

06.01 Actual Use of Built-up Areas 06.02 Inventory of Green and Open Spaces (Edition 1995)

Overview

Social, political and economic changes generate new tasks and assignments for a city, many of which cannot be satisfied within the framework of existing urban structures. For the Berlin metropolitan area and its surroundings, a major growth impetus is predicted during the next 20 years as a result of planning for the capital. According to the prognoses of the Berlin Master Plan (FNP 94), the population should grow by some 300,000 people by the year 2010, to some 3.7 million inhabitants; 400,000 new housing units will be required over and above the existing stock. The estimated requirement for additional commercial space is 1,000 ha. In addition, it is assumed that some 11 million m² of office space and 1.4 million m² of retail-sales space will be required by the year 2010 (figures refer to gross floor-space). At the same time, the demands of the urban inhabitants upon the quality and quantity of green and open spaces in which to fulfill their needs for rest and recreation, relaxation and play, are growing. The multifaceted and contradictory demands upon the urban spaces in Berlin will necessarily lead to changes in the existing land use pattern.

Urban planning faces the task of balancing the demands for space against one another, and of ensuring a compromise between interests.

An understanding of the current land use situation in Berlin is needed, too, for the tasks and issues of landscape planning. Thus, an evaluation of the needs of the population for recreational possibilities near their homes requires information about the location of residential areas and of open spaces. Also, the close proximity of certain polluting uses and sensitive uses, such as commercial and residential areas, or allotment gardens in the neighborhood of commercial areas, can provide indications on existing conflicts (noise pollution, air quality, heavy-metal pollution of the soil), and strategies for solutions can be developed.

An understanding of the current land use situation in Berlin is also an important base for the development of the tools for ecological planning, i.e. for the soil concept map, the vegetation types or the delimitation of climatic zones.

The data compilation in the Environmental Information System (UIS) of the Berlin Department of Urban Development and Environmental Protection (SenStadtUm) permits interfacing with other factual data managed here, for example the contaminated site roster, and thus enables new statements to be made regarding a multitude of issues.

Maps 06.01 and 06.02 fit together to form a comprehensive representation of actual land use in Berlin, and should, in terms of their content, be considered a single map, printed, for reasons of readability, on two map sheets. The following text thus refers in principle to both maps, unless reference is expressly made to a particular map.

Statistical Base

The data on use of built-up and non-built-up areas in West and East Berlin derive from a large number of sources.

The basis for the categorization and use assignment was provided by the land use maps in the **1985 Umweltatlas (Environmental Atlas)** for West Berlin, **06.01 "Actual Use of Built-Up Areas,"** and **06.02 "Inventory of Green and Open Spaces."**

Map 06.01 is based on the statistical base and categorization of the Urban Planning Sustainability Investigation (STU), and on the Urban Planning Data Base. The categorization was carried out on the basis of gross floor-space shares for various uses. Map 06.02 was compiled with the aid of various surveys, and through evaluation of aerial photography taken in 1984. Both maps were continued in digitized form in 1988 in the UIS.

For the update of the land use maps which appeared in the *Umweltatlas* for West Berlin in 1985, the **Maps of Uniform-Use Block Segments** of 1989 were used. These are available for West Berlin, and are drawn on the basis of the maps of Berlin to a scale of 1:4,000. The use categories are transferable to the *Umweltatlas* maps. They are authoritative for block segments down to the level of plots.

The **infrared aerial photography** of August 1990 are available comprehensively for all of Berlin. They exist for West Berlin and the former border areas in a scale of 1:4,000, and for East Berlin in a scale of 1:6,000.

Further bases for the ascertainment of the land use in East Berlin were the 11 **Land Use Maps of the Boroughs (Inventory)** of East Berlin, as of 1990-'91. They are available in a scale of 1:5,000, and show the actual land use in East Berlin. They are based on the data base "Housing Policy" (as of 1990), and on current housing-stock data of the urban planning agencies. They have different legends and varying degrees of accuracy.

The Map **Land Use Inventory (Berlin and Surroundings)** was compiled in 1990 at a scale of 1:25,000, and has an resolution of 3 ha.

The **Topographical City Map** (military edition), as of 1986-89, consists of various sheets in a scale of 1:10,000, and has very exact information on East Berlin, i.e., regarding specific usage of certain buildings.

The **Commercial Space Investigation of Berlin (East)** was compiled in 1990 to ascertain the internal reserve of the commercial space stock of East Berlin, and was represented on maps scaled 1:10,000.

The **map and list of Berlin's allotment garden colonies** (as of 1990) is available for East Berlin in a scale of 1:25,000.

Methodology

The updating and extension of the *Umweltatlas* maps proceeded in three stages: review of the system of land use representation, ascertainment and update of the actual land use, and finally, update of the digitized working map of the Berlin UIS.

Review of the System of Land Use Representation

For both halves of the city, a uniform system of representation had to be developed, in which existing deficits would be removed and the special East Berlin statistical base would be taken into account.

Compared with the old system of representation, the categories "Traffic Area," which now includes airports and harbor facilities as well, and the categories "Construction Site" and "City Square/ Promenade" have been added. The formerly separate category "Water Sports Area" is now subsumed under the category "Sports Facility/ Outdoor Swimming Pool."

Categories of the Map 06.01 "Actual Use of Built-up Areas"

Residential Areas are characterized by housing and by the infrastructure required for living, such as shopping possibilities and service enterprises (laundries, restaurants, schools, etc.). The housing share in terms of floor-space is dominant, constituting 75-100%, compared with commercial, service and small business use. Residential areas include both the dense inner city development and the open settlement development at the edge of the city (cf. Map 06.07, SenStadtUm 1995).

The **Mixed Area I** areas are similar to the residential areas in appearance. However, the housing is more strongly interspersed with commercial and service enterprises (department stores, offices, etc.) and small businesses in lofts and courtyards. As a rule, housing predominates, with a share as high as 75%, but it may drop as low as 10%, with the rest being commercial and service enterprises and small businesses. The negative impact of this commercial use on neighboring residences is overall minimal. Large tour-restaurants in recreational areas have also been assigned to this category.

The **Mixed Area II** category is characterized by a high share of production-related enterprise, with the corresponding building complexes and warehouse/ storage areas. A third of the area, and no more than half, is generally used for housing; in East Berlin, this can drop to 10%. The appearance is that of a small business area. Major inconvenience for residents due to noise and emissions can be assumed.

In **Core Areas**, the office and business centers of commercial and service enterprises predominate, with 70-100% of the space. The residential share is very low, 30% at a maximum. Business and shopping streets are as a rule not categorized as core areas, since, for reasons of visual representation, entire blocks and not single streets along a block, were used as the basis for assignment to use categories (e.g., Wilmersdorfer Strasse). Especially in the Borough of Mitte, public, largely federal administrative buildings, embassies and other comparably-used building, which are as a rule assigned to the category "Public Facilities," may be assigned to the category "Core Areas," since these facilities are marked as core areas on the land use map of that borough (cf. the category "Public Facilities").

Characteristic of **Small Business/ Industrial Areas** are large industrial buildings and warehouses and storage areas. The housing share is subordinate, with 30% at a maximum. Inconvenience due to noise and emissions can be rated very high. The category Small Business/ Industrial Area also includes railway freight yards and small business areas on railway land, as well as clearly small business-used waterside areas (shipyards, boatyards, etc.).

Sites of the category **Public Facilities Areas** include cultural, university and research, health care, administrative, postal and law-enforcement facilities, and also day care centers, playgrounds, schools, sports facilities, youth centers and retirement homes, and religious institutions such as churches. **Special Use Areas** are built-up areas with a specific purpose, such as the Olympic Stadium and the *Messegelände* (trade fair complex).

The sites of the category **Utilities Areas** include power, gas, water and sewage-treatment plants, facilities of the sanitation department and the public transportation system, including railway stations and port facilities, central market halls (the Central Market, the Flower Market, the slaughterhouse) and other service facilities, such as broadcasting facilities.

The **Traffic Areas** include the areas required for truck and rail service, other than public roadways. Traffic islands and airports also count as Traffic Areas. Parking lots and parking garages are only recorded as Traffic Areas if they occupy an entire block. Parking lots which exceed the minimum ascertainment limit of 1 ha, but which are within one statistical block, and connected with other uses, such as residential areas, have not been delimited through the definition of a corresponding segment formation, but have rather been assigned to the dominant use category. The category "Traffic Area" also includes track-beds and railyards of the city and long-distance railways, and also those portions of the subway running outside the tunnels in open right-of-ways or as elevated railways, and also streetcar-related areas. Median strips are assigned to the "Traffic Area" category if their use justifies their categorization as motor-vehicle parking. Freight yards and commercial facilities on railway land are not classified as Traffic Areas (cf. the category "Small Business Areas").

The **Weekend Cottage Areas** differ hardly at all in appearance from the Allotment-Garden or Residential Area. Those areas assigned to this category in the 1985 *Umweltatlas* were retained; for the eastern boroughs, areas were assigned to the category "Weekend Cottage Area" only if they were neither residential nor allotment-garden areas (cf. also use category "Allotment Gardens" in Map 06.02, "Inventory of Green and Open Spaces").

Areas classified as **Construction Site** were those with a typical construction site character: as a rule open areas with soil disturbed by construction vehicles. Often, the foundations or the first stories are recognizable.

Categories of the Map 06.02 "Inventory of Green and Open Spaces"

The category **Forest** includes all wooded areas of the Berlin forests, as well as those wooded stands outside the Berlin forests which appear clearly in aerial photography as self-contained forest stands. The forests include reforested former sewage farms.

Bodies of Water include all natural bodies of water - rivers, lakes, ponds - and also canals and reservoirs belonging to the Berlin Water Authority.

The category **Meadows and Pastures** includes meadows, pastures and enclosures used for agricultural purposes, and also experimental areas used by the universities for similar purposes, and former sewage fields.

Farmland includes areas identified in aerial photography as being used for agricultural purposes. The difference from "Meadows and Pastures" is that in this case, the land is periodically sown, fertilized and harvested.

Parks or Green Spaces include those facilities listed in the *SenStadtUm* Directory of Green Spaces, other city squares with a sealing level of less than 30%, and median strips used as green spaces. In addition, playgrounds, the Botanical Garden, the Zoos in Tiergarten and Friedrichsfelde, the Charlottenburg Palace Gardens, and similar facilities were assigned to the category "Parks/Green Spaces." Green spaces around public facilities such as hospitals were not marked separately.

City Squares and Promenades serve as places of leisure for free time and recreation, as places of assembly, markets, etc. They generally have the word "*Platz*" (square) in their names, i.e., *Alexanderplatz*. They are defined differently from green spaces due to their high degree of sealing, which is 30% or more for both city squares and promenades. Promenades also include median strips with sealing levels of over 30%, unless they are used as parking lots.

Cemeteries are areas used for burial purposes.

The basis for the assignment and delimitation of the category **Allotment Gardens** was the *SenStadtUm* map and list of Berlin allotment garden colonies, which record the allotment gardens as defined by the Federal Allotment Garden Law, which are used as such and are on leased land.

Vacant Areas are areas currently not used or cared for, on which variegated stands of vegetation can develop. Sand beaches and other non-vegetation-filled areas also belong to this category. In addition, a few artificial rain catchments, ditches, landfills and wet areas are assigned to this category.

The category **Campgrounds** includes areas used for occasional residence in mobile shelters, such as tents, trailers and campers. These include both tent camps and permanent campgrounds.

The category **Sports Facilities/Outdoor Swimming Pools** includes, in addition to sports facilities, swimming pools and beaches, riding facilities and water sports areas. The water sports areas are characterized by small dockyards, boat-hangars, club houses, parking lots, etc.. Clearly commercial water sports areas (dockyards, boat-building facilities, etc.) are assigned to the category "Small Business Area" of Map 06.01 "Actual Use of Built-Up Areas."

The category **Tree Nursery/Horticulture** includes, gardening schools, and the planting fields of private tree nurseries and market gardens, except for those areas marked as having solely greenhouse cultivation.

Maps 06.01 "Actual Use of Built-Up Areas," and 06.02 "Inventory of Green and Open Spaces" fit together to provide a comprehensive representation of actual land use. **Overlapping** occurs with "Public Facility" and "Special Use" Sites, with "Utilities Areas", with "Small Business Areas" and "Industrial Areas" and with "Traffic Areas". Areas of these categories are in some cases represented on Map 06.02 "Inventory of Green and Open Spaces," if their character, regardless of their use, is more like that of a green or open space. A sports facility for example, would be represented on Map 06.01 as a Public Facility, and on Map 06.02 as a "Sports Facility"; a median strip might simultaneously be shown as a "Traffic Area" (Map 06.01) and as a "Vacant Area" (Map 06.02). Churches on city squares are shown on Map 06.01 as "Public Facilities" and in Map 06.02 as "Parks/Green Spaces" or as "City Squares/Promenades", depending on their degree of sealing (cf. Tab. 2).

	Public Facilities	Small Business / Industrial Areas	Utilities Areas	Traffic Areas
Vacant Area	23	37	15	89
Sports Facility	302	–	–	–
Park/Green Space	35	–	–	–
Forest	14	–	6	5
Allotment Gardens	2	–	–	–
Tree Nursery/ Horticulture	7	–	–	–
City Square/ Promenade	7	–	–	–

Tab. 2: Number and Variations of Overlappings

Survey and Update of the Actual Land Use

The available maps were compared and checked against the aerial photography for changes.

The most important map sources for the update and investigation were, for West Berlin, the maps of the uniform-use block segments, as of 1989, at a scale 1:4,000 and, for East Berlin, the land use

maps of the boroughs (inventory), as of 1990/91, at a scale 1:5,000. For uniform-use block segments of plot size up to block size, use is shown in a very differentiated manner. In this way, assignment to the individual categories could be carried out very well and implemented according to the system used here.

For different land use within a statistical block, **uniform-use block segments** were delimited. For reasons of clarity, the minimum size shown is 1 ha and the minimum width 20 m. In individual cases, partial areas of less than 1 ha were delimited to show such contrasting uses as green space and housing; in such cases, the minimum was 7,000 m².

Since in the maps of the uniform-use block segments and the land use maps of the boroughs (inventory), areas of less than the minimum size of 1 ha are shown, these had to be merged to form larger block segments. In case of uniform-use block segments defined according to the categories housing, commercial/service and business/industry, the respective area shares of the different block segments were estimated and classed according to the use shares in the categories of Table 1. If uniform-use block segments had to be merged which were defined according to very different criteria, e.g. living space and public facilities, they were classed according to dominant use: Land uses of smaller size were assigned to the prevailing use category.

The information of the map sources used was checked against the aerial photography. In particular, the open space inventory could be updated very well with the aid of aerial photography. Also structural changes, such as new construction and landscaping, and the course of borderlines of uniform-use block segments, could be ascertained and corrected accordingly. Use changes without change of construction structure, for instance the transformation of a residential area to a mixed area, could be determined only from the map sources, not from the aerial photography.

For the delimitation and examination of the mixed areas in East Berlin, the map "Land Use Inventory (Berlin and Surrounding Countryside)," 1990, was also used.

For the examination of the commercial areas of East Berlin the map of the ISA commercial area investigation was used.

The Topographical City Map was used for the determination of Public Facilities and Special Use Areas, and Utilities Areas in East Berlin.

Update of the UIS Digitized Work Map

All information about actual land use is managed and processed at the UIS. This makes possible a graphic data processing of the **factual data** on basis of a **uniform spatial reference system**.

The spatial reference system is provided by a digital topographical basic map in a scale 1:50,000 - the **UIS work map**. It shows each individual statistical block, which is as a rule delimited by streets, with its block number. The numbering and delimitation of the blocks are carried by the State Statistical Office (*Statistisches Landesamt*). The statistical blocks of the digitized work map were updated as part of the processing of the actual land use for the western part of the city, and digitized for the eastern part of the city for the first time, in accordance with the latest information.

The smallest reference segment is formed by the block segments, which were delimited for different land use within a statistical block.

The uniform reference system makes possible a clear spatial identification of all factual data. Over a common key, which contains, among other things, borough, block and block segment numbers, these data are assigned to the spatial reference system.

Streets do not have any area in the UIS spatial reference system, and are thus digitally non-addressable. The course of the street is described by the boundaries of the individual statistical blocks.

The data on actual land use are stored in the use data base. This data base contains, in addition to a statement of the actual land use of a block and/or a block segment, further information about the area size, the area type, the sealing degree, the distribution of differently permeable surface covers, and also detailed information on mixed areas and vacant areas.

Map Description

The City of Berlin covers an area of 889 km². Of this, 55% is built up, and 45% is green and/or open space (cf. Fig. 1).

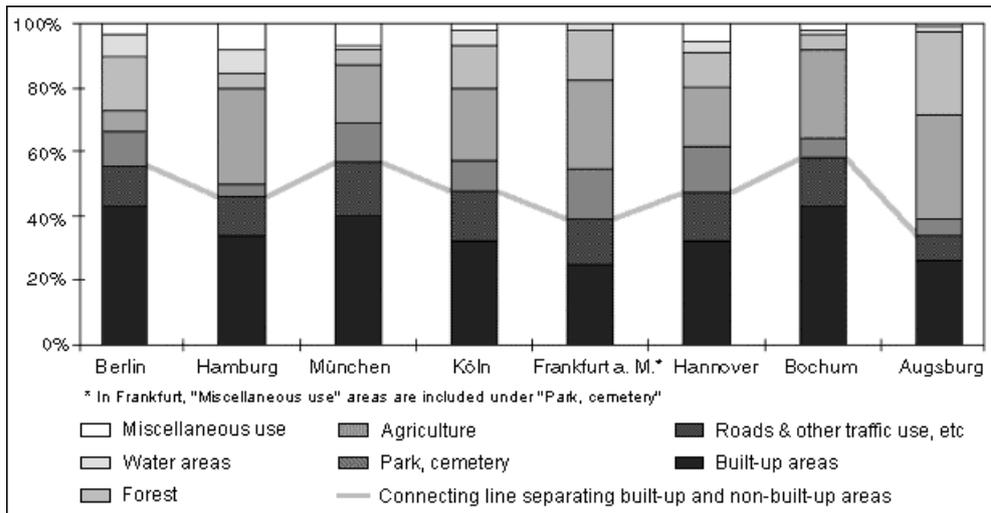


Fig. 1: Land Use in Berlin by Comparison with Other Cities

The share of the city's area taken up by built-up areas, including roadways, 55%, is high in comparison with other cities. Similar relationships between built-up and non-built-up area are to be found in the cities of Munich (57% built-up area) and Bochum (58% built-up area). In other cities, the open space share is over 50%, with especially high shares in the cities of Frankfurt-on-Main (61%) and Augsburg (66%).

Map 06.01 "Actual Use of Built-Up Areas"

Map 06.01 "Actual Use of Built-Up Areas" shows the different use categories by their shares of the built-up area of Berlin and their distribution throughout the city area. Figure 2 elucidates the distribution of the use shares further.

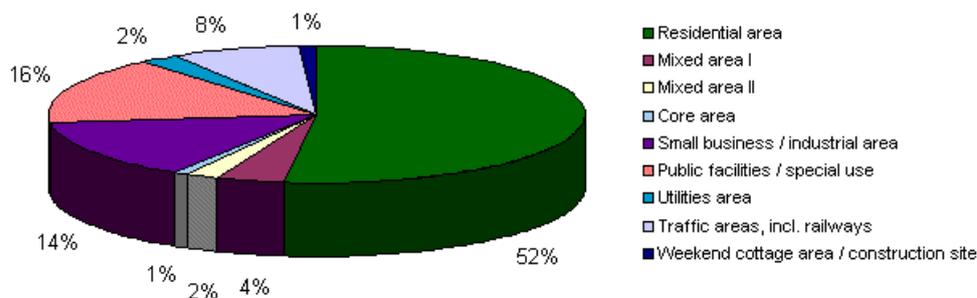


Fig. 2: Shares of the Various Use Categories of the Total Built-Up Area of Berlin

More than the half of the built-up area of Berlin is used for housing. Small-Business and Industrial Areas and Public Facilities account for 14% and 16%, respectively - still a relatively large part of the built-up area of Berlin. The Traffic Areas are next, including the roadways, which are not shown as traffic areas, with 8%, and then the Mixed Areas I and II with together 6%. Very little space is taken up by the Core Areas, Utilities Areas, Traffic Areas, Weekend Cottage Areas and Construction Sites.

In the distribution of the use categories of the built-up areas within the urban area, characteristic structures can be recognized. Thus, purely residential and small business areas exist in the outskirts area much more frequently than within the City Rail Circle Line; there the Mixed and Core Area use categories are more heavily represented. Particularly, Small Business Areas are concentrated along from waterways and railroad lines, due to the more favorable transport conditions. One often finds Mixed Areas and scattered Core Areas in the old village centers in the different parts of town, as a consequence of the well-developed structures. Striking is the concentration of the Core Areas in both city center areas, of West and East Berlin, i.e., around Kurfürstendamm / Tauentzienstrasse and

around the area of Alexanderplatz / Friedrichsstrasse, respectively. Public Facilities Areas are distributed throughout the entire urban area relatively evenly. Utilities Areas occur mainly in the outskirts, frequently in the neighborhood of Small Business Areas.

The described structures are also reflected in a comparison of the distribution of the land use categories within the individual boroughs (cf. Fig. 3).

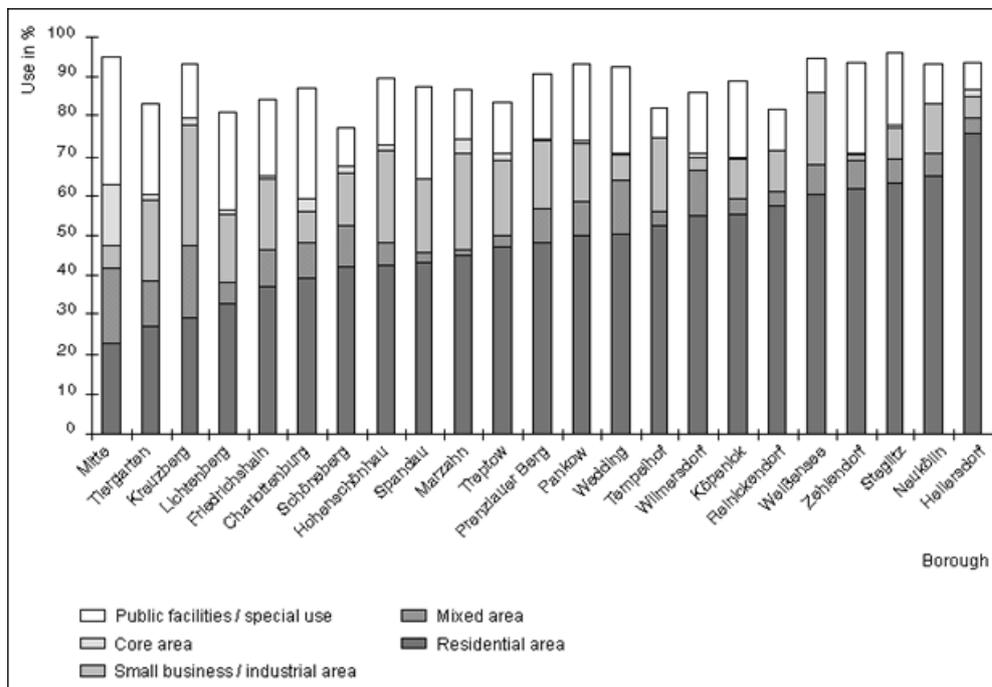


Fig. 3: Proportions of Selected Use Categories in the Built-Up Areas of All Berlin Boroughs

Examples for the characteristic use distribution in the outskirts area are the boroughs of Tempelhof and Pankow, with 52% and 50% residential use and 18% and 15% industrial use, respectively, while in the borough of Mitte, with only 23% Residential Areas, but 15% Core Area use and a high share of Public Facilities (39%), the central functions which have existed for centuries are reflected. This function is not shown so clearly for the West Berlin center around Kurfürstendamm / Tauentzienstrasse, which has a Core Area share of only 3% or less, since the core area is distributed among the three boroughs of Charlottenburg, Tiergarten and Schöneberg. The inner city boroughs of Kreuzberg and Tiergarten have, with 30%, a relatively low share of living space. In turn, the share of commercially-used area is very high, with 30% and 20%, respectively. Kreuzberg and Mitte are the boroughs with the largest Mixed Area shares (18%). The originally available use mixture can still be recognized most clearly in the boroughs of Prenzlauer Berg, Friedrichshain and Kreuzberg.

Zehlendorf (63% residential use) and Hellersdorf (76% residential use) stand out as neighborhoods with slight industrial use (2 and 5%, respectively).

Map 06.02 "Inventory of Green and Open Spaces"

Map 06.02 "Inventory of Green and Open Spaces," shows the different use categories in their shares of the non-built-up areas of Berlin, as well as their distribution throughout the city.

The largest part of the inventory of green and open spaces lies in the outskirts area. The large wooded areas of the Grunewald and the Düppel forests in the southwest, the Spandau and Tegel forests in the northwest and the large forest areas in the borough Köpenick in the southeast of Berlin stand out particularly. Forests account for 38% of all Green and Open Spaces (cf. Fig. 4).

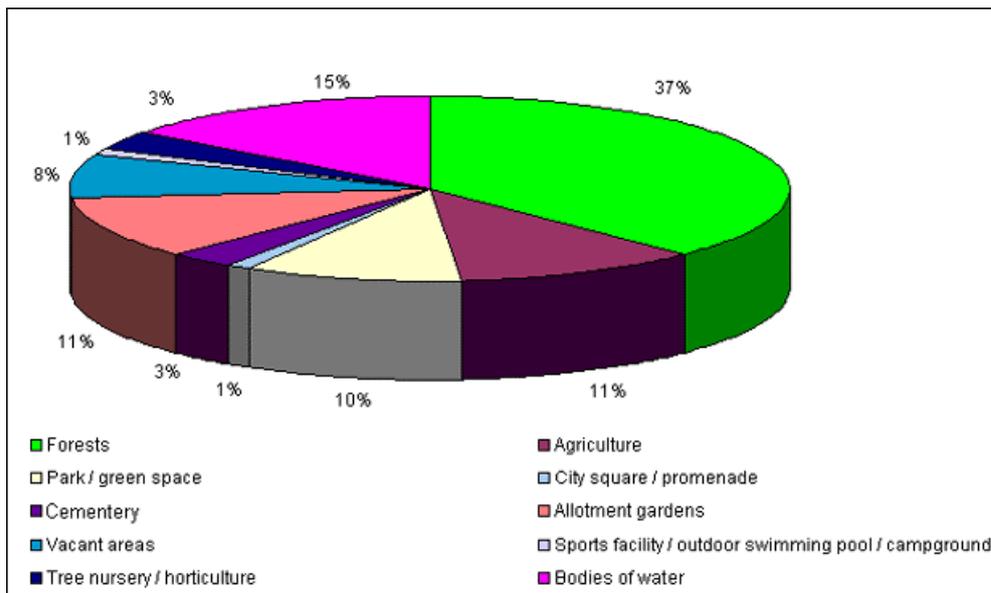


Fig. 4: Shares of the Various Use Categories of the Total Inventory of Green and Open Space of Berlin

Agriculturally-used areas, which account for 11% of the inventory of open space, are found particularly in the northeastern area (Pankow and Weissensee). Other agricultural areas are located in the eastern, southern and western outskirts. Allotment Gardens, which account for an additional 11% of the open space inventory, are found almost exclusively outside the City Rail Circle Line, in the outer boroughs. Often, they are located near canals, rivers and railroad lines. The currently unused Vacant Areas are distributed throughout the entire urban area, particularly along railroad lines and bodies of water as well as on the airfields. Tree Nurseries and Horticulture areas are found only in the outskirts area, while Sports Facilities, Cemeteries, and Parks and Green Spaces are located throughout the entire urban area. The area sizes of the individual open spaces increases as one moves from the inner city area toward the outskirts. In the inner city boroughs, the open space inventory consists mainly of smaller parks - with the exception of the *Tiergarten*, while Sports Facilities, Cemeteries, Vacant Areas and City Squares and Promenades. In the outer areas, the different open-space categories appear frequently in association with one another, e.g. Green Spaces, Allotment Gardens and Sports Areas; or Tree Nurseries, Vacant Areas and Allotment Gardens; or Forests, Meadow and Pastureland and Farmland, while the various open spaces in the inner city area usually occur in isolation, and are surrounded by built-up areas.

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