

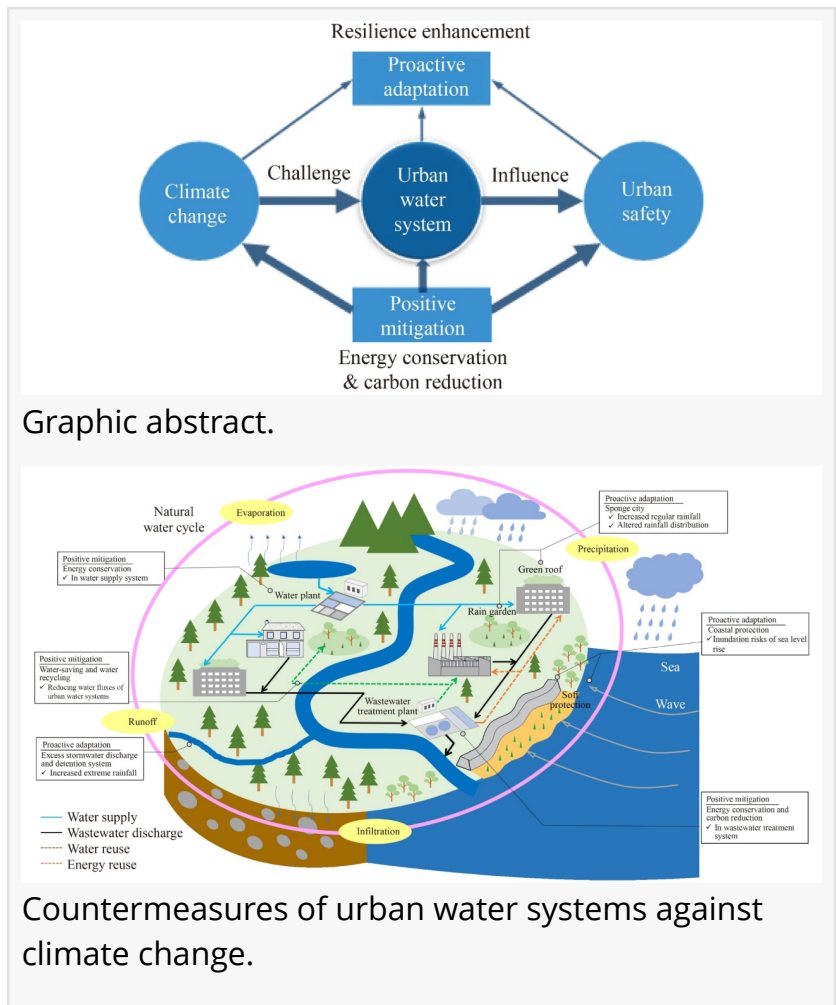
Enhancing Urban Water System Resilience in the Face of Climate Change

CHINA, November 17, 2023

/EINPresswire.com/ -- Urban water systems worldwide are grappling with the increasing impacts of [climate change](#), which threaten urban security and sustainable development. Three critical challenges have been identified: rising submersion risks for coastal cities due to melting glaciers and sea-level rise; intensified urban flooding from extreme weather events; and disrupted regional water resource patterns from changes in precipitation distribution.

In a new study published on 11 August 2023, in the journal *Frontiers of Environmental Science & Engineering*, researchers from China Academy of Urban Planning & Design presents a comprehensive approach to combat the challenges posed by climate change to urban water systems. Their research proposes two innovative strategies: proactive adaptation and positive mitigation. Proactive adaptation involves constructing sponge cities to manage increased rainfall, redesigning stormwater systems to handle extreme precipitation, and enhancing coastal protections against sea-level rise. Positive mitigation focuses on reducing urban water system fluxes, boosting energy conservation, and cutting carbon emissions within water supply and wastewater systems.

The study reveals that the implementation of sponge cities, a concept originating in China in 2014, significantly reduces urban flooding risks, mitigates water scarcity, and diminishes urban heat islands, with pilot cities showcasing investment and operational cost savings of 20% and 25% respectively compared to traditional development. Additionally, the optimization of



Graphic abstract.

Countermeasures of urban water systems against climate change.

stormwater discharge systems and flood risk assessments, in line with future climate projections, substantially enhances urban resilience. For coastal protection, a combination of robust infrastructure and ecological measures, inspired by successful models like the Netherlands' Katwijk coastal defense system, is recommended. The study emphasizes the importance of advanced energy-saving technologies and sustainable practices in positive mitigation, aimed at reducing the carbon footprint of urban water systems. Conclusively, these proactive and mitigative strategies not only fortify the resilience of urban water systems but also yield both economic and environmental advantages, highlighting the need for systematic planning, design, and the integration of renewable energy sources to balance the increased energy demands and environmental impacts of sophisticated water treatment methods.

Highlights

- Urban water systems are challenged by climate change.
- Proactive adaptation and positive mitigation were proposed as the coping strategies.
- Proactive adaptation is to enhance the resilience of urban water systems.
- Positive mitigation is to strengthen the energy conservation and carbon reduction.

The study emphasizes the importance of meticulous design and scale management in urban water systems to ensure a balance between the benefits and potential side effects of various interventions. It underscores the necessity for a collaborative effort between the scientific and industrial communities to address both emerging scientific questions and practical challenges effectively. Such a collaborative approach is crucial for the transformation of urban water systems, enhancing their resilience against the impacts of climate change. This transformation is key to ensuring the safety and sustainability of urban environments for future generations, making it a vital step in our response to evolving environmental challenges.

DOI

10.1007/s11783-023-1756-3

Original Source URL

<https://doi.org/10.1007/s11783-023-1756-3>

Funding information

The National Key R&D Program of China (2022YFC3800102);
The Scientific Innovation Fund of China Academy of Urban Planning & Design (C-201731);
The Key Consulting Project of Chinese Academy of Engineering (2015-ZX-29-03);
The Fundamental Research Funds for China Academy of Urban Planning & Design (CZ-2020009);
The Major Science and Technology Program for Water Pollution Control and Treatment (2018ZX07110-008).

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