

## Analysis on Current Situation and Problems of Sponge City Construction in Zhenjiang, China

\*Yuanyuan Yang<sup>1</sup>, Akio Kuroyanagi<sup>2</sup>, Ryo Sugahara<sup>2</sup>

**Abstract:** Japan and other western countries have developed low impact development to mitigate the waterlogging since 1990s, while China started Sponge City Construction recently, which is based on those theories and practical experiences from those developed countries. Studies about Sponge City Construction are booming these years, but few of them focus on concrete problems occurred during its implementation process. Thus, this paper aims to summarize those challenges from a case study – Zhenjiang, by literature review, site investigation and hearing research to officers and designers.

### 1. Introduction

Since 2015 the Chinese government has been actively promoting a policy called Sponge City Construction nationwide, which refers to an urban development mode that such built cities function like a sponge which are able to absorb, store, infiltrate, purify and release water, so as to pursue a low impact to the former more natural environment, typically in harmony with local ecosystem and water cycle system. Evidently, China has showed a trend focusing on the infrastructure construction since 2000, as a result of restriction by limited resources which were mainly poured on the industrial construction before. <sup>[1]</sup> Till now, 30 pilot cities have been designated by the central government of China and some provinces are carrying out similar improvement projects at a provincial level as well.

This paper takes Zhenjiang, Jiangsu Province as a case study to find out the problems faced in the process of implementation and gives some counter measurements. The followed *Table 1* shows our research method and schedule. The head office is situated at the Municipal Bureau of Housing and Urban-Rural Development, as showed in *Photo 1*, namely Zhenjiang Command Center for Sponge City Construction.

### 2. Research Area

Zhenjiang has largely been improving its ability against waterlogging and diffused pollution since 2007, mainly by enlarging drainage networks and building reservoirs. The location of Zhenjiang is showed in *Figure 1*.

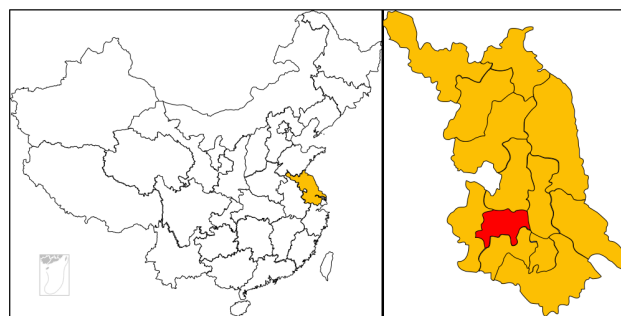
Zhenjiang was designated as pilot city by the central government in April 2<sup>nd</sup>, 2015, from which gets annual subsidy of 0.4 billion from 2015 to 2017. *Table 2* shows Its basic information.

**Table 1.** Research Method and Schedule

Method	Schedule (In 2016)
Literature Review	June 1 <sup>st</sup> ~ Sep.30 <sup>th</sup>
Site Investigation	Sep. 29 <sup>th</sup> ~ Sep. 30 <sup>th</sup>
Hearing Research to Officers and Designers	Sep. 29 <sup>th</sup>



**Photo 1.** Zhenjiang Command Center for Sponge City Construction



**Figure 1.** Site Map of Zhenjiang, Jiangsu Province, China

**Table 2.** Basic Information about Sponge City Construction in Zhenjiang

Experimental Area (km <sup>2</sup> )		22
Total Investment (billion RMB)		2.585
Amount of Projects		396
Objectives	Volume Capture Ratio of Annual Rainfall	75%
	Overcome Storm	30-year
	Reduce Diffused Pollutants	60%

1. Graduate School of CST, Nihon-U

2. Department of Oceanic Architecture and Engineering, CST, Nihon-U

### 3. Problems of Implementing Sponge City Construction in Zhenjiang and Countermeasures

By summarizing the results of literature review, our hearing research and site investigation [2, 3, 4, 5, 6], we concluded some practical factors against successful implementation as following:

- (1) No direct experience could be simply and soon applied in Zhenjiang as their natural, social and other conditions differs among those pilot cities or foreign cities, thus the chance of making ill-considered decision is inevitable and high.
- (2) The construction itself is a systematical solution. So every parts should be well considered and the total should be balanced. For instance, only valuing the Low Impact Facilities is not enough, the enhancement of drainage system is also important, and every site should be maintained in good condition, otherwise, risk of immersing the low-lying areas would rise high.
- (3) Implementation involves multiple municipal bureaus. The procedures of construction include: project establishment, feasibility study, bidding, contract reporting, safety supervision, etc. Involved sectors include: Transportation and Traffic Administration, Police Office, Water Supply Company, Power Supply Company, Industry Associations, etc. Besides, the bid winning company is an endemic enterprise, thus lacks the strength to deal with local connections smoothly. Therefore, their cooperation and communication need be improved. Typically, the present Promotion Committee of Sponge City Construction consists of leaders from each bureau, thus a sort of loose. So different bureaus should share more real-time information together and enhance their collaboration from now on.
- (4) The most difficult type of projects is renewing old communities with Low Impact Facilities, compared with transforming streets, green belts, squares and waters. The interest of residents is complicated and difficult to balance. For instance, residents prefer their parking area without green for worrying attracting insects and venomous insect such as centipede.
- (5) As residents oppose or other reasons, planning and

designs always have to be changed frequently, resulting the project delayed or not reach the expected effect. Therefore, the demand survey of residents should be well taken previously.

- (6) After the transformation, most residents think the effect is positive and wonderful, but few quantitative studies support those opinion as the lack of a long series of measured data about rainwater and drainage system. At present, only mathematical models are being used to simulate and evaluate the effect.
- (7) Most residents lack the awareness of importance of rainwater utilization. For instance, 100 rainwater tanks will be set up in those communities this year, however most residents think there is no need to use rainwater and the tanks look disharmonious.

### 4. Conclusions

In conclusion, this study indicates that implementation of sponge city construction in Zhenjiang faces many challenges and their solutions will take a very good enlightenment significance for other similar cities.

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