

05.04 Age and Inventory Structure of the Forests (Edition 1995)

Overview

The Berlin forests and woodlands are exposed to heavy use pressure because of their multiple functions. The primary function of the forest is recreational, but it also serves as protection and equalization for the water, soil and climate, and as a habitat for animals and plants. In Berlin, the forest now plays only a subordinate role in terms of its economic significance. Almost 20 % of the Berlin urban area is covered with forest. Thus, Berlin has a very high share of forest in comparison with Hamburg or Munich, which have 5.7 and 5.1 %, respectively.

A natural forest is a complex system. Depending on the prevailing soil and climatic conditions, a herbaceous layer, a richly structured shrub and tree layer, and the corresponding fauna will have formed. A wooded area, by contrast, is defined by its principal economically useful main tree layer. The type of tillering in a wooded area is oriented primarily toward profitability, with the soil only an optimization factor. For easier care and harvest, age-class forests prevail, in which only one age and/or height level is to be found on a given area. Moreover, monocultural plantation is frequent. These woodlands are considered non-natural.

In Berlin, there are today no longer any natural forests. The areas are characterized by more than a century of forestry management and by the functions which near-urban forests fulfill today. However, some near-natural forest associations do exist. The natural forest associations occurring under the present local conditions can be seen on Map 05.02 - "Vegetation." The present Map, "Age and Inventory Structure," on the other hand, shows the actual situation of the main tree layer.

With passage of the State Forest Law (LWaldG) in 1979, the entire wooded area of then-West Berlin was proclaimed as **protected and recreational forest land**, in which recreation receives precedence over wood production. This natural forestry operation provided for sustainable management. In East Berlin, economic use of the forest had priority up until the political transformation. Since consolidation of the two forestry administrations in 1990, the State Forestry Law has applied to the entire city. The goal of near-natural and site-appropriate forestry was concretized in the new Forestry Guidelines of 1992. Today, the goal is to gradually develop the Berlin forest into a florally appropriate and near-natural forest.

The **state of health of the Berlin forests** must be classified as poor, even though a slight improvement in its condition could be recorded in recent years. According to the 1995 Survey of Forest Conditions (*Waldzustandserhebung*), 18 % of the forests are significantly damaged in Berlin, and 14 % in Brandenburg (cf. SenStadtUm 1995b and Brandenburg State Ministry for Food, Agriculture and Forestry, 1995). These proportions of the Berlin and Brandenburg forests and woodlands fall into Damage Levels 2 to 4, which means that over a 25 % loss of needles or leaves appears on the trees (cf. Tab. 1). In 1993, with 51 % clear damage, a high damage level was found for oaks. The cause was the dry weather in 1992. Due to the relatively precipitation-rich springs of 1993 to 1995, the oaks were able to recover. The proportion at Damage Levels 2 to 4 was 22 % in 1995, and thus approximately at the damage level of 1992. The health of pines, too, has improved (cf. Tab. 1). In 1995, the best condition of the crowns since 1983 was attained.

Tree Species	Damage Level 2 to 4 (clear damage)				
	1991	1992	1993	1994	1995
Overall	29	14	24	21	18
Oak	27	21	51	38	22
Pine	35	12	21	19	18

Tab. 1: Forest Damage, 1991 to 1995 in Berlin (in %)

Evolution of the Berlin Forests

Before the colonization in the 12th century, the area of today's Berlin was largely covered with forest. Oak and hornbeam forests were the prevailing forest types on the clayey soils of the plateaus (the Teltow, Barnim and Nauen plateaus), and pine and oak forests on the valley and plateau sands of the glacial valley and the Grunewald forest. In locations remote from groundwater, the pine-oak forest occurred in the form of durmast oak-pine forests, in locations near groundwater, in the form of English oak-beech forests or English oak-birch forests with a proportion of pines. This proportion was generally below 50 % in the original pine-oak forests, however, so that deciduous trees prevailed. In the river valleys and the flood areas, elm riparian forests and oak-hornbeam forests grew. The woodland was interrupted only by some bogs in the Grunewald and Spandau forests. Before the colonization, the oak-hornbeam and the pine-oak forests each accounted for approx. 45 % of the wooded area, of which only 9 % consisted of pure pine stands. The forests of moist to wet locations thus accounted for only 10 % of the wooded area.

The earliest extensive use of the forest was forest pasturing. The cattle were driven into the forest and fed on foliage, bark and fruit as well as seedlings of the young trees. This caused a thinning of the forest, i.e. fewer young trees grew to maturity. The consequence was a changed species composition and the formation of stands of the same age. The colonization and cultivation of the countryside and, with it, the clearing of the forest began on the most fertile soils, which were transformed into farmland. Thus, the oak-hornbeam forests were displaced on the clayey soils first. The heavy settlement development beginning in the 19th century also led to the build-up of fertile areas of arable land. Additional wooded areas were cleared, so that the forest survived only on the poorest soils, the pine and oak sites, strengthening the dominance of pines and oaks.

Not only direct soil utilization caused a constant retreat of the forest. With the rising population, the need also arose for wood as a raw material and energy source. Mismanagement soon resulted in a wood supply shortage, so that as early as around 1700, the first legal regulations were imposed. The oak receded in the Berlin forests more and more in favor of the pine, since the latter grew better on the soil considerably damaged through forest pasturing, and since the oak was no longer favored for feed. Since the beginning of the 19th century, the primary cause for the growing loss of wooded areas has been real estate speculation. Thus, the Berlin Council determined in 1823, despite furious citizens' protests, to clear-cut the Cöllnisch Heath. By 1875, the city of Berlin had no more public forest property in its possession. In 1890, the Grunewald Forest consisted almost completely of pine monoculture. At the turn of the century, the State Forestry Administration began to sell large wooded areas of the Grunewald Forest to real-estate speculators (by 1909, some 1,800 ha had been sold) (cf. SenStadtUm 1991).

As part of the property acquisition for the extensive establishment of sewage farms, the city acquired the districts of Buch (1898) and Gorin (1909). In order to guarantee the drinking-water supply for the growing population, the Wuhlheide Heath was added in 1910-'11. In 1911, Berlin and the surrounding communities combined to form the Administrative Association of Greater Berlin. One essential purpose was the acquisition and conservation of large areas which were to be kept free of development. In 1915, the "Permanent Forest Purchase Agreement" was concluded between the Royal Prussian State and the Administrative Association of Greater Berlin. The Administrative Association acquired large parts of the forest districts of Grunewald, Tegel, Köpenick, Grünau and Potsdam (approx. 10,000 ha) from the State of Prussia, and obligated itself not to build upon or to resell the acquired wooded areas, but to preserve them permanently for the citizens as near-urban recreational areas. In order to provide the inhabitants of the populous industrial borough of Wedding with recreational possibilities to the north, the city bought the Lanke forest area as well. With the establishment of Greater Berlin in 1920, the municipal forests of Spandau and Köpenick as well as the woodlands of Wansdorf, Carolinenhöhe and Tasdorf belonging to sewage farm properties, became the property of the city. Only after the inflation could Berlin acquire further small forest areas in 1928 (e.g. the Düppel Manor and Neu-Kladow). The last large purchase occurred in 1937, with the acquisition of the Stolpe Forest, bordering Tegel. The forest land of the City of Berlin covered 25,480 ha before the beginning of the Second World War. This lay both within and outside the city limits (cf. Fig. 1).

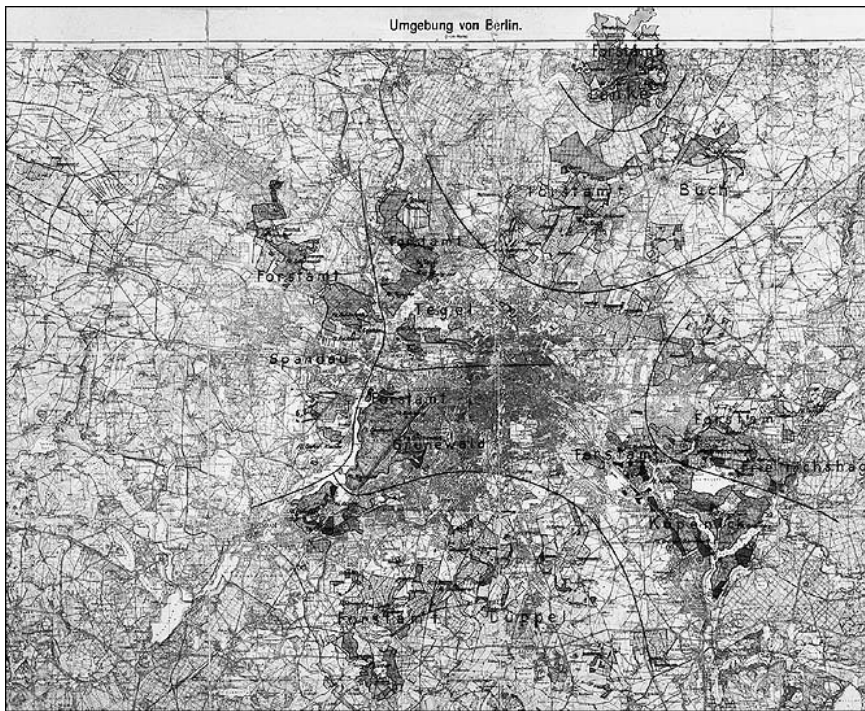


Fig. 1: Survey of the City Forests in the Area Surrounding Berlin in 1945

In the course of the Second World War, the Berlin forests were greatly damaged. Between 1937 and 1944, twice as much wood was cut "to strengthen raw material supply" in Berlin, as would have been sensible from the point of view of forestry planning - 150,000 solid cubic meters per year (fm/a) instead of 71,000 fm/a. At the same time, the planting of new trees was neglected, and thus the principle of sustainability abandoned (cf. SenStadtUm 1995a). This systematic depletion increased still more during the last two years of the war: For the defense against the advancing Allies, a large number of trees was indiscriminately felled by the *Wehrmacht*, leaving behind extensive desolation. But also large-scale theft of firewood, both by the *Wehrmacht* and by the population, did great damage to the forest (570,000 fm during 1945-'46).

With the end of the Second World War, a period of different development of the forests began in the eastern and western parts of the city, as well as in the districts located outside the city.

In **West Berlin**, after the war's end and the ensuing blockade (1948-'49), approx. 45 % of the original wooded areas had been cleared and/or greatly thinned. For lack of other plant material, mainly pines were used for the extensive reforestation of the barren areas. This is reason today for the relatively high proportion of approx. 45-year-old pine monocultures.

Since the beginning of the 50s, the West Berlin forestry institutions have been promoting the transformation of the forest by deciduous underwood seeding and planting in clearings in stands of clear, old trees, as a step in direction of a mixed forest. The goal has been forestry on the basis of a selection forest, and the development of a permanent forest. At the same time, however, such florally foreign tree species as larch, Douglas fir, Weymouth pine and red oak were also introduced by hurst and cluster into the stock. The 1979 State Forest Law and the 1982 Basic Forestry Plan for the Berlin Forests were oriented toward a naturally compatible operation of the Berlin forests. The most important goals of these operational guidelines were:

- an increase in the deciduous share from 40 % to 60 %;
- the development of a richly-structured mixed forest;
- the improvement of the conservation and landscape care;
- a 1-ha limit on clear-cutting;
- the adoption of natural regeneration; and
- to dispense with the use of herbicides and improvement measures.

The forest lands in **East Berlin** developed differently. The destruction of the old growth had not been as extensive as in the western part of the city. Those trees which, by the end of the war, had surpassed pole-timber age, but not yet reached felling maturity, were not subjected to harvesting during the '50s to the same extent as in West Berlin. This affects many areas in the districts south of the Müggelsee Lake. Thus, the old-growth proportion (stocks over 80 years old) was able to grow to 53 % by 1975. In addition, the rotation age has been raised for pines from 100 to 120 since 1975. The result was a deficit in wood production, which was tolerated out of consideration for the recreational function of the Berlin forests. Due to the staged clear-cutting of the pines, wooded areas were characterized predominantly by the structures typical of an age-class forest. Thus, the Berlin forests assumed a special place in East Germany. They received a recreational function, in addition to the primary role of raw material production.

Forestry in East Germany was greatly centralized. This was further intensified during the '70s. The goals were maximum increase in domestic wood production and the transition to industrial production methods. In the Berlin forests, the following measures were to be carried out:

- removal of all low-production stocks;
- no toleration of afforestation delays;
- fertilization and melioration measures; and
- restoration of a normal age structure (i.e., removal of the high old-growth proportion).

Because of the goal of multiple use of the Berlin forests, these guidelines could be somewhat diluted. The forest was broken down into classes of recreational functions. Maximum allowable clear-cut areas were established. For instance clear-cutting was forbidden at recreational centers. In recreational park forests, clear-cutting up to 3 ha was allowed; in normal economic-use forests, clear-cutting was allowed up to 10 ha. In the areas of the former city forests outside the city limits, economic management was, however, carried out according to the guidelines of optimal economic use.

As early as the '60s, smoke-damage investigations were carried out in the East Berlin forests, and damage to the trees was ascertained. As a result, a smoke-damage area amounting to 36 % of the total area was certified in 1974 (by 1975, it was already 43 %). For "revitalization," damaged pine forests were fertilized with nitrates. Between 1977 and the cessation of fertilization in 1985, 100 to 800 kg of nitrogen/ha were spread in the Fahlenberg and Müggelheim Districts.

A major problem in the East Berlin forest is the wide dissemination of chee-reed grass (*Calamagrostis epigeios*), which complicates natural regeneration. Its center of dissemination is found particularly in the relatively clear, single-layer pine stands which are free of a shrub layer and of medium age. The spread was furthered through the former practice the clear-cutting and complete replowing, and the fertilization of the forests.

In the Northeast of the city, large former sewage-farm areas were transferred to the Berlin Forestry Operation in 1985 and afforested on the occasion of the 750-year anniversary festival of the founding of Berlin. This was carried out under heavy deadline pressure and without sufficient preliminary examinations, with the goal of the creation a recreational forest. After grading, the sewage farms were planted predominantly mechanically with over 50 different tree and shrub species, such as poplar, mountain ash, birch, alder, European beech, pine and spruce. The site problems, including heavy-metal pollution, the disturbed soil surface and ground-water conditions, and a mistaken selection of tree species (including decorative trees and shrubs) resulted in unsatisfactory growth results and poor stock vitality (cf. SenStadtUm 1995a).

The abundant dissemination the durmast oak, which was introduced about 100 years ago from North America, presents a considerable Berlin-wide problem, since it suppresses natural regeneration of florally-appropriate tree species, and the development of a herbaceous layer. In the former West Berlin, it has been increasingly cleared since 1985. Its removal from the stock is one of the essential tasks in the Berlin forest.

In 1992, the Berlin Forests published the Forestry Guidelines for Greater Berlin, which brings together the interests of forestry, conservation, recreational use and landscape esthetics to form a uniform concept for action. The orientation is toward careful, sustainable and naturally appropriate forestry. To preserve the climatic, hydrological, hydrochemical and public-health effects of forest areas, extensive measures for the protection and development of near-natural forest structures with rich animal and plant life are carried out in the entire wooded area.

Wood production, otherwise a main task of forestry, will over the long term take a back seat to regional-cultural and social functions. The forests emerging in the future should contain a web of all stages of development, from the regeneration through the aged phase. Important structural elements, like standing deadwood or glades, should exist in sufficient quantity and quality and be distributed throughout the entire wooded area, and/or should emerge anew. The essential criteria for a natural management of the Berlin forest are:

- Gradual reduction of the florally foreign tree species;
- Planting of site-appropriate and florally appropriate tree species;
- Stock renewal through advancement of natural regeneration;
- Promotion of mixed stands with rich structural and species diversity;
- Renunciation on firm rotation times; felling is to be carried out after trees reach their target size;
- Selective, tree-by-tree wood harvesting;
- Abandonment of clear-cutting;
- Protection of hollows and nest-trees;
- An increase in the proportion of deadwood;
- No complete replowing of areas; and
- Renunciation of fertilizer and pesticides (cf. SenStadtUm 1992).

The Berlin Forests in 1990 applied to the Trust Agency for the restoration of approx. 10,750 ha of former Berlin city forest land in Brandenburg. Up to now 9,179 ha of these areas have been restored to the Berlin Forests (as of October 1995). Map 4 shows the new districts Gorin, Stolpe and Wansdorf as well as the Parforce Heath, which is attached to the Dreilinden District.

Statistical Base

For West Berlin, the data from the 1990 *Forsteinrichtung* (Forest Establishment) were evaluated. The *Forsteinrichtung* is conducted at ten-year intervals as the basis for the Management Plan; however, no projections are made for the interim years. The data is stored at the State Forestry Agency.

The data for the East Berlin forest and the city forest areas in the state of Brandenburg were taken from the data base of the Forest Fund (DSWF) in the Forest Planning Facility in Potsdam. This data base was maintained centrally for all forestry-run areas in the former East Germany, and contains extensive data on the condition and for the planned management of the areas. The data on conditions were collected every ten years, and projected annually for the interim years with the help of a growth model. The data evaluated for the map show the 1991 status on the basis of the 1990 survey.

Despite different data bases, the data prepared for the illustration of the wooded areas are comparable for both sections of the city, since similar parameters were used for the compilation process. For the presentation shown in the Map, the features listed in Table 2 were evaluated.

Tab. 2: Overview of Evaluated Features from Corresponding Data Bases	
Forest Establishment (West Berlin)	Forest Fund Data Base (East Berlin)
Position in the forest according to the following levels: - Chief Forest Agency - District - Section - Subsection	Position in the forest according to the following levels: - Chief Forest Agency - District - Section - Subsection
Tree species	Tree species
Age class (tree age in 20-year cohorts)	Ages of the tree species (tree age in years)
Area (total area of the respective position in forest, to 1/10 ha)	Area share of the tree species (area size of the line in 1/100 ha)
Proportionate area (area occupied by a tree species at a position in forest)	
Ratio in percent (proportional share of a tree species at a position in forest)	
	Density of stand (statement about the density of a tree species at a position in the forest) - Reference to residual stands and/or seed trees
Seed trees (statement about the trees standing above the stand)	Mixture form (incl. statements about residual stands)

Tab. 2: Overview of Evaluated Features from Corresponding Data Bases

The ratio of tree species (in %) at a given position in the East Berlin forests could not be taken directly from the statistical base, but had to be calculated separately.

The operational maps in a scale of 1 : 10,000 constituted the cartographic base; however these were available in differing states of preparation (East Berlin: 1990; West Berlin: 1991; Brandenburg: 1981 and 1985). For the area of Parforce Heath, there was no operational map available. It was therefore necessary to fall back on the map of Berlin at a scale of 1 : 10,000 (as of 1989).

Methodology

The present map, like the map from the 1985 Environmental Atlas, refers only to the main tree layer, and, to the extent available, to residual and/or seed-tree stands.

In the age-class forest, the **main tree layer** is understood to be that layer of the forest which is the most important from the point of view of forestry, and which is the most characteristic from a visual point of view. In the main tree layer, the trees raised by the forestry operation grow to harvest maturity; the age of the main tree layer can vary greatly. After the afforestation of a clear-cut area, the one-year-old seedlings already form the main tree layer, while old self-contained stocks can be as much as 140 years and older. With the progressive build-up of a near-natural forest with a mix of tree-ages, it is becoming ever more difficult to maintain the mapping method of main tree layer and undergrowth developed from the point of view of forestry, because the clearly recognizable stratification is purposely being broken up. The main tree layer consists of main and subsidiary tree species. The **main tree species** is the tree species which currently characterizes the stand. The **subsidiary tree species** are accompanying species which occur alongside the main tree species in the main tree layer.

Seed-trees are trees, usually individuals, which are of an age greater than that of the main tree layer. Residual stands are trees of another tree species, which occur only in isolation in the main tree layer. Both serve mostly as seed providers for the natural new generation. The layer of young trees which do not yet constitute stands are called undergrowth. With near-natural forestry, they should arise mainly from the natural regeneration (e.g., through seeding from the seed trees). A change in species composition can first be ascertained in the undergrowth, as the first successes of 14 years of near-natural forestry show. This layer is not shown on the map for technical reasons. Also, the herbaceous layer is not shown, because it is not ascertained during the forestry stocktaking.

In contrast to the 1985 Environmental Atlas, the tree species are divided into **florally foreign and florally appropriate species and/or species groups**. For the formation a near-natural forest, only site-appropriate and florally appropriate tree species should be introduced. In the Berlin area, pine and oak are the major domestic species. The soft-wood deciduous moist-site trees, such as alder, ash, poplar and willow, are included in a class, as are such precious-wood species as elm, linden, hornbeam, maple, aspen, chestnut and mountain ash, which occur in the Berlin forests traditionally as mixed-stand tree species. An example of a florally foreign (i.e. not domestic), but site-appropriate species is the durmast oak. The Douglas fir can be considered florally-foreign and site-inappropriate. It was introduced because of its fast growth; however, it cannot regenerate under Berlin site and climatic conditions. As a result of the new break-down and the changed legend in the Environmental Atlas, the red oak was, for instance, removed from the class of oaks and added to the class of a florally foreign tree species (cf. Tab. 3 and Tab. 10). A contrast of the old and the new legends in Table 3 elucidates the changes.

Tab. 3: Comparison of the Legends of the 1985 Environmental Atlas and 1995 Environmental Atlas	
Environmental Atlas 1985	Environmental Atlas 1995
	Florally Appropriate Tree Species
Pine, Weymouth pine	Pine
Oak	Oak
Birch	Birch
Beech, maple, elm, linden-tree, durmast oak	Beech
Alder, ash	Alder, ash tree, poplar, willow
Aspen, robinia	Elm, linden, hornbeam, aspen, maple, chestnut, mountain ash
Poplar, willow	
	Florally Foreign Tree Species
Douglas fir, spruce	Douglas fir, Weymouth pine, spruce, larch, arbovitae
Larch	
	Red oak, robinia, durmast oak

Tab. 3: Comparison of the Legends of the 1985 Environmental Atlas and 1995 Environmental Atlas

The representation of the age structure is shown according to three **age classes** (A.Cl.):

- Age class : 1 0 - 40 years,
- Age class : 2 41 - 80 years,
- Age class : 3 > 80 years.

By contrast to the 1985 Environmental Atlas, the subsidiary tree species, too, are shown in this map according to their respective age class.

The main tree layer with the main and subsidiary tree species is represented in the respective district in the pertinent section and subsection (if present), i.e. in the respective position in the forest.

In order to bring together the mass of the existing information into a format readable in a map, the data evaluation was undertaken according to the following criteria:

- The percentage shares (ratios) of the various tree species for a reference area (total area of the position in the forest) are shown, rounded up or down to 5 %-stages.
- The minimum share for the display of a class is 10 %; if the proportion is smaller, the class is added to the share the main tree species.
- If several classes together have an area share of over 10 %, they are represented as "others tree species" without an age indication (cf. 1 in Tab. 4).
- Different age classes of a tree species within a reference area, which each have shares of under 10 %, are summed up and represented under the older age class (cf. 2 in Tab. 4).

- Different age classes of a tree species, of which one (or two) has an area share of under 10 %, are grouped together under the age class with the larger area (cf. 3 in Tab. 4).

Tab. 4: Examples for the Summary of the Ratios of Tree Species					
Tree Species	Age Class (A.Cl.)	Total Area (in ha)	Area Share (in ha)	Ratio of Tree Species	Summary of Ratio for Map
1: Tegel Forest Agency, Gatow District, Section 97a₃					
Pine	2	1.6	1.2	80 %	85 % A.Cl. 2 pine
Pine	1	1.6	0.1	5 %	
Maple	1	1.6	0.1	5 %	15 % other tree species
European larch	1	1.6	0.1	5 %	
Red oak	2	1.6	0.1	5 %	
2: Tegel Forest Agency, South Tegel District, Section 46a₂					
Pine	1	1.4	1.1	80 %	80 % A.Cl. 1 pine
Birch	1	1.4	0.1	10 %	10 % A.Cl. 1 birch
Oak	1	1.4	0.1	5 %	10 % A.Cl. 3 oak
Oak	3	1.4	0.1	5 %	
3: Grunewald Forest Agency, Nikolassee District, Section 95a₀					
Pine	1	5.4	2.8	55 %	60 % A.Cl. 1 pine
Pine	2	5.4	0.4	5 %	
Oak	2	5.4	1.3	25 %	25 % A.Cl. 2 oak
Birch	2	5.4	0.9	15 %	15 % A.Cl. 2 birch

Tab. 4: Examples for the Summary of the Ratios of Tree Species

The ratio of the tree species at a given position in the forest could not be taken directly from the *Waldfonds* data base, but had to be calculated separately (cf. Tab. 5).

Tab. 5: Example from the Available Data (Buch District) for the Calculation of the Ratio of Tree Species									
Position in Forest					Area (in ha)	Tree Species	Age (in Years)	Mix Ratio	
Forest Agency	District	Section	Sub-section	Line				Calculated	Rounded
3	1	901	a ₃	1	0.47	English oak	27	46.1 %	45 %
3	1	901	a ₃	2	0.40	Common pine	27	39.2 %	40 %
3	1	901	a ₂	3	0.15	Robinia	27	14.7 %	15 %
Sum of the segments:					1.02				

Tab. 5: Example from the Available Data (Buch District) for the Calculation of the Ratio of Tree Species

The survey of the West Berlin *Forsteinrichtung* distinguishes according to stands, which, however, are not delimited spatially on the corresponding map. So the respectively occurring species were grouped together on a subsection or segment level and the ratio was calculated anew. For the example area (cf. Tab. 6), four stocks and reference sizes were distinguished to obtain ratios, which, however, are all referenced to Section 67 a in terms of total area. The occurrence of the species was summed accordingly for display on the map.

Tab. 6: Example for the Recalculation of the Ratio in the Grunewald Forest Agency, Dreilinden District, Section 67 a					
Tree Species	Age Class (A.Cl.)	Total Area (in ha)	Area Share (in ha)	Ratio of Tree Species	Summary of Newly Calculated Ratio
Oak	2	9.4	1.2	30 %	
Birch	2	9.4	1.0	20 %	10 % A.Cl. 2 birch
Red oak	1	9.4	0.9	20 %	15 % A.Cl. 3 beech
Robinia	2	9.4	0.7	15 %	20 % A.Cl. 2 oak
Douglas fir	1	9.4	0.3	5 %	10 % A.Cl. 1 pine
Spruce	1	9.4	0.2	5 %	20 % A.Cl. 2 elm
Pine	1	9.4	0.2	5 %	15 % A.Cl. 1 red oak
Beech	3	9.4	1.2	65 %	10 % others
Oak	3	9.4	0.6	35 %	
Mountain ash	2	9.4	1.2	55 %	
Alder	2	9.4	0.6	25 %	
Maple	2	9.4	0.5	20 %	
Pine	1	9.4	0.5	60 %	
Oak	1	9.4	0.2	25 %	
Larch	1	9.4	0.1	15 %	

Tab. 6: Example for the Recalculation of the Ratio in the Grunewald Forest Agency, Dreilinden District, Section 67a

With the exception of some federal forest areas, only those areas are shown which belong to the Berlin Forests and are used as forests. This includes also non-wooded areas which are property of the forests, but not forested. In cooperation with the State Forestry Agency, these have been included if they display a forest-like character (e.g. nature reserves in the forest).

Map Description

The pine (61.8 %) and oak (13.5 %) are the **main tree species** in the Berlin forests. Of the total area, 5.4 % is planted with birch and 4 % with poplar. These are followed by larch, beech, alder and red oak, with approx. 2 % each. Fig. 2 and Tab. 7, provide an overview of the tree species distribution in the Berlin forests and the differences between the individual forest agencies.

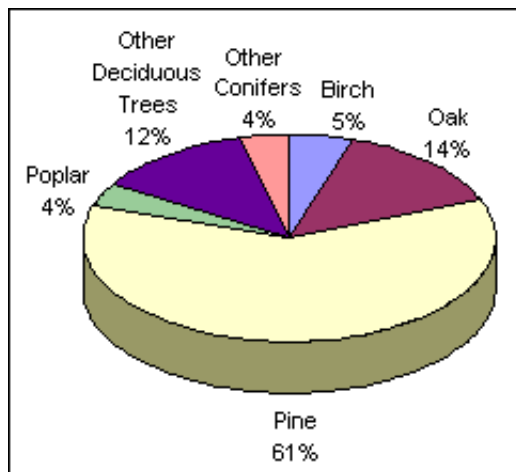


Fig. 2: Tree Species Distribution in the Berlin Forests (Nebel 1992)

Tab. 7: Tree Species Distribution by Forest Agency (Nebel 1992)

Forest Agency	Pine	Oak	Birch	Poplar	Other Common Species
Treptow	80.4 %	6.8 %	4.2 %	0.5 %	3.4 % alder
Friedrichshagen	82.0 %	7.8 %	2.7 %	0.6 %	1.7 % alder
Buch	11.7 %	3.5 %	5.4 %	33.7 %	6.9 % alder
Grunewald	52.5 %	21.8 %	9.6 %	0.7 %	5.2 % red oak
Tegel	56.2 %	22.0 %	4.1 %	0.1 %	5.0 % larch

Tab. 7: Tree Species Distribution by Forest Agency (Nebel 1992)

Among the younger stocks up to 40 years of age, the pine prevails (since the afforestation after 1945), but in the older stocks the oak is frequently the main tree species.

Thus, in some areas, the main tree layer consists exclusively of over 80-year-old oaks (cf. Tab. 8).

Tab. 8: Areas with Exclusively over 80-year-old Oaks as the Main Tree Species

Tegel Forest Agency	
Tegel Lake District	Sect. 77 b, 78 a ₂ , 89 c, 91 d, 92 e ₂
North Tegel District	Sect. 84 d ₁ , 100 b
Radeland District	Sect. 19 a, 20 a ₂ , 49 d ₁ , 66 c ₁
Hakenfelde District	Sect. 158 a ₁
Grunewald Forest Agency	
Eichkamp District	Sect. 157 b ₁
Dachsberg District	Sect. 27 c ₂ , 34 d ₂ , 38 c ₂ , 49 b
Wannsee District	Sect. 76 a, 82 a ₃ , 90 a ₁
Friedrichshagen Forest Agency	
Friedrichshagen District	Sect. 286 a ₈ , 299 a ₂ , 303 a ₁ , 463 a ₂ , 465 a ₃
Müggelsee District	Sect. 250 a ₂
Köpenick District	Sect. 415 a ₄ , 420a ₁
Treptow Forest Agency	
Wuhlheide District	Sect. 139 a ₂ , a ₄ , 140 a ₁ , 328 b, 330 a ₂ , b ₁ , 340 b ₂ , 349 a ₃
Schmöckwitz District	Sect. 28 a ₄
Grünau District	Sect. 48 a ₂ , 77 a ₁
Surrounding Countryside	
Stolpe District	Sect. 1103 a ₈ , 1131 b, 1137 b ₁

Tab. 8: Areas with Exclusively over 80-year-old Oaks as the Main Tree Species

Figure 3 provides an overview of the age-class structure of the Berlin forests.

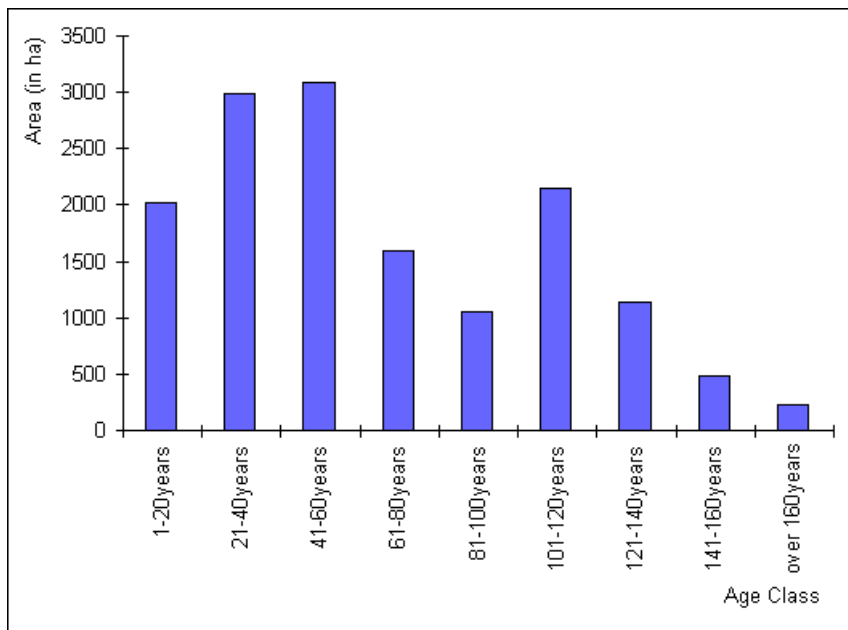


Fig. 3: Age-Class Structure of the Berlin Forests - All Tree Species (Nebel 1992)

Due to the different development of the forests in the East and in the West of the city, there are also age-class structure divergences. The over 80-year-old tree population prevails in the East. An exception is the Buch Forest Agency. There, due to the extensive afforestation of sewage farms during the past 10 years, three-fourths of the area belongs to the youngest age class. In the West, there are differences between the two forest agencies. In the Grunewald Forest, due to the especially high losses there in the Second World War, only few trees are older than 80 years; as a result of the extensive afforestations after 1945, trees between 40 and 80 years of age predominate. The age-class structure in the Tegel Forest Agency is relatively equalized (cf. Tab. 9).

Tab 9: Age-Class Structure by Forest Agency - All Tree Species (Nebel 1992)			
Forest Agency	Ages in Years		
	< 40 (A.Cl. 1)	40 - 80 (A.Cl. 2)	> 80 (A.Cl. 3)
Treptow	23.0 %	31.5 %	45.5 %
Friedrichshagen	27.5 %	29.0 %	42.5 %
Buch	79.0 %	12.5 %	8.5 %
Grunewald	33.0 %	42.5 %	24.5 %
Tegel	32.0 %	32.5 %	36.5 %

Tab. 9: Age-Class Structure by Forest Agency - All Tree Species (Nebel 1992)

On the present map, only the main tree layer is considered, so that no exact picture of the forest is given. In the undergrowth, deciduous tree species dominate (e.g. oak, durmast oak, beech). In the West of the city, the half the forest areas have a distinct secondary tree layer, while in the East, over 70 % of the forest has no secondary tree layer. Here, there are a number of areas which were afforested under the pine-monoculture system. Today, they consist of large contiguous, pure pine stands, such as in the forestry Districts Fahlenberg (60 % pure pine stands), Müggelheim (36 %), Köpenick (35 %), Schmöckwitz (32 %) and Rahnsdorf (32 %). The pine share is over 80 % in the forest agencies of Treptow and Friedrichshagen, considerably above the level in the West (cf. Tab. 7).

In addition to the pure pine stands, some mixed stands of pine-oak and/or pine-birch can be found in East Berlin, too.

The forest areas in the East of the city, which served essentially for recreation, e.g. the forest belt around the Müggelsee Lake, were frequently stocked as mixed forests, in which the pine did not

dominate in the main tree layer. Softwood tree species can be found in the moist areas and hollows of the **Friedrichshagen Forest Agency** as well as in the shore areas of the Great Müggelsee Lake, the Seddinsee Lake, the Dämeritzsee Lake, the Müggel-Spree and the Gosen Canal. Some 15 % of the forest area of the Fahlenberg District is covered with alder, willow, poplar, etc.

The **Treptow Forest Agency** manages the last inner-city forest areas in the eastern boroughs. These are the Königsheide Heath, the Plänterwald Forest, the Wuhlheide Heath and the Cöllnish Heath in the Wuhlheide Heath District. Even before reunification, they served primarily for recreation, and have a higher deciduous-tree proportion than the other areas. One of these areas, the Königsheide Heath, is a remainder of the formerly extensive Cöllnish Heath. Here, an abundantly structured mixed forest of pine (54 %) and oak (41 %) has developed. Remnants of natural forest associations have survived. There are valuable old-growth stands with approx. 200-year-old oaks. A further example of a well-structured deciduous mixed forest is the Plänterwald Forest. Owing to a long period of extensive economic use (or none at all), and a good water supply, a forest profile rare for Berlin has developed here. In large parts, there is a near-natural character. There are oak-beech and oak-hornbeam forest stands. The prevailing tree species, with 54 %, is the oak, followed by the beech with 17 % and the hornbeam with 11 %. Also remarkable is the high age of the tree population: over 83 % of the trees are older than 90. In the other districts of the Treptow Forest Agency, pines dominate. In the Grünau Forestry District, approx. 26 % of the area is covered by pure stands of older pines (A.Cl. 2 and 3). In boggy, moist channels like the *Krumme Lake* at Grünau (e.g. Sect. 44 a, 49 a₁, 49 a₂) and at the *Plumpengraben* (e.g. Sect. 62 a₁, 572 a₁) alder-swamp forests grow. In the Schmöckwitz District; there are likewise extensive pure stands of pine. In approx. 20 % of the pine stands, florally foreign tree species are present, frequently red oak and durmast oak grow in the secondary tree layer.

The **Tegel Forest Agency** has a high proportion of contiguous pine and pine-oak forest stands. Following pine (56 %) and oak (22 %), the florally-foreign larch is the third most common tree species here, with 5 % (cf. Tab. 7). The proportion of pure stands of pine is around 10 %, and thus clearly below that in the East. The North Tegel District consists of 60 % pine-oak-forest stands and 25 % mixed oak forest. Other tree species are hardly present at all. At Hubertus Lake in Frohnau, residual alder-swamp forests can be found (Sect. 112 d₂). In Tegel Lake District, there are, in addition to 50 % pine-oak-forest and 25 % mixed oak forest, also 15 % mixed beech forest (i.e. Sect. 72 a, 91 c₂, 91 e). Here, remnants of the natural oaks-beech forest are also found (e.g. parts of sections 75, 76). The Spandau Forest (Radeland and Hakenfelde Districts) and the Gatow District (aside from the Jungfern Heath) have a relatively high proportion (up to 20 %) of florally-foreign tree species (red oak, Douglas fir). In the Jungfern Heath, in the area of the Airport Lake, typical oak-birch forests exist (e.g. Sect. 48 a). On Pichelswerder in Hakenfelde District, near-natural oak-hornbeam forest stands still grow (Sect. 159 b).

In the **Grunewald Forest Agency** the pine is likewise the most frequent tree species, with a proportion of approx. 52 %. After that come oak (22 %), birch (10 %) and red oak (5 %). The Grunewald Forest is covered by pine and mixed pine-oak forests on approx. 50 % of its area. Well structured mixed-forest areas have developed. The proportion of florally foreign tree species is especially high in the Dachsberg and Eichkamp Districts. However, there are also many contiguous mixed-oak forest areas, for instance at the Schlachtensee Lake. The Nikolassee District has a relatively high proportion of birch: 30 % of its area is covered with birch and birch-oak forest (i.e. sections 94, 95, 96). The Dreilinden District consists of 70 % pine and pine-oak forest and 30 % of deciduous mixed forest (mostly in its eastern area). The Wannsee District consists of 60 % pine and pine-birch forest stands, 20 % well-structured oak mixed-forest stands, 10 % birch-mixed forest and 10 % other deciduous mixed forest. On the slopes of the Griebnitz Lake and the Havel with northern exposure, remnants of the natural durmast oak-beech forest can still be found.

The **Buch Forest Agency** occupies a special position within the Berlin Forests system. It consists of 52 % open cultivated land (predominantly ruderal semi-dry meadows), 32 % wooded structures, 14 % forest and 2 % standing bodies of water. A particularity are the afforested sewage farms with an area of approx. 1,370 ha, of which 770 ha are in the northeast of Berlin and 600 ha in Brandenburg. The landscape of these reforestation areas is today marked by incomplete stands of various deciduous tree species and some pine areas. More or less contiguous stands of predominantly site foreign and florally foreign tree species (pioneer forest structures) have developed on only 40 % of the area. The main tree species, with a proportion of 35 %, is the poplar (408 ha). That explains the high share of poplar in Berlin as a whole (cf. Fig. 2), since it is represented in the other forest agencies to a far lesser degree. During the afforestation, different species were used (e. g., the black poplar, aspen,

balsam poplar, gray poplar, Canadian poplar). Otherwise, box alders (10 %) and willows (6 %) characterize the stands. Pines grow on 4 % of the area.

The development of this area to a forest-dominated recreational landscape is of great significance, considering the uneven distribution of recreational forest areas in the city. While in the west of the city, the wooded areas are distributed rather evenly and extend far into the urban area, 90 % of the forests located in the east of the city are in the south-east, where, however, only a small part of the population lives. In the central area of East Berlin, there are almost no wooded areas. The Northeast is likewise a forest-poor area. Moreover, there is a growing need for recreational forest in this area due to the extensive residential construction and commercial location planned here. Since 1991, a project for the rehabilitation and reformation of the former sewage farms has been carried out as part of the "Ecological Reconstruction Program" (ÖSP), under the sponsorship of the Berlin Forests, from which rehabilitation concepts for polluted sites have been derived. The goal is a recreational forest landscape, with the old Buch Forest as the centerpiece, and a varied landscape, consisting of mixed forests with site and florally appropriate tree species, bodies of water and open spaces on the former sewage farm areas. In addition, the existing forest structures are to be planted with undergrowths of oak, maple, pine, linden, birch, alder, ash and aspen in coming years.

The Buch Forest is one of the most valuable forest areas in Berlin. There, there are near-natural forest lands such as remainders of the beech and durmast-oak forest (e.g., Section 504) and the lathraea and English oak-hornbeam stands (e.g., Section 506). The Buch Forest is an alder-rich forest; alder-swamp forests grow in the land-forming portions of the Bogensee chain of lakes and alder-ash stocks in wet hollows (Section 507). The alder is the second-most frequent main tree species, after the pine (40 %); it is followed by the oak (13 %), the birch (8 %) and the beech (6 %).

In comparison with the Environmental Atlas 1985, it is to be observed that there is a larger proportion of areas in which the main tree species has changed. The main reason for this lies in the change of the legend. This is most evident in the case of the red oak stands, which were counted in the Environmental Atlas 1985 as part of the oak stands.

The sections with red oak stands as the main tree species are no longer marked yellow on the present map, but rather violet (florally foreign deciduous tree species). The changes resulting in the Grunewald and Tegel Forest Agencies can be seen in Tab. 10.

Tab. 10: Red Oak Stands as the Main Tree Species in the Forest Agencies of Grunewald and Tegel	
Grunewald Forest Agency	
Forestry District	Section
Dachsberg	6 a ₃ , 13 b ₂ , 13 b ₃ , 14 b ₂ , 20 b, 20 d ₃ , 21 a ₁ , 23 b ₂ , 23 b ₃ , 23 c ₁ , 24 c ₃ , 27 b ₂ , 27 c ₁ , 34 a ₃ , 34 d ₁ , 35 b ₃ , 36 a ₁ , 36 a ₃ , 37 a ₁ , 37 a ₅ , 38 a ₂ , 39 b ₃ , 39 c ₁ , 39 c ₂ , 39 c ₃ , 41 b, 43 b ₂ , 43 b ₃ , 45 a
Eichkamp	56 c ₁ , 56 c ₂ , 56 c ₄ , 60 a ₁ , 111 a, 113 a ₂ , 114 b, 134 c ₁
Nikolassee	76 e, 103 c ₃ , 122 b ₂ , 122 c
Saubucht	61 b, 152 a ₂
Wannsee	96 b ₃
Dreilinden	14 a ₂
Tegel Forest Agency	
Forestry District	Section
Tegel Lake	78 d ₁ , 79 b, 89 b ₃ , 90 a ₄ , 92 f ₂ , 94 b ₅ , 102 a ₁ , 102 a ₂ , 103 a ₂

Tab. 10: Red Oak Stands as the Main Tree Species in the Forest Agencies of Grunewald and Tegel

Other changes include the replacement or renaming of subsectional boundaries. This effects, for example, the following areas of the Grunewald Forest Agency: Nikolassee District, Sect. 98 b₁, 98 b₂, 75 b; Eichkamp District, Sect. 59 b, 133 c₁, 149 c₃, 156 a; and Wannsee District, Sect. 80 a₂, 88 b₃. Furthermore, subsections were broken down into segments: Wannsee District Sect. 89 b into 89 b₁ and 89 b₂, and, inversely, Wannsee District Sect. 102 a₁ and 102 a₂ were merged to form Sect. 102 a.

A further reason for the change is the tree species composition in the main tree layer, since the new generation has grown in the main tree layer, for instance in the Nikolassee District in Section 22 b₃, in the Dachsberg District in the Section 6 a₄ and 11 d₁ and also in the Wannsee District in the Section 102 a.

Of the restituted Berlin forest areas in the surrounding countryside (Map 05.04.4), pine and oak are likewise the species which characterize the stands. There are extensive contiguous pine monoculture systems. Thus, in the Gorin forestry district, pure stands of pine predominate. Only the areas around Gorin Lake are covered with birch, soft deciduous tree species and florally foreign evergreens. In the "Young Oaks" and "Old Oaks" areas, mixed-oak and florally foreign evergreen species can be found. In the Berlin city forest areas in the state of Brandenburg, tree species such as oak and birch, but also red oak were frequently planted in near-residential areas.

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Maps

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