Towards a Valuable Green Infrastructure in Cities

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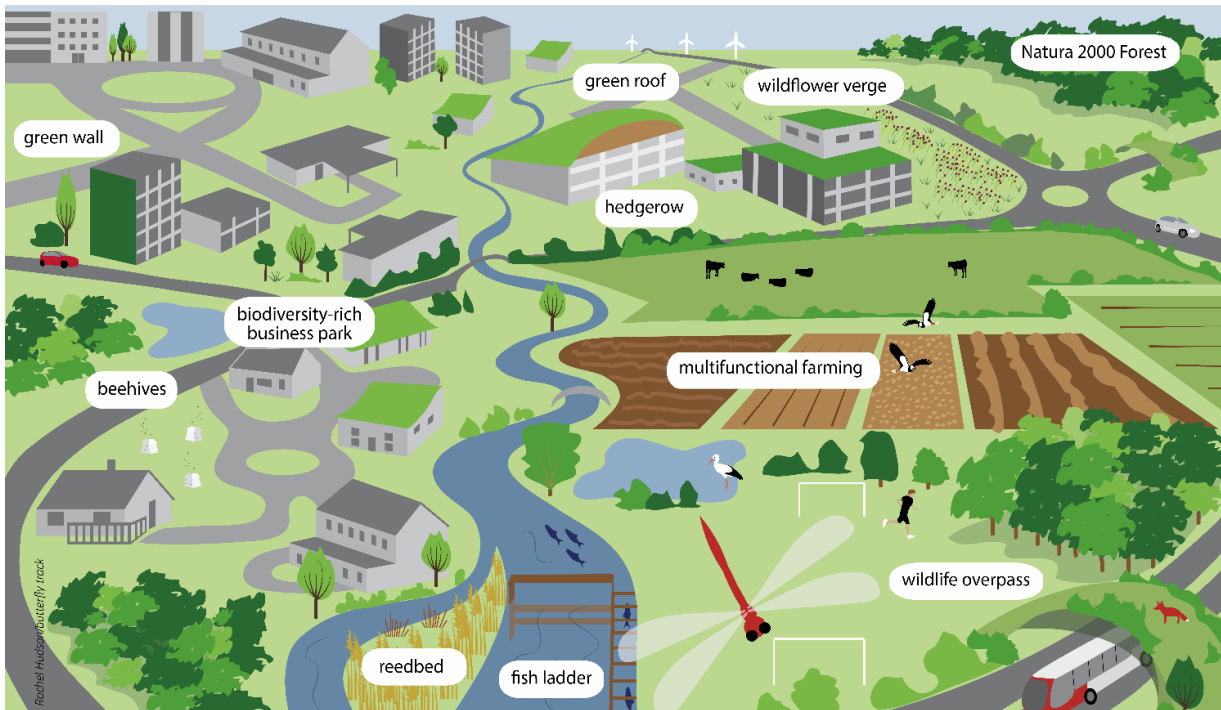# 难点和问题 Problems and questions

- Post-mining cities need to overcome their economic/social decline to start a new development and attract investments
  - Sanitation of ecological damages
  - Renewal of the image
  - Improve the quality of life
- Life quality depends (among others) on clean air and water, pleasant climate, enjoyable environment, biodiversity and according possibilities of recreation – in short:
An advanced Green Infrastructure
- Do we have the space and how it can be developed?
- What solutions have been proven as useful in Germany?

Conception/term: 'Green Infrastructure'

is a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. This network of green (land) and blue (water) spaces … enhances biodiversity.

EEA at
http://ec.europa.eu

绿色基础设施是由自然、半自然及其他环境要素构成的战略性生态规划网络。其为城市提供了广泛的生态系统服务和生物多样性保护的基础。

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What belongs to Green Infrastructure?
城市自然类型 /Four types of nature in cities (Kowarik 1993)

- **Remnants of former natural landscape**
  Forest, Swamps, Rock areas etc.

- **Remnants of agricultural landscape**
  Fields, orchard meadows, meadows, pastures, heats, dry grassland etc.

- **Designed and symbolic natur**
  Parks, gardens, street trees, flower pots etc.

- **Specific urban-industrial nature**
  wall vegetation, vegetation of sidewalks, spontaneous vegetation in gap sites, brownfields and fallow land

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For example: the 4 types of city's nature in Dresden
德累斯顿的 4 大类城市自然

250 m² Green space/capita: Dresden = 4. greenest City in Germany
(Ranking of „Berliner Morgenpost" 2016)

Forest: 7.600 ha
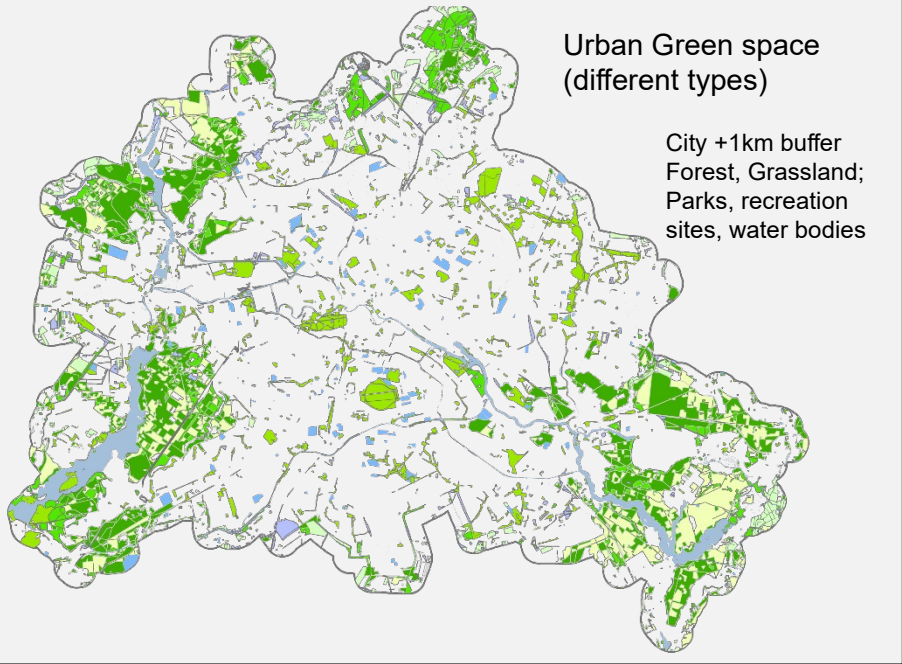森林

Agriculture: 10.700 ha
农田

Parks: 1.600 ha
公园

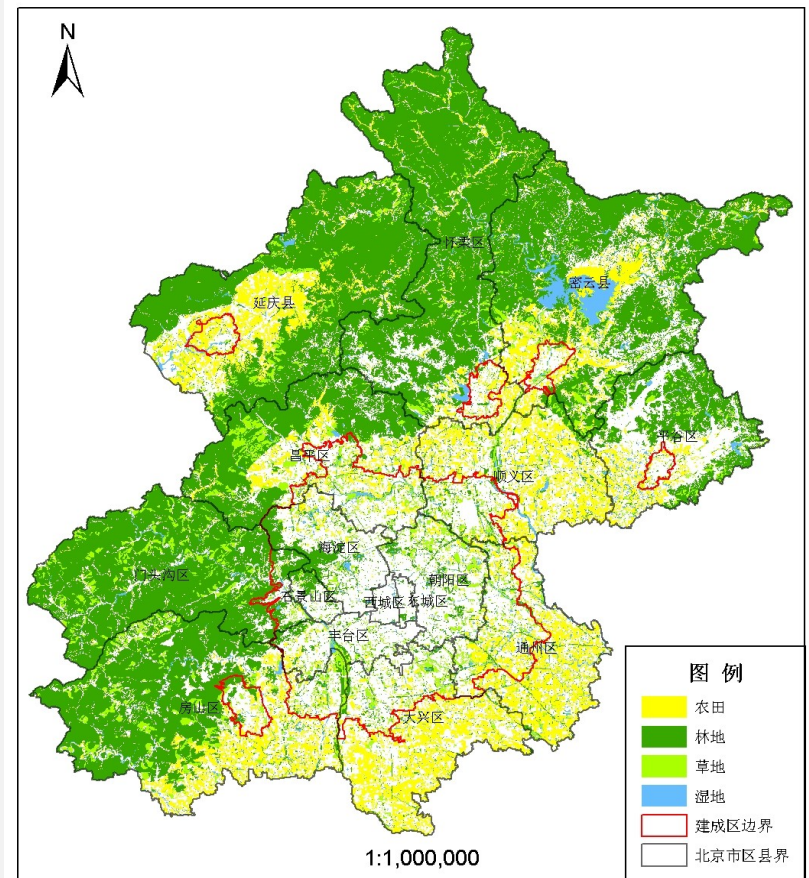
Brownfields,
spontaneous green
荒地 / 棕地

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How to measure urban green: Indicators/ 评价指标

Indicator	Recording method
1. **Green space proportion** 绿地比例	Green space / total area in % 1. topographical data 2. remote sensing (total green)
2. **Green space per capita** 人均绿地面积	Green space in m²/inhabitant 1. topographical data 2. remote sensing combined with population statistics
3. **Green space volume** 绿地总量	1. Average vegetation height (m) 2. Tree canopy proportion (%) 3. Green volume number (m³/m²) 4. Leaf area index (m²/m²)
4. **Green space accessibility** 绿地的可达性	Share of inhabitants living within an walking distance to accessible urban green
5. **Soil sealing degree** 地表硬化程度	Area of developed or paved surface divided by total area

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Berlin (982 km²) is 'green' (44% green space), but 28% of the population (still) do not have access to a public green space relevant to recreation (in walking distance).

Beijing (3,500 km²) is also 'green' (45% green space), but the spatial arrangement in relation to the residential areas is less favorable (78% live in the city center with little green and only 2% live in the satellite districts).
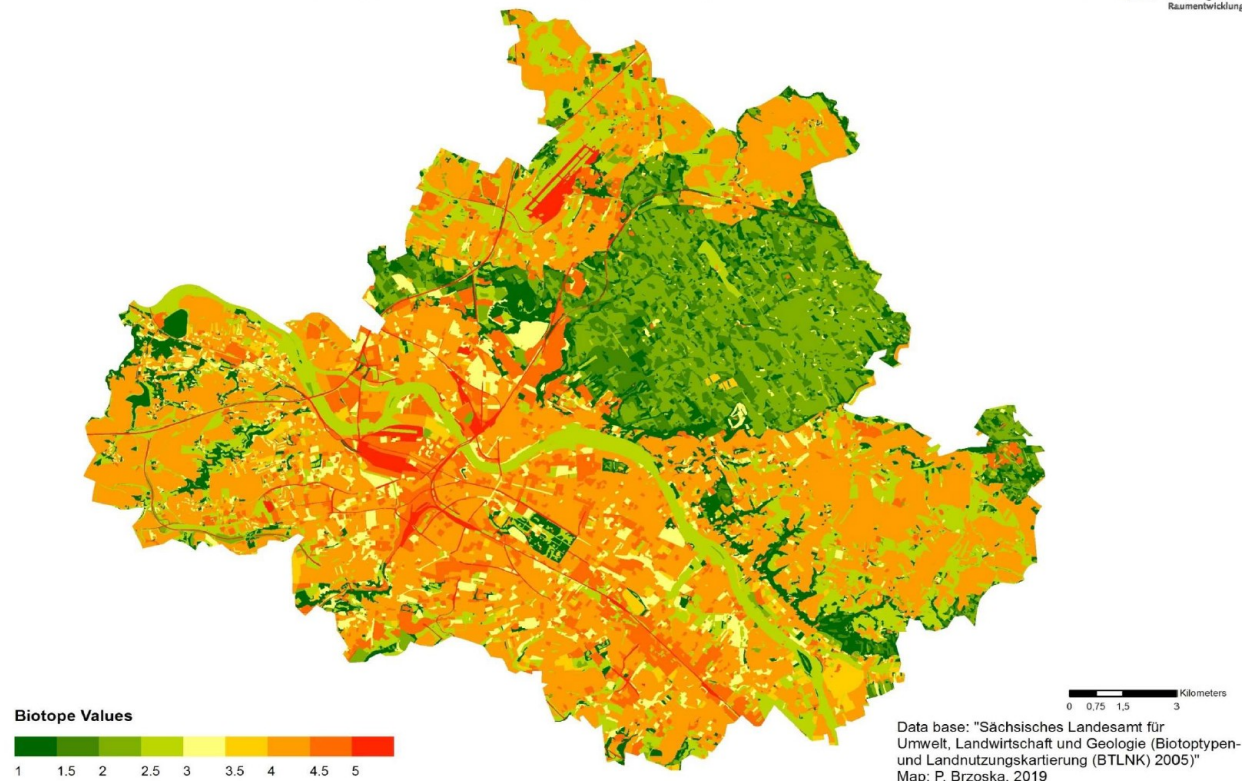
Urban Green space (different types)

City +1km buffer
Forest, Grassland;
Parks, recreation
sites, water bodies

What is comparable? 可比性？

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N

图 例
农田
林地
草地
湿地
建成区边界
北京市区县界

1:1,000,000

Biodiversity = Basis for Ecosystem Services/ 生多保护

Definition: Ecosystem services encompass both the tanggible and intangible benefits people can obtain from ecosystems
(MA 2005)

Valuation of biotope types in Dresden (according to Bastian & Schreiber 1999)

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Biotope Values

1 1.5 2 2.5 3 3.5 4 4.5 5

Data base: "Sächsisches Landesamt für Umwelt, Landwirtschaft und Geologie (Biotoptypen- und Landnutzungskartierung (BTLNK) 2005)"
Map: P. Brzoska, 2019

0   0.75 1.5   3 Kilometers

The benefit of Urban Green Infrastructure: Ecosystem Services / 生态系统服务

Cultural services 文化服务

- ❖ Heritage + Homeland
- ❖ Aesthetics
- ❖ Recreation + Health
- ❖ Inspiration
- ❖ Environmental education
- ❖ Rare species

Provisioning services 供给服务

- ❖ Medicines
- ❖ Cosmetics
- ❖ Crops
- ❖ Timber + insolants
- ❖ Raw materials
- ❖ Mushrooms + berries
- ❖ Honey
- ❖ Game
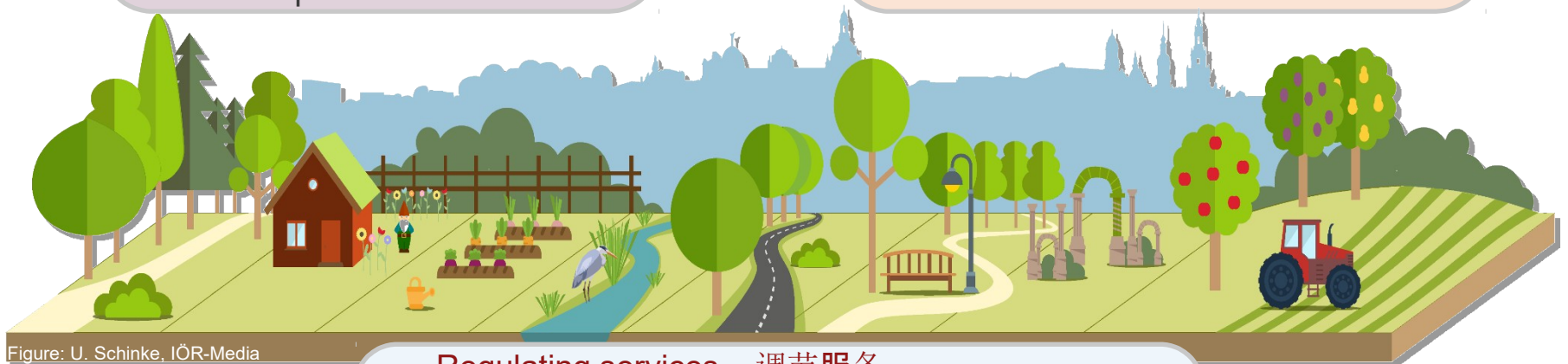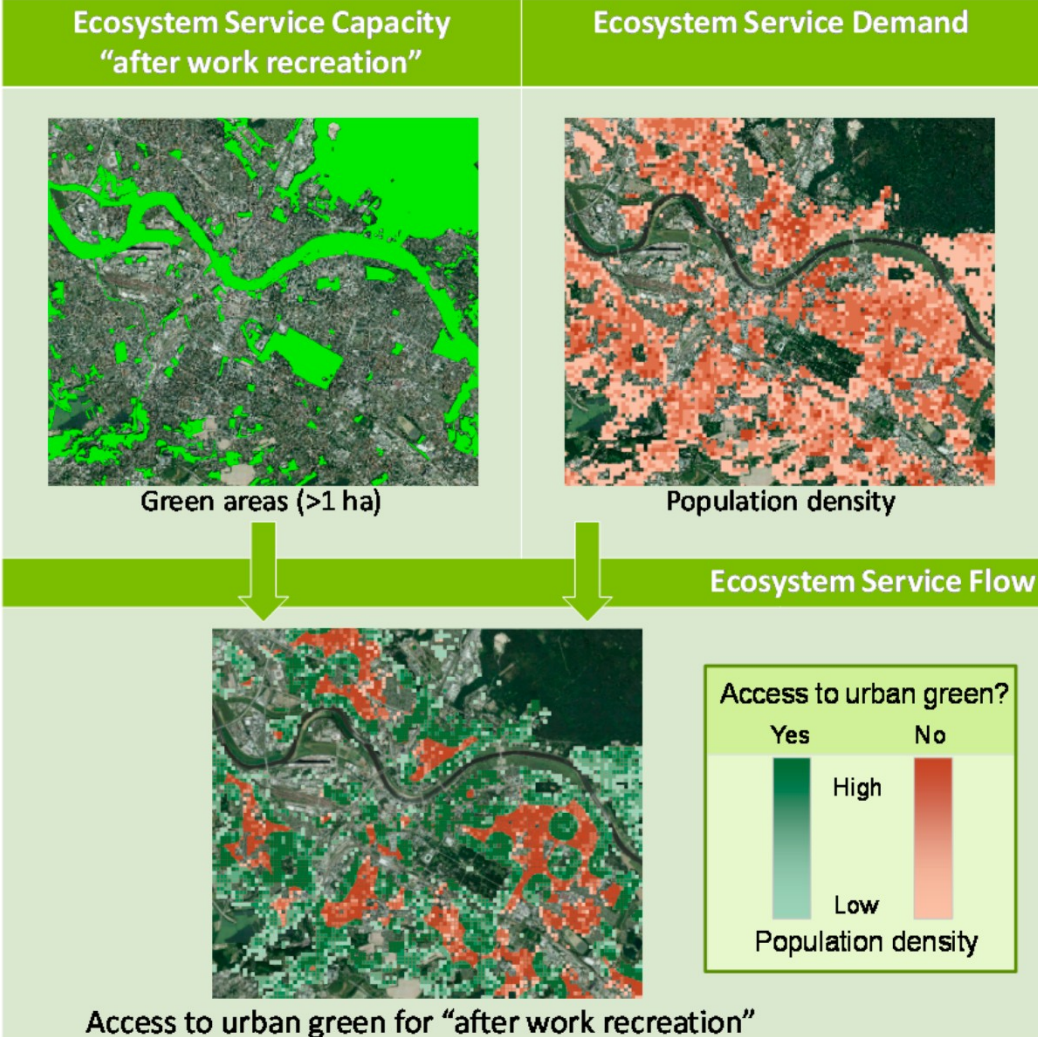- ❖ Ren. Energy
- ❖ Fresh water
- ❖ Fodder

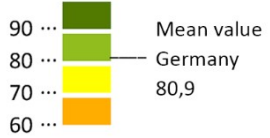Figure: U. Schinke, IÖR-Media

Regulating services 调节服务

- ❖ Noise reduction
- ❖ Rotting/soil formation
- ❖ Flood retention
- ❖ Storm mitigation
- ❖ Carbon storage
- ❖ Mitigation of pests
- ❖ Local climate regulation
- ❖ Erosion protection
- ❖ Pollination
- ❖ Cleaning of air and water

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Indicator: Access to urban green space in Germany
绿地可达性

Ecosystem Service Capacity "after work recreation"

Green areas (>1 ha)

Ecosystem Service Demand

Population density

Ecosystem Service Flow

Access to urban green?
Yes — No
High
Low
Population density
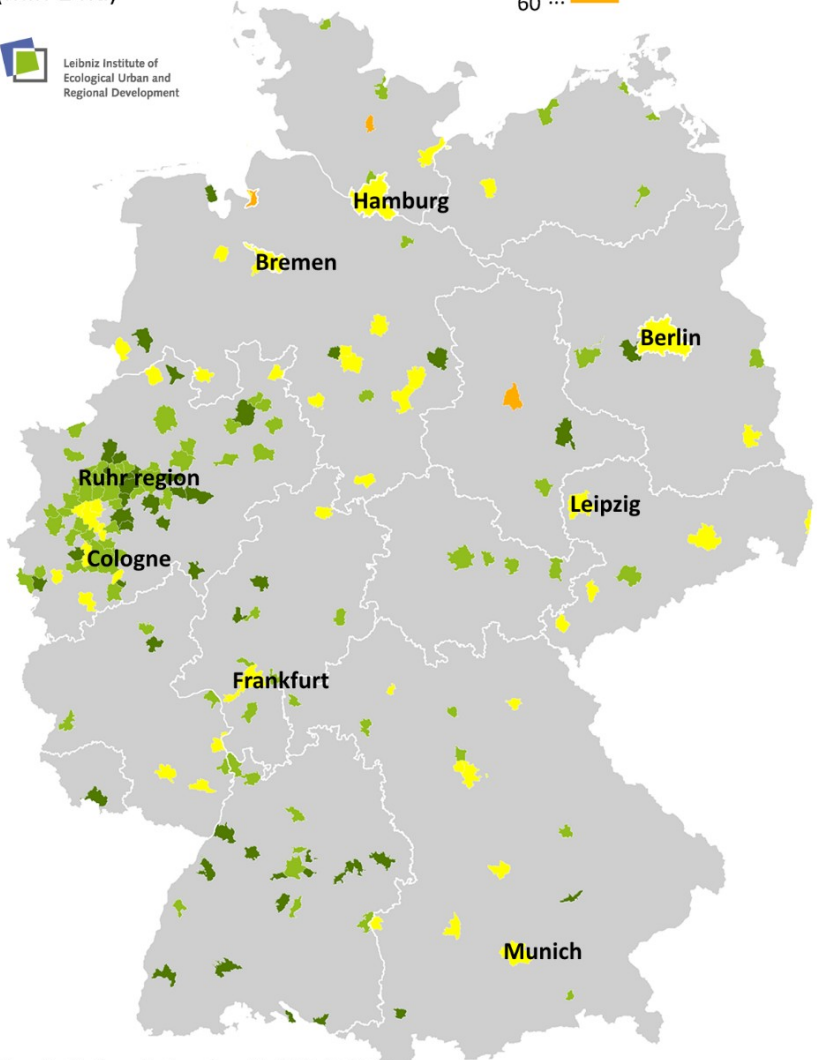
Access to urban green for "after work recreation"

Percentage of inhabitants within walking distance (max. 300 m) to **nearby green spaces and water areas** (min 1 ha)

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90 ···
80 ···
70 ···
60 ···

Mean value Germany
80,9

Hamburg
Bremen
Berlin
Ruhr region
Leipzig
Cologne
Frankfurt
Munich

Map: B. Richter, K. Grunewald, IOER (2015)
2011 population raster census ©Destatis (2015)
Data bases: ATKIS Basis-DLM; VG25 ©GeoBasis-DE / BKG (2014)

Solutions? 提升生态服务

- Multifunctionality of Green Infrastructure
- Green traffic (cycling, skating, soft mobility in the green)
- Children adventure areas (without strong design)
- Informal Initiatives e.g. Municipalities for biodiversity (left)
- Renewal of rivers and other water bodies (right)

KOMMUNEN für biologische Vielfalt

Trümmerberg

Leubener Kiesseen

采后矿区的发展路径
Options for post-mining regions

Improve the rivers' quality and
reorientate towards water bodies:
Exclusive housing: Loft flats in
Leipzig

亲水游憩　Aquatics and nearby recreation

Lagune Kahnsdorf (Leipziger Neuseenland)

Big photo: LMBV

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New sports possibilities

Green ways for waling, cycling, etc. near Leipzig: Around the Cospuden lake with the look-out ‚Bistumshöhe‘

New trend in Europe: Edible Cities

Implementation?

Impact?

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Synergies between flood protection and city planning
Public relation for citizens engagement

„Be the designer of your city:

Take part in the blue band survey!"

Dresden Südost

- Synergy: flood rotection + better green spaces + citizens' live quality

- Civic participation

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Conclusions/ 结论

- Technics / data are improving ➡ better indicators become possible
- Results are suitable for political diskussions, comparisons, monitoring,
- ES assessments + accounting helps to understand role of nature
- Targets need to be defined within a broad public (photo)
- Further questions:
  What kind / amount of nature
  do we want in cities?
- 城市应该"多自然"？（数量和质量）
  How do city inhabitants
  (the majority of mankind)
  want to live in the future?
- 你希望你所居住的城市是
  什么样的？

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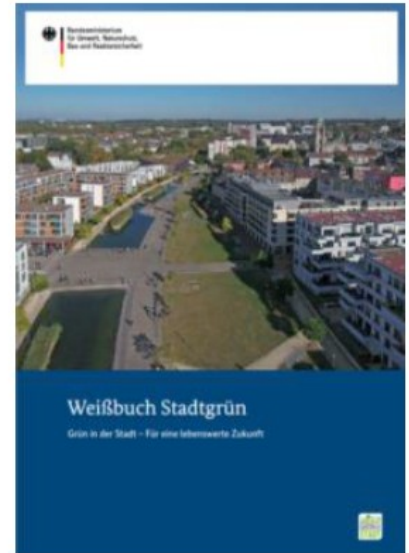# Strategies and guidelines on Green Infrastructure

2001, 2017   **2007**   **2015**   **2017**

Draft of the „Masterplan Stadtnatur" by the Federal German Government:
10 Action fields with 19 action types including:
- Strengthening the Green Infrastructure by law
- New funds for enhancing biodiversity in cities
- Empowerment of the urban landscape planning

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Thanks for your attention!

谢谢！

Cities and Nature

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Towards Green Cities

Urban Biodiversity and Ecosystem
Services in China and Germany

The book about

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