



GreenEquityHEALTH

Background

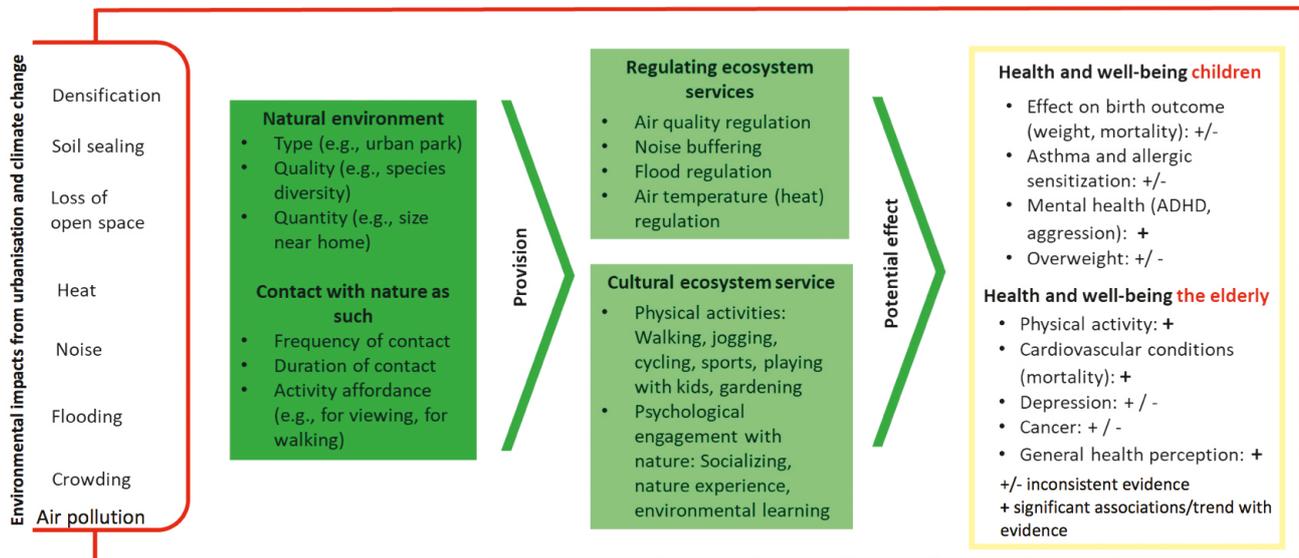
By 2050 around 68% of the world population is estimated to be urban (UN 2018). Urbanization is accompanied by environmental and public health threats such as increase of traffic, air and noise pollution, intensification of the urban heat island effect, and a lack of resources through a loss of open green spaces. These threats are substantial challenges to ecosystem functionality and human health while the most affected are vulnerable populations, such as children, the elderly or socioeconomically deprived population groups.

Natural environments in cities such as parks, street trees, gardens, lakes, rivers or cemeteries provide a number of health opportunities because exposure to natural environments can contribute significantly to human health through mediating pathways and direct effects (Hartig et al. 2014). These pathways can act to either encourage healthy behaviours like physical activity or social interaction, or to decrease risk factors such as air pollution or urban heat through the provision of regulating ecosystem services (heat mitigation, noise buffering or reduced air pollution).



The research group GreenEquityHEALTH will provide quantified knowledge on how urban green spaces contribute to the mitigation of climate change induced challenges and challenges from urbanization to improve health, well-being and environmental justice. The project will identify the mediating pathways or direct effects of diverse urban green spaces that act to either promote health, encourage healthy behaviours like social interaction or physical activity, or to decrease risk factors such as air pollution or urban heat.

Pathways through which urban nature can affect health in children and elderly in the context of challenges from climate change and urbanisation. (Kabisch et al. 2017)



The project will assess urban green space distribution and change. Both are then related to ecosystem services provision to show the mitigation potential of environmental pressure and stress from climate change and urbanisation. Pressure such as high temperatures, soil sealing, air pollution or changes and disturbances in urban vegetation patterns with potential effects on human health and well-being will be detected with remote sensing time series data and on-site sensor based measurements.

Field surveys will be conducted to measure health on site including observations and perception studies via questionnaire surveys and health measurements. The aim is to assess the potential of urban green spaces for improving health of city residents.

Surveys and measurements will focus on diverse urban green spaces that differ significantly in their characteristics. They will include historic old parks but also new parks that were developed on former brownfield sites. We will explore how urban green spaces with specific characteristics differ in their provision of ecosystem services. In particular, we will assess ecosystem service provision under condition of extreme heat and environmental pollution.



Friedenspark in April



Friedenspark in July - summer heat

We focus on two different parks in the city of Leipzig - a revitalized brownfield and an old grown park. We hypothesise that both parks significantly differ in their provision of ecosystem services and co-benefits for health and well-being.

In detail the main objectives are to:

assess the cooling function and the air quality regulation function of urban vegetation under heat stress using both data from remote sensing and stationary measurements;

quantify/measure health benefits and socio-spatial effects of urban green spaces;

assess affordances of the urban landscape that make health-promoting activities possible;

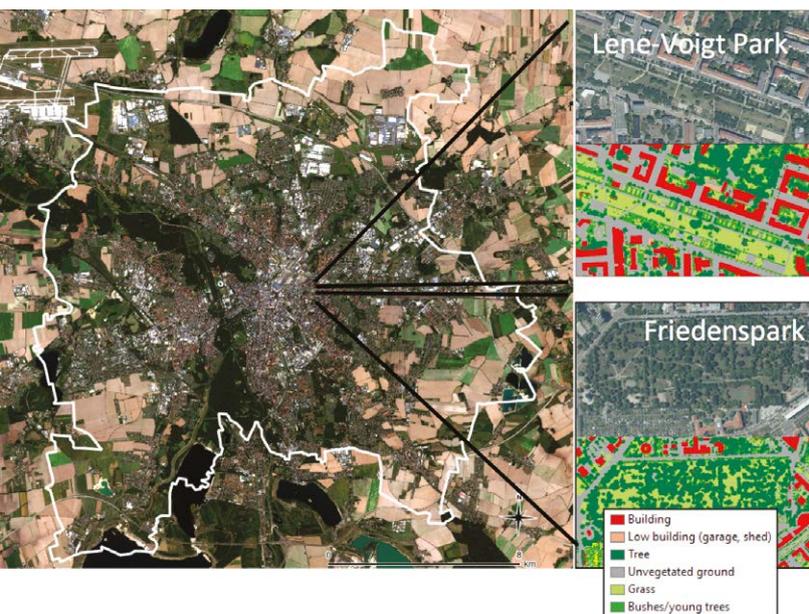
identify who has access to green space, who has no access and why;

synthesize knowledge in a multi-criteria assessment tool, called URBAN-HEALTH, which shall be used as a decision support tool for stakeholders from urban planning and public health;

finally develop recommendations together with stakeholders from urban planning departments, IUCN and the WHO.

CASE STUDY: CITY OF LEIPZIG, GERMANY

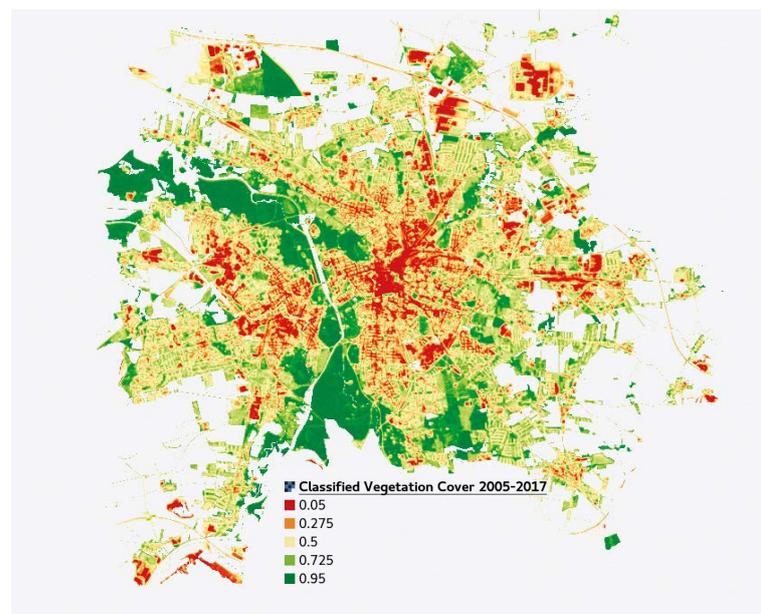
Sites: Revitalized brownfield developed into new urban park - Lene-Voigt Park
Old grown park - Friedenspark



Rapid Eye Image of Leipzig in RGB and location of the two case study parks in Leipzig.

FIRST RESULTS

City wide assessment of greenness (NDVI) with remote sensing data using a multi-temporal multi-sensor approach.



Classified NDVI (CVC) showing mean greenness of Leipzig. Dense urban green and urban forest areas are indicated in green, sealed built-up areas are in red (Kabisch et al. in Ecological Indicators)



Lene-Voigt Park in April



Lene-Voigt Park in July – summer heat and first field campaign with students

Team:

Lead: Dr. Nadja Kabisch

PhD-Student: **Roland Krämer**

PhD-Student: **Miriam Brenck**

Management assistance: **Dagmar Wörister**



Nadja



Miriam



Roland



Dagmar

Acknowledgement

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www.greenequityhealth.hu-berlin.de

nadja.kabisch@geo.hu-berlin.de

Publications

- Kabisch, N., Haase, D., Elmqvist, T., McPhearson, T., 2018. Cities Matter: Workspaces in Ecosystem-Service Assessments with Decision-Support Tools in the Context of Urban Systems. *Bioscience* 68, 164-166. <https://doi.org/10.1093/biosci/bix153>
- 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. *Environ. Res.* 159, 362-373. <https://doi.org/10.1016/j.envres.2017.08.004>
- Kabisch, N., Selsam, P., Lausch, A., Kirsten, T., Bumberger, J., revised. A multi-sensor and multi-temporal remote-sensing approach to detect land use land cover change dynamics in heterogeneous urban landscapes. *Ecological Indicators*.

