

## **06.01 Actual Use of Built-up Areas**

## **06.02 Inventory of Green and Open Spaces (Edition 2002)**

### **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. Also 12 years after the reunion of the two separated parts of the city, Berlin is in a prolonged process of the economic and demographic restructuring. This was formulated in the master plan (FNP 94) in the beginning of the 90s, but the development expectations have only partially been fulfilled up to present moment. For the Berlin metropolitan area and its surroundings, a major growth impetus was predicted until 2010 as a result of planning for the capital. According to the prognoses of the Berlin Master Plan, 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 was 1,000 ha. In addition, it was assumed that some 11 million m<sup>2</sup> of office space and 1.4 million m<sup>2</sup> of retail-sales space would be required by the year 2010 (figures refer to gross floor-space). The real development between 1990 and 2000 shows a stagnation of the population with 3.4 million inhabitants in 2000 and has to report a drop of jobs from 1.7 million to 1.54 million.

Housing existence had increased, 150,000 new flats were built. The office space had also increased by 7 million m<sup>2</sup>. So today it's with 1,5 million m<sup>2</sup> clearly over the increase assumption for 2010. Unforeseen developments, like social and spatial segregation, clearance of surfaces, vacancy of apartments and decrease of financial resources, demand new strategical considerations about the planning of urban development, like it was presented with the project of the concept of urban development -Strategie Berlin 2020 (StEK 2020)-. It is assumed that there will be an essential reduced projected growth until 2010: stagnating rate of inhabitants and jobs, 45,000 additional apartments, 480 ha new commercial areas, 4.5 million m<sup>2</sup> and 0.4 million m<sup>2</sup> additional office and retail space.

The general urban and environmental planning is a process, what needs a continuous monitoring. The aim is to audit the presumed development on the basis of the actual progression. In order to implement this aim there will regular present, according the Masterplan, a report of landuse (Stadtentwicklung 2000) and a mapping of real landuse with an update of the maps 06.01, 06.02 and 06.07 (urban structure).

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 Urban and Environmental Information System (UEIS) of the Berlin Department of Urban Development (SenStadt) 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, was 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 which are differentiated described in the respective edition.

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," 06.02 "Inventory of Green and Open Spaces" and the edition from total area of Berlin **1995** (06.01/06.02) (data base 1990).

The update of the **edition 2002** (data base 31.12.2000) was implemented by an external contractor. For the changes the information were taken from the geodata base "Flächen mit gesamtstädtisch bedeutenden Veränderungspotenzialen" (areas with statistically important potential of change) published by the groups: City Knowledge, Urban Development Monitoring and Population Prognosis of the Senate Department for Urban Development. Based on the FNP decision from the House of Representatives in 1994 to regularly monitor conditions, the actual land use is documented. Areas with a minimum potential for 100 residential units; 10,000 m<sup>2</sup> BGF for services; 5,000 m<sup>2</sup> retail-sales; 1 ha for trade and industry; 3 ha green-spaces or forest/woodland. Information is available on previous use, planned use, and actual use on completion. Projects started before the study and projects not due for completion before 2002 are also examined.

For the determination of the changes in land use were also used the following digital maps:

- Digital basic map Berlin 1:5,000 of ISU; status: 1999-12. with new block segments and actual block numbers
- Basic map Berlin 1:5,000; K5, 147 single sheets (1968 until 1999) from the geo data service in the raster format TIFF, published by the land surveying offices, status: 2000-01
- ALK-Berlin, selected data from the ALK with selected object information and assignment of allotment areas to ownerships and use categories of the Automatisiertes Liegenschaftsbuch ALB (automated real estate book) for the innercircle S-Bahn, vector formatted; updated by the land surveying offices, status: 1998
- Map "Flächen mit gesamtstädtischen Veränderungspotentialen" (areas with statistically important potential of change), SenStadt IA1. digital map 1:25,000, status: 2002-06-20
- Digital aerial view from LUA Brandenburg in the sheet line system of the K10 Berlin, SW, 1:10,000, status 1998

And

- Digital CIR-aerial photographs of 2000, SenStadt (archive for aerial views) for areas where block numbers or restrictions had changed and for surfaces with general urban potential of change (s.a., all up nearly 650 aerial views).

Further the structures of use from all existing Bereichsentwicklungsplanung Berlin (BEP) were analysed.

## Methodology

All information about actual land use is managed and processed at the ISU (Informationssystem for city and environment). 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 ISU 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 ISU 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.

## Update of the ISU Digitized Work Map

The **Digitized Work Map 1:50000** (ISU50) and the corresponding data base (status 1990) were updated via using the above mentioned sources in the following steps:

After overlaying with the "Digital Map Berlin 1:5000" and the corresponding aerial photographs the block-segments which have changed were adopted using the style of portray of the map ISU 50. The actual codes of the State Statistical Office (2000) were also adopted.

According to the methodology of portraying uses and types of areas of the Environmental Atlas Berlin blocks were separated into **block-segments**. This happened when the current use of a block area could be separated into a residential or openspace type of use. These block-segments were documented by a unique code in the GIS database and the statistical data base.

All together **3,885 new block/block-segments** were created. These new blocks were checked with the map "Flächen mit gesamtstädtischen Veränderungspotentialen" (areas with statistically important potential of change), and if necessary adapted.

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

The methodology for building the categories of uses is portrayed in detail in the text of the edition 1995 in the chapter methodology.

**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., Wilmerdorfer 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 *SenStadt* 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 SenStadt 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. Altogether the overlapping applies about 750 areas with a total area of nearly 30 km<sup>2</sup>.

## Map Description

The City of Berlin covers an area of 889 km<sup>2</sup>. Of this, 55% is built up, and 45% is green and/or open space (cf. Fig. 1).

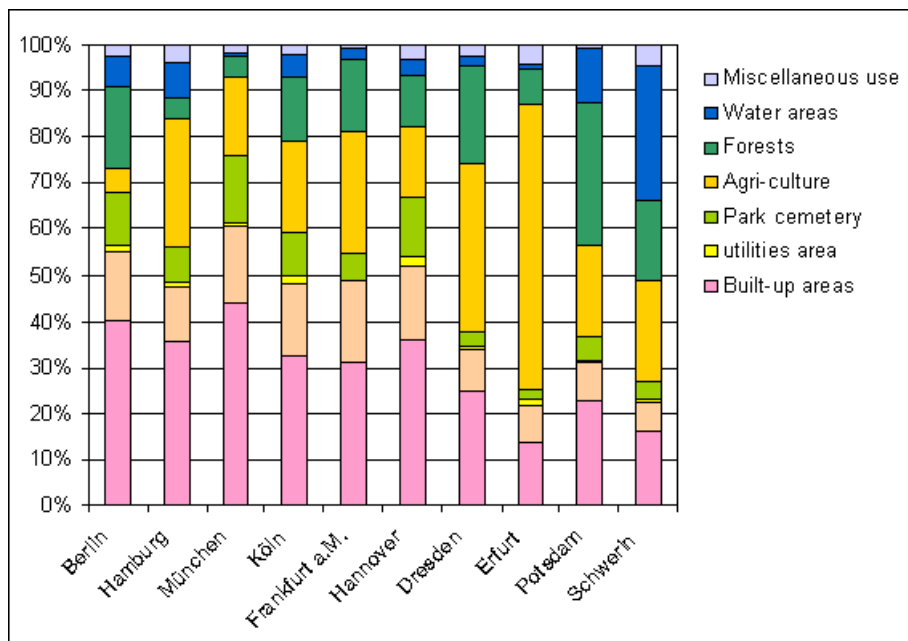


Fig. 1: Land Use in Berlin by Comparison with Other Cities

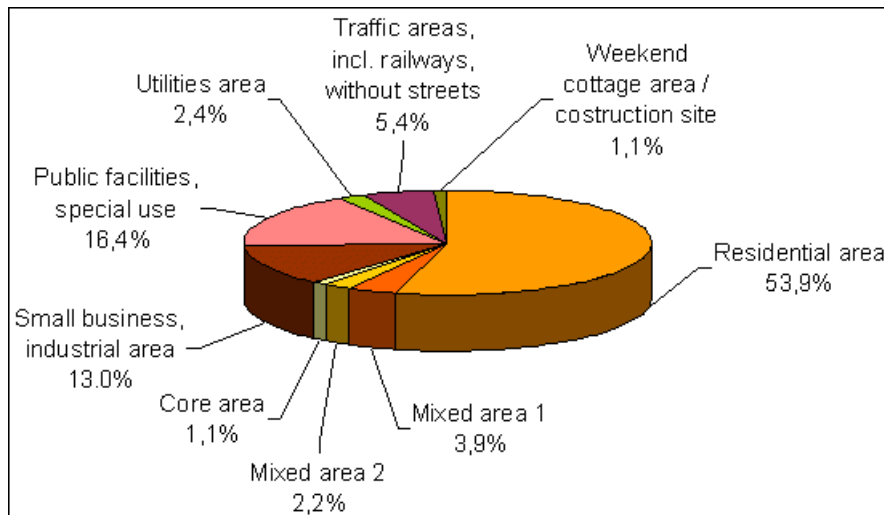
(according to the 1991 Statistisches Jahrbuch (Statistical Yearbook) of the City of Munich and the 1991 Statistisches Jahrbuch of the City of Berlin)

The share of the city's area taken up by built-up areas, including roadways, 55%, is high in comparison with other cities and will only be beaten by Munich with 61% built-up area. In other greater cities, as in Hamburg, the open space share is mostly over 50%.

## Map 06.01 "Actual Use of Built-Up Areas"

Opposite to the **figures of the State Statistical Offices** which were used for the comparison of different cities, the following shares of uses based on the block/block-segments which are stored in the statistical base of the ISU database. Because of varieties in data collection they are **not total comparable**.

**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.

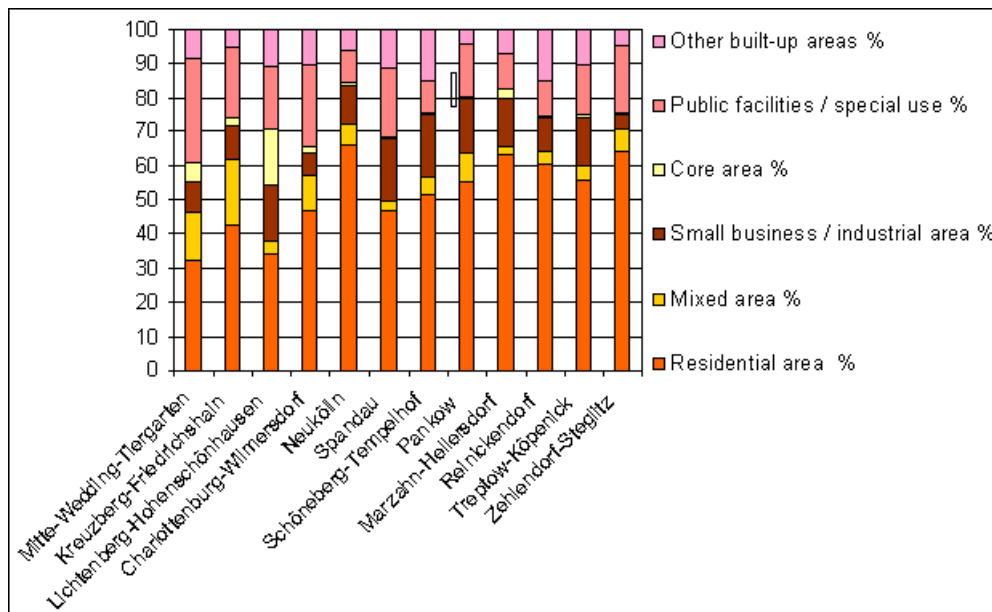


**Fig. 2: Shares of the Various Use Categories of the Total Built-Up Area of Berlin**

More than the half of the built-up area of Berlin is used for housing. This share has increased compared to 1990 for 2 % to 54 %. 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 5%, 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 Kurfuerstendamm / 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**

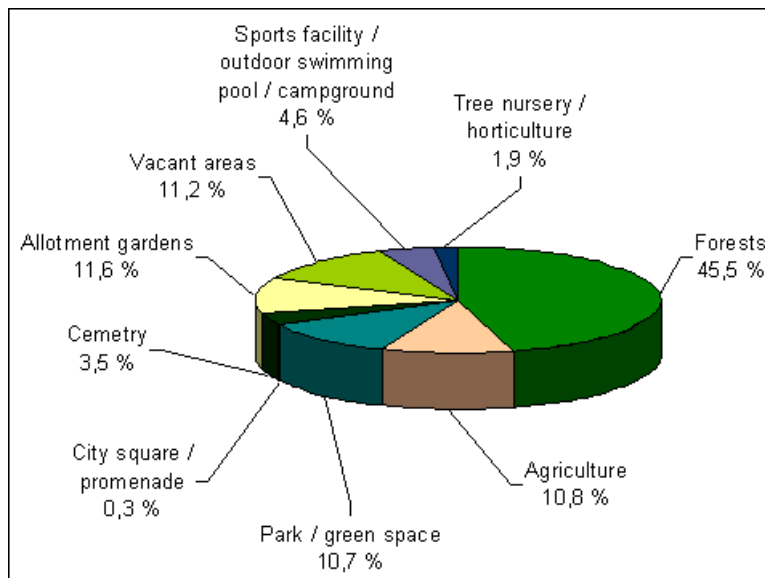
After the integration of the former 24 Berlin boroughs into 12, the shares of uses have changed, compared to 1990, but there is still visible a historic grown structure of the city. Examples for the characteristic use distribution in the outskirts area are the boroughs of Marzahn-Hellersdorf and Reinickendorf, with 63 % and 60 % residential use and 14 % and 10 % industrial use, respectively, while in the borough of Mitte, with only 32 % Residential Areas, but 5 % Core Area use, 14 % Mixed Area use and a high share of Public Facilities (30 %), 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 2 % or less, since the core area is distributed among the three boroughs of Charlottenburg-Wilmersdorf, Mitte and Schoeneberg-Tempelhof. The inner city boroughs of Friedrichshain-Kreuzberg and Charlottenburg-Wilmersdorf have, with 42 % and 47 %, a relatively low share of living space. In turn, the share of public facilities is very high, with 21 % and 24 %, respectively. Friedrichshain-Kreuzberg and Mitte are the boroughs with the largest Mixed Area shares (19 % and 14 %). The originally available use mixture can still be recognized most clearly in the boroughs of Mitte and Friedrichshain-Kreuzberg. Zehlendorf-Steglitz (64% residential use) stand out as neighborhoods with slight industrial use (5%).

## 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 Dueppel 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 45% of all Green and Open Spaces (without waters) (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 12% 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, as well as 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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