

Speical Session: SS-3-4

# Development process and effect of Sponge city construction in China

from LID to Systematic Governance

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**Germany**  
**180 deaths**  
**€3 bn loss**



**398 deaths**  
**¥20 bn loss**



**More than 3 years of rainfall fell in about 24h**

July 2021-Flood in Western Europe

July 2021-Extreme rainstorm in Zhengzhou Province, China

October 2021- Rare desert floods in Oman, Arabian Peninsula

April & May 2022-Extreme rainfall in Eastern South Africa

June 2022-Extreme flood in Pakistan

August 2022-Rainstorm in Sanaa, Yemen

**2021-2022**



**Continuous rainstorms**  
**448 deaths**



**over 1700 deaths**  
**3.3 million affected**



**Destroy cultural relics**

**1.8 billion** people are at risk for mega-floods globally including nearly **0.8 billion** impoverished people

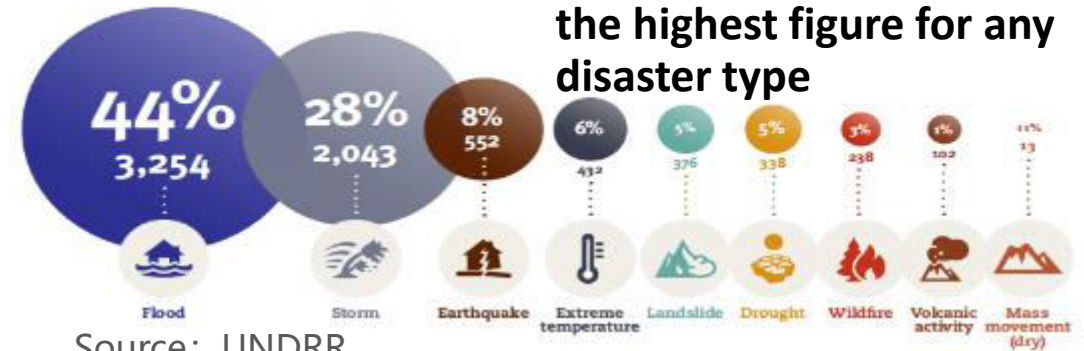


Global extreme floods in 2020 Global extreme floods in 2021 Global extreme floods in 2022

Source: ICFM Permanent Secretariat

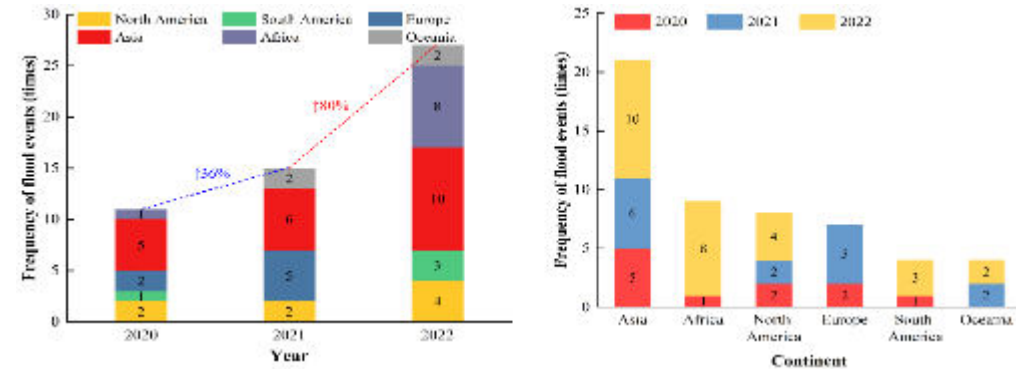
**Floods have the highest impacts in Asia, accounting for over 35% according to our statistics the most affected country is China**

Figure 4 Percentage of occurrences of disasters by disaster type (2000-2019)



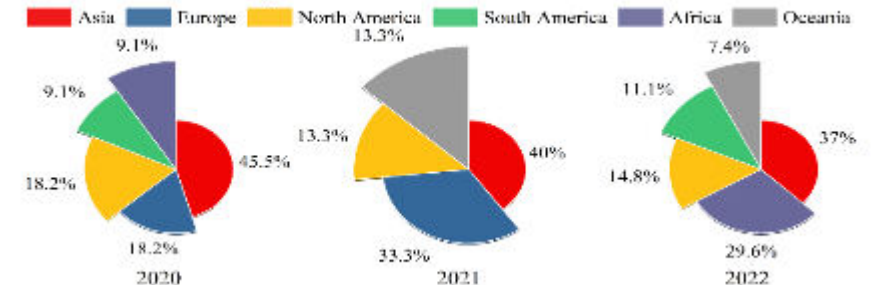
Floods have accounted for **44%** of all disaster events, the highest figure for any disaster type

Source: UNDRR



(a) Flood events in recent 3 years

(b) Flood events on each continent



Source: ICFM

(c) Proportion of annual flood events on each continent

# Sponge City is an idea for Urban Water Management in new era

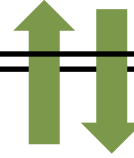
## The Relationship between Sponge City Construction and Urban Sustainable Development



Sustainable Development Goals No. 11  
Make cities and human settlements inclusive, safe, resilient and sustainable.



Interaction



Synchronous promotion

Leading guidance



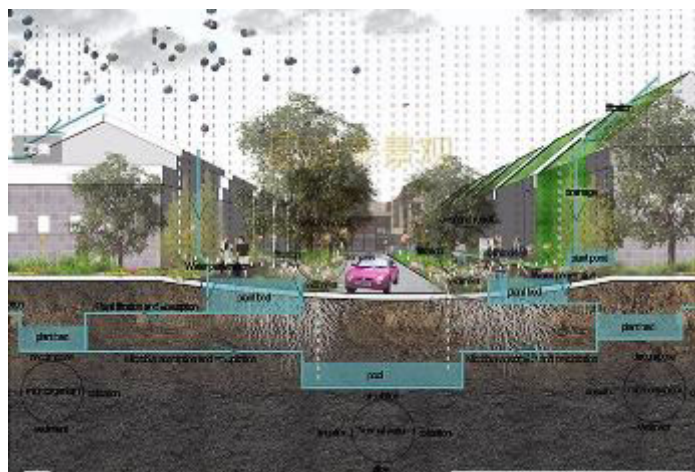
Conceptual embodiment



**Sponge City Development Goals** ——  
Protect the original urban ecosystem, carry out ecological restoration, rehabilitation and low-impact development, and create an ecologically livable human settlements

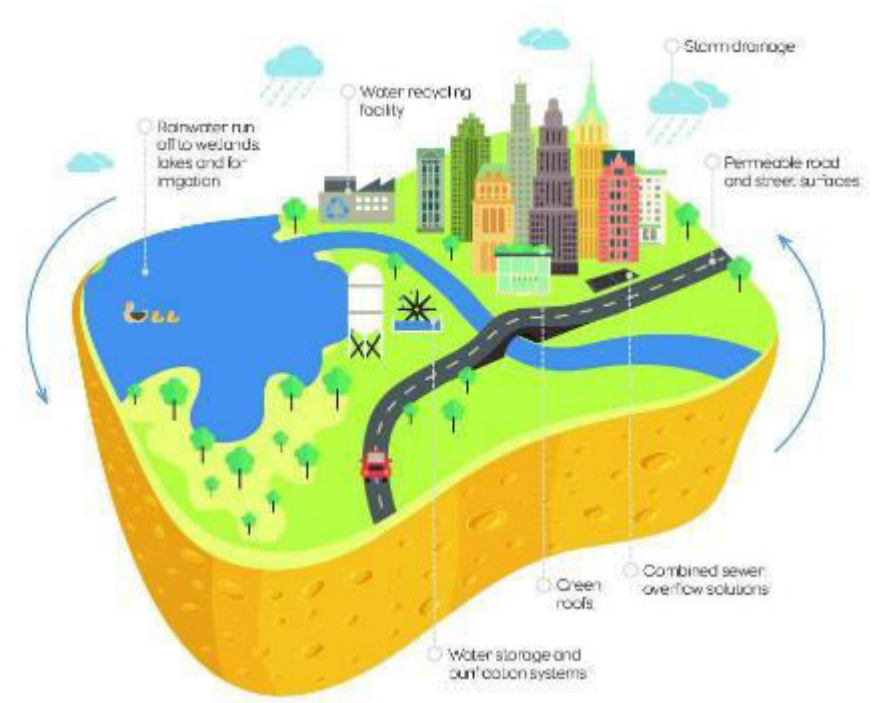
# Development of sponge cities is a model developed by China for the concept of rainwater management globally

- Low-Impact Development (LID) and Green Stormwater Infrastructure (GSI) in the U.S., Water Sensitive Urban Design (WSUD) in Australia, Sustainable Drainage Systems (SUDs) in the U.K., and others
- Utilization of rain and snow resources in cities such as Sapporo and Moscow
- Focusing on water resource utilization, the utilization of non-conventional water resources such as reclaimed water and rain and snow water resources have been enhanced in central and western China.
- Efforts are made to address waterlogging by "reducing drainage at the sources, implementing process control and improving end-of-pipe management". In the case of Urumqi, focus should be placed on solving the overflow of rainwater and sewage.



# Developing sponge cities is an important initiative to implement national policies

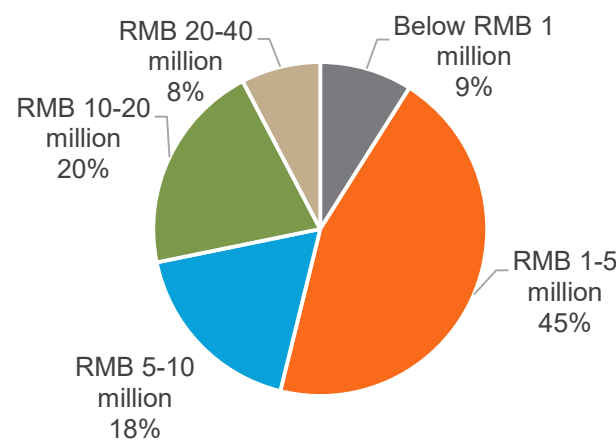
- In 2013, it was proposed at the Central Urbanization Work Conference that 'Priority should be given to leaving rainwater behind when upgrading urban drainage systems, to the greater use of natural forces to drain water, so as to build 'sponge cities' characterized by **natural accumulation, natural infiltration and natural purification**.
- In 2014, **470 cities, 30 pilot cities**---Sponge city construction(SCC)-LID
- In 2021, the Ministries of Housing and Rural Development, Water Resources and Finance launched a new round of SCC demonstration works, **45 cities** have been selected. **1 billion Yuan** for each city for **3 years** from the centre government, and **1:1 counterpart funding** from local government should be guaranteed-Systematic approach
- Since 2021, a total of **365** construction projects have been completed, with a total investment of **19.86 billion yuan**-PPP、EOD、REITS
- Urban flood control and drainage capacity; guiding investment direction and driving effective investment.



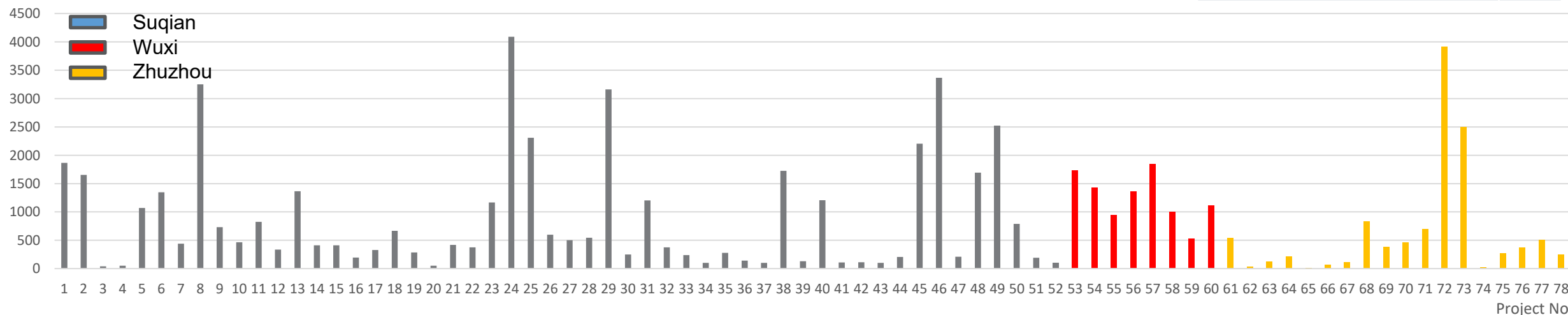
# Costs of Sponge Cities (2022-2024)

## □ Sponge river systems

- The statistics cover 78 sponge river system projects in three cities, with their construction costs ranging from **RMB 120,000 to RMB 40.91 million** per kilometer, which average **RMB 5.22 million**.
- 45% of these projects cost **between RMB 1 million and RMB 5 million** per kilometer.



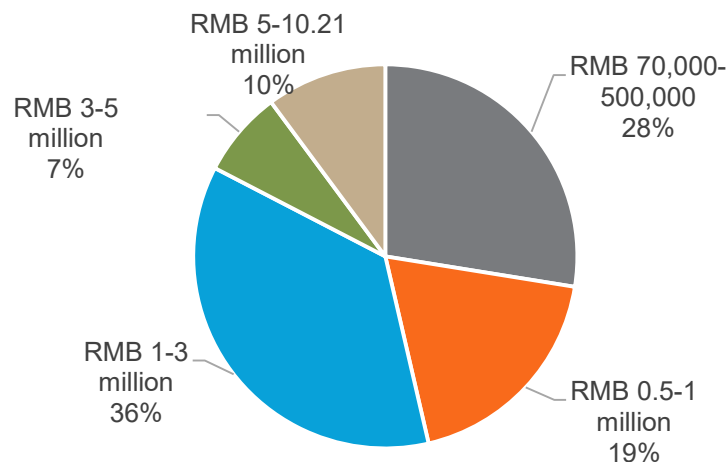
City	Minimum	Maximum	Mean
Suqian	41	4091	514
Wuxi	532	1841	1276
Zhuzhou	12	3909	404
Mean of the three cities (total construction cost/total scale)			522



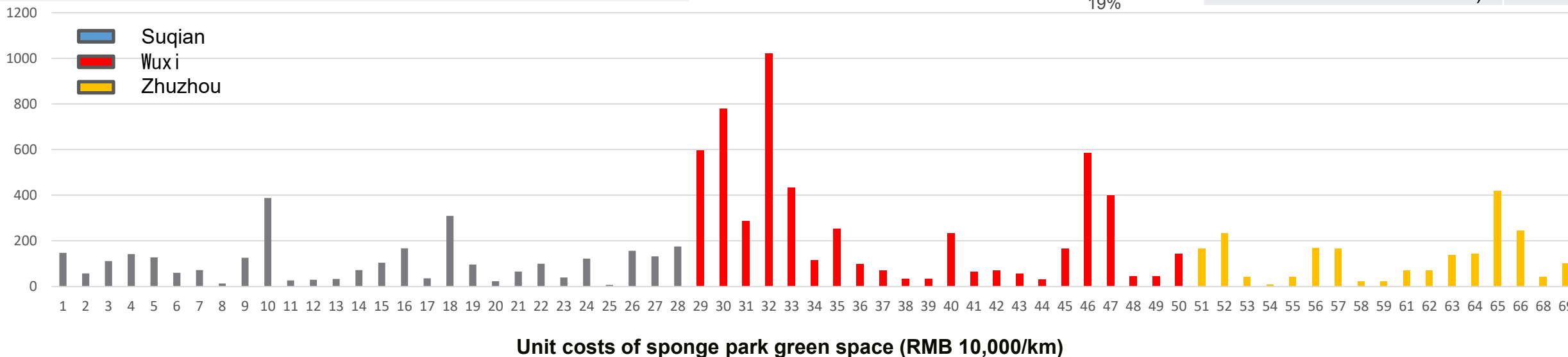
# Costs of Sponge Cities

## □ Sponge park green space

- The statistics cover 69 sponge park green space projects in three cities, with their construction costs ranging from **RMB 70,000 to RMB 10.21 million** per hectare, which average **RMB 1.21 million**.
- About 36% of these projects cost **between RMB 1 million and RMB 3 million** per hectare.



City	Minimum	Maximum	Mean
Suqian	7	388	54
Wuxi	31	1021	155
Zhuzhou	9	419	165
Mean of the three cities (total construction cost/total scale)			121

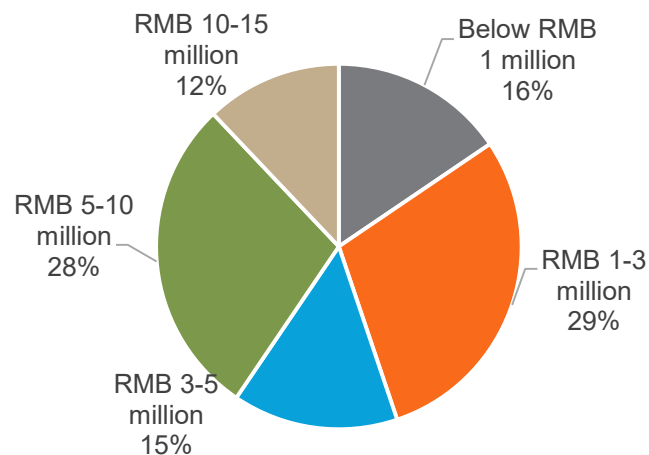




# Costs of Sponge Cities

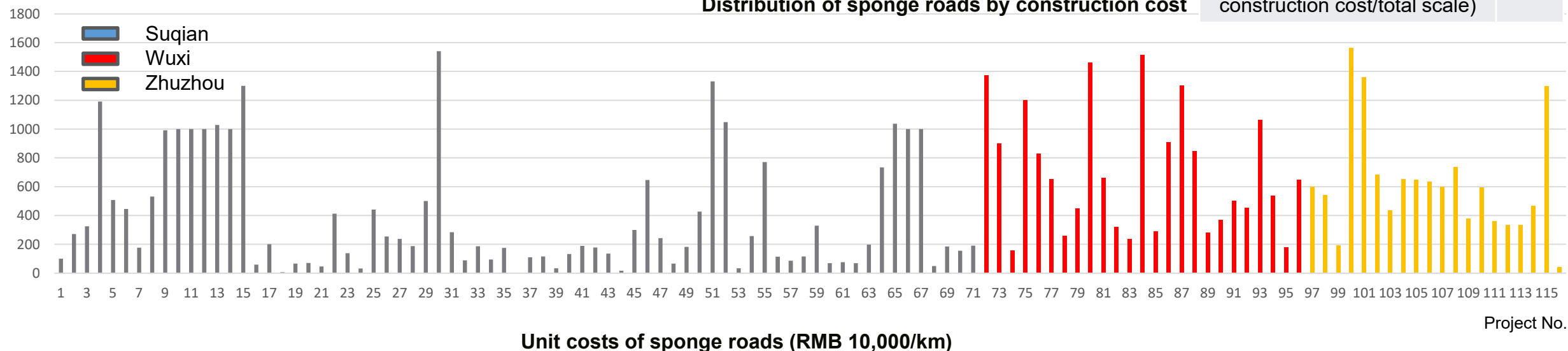
## □ Sponge roads

- The statistics cover 116 sponge road projects in three cities, with their construction costs ranging from **RMB 170,000 to RMB 15.63 million per kilometer**, which average **RMB 3.07 million**.
- About 29% of these projects cost **between RMB 1 million and RMB 3 million per kilometer**.



Distribution of sponge roads by construction cost

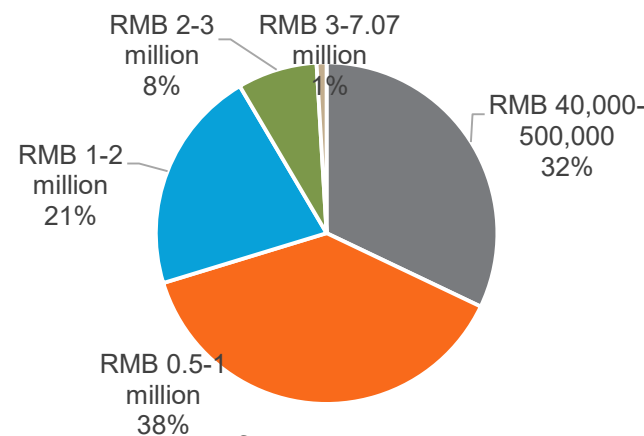
City	Minimum	Maximum	Mean
Suqian	17	1540	283
Wuxi	158	1512	646
Zhuzhou	42	1563	527
Mean of the three cities (total construction cost/total scale)			307



# Costs of Sponge Cities

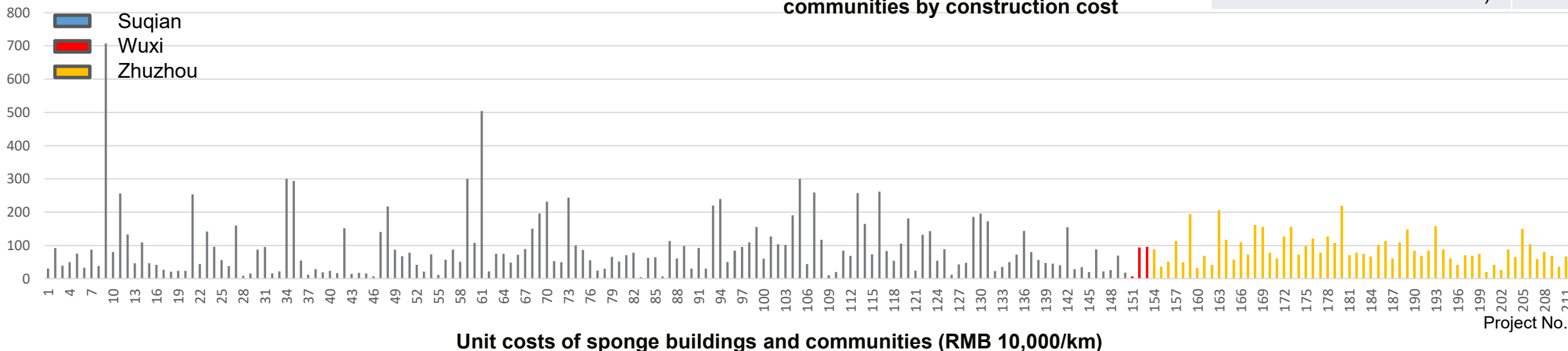
## □ Sponge buildings and communities

- The statistics cover 212 sponge buildings and communities in three cities, with their construction costs ranging from **RMB 40,000 to RMB 7.07 million** per hectare, which average **RMB 620,000**.
- 70% of these projects cost **between RMB 40,000 and RMB 1 million** per hectare.



Distribution of sponge buildings and communities by construction cost

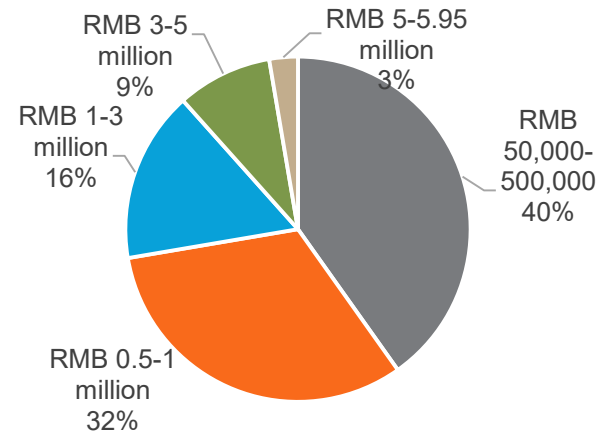
City	Minimum	Maximum	Mean
Suqian	4	707	72
Wuxi	6	96	78
Zhuzhou	21	219	85
Mean of the three cities (total construction cost/total scale)			62



# Costs of Sponge Cities

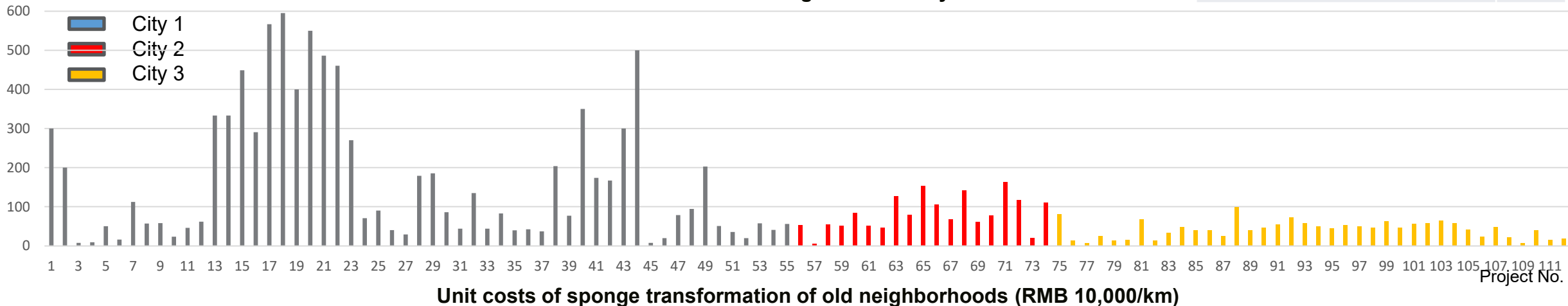
## □ Sponge transformation of old neighborhoods

- The statistics cover the sponge transformation of 112 old neighborhoods in three cities, with their construction costs ranging from **RMB 50,000 to RMB 5.95 million** per hectare, which average **RMB 1.04 million**.
- 72% of these projects cost **between RMB 50,000 and RMB 1 million** per hectare.



Distribution of projects for sponge transformation of old neighborhoods by construction cost

City	Minimum	Maximum	Mean
Suqian	8	595	150
Wuxi	5	164	75
Zhuzhou	7	99	39
Mean of the three cities (total construction cost/total scale)			104



# Costs of Sponge Cities

## □ Sponge squares

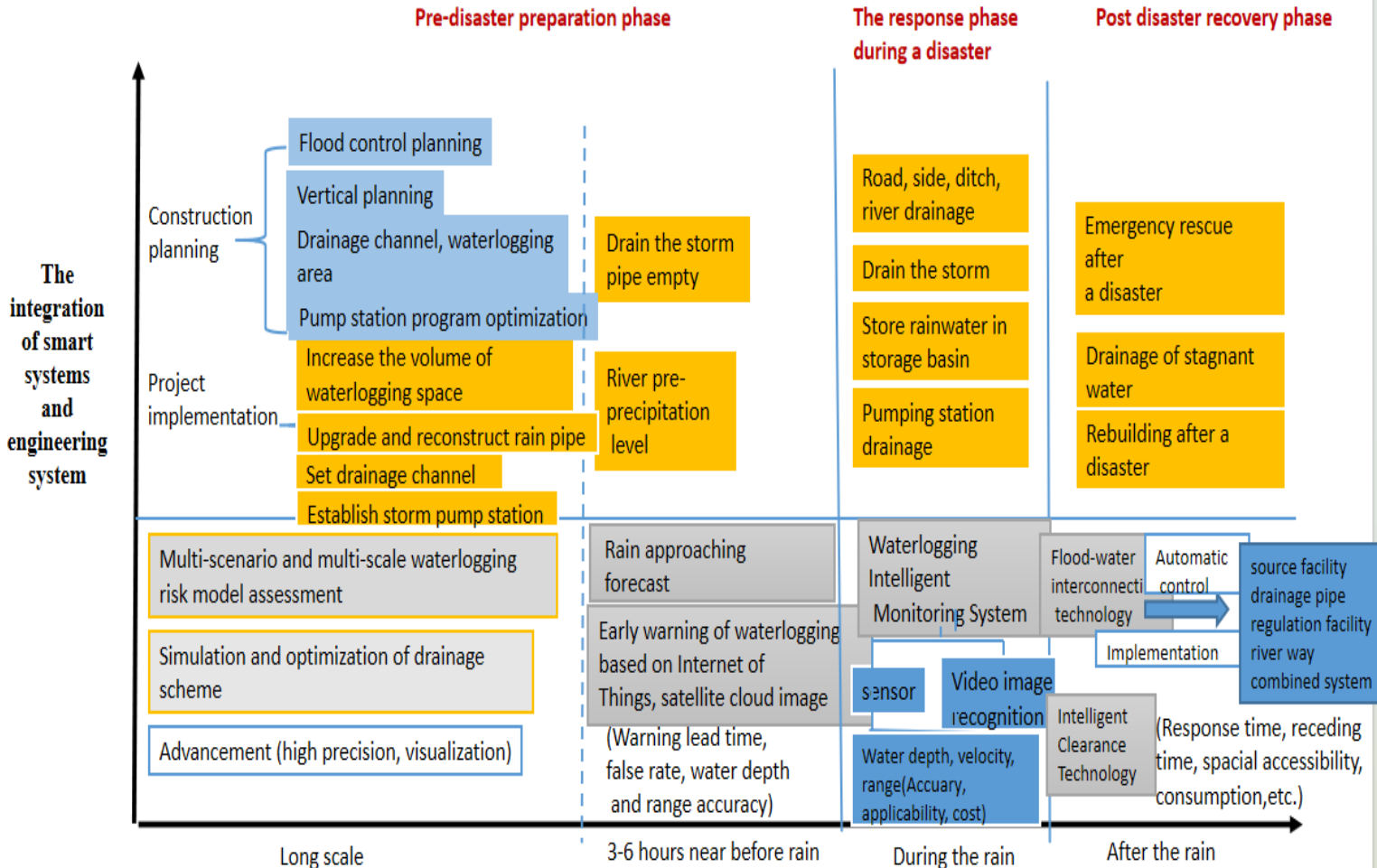
- The statistics cover three sponge squares in three cities, with their construction costs ranging from **RMB 350,000** to **RMB 4.63 million** per hectare, which average **RMB 510,000**.



City	Construction cost (RMB 10,000/hectare)
Suqian	45
Wuxi	463
Zhuzhou	35
Mean of the three cities (total construction cost/total scale)	51

Examples of sponge square projects

## Smart empowerment boosts sponge city's construction&operation



About 10~15% additional investment needs to be increased for reconstruction projects, 1 billion is a lever. **The average investment amount is RMB100~150 million per square kilometer, which is directly related to the level of planning and design.**

Sponge cities involve multiple disciplines and a wide range of departments, with **misunderstanding** between them, inadequate understanding and outdated concepts. These hinder the development of sponge cities. It involves such disciplines as water supply and drainage, planning, landscaping, structure, roads, cost, etc.

Sponge city should never be to **blame** for the waterlogging in urban areas. **A sponge city cannot be built up overnight, and it is not omnipotent either.**

We should be **problem-oriented** and address such issues as water resource utilization, improving quality and efficiency in sewage treatment, treatment of dirty and odorous water bodies, urban waterlogging prevention and control, while **weakening some indicators such as the total runoff control.**

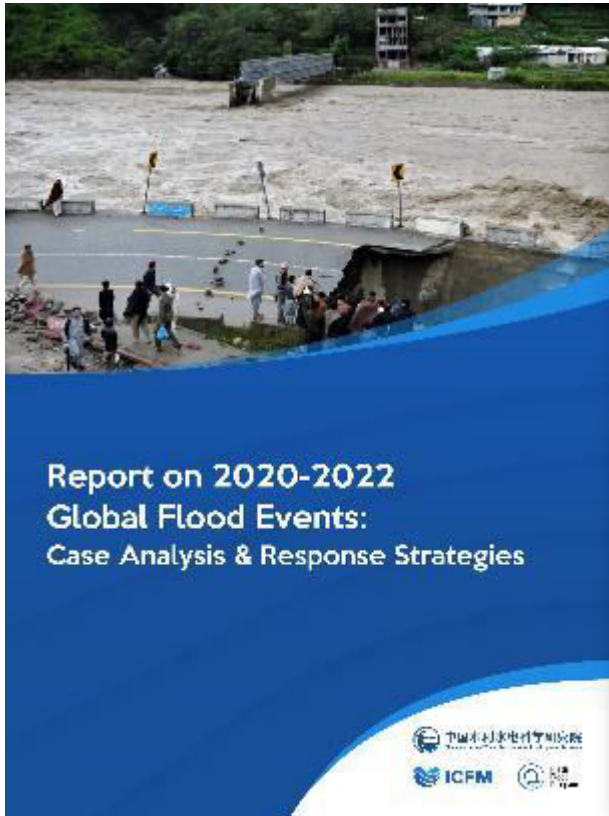


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