

Under the High Patronage of His Majesty King Mohammed VI



XIX WORLD WATER CONGRESS
International Water Resources Association (IWRA)
Marrakech, Morocco | 1-5 December 2025

Kingdom of Morocco



Ministry of
Equipment and Water

Research on the development of resilient water supply infrastructure systems for addressing extreme drought events: a case study of typical coastal regions in eastern China

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Outline of Presentation

- Basic Situation of Drought Disasters in China
- Challenges of Climate Change and Drought to the planning of water supply infrastructure system
- Development of resilient water supply infrastructure system
- Case Study





1. Basic Situation of Drought Disasters in China

- According to the "China Meteorological Disaster Yearbook", droughts have caused an average of over 98 million people to be affected annually across the country, with an average direct economic loss of 35.93 billion yuan and an average of 15.288 million hectares of crops being affected, and 1.785 million hectares being completely lost during 2001~2022.
- Under the climate change context, the increasing frequency and intensity of persistent drought events and other extreme weather phenomena in China are imposing significant pressure on water supply security in densely populated and economically developed regions along the southeastern coast.
- Prolonged and severe water shortages during extreme drought episodes may generate substantial socio-economic risks for areas with highly concentrated industrial clusters.



2. Challenges of Climate Change and Drought to the water supply infrastructure system

- Reliability, resiliency and vulnerability, together capture the characteristics of water supply infrastructure system, especially during periods of drought or peak demands.
- In China, current principles guiding water supply infrastructure construction primarily focus on reducing water shortage duration (typically measured monthly) within limited fluctuation ranges of water deficit intensity, while insufficient attention has been paid to the cumulative consequences of prolonged high-intensity water scarcity under extreme drought scenarios.



3. Development of resilient water supply infrastructure system

- This study investigates the vulnerability of regional water supply systems during extreme drought events under climate change, aiming to enhance the resilience of regional water supply infrastructure.
- We propose a multi-objective coupled optimization framework for water supply infrastructure system optimization, integrating three critical dimensions: controlling total water deficit, shortening water shortage duration, and mitigating high-intensity prolonged water scarcity.



4. Case study



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- The methodology is applied to typical regions in Guangdong Province to simulate responses to historical extreme drought events (1963-1964 and 2021-2022), while future extreme drought scenarios projected by General Circulation Models (GCMs) are constructed to evaluate system performance.
- Simulation results demonstrate that this approach effectively reduces the vulnerability of water supply systems.
 - ✓ Through systematic infrastructure optimization, the water shortage intensity during consecutive water-deficient months in drought periods can be controlled below 10%, with simultaneous reduction in total regional water deficit.
- This methodology demonstrates significant potential in mitigating industrial production losses caused by water scarcity during future extreme drought events under climate change, thereby providing crucial water supply support for regional sustainable development.



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Thank you!

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