Present status of sponge (resilient) city development in Sichuan, China

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Contents

1. Backgrounds of sponge city development

- **Increasing floods in cities**
  - More frequent floods in cities
  - Affected more extensive areas, with deeper water and longer flooding period
  - Increasing economic loss
  - Increasing risks
  - Statistics
    - Floods in 213 cities during 2008-2010, or 1/3 of cities in China affected by flooding
    - 62% of 213 cities flooding within cities
    - Flooding occurred over 3 times in 137 cities

1. Backgrounds of sponge city development

- **Deteriorating city water environment**
  - Increasing wastewater/sewage discharge
  - Water quality in cities deteriorating considerably, with increasing pollutants and loss of self-purification capacity of rivers
  - Water in over 90% of cities in China heavily polluted: Grade V or Extra-V (worst) in many rivers.
    - Tonghui in Beijing
    - Jinshui in Zhengzhou
    - Qinhuai in Nanjing
    - Xiaoqing in Jinan

1. Backgrounds of sponge city development

- **Increasing shortage of water resources in cities**
  - 400 of 668 cities in China face shortage of water
  - 114 face severe shortage of water
  - Water supply is time fixed in many cities
    - Influencing daily life of people
  - In China, daily water shortage is 20 million m^3
  - Annual loss of industrial value: RMB 250 billion yuan

2. Brief history of sponge (resilient) city development

In response to these challenges, central government has taken a series policies to promote sponge city development.

- March 25, 2013: **Low impact development conceptualization**
  - Ecological and environmental impacts of construction as low as possible
  - A reasonable development level/rate
- Effective control of surface runoff, reducing ecological and environmental impacts
  - Increasing water infiltration areas, collecting and storing runoff
  - Increasing depressed green areas, planted gullies, artificial wetlands, permeable land surface, etc

2. Brief history of sponge (resilient) city development

- September 6, 2013: **State Council: low-impact construction mode is prerequisite for approval of any city construction projects**
- Emphasize low-impact construction concept/mode
  - Increasing areas to store rainwater resources
- Promote water protection and management of rivers and lakes
  - Strict banning on taking lakes or rivers for construction
  - Maintaining and improving ecological, draining and flood control functions of lakes and rivers

2. Brief history of sponge (resilient) city development

- December 12 2013: **Central Urbanization Conference**
- President Xi Jinping: to construction sponge cities of “nature storing, nature infiltration and nature purification”.
- First use of concept of sponge city by the central leadership
- Guides for and direction of sponge city development


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“新三板”试点扩大至全国

2. Brief history of resilient (sponge) city development

- October 22, 2014: Ministry of Housing & Urban-Rural Development issued "**Technical Guidelines for Sponge City Development**"— Building rainwater systems for low impact development.
  - **Goal**
    - guide low impact development mode throughout the country
    - compulsory requirements for runoff reduction
    - prioritize use of natural drainage system to construct ecological draining systems
  - **Principle**: guided by planning, prioritizing ecology, emphasizing security, location specific, and integrated construction
  - **Technologies**: permeable surface, green rooftop, depressed green areas, biological barrier facilities, rainwater wetlands, water storing pools, water tanks, planted gullies, vegetation buffer zones, etc.

2. Brief history of resilient (sponge) city development

- September 29, 2015: State Council Conference on Sponge City Development
- From 2015 onwards
  - Promote sponge city development in all new city districts, all industrial parks, continuous development areas
  - Specific requirements are required in each stage of infrastructure planning, implementation and project completion
  - To improve storm water infiltration in living compound, green areas in public parks, road green belts
  - Use permeable flooring materials in cycle and pedestrian ways
- Central government has strong faith in sponge city development

2. Brief history of sponge city development

- November, 2015: **State Council: Guides for promoting sponge city development**
- **Goal**: 70% of surface runoff should be locally stored
  - 2020: 20% of the constructed area achieve the goal
  - 2030: over 80% of the constructed area achieve the goal
- **Basic Principles**
  - Ecological and natural cycling
  - Planning guided, integrated promoting
  - Government guides, social participating
- **Main Contents**
  - Specific requirements on planning, development, maintenance and management

3. Trial and Demonstration

Started from 2014

- Annual financial support (million): :
  - City (Beijing, Shanghai, Tianjin, Chongqing): 600
  - Provincial capital: 500
  - Other cities: 400
- PPP incentives
  - If PPP is over 50% of the governmental investment, another 10% of the government investment will be added.
- Another 10% will be added if the project is evaluated excellent
- First phase is for 3 years

- April 2015, 16 of 22 proposed cities were selected as trial and demonstration cities for the year 2015.
- The total central government investment is about RMB 7 billion yuan
- Suining City in Sichuan is one trial and demonstration city, the only one in southwestern China

Suining City

Goal: 70% of surface runoff collected and stored

- Area of trial and demonstration: 25.8 km^2
- 346 projects in 7 categories implemented in three years
- Total investment: RMB 5.828 billion yuan
  - RMB 1.2 billion from central government
  - PPP RBM 2.922 billion yuan, accounting for 50.1%
- Up to the end of 2015
  - 44 projects started, 31 of which completed. Invested RMB 500 million
- By 2017
  - Achieve the goal of resilient city development in trial areas

Sichuan Province

- Goal: by 2020 and 2030, the same as the central government
- Planning
  - By the end of April 2016: guides for resilient city development planning of Sichuan
  - By the end of October 2016, Prefecture-level municipality planning completed
  - By the end of December 2016, all county or county-level municipality planning completed.
- Provincial trial and demonstration in 2016: Applications end in April
  - 5 prefecture-level city
  - 10 county-level city
  - Encourage trial and demonstration projects: resilient living compound, road, squares, public service facilities (parking, play ground, sports ground), floods control facilities, river/stream protection and restoration

Challenges

- Low public awareness
  - Inadequate understanding of resilient city
    - Construct some infrastructure only
- As a new strategy, lack of knowledge, technology, management
  - Big challenge for the Suining project
    - 25.8 km^2
    - Over 300 project
- Financing difficulty
  - PPP encouraged by central government and important composition
  - Practically, difficult
    - Do not know how to do it
    - Enterprises do not understand it well, benefits not clear; cautious
- Technical, regulation, standards lacking

4. Considerations in sponge city development

Combine the philosophy/idea, goal and system composition

- Philosophy: with low-impact development philosophy, through modern theory, methodology and scientific system of flooding management, reduce adverse effects of urbanization on local hydrology and ecosystems.
  - New concept, new philosophy, new things
  - Inadequate understanding of sponge city development
  - Lack of systematic planning and implementation
    - Individual and independent projects
    - No clear regulation for operation (PPP)

- Goal: to promote natural hydrological cycle and to protect ecosystem and environment
  - effectively reduce runoff discharge
  - Effectively reduce pollution
  - Reduce flooding in cities
  - efficient use of rain water resources

Location specific projects and integrating grey and green infrastructure

- Sponge city development should consider local specific conditions, promote scientific use of grey and green facilities
- Fully use locally available facilities
- Promote “green-grey combination in infrastructure development
- Green rainwater infrastructure
  - vegetation
- Grey infrastructure (river banks)
  - Restore natural river bank system
  - New channelization banned from 2015
  - New filling lakes banned from 2015
  - Straight channels banned from 2015

Science-based sponge city planning and project design

- Scientifically
- Practically
- Incorporated with related planning programs
  - Transportation
  - Water resources/hydrology
  - Land use
- Project design: some current designs practically not possible (rainwater collection and store facilities above gas, communication, electricity pipes)
- Well consideration of
  - Physical condition
  - Other related infrastructure (gas, electricity, communication, wastewater)
  - Socio-economic condition

Opportunities for collaboration

- As a new development strategy in China and central government is very keen on this, there are many for us to learn.
- We are eager to learn from other countries.
- We hope to have collaboration with institutions or people having expertise and interest in this.

Thank you for your attention!

You are welcome to visit Sichuan!

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