EURASIAN WATER CONFERENCE
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Urban solutions for global challenges
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Sponge City construction practice for sustainable urban development -- take Shenzhen as an example
Sponge City Construction in China
Urbanization Rate: China vs the world

- China: 19, 20, 21, 23, 26, 27, 29, 30, 30.89
- The world: 19, 20, 21, 23, 26, 27, 29, 30, 30.89

### Urbanization

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<td>170 million</td>
<td>750 million</td>
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| Number of City | 193 | 653 |

| Urbanization Level | 17.92% | 54.77% |

| Urban Built-up Area | 700,000 ha | 4,900,000 ha |

Flattening mountain and valley  
Reclaiming land from water bodies  
Increasing impermeable area  
Overuse of water resources  
Excessive consumption of natural resources  
……  

→ Environmental problems  
→ Ecosystem degradation  
→ Loss of the ability to recover & repair

**Accumulated problems caused by urbanization!**
Priority should be given to on-site control using natural means when upgrading the urban drainage abilities, by which we could build the Sponge City that can store, infiltrate, detain and treat runoff naturally.

——said by Xi Jinping
General Secretary
Central Committee of the Communist Party of China
Sponge City Construction in China

General Office of the State Council [2015]Reference No.75

Sponge City is an urban development mode, that can store, infiltrate, detain and treat runoff naturally through strengthening the urban planning and development management, as well as making full use of buildings, roads, green spaces, water and other ecosystems.

**Goals:**
Urban area should achieve Sponge City requirements

- **2020 → 20%**
- **2030 → 80%**

**Principles:**
- Planning Guide
- System Governance
- Comprehensive Construction
- Safety First
- Eco-oriented
Sponge city construction in China

5 Key Works

- Spongy architecture and community
- Spongy roads and squares
- Spongy parks and green space
- Drainage and storage facilities
- Ecological restoration of water body
Sponge city construction in China

Construction Concept and Development Mode:

Traditional

- Development intensity control
- End of pipe treatment
- Traditional rapid discharge

Sponge City

- Sponge City construction
- Source reduction, Process control, System governance, Comprehensive construction
- Infiltration, Detention, Retention, Purification, Reuse, Discharge
Sponge City Construction in Shenzhen
Sponge City Construction in Shenzhen

Background 1: Socioeconomic Development
High-speed development, high-density construction, high population density and GDP.

➢ Total land area: 1997 km²
➢ Construction area: 900 km²
➢ Urbanization rate: 100%
➢ Residential Population(2016): 11 million
➢ Servicing Population: more than 20 million
➢ GDP: 2000 billion RMB
➢ Population Density: 20000/km²
Sponge City Construction in Shenzhen

Background 2: Ecological Planning
Implementing the concept of Protection first, intensive development, low carbon ecology

- Having protected well of the natural Spongy area.
- Being the first city in China to stipulate the ecological protection boundary and the “river blue line”.

- Ecological protection area percentage 50%
- Greening rate of construction area 45%

Title of Honour Obtained

- National Garden City
- National Water-saving City
- Ecological Garden Demonstration City

......
Background 3: Water Environmental Problems

1. Flood controlling and urban inland inundation safety problem
   - 9 drainage basin; 310 rivers, total length 999 km;
   - Only 65% of the total length meet the flood prevention standard;
   - Mean annual precipitation 1,830 mm;
   - 80% of the rainfall happening on the rainy season;
   - 4~5 severe typhoon impact per year on average.

2. Local water resources can hardly meet the city developing requirement
   - Outside water import / Total city water using: 80%.

3. Severe water environment; hard to manage and control
   - 45 segments of black and odorous water bodies in 36 rivers among built up area.
Sponge City Construction in Shenzhen

Background 4: City Development Path Under the Transition Period

- Resource shortage problem
- Urban Inland Inundation Safety Problem
- Ecology balance problem in high-density construction
- Protection Issue of Rainfall-generated character Rivers

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Sponge City Construction in Shenzhen

Character of Sponge City Construction in Shenzhen

Exploration of the Sponge City construction path:
“urban transition development and whole social participation”

Trying to create reproducible and representative Sponge City patterns...

1. Combining Sponge City construction with water management
2. Citywide Sponge City construction
3. Beforehand planning standards
4. Close cooperation between departments
5. Whole social participation
**Sponge City Construction in Shenzhen**

**Outcome:** Significant improvement of urban environment

- 220 waterlogging points have been eliminated
- 59 black and odorous water bodies have been regulated
- 3,900 ha area has achieved Sponge City requirements
- 5,500 ha area is conducting Sponge City construction in 2018
- A large number of high quality Sponge City projects have been built and are welcomed by the public
Shenzhen Bay water management has achieved remarkable results.

“More Black-faced Spoonbill come back here to spend winter”

——Bird watcher Mr Yang

By vigorously promoting the source control and drainage limitation, 619 communities has established compliant drainage system (175 of which are residential areas, 444 are other drainage units and communities).
Futian River has obtained high aesthetic and recreational value

“The river used to be smelly and unfavorable, but now it becomes an attractive open spaces welcomed for year round.”

— Citizen Miss Luo

135,000 m³ swage from this basin is 100% collected during dry season. And there are 38,000 t reused water pumped back to guarantee the runoff volume and ecological service.

Black and odorous water in the past

Case Studies
Case Studies

Cloud City of Wanke

Location: Nanshan District of Shenzhen

Area: 39.40 hectares

Used to be a granite quarry
Case Studies

Principals practices

- Redevelopment of the quarry
- Vertical greening: 70% planimetric area
- Green roof
- Permeable pavement
- Covering depth >1.2m
- Annual runoff control rate ≈ 65%
Honey Park

**Location:** Futian District of Shenzhen  
**Area:** 42.40 hectares

- **Feature analysis**
  Elevation: lower from north to south, from west to east
Case Studies

Honey Park
Location: Futian District of Shenzhen
Area: 42.40 hectares
Honey Park – One of the most beautiful parks in Shenzhen

“I never expected we’d have such a large green park in the city center where land is really luxury.”

Citizen LISA

Case Studies

Before construction

Dry Swale

Green Roof

Grass Brick

Permeable Walk Path

Original Litchi Forest

Original Litchi Forest
THANK YOU FOR YOUR TIME!

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