

# From shanty towns to metropolises

- Historical progress and reflections on water services in Shanghai and some African countries
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- Shanghai, China



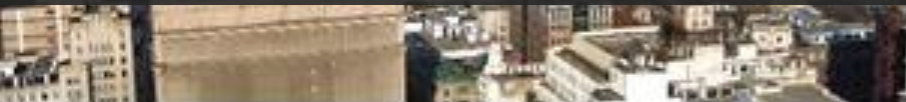


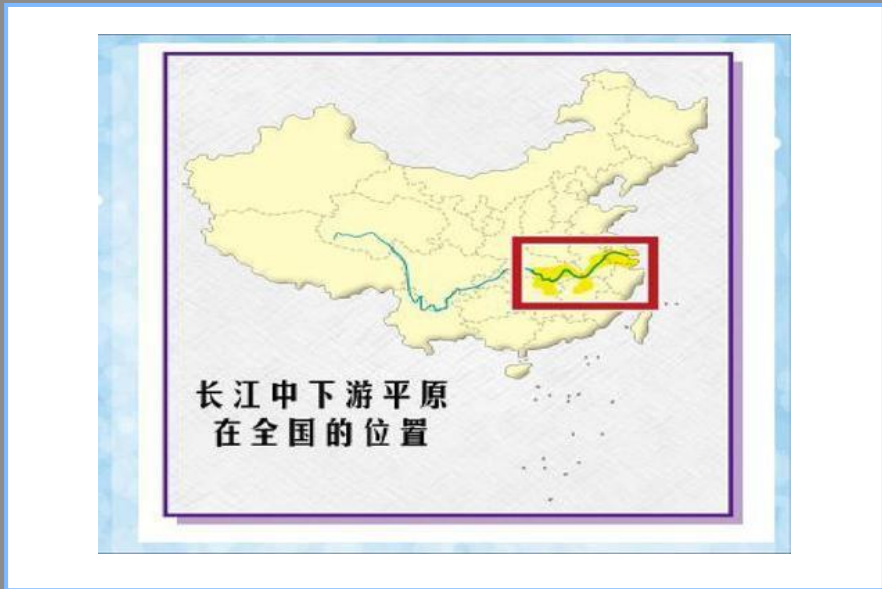
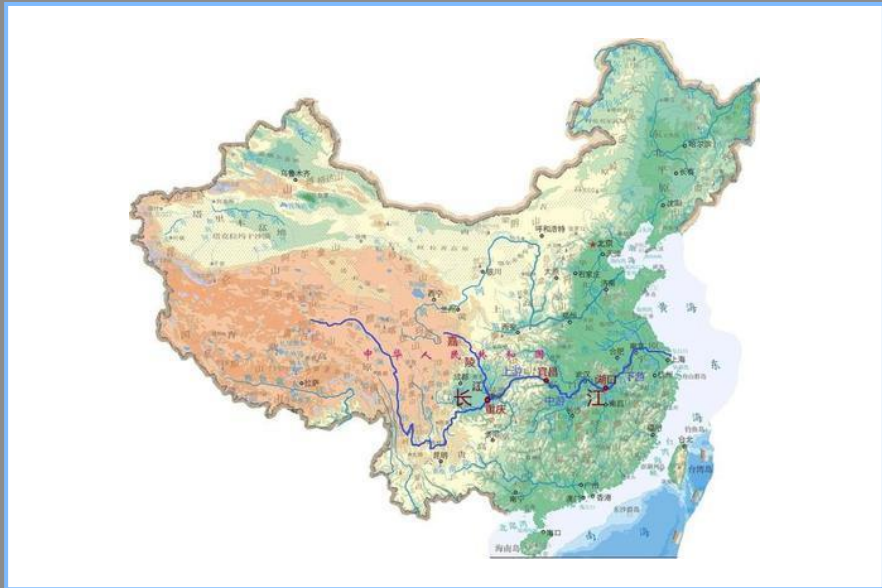
**TODAY**



## Trend of Water Services in Shanghai, China

- The global water crisis
- Rapid urban growth
- “Water Solutions”







## 1. Historical background of water service in Shanghai

- 1). 19<sup>th</sup> century:
- 1843 shanghai open as a port
- Ship MAOMAO, Stranded on the bank of the Huangpu River.
- Over time, the embryonic form of modern Shanghai's shanty towns was formed: the ground-rolling dragon (contiguous shanty towns, resembling a dragon)



# Traditional water service

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- Before the 1870s, Shanghai's urban water mainly relied on rivers.
- The water porter took the water from the Huangpu River and the Suzhou River and then yelled it to the residents' homes along the way.
- The river water contained sediment and was restricted by the fluctuation of tides.
- After the residents buy the water, they need to use alum to stir and settle the water.
- In addition, there are ships that transport clear water from Taihu Lake to Shanghai, which is only used by high-end consumer places and opium smoking restaurants.



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## 2) Contract water services, 1850s-1950s:

- People from Subei began to influx into Shanghai.
- In 1860, Qichang Foreign Company excavated Shanghai's first deep underground well in the Bund to take groundwater for internal use.
- In 1870, 1875, 3 water supply company had sand filter which founded by foreign merchant in Yangshupu and pudong, ceased operations after several years of operation due to the high price of water.
- 1880-1883 joint venture water plant between the British and Chinese governments established.
- In 1897-1902 , "Inland water plant" by local gentry.



# Water services in these shanty towns



- Riverside well
- (Heavy rain is also a natural enemy)

Daily water storage and fire-fighting water storage (Sometimes for vintaging)

Glazed earthenware bottle

- Local materials for water purification: bamboo pipes, ceramic tanks, quicklime ( $\text{CaCO}_3$ ,  $\text{CaO}$ ) (or By Calcined shells) alum



## Water services For “citizens”

Yangshupu water plant:

1881, Raise funds to set up Shanghai Water Supply Company; Change the trends of taking water from tide, muddy or salty taste.

1883, British businessman builds water plant in Shanghai concession

Residents can use the fire faucet in the block to get water service for one hour every morning.

In 1897-1902, Shanghai businessmen set up "Mainland Water Supply Company"



# Before 1949(PRC founded)

Shanghai is becoming more prosperous and shanty towns are expanding day by day. The wars during 1924-1949, accelerated the expansion of shanty towns.

1924 and 1937

1949

In 1949, Shanghai had 322 shanty towns, accommodating nearly one million people, and each shanty town had at least 200 thatched houses.



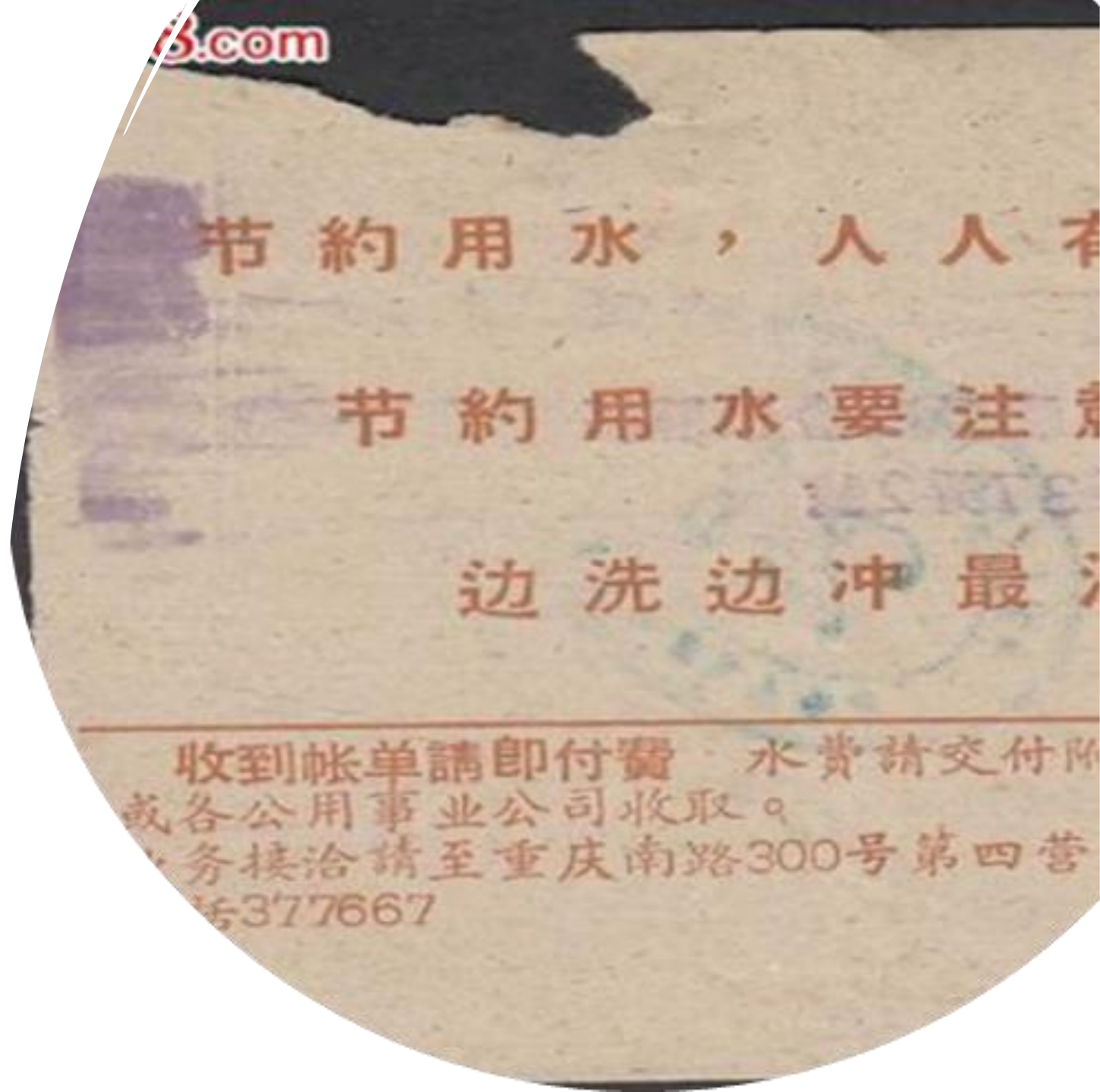
## 2. To the new world

Rebuild a new one  
Or  
Continuation and  
innovation



## 2.1 water price

- At the beginning of the War of Resistance Against Japan, the political situation did not hesitate. Water prices have soared, and the water prices of water supply companies owned by British and French companies have risen 2.5-2.8 times respectively.
- During the civil war, inflation, currency devaluation, and water prices adjusted 6 times, with an increase of 1,739 times.
- After 1949, especially in November 1952, the Shanghai Municipal People's Government unified the city's water price into the new RMB 0.12 yuan. Due to stable prices, the water price has not changed for 38 years. (For shanty towns only half of that)



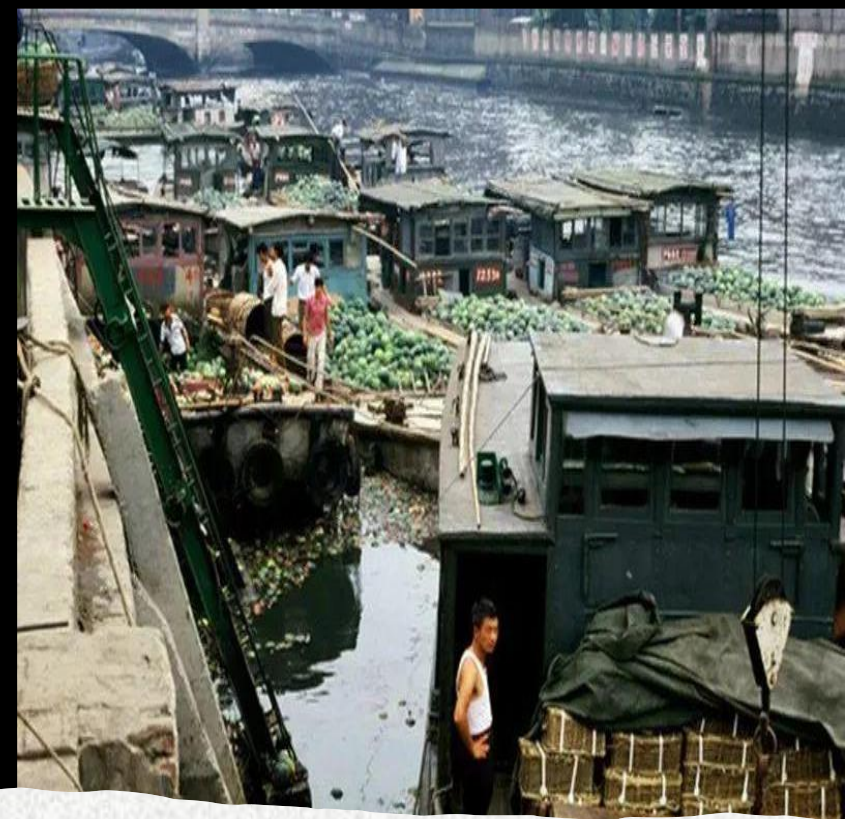
## 2.2 Constructions for water supply enterprises and stations

- From 1949 to 1955, the Shanghai Municipal Government merged the five independent water supply enterprises in Shanghai to form the Shanghai Water Supply Company through acceptance, expropriation, escrow, and merger. In 1955, the city's water supply enterprises were operated in a unified manner.
- Since 1949, the municipal government specially allocated funds to build water supply stations in shanty towns to solve the water problem of these residents, and the water price was halved.
- By 1956, the total number of water supply stations in the city reached 1,865, enabling 1.3 million shanty households to use tap water. Households using water supply stations cost about 0.10 water per house per month.
- In June 1999, Shanghai City basically realized the installation of meters to receive water into the households.





百家号/旧影阁



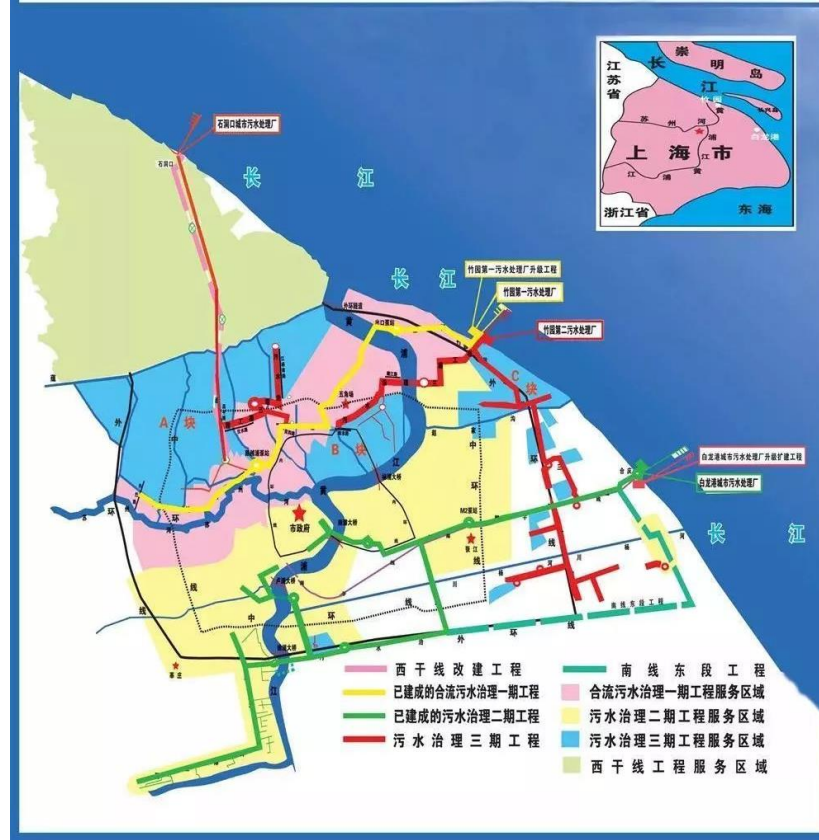
## 2.3 Complete sewage treatment and water supply infrastructure

- “Water-quality-type water-scarce city.”(1990)
- water pollution came from industrial wastewater, domestic sewage, and non-point source pollution.
- Although Shanghai has a lot of water, its water pollution cannot meet the ecological needs of production and life.



In 1870, 1883, China's  
first tap water quality test  
reports.  
Change the idea of tap  
water.





Asia's largest sewage plant-Bailonggang Sewage Plant, Shidongkou Sewage Treatment Plant

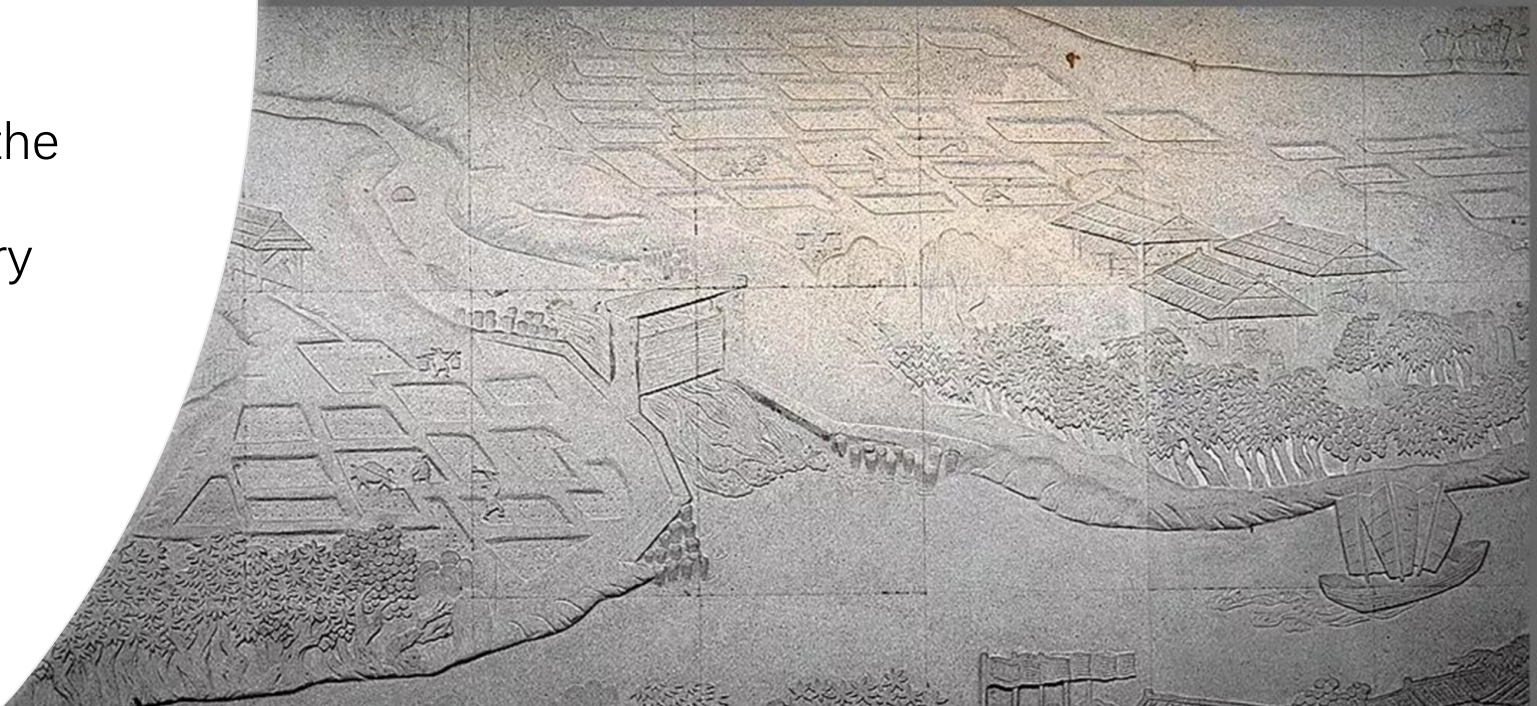
- Before 1978, there were only 9 sewage treatment plants in Shanghai, which treated 139,000 tons of sewage per day.
- At the end of 2017, there were 51 sewage treatment plants in Shanghai. The daily sewage treatment capacity of Shanghai reached 8.257 million tons. The sewage treatment capacity was improved. By 59.4 times, the sewage treatment rate has reached 94.5%.

Water services are trapped by summer heat and raw water pollution. Es.1920s.

Due to the low terrain of Shanghai, whenever a typhoon storm hits, both sides of the Huangpu River suffer from floods.

Yuan Dynasty Sluice Remains (1271年—1368年)

- Switch to a tributary source of clear water
- The flood control wall is heightened, the tide gate is built in the estuary, and the traffic layout is combined with the gallery bridge.

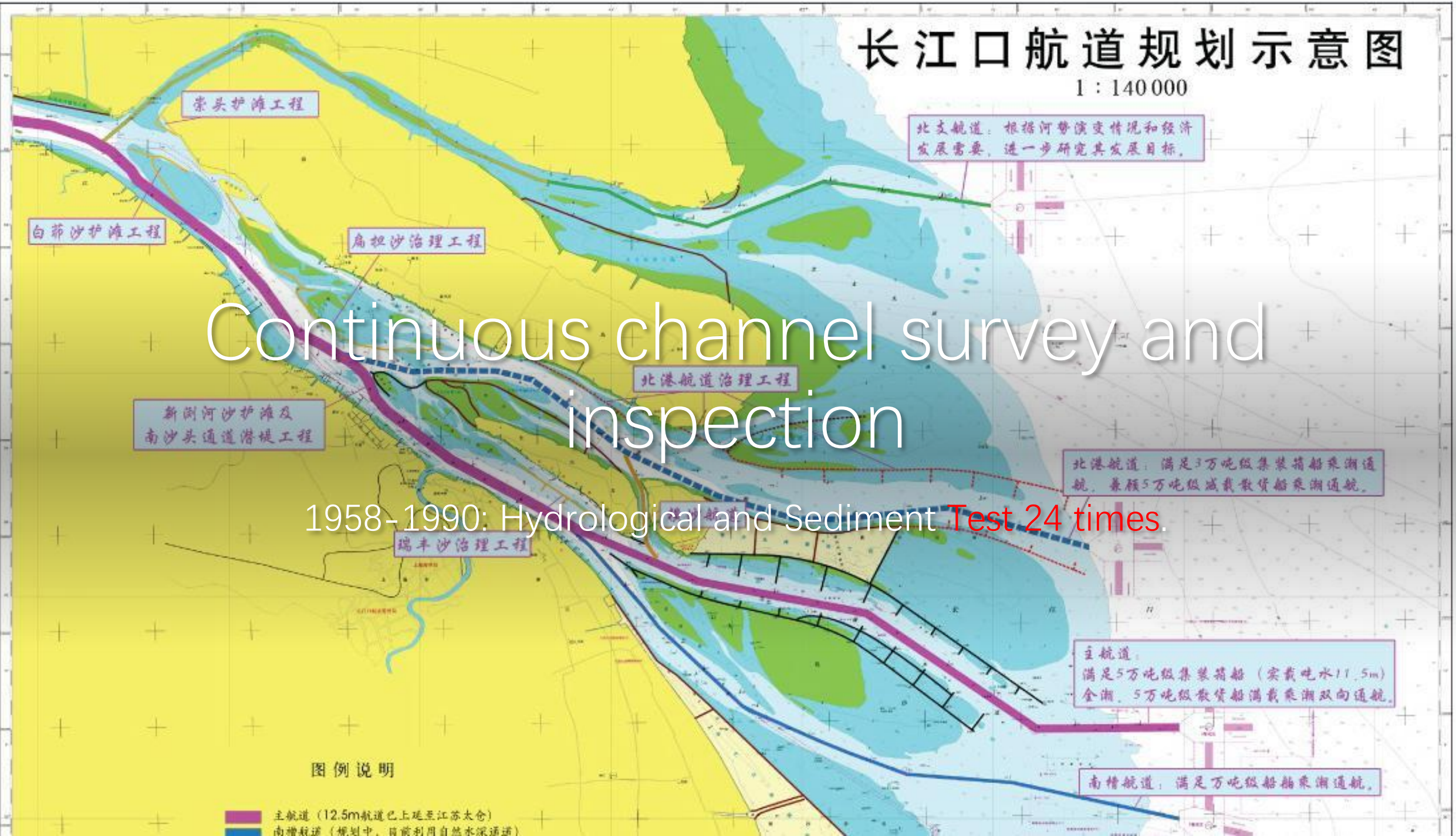


# 长江口航道规划示意图

1 : 140 000

## Continuous channel survey and inspection

1958-1990: Hydrological and Sediment Test 24 times.



Channel detection and dredging based on data research of tidal current, runoff and sediment

After 1949, a total of 487 spur dams with a total length of 60 kilometers and 407 kilometers of revetment projects have been built.

From 1956 to 1990, new flood control walls were built and reinforced along the banks of the Huangpu River. The total length is about 256 kilometers.

There are 58 tide barriers along the banks, and 200 kilometers of the main stream and tributaries in front of the sluice.





Trade volume tonnage  
water depth,  
correlated with each other

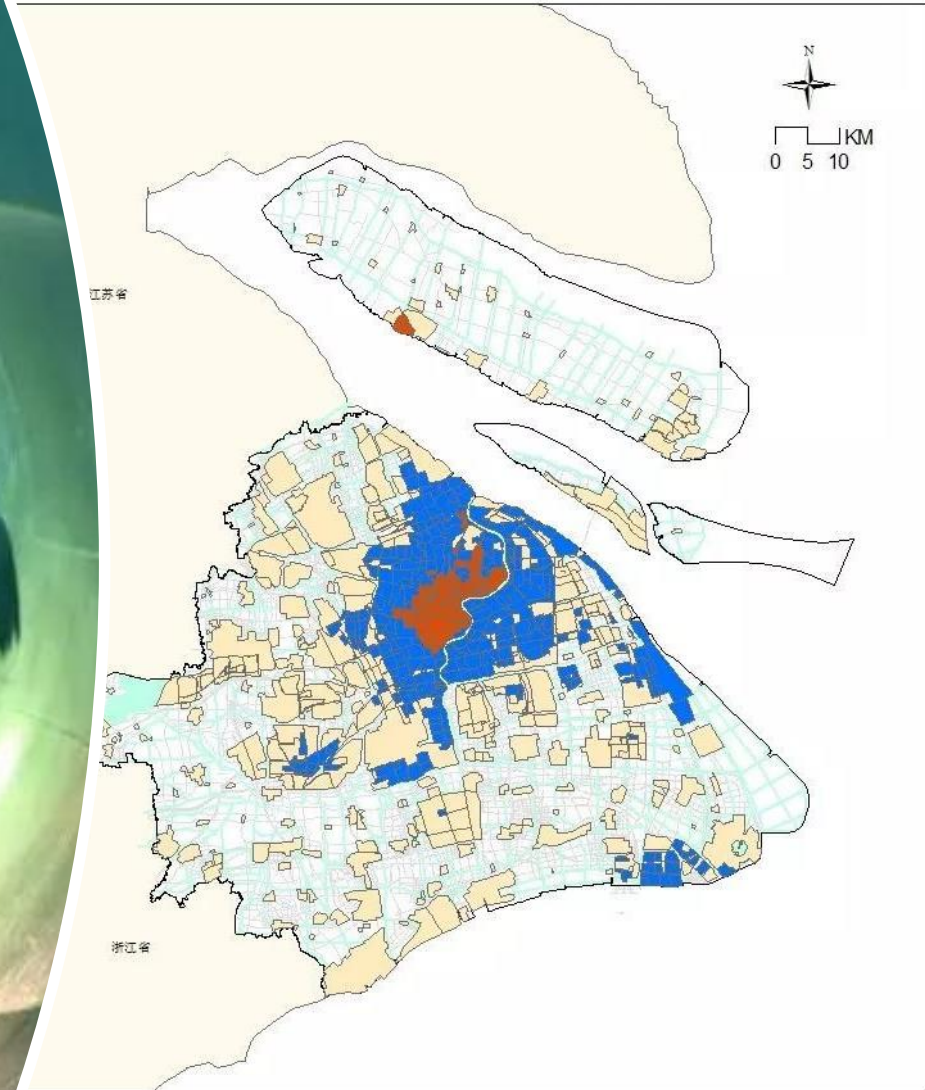
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Infrastructure and fees are  
closely related, achieving a  
three-in-one design,  
operation and revenue



## 2.4 Improve flood control capabilities, improve the utilization and treatment of water sources

- In December 1954, a total of 140,000 people from 102 communes in 6 counties participated in the continued dredging and excavation project of the Dianpu River. In August 1977, the entire Dianpu River line was completed and watered.



4

— 骨干河道 — 骨干路网 — 合流制强排系统 — 分流制强排系统 — 分流制自排地区

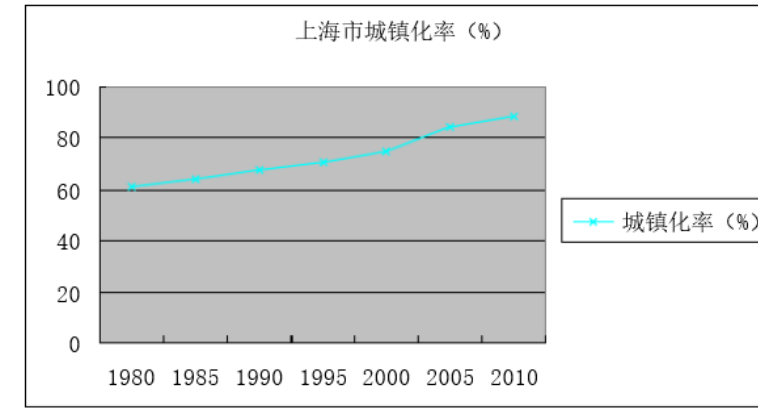
In terms of drainage pipelines, the city's drainage pipeline network was only 490 kilometers before 1976, which is not compatible with the development of Shanghai. As of the end of 2017, according to statistics, all the drainage pipe networks in the city have reached 24,886 kilometers. by 51 times.

The collection and transportation capacity of the sewage trunk line has reached 10.84 million cubic meters per day.



# 3. Smart water service

- Since 1980-1990, The 2nd trend of rapid urban growth, certain economic scale and agglomeration effect.
- In 1990, it mainly existed as an industrial center, with a population of 13 million; by 2020, the population is about 25 million. Shanghai has become one of the world's largest metropolitan areas and the financial and economic center of China.
- AIM of Water service: for people, from people.



# 3P+3R+3I policy system

- In order to solve the problem of the deterioration of the water environment, Shanghai relies on the theory of circular economy and proposes to verify the ecological threshold of water, to improve the ecological efficiency of water resources as a breakthrough, and to build a three-party governance model of government, enterprise, and society in Shanghai's water resources governance.
- Corresponding 3P (Public, private, people) + 3R ("Reducing, Reusing, Recycling") + 3I policy system model. (Targeted input end control policy, process control policy output end control policy.)
- Input/throughput/output.

# Comprehensive improvement of water services

- 01 Determine the water diversion project
- 02 Designation of water source protection zones
- 03 Sewage treatment
- 04 Water supply by quality: municipal water and direct drinking water are divided into different supply and price standards.
- 05 Construction and renewal of special water pipelines

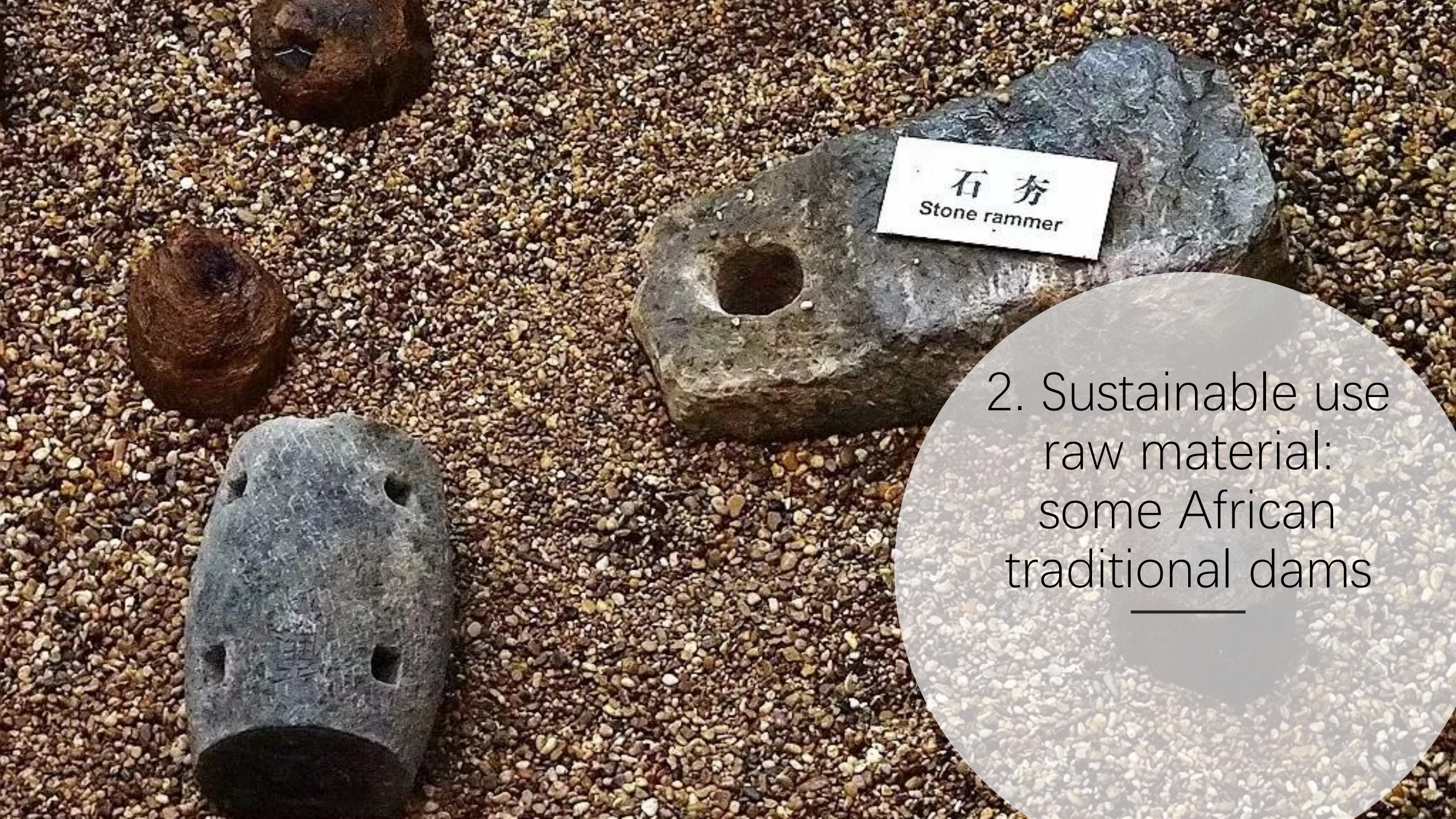


## 4. Globally comparative perspective especially African Countries

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- 1. New Waterway Storm surge barrier in Rotterdam, Netherlands.
- Fully consider the impact of future climate change and sea level rise





石 杵  
Stone rammer

2. Sustainable use  
raw material:  
some African  
traditional dams

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- 擗石桩:
- Reduce the impact of water flow on the gate wall



## 衬河砖:Lining river bricks.

- Outside the stone wall, a brick wall ,height of which is the same as that of the stone wall, and the width is 1-1.35 meters.

## 4.3. Sustainable use of traditional knowledge

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- The stone slabs are embedded with iron ingots and tenons to prevent water seepage and displacement of the slabs; the bottom stone is covered with stone slabs, and the bottom is carried by the keel; there is ground support under the keel





## 4.4 Sustainable use of traditional engineering

- shore reclamation

4.5.  
Freshwater  
fish farming  
and tourism  
development



## 5. Kind of Inspiration

1. From the perspective of resource and environmental economics, the economic and governance development effects of the overall society can be improved structurally.

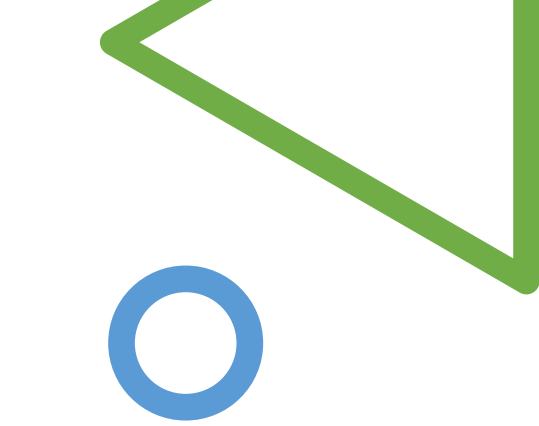
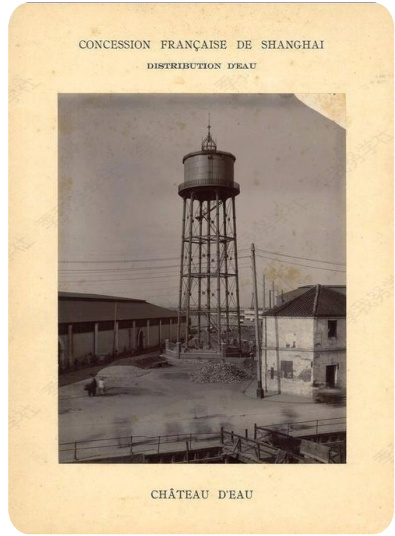
Dikes and roads built  
reclaim farmland  
pay taxes



## 5.2. Logical construction and practice



## 5.3 How to maximize the fund?



Social disaster relief activities during the Republic of China, the Bund signal tower

- 5.4 Where comes the money?



A scenic landscape featuring a calm body of water in the foreground, reflecting the sky and the silhouettes of trees and birds. The background shows a line of trees and a hazy sky with many birds in flight, suggesting a natural, possibly coastal or wetland, environment.

# progress

- intelligent water management.
- Coordinating upstream and downstream, main and tributary, left and right banks,
- coordinating regions and river basins,
- promoting water system governance,
- part-time specimen work
- comprehensive policy implementation