

KEYS – Smart technologies for sustainable water management in urban catchment areas

Client II – International partnerships for sustainable innovations

With the goal of creating a sustainable urban water management system, the German-Chinese collaborative project “KEYS” uses specific innovations to help realize the sponge city concept in China. Specifically, “KEYS” develops innovative technologies and implements them primarily in the “sponge city” of Beijing. The measures are supported, evaluated and implemented by a German-Chinese team of scientists and integrated into transferable concepts.

Further development of the sponge city concept

In China, the concept of the sponge city has become a key element in urban development. A concerted effort is being made to create green and blue infrastructure on urban surfaces, which should yield significant future benefits in terms of dealing with rainwater. China's nationwide guidelines for implementing the “sponge city” concept was prompted by recurrent and increasingly intense urban flash floods, which caused significant damage to urban infrastructure and resulted in numerous deaths. Additional considerations regarding the storage and use of rainwater are also central elements of the sponge city concept.

In 2016, Beijing was nominated as a pilot sponge city. The associated pilot measures are currently being implemented in Beijing's Tongzhou district, the new home of Beijing's city government. The sponge city measures are supported by the scientific findings from the Tongzhou Mega Water Project. The “KEYS” joint project serves as the intersection for German contributions to the ongoing Mega Water Project, which will be completed in 2020.



“Emscher River Modification” excursion as part of the KEYS workshop in May 2019 in Germany.

The main objective of the “KEYS” project is to provide needs-based assistance for the implementation of specific measures following the sponge city concept and to embed

it in the context of sustainable urban water management. The project not only addresses different elements of the sponge city concept and the composition of sponge urban areas, but also focusses on issues that have largely been overlooked until now. These include, for example, questions of materials and hygiene regarding the degree of precipitation contamination in sponge cities or treatment requirements for the storage and use of water.

Implementation of demonstration projects

Within the “KEYS” joint project, two research institutes and six commercial enterprises are working closely with the Chinese partners in Beijing and Shenzhen. The project focusses on implementing several demonstrations, primarily in Beijing, but also in Shenzhen, which highlight the innovative contributions made by the German partners. In specific terms, these include adapted retention ground filter technologies, the use of mobile measurement units for advanced data collection in urban catchment areas, the further development of individual sponge city elements as well as comprehensive approaches to the modelling of sewage treatment plants and measures for integrated rainwater management. In addition to this, project partners will also work together with Chinese authorities to investigate how to connect sponge city areas to the existing underground drainage infrastructure and what substantial effects this will have on sewage treatment plants as a consequence.

The “KEYS” demonstrations are flanked by three research work packages, which will provide a scientific and technical basis for preparing and supporting the demonstration measures. The three priority areas are intelligent sponge city concepts, sustainable water management in the urban catchment area and environmentally friendly wastewater treatment. For each area, the technical foundations are laid, data is collected and plans are drawn up. After the

measures have been implemented, the commissioning and first phases of operation will be scientifically monitored, evaluated and transferred into overarching concepts.

Fresh ideas for urban development

Due to the strong links to ongoing Chinese projects and development goals as well as the close cooperation between the German and Chinese project partners, “KEYS” represents a targeted transfer of technology that is called for by the Chinese side. The changes in future urban development initiated in China are a very good opportunity to present and introduce German innovations on-site. However, the experience gained in China will also be of great value for urban planning and development work in Germany in order to advance water-sensitive urban development methods that are adapted to future needs and local conditions.



Sponge city district in Tongzhou, Beijing in 2018.

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Contact

Prof. Dr.-Ing. Stephan Köster
Leibniz University Hannover
Welfengarten 1
30167 Hannover, Germany
Phone: +49 511 762-3379
E-mail: koester@isah.uni-hannover.de

Project partner

Kompetenzzentrum Wasser Berlin gGmbH; DAHLEM Beratende Ingenieure GmbH & Co. Wasserwirtschaft KG; Steinhardt GmbH Wassertechnik; NIVUS GmbH; MARTIN Systems GmbH; AKUT Umweltschutz Ingenieure Burkard und Partner; BPI Hannover – Verworn Beratende Ingenieure; Tsinghua University; Harbin Institute of Technology

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