

Current Water Issues and Water Management in China

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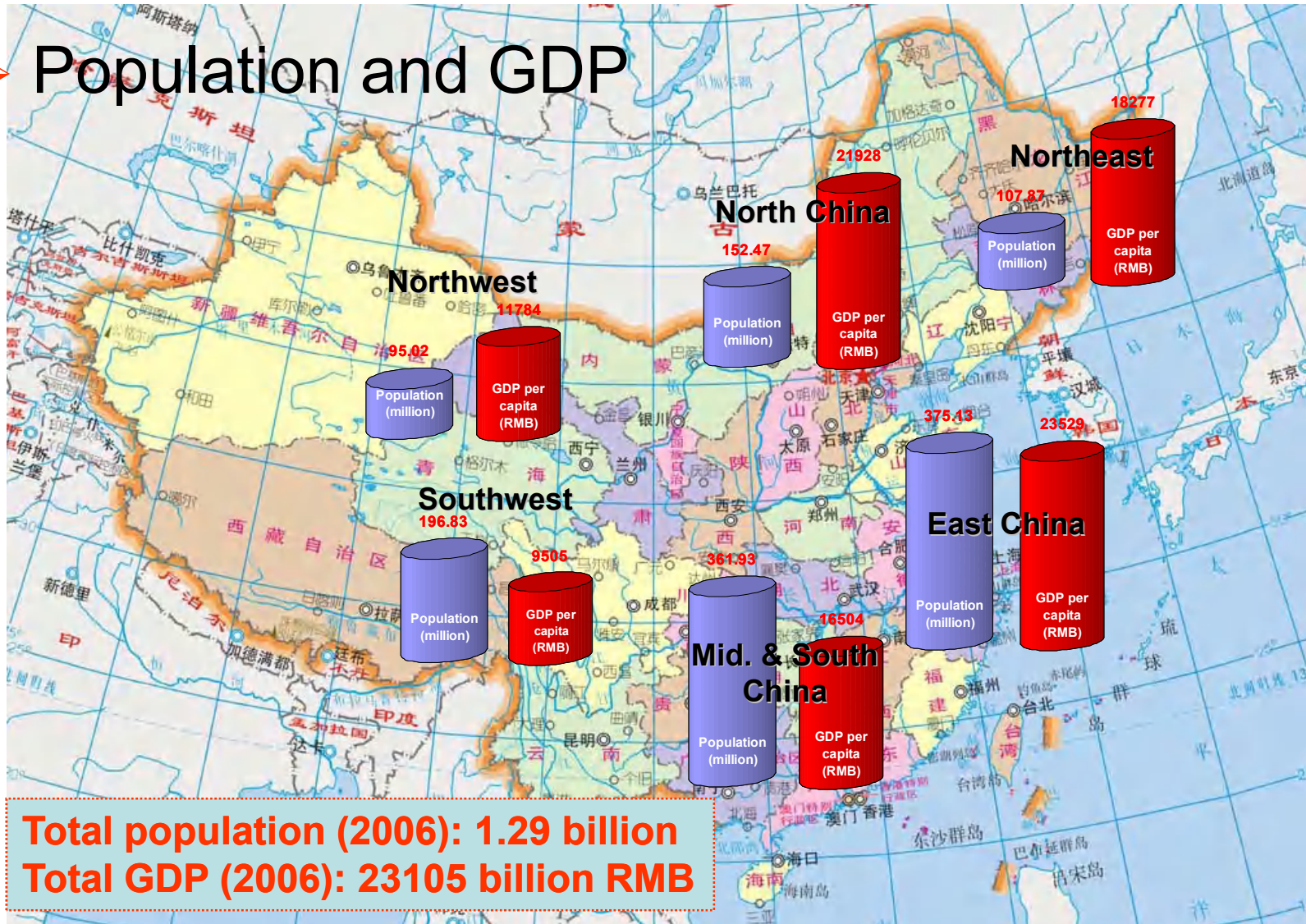
(西安建筑科技大学)

Outlines

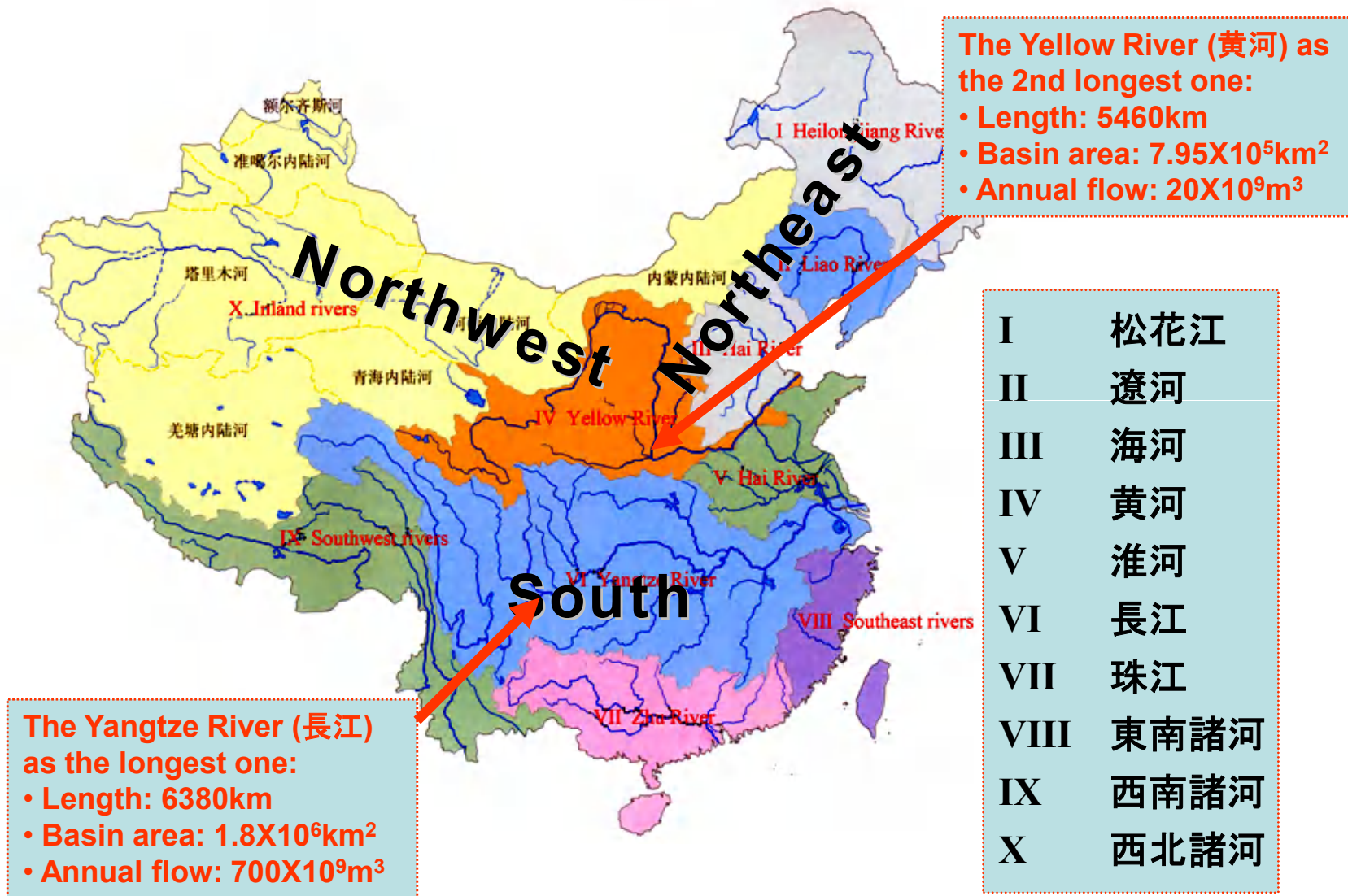
- Introduction
- Distribution of water resource and its consumption
- General conditions of surface water quality
- Actions for water management
- Concluding remarks

Introduction

➤ Population and GDP

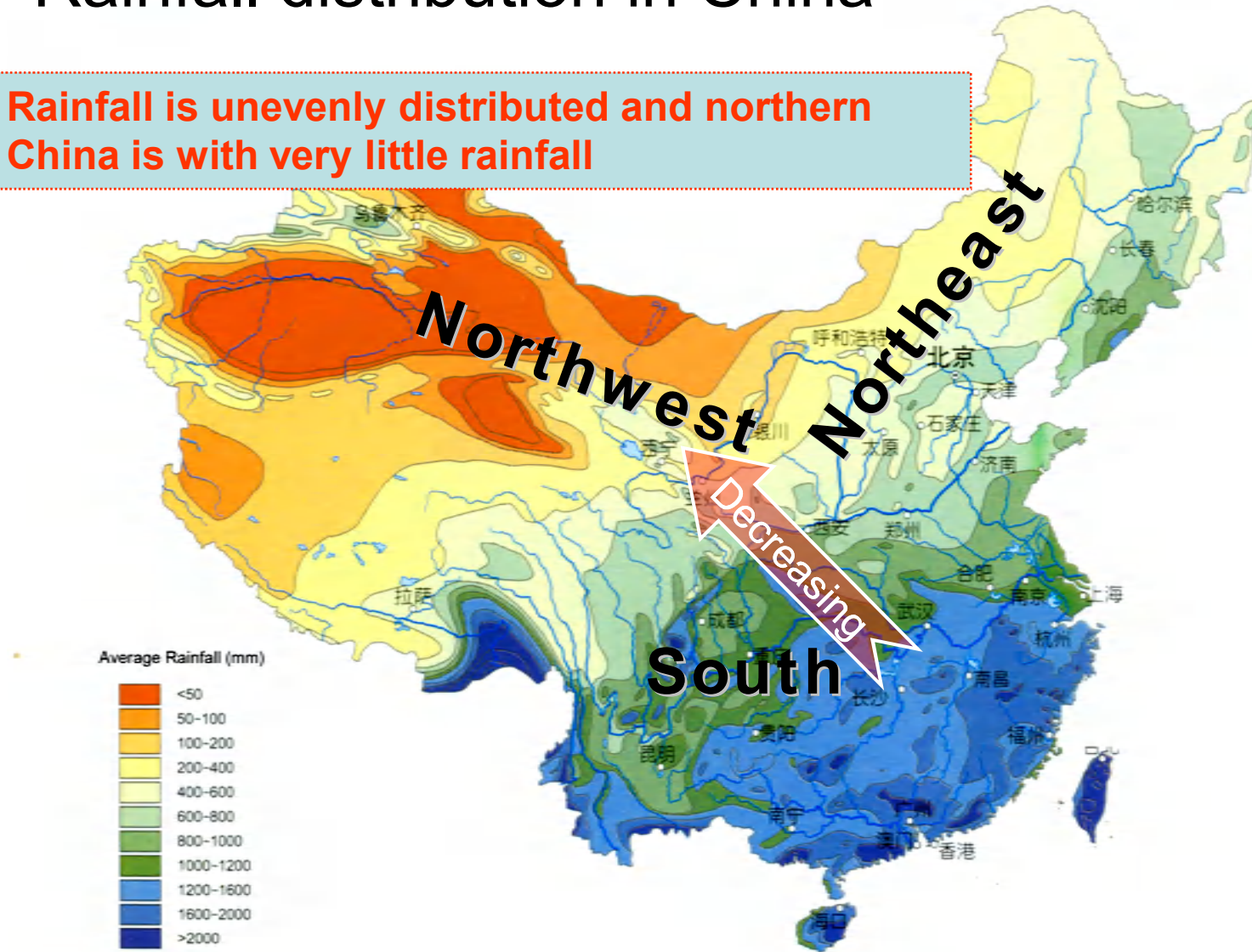


➤ Water basins in China



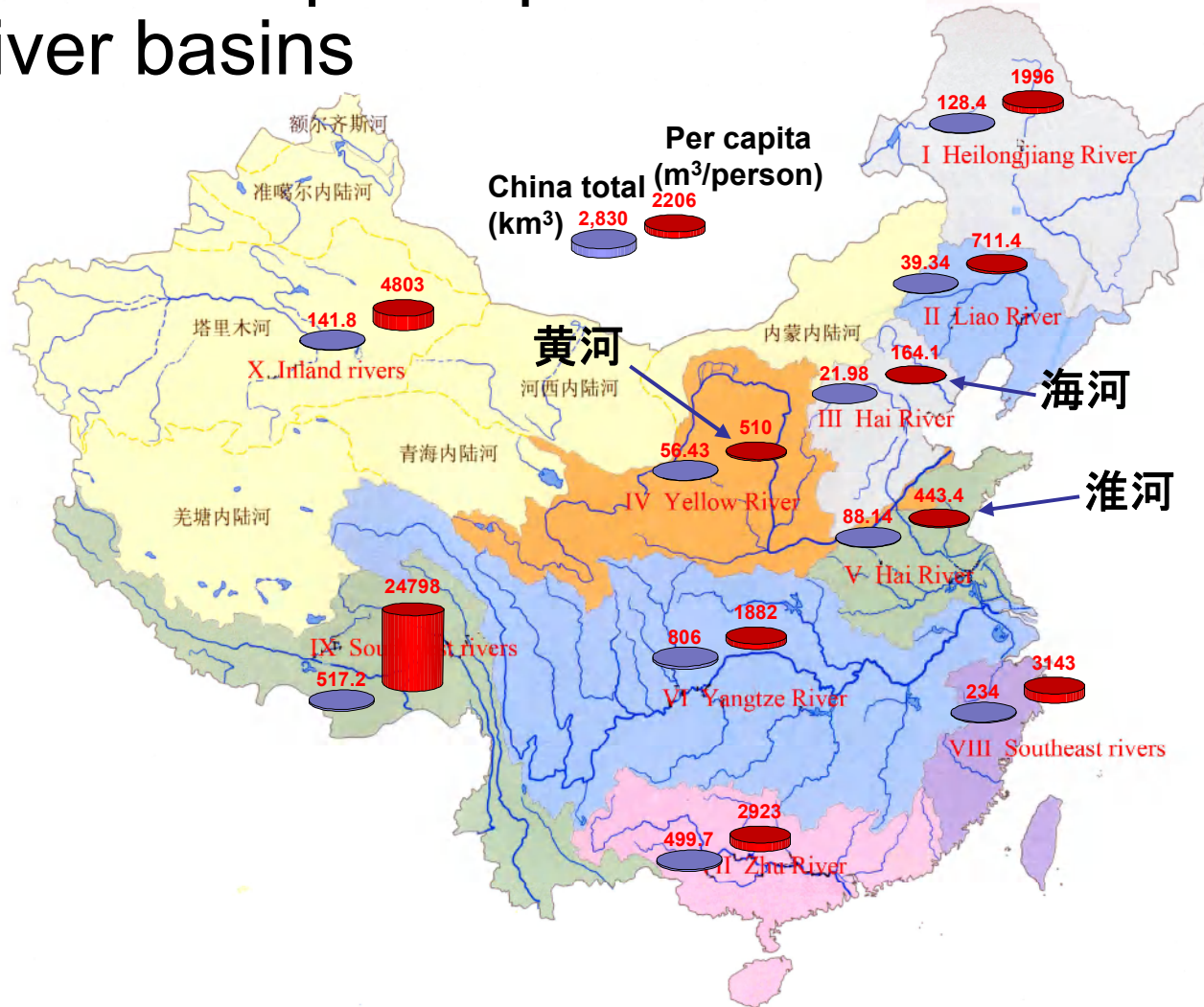
➤ Rainfall distribution in China

Rainfall is unevenly distributed and northern China is with very little rainfall

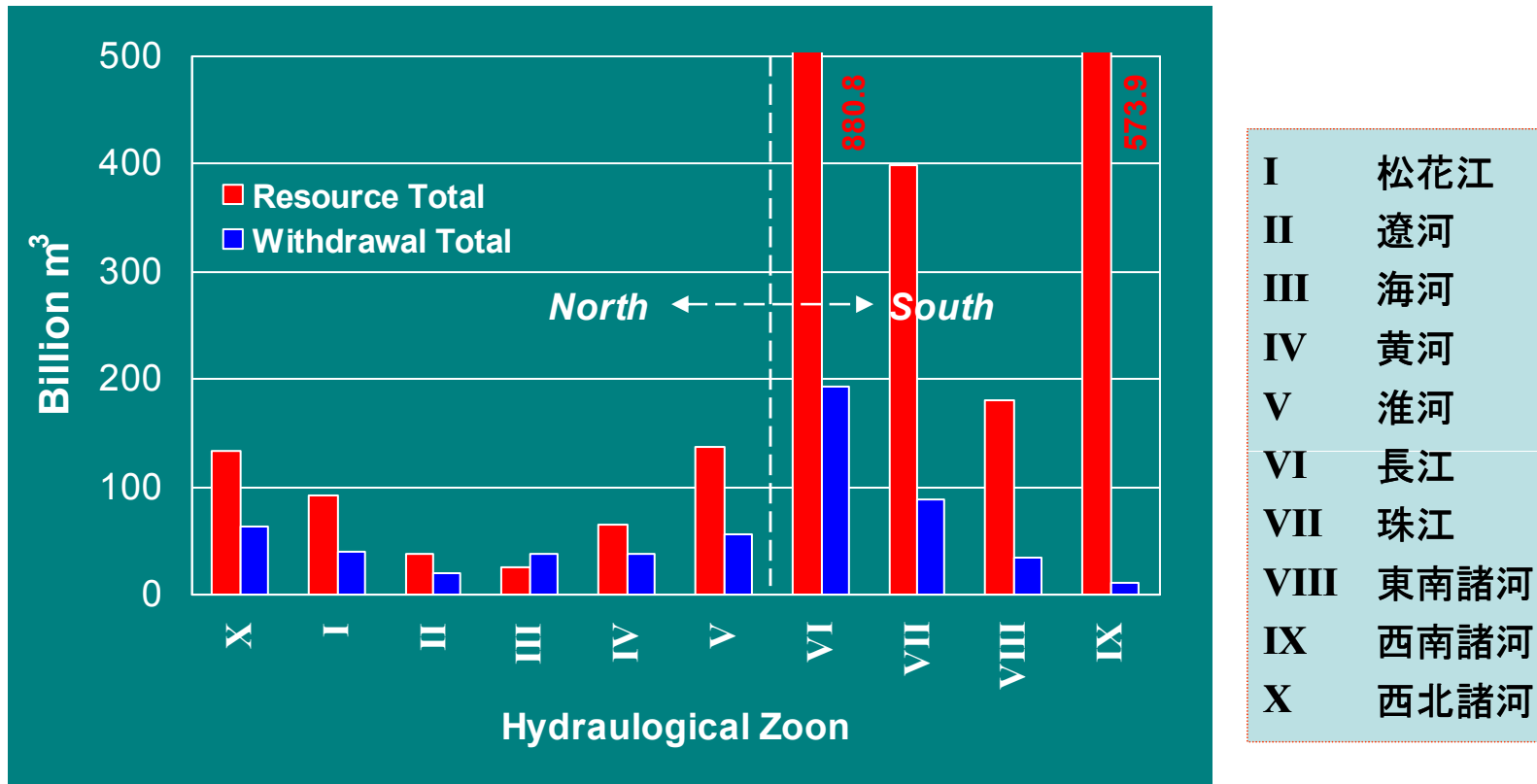


Distribution of water resource and its consumption

- Total and per capita water resources by river basins

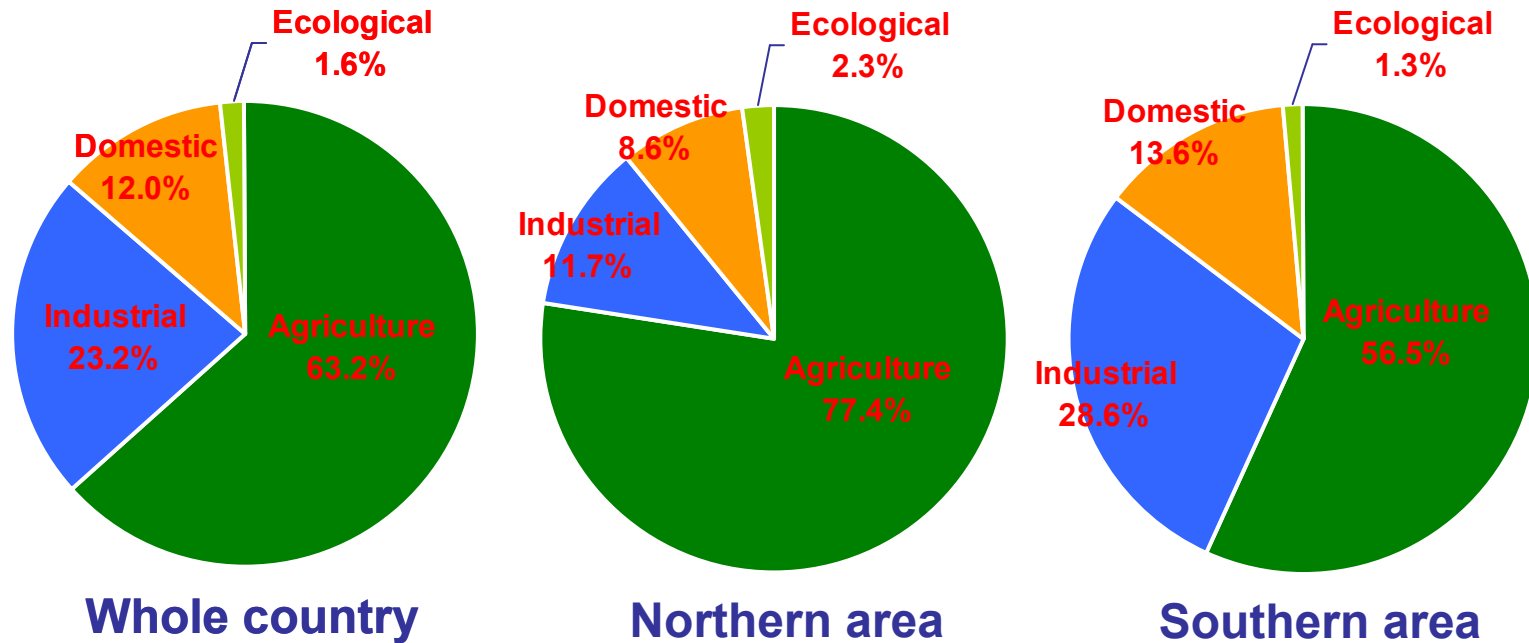


➤ Water withdrawal by river basins (2007)



In northern river basins, average water withdrawal takes about 52%, and among them, withdrawals from the Haihe River (海河), Liaohe River (遼河), and Yellow River (黄河) basins take 155%, 58%, and 54%, respectively.

➤ Water consumption by sectors (2006)

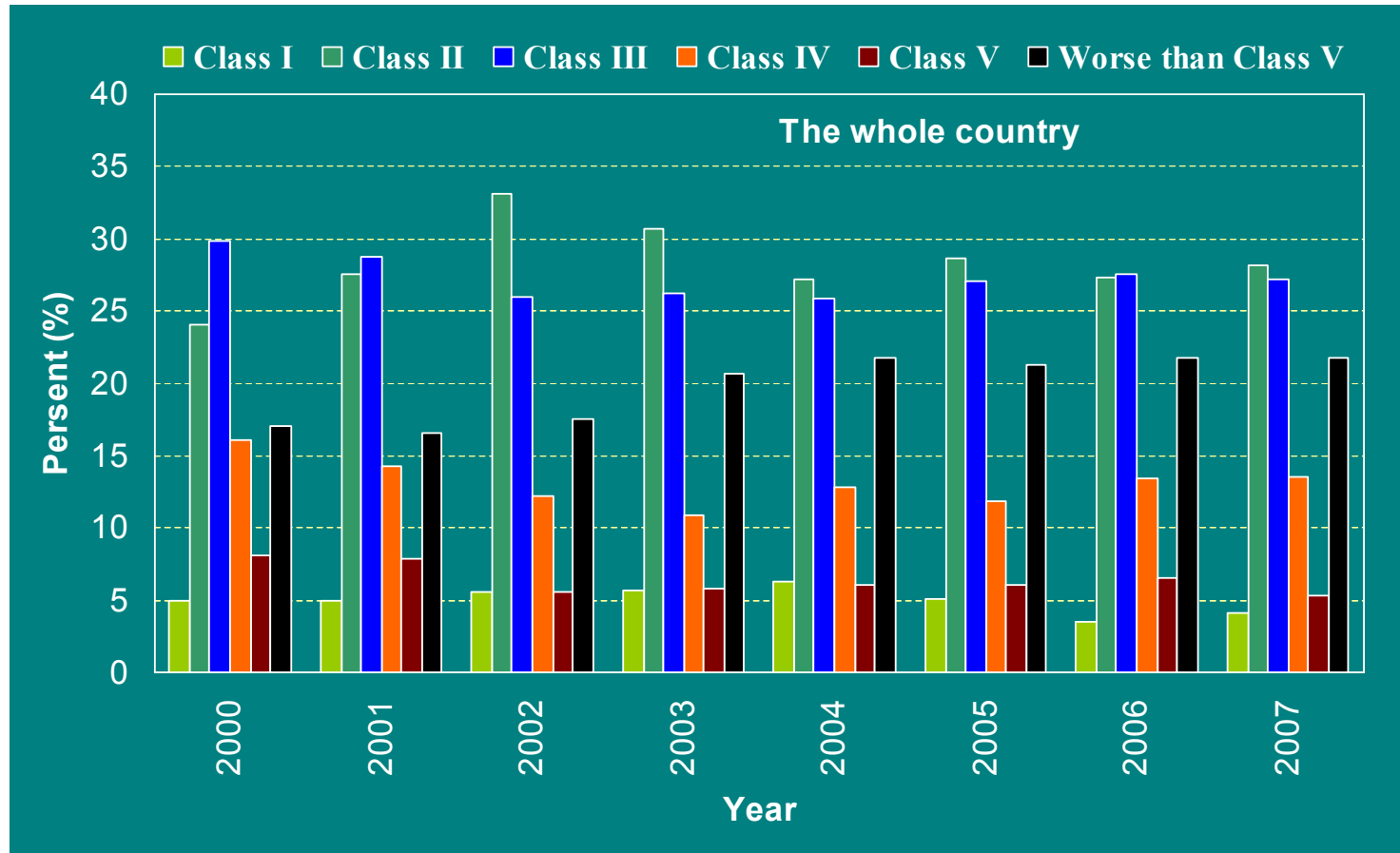


- ✓ In the whole country, more than 63% water was consumed by the agricultural sector though the agricultural GDP took only 10.7%;
- ✓ In the northern area, agricultural water consumption was as high as more than 77%.

General conditions of surface water quality

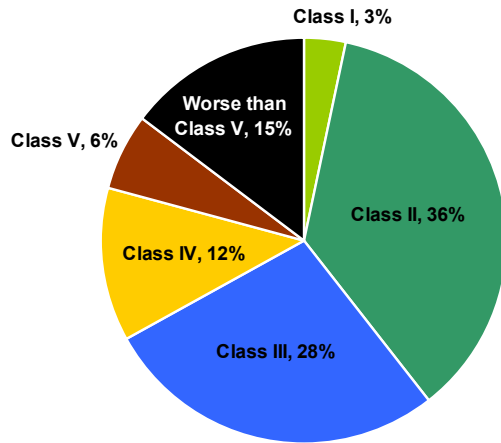
- Chinese standard for surface water quality (GB3838-2002)
 - ✓ Surface waters are categorized into 5 classes
 - Class **I**: header water, directly drinkable
 - Class **II**: 1st class source water for drinking water supply
 - Class **III**: 2nd class source water for drinking water supply
 - Class **IV**: source water suitable for industrial water supply
 - Class **V**: source water suitable for agricultural water supply

- Current river water quality
 - ✓ In the whole country

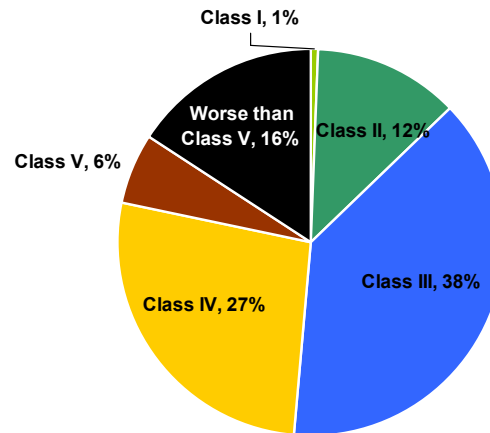


In 2007, 60% of the river sections monitored were with water quality of Class III or better. From 2000 to 2007, no apparent improvement was shown regarding river water quality in China.

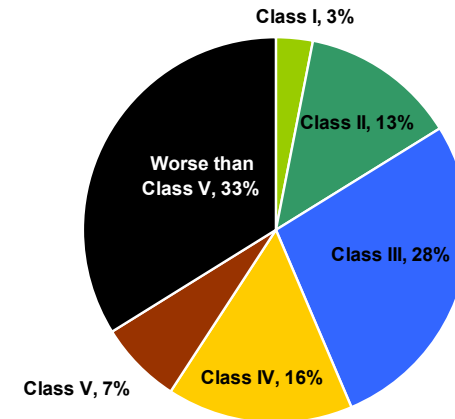
➤ Current river water quality
 ✓ Major rivers (2007)



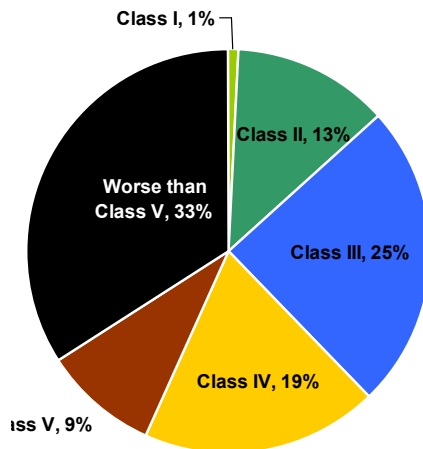
The Yangtze River
(长江)



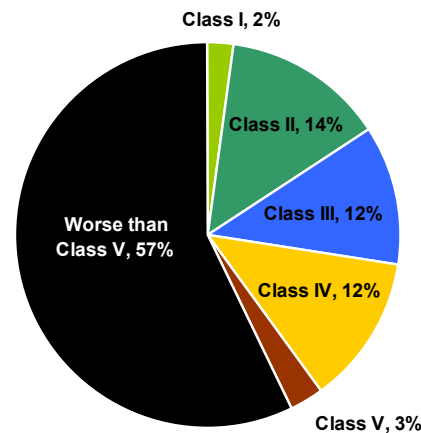
The Songhuajiang River
(松花江)



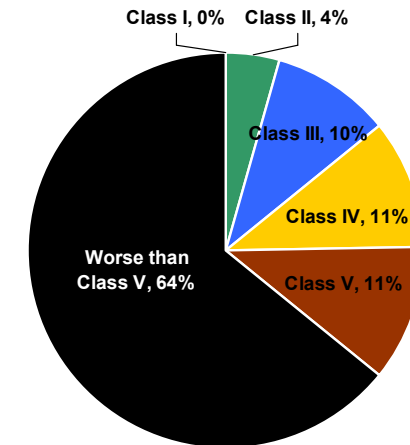
The Yellow River
(黄河)



The Huaihe River
(淮河)



The Haihe River
(海河)



Rivers in the Taihu Lake Basin
(太湖流入河川)

➤ Current lake water quality (2007)

✓ In the whole country

- Of the lakes monitored, 38.1% were Class III or better, 22.3% were Classes IV and V, 39.6% were worse than Class V.

✓ Lakes suffering from heavy pollution



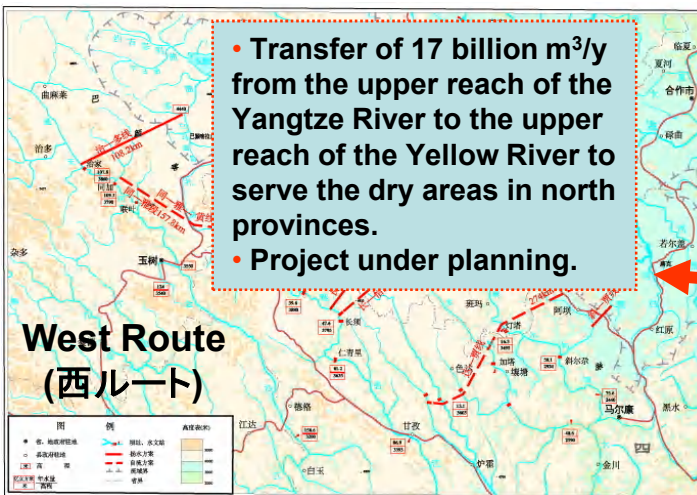
- **Pollution analysis (2006)**
 - ✓ Industrial and domestic discharges are still the main pollutant sources in the urban area.
 - **COD_{Cr}**: 9.44 million tons discharged to surface waters of which 57.3% from industrial source and 43.7% from domestic source.
 - **NH₃-N**: 1.12 million tons discharged to surface waters of which 37.8% from industrial source and 62.2% from domestic source.
 - ✓ Fast urbanization resulted in centralized discharge of pollutants into surface water bodies.
 - ✓ Insufficient dilution and/or self-purification by surface water body itself due to limited base flow for many rivers and lakes.

Actions for water management

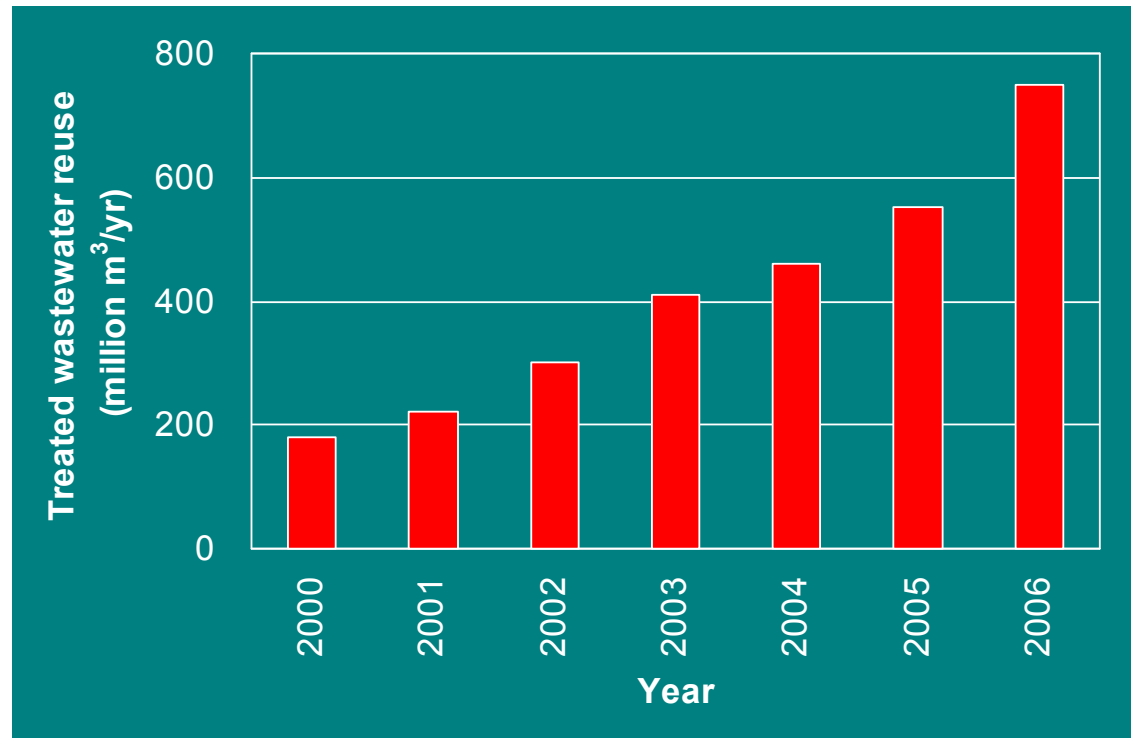
- Actions and/or anticipated measures for water resources management
 - ✓ South to North Water Transfer Project
 - Water transfer by canals from the Yangtze River (長江) basin to the Yellow River (黃河), Huaihe River (淮河), Haihe River (海河) basins to solve water shortage problem.
 - Planned capacity of water transfer: 44.8 billion m³/year
 - Project budget: 500 billion RMB (about 73 billion USD)
 - Project outline and current condition – *see figures in the next slide*



Danjiangkou Dam
(丹江口ダム)



- Actions and/or anticipated measures for water resources management
 - ✓ Water reuse for mitigating water shortage

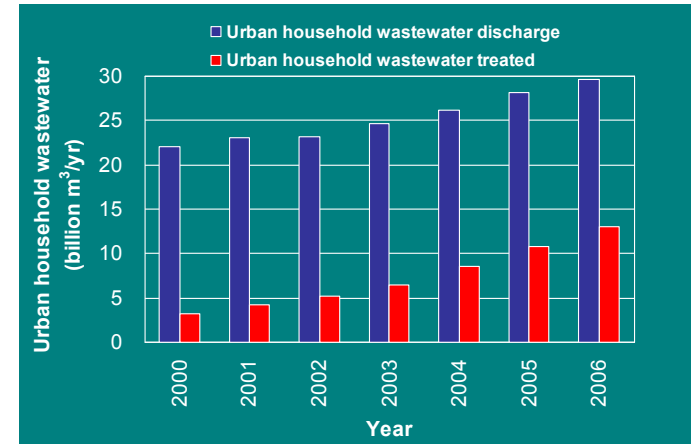
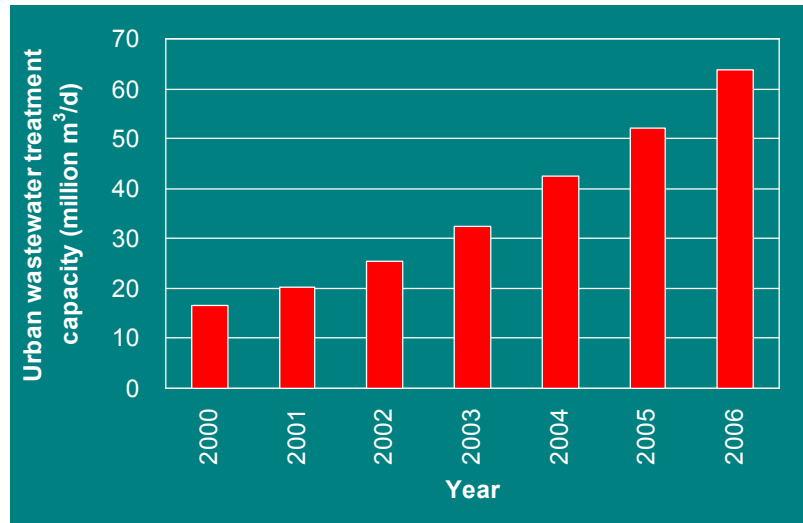


- Treated wastewater reused has been required by the government for each newly built WWTP
- Fast increase of wastewater reuse quantity was seen in recent years especially in Beijing and other northern cities
- In 2006 about 6% of the household wastewater treated was reused

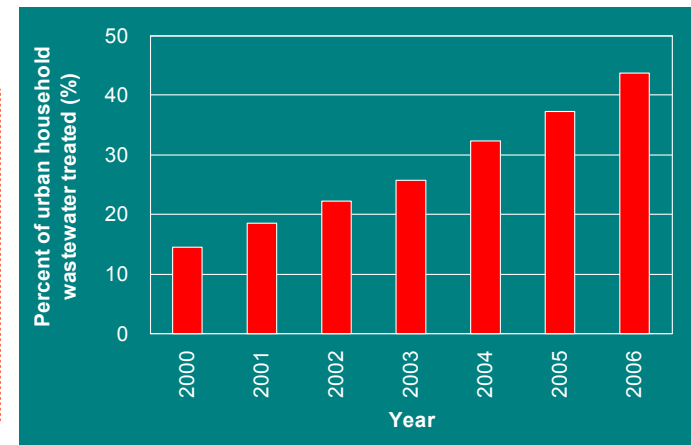
- Actions and/or anticipated measures for water resources management
 - ✓ Consideration on water saving from the highest water consumption sector
 - Agricultural water allocation has been at a high ratio (63.2% in the whole country and 77.4% in the northern provinces in 2006).
 - Water consumption per unit GDP is also at a high level (equivalent to 1.01 m³/USD) in the agricultural sector comparing with industrialized countries.
 - Application of advanced irrigation technology for agricultural water saving will be an important strategy in the near future.
 - Rationalization of industrial structure (including farming industry) will also be necessary in a viewpoint of efficient water use.

- Actions and/or anticipated measures for water quality management
 - ✓ Point source control is still the main task of water quality management in China.
 - ✓ More stringent standards and/or regulations have been put forward recently on industrial and domestic wastewater discharge.
 - A series of standards/regulations have been revised regarding various industrial wastewater discharges.
 - “Discharge standard of pollutants for municipal wastewater treatment plant” (GB18918-2002) has required every WWTP discharging effluent to a surface water body of insufficient dilution capacity to meet the most stringent Class IA (一級A) standard:
 - $\text{COD}_{\text{Cr}} \leq 50 \text{mg/L}$; $\text{BOD}_5 \leq 10 \text{mg/L}$; $\text{SS} \leq 10 \text{mg/L}$
 - $\text{TN} \leq 15 \text{mg/L}$; $\text{TP} \leq 0.5 \text{mg/L}$

- Actions and/or anticipated measures for water quality management
 - ✓ WWTP construction for urban domestic pollutants reduction



• Currently there are more than 3000 WWTPs under construction in cities and towns.
• The percent of urban household wastewater treated is estimated as 60% by end of 2008.



- Actions and/or anticipated measures for water quality management
 - ✓ National plans for water quality management of priority rivers and lakes.
 - 3 “he” + 3 “hu” + 1 “jiang” + 1 “ku” (三河三湖一江一庫) water quality improvement plan
 - 3 “he” – Three priority rivers (三河): Huaihe River (淮河), Haihe River (海河), Liaohe River (遼河);
 - 3 “hu” – Three priority lakes (三湖): Taihu Lake (太湖), Chaohu Lake (巢湖), Dianchi Lake (滇池);
 - 1 “jiang”: One large river (一江): Songhuajiang River (松花江)
 - 1 “ku”: One reservoir (一庫): The Three Gorge Reservoir (三峽大壩)
 - National research project on “Water Pollution Control and Management”
 - Research budget: 4.3 trillion RMB (1st phase)
 - Duration of 1st phase research: 2008-2010

- Actions and/or anticipated measures for water quality management
 - ✓ National plans for water quality management of priority rivers and lakes.
 - Engineering projects to be implemented for
 - Erasing major pollutant sources to the surface waters
 - Increasing the “self-purification” capacity of the surface water bodies
 - Improvement of the water environment in cities and towns within the related basins
 - Water quality conservation for safe drinking water supply in the related areas
 - Objectives
 - **1st phase** (2008-2010): complete control of pollutant sources and apparent water quality improvement
 - **2nd phase** (2011-2015): complete improvement of water quality
 - **3rd phase** (2016-2020): construction of sound and sustainable water environment

Concluding remarks

- China is a large country with uneven distribution of water resources, and its north part is suffering from water shortage problems.
- Fast economic development in China is accompanied by an increase of pollutant discharge which results in an unsatisfactory surface water environment.
- Water resource and quality management is a heavy task in China for its sustainable development and various efforts have been made in this regard.
- Nationwide water transfer is playing an important role for solving water shortage in water deficient regions but water saving and water reuse are considered to be more sustainable measures.

- Point source pollution is still the main reason for the current low quality water environment in China and its effective control will require more stringent regulation, pollutant reduction by popularization of wastewater treatment, and application of more advanced technologies.
- International cooperation has by far played a very important role in China's economic development and it will still be important in the field of water management.

*Thanks to SCJ for kind invitation
to this Symposium!*

有難うございました！