



Riverbank development: Rethinking the options

Shanghai Suzhou Creek Rehabilitation project

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Project Background

- Suzhou Creek originates from East Taihu Lake in Jiangsu Province, entering Shanghai at Zhaotun town of Qingpu district, passing nine districts, finally flowing into Huangpu River at the bund. The total length of the creek is 125km, of which 53.1km is within the boundary of Shanghai Municipality. It is a plain tidal river with average flow rate of 0.1-0.2m/s.
- Suzhou Creek is an important waterway that passes through the urban heart of Shanghai, and is used to provide navigation and flood control facilities. It is a water source for irrigation and industrial processing.
- It is recorded that the phenomena of “Black and Stink” was occurred in Suzhou Creek since 1920s and became totally black and malodorous all the year in late 1970 with large untreated agricultural, industrial, and municipal wastewater and solid waste discharged into it.

Project Background

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Main Engineering Measures

● Actions before Suzhou Creek Rehabilitation Project (Phase I)

◆ Shanghai Sewage Project (Phase I, Aug.1988 - Jan.1995)

Intercepting 1.4 million m³/day industrial and sewage wastewater produced by about 1000 factories formerly directly discharged into the middle and lower reaches of the Creek from Danba Road to the estuary;

Total investment is 1.6 billion RMB, including 145 mil. US\$ of WB loan.

Main Engineering Measures

- **Actions before Suzhou Creek Rehabilitation Project (Phase I)**
 - ◆ **Wastewater interception** about $22.4 \times 10^3 \text{m}^3/\text{d}$ directly discharged to the mainstream from Huacaogang to Danba Road of the Creek, to reduce pollution load of upper reach of the Creek. The total investment of 19.3 mil. RMB, completed in 1998;
 - ◆ **Renovation of 17 interception pumping stations of SSP I**, to avoid discharging wastewater to the mainstream during maintenance in dry seasons, reducing the pollution load of COD 12 t/d. The total investment is 31.1 mil. RMB. This project was completed in 1998.

Main Engineering Measures

● Actions before Suzhou Creek Rehabilitation Project (Phase I)

Achievement:

water quality of the most severely polluted section at Wuning Rd bridge after above projects put into operation

1998 average	DO	COD _{Cr}	BOD ₅	NH ₃ -N (mg/l)
	1.56	57.79	15.09	13.74
class V standards	2	40	10	1.5

Main Engineering Measures

● Actions before Suzhou Creek Rehabilitation Project (Phase I)

Achievement:

The water quality of the Suzhou Creek has been improved to certain extent. But the water quality in urban area is still worse than Class V, the black and malodorous appearance of the Creek in urban city area is not eliminated, the black demarcation line between the Huangpu River and the Suzhou Creek can be clearly seen at ebb tide.

Main Engineering Measures

● Suzhou Creek Rehabilitation Project (Phase I, Dec.1999-Sep.2004)

Including 9 sub-projects, the total investment is 6.59 billion RMB, including 161.5 million US\$ from ADB.

wastewater interception: 6 tributaries, Hongkou and Yangpu Gang
Shidongkou WTP

integrated augmentation: gates pumping station construction

water system rehabilitation: sluice gates construction of Mudu Gang and six tributaries of up reach of the Creek, re-aeration

embankment reconstruction: nightsoil and solid waste collection wharves, dilapidated embankment walls

greening: Meng Qing Garden Phase I

Main Engineering Measures

● Suzhou Creek Rehabilitation Project (Phase I, Dec.1999-Sep.2004)

Achievement:

water quality of the most severely polluted section at Wuning Rd bridge after the project put into operation

2002 average	DO	COD _{cr}	BOD ₅	NH ₃ -N (mg/l)
	2.96	21.28	5.28	5.33
class V standards	2	40	10	1.5

By 2000, the black and malodorous appearance of the main stream is eliminated, by 2002 restore the key indexes of Class V water quality standards in the lower reach of 24 km of the Creek and Class IV standards on the upper reach of 29 km. But many tributaries are still black and stink, it is even worse in suburban tributaries.

Main Engineering Measures

● Suzhou Creek Rehabilitation Project (Phase II, Apr.2003 -2005-Agu.2009)

Including 8 sub-projects, the total investment is 2.98 billion RMB.

wastewater interception: 5 rainwater storage ponds, subsequent interception projects of SCRP I, wastewater collection system of Huangdu Town at the upper reach of the creek, in the middle and lower reach of the creek

integrated augmentation: bi-direction sluice gate

embankment reconstruction: closure of 3 dump sites in the upper reach of the Creek, Huangpu MSW transfer station

greening: 19.2 ha. green belt along the riverside

Others: reconstruction of Xizang Road bridge

Main Engineering Measures

● Suzhou Creek Rehabilitation Project (Phase II, Apr.2003 -2005-Agu.2009)

Achievement:

After the Phase II project put into operation, the black and malodorous appearance of the main tributaries of the Creek is basically eliminated. A water-front landscape corridor has been completed, the water quality of the urban reach steadily improved, and restore the key indexes of Class V Standard.

Water quality of the most severely polluted section at Wuning Rd bridge after the project put into operation is:

2005 average	DO	COD _{Cr}	BOD ₅	NH ₃ -N (mg/l)
	<u>2.78</u>	<u>21.83</u>	<u>4.87</u>	<u>8.50</u>
class V standards	2	40	10	1.5

Main Engineering Measures

● Suzhou Creek Rehabilitation Project (Phase III, Jul.2007-Sep.2011)

Aiming to improve the water quality simultaneously through out the mainstream and tributaries, gradually restore the ecological system.

Including 5 sub-projects, the total investment is 3.14 billion RMB.

The specific measures are such as dredging sediment (1.3 mil. m³, 16.4km), renovating flood prevention wall, wastewater interception, wastewater collection system in Baihe town of Qingpu district, removing sanitary wharves.

Main Engineering Measures

● Suzhou Creek Rehabilitation Project (Phase III, Jul.2007-Sep.2011)

Achievement:

The water quality of the most severely polluted section at Wuning Rd bridge after the project put into operation is

<u>2010 average</u>	DO	COD _{Cr}	BOD ₅	NH ₃ -N (mg/l)
	2.76	17.75	5.93	4.38
class V standards	2	40	10	1.5

Water quality of Suzhou Creek has improved gradually since 1998, playing a positive role in stimulating waterside housing development sector along the creek.

Main Engineering Measures

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Main Engineering Measures

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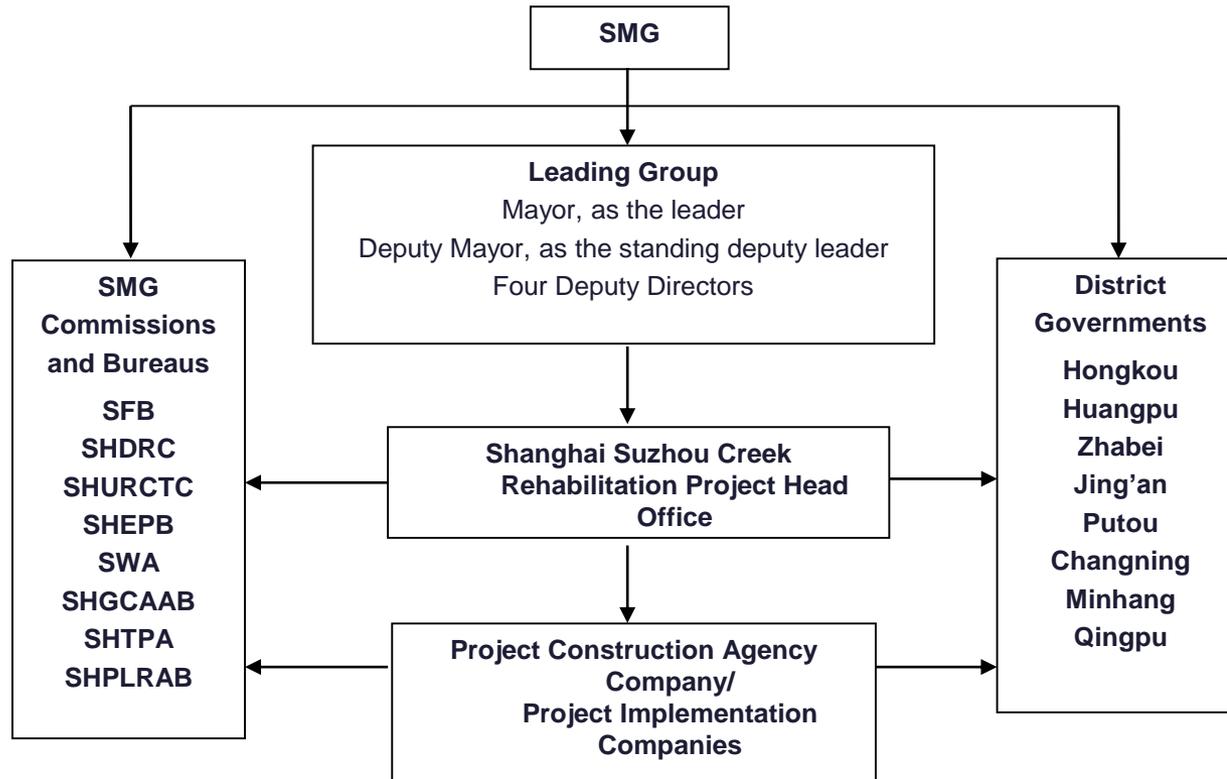
A. Guiding by the rehabilitation plan, implementing phase by phase

Based on the pollution source and hydraulic and water quality survey, after many times of discussion and modification, the environmental rehabilitation plan of Suzhou Creek was finally made in Apr. 1998 and approved by SMG on May 14, 1998. It specifies reasonable stage target and responsive main engineering measures. Actions followed up are fully guided by it.

B. Effective Institution Arrangement

As Suzhou Creek comprehensive rehabilitation project comprised many components and an effective coordination and implementation arrangement was set up early in 1996 to bring in all related agencies of SMG throughout planning and implementation of the project.

B. Effective Institution Arrangement



C. Focusing on wastewater interception, addressing both the symptoms and root causes

The main problem of Suzhou Creek is wastewater pollution. Wastewater interception is the first comprehensive treatment of the Creek, at the same time, augmentation and the riverside landscaping are taken into action.

D. Adopting scientific technology and enhance research

Investigate the situation and cause of the pollution in Suzhou Creek, make practical strategy, propose reasonable stage target, study rehabilitation technology, those are the key to the success of Suzhou Creek Rehabilitation.

D. Adopting scientific technology and enhance research

For example, an innovative design approaches was introduced in the Mengqing Garden construction. As part of the embankment reconstruction component, it was designed as an integrated functional facility. It serves as a landscaped leisure and recreational area, with an equalization basin to store excessive rainwater in an underground storage pond, and a base for environmental and water resources protection education. Ponds and streams in the garden demonstrate self-purification mechanisms of natural water courses. The exhibition center, converted from an old beer factory, presents the history of Suzhou Creek.

Experience and Lessons

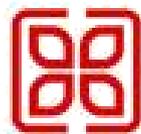
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D. Adopting scientific technology and enhance research



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Thank you