930s and 1940s the British forest economist W.E. Hiley was given an opportunity to implement in the woodlands there his ideas of improving the economics of timber production by applying wider planting spacings, heavier thinnings, and shorter rotations*. Today Dartington Woodlands has moved from the economic new thinking of the 1940s to the ecological new thinking of today, and in this field the Forestry Authority (see *Forestry Commission*) has declared it a 'Centre of Excellence'.

Dartmoor rain forest

Rain forests are not confined to the tropics. Wistman's Wood on Dartmoor in SW England is also considered one. It is situated at an altitude of 400 m, and receives a mean annual precipitation of 2,000 mm. Like many high-altitude rain forests, also in the tropics, its trees are stunted and gnarled, and covered with mosses and lichens. Cf. *Cloud forests*.

Dead wood

Because it represents a fire hazard and sometimes also a forest health hazard, dead wood is avoided in production forests and plantations, but in recreational forests and woodlands those hazards are generally considered to be outweighed by the fact that dead trees provide homes for birds, and rotting wood provides food for insects which in turn provide food for birds. Cf. *Forest recreation*.

Deadwood

City in Lawrence County, western South Dakota, a few miles south of the town of Whitewood. Deadwood was prominent in the lore of the American West, and its well deserved image of a wild and lawless frontier town was enhanced by the *Deadwood Dick* dime novels. Deadwood was the chief area of operation of Calamity Jane.

The town was founded during a gold rush in 1876, and practically emptied again during another gold rush some years later to a place called Lead, a few miles to the southwest. Today forestry is one of the main economic activities of Deadwood.

Dean, Forest of (Gloucestershire), and the Verderers' Court

The Forest of Dean is an ancient royal forest of conifers, oak and beech in west Gloucestershire, between the towns of Gloucester and Newport, near the Welsh border. Part of the ‘forest’ consists of agricultural and even urban land. It is a National Forest Park administered by the Forestry Commission. Residents of the ‘forest’ (commoners) have the right to collect ‘estovers’ (fuelwood) for a modest annual fee, and to graze sheep — 2000 of them in 2004. Under a privilege granted by Edward I, men born in the Forest of Dean, and who can show that they have worked in its coal mines for a year and a day, have the right to be ‘Freeminers’ there, but in the 1990s the Forest’s two maternity units closed, so in the future there will presumably be no Freeminers.

Timber from the Forest of Dean was so important for the English navy that soldiers on the Spanish Armada had instructions to destroy the forest. The ‘verderers’ court’ is held at Speech House in the middle of the forest proper. It makes and amends by-laws relevant to the management of the forest, and receives presentations regarding the same subject. ‘Verderer’ is an old English legal term for officer in charge of royal ‘forests’. The word is derived from ‘vert’, which was the woodland, undergrowth and heath which provided the habitat for the deer in the royal hunting reserves.

Deciduous

All leaves are shed from time to time, and replaced by new ones, but in some tree species the leaf-shedding is continuous, partial and not very noticeable; in other species it is periodic and more dramatic. Deciduous trees shed their leaves in preparation for a period of hardship, usually cold or drought. Most species are either evergreen or deciduous. Some, like teak, are deciduous when the dry period is pronounced, otherwise evergreen. Virtually all tree species will shed their leaves to reduce evapotranspiration in times of critical water shortage. Conifers are generally evergreen, although conifers like larch and ginkgo do shed their needles and leaves in winter. Before a deciduous tree sheds its leaves in autumn, it converts the nutrients in the leaves to forms which can be withdrawn and stored in the stem over the winter, and that chemical transformation accounts for the autumn colours. Then it creates a kind of tear-line across the leaf stem, and the leaf falls off. Cf. *Evergreens*.

Deer

Deer can be a serious problem in forests because their browsing on young shoots and leaves can slowly destroy the regeneration. But they can also be a source of revenue, from the sale of hunting licenses, or from meat production like in the natural forests on the west coast of South Island, New Zealand. Cf. *Epping forest*.

Red deer is a forest animal. In Britain it generally lives in the open mountain and moorland country of Scotland and north England, but that is because it has no choice, now that those areas have been deforested. In the forest of Białowieża*, Poland, it is more at home. Unfortunately it also does much damage to forests, e.g. by rubbing its antlers against the bark of trees, and, like all deer, by browsing on young shoots.

Deforestation and reforestation

The world forest area decreased by 5.2 million ha (0.13%) p.a. during the period 2000-2010, down from a rate of decrease of 8.3 million ha p.a. during the period 1990-2000 (FAO 2011). This is the *net* decrease. The total area deforested each year is greater, but it is to some extent offset by forestation and natural regeneration. The net decrease is mainly due to some forests being converted to agricultural land. This is a process as old as history itself.

During the period 2000-2005 South America recorded the greatest net loss of forest area with 4.3 million ha p.a., and Africa came second with 4.0 million ha p.a.. North & Central America and Oceania recorded small net losses, whereas Asia and Europe actually showed a net gain. The increase in Asia is mainly due to massive afforestation in China, whereas the increase in Europe is due to the fact that agriculture there has become more efficient, which has released land for other uses. If Europe and the USA ever give up their policies of agricultural subsidy, as they promised to do at the WTO meeting in Doha, then huge areas of marginal agricultural land in those regions could become available for afforestation for the purpose of timber production, outdoor recreation, and the alleviation of flooding.

The main reason for deforestation in the tropics, especially in Africa, is not greedy loggers but small farmers clearing land in their struggle to survive. The best solution to this problems is economic development, because deforestation and the shifting cultivation that normally follows it are very hard work, and people will normally prefer another way of earning a living, if they have that option. See *Boom, bust, and deforestation* and *Slash-and-burn shifting cultivation*. The second best remedy of deforestation is to improve the

agriculture in the region around the endangered forest, so that the ever-growing population can make a living there without having to look for more land in the forest.

Deforestation is often thought of as always being bad. It can indeed have many bad effects, but sometimes it benefits mankind, as when the forest is replaced by fertile agricultural lands. This was the case with much of the primeval forest which was cleared in Europe, on Java, and in other places. The reason why deforestation causes such *angst* is that the forest is still very important in our collective subconsciousness; see *Evolution of early man*.

Cf. *Afforestation*.

***Dehesa* ('pasture land' in Spanish)**

Traditional form of agroforestry in the open evergreen oak forests of Spain, especially in the region of Extremadura. For example: the forest floor is ploughed every four years, then used for cereal production during two years, for grazing during one year, for fallow during one year, and is then ploughed again, starting a new cycle. Theoretically this can go on in perpetuity, although today some areas are cleared of forest and used for more intensive agriculture. The *dehesa* is a very important habitat for wildlife: wild boar, deer, lynx, wildcat, mongoose, vulture and three species of eagle.

Besides cereal, beef and hides, the *dehesa* system can produce up to 40 kg of acorns per oak per year, which can serve as pig food; the cork oaks (*Quercus suber*) can yield cork every ten years for more than 150 years, and the holm oaks (*Q. ilex*) provide much of the fuelwood and charcoal for the barbecues of Europe. Meat from the *dehesa* sells at a premium in The Netherlands because it is derived from a pesticide- and fertiliser-free type of land use.

Dehradun Forestry School, India

In the days when Britain ruled India there were no forestry schools in Britain, whereas forestry was already a long-established and highly respected scientific discipline in Germany, so the Indian Government recruited German foresters to administer its forests. When the first professional-level British forestry school was set up, these German-born foresters, by then mostly British citizens, were chosen to lead it.

In India itself, the famous forestry college at Dehradun has trained generations of professional foresters, not only for India but for other Asian countries as well. To be

admitted, students have to have a first degree, and only the best and the brightest are accepted. In his book *Seven Years in Tibet* Heinrich Harrer writes about how he and another Austrian mountaineer were trying to escape from India to Tibet at the outbreak of World War II in order to avoid being interned, and how they were apprehended by two Indian forest officers. Harrer and his colleague talked German with each other, but when they found out that the forest officers understood that language, they switched to French, only to find out that the forest officers understood that language too — that was the Indian Forest Service for you.

In recent years India has been the world leader in social (participatory, community*) forestry. The states of Uttar Pradesh and Gujarat were the pioneers.

Cf. *Water, trees and forests*.

De-icing of roads

It has been estimated that damage by salt used for de-icing roads kills more than 700,000 trees a year in Western Europe. Between the road salt, the trenching for broadband cables, and (in Europe) gung-ho tree ‘surgeons’, the off-forest trees of Europe and North America are having a hard time. Cf. *Urban forests ...*

Deregulation

Deregulation can sometimes be a good thing, but in forestry it can lead to deforestation — see *Protected forests* .

Diana

In Roman religion, originally a woodland goddess. Her most famous place of worship was the grove of ‘Diana Nemorensis’ (‘Diana of the Wood’) by Lake Nemi in the Lazio region of central Italy.

Dinosaurs

The ancient coniferous genus *Araucaria* originated already in the Triassic period 245 to 208 million years ago. The crowns of the mature trees of some of the species, like Chile pine (*A. araucana*) and Paraná pine (*A. angustifolia*), are confined to tufts at the top of the trees, and it is thought that this feature developed to protect the trees against browsing by long-necked dinosaurs – the leaves are surprisingly nutritious

Dioxin

Forest fires are one of the main sources of dioxins, toxic substances generated as a by-product of incineration.

Domesday Book

Land census carried out in England in 1086 at the order of King William I the Conqueror. Contrary to popular belief, most of England was not covered by forest in those days. The proportion of forest was about the same as it is today. Cf. *Pigs*.

Dover Boat

In September 1992 archaeologists from the Canterbury Archaeological Trust discovered a well preserved about 3,550 years old boat near Dover on the south-east coast of England. It was made of oak 'planks' or boards derived from huge tree trunks. The boards were 'sewn' together with twigs of yew, and the joints were caulked with moss. Although it was from the Bronze Age, no metal was used in its construction. It was 2.4 m wide and at least 20 m long, presumably used in the cross-Channel trade, and probably propelled by at least 18 oarsmen. Being from before 1,500 years BC, the boat predates the time when Celtic languages were spoken there. Cf. *Logboat*.

Today the boat is in the Dover Museum.

Dowsing

Generally a forked piece of hazel, rowan or willow wood is used for dowsing, i.e. to allegedly detect hidden bodies of water, minerals, treasure, archaeological remains etc..

Dresden

The name of Dresden, the German city, is derived from the Slavonic *Drežd'ane* which means 'forest dwellers on the plain'.

Dubček, Alexander

The Slovak Alexander Dubček (1921-92) was the leader of Czechoslovakia during the 'Prague Spring' of 1968-69. After his expulsion from the Communist Party in 1970, he

worked for the Forest Service in Slovakia, until he was elected Speaker of the federal Czechoslovak parliament in 1989.

Dyrehaven

Dyrehaven, meaning ‘the animal (deer) garden’ in Danish, is a wonderful beech forest north of Copenhagen, open to the public, and easily available from the city by train. The forested area is about 1,000 ha. It has several hundred free-ranging European and Asiatic (sika) deer, and a rich bird life. In Denmark and other relatively densely populated and sparsely forested developed countries, the amenity value of forests exceeds their timber production value. See *Forest recreation*.

Early forests, effects of

When the first forests appeared some 360 to 385 million years ago, they affected the environment in different ways:

- The deeper root systems of the trees, compared to those of the preceding lower vegetation, accelerated the weathering of the underlying rocks and thus soil formation.
- The bigger biomass of the trees increased the storage of carbon dioxide, which lowered the content of that gas in the air.
- The forests increased the proportion of oxygen in the air. It has been suggested that this made it possible for our aquatic ancestors to leave the water for the air. Virtually all the oxygen in the air has been produced by plants through the process of photosynthesis.
- They encouraged the development of biodiversity, as forests tend to be more biodiverse than surrounding areas, then as now.

Cf. *Oxygen*.

Easter Island

Today there are almost no native trees left on this island, although analysis of pollen deposits shows that trees were once present. One hypothesis is that the deforestation was partly brought about by cutting logs for rolling the huge stone statues into place, and that Easter Island is an early example of an ecological disaster. On Easter Island there are wooden tablets covered with signs called *rongo-rongo*, a form of writing which has not been deciphered. Cf. *Moai figures*.

Eco-imperialism

The world having entered a phase during which gene-splicing has become possible, but not *gene-making*, the global gene pool has become a coveted resource. As most of the global gene pool is in the tropical moist forests — it is estimated that some 30% are in the Amazon forest alone — that is often where the new battles take place, much to the resentment of countries like Brazil and Malaysia when they are told that they should not convert their forests to farms or plantations. Even when the developed countries are willing to pay for the forest preservation they advocate, as in the REDD* programme, the problem is not solved, because ‘he who pays the piper calls the tune’. So, gene pool preservation is important, but problematic.

Economic value of trees

A 2007 census in New York valued that city’s almost 600,000 trees at US\$122m, i.e. at an average of US\$203 (£125 at the 2011 exchange rate) per tree. If anything, this sounds too low. The total value is distributed as follows: US\$53m for aesthetic value; US\$36m for reducing storm-water run-off; US\$28m for savings of energy in air conditioning; and the rest for filtering out air pollutants, providing shade in the heat of the summers, and for other benefits. A survey in Chicago found that properties in tree-lined streets were worth 18% more than comparable properties in streets without trees.

From the window of my study I see three tall magnificent Lombardy poplars. I would certainly be willing to pay up to £100 p.a. for this pleasure. These trees are seen daily by at least some 200 people. If I asked them how much they would be willing to pay per year to retain these trees I would probably get answers varying from £0 to at least £100, with an average of about £50. On the basis of these figures the aesthetic output alone of these three trees would then be about $200 \times £50 = £10,000$ p.a.. Many historic or otherwise exceptional trees would have vastly higher values.

Effect of radiation on trees (‘moon trees’)

Tree seeds were taken along during the first moon landing in 1969, and brought back to earth again, to see if the exposure to radiation made the resulting saplings differ in any way from those in a control sample. It didn’t. The 400-500 seedlings of maple, sweetgum, Douglas fir, redwoods and other species which were raised in different parts of the US

from the seed which had been to the moon, and the descendants of these trees, are popularly referred to as ‘moon trees’. They have been distributed to many countries in the world, and there are at least six specimens in the UK.

Effect of snow on tree shape

Trees with broad, umbrella-shaped crowns, such as the East African umbrella acacia, or the stone pine (*Pinus pinea*) so characteristic of the Italian landscape, indicate regions where snowfalls are either absent or not very heavy, for such broad-crowned species simply would not survive where snowfalls are heavy — the parks of Rome are littered with broken pine branches after the heavy snowfalls which occasionally hit the city. In regions with heavy snowfalls, like the mountain areas of central Europe or the northern parts of the Rocky Mountains, tree ‘races’ with narrow columnar crowns develop by means of natural selection.

‘Eikestad’ (Oaktown)

Popular Afrikaans name for the university town Stellenbosch, 50 km east of Cape Town, where the common oak (*Quercus robur*) has been widely planted as a street tree. The planting of this species was much encouraged by Simon van der Stel, governor of the Cape of Good Hope for the Dutch East India Company in the 17th century, who founded Stellenbosch in 1680, and who hoped that the oaks would one day yield timber for shipbuilding. But, as so often happens in forestry with its long rotation periods, by the time the trees had matured that market had disappeared. That is why futurology is so important for tree-planters.

Elephants

The African elephants in the dense tropical forests are smaller than the ones in the savannas, and their tusks curve inwards rather than outwards; both features have survival value in dense forest. There are elephants as far south as in the temperate Knysna forest on the south coast of South Africa.

Asian Elephants have been trained to assist with the logging in the forests of Thailand and other SE Asian countries. Their large padded feet are more environmentally friendly than tractors in the forest, and they are particularly useful for the first stretch of log transport from the point of felling to central collection points where tractors and

perhaps even lorries can take over. In 1998 the Forestry Department in Uttar Pradesh, India, introduced 1-year maternity leave for its elephants.

At Gangala-Na-Bodio in the Garamba National Park in NE Congo-Kinshasa there was a station where African elephants were trained for work in forestry. This work began in 1897. By the late 1930s, some 120 elephants were at work with forest clearing and logging. Their cost per unit of output was only a tenth of that of tractors. However, the tractors improved, and by the 1950s they were cheaper per unit of output than the elephants. In 1997 there were only three such domesticated elephants left, and because of neglect they were reverting to the wild state.

Elm disease

The Elm Disease is sometimes unfairly called the ‘Dutch Elm Disease’ although it is not of Dutch origin at all. It was probably first introduced from Asia, and the really virulent form was brought to Britain in the mid-1960s from North America. The only role of the Dutch was that they were the first to describe it, and then, before the virulent form had arrived, they tried to breed a variety of elm that was resistant to the disease.

It has by now killed most of the elms in Europe and North America, changing the landscape as it did so. In Britain alone, where the disease has now reached Scotland, it has killed about 25 million elms over the last thirty years, some three quarters of all the elm trees in the country. By the year 2006 the elms in Brighton, on the south coast of England, still largely survived, because (a) they are isolated from other elms by a broad area of agricultural lands to the north, and of course by the sea to the south; (b) the town council from the beginning prohibited the importation of elm timber, which could have brought in the infection; and, in particular, by the town’s rapid reaction team which continually inspects the elms and immediately cuts out and removes infected branches or trees. An unusual feature, as diseases go, is that vigorous trees are killed faster than less vigorous ones. Besides trying to slow the spread by destroying infected trees, nothing can be done.

El Niño

The phenomenon which appears every few years when the cold water current off the west coast of Peru and northern Chile is replaced by warm water. This leads to droughts and forest fires in SE Asia and Australia. There were particularly serious forest fires in SE

Australia in 1993 and in 1997/98, and in SE Asia in 1997, and those were El Niño years. Cf. *Fire*.

Endangered tree species

Of the 80,000 to 100,000 known tree species, it is estimated that more than 8,750 are endangered, thereof almost 1,000 critically endangered. Of the critically endangered species, 11 are in the UK. Among them are the following members of the *Sorbus* group: English, Welsh, Arran and Ley's whitebeam, and the Arran service tree.

Then there are also endangered forest-dependent species of animals, like for example the traditional European red squirrel, which in Britain has been largely replaced by the North American grey squirrel. The red squirrel has a relative feeding advantage in the pure pine forests, but pine is wrongly considered not to be indigenous enough and is therefore being replaced by broadleaved species (hardwoods*).

Energy plantations

Trees convert solar energy and carbon dioxide to woodfuel, storing the solar energy in solid form. Energy plantations differ from other forest plantations in that their main objective is to produce maximum biomass per hectare per year as cost-effectively as possible, with less regard to diameter and stem-form than in other types of plantations. In Sweden energy plantations have generally been with willow, in the US with poplar and sycamore (*Platanus occidentalis*, a relation of the London plane).

In a study in England it was estimated that willow plantations for energy production could yield about 12 oven-dry tons of wood per hectare annually. The wood produced in energy plantations could of course be burnt as such in industrial boilers for the production of electricity, or it could be used in the form of producer gas, charcoal briquettes or dust, methanol or ethanol. Most motor vehicles in Sweden during the second world war drove on wood-derived producer gas.

In contrast to coal-, oil-, or gas-burning power stations, those based on wood are almost carbon neutral (cf. *Carbon dioxide*), because the plantations absorb as much CO₂ as the power station emits, in a kind of virtuous circle.

Epping Forest

A 2300-ha forest in Essex, NNE of London. Mainly hornbeam. In the nearby suburb (formerly village) of Chingford there was until the 1980s, in the old Elizabethan hunting lodge, an interesting museum dealing with the history of the forest. It showed how the production objective changed over the millennia. In the Celtic and Anglo-Saxon times it was the production of fuelwood, building timber and protein in the form of game meat; the volume of fuelwood consumed per person per year was comparable to what it is in developing countries today. Then, when the Normans imposed feudalism in England, hunting itself (not the meat) by the king and the nobles became the main production objective, and strict laws were introduced against hunting by the people. The forest was heavily stocked with deer, which was good for 'hunting' but bad for the regeneration of the trees. The people, who were still allowed to harvest some wood in the forest, therefore began cutting the trees at man height instead of at ground level, i.e. they began pollarding the trees, so that the coppice regrowth could not be browsed by the deer. This is a useful device in the developing countries too, where browsing by goats is often a serious impediment to regeneration.

Today the main production objective of Epping Forest is again outdoor recreation, this time for the people of London.

Estovers

Old English term meaning the fuelwood, building timber and other products from an area allowed by law to a tenant or, in the case of commons, to the adjacent population.

European Union (EU) - forests

The area of forest and other wooded land in the 27 members of the European Union is 177 million ha, which equals 42% of its land area. This is an even higher percentage than in forest-rich countries like Norway (39%) and the USA (33%). The EU is one of the few major areas of the world where the forest area is increasing. See also *Deforestation and reforestation*.

Evelyn, John

Distinguished English landowner, forester, gardener, public servant, author on many subjects, and co-founder of the Royal Society, 1620-1706. He produced *Sylva, or a Discourse of Forest-trees, and the Propagation of Timber* for the commissioners of the

navy (wood and tar being very important for shipbuilding). It was delivered in the Royal Society on the 15th of October 1662. This work, which has been reprinted many times, contains descriptions of various kinds of trees, their cultivation and uses. Evelyn also recommended the planting of more street trees, for looks and for pollution abatement.

Evelyn lived on the family estate of Wotton, near Wimbledon, where he acquired much of his forestry knowledge. The Local History Museum in Wimbledon was previously known as the John Evelyn Museum.

Evergreens

Evergreens, i.e. plants which keep their leaves or needles throughout the year, have been a symbol of survival in Europe since the Middle Ages, which is why they have been associated with Christmas — which falls at the darkest time of the year in the Northern hemisphere — in the form of conifer and holly branches, wreaths and Christmas trees. Evergreen trees have a great advantage over deciduous* (leaf-shedding) trees along railway lines, roads and in urban areas because, although they do not keep their leaves forever, they do not shed them as copiously. See also *Railways*. In the temperate countries we should take advantage of the global warming to plant more evergreen broadleaved species (holly, laurel, holm oak, magnolia, acacia etc.) in our urban areas, including species for which our cities were previously too cold. Cf. *Small trees*.

The fact that evergreen trees generate less leaf-fall than deciduous trees has become a big advantage now that fallen leaves in the urban areas of the West are collected with the help of leaf-blowers and other noisy mechanical means, and no longer with quiet rakes. Consequently our suburbs have in autumn become as noisy as industrial zones.

Evolution of early man

Bones found in a cave at Sterkfontein near Johannesburg in 1980 indicate that our ancestors passed through a tree-climbing stage. That stage was probably necessary for the evolution of the primates, and hence of man. In the first place, by the infinitely slow process of mutation and natural selection the forefeet developed into hands for grasping the branches, and the hand favours the development of the intelligence by giving it much greater scope and thus making it an even more important survival factor.

Secondly, the tree-dwelling stage developed our stereoscopic vision, i.e. our ability to fix both eyes simultaneously on one object, for such vision was necessary to estimate distances when jumping from one branch to another.

Thirdly, every leap from one branch to another entailed an unconscious split-second estimate of distance, wind, strength of branch, and amount of energy required for the jump, and this again tended to favour the development of the brain by elimination of the slow-witted.

For all these reasons, it has long been assumed that early man developed in a forested environment, and excavations in Ethiopia have recently provided further proof of this. Our early ancestors probably did not venture outside the forests until about 4.4 million years ago.

Fairy stories

Forests play a big role in children's fairy stories. Little Red Riding Hood met the wolf in a forest. Hansel and Gretel lived in a forest, were the children of a woodcutter, and laid a trail of white pebbles as they walked through the forest so that they could find their way back again. And Snow White was taken to the forest to be killed, and then lived there with the dwarfs. This is symptomatic of the role that forests play in our subconsciousness, and the fear that they evoke in the Western mind. Today this is exemplified by children's stories like *The Gruffalo* and *Harry Potter*. See *Civilization, forest; Tolkien; and Wind in the Willows*.

'Farmed parklands'

In vast areas of the African savannas, farmers are protecting some of the original trees and cultivating the land underneath. Such agroforestry* areas are often referred to as 'farmed parklands', and the trees as 'economic trees'. In north-east Thailand there is another type of farmed parkland, where the more valuable original trees are left, even in the middle of rice paddy fields, as a savings account for when they need to be converted to cash. In England, Italy and many other countries, trees are also often left in the fields for various reasons, when their advantages are found to outweigh the disadvantages that they shade out the crops, compete with them for water, and harbour birds. The vast evergreen oak forests

of Extremadura in Spain is another example of farmed parklands — see *Dehesa*; also *Bushfallow*.

Feudalism and treeplanting

Feudalism is characterized by land-users leasing rather than owning land. It was the Norman invasion that really established this system in Britain. In Normandy itself, the nobility had forbidden peasants from hunting in the forests for the pot. When the peasantry sent a delegation to a local lord protesting that hunting had always been allowed by customary law, they had their Achilles' tendons cut for being disrespectful.

After the Norman invasion of England, the king laid claim to ownership of all land, but he leased most of it to big landowners, who in turn sub-let it to smaller landowners, and so on, the whole hierarchical pyramid being supported by the taxes of the small-holders. Feudalism is not good for forestry, because the latter requires long-term commitment, which is lacking when you are not the owner but only the lessee of land.

Feudalism still exists in Britain: millions of people live on or farm land which does not belong to them. In Scotland there are still some 17,500 crofters, but the Scottish Law Commission recommended already in the 1990s that 'the existing feudal system [be] replaced by a system of absolute ownership', the Abolition of Feudal Tenure (Scotland) Act 2000 was passed, and about 100 hectares a year are now being 'decrofted'. In England far more people live on or farm leased land, and such people are obviously reluctant to plant trees.

In Africa a similar system is in place: millions of small-holders farm land which is not their own, but which belongs to the community, the village chief or the 'land chief'. There the situation is often that the *landowners* are against treeplanting by their tenants, because they are worried that it would give the latter a claim to the land. However, the system of land tenure in Africa varies from tribal area to tribal area.

Finland

Finland is an example of a country which a century ago was poor, but which today, largely through wise use of its forest resource, has attained a very high standard of living. Although its forests have been heavily harvested (rather than 'exploited', which has a derogatory sense in English) over the centuries, first for their mineral ash content in

connection with slash-and-burn farming (see *Bushfallow*) and then for a modern and very efficient wood industry, they are more productive than ever.

When I worked on the World Bank's 1991 forest policy paper, two Finns from the embassy came to see us, and they said: 'We have read your draft. It is all about forest conservation. Not a word about production. But forest production was the lever that lifted us out of poverty. Please don't neglect it.' But the World Bank was so keen to please the environmentalists that – although its main task was to fight poverty – the productive, developmental, pro-people aspects of the forests remained neglected in that paper.

Fire

Most forest fires are man-made. In South Europe they are often caused by developers who want the land re-zoned for housing. Other fires are started by people who hope to earn an income as fire fighters and then perhaps in connection with the replanting of the forest. Then there are the people with a grudge. If the grudge is of a political nature, and if the country is such that people cannot express themselves through the ballot, the frequency of forest fires is a good measure of the level of political discontent. Farmers burning their land after the harvest, to kill parasites and reduce waste, is another cause.

Forest fires can obviously be very destructive, but fire can also benefit the forest. It can be a useful tool there, but it must be managed and controlled. Without periodic fire, the litter* in many forests builds up to such an extent that (a) when a fire does occur, which it sooner or later must, it becomes particularly hot, destructive and difficult to control; and (b) the thick mat of litter may prevent seedlings from rooting in the soil, thus preventing regeneration. Also, some species have seed which regenerate more easily if they are exposed to fire, e.g. the thick-shelled seed of most acacias. Finally, periodic fires often reduce the incidence of insect pests. The many reasons why the Native Americans, already before the arrival of the Europeans, used frequent fires as a tool in their forest management, are mentioned in the entry *Amerindian forestry*. See also *Urban forests*.

First trees

Trees first appeared on earth during the Devonian Period, 408 to 360 million years ago. Modern man came along much later, just some 200,000 years ago. Expressed as a fraction, that means that humans have been on earth for only one 2000th of the time that trees have existed. Will we last as long as they in the struggle for survival?

Trees from the Devonian period did not have flowers and seed, but reproduced by means of spores, like ferns and fungi today. Fossils recently found at Red Hill in Pennsylvania indicate that some of the trees during the Devonian Period may have been up to 30 m high.

See also *Evolution of early man*.

Floating or driving timber

Vast quantities of logs used to be transported along the rivers. In the cold countries felling was usually done in winter when the logs could be more easily moved over the frozen and snow-covered ground to the nearest river, where they were left on the ice to await the spring thaw. Different owners put different marks on the logs, and further down the river they were sorted out. It was dangerous work, and in Sweden the log drivers were surrounded by a romantic aura, a bit like the cowboys in the US.

Although river transport may seem simple and ingenious, there were problems. Some logs were heavier than water, and had to be bundled with lighter types of wood. Some got stuck along the river banks, and had to be pushed out into the river again by the log drivers. Some sank and were lost forever. Sometimes logjams had to be dynamited apart. All in all it was a labour intensive form of transport, and as the cost of labour increased, the balance tipped in favour of road and rail transport.

Flowers

All trees have flowers, but only trees which need to attract insects for pollination have showy flowers, whereas forest trees usually rely on wind for pollination. Therefore, although some forest trees do have beautiful flowers, by and large you see more flowers in suburbs and parks than in forests.

Since leaves reduce wind speeds, some deciduous forest trees produce the pollen in early spring before the leaves appear, some evergreens shed leaves at the time when they produce pollen, or in the years when they produce bumper crops of it. Pollen-bearing catkins are generally concentrated near the tree tops, not only because that is the part that gets most sun, but also because it provides an advantage from the point of view of wind pollination.

‘Forest’

The Food and Agriculture Organization (FAO) of the United Nations in Rome defines ‘forest’ as ‘land with a tree canopy cover of more than 10 percent and an area of more than 0.5 ha’. With this definition many a leafy urban area could be considered ‘forest’. See *Global forest cover*.

The word did not always have this connection with trees. It is derived from the Latin *foris*, ‘outside’, same root as ‘foreign’. ‘Forests’ were, during the Middle Ages, the land outside the common law; that land was subject to a special law that safeguarded the king’s hunting. It was the land outside the towns, villages, fields and commons – the ‘rest’ as it were. So the royal hunting grounds were called ‘forests’ whether they contained trees or not. Vast areas of former royal forests in England, like New Forest and the Forest of Dean, are treeless today, but they were probably treeless even at the time when they were set aside. After all, hunting is easier where there are not too many trees. The *Domesday Book*, the land census carried out in England in 1086 at the request of King William I, dealt only with private lands, and the translators into English of the Latin text are therefore careful to use the word ‘woodland’, not ‘forest’. The Latin for ‘forest’ in the modern sense of the word was *silva*.

The forest services of the world still tend to deal not only with forests in the modern sense of the word, but also with drift sands, high mountain zones, and wilderness areas of all sorts, whether covered by grass, trees or other vegetation forms; i.e. with the land ‘outside’ the inhabited and farmed areas. For the climatic requirements enabling forests to exist, see *Tree limit*.

‘Forestation’

Afforestation or reforestation. Can be artificial (carried out by man) or natural. The word *forestation* is rarely used, but it is a good word.

Forest Cantons

The Swiss districts of Uri, Schwyz and Nidwalden are sometimes referred to as the ‘three forest cantons’. In 1291 those three cantons formed the ‘League of the Three Forest Towns’ (*Dreiwaldstätterbund*) to defend themselves against the feudal powers around them, and that was the nucleus around which Switzerland grew.

‘Forest damage’, ‘forest death’ (*Waldschäden, Waldsterben*)

The idea of large-scale ‘forest death’ caused much alarm, especially in Germany in the 1980s. The alleged problem was found mainly among conifers at higher elevations in central Europe. Sometimes it was probably due to air pollution, sometimes to drought, sometimes to global warming, sometimes to the acid rains which were more prevalent at that time, and sometimes to other reasons. However, today it is considered to have been mainly a media phenomenon, for studies in the late 1990s indicated that on the whole the forests of Europe have never grown so fast or had such high wood volumes per hectare.

This being said, there is no doubt that ever since industrialization began a couple of centuries ago, there have been forests which have been damaged by air pollution*. The problem is particularly serious in the Czech Republic, Slovakia, southern and western Poland, adjacent parts of Germany, and in parts of eastern Canada like the Sudbury area and the Gaspé Peninsula. Air pollution mainly affects conifers.

Forest recreation

During the era of feudalism*, which peaked in Europe in the Middle Ages, a very important use of the forest was for recreational hunting*. Today the recreational value of the forest has again come to the fore, now not just for the elite. In countries like The Netherlands, England and Denmark, with a relatively small forest area per inhabitant, a simple calculation shows that the recreational value of the forest is greater than the value of its timber output, even if each forest visit is cautiously valued at only, say, half the cost of a cinema ticket. In other areas, with much forest and few people, like north Sweden and Finland, the recreational value of the forest, though still important, is dwarfed by the value of its output of industrial roundwood. Cf. *Milton Keynes* and *Amsterdam Bos* and *Forestry Commission*.

Forest Reserve

A ‘forest reserve’ (*forêt classée* in French) is a forest, typically in Africa, which has been ‘gazetted*’ to be under forest forever, although sustainable logging is usually allowed there. Cf. *Protected forests*.

Forestry as a profession

Forestry as a science began in Germany at the end of the 18th century. In the Anglo-Saxon countries and in Germany the graduate foresters are usually trained at universities, whereas

in many other European countries they are trained at specialized agricultural universities together with agronomists, animal husbandry specialists, and sometimes veterinary surgeons. Forestry is basically an applied biological science like medicine and agriculture, but forestry courses also comprise engineering, economics and sometimes sociology, and diplomacy is a useful skill because today foresters must balance the demands of different groups who want different things from the forest.

On the Continent forestry is traditionally a profession favoured by the aristocracy, who often have forests on their estates and who are keen on hunting. In the stiflingly hierarchical old British Indian civil service, forestry was also very high in the pecking order, perhaps because it had been set up by German foresters who brought a high regard for their own profession with them. In South Africa, by contrast, the profession does not have a particularly high social status, possibly because the poor whites were traditionally associated with the indigenous forests in the neighbourhood of the towns of George and Knysna* in the coastal area of the southern Cape.

Until recently forestry was an almost exclusively male profession, for no good reason, and this led to a concentration on logging and such 'macho' aspects of the profession, at the expense of the more nature- and people-oriented aspects. Because most forests are owned by the public, and because the public became more interested in ecology, conservation and forest recreation than in wood, foresters have often been depicted as 'bad guys'. Another reason for the alienation of forestry professionals today is that they are generally of a scientific rather than diplomatic bent, and in the past did not give enough attention to public relations.

Forestry Commission, Great Britain

The British Forestry Commission was created by the Government in 1919 to build up a strategic reserve of timber, in case of future wartime shortages. And what a good investment it turned out to be during the shortages of World War II. Today the Commission manages its forests not only for timber but also for recreation and biodiversity, and it has become a key partner in programmes to improve urban environments through the provision of 'greenspace' in towns and cities, often leading to the rehabilitation of derelict and contaminated post-industrial land. It actively encourages the public to visit its forests, which receive some 50 million recreational visits per year for activities including walking, camping, mountain biking and horse riding. It is also

becoming involved in renewable energy projects such as the development of the woodfuel industry and hosting windfarms and hydro-electric developments on its land. The Forestry Commission has in the past been much reviled for its ‘sterile conifer plantations’, but when the government in a 2011 discussion paper floated the idea of selling some of its land, the public was outraged.

Fossilized (petrified) trees and wood

Fossilized wood is formed by minerals filling the spaces between the cell walls. Such wood is often found in dry areas, e.g. western USA. There is also a 45-million-year old fossilized forest on Axel Heiberg Island in the Canadian Arctic, far to the north of today’s tree limit, proving how much warmer it once was there.

See also *Black Forest, Arizona* and *Petrified Forest Park, Lesbos (Lésvos)*.

‘Fossil trees’

Tree species which have been found represented in fossils from earlier geological eras, and which still exist as living trees, are sometimes referred to as ‘fossil trees’. Examples are *Ginkgo biloba*, the maidenhair-tree, and Dawn Redwood (*Metasequoia glyptostroboides*), both from East Asia; and Wollemi Pine from Australia.

‘Four Arouds, The’ (China)

In China, where most rural people live in densely populated areas where land may not be available for conventional block plantations, the government in the 1950s promoted the concept of tree planting in the ‘four arouds’: around the fields, around the houses, along (but in Chinese the same preposition is used in the four cases) the roads, and along the canals.

Fowl (poultry, chickens)

Chickens are descended from wild jungle fowl of India, and are therefore reluctant to go out into the open where they can be attacked by birds of prey. Even ‘free-range’ chickens spend most of their time in their shelters. To remedy this, some free-range chickens and hens are now reared under the shelter of trees, harking back to their forest origin, and then they really do dare to range freely; the resulting products are marketed as ‘Woodland Eggs’ and ‘Woodland Chickens’.

Foxes

Foxes are useful in the forest because they eat grey squirrels and voles, which gnaw the bark of trees. In the cities they are useful in that they catch mice and rats, but harmful in that they tear rubbish bags, and have even been known to attack infants. In the open countryside they are hunted by people whom Oscar Wilde described as the ‘unspeakable in hot pursuit of the uneatable’. There is absolutely nothing wrong with hunting; in fact in many situations it prevents overpopulation of some species, and consequent hunger and environmental degradation; but there is everything wrong with cruel hunting.

Fractometer

Device for measuring the strength of tree stems on the basis of test cores taken from the stem. Other devices for determining the strength and soundness of tree stems are arborsonic decay detectors, portable compression meters, sonic hammers and micro-drills. As there are more and more urban areas in the world, and more and more urban trees where considerations of safety are critical, such instruments have become very useful.

Free-growing trees

Competition between trees in a stand begins at a surprisingly early age, and free-growing trees can grow up to five times faster than trees under severe competition. This is an advantage for farmers who plant individual trees on their land. However, if you want maximum volume increment *per hectare* you should plant the trees very close together.

Frontiers

Frontier areas are generally more forested than others, partly because forests (like seas, mountain ranges or deserts) tend to act as cultural divides, and partly because border areas are less secure during times of raids and wars, and therefore tend to be less populated. Today, in insecure parts of the world, it is still dangerous to live near frontiers because bandits come across, commit crimes, and then escape back over the frontier where they cannot be pursued by the local police. See also *Language diversity* and ‘*Marches*’.

Fuelwood and the Roman central heating system

The Roman system of heating houses by channelling hot air through ducts under the floors consumed enormous quantities of woodfuel (fuelwood or charcoal). It has for example been estimated that the Romano-British villa at Bignor in West Sussex — granted, the biggest such villa found in England, and one that included a sauna — required 120 tons of charcoal per year for heating purposes. In energy terms, 120 tons of charcoal equals 95 m³ of heating oil. This is many times more than a very big well-heated house will use in the same region today. We usually think that we use more energy per person per year than in earlier times or in the developing world, but that is not always the case, because we use the energy more efficiently.

The construction of the Roman villa also required a considerable amount of fuelwood for energy, what with the tiles used for roofs and ducts, and the mosaic floors, some pieces of which were made from glass or baked clay. Other huge uses of wood at that time were fuelwood for the public baths and for iron-smelting (see *Weald*), and construction timber for the half-timbered houses which dominated at least until about 100 AD. All this contributed to deforestation in Roman Britain.

Gaia

According to the Gaia hypothesis, proposed by the British scientist James Lovelock, the earth should be seen as a self-regulating organism rather than an inert physical system, with the biosphere playing a role in maintaining environmental conditions favourable to its own survival. It is sometimes called the ‘world looks after itself’ hypothesis. For example, the more CO₂ there is in the atmosphere, the faster trees grow, and the faster trees grow the more CO₂ they absorb. See *Carbon dioxide* and *Global warming*. (Lovelock has recently said that he does not think that the earth’s self-regulatory system can cope with the present rapid rate of global warming.)

Gas pipelines

Trees are not allowed to grow on land below which national gas transmission pipelines have been laid, as they would interfere with repair and maintenance. The pipelines thus create treeless strips in the landscape, as do the power lines, but for different reasons.

Gazetting

In the British colonies, when an area was legally set aside as a forest reserve, this was announced in the Government Gazette, after which the area was said to have been ‘gazetted’.

Genesis

In Genesis, the first book of the Bible, trees were created already in the second of the six days during which God created the world; before sun, moon, stars, animals and man: ‘Then God said, ‘Let the land produce vegetation: seed-bearing plants and trees on the land that bear fruit with seed in it, according to their various kinds.’ And so it was. ... And God saw that it was good.’ (Genesis 1:11-12)

Cf. Tree of knowledge of good and evil.

Gladstone, William (1809-98)

The English statesman William Gladstone had a passion for felling trees, and his rival Benjamin Disraeli liked planting them.

Glass-making

The glass-making industry often originated where wood was plentiful, e.g. in Småland in south central Sweden, in Finland, and in forest-rich areas of France, because it is a very energy-intensive industry, requiring the smelting of sand into silicon, and the wood could serve as fuel.

Global forest cover

The world forest area in 2010 was slightly over 4 billion hectares (ha), which corresponds to 31% of the land area, or 0.6 ha per person. It is distributed as follows over the continents and over the main forest countries (FAO 2011):

<i>By continent</i>	<i>Mill. ha</i>	<i>%</i>
Africa	674	17
Asia	593	15
Europe, incl. Russian Federation	1,005	25
North and Central America	705	17
South America	864	21

Oceania	<u>191</u>	<u>5</u>
Total:	4,033	100

By main forest country

Russian Federation	809
Brazil	520
Canada	310
United States	304
China	207

Global warming and forests

The earth has been getting warmer over the last 15,000 years or so, since the depth of the last ice age, and as a result the level of the oceans has increased by about 130 m – the land connection between England and France is, for example, long-since gone. The fact that there are still huge ice sheets around the Arctic and the Antarctic, whereas the poles have been ice-free during most of geological history, indicates that we are still living in the tail-end of the last ice age and that in the long term the warming is certain to continue, whatever we do, although the carbon dioxide* (CO₂) emissions accelerate the warming.

For the world's forests this is both good and bad news. Good because (a) as the remaining ice sheets melt and liberate water, the rainfall in most areas will increase, which will favour the growth of trees (see *Ice ages*); (b) with increased temperature the boreal* forest can spread into vast areas of tundra; (c) the increased temperature in itself will favour more rapid growth; and (d) the increased level of CO₂ in the atmosphere will also improve conditions for tree growth, because CO₂ is the main raw material in the process of photosynthesis. On the other hand, the warming will cause vast forest epidemics, as already seen in British Columbia and parts of Siberia, where the winters are no longer as cold as required by the local tree species; these species will then have to migrate towards the poles, while new species will have to come in from warmer areas. Such species migration won't be possible for example in the case of the rich Cape flora, because it is already near the southern tip of the African continent and cannot therefore move to cooler areas.

Gods and trees

In the pre-Christian Western religions various trees were associated with various gods. To the ancient Greeks, for example, the oak belonged to Zeus, the supreme deity and the god of heavens; the palm and the laurel belonged to Apollo, the god of light, music and poetry; and the fig tree belonged to Demeter, the goddess of the fertility of the earth — the fig was a very important food to the Greeks.

Goethe, Johann Wolfgang von

In 1815 the German poet, dramatist, scientist, philosopher, statesman, courtier and many other things Johann Wolfgang von Goethe (1749-1832) wrote a poem about the leaf of the *Ginkgo biloba* tree, and sent it to Marianne von Willemer. The poem refers to the two-lobed (*biloba*) shape of the leaf, and he pasted two deeply lobed leaves below his poem, as a symbol of their friendship and affection – ‘we are two, yet one’. The poem was published in *West-östlicher Divan* (Poems of the West and East), 1819.

Goshawk

Forest-dwelling bird catcher. The habitat of the northern goshawk is the boreal coniferous forest throughout the Northern hemisphere. The species became extinct in Britain at the end of the 19th century, but was reintroduced in the 1950s and -60s, helped by the considerable afforestation with conifers at that time (so much for the myth that coniferous plantations are biologically sterile). For nesting it prefers larch, because the soft branches of that tree are suitable for nest-making. The Forestry Commission’s wildlife experts support it, for example by identifying nesting trees which are then allowed to stand long after having reached their normal felling age.

Gothic cathedrals

The German philosopher Oswald Spengler considered the Gothic cathedrals with their soaring lines to be the architectural representation of the great north European forest, or, as he expressed it himself: ‘the architectural actualising of a world-feeling that had found the first of all its symbols in the high forests of the northern plain, the deciduous forest with its mysterious tracery, its whispering and ever-mobile foliage over men’s heads, its branches

straining through the trunks to be free of the earth'. Regarding the forests which once covered the north European plain, see *Białowieża forest*.

Great Storm of 15 Oct. 1987 in SE England

This was the worst storm in England since 1703, and it felled 15-19 million trees, including many in Kew Gardens and other famous parks and gardens. Many more trees snapped and had to be topped, and today their amputated stems are still eyesores all over SE England in winter when the deciduous trees are without leaves. The most dramatic effect of the storm was in Rendlesham and Tunstall Forest in Suffolk where every tree except some edge trees blew over or snapped in a vast area of Corsican pine planted in the 1930s; edge trees are normally bigger than the trees inside the stand, and have bigger root systems and a more pronounced stem taper, and that is probably why some of them survived. By contrast, elsewhere areas coppiced oak of medieval origin were hardly damaged at all.

In December 1999 western Europe was hit by another very severe gale which in France, for example, blew over 115 million m³, corresponding to 2.7 times the normal annual cut.

Great Wall of China

The part of the Great Wall of China which was constructed in the Gobi Desert during the Han Dynasty (206 BC to AD 220) contains vast amounts of twigs of red willow which were incorporated to hold the loose gravelly soil together. Along other parts of the 6,400 km Wall the rainwater was drained 'inwards' towards the Chinese side of the wall so as not to favour vegetation on the other side in which the enemy could hide. Much of the Wall is constructed from kiln-fired bricks, for the making of which huge quantities of fuelwood must have been used.

Today a 7,000 km 'green wall' of trees has been planted to reduce the incidence of sand-storms in north China, including Beijing.

Greenland and Antarctica

DNA extracted from ice cores shows that between 450,000 and 800,000 years ago Greenland had forests of alder, spruce, pine and yew. The areas where these forests once grew is today covered by more than 2 km of ice. There were also forests in the Antarctic.

Already the explorer Robert Falcon Scott found fossil plants there in 1912. More recently Professor Jane Francis of the University of Leeds has made many expeditions there, bringing home plant remains. The early forests were subtropical, in the later ones beech has been identified.

This is another indication that we are still living in the tail end of the last ice age: the world will continue to get warmer, willy-nilly, the poles will be ice-free again, and the sea level will consequently continue to rise. Cf. *Ice ages and forests*.

Green Man

The ‘Green Man’ is a mythological figure of medieval European art and literature. He was depicted as very muscular Herculean figure, carrying a club, and dressed only in a wreath of leaves. ‘The Green Man’ lives on in Britain as a popular pub name; in central London alone there are half a dozen pubs of that name. The Green Man and the related ‘Jack-in-the-Green’ were manifestations of pre-Christian woodland deities, and the depiction in England today are mainly on churches – another example of the early Christian church making use of pre-Christian symbols in order to make itself more acceptable.

‘Greenwood’

‘Greenwood’ in old English has outlaw connotations. To ‘go to the greenwood’, for example, meant to become an outlaw.

Grove of Academe

The Grove of Academe was an open parklike area about a mile NW of Athens called after the mythological Attic hero Akademos (Hecademus) who was said to have planted twelve olive trees there, taken from shoots of Athena’s sacred olive tree on the Acropolis. Plato acquired a plot here in 386 BC and it was here that he established his famous school or Academy. The name of the area gave rise to the word ‘academy’ and all its derivatives, rather than the other way round. It was dotted with plane trees, and Plato often set the scene of his Socratic dialogues in the shade of a plane tree.

Growth (increment), cambium, phloem and wood

Growth takes place in the cambium, the thin layer of growth tissue between the xylem (wood) and the phloem (the tissue that conducts food throughout the tree, situated under

the bark). The cambium adds one layer of wood each year, outside the one laid down the previous year. Trees thus do not ‘shoot up out of the ground’, as some people think — a nail driven into a tree stem will remain at the same height above ground level even as the tree grows taller.

A tree’s height growth levels off before its girth growth — as is the case with humans. The height growth is much less affected by competition with other vegetation than is the girth growth, so trees growing close together tend to become slender, whereas those which grow alone tend to become stout. See *Free-growing trees*.

The fastest wood increment is not obtained in the tropics, as one would think, but in the warm-temperate and subtropical zones — southern Brazil, South Africa, Chile, New Zealand, Australia, Portugal, northern Spain and such countries. The reason for the relatively slow growth in the humid tropics may be that because the nights are warm respiration continues during the night, burning up some of the gains from photosynthesis during the day. In the warm-temperate and subtropical zones, on the other hand, with their cooler nights, the tree factory ‘shuts down’ during the night, thus locking in the gains made during the day.

Guernica (Basque: Gernica)

The ancient oak tree (‘The tree of Guernica’ or *Guernikako arbola*) in the town of Guernica y Luno in the Spanish Basque province of Vizcaya (Biscay) was revered by the Basques because their elders used to hold their councils under its branches already in the Middle Ages. It was destroyed in a bombing raid in 1937 during the Spanish Civil War, an incident which inspired Picasso’s painting *Guernica*.

Today the original tree is a mere stump, but after Franco died and the autonomy of the Basque province was restored, a new oak was planted in the same place, from an acorn or a cutting from the former 300-year old tree.

Guitar

The backs and sides of this instrument are ideally made of Brazilian rosewood, but because of the ban on that wood they are now more often made of Indian or Madagascan rosewood. The soundboards used to be made of spruce, but are now usually made of cypress or cedar.

Hadrian's Wall

The building of the 118-km (73-mile) defensive Hadrian's Wall by the Romans in the second century AD somewhat to the south of today's border between England and Scotland led to much deforestation on the English side, partly to create an obstacle-free military zone, partly to grow crops and graze animals for the 9,000 to 14,000 soldiers stationed along the Wall, and their camp followers, partly to provide building timber for the forts along the wall, and finally also to provide fuelwood. The construction of the turf-and-wood fort in Carlisle alone, built in AD 72-3, needed several million cubic feet of timber. Cf. *Vindolanda*.

The 58-km (36-mile) Antonine Wall built some 160 km (100 miles) further north by Hadrian's successor as emperor, the good and therefore almost unknown Antoninus Pius, presumably also led to much deforestation.

Halland

Coastal county in SW Sweden, whose beech and oak forests were so heavily overcut in the 1500s and 1600s for the construction of ships and fortifications (the area was fought over by Sweden and Denmark), that they were replaced by vast areas of heather yielding only rough grazing for sheep and goats; and, worse, by drifting sands, although these have today have been controlled by re-introducing forest plantations.

Hardwoods ('broadleaved' species) vs. softwoods (conifers)

'Hardwood' and 'softwood' are botanical terms, relating to the characteristics of flowers and seeds, not to the wood, and as such the terms are misnomers. Some 'hardwoods' are very soft, like balsa, while some 'softwoods' are quite hard, like the podocarps. A 'hardwood' is the same thing as a 'broadleaved species', and a 'softwood' is the same thing as a conifer. 'Broadleaved' is also a misnomer, for some 'broadleaved species' ('hardwoods') have needle-like leaves, like the Casuarinas, while species which botanically speaking do not belong to the category of 'broadleaved species' do in fact have quite broad leaves, like ginkgo. Of the four terms in the above heading, the one which is least of a misnomer is 'conifer', 'bearer of cones', and the best practice in all this mess is therefore to speak of 'conifers' and 'non-conifers'.

Hardy, Thomas

One of the novels of the English writer Thomas Hardy (1840-1928) from Dorset was *The Woodlanders*. It is set in the forests of the fictitious region of 'Wessex' in south-west England. The villagers depend for their living on the trees around them, and their lives are governed by the slow changes of the seasons. One of Hardy's earlier and less well-known novels was *Under the Greenwood Tree*.

Harvester

Modern computerised logging machines called 'harvesters' fell, debranch and crosscut trees. Each machine can harvest 400 tons of wood a week, whereas a man with a chainsaw can only harvest 25-30 tons. The UK Forestry Commission has 50 harvesters, which do about 80% of its total wood harvest.

Hashish and marijuana

Many forest reserves in Pakistan, Hawaii and elsewhere shelter vast illegal plantations of Indian hemp, from which hashish and marijuana are made.

Hercules' Sixth Labour

Hercules used a rattle to mimic the sound of a forest fire in order to get rid of the dangerous birds which lived in the marshes bordering Lake Stymphalus at the foot of Mount Cyllene.

Hesse, Hermann (1877-1962)

The great German writer Hermann Hesse wrote, in *Wandering*: 'Trees are a sanctuary. A tree says: "A kernel is hidden in me, a spark, a thought, I am life from eternal life". A tree has something to say to us: "Be still! Be still! Look at me!"'. And: 'Trees are shrines. He who talks and listens to them, learns the truth. They don't preach doctrines and prescriptions, ... they teach the primary law of life.'

Hewers of wood (wood cutters)

When the Israelites had crossed the Jordan river and subdued the previous inhabitants of Palestine, their princes said: 'Let them live, but let them be hewers of wood and drawers of water unto all the congregation' (Joshua 6:5).

High Wycombe

Town situated in Buckinghamshire, England, NW of London, at the foot of the Chiltern Hills. It has for a long time been a centre for the manufacture of furniture (see also *Bodger*), especially furniture made from local beech wood, and formerly also from elm wood until the Dutch Elm Disease put an end to that. Today the furniture industry in High Wycombe has decreased considerably, in number of firms as well as in volume and value of output.

Hill forests

Forests on steep land are often richer in biodiversity than forests on the surrounding level lands, because the steep lands may never have been farmed or otherwise disrupted, and may thus provide a link back to ancient forests.

Hollow trees

The centre of trees is generally dead. All the transport of water and nutrients takes place elsewhere, so it is not serious if the centre rots away. After all, species like bamboo are hollow from the beginning, and a pipe can be as strong as a solid rod of the same material and weight. In fact, the rotting away of the centre is a rather clever way of recycling the dead material into nutrients for the tree. Trees *are* very clever, that is why they have survived for so long.

Hong Kong

Contrary to popular belief, Hong Kong is not all built up. The total area of the territory is 105,400 ha, of which only 13% is urban; the rest is under forests, plantations, shrublands, savanna and grasslands. Until the 1950s both tigers and leopards roamed the wilds of Hong Kong.

Huis ten Bosch

The palace Huis ten Bosch, meaning ‘House in the Forest’, is the official residence of the monarchs of The Netherlands. Built in 1640 it is situated in the ancient forest *Haagse Bos* on the outskirts of The Hague. In fact, one can say that if it wasn’t for that forest, The Hague may not have existed at all today, and it certainly wouldn’t have been such an important city – with the queen, the government and many international organisations – because the town grew up around the hunting lodge of the counts of Holland, and the hunting was mainly in the *Haagse Bos*, or the *Haghe* (enclosure) as it was known. In fact, the official name of The Hague is s’Gravenhage, ‘The Count’s Enclosure’.

Hunt, Leigh

The English poet (James Henry) Leigh Hunt (1784-1859), like his fellow romantic poets William Wordsworth and John Clare, loved trees, and he wrote: ‘Everyone should plant a tree who can. It is one of the cheapest as well as easiest of all tasks They are green footsteps of our existence, which show that we have not lived in vain’.

Hunting

The English writer George Orwell (1903-50), who had been assistant district superintendent in the Indian Imperial Police in Burma, wrote in *Burmese Days* (1934) that people become foresters because they like to shoot tigers and other big game. Perhaps this was true for British colonials at that time, but today, particularly in northern Europe, foresters are generally more interested in preserving the animals in the forest than in killing them. Anti-poaching work is in fact an important and dangerous part of the duties of foresters in many countries. Hunting fees can provide considerable forest revenue.

During feudal times, hunting by the kings and the nobles was the main use of the forests, and ferocious punishments were meted out to poachers and deforesters. In Swedish the term for forest officer is *jägmästare*, ‘hunting master’, which reflects the main task of foresters in the olden days. In the formerly communist countries of Central Europe hunting was a perk of the politically powerful, and as a result the forests of, especially, Poland are overstocked with deer (damaging the tree seedlings) and with wild boar (damaging the farms around the forest). In Western Europe, on the other hand, hunting is primarily the sport of the economically powerful. It confers social status — the more animals you kill, the more upper-class you are. This can be turned to good advantage by governments and

other forest owners, who can earn considerable revenues from shooting fees; animal populations have to be culled, or they will destroy the environment, so the forest owners might as well turn a profit from it. In the USA, hunting is primarily a working class pursuit.

In developing countries too, hunting as a sport is important, and in some parts of the Sahel just about the only forests which have been preserved are those which for long have been the hunting reserves of the elites. Some such 'islands' of forest in an otherwise denuded landscape prove that desertification is mostly due to man, rather than to climate change. In the developing countries, however, hunting for the pot is far more important, as it used to be in Europe before the feudal era; see *Bushmeat* and *Poaching*.

Hurricanes, cyclones and typhoons

Winds with a speed of more than 120 km/hour are known as 'hurricanes' over the Atlantic, 'cyclones' over the Indian Ocean, and 'typhoons' over the South China Sea. They tend to cause much damage in plantations of exotic species, but little damage in the indigenous forests, which developed to withstand that natural weather condition. Unfortunately the indigenous forests in the hurricane regions are less useful to man from the timber production point of view, although they have other uses.

Ice ages and forests

During the ice ages so much of the earth's water was tied up in the ice caps that the rainfall decreased and the area of forest shrank. It retreated to 'refuges' where the rainfall was higher than elsewhere. There it survived these dry periods, and from there it expanded again after the end of each ice age. In Europe, for example, pine recolonized the continent from refuges on the west coast of Ireland, while beech spread from Italy and the Balkans. As the last ice age 'ended' (see *Global warming*) only about 10,000 years ago, most forests in the northern hemisphere are of rather recent origin.

Today there is much concern about the increasing carbon dioxide* (CO₂) level and the global warming and sea level rise which that leads to, but too little CO₂ is not good either because it could bring about another ice age. The forest is a good buffer for regulating the CO₂ level, absorbing or releasing the gas according to need. Today, for example, to counteract the increased CO₂ emissions, we need more forests and plantations.

Iceland

Iceland has virtually no forests, not because its average annual temperature is particularly low, but because it does not receive enough heat during the *summer* months — see *Tree limit*. It was colonized by Norwegian Vikings in 930 AD (before that only a few Irish hermits lived there), and already during that century there were, according to the Icelandic sagas, imports of not only timber but even of a low-value product like fuelwood. On the other hand, in Nial's Saga, in the chapter called 'The Enmity between Hallgerd and Bergtora', there is the following passage: 'In Raudaskridur they owned a forest together, Nial and Gunnar. They had not divided it up between them, but would cut as much as each needed.' Raudaskridur was in SW Iceland. Later in that saga the author mentions that the forest in question gave not only fuelwood and wood from which charcoal was made, but even timber for construction. The fact that Nial and Gunnar had not bothered to divide up the forest between them seems to indicate that wood was not all that valuable.

Perhaps it was a birch forest, birch being the last trees to disappear in north Europe as the tree limit is approached.

'Iceman'

The approximately 5,300 years old mummified 'iceman' found in a ravine in the Ötztaler Alps in 1991 was from the interphase between the stone age (his arrowheads and dagger were of flint) and the first of the metal ages (his axe was copper-bladed). He carried the following tree and shrub products: a hazel-wood spine reinforcing the quiver; 14 arrows made of viburnum and dogwood (*Cornus* spp.) branches — the heads and the feathers were glued to the arrows with birch gum; a dagger handle made of ash wood; a backpack frame of hazel wood; two pieces of tree fungus with antibiotic properties; a handle made of linden-tree wood and shaped like a fat pencil with a hard object embedded in one side (a scraper or sharpener of some kind?); a sloe berry (sloe or blackthorn — *Prunus spinosa* — is a shrub or small tree up 5 m high); two canisters of birch bark; a six-foot long bow made of yew wood; and, inside one of the canisters, maple leaves and charcoal (embers from an earlier fire?).

Ida, Mount (Greece)

‘Ida’ (also spelled ‘Idi’, Ídhi and Idha), the name of the mountain on Crete where according to legend Zeus was reared, means ‘timber tree’.

Idols

In the biblical Book of Isaiah (44:14-17) there is the following passage satirizing an idol-worshipper:

‘He cuts down cedars, or perhaps cypress or oak, which he had let grow among the trees of the forest; or a pine which he had planted ... Half the wood he burns in the fire; over it he prepares his meal, and he eats his fill. He also warms himself ... From the rest he makes a god, his idol; he bows down to it and worships.’

It is interesting that the text mentions tree-planting. Spontaneous planting by individuals of trees other than fruit trees – i.e. tree-planting other than that induced by government or foreign projects – is unusual in the developing countries today. Where it occurs, it is generally the sign of an advanced stage of deforestation and wood scarcity. The text reference indicates that deforestation may have proceeded relatively far in Palestine already at the time when the Book of Isaiah was written, in the eighth century BC.

Illegal logging

Logging can be good, because it creates jobs and it keeps the forest young and vigorous, but illegal logging is bad. It can upset careful planning, destroy forests, and cause huge losses of revenue to the forest owners. Although illegal logging is not confined to developing countries, it is more difficult to control there, because their governments are weak. Forest certification* may be the most effective way of controlling illegal logging.

Inca civilization

Pollen analysis by the University of Cambridge’s plant sciences department has shown that vast areas of the central Andes mountains which are today treeless were once forested but that deforestation was well advanced already 4,000 years ago, long before the Inca civilization arose. It is thought that this civilization was brought down as much by problems of soil and water as by Francisco Pizarro and his soldiers.

Indo-European homeland

From what we know about the Indo-European protolanguage, spoken more than 5,000 years ago, its tree vocabulary fits the landscape of eastern Anatolia. It had words for ‘mountain oak’, ‘birch’, ‘beech’, ‘hornbeam’, ‘ash’, ‘willow’ or ‘white willow’, ‘yew’, and ‘pine’ or ‘fir’. There is also a ‘beech argument’ and an ‘oak argument’ in favour of a more northern origin of those languages, but they fit the data less well than the Anatolian hypothesis.

Iron industry

Until the 19th century charcoal was used to process iron ore into iron. This led to a huge demand for wood, e.g. in the area known as The Weald* (meaning ‘the forest’) in SE England, and it gave a relative advantage to a country like Sweden which was rich in both iron ore and wood. Then a method was invented in England for making iron with coke instead of charcoal as fuel, and much of the iron industry moved from Sweden to England, releasing the Swedish wood for other uses – see *Glass-making*.

Isabella ‘Plantation’

Plantation of 17 ha of oak, beech and sweet chestnut in SW London, established and enclosed in 1831. Some of the oaks there are much older. About a third of the plantation is conservation area, not open to the public, and more densely forested; it provides a sanctuary for wildlife.

Richmond Park, in which Isabella Plantation is situated, is one of the top five sites for ancient trees in Britain. There are about 1200 such trees there, most of them oaks. Cf. *Ancient woodland*.

Ituri Forest

The Ituri forest in NE Congo-Kinshasa, west of Lake Albert, mostly north of the Ituri River, and near the border with Uganda, is best known for its pygmies and its okapis, but is also botanically very interesting. The Welsh explorer Henry Morton Stanley crossed it in 1887 and 1888, and described it enthusiastically.

Iwokrama

Commonwealth-run research programme in central Guyana on how the tropical rain forest can be sustainably managed and yet contribute to economic and social development. The programme was proposed by the Government of Guyana during a Commonwealth conference. Beginning in 1989, it manages 360,000 ha of pristine tropical rain forest in an area populated by Amerindian tribes. One of the meanings of the word *iwokrama* in the local Amerindian language is ‘refuge’.

Japan

Japan is generally thought of as consisting almost entirely of rice fields and cities but actually two thirds of its land area is covered by forests, a higher percentage than in either Norway, the USA, Canada, Sweden or Russia. Even in absolute terms its forest area is considerable: 24 million ha, which is equal to that of Sweden and bigger than that of Finland. And yet the wood production in Japan is less than half of what it is in Sweden, because the Japanese forests – like the ones in Central Europe – are super-conservatively managed. Japan uses enormous quantities of wood, but prefers to import it.

Jesus Christ

According to Mark, Jesus was a carpenter, whereas according to Matthew it was his *father* who was a carpenter. Possibly they both were, considering that sons, especially in those days, often followed in the same occupation as their fathers.

Many tree-related sayings and events are associated with Jesus, e.g.:

‘No good tree bears bad fruit, nor does a bad tree bear good fruit. ... The good man brings good things out of the good stored up in his heart, and the evil man brings evil things out of the evil stored up in his heart.’ (Luke 6:43-44)

‘The kingdom of heaven is like a mustard seed, which a man took and planted in his field. Though it is the smallest of all your seeds, yet when it grows it is the largest of garden plants and becomes a tree ...’. (Matthews 13:31-32) This is puzzling, because most mustard plants are small herbs, but it probably refers to *Sinapsis nigra* which in Palestine grows into a small tree with a height of about three metres. Tolstoy, in his book *The Gospel in Brief*, changed ‘mustard seed’ to ‘birch seed’, more familiar in his country. The birch seed is indeed very tiny, but even it does not grow into a huge tree.

‘Look at the fig-tree, and all the trees. When they sprout leaves, you ... know that summer is near. When you see these things happening, you know that the kingdom of God is near.’ (Luke 21:29-31)

Or, on his way to be crucified, foreseeing a terrible future for Jerusalem, he said: ‘If these things are done when the tree is green, what will happen when it is dry’ (Luke 23:31).
Forty years later Jerusalem was besieged and destroyed.

Job creation during recessions

Forestry is a good engine of job creation during recessions and depressions because of its long production cycle. If, for example, taxpayers’ money is used for subsidising the car industry during an economic downturn in order to preserve jobs, as was done in 2009 in Europe and the US, the result is that ever more cars pour onto a shrinking market, but if the money is instead used for afforestation or forest improvements, the resulting production increase will come many years later when the market has hopefully recovered.

Jo Utra willow tree, Tibet

The Jo Utra, ‘Buddha’s hair’, was a huge twin-stemmed willow tree which used to grow outside the main entrance to Tsuglagkhang, the most sacred of Tibetan temples, in Lhasa. Now it has apparently been wrecked by vandals, and only the trunks remain.

Jungle

Tropical mixed hardwood forest. The word has Kiplinguesque and Indian connotations. It is derived from the Sanskrit *jangala*, which actually meant not only forest but also desert, i.e. uninhabited areas in general, in the same way that the word ‘forest’ is derived from the Latin *foris*, which meant ‘outside’ — outside the inhabited areas. The word ‘jungle’ is sometimes used synonymously with ‘rain forest’ or ‘moist tropical forest’, but in fact much of what is called ‘jungle’ in India is drier and more open.

The British writer and publisher Leonard Woolf (husband of Virginia Woolf), who was in the British Colonial Service in Sri Lanka from 1904 to 1911 and who wrote a novel called *Village in the Jungle*, said that ‘All jungles are evil’, and he had a point, at least in the sense of ‘moist tropical forest’ as it exists in Sri Lanka; it is not an easy environment for man, although very rich in biodiversity. I remember visiting a moist tropical forest of Sri Lanka, and in less than ten minutes I had bunches of leeches hanging onto my shins. Perhaps that is one of nature’s ways of protecting this rich gene pool.

Cf. Civilization, forest.

Juvenile wood

Wood formed during the first few years of a tree’s life, i.e. at the centre of logs. This wood is weaker than the rest, and contributes to warping. Often ‘boxed out’ during sawing, and used for particle board or pulp, where its weakness is less of a drawback.

Karlskrona

In 1679 the town and port of Karlskrona on the Baltic Sea in south-east Sweden was chosen as Sweden’s chief military naval base because of the high number of oaks in the region, oak being in those days the prime material for ship-building. The Admiralty Church, built in 1685, is the largest wooden church in Sweden.

Katyn forest

Katyn forest near Smolensk in west Russia was the scene of the murder of some 20,000 Polish officers and other members of the Polish elite by the Soviet government in 1940, during the second world war. The execution order was signed by Stalin and the secret police chief Beria. It was a Russian forester who told the Germans about the crime, although when the Soviets reconquered the area he was forced to renege. Young pine trees were growing over the mass graves when they were found in 1943. A forest consultant who was called in as expert witness estimated the age of the pine trees at about three years, which dated the massacre to the spring of 1940.

Unfortunately, the very seclusion which can be the charm of many forests can also provide cover for the perpetration of horrible crimes.

Kerimäki, Finland

The wooden church in Kerimäki, Finland, built in 1847, is reputedly the biggest wooden church in the world. It seats 3,300 persons, half the town's population. See also *Saint Peter and Paul Cathedral*.

Kett, Robert

'Kett's Oak' grows next to the B1172 road 12 km south of the town of Norwich in Norfolk, England, on the place where the folk hero Robert Kett led a popular revolt in July 1549 against the trend (already then) to enclose land for sheep pasture and in the process cutting off rural communities from their common land. Cf. *Commons* and *Lacandon forest*.

Khaki

During World War I the khaki uniforms were dyed with a substance called maclurin obtained from *Chlorophora tinctoria*, a tree from the tropical Americas of the mulberry family.

Kielder forest

With a total area of 60,000 ha, this is the biggest forestry plantation in England. It is situated in Northumberland, along the upper reaches of the North Tyne River. Established from the 1920s onwards by the Forestry Commission, which now owns it, it is composed mainly of Sitka spruce, but 10,000 ha have been left unplanted and include some of Britain's rarest habitats, the Border Mires. Stream banks have also been left unplanted, and the original broadleaved trees are re-establishing themselves there. One area has been planted to Scots pine for the benefit of the red squirrels*, and Kielder forest is now one of their last strongholds in Britain. Before the Forestry Commission acquired the land it was a biological desert inhabited mainly by sheep and grouse.

Today the forest helps reduce flooding, and filters the water for the Kielder reservoir which supplies water to the industries, towns and cities along the Tyne river. Recreational access is encouraged, too. Kielder forest is a good example of the multiple benefits provided by a wisely managed forest.

King's timbers

Coniferous trees in New England which were selected in colonial times to be reserved as masts for the Royal Navy. By the time they were ready to be felled, America was independent. Some of them are still standing. At the time of selection they were already more than 100 years old, and today some of them are up to 400 years old.

Knysna (South Africa)

This small town on the south coast of South Africa, between Cape Town and Port Elizabeth, used to be the main forest centre of the country. The wood famine which plagued the European settlement at the Cape from its foundation in 1652 was only broken when the forests in the Knysna area were discovered in the beginning of the 18th century. They are of the Afromontane* type which in the Southern Cape occurs at sea level, and in East Africa at 2,000 to 3,000 meters' altitude. The name 'Knysna', pronounced 'Nize-nah', is thought to be of Khoikhoi (Hottentot) origin, and meaning 'fern' or 'wood'.

Koala (*Phascolarctos cinereus*)

This 'tree teddy bear' of Australia feeds on eucalypt leaves. To cope with such indigestible fare, its intestine is about 7 metres long. The koala's main enemy is forest fire. There are fewer koalas in Australia today than there were a hundred years ago because some 80% of the eucalypt forests on which the koalas depend have been converted to other land use since the white settlers arrived. Today the koala has become a threat to the remaining eucalypt forests.

Kon-Tiki

Balsa*-wood raft on which the Norwegian scientist Thor Heyerdahl and five companions in 1947 sailed the 7,000 km from Peru to the Tuamotu Islands in the Pacific to prove that Polynesia *could* have been populated from South America. The raft was made of nine balsa logs tied together with hemp ropes; the bow and the centreboards were made from pine, the mast and the steering oar of mangrove, and the cabin of bamboo. No metal was used in the construction. Kon-Tiki is now in a museum in Oslo.

Koran (Qur'ān)

In the Koran fuelwood is regarded as a natural resource. God says to man: 'Is it you who grow the tree which feeds the fire, or do I grow it?', meaning that he, God, does it. That

may have been the case in antiquity, even in arid Arabia, but for centuries now it has been necessary for man to establish fuelwood plantations.

Kumasi (Ghana)

The city of Kumasi in SW Ghana is called after a *kum* tree under which the Ashanti king who founded the city in the 17th century conducted the land negotiations. Today Kumasi is the ‘forestry capital’ of Ghana.

Kyoto Protocol

In the Kyoto Protocol, the very expensive and cost-ineffective 1997 agreement on the reduction of greenhouse gas emission signed by most countries but not by the two main emitters China and the United States, carbon sequestration by new forest growth is allowed to be counted as carbon reduction.

Lacandon Forest, Mexico

The Lacandon forest or jungle was the venue of the August 1994 National Democratic Convention, attended by some 5,000 representatives of workers, peasants, Indians and students, as well as by writers, politicians and intellectuals. It had been organized by the Zapatista leader *subcomandante* Marcos, who had led the uprising in the state of Chiapas on New Year’s Day 1994. That uprising too had a forest connotation, as the insurgents had come out of the surrounding jungle, and melted away into it again when the government troops appeared. Marcos has been called the Robin Hood of Mexico, the green hood of the former replaced by the black balaclava of Marcos, and Lacandon jungle has been called Mexico’s Sherwood Forest. In 1997 45 villagers were killed by paramilitaries.

One of the main causes of the Chiapas uprising was that although the communal ownership of Indian land had been guaranteed by Article 27 of the Mexican constitution of 1917, that was amended in 1992 when land was virtually turned into a market commodity, in the name of structural adjustment, forest reform and efficiency. Cf. *Shining Path*.

Lammas shoots

Oaks whose leaves have been severely attacked by insects or micro-organisms have the ability to send out a second crop of young shoots and leaves called ‘lammas shoots’

because they are out by the first of August, ‘lammas’, the old pagan harvest festival. The leaves of this second crop are very rich in tannins, which makes them unpalatable to the tree’s predators. Cf. *Agony shoots*.

Land mines

Mine fields, being no-go areas, become the strictest of nature reserves, but at a terrible price. Nowhere in the Zambezi valley, or in northern Mozambique, or in Angola, to mention only a few examples, is the forest denser than in the old land mine fields.

Nowhere, that is, except perhaps in areas infested with river blindness or tsetse fly. So what is bad for man is often good for the forest, and vice versa.

Language diversity

Countries with a good deal of forest also tend to have a high level of language diversity, which is what one would expect, considering that forests have traditionally been barriers; e.g. New Guinea or the Amazon. Cf. *Frontiers*.

Leaf

The leaves and needles of trees serve the dual purposes of photosynthesis and evapotranspiration, the latter creating a suction which causes the roots to absorb water and nutrients from the soil. See also ‘*Sap circulation*’. There is a connection between leaf shape and climate. For example, leaves tend to be smaller in dry climates, and leaf edges are generally smooth in the tropics and jagged in temperate areas.

Leafy

The word ‘leafy’, in the sense of ‘well endowed with trees’, as in ‘a leafy suburb’, has come to mean ‘affluent’. Cf. *Urban forests*.

‘Leaves on the line’

In Britain tree leaves on the railways lines often delay trains in the autumn by causing what is known in the railway jargon as ‘poor rail adhesion’. Train wheels spin on the leaves causing wear in the track, or they slide creating ‘flat-spots’. The problem is exacerbated by the fact that electrified trains in the UK derive their power from a rail, not from an overhead cable like in many other countries. In 1999 the UK company Railtrack estimated

the resulting damage at £10 million per year. A company working for Railtrack, using computers and long-term weather forecasts, calculates when and where ‘peak leaf fall’ is likely to occur. Railtrack has spent £30 million on equipment to keep the lines clear, and runs special trains to clean tracks with water cannons. Railtrack estimates that a mature tree in the UK has 10,000 to 50,000 leaves.

The railway management would like to keep 10 m free of trees on either side of the tracks, as is done in some other countries, but that idea is not popular with the environmentalists, nor with the public. Network Rail fells many trackside trees, and the Save the Trees campaign fights that. The problem of leaves on the railways lines, and the enormous cost of collecting and disposing of fallen leaves each autumn, highlights the desirability of moving from deciduous to evergreen trees. Cf. *Deciduous* and *Evergreens*.

Lebanon

The Lebanese flag has a picture of the Cedar of Lebanon in the middle. The reason why the ancient city of Byblos, modern Jubayl 32 km north of Beirut, grew to prominence during the second millennium BC was that it was the main harbour for the export of timber to Egypt. It was also an exporter of papyrus, and the word ‘Bible’ is derived from ‘Byblos’.

Leshy

In the mythology of the Slavonic peoples this creature lives in heavily forested areas. A leshy is generally good-natured, in contrast to the Germanic trolls who are grumpy and sometimes malicious.

Les Landes

Les Landes (meaning ‘the moors’, ‘the heathlands’, ‘the wastelands’) is a sandy area in south-west France, south of Bordeaux, north of the French Basque country (*Pays Basque*), east of the sand dunes along the Atlantic Ocean, and west of Mont-de-Marsan. Altogether it has an area of 1.4 million ha. Until the second half of the 19th century it was marshy, but then it was drained by canals, and the biggest forest of France was established there. The species is almost entirely maritime pine (*Pinus pinaster*), which until after the 1939-45 war was widely tapped for resin, from which turpentine was manufactured. Today the forests produce mainly pulpwood and sawlogs.

Such a conversion from, in this case, virtually unproductive wetlands to productive forests could hardly have taken place today, considering the contemporary bias in favour of wetlands and against plantations, but it has converted a sandblown wasteland to a highly productive area supporting many jobs.

Liberia

Liberian timber revenues financed fighting in Liberia and surrounding countries when Charles Taylor ran the country, so in 2003 the UN Security Council imposed sanctions prohibiting timber imports from Liberia. Ellen Johnson-Sirleaf, elected President of Liberia at the end of 2005, made it her first administrative act to scrap all the timber concessions issued by the former regimes. The total area of those concessions exceeded not only the total forest area of the country, but the total area of the entire country. See *Timber wars*.

Light-demanding vs. shade-tolerant species

Tree species are sometimes described as ‘light-demanding’, ‘shade-tolerant’, and even ‘shade-demanding’. Examples of light-demanding trees are pine, birch and aspen in the temperate zone, or okoume (*Aucoumea klaineana*) in the tropics. These are fast-growing pioneer species which jump in wherever there is an opening in the canopy, whether created by man, wind, fire, lightning, insects or other factors. In Gabon they say that ‘okoume is the child of fire’, meaning that it is plentiful on abandoned slash-and-burn fields.

Examples of shade-tolerant and shade-demanding tree species, on the other hand, are spruce in the temperate countries, and most of the dark and heavy tropical hardwoods. Such trees shun clearfellings. They come up later, under the light-demanding pioneer species. In areas where forest recreation is very important, shade-tolerant trees should be given preference, as they can be harvested with selection felling rather than clearfelling, the latter system being very unpopular with the public.

Linnaeus, Carl von (1707-78)

The Swedish botanist Linné, or ‘Linnaeus’, the Latinised form by which he is generally known outside Sweden, was an enthusiastic proponent of slash-and-burn agriculture. In his book about his journey to Skåne or *Scania*, the southernmost province in Sweden, he wrote: ‘The people of Småland [the more forested province to the north of Skåne] obtain by means of slash-and-burn wonderful yields of grain from otherwise completely useless

forest, and after that good grazing for some years'. However, Linnaeus's influential patron Carl Hårleman (1700-1753) considered slash-and-burn to be a very harmful practice and pressured Linnaeus to omit this passage from later editions.

In the same book Linnaeus talks about the ploughed fields of Skåne as being the most beautiful landscape he had ever seen. This, and his above-mentioned remark about the 'useless forest', is typical of the pre-Romantic era, which appreciated the man-made landscape much more than the wilderness.

In his classification of plants, for which he is best known, Linnaeus groped in the dark, because the idea of evolution was not yet known. Today when DNA analysis has made it possible to classify plants according to common descent rather than according to similar floristic features, surprises have resulted, e.g. that the plane-tree (*Platanus spp.*) is related to the lotus plant, and the papaya tree (*Carica papaya*) to the cabbage

Linnaeus's surname was originally 'Bengtsson', but when he was knighted he took the name 'von Linné' ('Linnaeus') from a famous linden tree (*lind* in Swedish) in his home region.

Litter, forest

The word 'litter' usually has a bad connotation because we associate it with the rubbish which too often lies on our streets, but in forestry the term refers to the dead leaves and twigs which cover the forest floor. Forest litter is usually a good thing, reducing soil erosion and adding nutrients to the soil. Sometimes, however, especially in cool areas where decomposition is slow, the litter can build up so that seeds have trouble germinating and reaching the soil. Then one has to burn, use a mechanical rotavator, or resort to pigs which root about in the soil searching for food.

Logboat

Boat made from a single log. Used in Europe in earlier days, and still much used in the developing countries. A logboat excavated from the mud banks of the Thames river near Kingston, Surrey, was dated by tree-ring analysis to the period 870-1000 AD, i.e. Anglo-Saxon times; it was made of oak, and so was its paddle; tests with a replica have shown that it could carry three persons; it would have taken two or three skilled persons 14 days to make it.

Of the six wooden canoes or logboats from about 1100 AD found in the Arun valley in 1964, five were made from oak and one from elm. Cf. *Dover Boat*.

Logging concession

In the tropics the situation is nearly always that the forests are publicly owned (generally by central governments, sometimes by clans or other local communities), but logged by private firms. The latter pay various fees for the right to log the forests, and the right is known as the 'logging concession'. Normally these concessions are arbitrarily allocated, and the fees are considerably below the market rate. The result is, predictably, corruption on an massive scale, with the public officials and the private firms sharing the loot, i.e. the difference between what the concessionaires would be willing to pay and what they actually get away with paying. The solution would be to allocate the concessions by means of competitive tendering, but for the reasons indicated above this is fiercely resisted, and many spurious reasons are given for why it is 'impossible'.

Logjam

A deadlock or impasse. The expression *logjam* comes from the days when vast quantities of logs were floated down the rivers to factories or ports. Occasionally the logs got stuck and piled up, creating an obstruction in the river. See *Floating or driving timber*.

'Log revolution'

The Croats called the Serb separatist rebellion in Knin, Croatia, in August 1990 the 'log revolution' because the Knin Serbs used tree logs to barricade the roads.

London street names

142 London street names begin with 'oak', 49 with 'beech', 26 with 'birch', 22 with 'chestnut' and 11 with 'pine'.

London trees

The London Tree Survey of 1992 recorded more than six million trees, almost one tree per inhabitant. Some of these trees are of outstanding merit. About two thirds of the woodlands of London are registered as ancient woodlands. An organisation called The London Tree Forum is identifying trees which are either very old, very big, of an interesting or unusual

shape, culturally or historically significant, associated with a famous person or event, or of particular importance to wildlife. By the end of 1998, the first 32 Great Trees of London had been chosen. If the glory of Paris is its buildings, the glory of London is, one might say, its parks. Unfortunately many of London's trees are maltreated – see *Pruning, topping, pollarding and mutilation of trees*.

Lumberjills

The 'lumberjills' were the female lumberjacks who did much of the hard and sometimes dangerous work in Britain's forests during the war. They were part of the Women's Timber Corps (WTC) which again was part of the Women's Land Army. The WTC was set up in 1942 and disbanded in 1946. In 2007 a memorial statue to the lumberjills by the artist Malcolm Robertson was set up at the Forestry Commission's David Marshall Lodge in Aberfoyle, Stirling, Scotland.

Maathai, Wangari

Kenyan woman professor of veterinary anatomy and assistant environment minister who received the Nobel Peace Prize in 2004 for having started the mainly women's Green Belt Movement which planted more than 30 million trees in 20 countries between 1977 and 2004. In contrast to most other treeplanting projects, the beneficiaries of Prof Maathai's projects were paid for every seedling that survived. This is very contentious because the farmers are not paid for planting their crops, and if they get used to being paid for planting trees, it will become too expensive for many developing countries to encourage treeplanting. Perhaps the payment can be justified by external benefits yielded by the trees, i.e. benefits not only to the planter.

Madeira (the island)

Called after the wood – *madeira* means 'wood' in Portuguese – in which the island was originally so rich. The original dense forests were felled and burned (the fires are said to have raged for seven years), and much land was brought into cultivation.

Magna Carta, 1215

The Great Charter of rights granted by King John of England to the people, or at least to the rich people. The final version of the charter was agreed upon in a meadow called Runnymede, beside the river Thames, between Windsor and Staines, near where Heathrow airport is today. In his greeting at the beginning of the charter, King John specifically mentions the forester, and the ensuing charter contained a number of clauses relating to forests, for example:

(31) Neither we nor our bailiffs will take, for castles or other works of ours, timber which is not ours, except with the agreement of him whose timber it is.

(44) Men who live outside the forest need not henceforth come before our justices of the forest upon a general summons, unless they are impleaded [prosecuted] or are sureties for any person or persons who are attached for forest offences.

(47) All forests that have been made forest in our time shall be immediately disafforested [i.e. not deforested, but no longer included in the royal hunting reserves].

(48) All evil customs connected with forests and warrens [game reserves], foresters and warreners [gamekeepers], sheriffs and their officials, river-banks and their wardens shall immediately be inquired into.

Malta

Fuelwood has always been scarce on Malta, so a slow cooking method (simmering) and a stove called *kanur* were developed which used fuelwood very economically. The stove was a stone hearth requiring constant tending and fanning; that was the price paid for the saving of fuel. Even when gas and electricity took over as the main household fuels on Malta, slow cooking remained a hallmark of the Maltese cuisine.

George Bernard Shaw is alleged to have said, rather unkindly, that if priests were trees, Malta would be a delightful place, referring to the fact that the island is relatively tree-less but the church there is very strong.

Mamre

In the Old Testament ‘the great trees of Mamre’ represented the furthest point on Abraham’s wanderings after he had left his home in what is today Iraq about 4,000 years ago to settle in what is today Palestine. Mamre was where Ramat al-Khalil is today, 3 km northwest of Hebron. When Abraham’s wife died, he bought a plot of land there on which to bury her, from a Hittite called Ephron: ‘So Ephron’s field in Machpelah near Mamre — both the field and the cave in it, and all the trees within the borders of the field — was legally made over to Abraham as his property’ (Genesis 13:18, 18:1 and 23:17).

In some Bible translations ‘the great trees’ is translated as ‘the great oaks’.

‘Mango tree court’

Malawian expression for ‘kangaroo court’, derived from the fact that the traditional courts are usually held under the biggest tree in the village, which nowadays is often a mango tree. Incidentally, the latter fact holds a lesson for rural tree-planting programmes in Africa, namely that a tree which gives food is less likely to be cut down.

‘Man is like a forest’

‘Man is like a forest. Be full of caution. In our being there are thousands of wolves and hogs. In our being there is the righteous, the unrighteous; the fair and the foul.’ From the Masnavi, Moslem post-Koran scriptures.

‘Marches’

‘Marches’ like in the ‘Welsh and Scottish Marches’, ‘Denmark’, or the Italian ‘*Marche*’, meaning borderlands, is derived from an old Germanic word meaning ‘dark’ (today *mörk* in Swedish and *mørk* in Danish), indicating that these regions were generally forested – see also *Frontiers*.

Marimba

Type of xylophone* (from the Greek words for ‘wood’ and ‘sound’); popular folk instrument in Africa, and in Central America and Mexico where the instrument may have been brought by African slaves, or perhaps even by pre-Hispanic contacts. The word is of Congolese origin. The Central American orchestral marimba is tube-resonated, played by

up to five persons at a time, and uses not only local woods but also African woods for the bars.

Marx, Karl (1818-83)

When Marx was editor of *Rheinische Zeitung* in the 1840s, his first major article dealt with the more stringent laws which had been introduced criminalising the customary right of local people to gather dead fuelwood in the forest. As a result of this legislative change, 80% of all prosecutions in Prussia dealt with wood, and the proportion was even higher in the Rhineland. Marx argued that the state should defend the customary law. This article became a turning point in Marx's career, and influenced his decision to go to Paris to study French communism. Engels later said that he had 'always heard from Marx that it was precisely through concentrating on the laws of thefts of wood (and the dire conditions of the Moselle wine growers) that he was led to socialism'.

The same whittling away of traditional forest rights had contributed to the peasant wars in Europe of the 14th and 15th centuries, and to the recent Chiapas uprising in Mexico. Cf. *Commons, Epping forest* and *Lacandon forest*.

Mayan books

The four Mayan books (codices) known to have survived the book-burnings of the early Christian missionaries are written on fig-bark paper.

Mayan religion

Like most religions, the Mayan had many tree symbols. It was believed that four worlds preceded the present one. In one of those worlds men were made of wood, but, lacking souls and intelligence, and being ungrateful to the gods, they were punished by being drowned in a flood and devoured by demons. Four gods, the *Bacabs*, held up the sky, and two of them were associated with respectively the sacred kapok and the wild cotton tree (*yaxché*). One of the symbols of the maize god was a foliated cross or tree of life. He ruled over vegetation in general. His name, *Yum Kaax*, meant 'Lord of the Forests'. The fifteenth month of each year, *Muan*, was devoted to the cocoa-tree god. Most religious ceremonies ended in heavy drinking of *balche*, an intoxicating drink brewed from honey and tree bark.

Maypole dances

Ceremonial folk dances performed around a tall pole decorated with greenery or flowers; probably derived from ancient dances around a living tree as part of spring rites to ensure fertility. Occur throughout Europe, and also found in India and Mexico. In Europe these dances are typically performed on May 1, but in Scandinavia they are performed at midsummer. Being of pagan origin, they were once opposed by the church. May 1 Maypole dances are also important for the Morris dancers. A similar ceremony in ancient Rome was *Floralia*, called after Flora, the goddess of flowering plants.

‘May trees’

Formerly, engagements in Denmark were often contracted under ‘May Trees’, later under ‘Love Beeches’; there was a well-known specimen of the latter in Ballerup, which is today a suburb of Copenhagen.

McEwen, John

Scottish forester, 1887-1992, who devoted much of his later life to campaigning for land reform in Scotland so as to break the power of the landlords and end feudalism. In his honour, a John McEwen Memorial Lecture is given each year in Scotland. Now the Abolition of Feudal Tenure (Scotland) Act 2000 has been passed.

McNab, William

Scottish inventor (1780-1848) of a device for moving trees. Between 1821 and 1823, while curator of the Royal Botanic Gardens in Edinburgh, he used this device for moving the entire botanical collection from its old 2-ha site at Leith Walk to its present site, a distance of some 2.4 km. The biggest of the trees which he moved with the transplanter was 13 m tall. During the transport, the trees were held upright with a ball of soil around their roots. The transplanter was so successful that it was later commercially produced by an Edinburgh company.

Mendelssohn’s Tree

Gnarled old beech tree in the forest of Burnham Beeches, Buckinghamshire, under which the German composer Felix Mendelssohn (1809-47) is said to have composed some of his music, including some for *A Midsummer Night's Dream*. Mendelssohn visited England on ten occasions during his short life, his first visit being in 1829. The tree is no more, but a section of it is displayed outside the Barbican Centre in London.

Mendes, Chico

Ecologist and labour organiser in the Amazon area of Brazil, who helped the rubber tappers and nut gatherers resist the felling of the forest for, at the time, mainly ranching. He was murdered by a rancher and his son in the town of Xapuri in December 1988. The outcry after his death led the Brazilian government to create, in March 1990, a one-million hectare reserve for rubber tappers and their families.

Menominee forest, Wisconsin, USA

Indian-owned forest of some 90,000 ha which has been carefully managed on the selection system since the 1850s. The present Forest Manager, the Menominee Indian Mr Marshall Pecore, is the son and grandson of the forest's previous managers, providing a continuity which is important in forestry. Frequent inventories show that the timber volume of the forest is getting ever larger, and the forest looks like the virgin forests which once covered Wisconsin. Should be visited by all those people in North America who erroneously believe that logging always leads to deforestation. Cf. *Amerindian forestry*.

Methane

Some scientists say that trees and other plants produce tiny quantities of methane, a greenhouse gas. This has led some people to say that trees are after all not a good carbon sink – see *Carbon credits, carbon sequestration*. However, a careful experiment in Australia showed that the CO₂-equivalent of the annual emission of methane from trees was only one twentieth of their carbon sequestration, so their net effect was overwhelmingly beneficial. Other scientists argue that plants don't 'produce' methane at all, they only act as conduits from the soil to the atmosphere.

Miller, Arthur

Arthur Miller, 1915-2005, the American writer of plays and novels, loved wood, woodwork, trees and forests. In an interview recorded shortly before his 80th birthday he said that he had built a wagon at the age of six, and that later he built the wooden shed in which he wrote *Death of a Salesman*. ‘When you get depressed, that’s the time to go and make something out of wood. It’s a bit like improvising a play.’ Speaking of *The Crucible* and the witch-hunts in New England in the 17th century, Miller said that the early Puritanical settlers thought of the forest as the domain of the devil because they could not control it.

Since the 1960s he had been living on a 150-hectare property in Connecticut, where at one point he planted trees intending to sell them to landscape gardeners, but he got so fond of them that in the end he did not sell them.

Cf. *Tree and forest spirits* and *Civilization, forest*.

Milton Keynes

A ‘new town’ in Buckinghamshire, England, NW of London. It is one of the ‘greenest’ of towns, having planted over the years some 20 million trees for its 237,000 inhabitants. There are ‘linear parks’ along the river valleys; where the risk of flooding is greatest, species like poplars and willows have been used, which tolerate periodic inundation. There are also ancient forests, dominated by ash and aspen, within the town’s area of 310 km², and a part of these forests has been declared a Site of Special Scientific Interest (SSSI). An innovative feature is that the urban forests are not managed by the town councillors, who might be swayed by short-term political interest to ‘cut corners’ here and there, but by the independent Milton Keynes Parks Trust. In 1997 the Trust received the National Centre of Excellence Award from the government.

Cf. *Urban forests*.

Minimum allowable felling (cutting) diameter

In most African countries with important resources of tropical timber forest, there are laws stipulating the breast-height diameter which trees of different species must have attained before they may be felled in protected forest areas. It is a beautifully simple and effective rule. If implemented, deforestation is impossible. It is so easy to verify, because not only does the stump remain as a witness, but if smaller-than-allowed logs are transported to the mills, everybody can see it. The diameter limits are usually huge, probably set by the old

colonial governments for the very first felling, which was in a sense a salvage felling, to make use of the oldest and biggest trees before they fell over and rotted. In Ghana, for example, the minimum allowable felling diameter is 108 cm for most species, otherwise 67 cm. In Asia the minimum allowable diameter rule is often circumvented. In Latin America it is hardly even known. Even in Suriname, where Dutch NGO Tropenbos has done much to develop good forestry practices, people think nothing of felling trees with diameters as low as 30 cm.

The two cardinal principles of protection in the tropical timber forests are the minimum diameter rule and the cutting (felling) cycle, i.e. the minimum period between successive cuttings in an area, usually 25-40 years; both are very important, but the minimum diameter rule is the most important. These principles of course only apply in legally protected forests. Forests without such protected status can be clearfelled and converted to farmland, without regard to the minimum diameter rule.

Mining and forestry

In forest-rich regions of Europe in the 16th and 17th centuries, logs were piled on the rock face to be mined, and then set alight to crack and weaken the rock. For each unit weight of metal produced, the weight of wood consumed was obviously enormously much greater. Sometimes the expansion and contraction of the rock was amplified by pouring water over it when still hot.

Wood has for centuries been used for mine props. Stupendous quantities of wood have for example disappeared down into the coal mines of Britain, and the gold mines of South Africa.

Abandoned mining sites are often afforested, using species which will tolerate mineral soils with little nutrients and no humus. Black locust (*Robinia*) is sometimes used in Germany, and black wattle (*Acacia*) in South Africa.

Whereas trees can thus be helpful to mining in different ways, mining is usually harmful to trees. The nickel, copper and other mines and ore processing plants of Sudbury, Ontario, Canada, have wrought terrible damage on the surrounding forest.

Miombo woodland

Open savannas occurring in a broad band across Southern Africa, from Tanzania and Mozambique in the east to Angola and Namibia in the west, in areas too dry to support

dense tropical rain forest. Some miombo species yield excellent furniture woods, but the main economic importance of these forests is for the production of fuelwood, building poles, honey and beeswax for the local population, as well as for the conservation of soil and water. There is much grazing and agriculture under the canopy. Cf. *Agroforestry* and *Savanna*.

Mistletoe

A big nuisance in forests and plantations in SE USA, Europe, South Africa and elsewhere, where it entangles the trees so that if you fell one, several may fall, or none. Member of the sandalwood order of plants. Cf. *Celtic religion*.

Mithra

According to Indo-Iranian mythology, Mithra, the god of light, was born under a sacred tree.

Moai figures

Small wooden statues of religious significance carved on Easter Island. Between public festivals, the statues were wrapped in bark cloth and kept in private homes.

Monet, Claude (1840-1926)

Great French painter and gardener, known as ‘the father of Impressionism’. In the 1890s he did a series of paintings entitled ‘Poplars’ in which he would paint the same scene in different seasons or times of day, capturing different colours, shadows, and impressions on each canvas. When he learned that the landowner was about to auction the poplars, he found a logger interested in buying them and made a deal with him: Monet helped him outbid the competitors and in return the logger delayed the felling of the trees until Monet had finished his paintings.

Montado

Name of the open woodland of cork oak and holm oak in Alentejo, Portugal. It is the most important producer of cork in the world, and it also produces wood, honey, acorns for pigfood, and grazing for sheep and cattle. Because no chemicals are used in this type of

silvopastoralism, the *montado* produces highly priced organic meat. Today some of the *montado* is being converted to cereal crops. Cf. *Agroforestry* and *Dehesa*.

Monza (Italian Grand Prix in motor racing)

The safety improvements called for by the *Fédération internationale de l'automobile* for the Italian Grand Prix in motor racing at Monza in 1995 called for the felling of more than 185 trees in an 18th century royal park, but that was opposed by environmentalists.

More, Thomas

Thomas More's book 'Utopia' (1516) contains the following passage about his fictitious ideal society: 'There, therefore, a man may see a whole wood by the hands of the people plucked up by the roots in one place, and set again in another place [so that] wood and timber might be nigher to the sea or the rivers or the cities; for it is less labour ... to carry grain far by land than wood'. It is true that a bulky and relatively low-priced material like wood cannot easily support the cost of long transport. If only the problem could be solved as easily as More suggests.

Mosquito

The De Havilland Mosquito was a British Royal Air Force World War II bomber built of wood. Its range extended from Britain as far as to Berlin, and it could carry almost two tons of bombs. Variants served as night fighters, fighter-bombers, and reconnaissance planes. It was known as 'The Wooden Wonder' and 'The Timber Terror'.

The fuselage was built of plywood made up of Ecuadorian balsawood lined with Canadian birch, and where extra strength was needed the balsawood was replaced by more birch. The wings were made of birch plywood and fir stringers. Even Hermann Göring declared himself green with envy at this plane, which inspired the Germans to build a similar one which they called the Focke-Wulf TA 154 Moskito.

Mount Saint Helens

Volcanic peak in the State of Washington, USA, which 'blew its top' on 18 May 1980 in one of the biggest volcanic explosion ever recorded in North America, destroying ten million trees in the process. The trees were blown over by the force of the explosion; debranched, debarked and neatly lined up like white drifts of matchsticks. The gigantic

mudflows destroyed an enormous number of logs. As is so often the case, nature recovered quickly, and plants surprisingly soon recolonized the devastated areas. Cf. *Tunguska event*.

Muir, John (1838-1914)

Scottish-born American naturalist and forest conservationist. Already in 1876 he urged the US Government to adopt a forest conservation policy. Largely as a result of his endeavours national parks like Yosemite and Sequoia were established. In 1908 the government established the Muir Woods National Monument in honour of him, in Marin County, California, by enclosing a virgin stand of redwood trees.

Mutilation of trees

See '*Pruning, topping ...*'

Mycorrhiza

Mycorrhiza, meaning 'fungus root', is a symbiotic association of plant roots and fungi, in which the plant is provided with mineral nutrients by the fungus which in return receives carbohydrates and vitamins. Mycorrhiza is present in virtually all tree roots, but is particularly necessary for species such as pines, alder and beech. When such species are planted in soils where the fungus is not already present, the nursery beds are inoculated with the fungus and the seedlings are planted with some of the inoculated soil around their roots.

The fungi can form vast networks in forest soils, like a 'wood-wide-web', or a plumbing system under the city streets. These networks can be of huge weight and age. They serve not only for the above-mentioned symbiosis, but also as decomposers of litter and dead wood. Such decomposition is about five times faster in the humid tropics than in temperate areas.

Names of persons

Some first (Christian) names and very many second (sur-) names are associated with trees, forest and wood. In English, examples of such first names are Laura (Laurence) and Sylvia (Sylvester). Examples of surnames are Birch, Alder, Ash(e), Wood(s), For(r)est(er), Sawyer, Tree, Bush, Greenwood, Crabtree, and Carpenter.

In Germany a name like ‘Reuter’ in the north and the equivalent ‘Roider’ in the south are derived from a word meaning ‘forest clearance’; ‘Kohler’ means charcoal-burner; many surnames contain the word ‘Holtz’, meaning ‘wood’. In French ‘Dubois’ is one of the most frequent of surnames, and *bois* means ‘wood’; ‘Charbonnier’ means charcoal-burner.

Perhaps no language has as many forest-related surnames as Swedish, as one would expect in a country where forests have always played an important role. The botanist Linnaeus and the singer Jenny Lind both have their surnames after the linden tree, while that of the Elias Lönnrot, the Swedish-speaking Finn who collected the *Kalevala* poems, means ‘maple root’. Combinations between the names of the tree followed by words meaning ‘forest’, ‘grove’, ‘branch’, ‘twig’, ‘root’, ‘leaf’, are particularly numerous.

National Forest (England)

The National Forest Company is developing a National Forest in a swathe of country encompassing abandoned mines and other industrial sites in SE Staffordshire, S Derbyshire and NW Leicestershire, in central England. It was established by the government in 1995 and is sponsored by the Department for Environment, Food and Rural Affairs (DEFRA). By July 2009 it had planted nearly 8 million trees, increasing the proportion of woodland in its area of operation from 6 to 18 per cent.

National Forests (US)

There are 155 national (i.e. publicly owned) ‘forests’ in the United States, mostly in the West, of which about a third are forested. National forests are not national parks, and commercial use is encouraged, except in some areas of old-growth forest (the North American equivalent of what in the UK is called ‘ancient forest’) or in areas of endangered biodiversity. In the forested parts of the National Forest land logging is normally carried out, whereas the non-forested parts are generally rented out for grazing. Cf. *Protected forests* and ‘*War in the Woods*’.

Native American prayer posture

An Indian lady in the American Northwest told me in 1992 that when she was young the elders had said to her: ‘When you pray you should *stand like a tree*, tall and proud and with your arms stretched upwards like branches’. In Christian art, a figure in this posture is

known as ‘Orant’. Characteristic of early Christianity and of some evangelical churches today, it was an affirmation of faith, whereas the later Christian posture of prayer — hands clasped or folded, head bowed — is thought to be more an act of supplication. See also *Amerindian forestry* and *Sacred trees, groves and forests (tree worship)*.

Neanderthal man

In 1997, in an open-cast coalmine in Schöningen, Germany, three 2.3m long 400,000 years old (!) wooden spears were found which dated from the beginning of the Neanderthal period.

Nebuchadrezzar’s (Nebuchadnezzar’s) dream of a tree

In chapter 4 of the Book of Daniel in the Old Testament king Nebuchadrezzar described a dream which he had: ‘I looked, and there before me stood a tree in the middle of the land. Its height was enormous. The tree grew large and strong and its top touched the sky; it was visible to the ends of the earth. Its leaves were beautiful, its fruit abundant, and on it was food for all. I looked, and there before me was a messenger, a holy one, coming down from heaven. He called in a loud voice: ‘Cut down the tree and trim off its branches; strip off its leaves and scatter its fruit. Let the animals flee from under it and the birds from its branches. But let the stump and its roots, bound with iron and bronze, remain in the ground, in the grass of the field’.

Daniel interpreted the dream to the king as follows: ‘You will be driven away from people and will live with the wild animals; you will eat grass like cattle and be drenched with the dew of heaven. The command to leave the stump of the tree with its roots means that your kingdom will be restored to you when you acknowledge that Heaven rules.’ And, according to the Bible, the dream was fulfilled.

‘Neck of the Woods’

In that ‘neck of the woods’, meaning an area, locality or neighbourhood. The word ‘neck’ in this expression is derived from the Algonquian Indian word *niack*, meaning ‘point’ or ‘corner’.

Nelson, Admiral Horatio (1758-1805)

The Battle of the Nile in 1798 was one of Nelson's greatest naval victories. Two days after the battle Nelson asked for wood from the mainmast of the French flagship, and he arranged for planks to be sawn from it for his coffin. Before he went to Trafalgar, five years later, he said to his relations: 'Prepare the wood, I may need it when I return'.

Nepal

About a sixth of the area of Nepal is covered by forest, ranging from tropical moist hardwood forest in the Terai lowlands, to coniferous forests in the mountains at an elevation of about 3,000 to 3,700 metres. In the 1950s the village forests were nationalized, but the villagers then lost interest in their protection, and deforestation increased, because people do not look after the property of others as well as they look after their own. In the 1980s a beginning was therefore made with the handing back of these forests to their original owners, each forest with a management plan approved by the Forestry Department.

New Forest

An ancient forest (in the old sense of royal hunting reserve) in Hampshire, England, between Southampton and Bournemouth. Its heath and forest are home to deer and wild New Forest ponies, one of Britain's nine breeds of pony, which have roamed the New Forest for at least 1,000 years. The New Forest, with its relatively mild climate, is also the only place in England where cicadas occur. The surrounding commoners still have grazing rights.

The 17th century Queen's House in Lyndhurst, the old 'capital' of New Forest, is the home of the Lord Warden of the forest, and meeting place of the governing 'Verderers'.

Newton, Isaac

In 1665 the English physicist and mathematician Isaac Newton saw an apple fall from a tree, and wondered why it fell straight down and not upwards or to one side. This inspired him to formulate the theory of gravity. Today descendants of this apple tree grow in the Cambridge Botanical Gardens, the back garden of the Institute of Mathematical Sciences in Cambridge, and at Newton's family home Woolsthorpe near Grantham in Lincolnshire.

New Zealand

All New Zealand's native tree species are endemic, i.e. they exist nowhere else on earth. It has one of the most comprehensive systems of protected areas in the world, covering almost 20% of the land area. The largest of the protected areas, in the south-west of South Island, has been declared a World Heritage Site. It contains the most extensive surviving area of lowland native forest, which is of the temperate rain forest type .

New Zealand is also famous for its vast and well-managed plantations of radiata pine (Monterey pine, *Pinus radiata*), mainly on North Island, and mainly established on land which was earlier treeless grazing land of poor quality. These plantations were initiated by the government, by way of 'pump-priming' private sector involvement, and today they are almost entirely privately owned. They have generated massive numbers of jobs, foreign-exchange earning, sawmills and pulp and paper manufacture. They have also removed the pressure on the indigenous forests, which a hundred years ago were the main source of sawnwood in the country.

Nineveh

Nineveh was the oldest city in Assyria. It lay across the Tigris river from modern Mosul, in northern Iraq. Destroyed in 612 BC by Babylonians, Scythians and Medes. A study of charcoal excavated from the ruins indicated that the massive roof timbers were made from pine and cedar, species for which that area is today too dry. Tree ring analysis of the charcoal confirmed that the climate at the time was more stable and humid than it is today.

Noah's ark

It says in Genesis 6:14-16 that God told Noah to build his ark of cypress wood or, according to other translations, of gopher wood (*Cladrastis lutea*), 140 m long, 23 m wide and 13.5 m high; and to coat it with pitch inside and out. It also says that 'Noah did everything just as God commanded him'.

Normans

The Normans brought feudalism to Britain, and part of that was that they changed the main production objective of British forests from fuelwood, timber and meat (game meat and forest grazing), to hunting as a sport for the rich. There is an interesting account of this in the Epping* forest museum at Chingford, NE London.

Northern spotted owl

Species of owl found in the forests of north-west USA. The belief that this species was endangered by logging set off an enormous controversy between pro-logging and anti-logging interests in the early 1990s. Logging in state forests was reduced, resulting in much human hardship in the rural communities. The issue for the ecologists was not the owl *per se*, but the fact that the owl was considered an indicator of the general health of the forest. By 1992 more than 2.5 million ha had been set aside for this bird, with no logging allowed, not even selection felling.

There were also other conflicts between loggers and environmentalists in America dealing with old growth forest, and these conflicts were described in the press as ‘forest ire’.

Obelisk

This ancient Egyptian cult object is thought to have originally represented a branchless tree. Numerous other cult objects have the same origin: the Vedic sacrificial post, the Buddhist parasol shaft, the totem pole, and the sacred pillar of the ancient Hebrews. Cf. *Maypole dances*.

Oldest trees

Trees are indisputably the oldest living organisms on earth, although deciding which of them is the very oldest is not a straightforward matter.

Certain trees, ‘Phoenix trees’, reproduce by sending out suckers over and over again from the same roots. The new growth is genetically identical to the parent organism and shares its root system. If you date these trees by the age of the roots some of them are by now very ancient. The oldest tree in this category is said to be a 9,550-year-old Norway spruce (*Picea abies*) growing in the province of Dalarna in central Sweden. Its age was determined by carbon-14 dating in a laboratory in Miami, Florida.

The oldest yew in Britain, perhaps in Europe, is said to be 5,000 years old. Again, like the Norwegian spruce, this is a composite tree. The same is true of the Australian Huon ‘pine’ (*Lagarostrobus franklinii*) in Tasmania, which has propagated itself vegetatively over millennia.

However, it could be argued that these composite trees should not be dated by the age of the parent organisms and that the new growth should be considered a different plant in the same way that a sheep produced by cloning is not the same as the sheep from which it was cloned. If we discount composite trees, the bristlecone pine is a serious contender for the species with the longest lifespan. The African baobab tree is another – it can live for up to 4,000 years.

The bristlecone pines (*Pinus aristata*, formerly *longaeva*) are gnarled and relatively small trees found in the desert mountains of California and Nevada. Local conservationists named the very oldest of them ‘Prometheus’ after the Greek Titan chained to the rocks for all eternity by Zeus. Unfortunately, Prometheus’s existence was abruptly terminated in 1964 when this unique and awe-inspiring tree was cut down by a geography student who wanted to count the annual rings! Dendrochronologists later determined that the tree had reached an age of 4,950 years. Today, a group of these trees in the White Mountains on the border between California and Nevada form what is called the ‘Methuselah’s Walk’. The oldest of them, known as The Old Man, is unmarked to prevent souvenir-collectors cutting bits off it.

In Britain, the life expectancy of most trees is likely to be counted in 100s rather than 1000s of years. The Arboricultural Association of the UK estimates that our most common long-lived tree species reach the following *safe* ages under favourable conditions. (These estimates exclude composite or vegetatively produced organisms.)

300 years or more:	Yew
200-300 years:	Common oak, sweet chestnut, London plane, sycamore, linden.
150-200 years:	Cedar of Lebanon, Scots pine, hornbeam, beech, tulip tree, Norway maple.
100-150 years:	Common ash, Norway spruce, walnut, red oak, horse chestnut.

‘Old growth forest’

This is a North American expression meaning a forest which has not been logged for a long time, say at least 60 years. Europe, even without Russia, has almost six million

hectares of such forest, and North America and Russia of course have far more. In Britain the expression ‘ancient woodland’* has a slightly different meaning.

Orang-utan or orang-outan

This word is derived from the Malay *orang utan*, meaning ‘man of the forest’ or ‘wild man’.

***Othello* (Shakespeare)**

Willows are often used as a symbol of sadness. For example, in Shakespeare’s ‘Othello’, Scene III of Act IV, Desdemona says: ‘My mother had a maid called Barbara. She was in love, and the man she loved ... forsook her. She had a song of ‘willow’. An old thing it was, but it expressed her misfortune, and she died singing it. That song tonight will not go from my mind:

‘The poor soul sat sighing by a sycamore tree,
Sing all a green willow;
Her hand on her bosom, her head on her knee,
Sing willow, willow, willow’

Ottawa

Before Ottawa was chosen as the capital of Canada in 1855, it was a modest ‘lumbering’ centre. The Napoleonic Wars had increased Britain’s need for shipbuilding timber, and the Ottawa valley had plenty of it.

Otto I

Otto I the Great, Emperor of Germany 912-973, decreed that ‘Whosoever beheads a tree shall himself likewise be beheaded’. It is true that topping of trees can be very ugly, but the emperor was presumably motivated less by aesthetics than by the need for long straight timber.

Oxygen

Forest fires in the world peaked when the proportion of oxygen in the atmosphere reached 30% about 275 million years ago; today the proportion is 21%. See also *Early forests, effect of*. A fast-growing tree can produce more than 100 kg of oxygen per year.

Ozone

At ground level, ozone can irritate the linings of the respiratory system. Higher up in the atmosphere, by contrast, it is useful because it screens out ultraviolet rays which would otherwise increase the incidence of skin cancer. Although most ground level ozone comes from car fumes reacting with sunlight, trees and other vegetation are also said to emit hydrocarbons which react with nitrogen oxide and sunlight to form ozone.

Palestine

Palestine has been losing its forests ever since the United Nations gave away 55% of the country for the setting up of Israel in 1948. This is what a book by M. Merlo and L. Croitoru (CABI Publishing, 2005) says: ‘Between 1971 and 1999, the forest area decreased by 23% The lost forest area can be attributed to [illegal] Israeli settlements (77%), military camps (2%) and by-pass roads (1%); ... for example, 670,000 fruit and forestry trees were uprooted during 2001 by the Israelis. In fact, all forestry activities were prohibited and forest nurseries were closed in most districts of the West Bank ...’.

There is little interest in treeplanting because of the fear of uprooting or expropriation. However, the Olive Co-Operative through their Trees for Life programme, and other NGOs, replace some of the destroyed olive trees – until they are destroyed again. Conversely, many formerly Palestinian villages in Israel have been obliterated to prevent a return of the owners or their descendants, and trees have been planted over them to create ‘nature reserves’ and recreational sites (Pappe, 2006).

In the winter of 2009/2010 villagers from Jinba in South Hebron planted 450 ha of almond trees on land from which they had been unlawfully evicted, in an effort to claim it back.

Palisade

A fence of wooden pales. From the Latin word *palus* for ‘pale’. In US usage the plural, ‘palisades’, also means a line of high cliffs. That is the origin of the names ‘The Palisades’ along the west side of the Hudson River in the states of New York and New Jersey, and the suburb ‘Palisades’ along the Potomac River in Washington DC.

Palm Sunday

Palm Sunday, sometimes called ‘Passion Sunday’, the Sunday before Easter, commemorates Jesus’s triumphal entry into Jerusalem when ‘Many people spread their cloaks on the road, while others spread branches which they had cut in the fields’. In the Roman Catholic faith this day is marked in some countries by processions in which palm fronds or twigs from locally available trees are carried.

Pannage

Old English term for allowing pigs* to feed on acorns, beechmast or other nuts in a forest, or the right to do so, or the payment for such right. The practice was common all over Europe.

Paoli, Pasquale (1725-1807)

The great Corsican statesman and patriot Pasquale Paoli was very interested in the conservation of his country’s forests. He knew that their wood was useful for shipbuilding, and that the invading foreign powers might overcut them for that purpose, so in one peace treaty he included a clause forbidding their cutting. Corsica is the only Mediterranean island other than Cyprus with extensive forests of big trees.

Paoli was influenced by Jean-Jacques Rousseau, and in 1764 the Corsican nationalists invited the latter to write a constitution for Corsica, which he began (*Projet de constitution pour la Corse, 1765*) but did not finish. In his draft he too paid considerable attention to Corsica’s forest resource.

Paradise

The word ‘paradise’ is derived from the Avestan (an ancient Iranian language) word *pairidaeza*, which means ‘park’, i.e. an area with trees. In Christian tradition it is sometimes taken as meaning the garden of Eden, which, as we know, contained many trees including the Tree of Knowledge of Good and Evil*. It is interesting that a man-made park or garden was thought of as more paradisiacal than unimproved nature; that is how it was in the West too until the Romantic era.

Pelota

Basque team sport in which the ball is caught and then thrown back with a gracefully curved ‘glove’ or *chistera* which is made with a chestnut or ash frame. A variety of the game played in the Americas is called *jai alai* (Basque for ‘merry festival’) and its throwing device, *cesta* (‘basket’), is ideally made with a ribbed frame of Spanish chestnut.

Petrified Forest Park, Lesbos (*Lésvos*)

In the western part of the Aegean island of Lesbos (*Lésvos*), once home of the poet Sappho, petrified tree trunks are scattered over an area of 15,000 ha, especially in the districts of Sigri, Antissa and Eresos. This so-called ‘Petrified Forest’ is the result of intense volcanic activity 20 million years ago which covered the area with ash and mud, which have since eroded away, revealing the petrified tree trunks, some of which are up to 20 m in length and up to an impressive 3 m in diameter. Many of the trees are still standing and their roots too have been preserved. Among the tree genera represented are pines, cypresses, poplars, laurels, plane trees, oaks, alders, maples and hornbeam.

The Greek government has declared the Petrified Forest a Protected Natural Monument, and in the town of Sigri there is the Natural History Museum of the Lesbos Petrified Forest with the objectives of promoting the study and the preservation of the forest. For visitors, 286 ha of the main fossil site has been set aside as the Lesbos Petrified Forest Park, which has four different trails of altogether 3.3 km.

Cf. Black Forest, Arizona.

Phrygia

Ancient country in west-central Anatolia, including present-day Ankara and its territory to the south-west, which dominated that region from the 12th till the 7th century BC. The Phrygians excelled in wood carving, and timber was important to the economy. The countryside around Midas City (today: Yazilikaya) had extensive forests which no longer exist.

Pigs

The domestic pig originated from a forest animal, the wild* boar, *Sus scrofa*. Until the 19th century, one of the main benefits of forests in Europe was to provide feeding grounds for pigs. It was a kind of symbiosis: the pigs benefited from the acorns, beech- mast and all the other forest foods, and the forests benefited from the spilling and from the fact that the pigs

rooted about in the soil, thus preparing seed-beds for tree regeneration. Pigs are still used for this purpose today

On the other hand, excessive rooting can damage trees. The charter for Wimbledon Common, for example, stipulated that pigs had to have rings through their noses, which prevented them from uprooting trees.

The *Domesday Book*, the census ordered by William the Conqueror in England, generally indicated the amount of forest on a property by the number of pigs which it could sustain. E.g. 'Woodland, 40 pigs' meant that the property had enough woodland to sustain 40 pigs. It was quite a good measure in that it did not just indicate the area but also the quality of a forest. It has been estimated that 1 pig needed on the average about 1 hectare for its long-term sustenance, so in the above example the '40 pigs' would correspond to about 40 hectares.

Tamworth pigs are a rare breed thought to be closely related to the old woodland pig, and a Gloucestershire farmer keeps such pigs in a woodland as a commercial enterprise. They clear bramble and bracken for easier access, and they create a seedbed for woodland regeneration. The woodland gives them 20-40 per cent of their food requirement.

In some plantations of Monterey (*radiata*) pine in the Western Cape, South Africa, there are feral pigs descended from domestic pigs which were introduced between 1926 and 1950 to grub up and eat the pupae of a defoliating moth. The pigs did what was expected of them, i.e. they keep the pest under control. Now, after several generations, they don't look like domestic pigs any more, but have become more long-haired, thick-skinned and long-legged, and generally also darker. They can run very fast, and they need to because they are a favourite food of the leopards. In one plantation, Kluitjieskraal near Worcester, they have some boar blood from Austrian wild boars which escaped from captivity.

Cf. *Cattle, Pannage*.

Pine Islands (*Las Pitiusas*)

The western Balearic Islands, including Ibiza and Formentera, are known as the 'Pitiusas' or the 'Pityusae', from the Greek word *pitys* for 'pine', because of the many pines which used to grow on those islands.

Pit-sawing

Instead of taking the log to sawmill, in the case of pit-sawing the sawyers come to the log. They dig a pit below the log, build a simple temporary platform above it, stretch a piece of string along it, draw the straight lines along which they plan to saw the planks, and then do so with a big two-man saw held by one man in the pit and another one on the platform. From an environmental point of view it is generally gentler than conventional logging, because it does not require roads, the planks being carried out of the forest by hand or on the head. See *Upper hand*.

Plato

The Greek philosopher Plato, c.428-c.348 BC, in his dialogue *Critias*, ascribed the barrenness of Attica — the region around Athens — to soil erosion resulting from deforestation. Then already! Cf. *Shipbuilding*.

Plato's tree

Plato liked to teach under trees. An olive tree under which Plato is reputed to have taught stood in the western suburbs of Athens, on the 'Sacred Way' to Eleusis, until it was destroyed by a run-away bus a few years ago. Today the site is marked by a stone with an inscription, although there is some doubt about whether an olive tree could really have lived to such an age.

Poaching

Poaching is big business in the world's forests. Even in the relatively insignificant forests of East Anglia, it was estimated in 1998 that up to 5,000 deer are poached each year, and each deer at the time fetched between £75 and £240 on the market. The hunting is done at night, using four-wheel drive vehicles and powerful lamps. By the time the police have been alerted, the poachers are usually far away.

In Africa, the poaching is often done by the army, using trucks and machine guns. Especially when there is a break-down of law and order, the soldiers fan out over the national parks and game reserves, and shoot whatever game they see. That is why many such reserves straddle borders, so that if there is a break-down on one side of the border the animals can find refuge on the other side. In logging concessions, the firm which holds the concession may place barriers at all roads leading into the forest, and that reduces

poaching. The local people, who own the forest, *de facto* if not always *de jure*, resent poaching by outsiders, which interferes with their own hunting, so they will normally be very willing to help the logging firm police these boundaries.

Poisoning of trees

Sometimes in tropical forestry when foresters wish to eliminate certain tree species for which there is no market, they ringbark them, but generally it is cheaper to poison them. Incisions are made in the tree, through which the poison is introduced. The traditional poison used in West Africa was sodium arsenide, but it is better not to introduce arsenic into the environment.

Sometimes in West Africa the foresters poisoned certain species which they considered unmarketable, and then they discovered that the wood of those species was excellent for certain purposes. Those discoveries were often made by the Italians, who were particularly innovative when it came to the use of tropical woods. For example, in Ghana there was a tree species which was considered quite useless, but then the wood became all the rage for coffins in Italy, and it became a valuable species in Ghana. The lesson of this is that we should not be too interventionist too soon. Of all the frenzied activity in the world only about a third is useful, another third is indifferent, and the final third is positively harmful.

Poplar (the area in East London)

The area of 'Poplar' in the London Borough of Tower Hamlets obtained its name from the great number of poplar trees that once grew there.

'Post Office Tree' (at Mossel Bay, South Africa)

A *witmelkhout* (Afrikaans for 'white milkwood') tree (*Sideroxylon inerme*) used by the early Portuguese and Dutch seafarers to leave mail under, for the next seafarer going in the opposite direction to pick up. The tree has been declared a National Monument.

Bartolomeu Dias touched here in 1487, Vasco da Gama in 1497, Pedro d'Ataide in 1500, and many others after them. The age of the tree is estimated at about 1000 years.

Poverty alleviation and forestry

Community* forestry projects are often launched in the developing countries in order to alleviate poverty, but the poor have short time horizons. Even fast-growing trees will usually take a couple of years before they yield their first benefits in the form of fruit, leaf fodder or wood, but a couple of years is an eternity for a poor farmer in a developing country.

What the developing countries need are jobs — it is in search of jobs that the illegal immigrants come to the West. The old infrastructure projects provided jobs, but the modern development projects, for all their rhetoric about targeting the poor, tend to finance workshops, computers, training, stakeholder empowerment, awareness-creation, and such things, which benefit the rich much more than the poor. Plantation forestry can create many jobs, especially if labour-intensive instead of highly mechanized methods are used for land preparation, planting, weeding, pruning, and especially for the harvesting and processing the wood. Forests *can* lift people out of poverty; see entry on *Finland*.

Prehistoric forestry in Britain

In prehistoric times, ideal woodland for grazing animals – pigs, cattle, sheep -- comprised oak, beech, hazel and ash. Leaf fodder was very important. Elm and ash leaves were collected during the summer, dried, and kept for the winter months like hay. Prehistoric breeds of sheep like the Soay still prefer leaves to grass, whereas modern breeds prefer grass.

Hazel was very important, its nuts serving as food and its branches used for fences and house walls. It was probably coppiced on a big scale. Where hazel was rare, willow branches were used. In a modern reconstruction of a prehistoric farm 500 tons of hazel rods were needed to fence a 2.5-hectare site. Oak and ash were probably coppiced on a rotation of 45-60 years for the production of building timber. Fuelwood was very important, as it still is in developing countries. In the iron age, charcoal became important too.

Protected forests

A ‘forest reserve’ is an area legally set aside to be under forest forever. Legal protection is a necessary first step, but then the law must be enforced. Many countries have impeccable laws, but are not implementing them. Where corruption is rife, it is not possible to protect forests. The loggers and the local farmers merely bribe the forestry department officials to

over-log the forest, or to convert it to fields. If the Forestry Department shares the revenue from sustainably managed forests with the surrounding villagers, that should in theory help to get local cooperation in protecting the forest, but even with such revenue-sharing the local people and the forestry department officials will probably prefer liquidation felling to sustainable management, the villagers because the new land is so valuable to them, the forestry department officials because of the bribes.

‘Protective’ power of trees

In Denmark it used to be believed that a ‘plague hawthorn’ (*pesttjørn*) planted on the grave of a plague victim would prevent the spread of the disease. Similarly, branches were thrown on places where murders had been committed, to exorcise the evil spirits.

Pruning, topping, pollarding and mutilation of trees

‘Pruning’ means the cutting of branches, and ‘topping’ or ‘pollarding’ means the removal of tree crowns. Trees sometimes have to be trimmed for reasons of safety, to remove dead branches, or branches which interfere with buildings, traffic or views, or to allow more light to reach the ground, or to give the tree a desired shape. However, as the Forestry Commission states in its excellent handbook *Urban Forestry Practice*, any wound can serve as an entry point for decay fungi, so interventions like this may shorten the safe life of the tree, whatever the tree surgeons say to the contrary. Topping or pollarding are the worst from the tree health point of view because it also removes the most productive part of the tree, the crown.

If they are well done, these operations, which are sometimes necessary, will hardly show, but unfortunately they are not always well done. In 1998 the architect Lord Rogers said at a conference, ‘We must ... stop the terrible pruning, when specimens are mercilessly hacked to pieces supposedly to fit in with the local scene’; and the arboriculturist Mike Lawson said: ‘We are on totally the wrong track. ... All we keep talking about is chainsaws. We need to push them to one side. We need to be concerned about the decline in the whole urban forest and doing something about it.’

The urban forest, like any forest, needs thinning from time to time to remove dangerous trees or to give the remaining trees more growing space, but to fell a tree is one thing, to mutilate it is something very different. When pruning or topping is necessary, it is usually because people have planted a species which grew into a big tree where they really

wanted a small tree, more suited to our congested towns and cities. Cf. *Small trees and Urban forests*.

Pygmies and other forest dwellers

Most of the Pygmies (tribes in which the average height of adult males is below 150 cm) in central Africa and in Asia live in or near forests, although the mainstream populations of those continents, as indeed of Europe, tend historically to be ‘silvophobic’. That is probably why the pygmies live in the forest – nobody else wants to live there.

The Pygmies are often referred to as Negrito in Asia and as Mbuti or Bambuti in Africa. The latter live mainly in the Central African Republic, Congo-Brazzaville, Congo-Kinshasa, Rwanda and elsewhere in central Africa. They live in or near and mainly from the forest, whereas the Bantu people around them are anti-forest farmers. Because they know the forest, the Mbuti are used by logging companies as tree-spotters and for other forest work. They live in symbiosis with the Bantu (some call it slavery), providing the latter with forest products such as honey, game and caterpillars, in return for agricultural products like maize. Some Mbuti, like the Aka tribe in Central African Republic, have a legend that they originally lived outside the forest, but that the Bantu forced them into it.

Many people in the world live *near* forests, but few live *in* them; those who do, tend to be dispossessed, like the pygmies in Africa and the various tribal people in South and Southeast Asia. Only in Latin Americas was it until relatively recently the same (Amerindian*) people who lived in and around the forests, but there too the non-forest areas have now filled up with non-Amerindian people, and the forest dwellers have become marginalized.

Quarrying

In quarrying, e.g. for the famous Carrara marble from the Italian Alps, wooden wedges were formerly driven into cracks in the rocks and then moistened so that they swelled, thereby cracking the rocks further. See also *Mining*.

Rain forest

Tropical or temperate forest receiving a high rainfall. The very biodiverse tropical rain forest is the wetter type of the tropical moist forest. Temperate rain forest is also found in the tropical highlands; see for example *Afromontane forest*.

Rastenburg forest

Hitler had a military command post called ‘The Wolfe’s Lair’ in a bunker complex in Rastenburg Forest, East Prussia, now situated in Poland and renamed Ketrzyn Forest. This is where the attempt on his life by anti-Nazi Germans took place on 20 July 1944, the so-called July Plot. A bomb had been placed in his conference room, but he was shielded from the full force of the explosion by the massive oak support of the conference table. About 180 to 200 plotters were executed, many horribly. Today the bunkers are abandoned, in ruins, and covered in moss; an emotive monument to the German resistance movement against the Nazi regime.

Razor-strop fungus

This is a fungus found growing on birch in England, and only on birch. As the name indicates, the fungus was formerly used for sharpening (‘stropping’) razors. The wood of affected birches rots, and is eventually reduced to a crumbling texture.

REDD

‘Reduced Emissions from Deforestation and [forest] Degradation’ (REDD) is an international initiative for payments from developed countries to the developing countries to compensate them for not clearing away their forests, e.g. by converting them to agriculture as has been done in large parts of Europe and other developed regions of the world. For example, a power station in Britain might pay a forest owner in Brazil not to fell a forest – the reduced CO₂ emission in Brazil would then compensate for the emission of the power plant in Britain.

However, this is problematic and not necessarily cheap. Often such payments are for nothing, either because the forest owner is not planning to cut the forest anyhow, or even – if the contract is carelessly drawn up – because he or she pockets the money and then cuts the forest anyhow. Also, especially in Africa, deforestation in the developing countries is usually done not by big landowners and sawmillers, but by multitudes of small

farmers in search of land for survival, and how are we going to stop and then compensate those people? See *Deforestation and reforestation*. And yet billions of pounds, euros and dollars are likely to be spent on REDD over the next few years, much of it wasted.

Replacing fossil fuels in power stations by wood chips and wood pellets from sustainable forests is a more cost-effective way of abating CO₂ emission.

See *Carbon dioxide, Global warming*.

Robin Hood and Sherwood Forest

The hero of a series of English ballads from the Middle Ages and later, Robin Hood was said to live in Sherwood forest near Nottingham. The legend may have had its distant origins in pre-Christian beliefs in little green-hooded tree-spirits. It grew and took shape around the great resentment felt by ordinary people about laws of the forest that restricted hunting, laws generally introduced by the Normans (Cf. *Magna Carta*), a discontent which eventually contributed to the Peasants' Revolt of 1381.

Sherwood Forest, once a royal forest, is today a forest park open to the public. A number of old oaks remain. One of them, called the 'Major Oak', is reputed to be five hundred years old. It is visited by more than 600,000 people a year, from all over the world. The legend that Robin Hood hid in its hollow trunk arose in the 1820s. The reason why the forest was there in the first place is that much of the soil is poor and sandy, and not suitable for agriculture.

Root system

Tree roots serve both to anchor the tree and to absorb water and nutrients. Some trees have tap roots, and they are generally more windfirm and drought hardy. Others, like spruce, have superficial root systems, and are thus less windfirm and less drought hardy. The largest root system ever measured and recorded was of a pine tree in Finland; the roots had a total combined length of 50 km, and more than 5 million tips.

Rotation

'Rotation' is the planned period between successive clearfellings. Its length depends on species and production objective. It can vary from as little as two years in the case of coppicing fast-growing trees and shrubs for fuelwood in the tropics, 7-10 years for eucalyptus pulpwood coppice in the subtropical and warm-temperate zones, 30-40 years

for pine sawlog plantations in the same zones, 50-100 years for coniferous sawlog plantations in general in the cold-temperate zone, to several hundred years for oak in Normandy. A comparable concept in connection with selection felling is the cutting cycle.

Ruhunde arboretum, Butare, Rwanda

A 2,000-ha arboretum, one of the oldest in Africa, having been established in 1933/34 by the Belgians outside the town of Butare in the highlands of southern Rwanda.

Russia

The Russian Federation, by far the largest country in the world, also has the largest forest area. It has more forest than Brazil and Canada together. The forest is part of the great northern boreal* forest. To the west and to the east of this huge forest belt are the equally huge importers of forest products, West and Central Europe on the one hand, and East Asia on the other hand. Transport is a problem, however. There is the trans-Siberian railway, but the distances are enormous. Most of the big rivers in the forest area flow north, and as the ice melts first in the south, leading to extensive flooding, it is difficult to use the rivers for floating* the timber. Murmansk in the north-west has an ice-free harbour, but most of the other harbours along the north coast are only accessible during part of the year. However, shipping along the north coast is becoming easier with global warming. Many European, Asian and American firms have joint forest industry ventures in Russia.

During the summer of 2010 Russia was devastated by disastrous fires, made worse by the fact that the government had virtually abolished the state forest service some years earlier.

Sacred trees, groves and forests (tree worship)

In every continent there are sacred groves. In north-east Thailand there are some very deforested landscapes in which patches of luxuriant sacred groves remain next to temples. A ‘fossil tree’* like *Ginkgo biloba*, the ‘maidenhair-tree’, was preserved from extinction by Buddhist monks on temple grounds in China, Japan and Korea. In Ghana the sacred groves have been found to be richer in biodiversity than the forest reserves around them. In the Mediterranean area, and not just in its Christian parts, if a grove of trees remains in an otherwise deforested area, its origin is often religious. Often such patches of forests will

contain cypresses, a tree associated with graves. Amerindian forests contain areas of religious significance.

Not only *is* there something sacred about trees, groves and forests, but it also helps with their preservation if they are vested with sacredness. See *Amerindian forestry* and *Celtic religion*.

Sahel, The

The Sahel is the broad zone of semi-arid land that runs east-west in Africa from the Atlantic in the west, south of the Sahara. Today it is not forested, but once it was. The early Arab travellers talk of dense forest, and so do some place names. The name of the village of Garadoume near Tahoua in Niger, for example, is derived from the word *dim*, which means ‘dense forest’. Likewise, some reserves where it has been possible to keep out man, cattle and fire because the elite goes hunting there, are covered by dense forest, albeit of the dry type. This proves that the relatively treeless aspect of the Sahel today is not due mainly to the low rainfall, but to overgrazing, fire, and injudicious felling.

Saint-Exupéry, Antoine de (1900-1944)

French writer and aviator. In his book *The Little Prince* written during World War II, the massive baobab tree is used as a symbol of how evil must be nipped in the bud, before it reaches a size when it becomes difficult to deal with: ‘Children, watch out for the baobabs!’

Saint Peter and Paul Cathedral, Paramaribo, Suriname

Reputedly the largest wooden building in the Americas. Cf. *Kerimäki*.

Salamis, battle of

The great naval battle in the straits of Salamis in Greece in 480 BC had forestry aspects. The Athenians knew that at some point the Persians would return to exact revenge for their humiliating defeat at Marathon in 490 BC, so they sought advice from the Oracle of Delphi and were told that they should seek the protection of the ‘wooden wall’. The Athenian leader Themistocles decided to interpret this as meaning that they must rely on their navy.

As a consequence, the Athenian navy was expanded from 70 ‘triremes’ (ships with three tiers of oars) in 489 BC to 200 in 480 BC. The timber from which these ships was

built probably did not come entirely from what is today Greece; some of it may have been imported from Italy, where Themistocles had interests. Because of the urgency of the shipbuilding programme, there was no time to season* (dry) all the timber, and as unseasoned ('green' or 'wet') timber is much heavier than seasoned timber, the ships were not as light and fast as triremes usually were. The Greeks therefore decided to lure the Persians into constricted waters where speed was not so necessary, and thus were able to sink some 300 Persian vessels with the loss of only about 40 of their own. What was left of the Persian navy and army slunk home, and never attempted to invade Greece again.

This crash shipbuilding programme of the Athenians may have led to much of the deforestation of Attica referred to by Plato, writing some hundred years later. If so, one could say that the Athenians traded forests for liberty. Cf. *Shipbuilding*.

Salinity

The ground water in dry areas often has a high salt content, and when in such areas deep-rooted trees and bushes are cut, the groundwater may rise to the surface and cause serious problems not only for agriculture but also in the cities where the increasing salt level in the soil can corrode bricks and metals. In Australia, for example, about half the wheat belt of Western Australia has problems with salinity, and the Murray River in South Australia has similar problems. One of the solutions is to plant deep-rooted and salt-tolerant trees and shrubs such as the casuarinas to lower the ground water level. Unfortunately the Department of Water Affairs and Forestry in South Africa is an avid tree-cutter, hoping to maximize quantity of water yield per hectare regardless of quality and flood mitigation. See *Water, trees and forests*.

'Sap circulation'

Like the human body depends on blood circulation, the tree depends on sap circulation. With the evapotranspiration from the leaves acting as a suction pump, water and nutrients enter the roots and rise up the stem through the wood (xylem) to the leaves, where they are used for the photosynthesis. The products of the latter then move downwards through the phloem and are used for growth in the cambium. Cf. *Growth*.

Sasquatch (Bigfoot)

A big hairy humanoid legendary creature believed by some to live in the forests of Oregon and nearby parts of USA and Canada. People claim that they have heard it scream in the forest, and seen its faeces, and that the enormous size of the latter explains the screams.

Satyr

A satyr, in the mythologies of ancient Greece and Rome, was a forest god. In Greece he was depicted as having a horse's ears and tail; the Romans gave him a goat's ears, tail, legs and small horns.

'Savage'

The word 'savage' is derived from the Latin *silva*, forest, the creatures of the forest being untamed.

Savanna(h)

Open parklike dry tropical forest found in Africa, Latin America and Asia. Occupies a larger area than the more well-known closed moist tropical forest. The name is derived, through Spanish, from the Taino word *zabana*, the Taino being an extinct Arawak Indian tribe of the Greater Antilles and the Bahamas. Cf. '*Farmed parklands*' and *Miombo*.

Saw-doctor

Most materials are fluid, including the steel from which saws are made. In circular saws the molecules move outwards with the centrifugal force of the rotation. From time to time the saw blade must therefore be dismantled, put on an anvil, and hammered with a round-headed hammer from the edge towards the centre, to restore the balance of the saw blade. This, and the sharpening and setting of the saw-teeth, is the job of the saw-doctor.

Schevat (January-February in the Jewish calendar)

Tu bi-Shevat (the 15th of Shevat) was the New Year for Trees in the Jewish calendar. 'Behind it lay a long, rich, and pagan tradition that imagined forests as the primal birth-place of nations' according to Simon Schama (cf. *Evolution of early man*). In Israel it has been reinvented as a Zionist Arbor Day.

Schiller, Friedrich von (1759-1805)

During a visit to the countryside the German playwright and poet Schiller met a forester who told him that the trees which he was planting now would be harvested by future generations. Impressed by such long-termism Schiller exclaimed:

‘ ... I thought that you foresters were ordinary people whose deeds did not rise above the killing of game. But you are great, free from the tyranny of egoism, and the fruits of your quiet activities ripen in the distant future. Hero and poet achieve vain glory! Truly, if I were not a poet, I would want to be a forester!’

Schiller’s father was superintendent of the gardens and plantations at Ludwigsburg, the residence of Duke Karl Eugen of Württemberg.

Scotland

Samuel Johnson (‘Dr Johnson’) wrote, when he toured Scotland in 1773, that ‘a tree in Scotland was as rare as a horse in Venice’. Although the Caledonian Forest* had once covered vast areas, generations of sheep-, deer- and grouse-loving lairds almost did the Caledonian Forest in. Today Scotland has more trees per hectare than England, thanks to the efforts of the Forestry Commission.

Seahenge

On a beach in north Norfolk, England, there was a wooden henge (prehistoric circle of massive upright poles or stones) similar in lay-out to Stonehenge. The local people had always known about it, and called it the ‘sea henge’. When gales during the 1998/99 winter uncovered more of it, it was ‘discovered’ by the archaeologists, who excavated it to ensure its preservation, as it was no longer covered by sand and salt water. It was found to be about 4,000 years old, and made from oak trunks: a big inverted (upside-down) one in the middle, its root swelling probably serving as an altar, and 55 smaller ones in a circle around. The bark had been left on the tree trunks.

Seasoning

Most woods, if used immediately after being cut, will warp, split and shrink. They are therefore seasoned, which consists mainly of drying; either air-dried or kiln-dried, and perhaps left for a while in the wood yard to stabilise.

Selection felling

The removal of only a few trees per hectare in each felling. In the tropical moist forests of Africa, for example, only one or two trees are removed per hectare every 20-40 years. This is nature's way in those forests. In fact, human intervention can be gentler than nature, because trees can be felled in the direction where they cause least damage, whereas in nature, when dead trees crash to the ground they often bring down healthy trees. Selection felling is the opposite of clearfelling. See also *Close-to-nature forestry* and *Light-demanding vs. shade-tolerant species*.

Sevenoaks

Town in the county of Kent, England, on the south-eastern outskirts of London. The name is derived from the Saxon name *Seouenaca* which in 800 AD was given to a chapel near seven oaks in Knole Park.

Shade trees

The coffee bush was originally a forest plant, so for best results it is often planted under an open canopy of shade trees. The silky 'oak' (*Grevillea robusta*) was introduced to East Africa from Australia as a shade tree in the coffee plantations, and now it is very popular with the farmers in Rwanda and Burundi, not just as a shade tree but also for household timber, leaf mulching, soil improvement and firewood. Today many coffee plantations no longer use shade trees, which means that they need a greater input of chemicals.

Other crops which do not like too much direct sunlight are cacao and bananas. The forests in the mountains of the Comoro Islands in the Indian Ocean look pristine from a distance, but when one enters them one finds an enormous number of banana plantations in the shade of the forest trees, and those plantations will probably prevent the regeneration of these forests. Like so much vegetation on isolated islands, these forests are unique.

Shenandoah National Park, Virginia, USA

Narrow strip of mountain forest in the Blue Ridge section of the Appalachians. Best known for its 169 km long Skyline Drive which every year attracts some 1.4 million visitors to admire the vivid colours of the hardwood trees, the extensive views and the magnificent waterfalls. Although most visitors never get out of their cars, there are also some 800 km of hiking trails in the National Park. Wildlife includes black bear, deer, foxes and many other species. Much of what today looks like pristine forest was once farmed, and signs of

abandoned homesteads are everywhere. Before the Europeans came, much of it was prairie, burnt annually by the Native Americans. Cf. *Amerindian forestry*.

Shining Path

The Shining Path rebels in Peru were initially associated mainly with the high plateau, but its bleak and barren nature was not conducive to guerrilla warfare, and in 1997 its headquarters were in the depths of the virgin forest in Pangoa district, 350 km east of Lima, and to the east of the Andes mountains. ‘The forest is an impregnable hideout’, said the mayor of the nearby town of Satipo. Cf. *Lacandon forest*.

Shipbuilding

For millennia forests were associated with shipbuilding in the minds of the governing elites. Plato brought this up when, in book IV of his *Laws*, he has an Athenian and a Cretan discuss a hypothetical colonization project: ‘Well, but let me ask, how is the country supplied with timber for shipbuilding?’ ‘There is no pine of any consequence, or fir, and not much cypress; and you will find very little stone-pine (*Pinus pinea*) or plane-tree, which shipwrights always require for the interior of ships.’

The shipwrights divided the ship-building timber into two classes: straight timber, and ‘compass’ – meaning ‘curved’ – timber. The former came from trees of good form which had been grown in closed woodlands, whereas most of the crooked compass timber came from trees grown in hedgerows or singly. Some of the wood needed to be curved, because a grown curve is of course much stronger than a sawn curve.

The building of naval ships for the battles between Europe and its eastern invaders deforested the Mediterranean basin: the battles against the Persians in the 5th century BC (cf. *Salamis, battle of* and *Plato*), and the great battles in the 16th century between the Venetians and other Christian powers on the one hand, and the Turks on the other hand.

‘Shiver my timbers’

Curse reputedly used by pirates. ‘Shiver’ is here derived from an old Germanic word meaning ‘splinter’.

Siddis

Community of African origin living in western India and southern Pakistan, whose traditional occupation is the collection and sale of fuelwood. Some of them originally escaped slavery by fleeing to the forests, and today one group lives around the Gir Forest Natural Park and Wildlife Sanctuary in Gujarat State, the last place on earth where the Asiatic lion is still found in the wild.

Sila, La

Forest-rich mountain massif in Calabria, in the ‘toe’ of southern Italy. The forest is dominated by pine, which here reaches heights of up to 45 m, diameters of over 1 m, and ages of up to 500 years. Besides the pines, there is beech, oak and chestnut.

The Romans called it *Magna Silva*, the Big Forest, and from it they derived timber for their naval ships, their fishing boats, and even for building construction as far away as in Rome itself. In 1800 it was protected for use by the navy, and in 1968 a National Park was set up there which today covers an area of 16,000 ha. Now tourism is an important local industry.

Silviculture

Silviculture, sometimes written ‘sylviculture’, from the Latin *silva* for forest, is the growing and tending of forests. Specifically, it comprises subjects like choice of species, nursery practice, planting, weeding, ‘blanking’ (replacing blanks caused by seedlings which have died), pruning, thinning, fertilization, and tree breeding. Cf. *Arboriculture*.

Skogskyrkogården (The Forest Churchyard)

Cemetery laid out in the 1910s in a forest near Enskede, in the southern suburbs of Stockholm. It is a UNESCO World Heritage Site. The Forest Chapel, 1918, and the Holy Cross Chapel, 1935-40, were designed by Gunnar Asplund. There are also forest cemeteries in other parts of the world, such as the one in Kürten, Germany, where the composer Karlheinz Stockhausen was buried in 2007.

Slash-and-burn shifting cultivation (swidden agriculture)

Slash-and-burn shifting agriculture was nearly always the first type of agriculture in forested areas, temperate as well as tropical, and is still practiced over vast areas of the

developing world, mainly where people cannot afford to buy fertilizers. A piece of forest or woodland is cleared ('slashed'), allowed to dry, sometimes for a couple of years, and then burnt, after which agricultural crops are sown in the ashes, which act as mineral fertilizers. After a few years, when the fertility built up by the forest has been exhausted, and the invasion of weeds has become more than the farmer can cope with, he or she moves on, clears a new piece of land in the same way, and the forest, if that is the natural vegetation, takes over again on the abandoned land, until one day it is cleared for another round of farming.

Slash-and-burn shifting cultivation, or just 'shifting cultivation', is sometimes thought of as an 'inferior' system of farming, wasteful of forest, but it is very rational and sustainable provided the population density is not too high, so that the forest is allowed its required resting period, and provided there is no better use of the wood. In the forested areas of Sweden, for example, slash-and-burn shifting agriculture was cost-effective until the wood acquired a higher value for purposes other than as mineral fertiliser; first for mining (fuelwood was used for heating and cracking the rock, and charcoal was used for the smelting), and then for the forest industry (Hamilton, 1997). Slash and burn agriculture was practised in parts of Scandinavia until the Second World War (Kerkhof, 1998).

See *Agroforestry, Bush fallow, Linnaeus, Sweden, Swiddeners.*

Small trees

In urban areas it is both cheaper and more aesthetically satisfying to plant trees that will not need to be hacked about in order to limit their size. There are hundreds of such tree species, and plant nurseries can advise on suitable choices for different sites. For the UK some small broadleaved tree species are: acacias, alder, aspen, pendula or dawyck beech, birch, blossom trees (apple, cherries, crabs, pear, plum), cotoneaster, dogwoods, honey locust (*Gleditsia triancanthos*), 'fastigiata' or oriental hornbeam, fig, the frisia variety of black locust (*Robinia pseudoacacia*), hawthorn, hazel, holly, some hybrid black poplars, Judas tree, laburnum, laurel, some maples, especially the oriental maples, rowan (mountain ash), whitebeam, and white poplar.

Small coniferous trees include some species of cypress, cedar, thuja. We tend to shy away from conifers in urban areas, but you do see them in such settings in Italy and Spain, and they look good.

Cf. *Pruning and Urban forests.*

Smokey Bear

American cartoon character used for educating the public in forest fire prevention. Smokey first appeared on a poster in 1945, and had his heyday in the early 1950s. He went through several guises, and was drawn by several artists, but mainly by Rudolph Wendelin. The United States government holds the rights to the Smokey Bear image. See also *Fire*.

Smuggling

Once I did a job in a forested region of Benin, bordering on Nigeria. There was brisk smuggling of cheap petrol from the Nigerian side. Everybody knew about it, but the forest provided a seemly cover. The best argument I could find for persuading the locals to look after the forest was that if it disappeared, so might the smuggling. It worked.

Soil conservation

A problem in developing countries is that grasslands tend to be overgrazed and eroded; planting trees on such land will reduce or stop the grazing and thus the soil erosion. Agriculture too, with its ploughed fields, results in more soil erosion than forestry. If the hill farms of Britain, which are hardly profitable even with the agricultural support, were afforested, not only would there be less flooding, but also less soil erosion.

Soil pollution, alleviation of

Trees have been used for cleaning polluted soil in the US, Denmark and other countries. For example, on the land of a previous gasworks in the municipality of Søllerød in Denmark, poplars have been planted to absorb the cyanide with which the soil has been polluted. The alternative would have been to replace the polluted soil with clean soil, which would have cost almost twice as much. Although dealing with soil pollution by means of treeplanting is much cheaper than any other method, it does take longer.

Tree geneticists at Washington University in America have manipulated the genes of poplars to make them 100 times more efficient at removing the most common soil water pollutant there, trichloroethylene, by increasing the tree's production of a certain enzyme. For the time being they have added a gene from the liver of the rabbit, which produces that enzyme. The enzyme breaks down the harmful substance into harmless ones.

Sowing

The artificial regeneration of forest trees is generally by means of planting, but some species are established by means of sowing, e.g. acacias for the production of tannin bark. Sowing is sometimes used for other species with cheap and plentiful seed, like pinaster pine. Very occasionally, sowing is done from the air.

Spain

The Greek geographer and historian Strabo (about 64 BC to 23 AD) wrote that a squirrel could jump from tree-top to tree-top right across Spain. Be that as it may, two thousand years later Franco launched enormous treeplanting programmes in Spain, involving bigger areas than similar programmes in any other European country, although it was not always clear why those trees were planted, and many of the programmes were a waste of money because they were situated in areas too dry to support forests.

Along the north coast, however, where the climate is mild and the rainfall high, the plantations of *Eucalyptus globulus* from Australia and Monterey pine from California do extremely well. When farmers in that cool and rainy north abandon their farms to look for work in some nearby city, they often sow the seed of the local maritime pine on their land, in the hope that it will yield some future income for themselves or their children.

For the open oak forests in the west, see *Dehesa*.

Spiral grain

Some trees are spiral-grained. This is mainly due to genetic factors, although the environment can play a role too. Planks sawn from such trees are weak, because the grain or fibre runs across the plank rather than lengthwise.

Spiral grain confers two survival advantages to trees on harsh sites: it allows water from almost every root to reach almost every branch, and it allows the wood to bend more easily and thus not to be so readily broken by wind and snow.

Squirrels

Tree rodents found in most countries. In Britain and Ireland the original ‘red squirrel’ (reddish brown) has been largely replaced by the slightly bigger North American grey squirrel, although the two species occupy different feeding niches. The red squirrel prefers cones of pine, larch, sitka spruce and other conifers, as well as hazel nuts, whereas the grey squirrel prefers acorns. Paradoxically, the indigenous red squirrel survives in the largely non-indigenous coniferous plantations and forests disliked by the naturalists (cf. *Goshawk*), whereas the non-indigenous grey squirrel has taken over in the indigenous hardwood forests. Unfortunately for foresters both species like to eat the inner bark of certain trees.

Stamp(ing) hammer

Hammer used for stamping marks on trees (e.g. to show that they should, or should not, be felled) or on logs (e.g. to show that they have been legally felled, and perhaps also where). First given legal status in France, where it was mentioned in the *Ordonnance de Melun* in 1376. Marking wood with a stamping hammer is sometimes in forestry called ‘martelage’, from the French word for hammer, *marteau* or more specifically, in this case, *marteau forestier*. It is still used in some countries for valuable logs, for example of tropical furniture or panelling woods. As the hammer mark is deeply incised into the wood, it is more permanent than paint, or bar chart labels nailed or stapled onto the log. However, for mass-produced low-value logs such as pulpwood, other less time-consuming methods are used.

Stave churches

Beautiful wooden churches common all over all over north-west Europe in the Middle Ages, but today found only in Norway, apart from a single example in Sweden. There are some 500 to 600 left, the oldest ones from the beginning of the 11th century. The largest, built in 1250, is at Heddal in Telemark. The word *stave* refers to the load-bearing posts, and it is of the same origin as the English ‘staff’.

Stead, Tim

British wood artist, 1952-2000. Worked in native wood, especially heavily burred elm, making both furniture and sculptures. Was instrumental in founding the Woodschool in Monteviot. Founded the Borders Community Woodlands, and was awarded an MBE for his work for the millennium forest in Scotland.

Stem form

A tree puts down its new growth of wood where it is most needed from a structural point of view, i.e. wherever the stem is most likely to break. The result is a column of uniform breaking strength, where no section is weaker than any other. For example, when trees grow close together in dense stands, they shelter each other from the wind, and can afford to develop long thin stems with little taper, but when these trees are thinned and therefore more exposed to the wind, they add more wood at the base and less higher up, to develop more of a taper and a resulting greater wind-firmness. That is why free-standing trees are more tapered than trees which grow close together.

Stockholm

The name 'Stockholm' is composed of the two Swedish nouns *stock* and *holme*, which mean respectively 'wooden log' and 'small island'. Two thirds of the land area of greater Stockholm is forest. The forests around the city are mainly composed of pine, spruce, birch and aspen. On the edge of the city centre is a vast open area called *Djurgården* ('the animal farm') which is famous for its oaks. Swedish whitebeam (*Sorbus intermedia*), which is often used as a park and street tree in Europe, for example in the suburbs of west London, is particularly at home in the Stockholm area.

Stonehenge

The dating of charcoal found at different soil depths played an important part in determining the age of Stonehenge, the famous stone circle on Salisbury Plain, Wiltshire, England. It was built before the pyramids of Egypt. The enormous bluestone pillars, weighing up to 50 tons each, were transported from Wales, 250 km away, probably by pulling them inch by inch along wooden rails lubricated with animal fat. It was originally thought that they had been rolled on logs, but trials have shown that the logs would have been crushed.

At Durrington Walls, near Stonehenge, remains of ancient houses dating back to 2600-2500 BC have been uncovered. They are thought to have been part of a midwinter 'party place' for the people who built Stonehenge. This place had a henge built of timber with a very similar layout to that of Stonehenge, except for one important difference:

Stonehenge is aligned with the midwinter solstice sunset, whereas the Durrington timber henge is aligned with the midwinter solstice sunrise.

Stone-splitting

The Romans would split boulders, e.g. for purposes of building, by making oblong holes in them, driving pieces of wood into the holes, and pouring water over the wood, which would then swell and split the stone.

Stoss, Veit (about 1442 to 1533)

Perhaps the greatest wood carver of all time, at least in the West. He was German, but did much of his work in Poland, Hungary and Bohemia (Czech Republic). One his most famous works is the high altar in the Church of the Virgin Mary in Krakow, which was carved in linden (lime) wood. In Polish he was known as Wit Stosz or Stwosz.

Strength of wood

Weight for weight the tensile strength of wood is about three times that of steel.

Subsidence

Subsidence of buildings, and resulting cracks, are often blamed on trees, and the ‘offending’ trees are then removed. However, the direct reason is generally a change in the soil moisture under the building, resulting in shrinkage or swelling of the soil, i.e. subsidence or heaving. It is true that if a tree, especially a voracious drinker like a willow or a poplar, is planted too near a building, it could dry out the soil under or near the building and cause subsidence; but, equally, if a tree is felled near a building the result could be an increase in the soil moisture and consequent heaving. I.e. the removal of a tree can be as perilous as the planting of a tree, and the best is often to leave things alone.

It is still common practice to use only the minimum house foundations allowed by the building code, but foundations should be tree-proof even if at the time of construction there are no trees nearby. Subsidence is a big problem in the UK but not in the US. Perhaps the British building codes for foundations should take a leaf out of the American ones. Within the UK, most of the subsidence is in the London area, due to the clay soil.

Sundarbans

Sundarbans, formerly Sunderbunds, is an area of marshy tidal forest in the southern parts of Bangladesh and the Indian state of West Bengal, stretching from the mouth of the Ganges river westwards to south of Calcutta, an area of about 260 by 115 km. The southern part consists of almost uninhabited mangrove swamps. The name ‘Sundarbans’ is probably derived from the word *sundarī*, a large mangrove tree from which fuelwood is obtained.

Sunscorch

To protect ornamental trees against sunscorch in hot countries, the bark of the lower stem is sometimes painted white.

Sustainability

The concept of sustainability has been a buzz-word since the time when it was the main theme of the Brundtland Commission report some years ago, but for foresters the concept was already then old hat. As forestry is a multi-purpose activity, or, to put it differently, as the forest is a multiple-product resource, the word ‘sustainability’ in forestry always brings up the question ‘The sustainability of *what?*’. Are we talking about the sustainability of timber production, of game meat production, of traditional plant medicine availability, of biodiversity, or what?

The sustainability of timber production, for example, has obviously always been very important for the forest industry and for the long-term employment prospects of the forest workers. Although sustainable timber production can be highly profitable even in the tropical moist forest, in the boreal forest, and in other slow-growing forests — after all the resource is already there and the investments to unlock it are relatively small — it is unfortunately in most cases even more profitable to liquidate the forest, i.e. to manage it non-sustainably: ‘to take the cash and let the credit go’ to use Omar Khayyam’s expression; or ‘cut out and get out’ as the North Americans used to say. Where growth is slow, sustainable management is therefore unlikely unless it is enforced by legislation. In the boreal forest there are generally laws requiring satisfactory regeneration within a specified period after clearfelling. In the African tropical moist forest, where selection felling and not clearfelling is used, there are, as already mentioned, laws prescribing the minimum cutting cycle and the minimum harvestable diameter at breast height for different groups of species, and if they are implemented, deforestation is not possible.

Sweden

The name 'Sweden' is derived from the same root as the old English word 'swidden*', meaning the practice of shifting slash-and-burn* agriculture, called *svedje* in Swedish today. In other words, Sweden was the land *par excellence* of the slash-and-burn farmer. Swidden agriculture was practised for many thousands of years in the forests of central and north Europe, until the 20th century. In Sweden the last recorded use of swidden agriculture was in 1937. Some forests which are felled today in Sweden and Finland were established after swidden. (Cf. *Agroforestry*.)

Sweden has a bigger forest area than any other country in Europe after Russia. The total volume of wood in its forests has almost doubled since 1920; so much for the doom-sayers who contend that logging destroys forests.

Sweet Track

The 'Sweet Track' in Somerset, the longest prehistoric wooden trackway (walkway) in Britain, was constructed in about 3800 BC, running over marshy terrain. It is 2 km long. The planks of the walkway itself are made of oak, ash and linden, whereas the rails that line it and the poles and pegs that support it and hold it together are made of hazel and alder.

Swithland, Leicestershire

This place name indicates that the land was originally cleared by 'swidden'.

Sylph and sylphide

The words 'sylph' and, in French, '*sylphide*', much used in 19th century ballet librettos (Giselle, La Sylphide, Les Sylphides), are probably derived from the Latin word *silva*, forest – 'forest spirits'.

Szarvas

Outside the town of Szarvas, on the plains of SE Hungary, there is a famous arboretum founded in the 19th century by Count József Bolza and expanded to 43 ha by his son Pál. It has 1,600 species and varieties of trees and shrubs, of which at least ten are rare, like the

‘firebird tree’ (*Parrotia perscia*) of the witch hazel family, a small ironwood tree from northern Iran. Cf. *Arboretum*.

Taiga

The northern part of the boreal forest, along the edge of the tundra in Russia, Canada and Alaska. Often swampy, with open stands of smallish trees, and a very low increment. Cf. *Boreal forest*.

Tallest trees

The tallest trees are the redwoods (*Sequoia sempervirens*) from the Pacific coast in northern California and southern Oregon. The tallest one in 2006 was 115.2 metres, in California’s Redwood National Park.

The next tallest tree species is the Australian mountain ash (*Eucalyptus regnans*) from Victoria, which reaches a height of 100 m. A fallen mountain ash found in the 19th century had reached a height of 150 m, making it taller than the tallest living redwood in California. Cf. *Biggest trees*.

Tally

‘Tally’, in one of its meanings, is a stick or other piece of wood on which notches are made to indicate the number of some unit, and which can then be split to allow different parties each to keep a part as a ‘copy’. The word is of Germanic origin. In modern Danish, for example, *tælle* means ‘to count’, and *tal* means ‘number’.

Tapio

The Finnish god of the forest and of the animals in it. He is also known as Metsähine or Hiisi. Sometimes Tapio appeared to hunters in the shape of a beautiful woman who would persuade them to spend the night in the forest; on closer inspection, she would turn out to be nothing but a rotten old tree stump. This myth is ecologically interesting in that in order not to offend Tapio the hunters avoided making excessive noise in the forest or shooting unusual animal species. Sibelius’s symphonic tone poem *Tapiola* (1925) refers to this deity.

Taungya

‘Taungya’, originally a Burmese (Myanmar) word, is a term used in tropical forestry for the practice of establishing tree crops with the help of small-scale farmers who are allowed to cultivate the land between the newly planted trees for 2-4 years until the tree canopies close, making further agriculture unprofitable. The farmers gain in that they have access to the land for a few years, and the foresters benefit since they do not have to carry out weedings. Sometimes the farmers are also required to plant the trees. The taungya system, called the ‘shamba system’ in Kenya, must be very rigorously supervised and managed, otherwise the trees will soon disappear and the area will be covered with pure agricultural crops. For every tree that the farmer damages, he or she must be fined, and if too many trees die the contract must be cancelled. Taungya is a form of agroforestry*, and much agroforestry in the tropics is an excuse for deforestation.

‘Te’

The American cultural anthropologist Shelton Davis told me: ‘The Kanjobal Maya term for tree is *te*. It is one of nine noun classifiers which like gender in French or Spanish classify everything in the universe. Every tree, plant or shrub has *te* before the word. I remember someone saying *te tenis* for “tennis shoe” — when I asked why *te* was used, he said it was because tennis shoes are made of rubber [and rubber is derived from trees].’ The Kanjobal or Kanjobalan branch of the Mayan language is spoken in north-west Guatemala and the state of Chiapas, Mexico.

Temple in Jerusalem

The Old Testament book ‘1 Kings’, Chapter 5, describes the building of the temple in Jerusalem by King Solomon in the 10th century BC. Solomon wrote a letter to King Hiram of Tyre (the coastal area of Lebanon) announcing that he intended to build a temple in Jerusalem, and continuing: ‘So please give orders that cedars of Lebanon be cut for me. My men will work with yours, and I will pay you for your men whatever wages you set.

King Hiram wrote back: ‘I ... will do all you want in providing the cedar and pine logs. My men will haul them down from Lebanon to the sea, and I will float them in rafts by sea to the place you specify.’ That it was a considerable enterprise is shown by the

following continuation: 'King Solomon conscripted labourers from all Israel — thirty thousand men. He sent them off to Lebanon in shifts of ten thousand a month, so that they spent one month in Lebanon and two months at home. Adoniram was in charge of the forced labour'.

Tengenenge forest art gallery, Zimbabwe

About 150 km north of Harare, near the town of Mvurwi, lies the open forest of Tengenenge in which about 250 sculptors in stone live. Each artist has his or her allotted space in the forest, where they work and exhibit their work among the trees. One of the community's rules is that nobody is allowed to cut down any tree. In 1995 it was estimated that there were about 17,000 pieces of sculpture in the forest at any one time. Tengenenge sculptures have been exhibited and sold in Europe and elsewhere.

Termites

Termites eat both processed wood and young trees in the warmer parts of the world. Susceptibility of trees varies very much according to species and site. Young eucalypt trees, for example, are not attacked when grown in the cool highlands of the tropics, but the same species may be wiped out by termites in hot and dry areas. In these areas, on the other hand, other species are totally unaffected. In termite-infested areas of Ethiopia farmers plant small plots of eucalypts at incredibly high densities, and at least *some* of the seedlings survive the first three or four years after which the trees are no longer susceptible to termite damage. Elsewhere, Euphorbia leaves, neem extracts, or tobacco decocts are used to fend off the termites.

Teutoburg forest, Battle of

Fought in AD 9 in or near the present-day Teutoburger Wald between Bielefeld and Osnabrück in Germany. Three Roman legions and auxiliary troops were ambushed and annihilated by Germanic tribes led by Arminius, which is Latin for 'Hermann', a chief of the Cherusci tribe. In the same way that the battles of El Alamein and Stalingrad signified turning points in World War II, so the battle of Teutoburg forest marked the end of Roman expansion towards the north and an eventual reversal of the tide. The battle did not just *happen* to be fought in the forest: Arminius lured the Roman commander there by saying that there was a rebellion by a Germanic tribe in the area. Forests did not suit the Roman

way of warfare. The three legions, the auxiliaries and the accompanying civilians numbered more than 20,000 persons. Because of the dense forests they moved forward in a narrow column several miles long, and were very vulnerable. Cf. *Trajan's column*.

Thailand

Thailand's Royal Forestry Department is one of the oldest in the world. It is rich, powerful and well staffed. When it was established, just about all land which had not been cleared for agriculture was declared as 'forest reserve', but to the farmers that was the land on which the farms of their children and grandchildren would one day be established. It was not possible to hold back that human flood. There is a lesson in that for forest services and environmentalists all over the world: only set aside that which you can defend; if you try to defend everything, you may lose everything.

Theft and corruption

In all parts of the world forests are generally inaccessible, uninhabited, and difficult to guard, which means they are very vulnerable to theft and corruption. This may take many forms. If the user of the forest is different from the owner, which is very often the case – for instance, when a private logger operates in a publicly owned forest – the user may take more trees than he has paid for. Or the user may pay no official logging fee at all, perhaps bribing the forestry officials, or not even bothering to do that. The World Bank estimated that between 1979 and 1982 the Philippine government collected only about US\$140 million of potential US\$1.5 billion in stumpage fees: in other words there was a leakage of more than US\$450 million per year. This situation is typical of developing countries with considerable timber resources. In Europe too, such forest theft used to be a big problem right up until the nineteenth century.

Thetford (Chase) Forest, Norfolk

This is Britain's biggest pine forest, and its biggest lowland forest of any species, but it is scattered and piecemeal, containing villages and farms and intersected by main roads. Owned by the Forestry Commission, it extends more or less from Brandon, Methwold, Mundford and Watton in the north, to near Bury St Edmunds in the south. It is part of East Anglia's Breckland, and about 250-300 hectares of pine is being converted back to breckland (heath) in accordance with today's ecological thinking.

Travellers in the 17th and 18th centuries describe the area as a wasteland of shifting sands. But today the sands are tied down by stands of pine, beech and other species. The forest produces mainly softwood sawlogs. Wastewood is used for generating electricity, and the forest also receives more than a million visitors a year who come to enjoy its many facilities, which include 80 km of bridlepath for horse riders. This is another good example of a multiple-use forest.

Thinning

Heavy thinnings tend to be profitable, and they also produce the most attractive forests for recreation, with an open park-like aspect, so for once utility can be combined with beauty. The experienced forester develops a *Fingerspitzgefühl*, i.e. ‘finger tip feeling’ or intuition, for how heavy a thinning can be, especially if he is allowed to stay for long enough in one district, instead of being moved frequently like in some forest services. If a thinning is too heavy, weeds come in, the trees fall over in the next gale, and the stems become too tapered.

Thoreau, Henry (1817-62)

The American writer Henry Thoreau is best known for his book *Walden; or, Life in the Woods* about the two years when he lived at Walden Pond on land owned by Ralph Waldo Emerson. Thoreau enjoyed his life in the woods, but then it was only two miles from Concord where he could enjoy his mother’s cooking and the good conversation of Emerson and his circle of friends.

Thunberg, Carl Peter

Carl Peter Thunberg, 1734-1828, a pupil of Linnaeus’s, was a Swedish botanist who did much to describe the flora of the Cape Province, Japan, Sri Lanka, and Java. About tree species and their uses at that time at the Cape he wrote as follows in the book on his 1772-75 visit to the Cape (some of the botanical names may have been changed since then):

- Olive wood (*Olea capensis*) is white and very heavy, and is used for chairs.
- Assegai wood (*Curtisia saginea*) is used for spears by the Khoikhoin (Hottentots).
- The Khoikhoin also make bread from the pith within the stem of the *broodboom*

(Afrikaans for bread tree; *Encephalartos altensteinii*) by first burying it in the ground for two months to allow it to rot, and then kneading it into a loaf and baking it in cinders.

- Berries from the guarri bush have a sweet taste, are eaten by the Khoikhoi, and are also fermented to make vinegar.

About the firewood supply of Cape Town he wrote: ‘As there are no forests around or near the town, except a few small stands high up in the ravines, wood ... is both rare and expensive. Nearly all firewood is collected by slaves from protea roots which they dig up, and from the cut-off branches of small bushes.’ Cf. *Knysna*.

Tibet

It is not generally known that one of the four basic economic groups of the Tibetan people is the forest dweller. On the road from Nepal to Tibet, along the river which forms the border, the slopes on the Tibetan side are densely forested, whereas on the Nepali side they are not.

Timber wars

Some wars have been financed from logging revenues, like Pol Pot’s war in Cambodia and Charles Taylor’s in Liberia and surrounding countries. When the UN imposed sanctions on Liberia’s trade in looted ‘blood diamonds’, Taylor switched his main business into logs.

In return for Zimbabwe’s participation in the war in the Democratic Republic of Congo (Congo-Kinshasa) on the side of the government of that country, the latter allocated cutting rights in 34 million ha of forest to a company called Socebo whose board includes senior political and military figures from Zimbabwe. Profits were expected to be about £200m a year.

Afghanistan has been involved in wars almost continuously since 1979 – against the Russians, against themselves, and against America and its allies. In that time the country’s forest cover, never high, has been reduced dramatically because the forestry department became almost non-existent, and the number of people reduced to poverty and thus dependent on fuelwood increased dramatically. Cf. *Warfare and trees*.

Tolkien, J.R.R. (1892-1973)

The chapter ‘The Old Forest’ in the book *The Lord of the Rings* is a good illustration of the fear in which forests were held for most of history. Cf. ‘*Man is like a forest*’, *Tree and forest spirits*, and *Wind in the Willows*.

Toromiro (*Sophora toromiro*)

Tree sacred to the people of Easter Island, where it died out in the 1960s. Before that the Norwegian explorer Thor Heyerdahl had sent some seed to the botanic garden in Gothenburg, Sweden, whence the tree was eventually reintroduced into the Easter Islands.

Toronto

According to the Canadian anthropologist John Steckley 'Toronto' does not mean 'meeting place', as commonly believed, but 'trees standing in water'. It is a Mohawk term, was originally spelled '*tkaronto*', and was first applied to the spot not far to the north of today's Toronto where Lake Simcoe empties into Lake Couchiching and where the Huron and other local tribes had for more than 4000 years planted poles to trap fish.

Trajan's column

The friezes which wind their way up Trajan's column in Rome, inaugurated in AD 113, show the emperor's military campaign in Romania, and some of them show forest being cleared. The Roman army needed plenty of space to fight. Forests cramped its style. That contributed to its disastrous defeat in the Teutoburg* forest and to the fact that the northward expansion of the Roman Empire came to halt more or less where the great German forest began. The uniforms of the soldiers in the frieze showing the forest clearance indicates that the Roman citizens were used for that relatively safe job, whereas allied troops were used for the fighting.

A similar case is that when Edward I of England conquered Wales at the end of the 13th century AD, when Wales was much more forested than today, 800 woodcutters formed the vanguard of the English troops. And finally, 10,000 men were assigned the task of cutting trees to clear a space for a battle in 1741 involving the Ashanti people of Ghana – and they won.

Tree and forest spirits

Cultures in every region of the world seem to have populated their forests with a teeming multitude of imaginary creatures: hobgoblins, ogres, satyrs, ghostly huntsmen, green men, wild men, demons, dryads, nymphs, sylphs, leshies, elves, fauns, gods, demigods and spirits of all kinds. There are trolls in Germanic and Scandinavian fairy stories, wilis in Slavic folklore, jinns or djinns in the Arabic world, tokolosches in South Africa. These

spirits might be good or evil, but it was generally considered important to be on good terms with them. Hence perhaps the barbaric punishments meted out in some tribes to those who damaged certain trees, and hence also the rituals sometimes associated with the felling of trees.

In Europe, the tree and forest spirits of the Greeks and the Romans seem to have had a happier disposition than those of the Germanic peoples in the north. Perhaps this was due in part to fact that the forests of southern Europe tended to be lighter and more open groves of broadleaved trees, whereas the forests of the north are primarily coniferous and thus darker.

Greek authors like Aristotle and Plutarch ascribed the qualities of reason, passion and perceptions to trees. The Roman philosopher Seneca wrote: ‘If you come upon a grove of old trees that have reached unusual height and shut out the sight of the sky by the gloom of their matted boughs, you feel that there is a spirit in the place, so lofty is the forest, so lone the spot, so wondrous the thick unbroken shade’.

Tree limit

A tree limit or ‘tree line’ is a line on a map above or on the polar side of which trees will not grow in the form of forests or even open woodlands. In the equatorial regions of the Andes, for example, the altitudinal limit is at about 3,300 metres above mean sea level (m.a.m.s.l.). In central Switzerland, which is of course much further to the north, the tree limit is as low as 2,300 m, in spite of the Gulf Stream. Near Inuvik in the Northwest Territories of Canada the latitudinal tree limit advanced 10 km northwards during the 20th century due to global warming.

It is noteworthy that it is not the overall minimum temperature which limits tree growth, but the amount of warmth received during the growing season. The high plateaus of Peru and Lesotho cannot sustain tree growth, whereas Siberia can, in spite of its infinitely colder winters, because the *summers* in Siberia are warmer than in the two other areas. Similarly, the place where the lowest temperature ever was recorded in Canada, at Snag in Yukon Territory (-61.8 C), is well within the wooded region of that country.

Tree marriage

Marriage of a person to a tree, or in a nuptial ceremony taking place in close association with a tree, the latter being considered sacred. Tree marriages were once common in India.

In 2010 the Bollywood superstar and former Miss World Aishwarya ('Ash') Rai is reputed to have married two trees on the advice of astrologers to break an alleged curse, much to the despair of Indian feminists.

Tree of knowledge of good and evil (Old Testament)

The First Book of Moses, called 'Genesis', says that 'God planted a garden eastward in Eden, and there he put the man whom he had created. Out of the ground God made to grow every tree that is pleasant to the sight, and good for food; the tree of life also in the midst of the garden, and the tree of knowledge of good and evil.' God said to the man: 'Of every tree in the garden you may freely eat, but of the tree of knowledge of good and evil you shall not eat, for the day when you eat thereof you shall surely die.' After eating of the forbidden fruit, Adam and Eve knew that they were naked, and they sewed together fig-leaves to make aprons for themselves. God, realizing what had happened, drove them out of the garden of Eden, and set a guard to keep them away from the tree of life, which would have made them immortal.

The pomegranate tree was long held in reverence by Jews and Persians who considered its fruit to be the biblical forbidden fruit.

Tree of life (New Testament)

'Then the angel showed me the river of the water of life, clear as crystal, On either side, were the trees of life which bore twelve kinds of fruit, and yielded its fruit every month: and the leaves of the tree were for the healing of the nations.' (Revelations, verse 22). A tree of life is also mentioned in the Garden of Eden – see *Tree of knowledge of good and evil* above.

Treeplanting ceremonies

The custom of planting a tree to commemorate some important occasion or the opening of a public facility may be related to the old beliefs in tree-spirits. When Lord Byron first visited his family seat at Newstead he planted an oak, after which he believed that his own fortunes would be strongly influenced by the fate of this tree, about which he even wrote a poem. In 2005 only the stump of that tree remained, covered by ivy.

Treeplanting taboos

In some countries or regions there are taboos against women or young people planting trees. This is generally because treeplanting is viewed as an act of staking a claim to the land, and in many cultures that is considered inappropriate for women and youths. For the same reason the owner of land (perhaps the village chief) may not allow the user of land to plant trees. Cf. *Feudalism and treeplanting*.

Tree ring dating (dendrochronology)

A highly sophisticated method of determining the age of wood and the climate during which it was formed, by studying the number and width of its annual rings. Say that a beam is found in a ruin in New Mexico, or in a grave in Egypt, or in a bog in north Europe. The carbon-14 method might determine that the trees from which it derived was felled about 3,000 years ago. The width of the annual rings in the beam will give an indication of the climate during the time when that tree grew. If several specimens are found, the picture becomes more reliable. Once a reliable picture has emerged of the past climate in an area, it can be used for dating other pieces of wood found in that area on the basis of their patterns of annual rings.

Research institutes around the world are painstakingly putting together ‘tree ring prints’ or profiles for different species in the various climatic zones of their region. In the USA and Europe such work is for example done in Tucson, Sheffield and Belfast. At Queen’s University in Belfast a 7,000-year sequence of tree rings has been constructed, mainly based on pieces of oak found in bogs or on crannogs*. It shows both the radiation levels and the climate during that period, and even registers past volcanic eruptions.

Tree ring analysis can be so accurate and reliable that it has been used to correct the early carbon-14 method of dating.

Trees and houses

If trees stand too close to a house their roots can cause damage to the foundations or clog up the drains — poplars are especially aggressive in the latter respect — and if they blow over they obviously cause much more damage if they are closer to the house. A rule of thumb in England is that a tree should not stand closer to a house than half its adult height. Unfortunately people plant trees too close to houses, and then mutilate them when they grow taller. Cf. *Subsidence*.

Tree splitting

The ancient Warwickshire tradition of tree splitting held that childhood illnesses could be cured by splitting a tree trunk vertically, passing the child through the fissure, then sealing up the tree again.

Treetop Hotel

The hotel in Kenya where Queen Elizabeth II received the news that her father had died, and that she had succeeded to the throne.

Trelleborg, Denmark

Archaeologists estimate that some 7,000 trees were used in the construction of the palisades and barracks of Trelleborg, the fortified circular enclosure from the Viking age established in the year 980-81 AD near Slagelse on Zealand, Denmark. The fort could accommodate about 1,000 men, so seven trees were needed for each man accommodated.

Troll

Gnarled, grotesque-looking forest dwellers in German and Scandinavian mythology. Trolls can be very big or very small. They look human but sometimes a tail can be seen sticking out from a trouser leg or a skirt. They are more grouchy than evil, but terrified of church bells. In folktales, male trolls often pine with unrequited love for beautiful young princesses. Trolls could become very old and some measured their age by the number of oak forests they had seen grow up and die down. A forest of crooked gnarled trees is sometimes called a 'troll forest'. Cf. *Tree and forest spirits*.

Tsetse fly

The African tsetse fly, transmitter of sleeping sickness and Chagas' disease, thrives in dense bush, so efforts to control it include clearing strips of bush. River blindness is also promoted by dense bush.

Tsunami

The 1400 ha Pichavaran mangrove wetlands in the district of Cuddalore in SE India protected the six coastal villages behind it, whereas five nearby villages which were not protected by mangrove trees were totally destroyed. In a coastal village in Sri Lanka

protected by dense mangrove only two persons died, whereas in a neighbouring village without such protection 6,000 persons died. Of course no barrier of mangrove or any other tree could have withstood enormous tsunamis like the ones that hit NE Japan in 2011 and SW England in 1607.

Tunguska event

The enormous explosion which took place over Siberia on 30 June 1908, and which is known as the ‘Tunguska event’, flattened about 200,000 ha of coniferous forest near the Podkamenya Tunguska River in central Siberia. As the comet, or whatever it was, left no crater, the damaged trees became the main object of the scientists’ study. The trees immediately below the explosion were not blown over but were merely stripped of their branches, whereas in a wide circle around the epicentre the trees were blown over in a neat radial fashion (see also *Mount Saint Helens*), sometimes as far as 30 km away.

Each one of the hundreds of millions of trees felled by the blast has been mapped, measured and had its angle of felling determined in the course of the scientific work which still goes on. This research is of great practical as well as theoretical importance, in case a similar event should one day threaten a densely populated area.

Universe tree

The idea of a tree supporting the universe seems to have arisen independently among several peoples, e.g. the Chaldeans and the Egyptians, the Persians and the Hindus, the Chinese and the Japanese, the Scandinavians (see *Yggdrasill*), and, in a rudimentary form, among the Native Americans and the Maoris of New Zealand.

‘Upper Hand’

The expression ‘to have the upper hand’, meaning to have the advantage, comes from pit-sawing*, when it was much better to stand on the platform above the saw-pit than to stand down in the pit, working in an uncomfortable position and getting the sawdust over you and in your eyes.

Urban forests, urban forest fires, and urban forestry

When you look out over some modern cities from a tall building or an aeroplane, you see a forest rather than houses. In fact, when you fly over a city like Washington you see that there are more trees in the city than in the surrounding countryside with its ploughed fields. In the developing countries too, people are often more willing to plant trees around their houses in the villages, and along the village streets, than around their fields outside the village where it is more difficult to protect them against animals and thieves. Because of this, and because most people now live in urban areas, even in the developing world, urban forestry has become very important.

Today's green cities often have more biodiversity per square kilometre than the surrounding countryside with its artificial fertilisers and insecticides, and studies in Germany have shown that the biggest cities often have the most biodiversity. But the city trees have a hard time. Their main enemies are the insurance companies which think that any tree is dangerous to people and buildings; the utility companies which rip their roots when they bury pipes, wires and fibre glass cables; the tree surgeons who love to take drastic and expensive action; the traffic departments because of the salt they put on the roads after snowfalls; and people, because, as the London poet William Blake said, 'The tree which moves some to tears of joy is in the eyes of others only a green thing which stands in the way'. As a result, the average lifespan of urban trees in Britain is only 32 years, compared to 150 years for the ones in rural areas. Urban trees would have a better chance of survival if each tree belonged to a nearby family which derived some benefit from it, whether it be beauty, shade, or fruit.

See also *Arboriculture, Economic value of trees, London, Pruning and Small trees.*

Vancouver's tree debate

Vancouver in British Columbia has over the last couple of decades received massive immigration from Hong Kong, Taiwan and other parts of China, and there have been some cultural conflicts, one of which concerns trees. The natives say that the immigrants cut down all trees on the plots of land which they buy, turning leafy suburbs into deserts. New building regulations have therefore been introduced limiting how much of each plots can be paved over. This also reduces flooding.

Várzea forest

This is the periodically flooded part of the Amazon forest, about 3% of the total. It is more subject to overexploitation than the *terra firme* forest, because the water provides an easier access. The Mamirauá Ecological Station near Tefé in Amazonas protects and studies about 1.1 million hectares of várzea.

Victory, HMS (His Majesty's Ship)

HMS *Victory*, the ship on which in 1805 Vice Admiral Nelson led the British fleet into the Battle of Trafalgar, was built from the wood of some 5,000 about 100 years old oak trees, which after felling had been seasoned (dried) for 14 years. Not all the felled trees turned out to be sound, and in order to find 5,000 good trees some 6,000 had to be felled. The shipwrights preferred the oaks to be between 80 and 100 years when they were felled; after that age the wood began to 'go back' and the chance of rot increased. The very long period of seasoning was important, and may be the reason why this ship can still be seen in the Historic Dockyards in Portsmouth. Cf. *Shipbuilding*.

Vienna Woods (*Wienerwald*)

The woods just to the west of Vienna that inspired Beethoven's Pastoral Symphony, some of Schubert's songs and Johann Strauss's music, and the author Franz Kafka. The latter died there in 1924, in a sanatorium in Kierling.

Vindolanda writing tablets

In 1973 some 200 wooden writing tablets were excavated at the old Roman fort of Vindolanda, the modern Chesterholm, close to where Hadrian's Wall* is today. It seems that they were deposited sometime between the years 95 and 105 AD, a decade or two before the wall was constructed. On the tablets were written letters, accounts and all kinds of documents in connection with the administration of the fort.

The Greek historian Herodian, who lived at the middle of the third century AD, wrote that such tablets were generally made from linden-wood (lime, *Tilia spp.*). However, the Vindolanda tablets were made from the sapwood of young trees of birch or alder.

Violin

Violins are today typically made from maple for the belly and the back, pine for the sound post, and pine-lined maple for the sidewalls or ribs. Violin-making was first perfected by

Antonio Stradivari (Latin form: Stradivarius) and other masters in Cremona and adjacent parts of north Italy about three hundred years ago. Stradivarius used spruce wood for the harmonic top, and willow and maple in other parts.

One theory is that the excellence of those early violins is partly due to the fact that the Alpine spruce wood from which they were made had grown very slowly, a feature which was probably accentuated by the fact that it had grown during the cold period in Europe which is known as the 'Little Ice Age' (about 1550-1850). Modern research has in fact confirmed that the tone of Stradivarius's violins is partly due to microscopic properties of the wood.

To this day, spruce is the favourite wood also for acoustic guitars, especially Sitka spruce from British Columbia and Alaska.

Virgin forest

In fact, there is not much 'virgin' forest in the world. Even the most untouched-looking and remote forests have usually been influenced by the forest dwellers over the millennia. See for example *Amerindian forestry*.

Virgin of the Pine, The (*Virgen del Pino*)

The patron saint of Gran Canaria in the Canary Islands. A vision of Virgin Mary is said to have appeared in a tree top near the town of Teror there on 8 September 1481, and today her statue is an object of pilgrimage on that day each year.

Wales

Once 90% of Wales' land area was forested, but during the bronze and especially iron age that proportion went down, presumably because better axes were available than during the Stone Age. Two thousand years ago the proportion of forested land had gone down to about a quarter, and in 1980 it was a tenth. Since then it has increased again, mainly due to afforestation by the Forestry Commission. Tycanol Wood on the north slope of Preseli range has almost certainly been under forest for the last 9,000 years. Today it is a primary forest of oak, ash and hazel.

The Welsh Forestry Commission has carried out an archaeological survey of its 130,000 ha. It has uncovered hundreds of previously unrecorded archaeological sites —

Bronze Age barrows, Roman roads, houses, farm buildings, mines, an abandoned 18th century village, and much else.

‘Walk in the Woods’ (Switzerland)

During Soviet-American nuclear disarmament talks in Geneva in 1982, the chief negotiators from the US and the USSR — Paul Nitze and Yuli Kvitsinsky respectively — went for a walk in the wooded outskirts of the city, in search of privacy. There they arrived at what could have been a great breakthrough in disarmament, if their political masters at home had not squashed it. This momentous almost-event was later the subject of a two-person play performed in London, New York, Washington and elsewhere.

Warfare and trees

As regards warfare on land, the military importance of forests has grown with the increasing importance of the air force, including drones. Armies can be more easily hidden inside a forest than in tree-less areas. The fact that the American army was initially more successful in Iraq than in Vietnam, although America had vast aerial superiority in both conflicts, was probably partly due to the fact that Iraq was far less forested than Vietnam. Forests have been hiding places for guerrillas from Robin Hood to the Viet Minh. The defence value of the forests in Vietnam was acknowledged by the fact that the purpose of much of the bombing to which that country was subjected was to defoliate the forests (see *Agent Orange*). The Malayan rebellion from 1948 to 1960, and the Mau-Mau rebellion in Kenya from 1952 until about 1960, were both forest-based.

During times of unrest forests serve as sanctuaries. The forests of eastern Congo-Kinshasa, for example, are full of refugees: Hutus from Rwanda, and locals who have fled from the Hutus and from the government soldiers.

Cf. *Timber wars*.

‘War in the Woods’

The controversy in the United States about how the National Forests* should be used: how much for timber, how much for recreation, how much for biodiversity, and so on. It peaked in the 1980s and early 1990s. In 2003, after devastating fires in the National Forests in the US West, the government advised heavier thinnings and shorter rotations to reduce the

load of inflammable material in the forests, and that advice made sense, but the environmentalists did not like it. Cf. *Fire*.

Washington D.C., USA

The District of Columbia (D.C.), the central part of the city of Washington, has been known as the ‘City of Trees’ since the late 19th century, when the then Governor Alexander ‘Boss’ Shepherd planted 60,000 trees there. Today Washington has more than 100,000 street trees, a magnificent 180-hectare arboretum with a herbarium and a bonsai collection, a botanical garden, and many parks, gardens and wilderness reserves. A notable feature of Washington’s trees is that they are not hacked about like so many of the urban trees of Britain, but they are allowed to develop as nature intended them to be, without topping, lopping, pollarding and other ‘improvements’; see *Pruning, topping*

Washington, George

George Washington (1732-1799), the first president of the United States, had many trees planted on his estate Mount Vernon in Virginia – American hollies, tulip poplars, hickory, ash, etc. – and he meticulously recorded plantings and survivals in his diary. The tallest tree there today, planted under his direction, is a 44-m (145’) high ash. Unfortunately his tree work caused his death, because on a cold snowy day in December 1799 he went out to mark some trees for felling as they hindered the view from his home, and he caught an infection from which he died.

Wasps

Wasps make their nest from paper which in turn they make from wood pulp. They scrape tiny fragments of wood from decaying fence posts, dead trees etc., and mix it with saliva and water. The queen does the early building of the nest, until the workers are there to take over. The final nest can be larger than a soccer ball, and can house up to 25,000 wasps.

Water, trees and forests

Forests serve both as a sponge and as a filter, improving the water penetration into the soil, and releasing the water slowly into the rivers and streams through the ground water. In other words, they replace dirty water derived from surface runoff with clean water derived from the ground water. By evening out the stream flow, they also fulfil one of the functions

of dams. But they do decrease overall runoff, because they increase evapotranspiration and rainfall interception by the trees. A mature tree can ‘drink’ more than 1400 litres a day. In an average English forest the surface runoff is only 15% of the total precipitation, whereas in a city it is almost 100%.

The increased flood damage in recent years in the lowlands of Thailand, India, China, Bangladesh and other countries is probably due to the deforestation which has taken place in the highlands. After the Chinese floods of 1998, in which more than 3,000 people died, the government restricted logging and invested more in highland afforestation.

As regards water consumption, trees, like most living organisms, are profligate when they can be, and frugal when they must be. A tree growing next to a stream will use far more water than another tree of the same species, age and size but not growing next to a permanent source of water, even though the latter tree may grow just as fast. Only a small fraction of the water consumed by a tree is needed directly for the tree’s tissue-manufacturing activity, by far the greatest proportion of it being used to transport nutrients from the roots to the crown, where those manufacturing activities take place.

Weald

Formerly heavily forested districts of Kent, Surrey and East Sussex. This is still one of the most forested areas of Britain. The name is Old English for ‘forest’, of the same root as the German *Wald* and the Dutch *woud*. Mentioned in Rudyard Kipling’s 1902 poem *Sussex* in connection with its description of the ‘whale-backed’ South Downs: ‘And through the gaps revealed, / Belt upon belt, the wooded, dim, / Blue goodness of the Weald’.

In Roman times the Weald was home to a huge iron*-smelting industry, for which the forest was coppiced* to provide fuel. One of the iron mines there, at Beauport Park, was probably the third biggest in the Roman Empire, and it produced a slag heap of about 100,000 tons.

Westminster Hall

The timber roof of Westminster Hall in the Houses of Parliament, London, is an excellent example of an ‘English hammer-beam roof’. Its oak beams are 0.9 metres thick, 6 m long, and they form a span of altogether 21 m. It was completed in 1402. The king who ordered it was Richard II, the builder was Henry Yevels, the carpenter Hugh Herland.

Westonbirt Arboretum (Gloucestershire)

Site of the Forestry Commission's main arboretum. Situated in the Cotswold Hills, south of Gloucester, north-east of Bristol. This arboretum, one of the biggest in the world, was started in 1829 by Robert Holford. Today it has 18,000 trees spread over an area of 240 hectares. Some stands of hazel at Westonbirt have been continuously managed on the coppice* system for 600 years. Cf. *Arboretum*.

Whipsnade tree cathedral

Inspired by a visit to Liverpool Cathedral, Edmond K. Blyth (the father of the present landowner) planted a 'tree cathedral' near Whipsnade in Bedfordshire. Rows of trees outline the walls of the cathedral, and different species have been used for different parts, so as to create sections especially suitable for the different seasons; the section for summer worship, for example, makes much use of birch with its white bark and delicate foliage. Although the ground has not been officially consecrated by any church, services are held in the tree cathedral by various denominations.

Wild boar (*Sus scrofa*)

Found in woodlands in Poland, Italy, Spain, Austria, Germany, East Europe, North Africa, the Middle East, and central and northern Asia. Ancestor of domestic pigs. Hides in thickets during day, comes out to feed at night. Besides eating berries, fruits and grass, it roots in the soil for worms, insects and small vertebrates. By thus disturbing the soil, it prepares a seed-bed for regeneration, as the plough or the seed-drill does in agriculture. Negative effects, on the other hand, is that it also eats roots, both in the forest and outside it. It can cause severe damage to agricultural crops near the forests, especially to potatoes and sugar beets. The wild boar was extinct in Britain, but was reintroduced, and in 1995 a 100-kg specimen was shot dead by a forestry worker in Wales because it was believed to have killed several sheep on a nearby farm.

The European wild boar is the largest of all the wild pigs, weighing up to more than 200 kg. Its meat is very tasty, and because of its ferocity and speed it is a very popular animal for the hunt. It is one of the four heraldic beasts of the chase and was the distinguishing mark of Richard III, king of England. In Polish forestry the sale of licences to hunt wild boars bring in considerable net profits, even after the neighbouring farmers

have been compensated each year for the damages the animals cause in their field. Cf.

Pigs.

Wild(l)ing

A naturally grown seedling, i.e. not one produced in a nursery. On most sites there are far more wildlings than needed for regeneration, in which case the collection of wildlings will not result in deforestation. If there is a tradition of collecting wildlings and using them for treeplanting, the establishment of forestry department nurseries for that purpose can do more harm than good, creating a spirit of dependency and replacing a simple nature-based system with a more fragile technological option.

Wild Man of the Woods

This is a figure similar but not identical to the Green Man*. Often known as Wodewose, the Wild Man of the Woods is found not only in Celtic literature, but in literature, art and mythology of Europe in general from about 1300 AD onwards. Other spiritual relations are Robin Hood, the Green Knight of medieval legend, and Caliban in *The Tempest*. Medieval and Elizabethan English literature and folklore place the Wild Man of the Woods in a forest setting, as one would expect — in the ‘greenwood’ of the legends. There are representations of the Wild Man of the Woods in churches in York, Halifax, Beverley, Ripon and many other places in England.

Windfalls

Windfalls in forests are especially common (a) after drenching rains, which soften the ground; (b) after heavy thinnings, before the remaining trees have had time to send their roots into the space vacated by the felled trees, and develop the increased taper required by their increased exposure to wind (see *Stem form*); (c) on shallow soils; (d) in the case of species with a shallow root system, like spruce and beech; and (e) in the case of older trees. The replacement of broadleaved trees with more profitable but less wind-firm conifers have led to a considerable increase in windfalls in Europe. In the cities falling trees can be lethal, and it is therefore one of the main tasks of urban forestry to reduce windfalls, e.g. by choice of species, or by felling trees before they become so old that they are highly likely to blow over in the next gale. See also *Chablis* and *Great Storm of 15 Oct. 1987 in SE England*.

Wind in the Willows, The

Children's book by Kenneth Grahame, published in 1908. In Chapter 1 he writes: 'What lies over *there*?' asked the Mole, waving a paw towards a background of woodland that darkly framed the water-meadows on one side of the river. 'That? O, that's just the Wild Wood,' said the Rat shortly. 'We don't go there very much, we river bankers.'

In Chapter 3, 'The Wild Wood', which describes a visit by the Mole to the forest, where he has taken refuge in an old hollow beech tree: 'And as he lay there panting and trembling, and listened to the whistlings and the patterings outside, he knew it at last, in all its fullness, that dread thing which the other little dwellers in the field and hedgerow had known in their darkest moment — that thing which the Rat had vainly tried to shield him from — the Terror of the Wild Wood!' See also *Fairy stories*.

'Wishing-trees'

In Scotland, 'wishing-trees' are trees into which coins are hammered, each coin representing a wish. There is for example an old hawthorn about three kilometres south of Armaddy House in Argyllshire which is absolutely encrusted by coins hammered in by hopeful visitors over the centuries. The older coins have by now been incorporated into the wood of the growing tree, but coins from the 17th century are still visible. Queen Victoria had a coin hammered into another wishing-tree, now dead, probably a pine, on the island of Innis Maree in Loch Maree in Wester Ross.

In Armenia they tie cloths representing wishes to walnut trees, which are 'sacred' in Armenian culture.

Wonderboom ('Wonder tree'; Ficus pretoriae)

This Southern African species spreads like the Indian banyan tree by dropping prop roots from its branches, and these roots then develop into secondary tree trunks. A specimen outside Pretoria has a spread of 50 metres.

Woodcarving for the tourist industry

Tourism is one of the biggest and fastest-growing industries in the world, rivalling oil and drugs. It can be culturally and environmentally devastating, but it can also provide an income to traditional woodcarvers whose products find a market among the tourists. In

2003 tourists spent more than €390 billion outside their own countries, and some of that ends in the pockets of the woodcarvers. Their products have always been prominent among art objects bought by tourists in Africa: e.g., stylised heads at Nairobi airport, bowls in Southern Africa, masks in West Africa, and so on.

On the island of Bali some €78 million worth of woodcarvings are sold each year to tourists. 6,000 enterprises and 24,000 carvers are involved. The government has encouraged farmers to grow a tree species whose wood is well suited for carving, *Paraserianthes falcataria*, so now the carvers have a local sustainable source of wood, and some of the tourist money trickles down to the tree-growers too.

Woodhenge

A ‘henge’, like in ‘Stonehenge’, is ‘a prehistoric monument consisting of a circle of massive stone or wood uprights’ (Concise Oxford Dictionary). In the case of Woodhenge in Wiltshire, England, a stone circle replaced earlier wooden structures some time after 1700 BC. At Avebury henge, also in Wiltshire, traces of a wooden gate post and temple structures have been found.

Woodland Trust

British forest conservation organisation which puts its money where its mouth is by buying up valuable forests as they come on the market and then setting them aside for posterity.

Wordsworth, William (1770-1850)

This English romantic poet, who is sometimes referred to as ‘Nature’s Priest’, wrote: ‘One impulse from a vernal wood / May teach you more of man, / Of moral evil and of good, / Than all the sages can.’ ‘Vernal’, by the way, means ‘pertaining to spring’.

‘Wordsworth’s yew’ is often mentioned in his writing. It is situated at High Lorton in Cumbria, in the Lake District of NW England, near Thornthwaite Forest.

Wych

‘Wych’, ‘witch’ or ‘wich’ in combinations like ‘wych elm’, ‘wych hazel’ and ‘wych alder’ means that the branches are pliable. The word has the same root as ‘weak’.

Xylophone

Musical instrument made up of wooden bars which, when struck by a small wooden hammer, give different notes. From the Greek words for 'wood' and 'sound'. See also *Marimba*.

Yggdrasill (Igdrasil)

The mythological giant ash-tree of the old Scandinavians, or the 'world tree'. It symbolized existence, bound together earth, heaven and hell, and was at the same time the tree of life, knowledge, fate, time and space. Its roots went down into the realms of respectively death, the giants, and the gods. On its topmost branch sat an eagle. At its foot, in the realm of death, sat the three Norns or goddesses of fate: the past, the present, and the future. Its branches stretched through all lands and times and over the whole universe. Thomas Carlyle waxed lyrical about it in his book *On Heroes* (1841). After *ragnarök* (doomsday), the world tree would be the source of new life. Cf. *Ashwattha* and *Tree of life*.

Yule-log

A Northern European tradition where a log was kept burning in the hearth from Christmas Eve for the whole 12 days of Christmas. Preferably the log should be from an ash tree, a species holy to the Norse. 'Yule' is an old Germanic word for 'Christmas'; the word in Danish is still *jul*, pronounced just like 'yule'.

Ziama and its people

One of the two biggest surviving forests in Guinea, Ziama is situated in the Forest Region of that country, south of the town of Macenta. Most forests in West Africa have people around them but not in them, whereas in Ziama there are actually forest dwellers. They are not pygmies like the forest dwellers in central Africa, but are similar to the Africans who live outside the forest. For centuries these forest dwellers lived from gathering the fruits of the wild oil palms, the kola nuts which they sold to the surrounding communities and which went along the trade routes as far as to Dakar, and other products of the forest, to which they did no damage. They called it the 'sacred forest'. Their young people spent seven years in the forest with teachers who instructed them in its lore. Once I came across

a group of youngsters in the forest who were being taught how to extract oil from the fruits of the wild oil palm, which originated in that part of the world. Today, however, these forest dwellers have begun practising slash-and-burn cultivation of hill rice, and the forest is under threat, not from commercial loggers but – as is nearly always the case in the tropics – from small farmers in search of survival.

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