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## Sensors and Citizens - Potential of climate adaptation strategies for analyzing the regional land use change in NRW

### *Abstract*

The project "Town and Country in the Flow - Network for the Creation of a sustainable Climate Landscape" (KlimNet) aims at improving the climate adaptation competence of cities. To collect maximum knowledge for creative solutions towards resilient towns, both scientists, municipalities and citizens are closely cooperating. Whereas the notion of climate protection has reached the general public in Germany, most citizens only actively deal with the topic of climate adaptation when they are directly affected by the effects of climate change. However, creative climate adaptation strategies are best found by moving beyond mere threat scenarios. This is where the project KlimNet sets in.

Satellite data of North Rhine-Westphalia (NRW) from the 1970s to date are analyzed regarding different kinds of land cover and use as well as varying degrees of imperviousness or soil sealing. Land use and consequent soil sealing are particularly high in urban areas and bring about conflicts of use: the demand for housing, business and economy is enormous, but at the same time it is important to maintain and improve the quality of life through a network of green spaces. With the help of remote sensing, the change of urban areas can be observed and quantified over time. This study examines to which extent Landsat, LUCAS and Sentinel data can be harmonized in order to monitor and analyze half a century of urban change. In addition, MODIS data are used to estimate recent trends in land surface temperature.

The satellite-based analyses are combined with in-situ information gained by crowd mapping. On the one hand crowd mapped data enhances the extensive land use information with point by point information. On the other hand, it is shown, how citizen science can help not only by gathering people's knowledge acting as data collectors but also by letting them participate in research and regional planning. The examples of Bonn and Gelsenkirchen demonstrate how local knowledge of people is integrated to detect calls for actions, potentials, and best-practice examples related to climate adaptation of urban systems. With the help of Science cafés, workshops, and summer schools scientific methods and paradigms are again imparted to the citizens and discussed. The integration of "sensors" and "citizens" will enforce the development of regional climate adaptation strategies, increase the resilience of cities, and help to analyze spatio-temporal urban dynamics within the coupled human-environmental system of urban areas.