

A large green circular graphic at the top of the page. Inside the circle, there is a stylized illustration of a city skyline on the left and a park area on the right. In the park, a person is running, a child is on a swing, and an elderly person with a cane is standing. The background of the circle has a pattern of white lines radiating from the center, resembling a compass rose or a stylized sun.

# GreenEquityHEALTH

## **Factsheet III: Multi-method assessment of urban green spaces under global change**

### **Background**

In times of climate change and the global environmental crisis, socioeconomic challenges like urbanization need to be addressed hand in hand with nature and no longer at its expense. Nature-based solutions such as urban parks have become a popular instrument in science and practice. Improved health is a major outcome of their preservation, improvement and expansion. Equal accessibility to urban green for all city dwellers in response to different demands is crucial to generate liveable neighbourhoods with a high quality of life. The identification of the various needs of city dwellers, impeding usage barriers and future potentials of urban green spaces based

on a scientific foundation helps city planning and decision making to meet the challenges deriving from global change while benefiting both the health of people and the natural environment. The interdisciplinary research project GreenEquityHEALTH addresses these needs by applying a multitude of methods to assess the functions of green spaces in the city of Leipzig (Germany). Leipzig is challenged by recent heat and drought periods, rapid urban growth and demographic change. The city planning administration has, however, recognized the vital role of green spaces in tackling these challenges and also appreciates the research outcomes of GreenEquityHEALTH.



## Assessing park use patterns, barriers and green space functions during heat

The old-grown Friedenspark with numerous mature trees and the Lene-Voigt-Park – built on a former railway brownfield site – with younger trees and vast open lawns have been subject to our research: We found people adapting their park visitation behaviour during summer heat and different activity patterns, e.g. more people jogging in the shaded Friedenspark (see details in Kabisch & Kraemer 2020). In this park, we also found improved restoration experience and protective health effects during park visits for older people (for details see: Kabisch et al. 2021a). In our on-site questionnaire survey during summer 2019 we identified that the Friedenspark is being used more frequently

for nature experience whereas the Lene-Voigt-Park is more important for social activities. Nearly 140 statements of study participants on the role of parks during summer heat could be matched to established ecosystem service categories with cooling and recreation being the services mentioned most. At the same time, park visitors requested an improved availability of drinking fountains and public toilets. Women rated their safety in both parks significantly lower than male respondents, all of which is important to be considered in future urban green space planning. See details in Kabisch et al. 2021b.



Lene-Voigt-Park in summer 2019 and our survey team (Pictures by GreenEquityHEALTH team).

## Comparing air quality regulation depending on park structure and the urban environment

Heat and air pollution are putting urban health at risk particularly when both factors occur simultaneously. Hence, in times of increasing heat periods, the air quality regulation provided by urban parks becomes even more important. In order to generate robust quantitative data on this vital green space function, we conducted structured mobile air quality measurements in June 2019 using portable sensors in small backpacks and then related pollution patterns to park characteristics and spatial contexts. Our results confirmed the assumption that the structure and composition of a park's vegetation is crucial in determining its air quality regulatory function. The dense shrub layer together with large, mature trees along the park boundaries



Air temperature measurement station and Nadja wearing the bag with the air quality measurement device (left). Urban environment around Friedenspark (right above) and Lene-Voigt-Park during air-quality measurement campaign.



in the Friedenspark corresponded with lower particle concentrations inside the park compared to the vast open spaces in the Lene-Voigt-Park. However, the heat and drought

situation in 2019 may also have led to a loss of vegetation in the parks, and thus intensified dust emissions. For details see: Kabisch et al. 2021c.

## Developing a standardized tool to evaluate potentials of green spaces

We developed a comprehensive and standardized tool that evaluates green space characteristics to support city planners and decision makers. Our interactive tool includes more than 30 indicators for green and blue structures and facility elements within green spaces but also for their spatial context, i.e., their embeddedness in the infrastructural, environmental and socioeconomic surrounding. The tool was applied to nearly 250 parks in our case study Leipzig and helps evaluating the current green space status but also identifying untapped potentials for future management and planning. The tool can be interactively explored through an online map application available at: <https://arcg.is/OGXafX>, or scan the following QR. See details in Kraemer & Kabisch 2021.

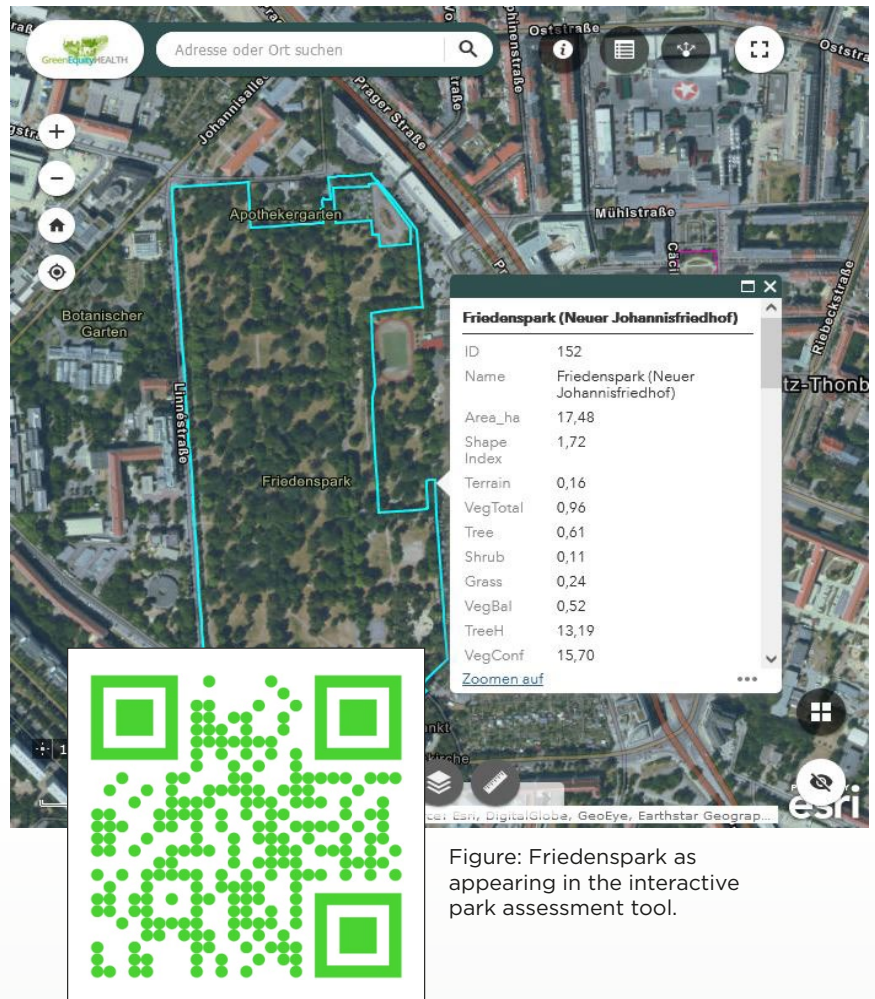


Figure: Friedenspark as appearing in the interactive park assessment tool.

## GreenEquityHEALTH video

In GreenEquityHEALTH we regard urban green spaces in their greater context. We recognize the growing information needs of city planners, decision makers and urban citizens to be able to safeguard and improve public and ecosystem health. To provide vivid examples for green space planning projects and our research results in Leipzig, we produced our GreenEquityHEALTH information video "Leipzig - A growing city responds to global changes". To watch the video just scan the QR or follow the [link](#)!



## Team:

**Nadja Kabisch, Roland Krämer, Oskar Masztalerz, Lennart Eichfuss, Dagmar Wörister, Camille Dammann, Miriam Brenck\*, Catharina Püffel\*, Jan Hemmerling\*, Judith Rakowski\*, Peer von Döhren\***

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\*Former employees

[www.greenequityhealth.hu-berlin.de](http://www.greenequityhealth.hu-berlin.de)

[nadja.kabisch@geo.hu-berlin.de](mailto:nadja.kabisch@geo.hu-berlin.de)

## Publications (selection)

- Kraemer, R., Kabisch, N. (2021): Parks in context: advancing citywide spatial quality assessments of urban green spaces using fine scaled indicators. *Ecology and Society* 26(2): 45. <https://doi.org/10.5751/ES-12485-260245>
- Kabisch, N., Kraemer, R., Brenck, M. E., Haase, D., Lausch, A., Luttkus, M. L. et al. (2021c): A methodological framework for the assessment of regulating and recreational ecosystem services in urban parks under heat and drought conditions. *Ecosystems and People* 17(1): 464–475. <https://doi.org/10.1080/26395916.2021.1958062>
- Kabisch, N., Kraemer, R., Masztalerz, O., Hemmerling, J., Püffel, C., Haase, D. (2021b): Impact of summer heat on urban park visitation, perceived health and ecosystem service appreciation. *Urban Forestry Urban Greening* 6: 127058. <https://doi.org/10.1016/j.ufug.2021.127058>
- Kabisch, N., Püffel, C., Masztalerz, O., Hemmerling, J., Kraemer, R. (2021a): Physiological and psychological effects of visits to different urban green and street environments in older people: A field experiment in a dense inner-city area. *Landscape and Urban Planning* 207: 103998. <https://doi.org/10.1016/j.landurbplan.2020.103998>
- Kabisch, N., Kraemer, R. (2020): Physical activity patterns in two differently characterised urban parks under conditions of summer heat. *Environmental Science and Policy* 107: 56–67. <https://doi.org/10.1016/j.envsci.2020.02.008>
- Kabisch, N., Alonso, L., Dadvand, P., Van den Bosch, M. (2019b): Urban natural environments and motor development in early life. *Environmental Research* 179: 108774. <https://doi.org/10.1016/j.envres.2019.108774>
- Kabisch, N., Selsam, P., Kirsten, T., Lausch, A., Bumberger, J. (2019a): A multi-sensor and multi-temporal remote sensing approach to detect land cover change dynamics in heterogeneous urban landscapes. *Ecological Indicators* 99: 273–282 <https://doi.org/10.1016/j.ecolind.2018.12.033>
- Kabisch, N., Haase, D. (2018) Urban nature benefits - Opportunities for improvement of health and well-being in times of global change. 29th WHO Newsletter on Housing and Health "Urban Environmental Health"
- Kabisch, N., van den Bosch, M., Laforteza, R. (2017): The health benefits of nature-based solutions to urbanization challenges for children and the elderly - A systematic review. *Environmental Research* 159: 362–373. <https://doi.org/10.1016/j.envres.2017.08.004>