Water Resources CHOIR in China—

Strategic research and innovation priorities for water

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Water Resources CHOIR in China

Part Ⅰ

Four Main Water Resource Challenges

1. Frequent Flood and Drought Disasters
2. Water Resource Shortage and Uneven Distribution
3. Serious Water Pollution Treatment Challenges
4. Severe Damage to Aquatic Ecology

First Major Issue

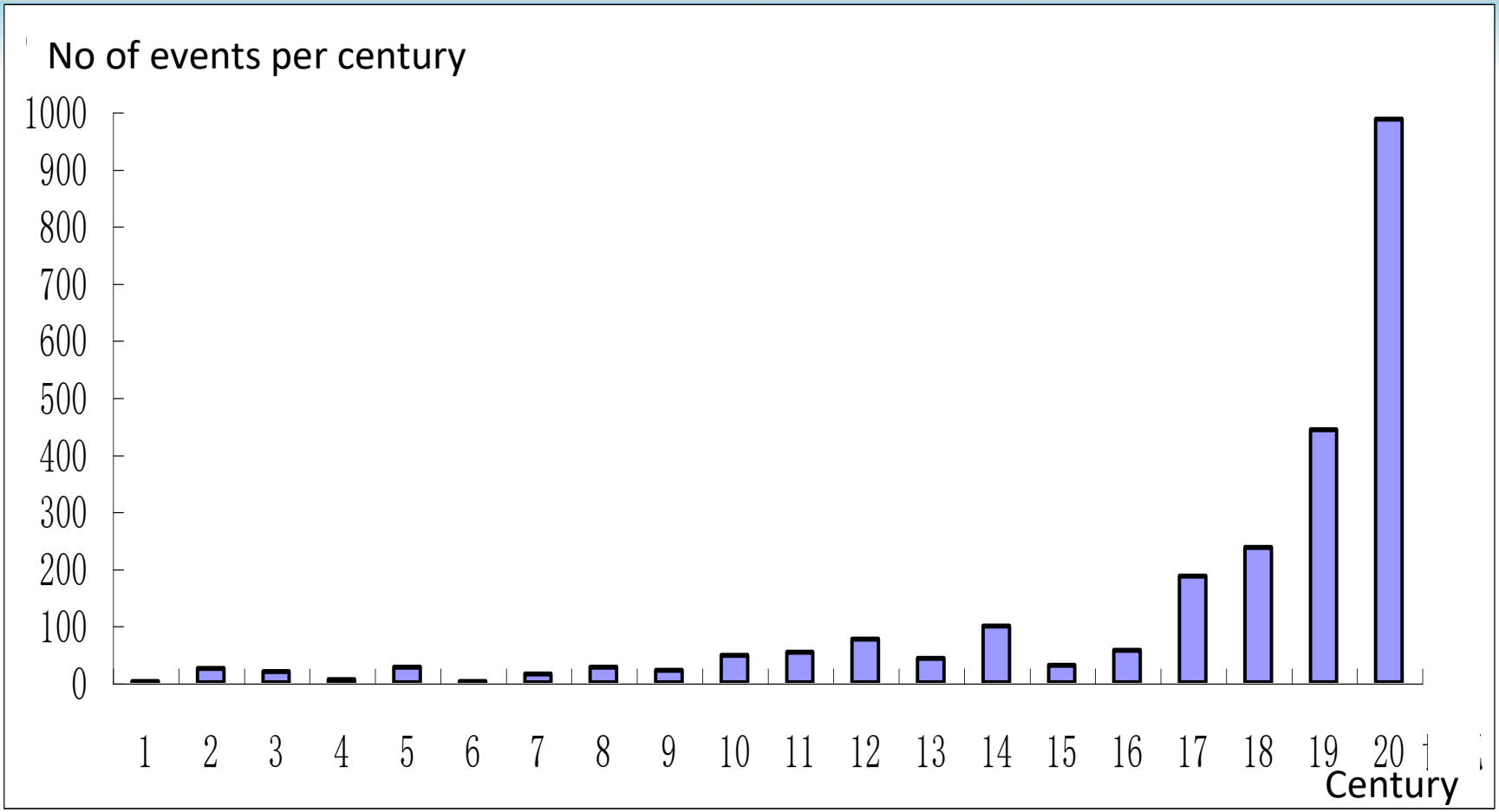
1. Frequent Flood and Drought Disasters

Sub Issues

i. Drought Disasters seriously affect Crop Production

iii. Dramatic increase in Flood Frequency

Dramatic increase in Flood Frequency



Flood frequencies in China in the last 20 centuries

City Waterlogging

Most medium- and large-size cities encounter flooding once every 1-3 years.

Vehicles damaged by flood water in Yongji after heavy rain caused waterlogging from July 13 to 14

Trapped citizens rescued by boat. Wuhan, July 9

Mountain Torrents

There are over 4.63 million km^2 of areas prone to mountain torrents; over 20 thousand mountain torrents that affect people directly.

…..Two Points

- Climate change increases the uncertainty of extreme weather events, making flood and drought risk management even more difficult

- Rapid development of the economy and population in China adds to the challenge of providing adequate flood control and drought relief

The Second Big Issue

2. Water Resource Shortage and Uneven Distribution

Sub Issues.

i. Low per capita water resources

ii. Uneven temporal and spatial distribution of water resources

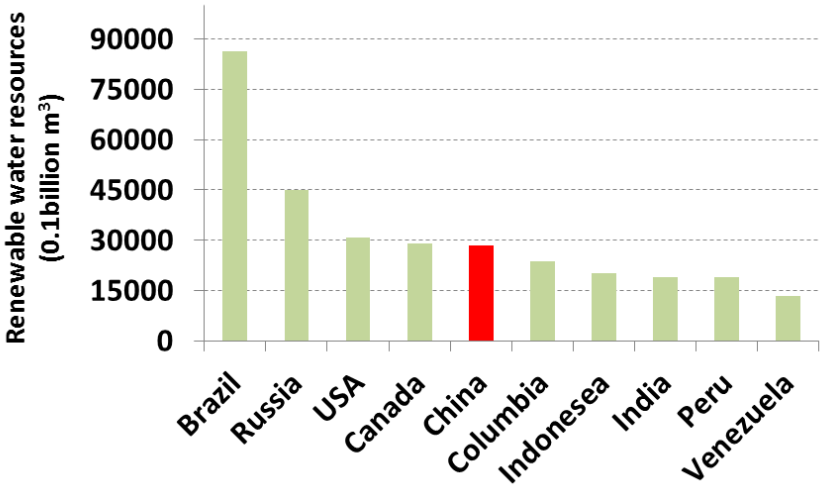
iii. Mismatch between water availability and sites of economic productivity

iv. Increasing water shortage puts huge pressure on water supply security

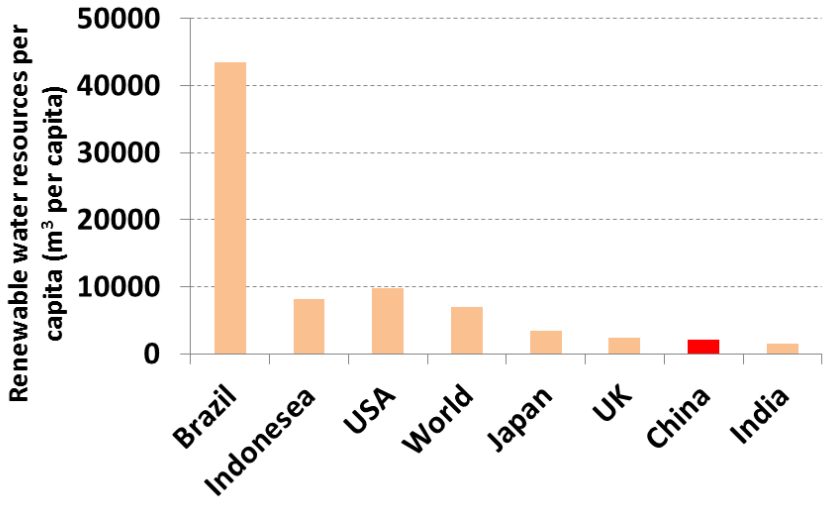
i. Low per capita water availability

Total volume: 2.8 trillion m^3, ranked 5th in the world.

Per capita share: 2100 m^3, less than one third of the world's average.



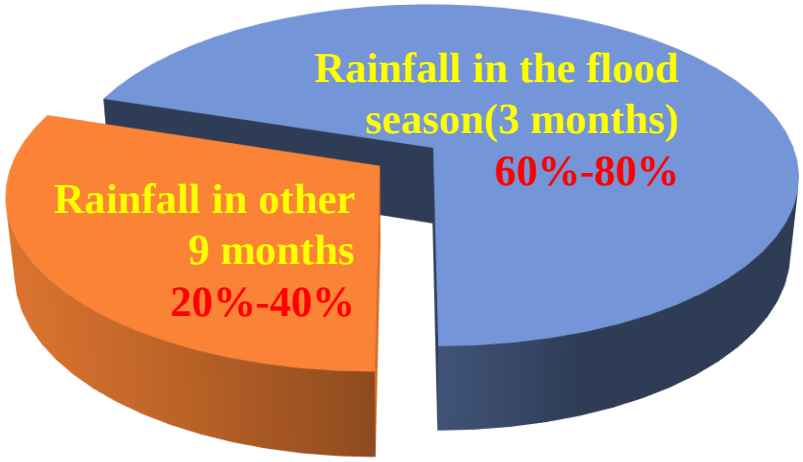
Total water availability in different countries

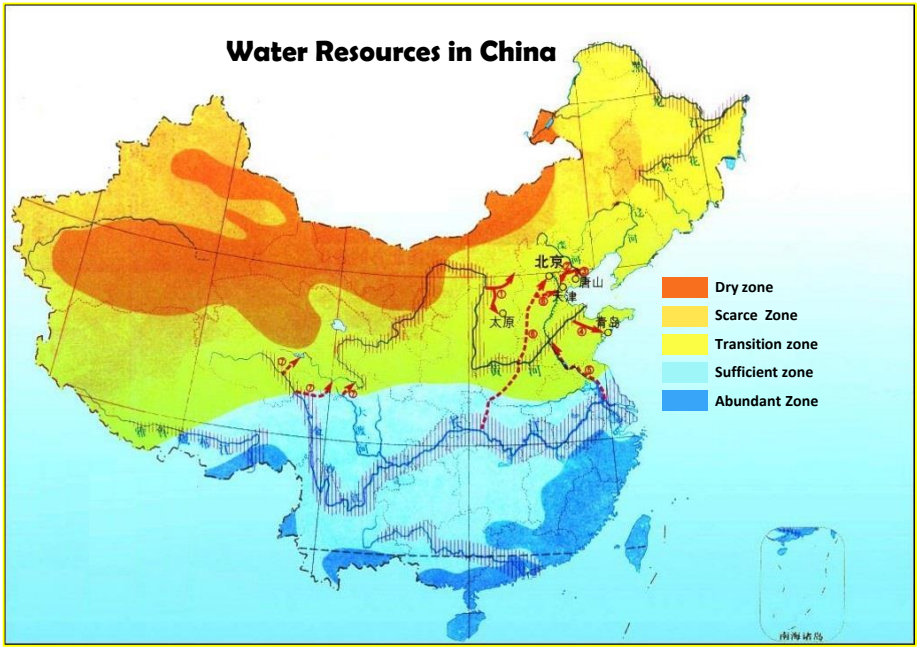


Per capita water availability in different countries

ii. Uneven temporal and spatial distribution of water resources

- 60-80% of precipitation and river runoff is concentrated in the flood season.
- Precipitation amounts decline dramatically from southeast to northwest.



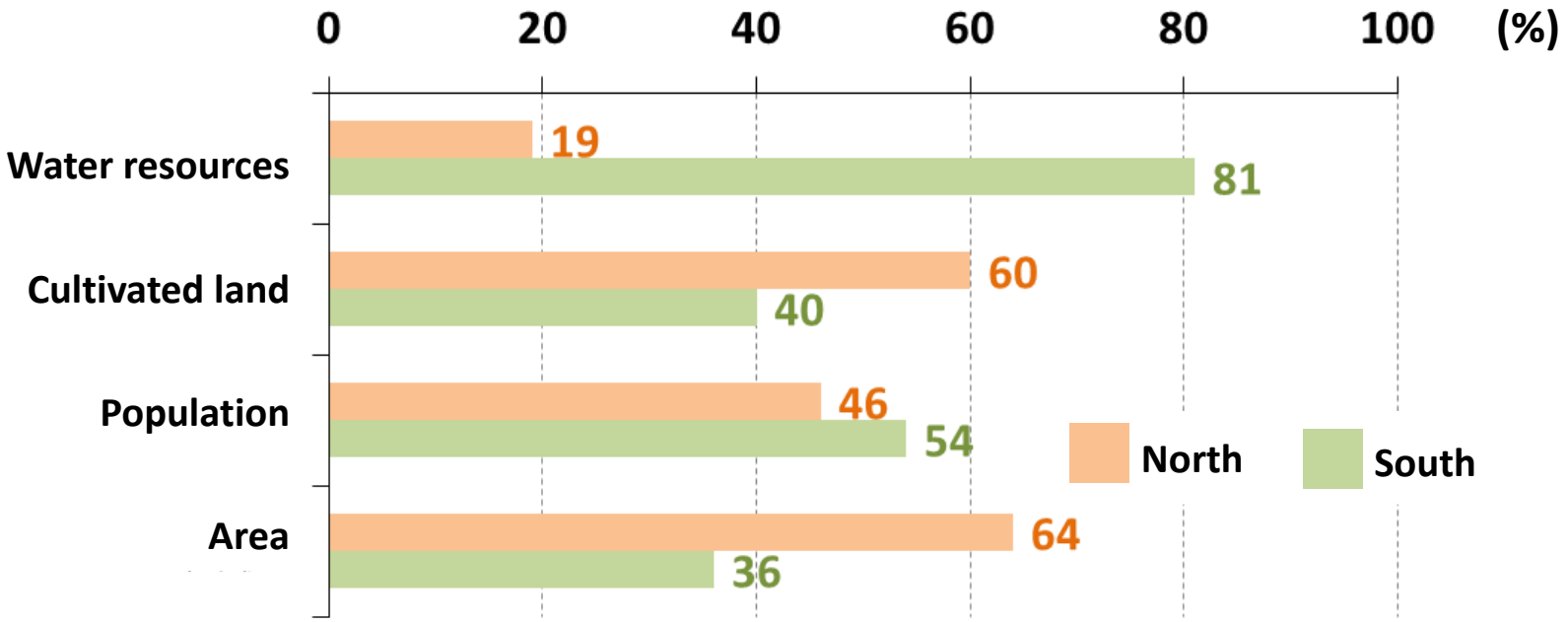


Distribution of water resources in China

iii. Mismatch between water availability and sites of economic productivity

More cultivated land and less water resources in northern areas .

Less cultivated land and more water resources in southern areas



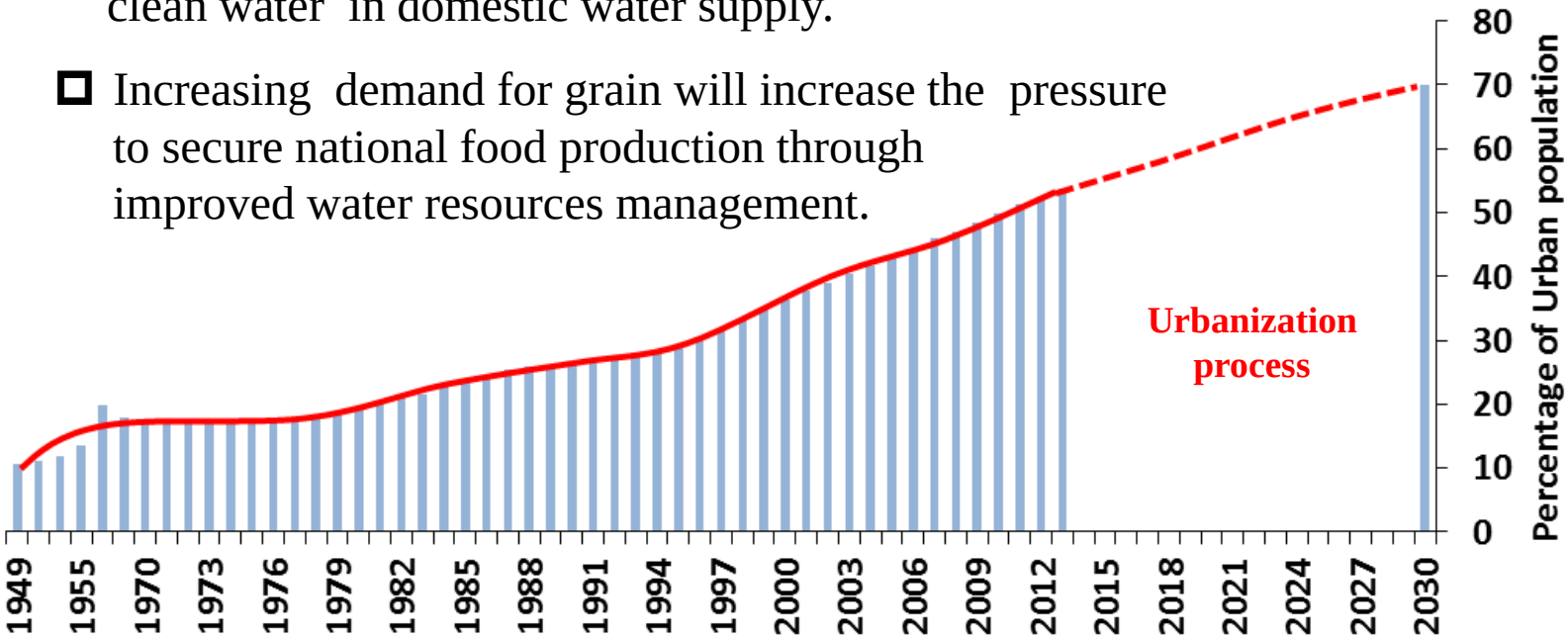
iv. Increasing water shortage puts huge pressure on water supply security

Since 1997, national water consumption has been slowly increasing.

In 2013 it was 618.35 billion m^3

This is close to the control target by 2015: 635 billion m^3.

- Rapid urbanization will result in 70% of China's population being urban by 2030, and there will be more demand for consumption of clean water in domestic water supply.
- Increasing demand for grain will increase the pressure to secure national food production through improved water resources management.



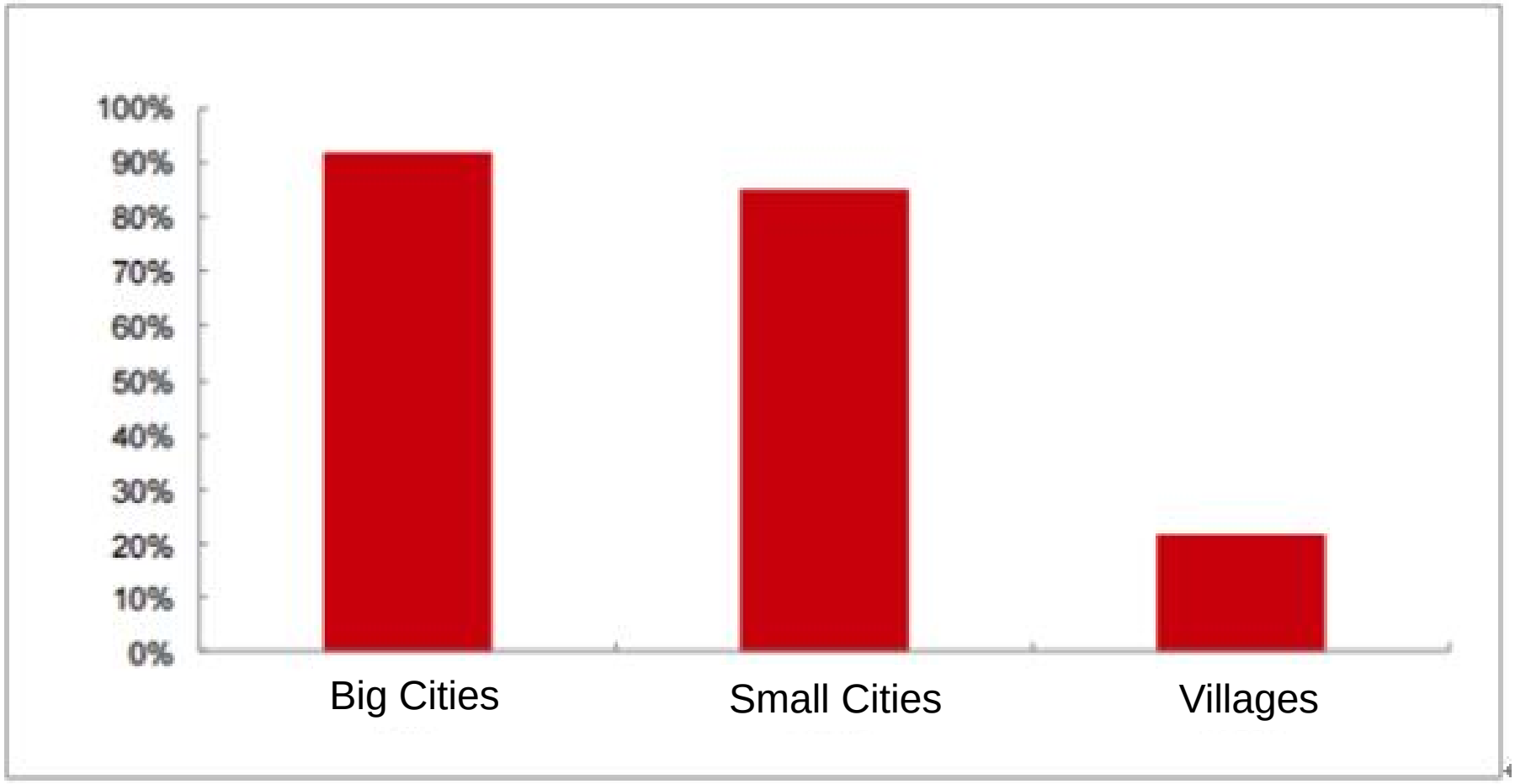
The Third Big Issue

3. Serious Water Pollution Treatment Challenges

Sub Issues

i. A high risk exists of groundwater pollution

ii. Waste Water Treatment Capacity is limited in small towns and villages



The waste water treatment rate was only 22% in 2015

The Fourth Big Issue

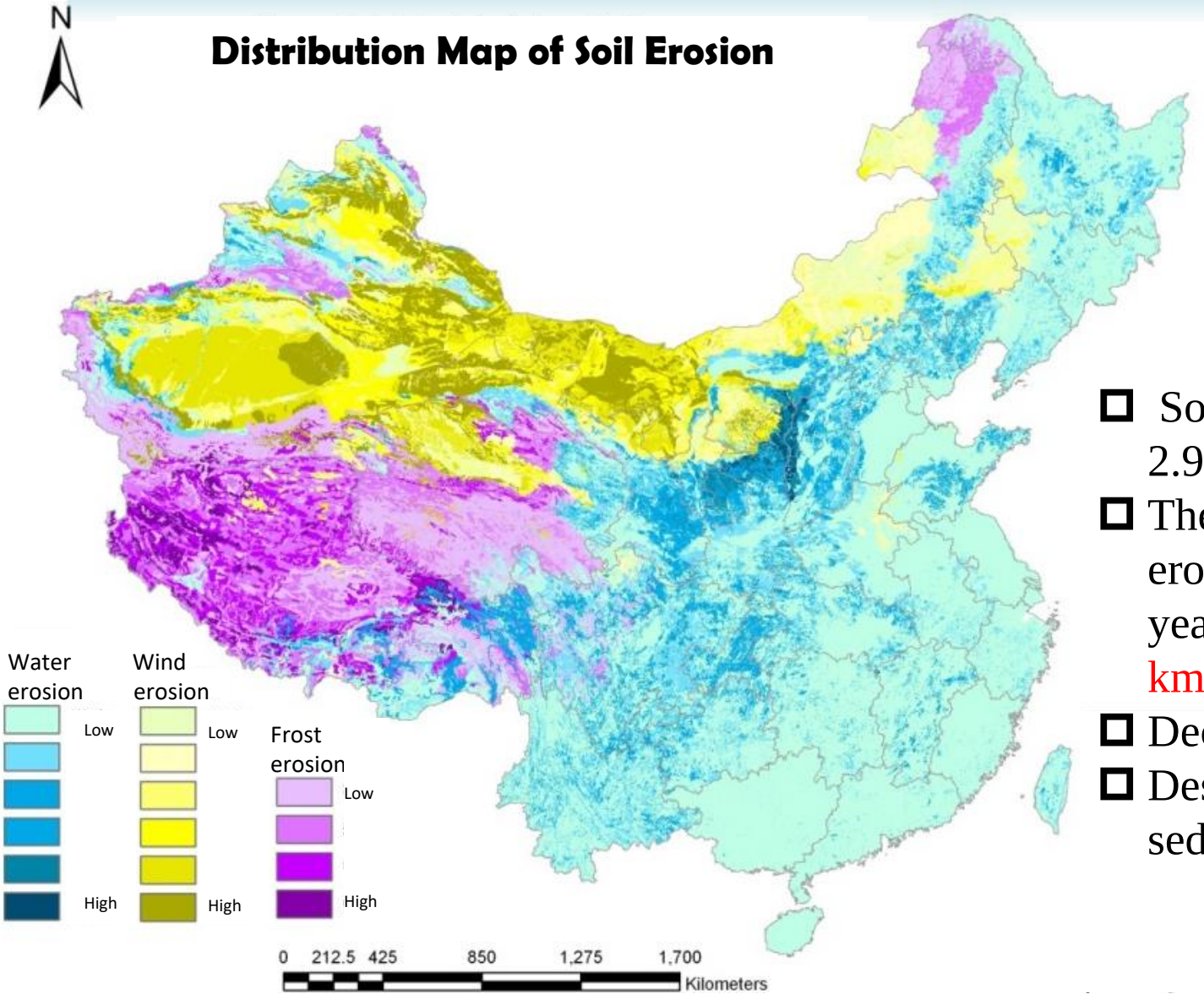
4. Severe Damage to Aquatic Ecology

Sub Issues

i. Serious soil erosion damages aquatic ecology

ii. Lake and wetland areas are in decline

i. Serious soil erosion damages aquatic ecology



- Soil losses occur over 2.95 million km^2.
- The area with soil erosion increases each year by over 10,000 km^2, or 4.5 bn tons
- Declining soil fertility
- Desertification and sedimentation.

ii. Lake and wetland areas are in decline

- 200 lakes larger than 10 km^2 are shrinking
- Wetland area has declined by nearly 90,000 km^2 since 1990

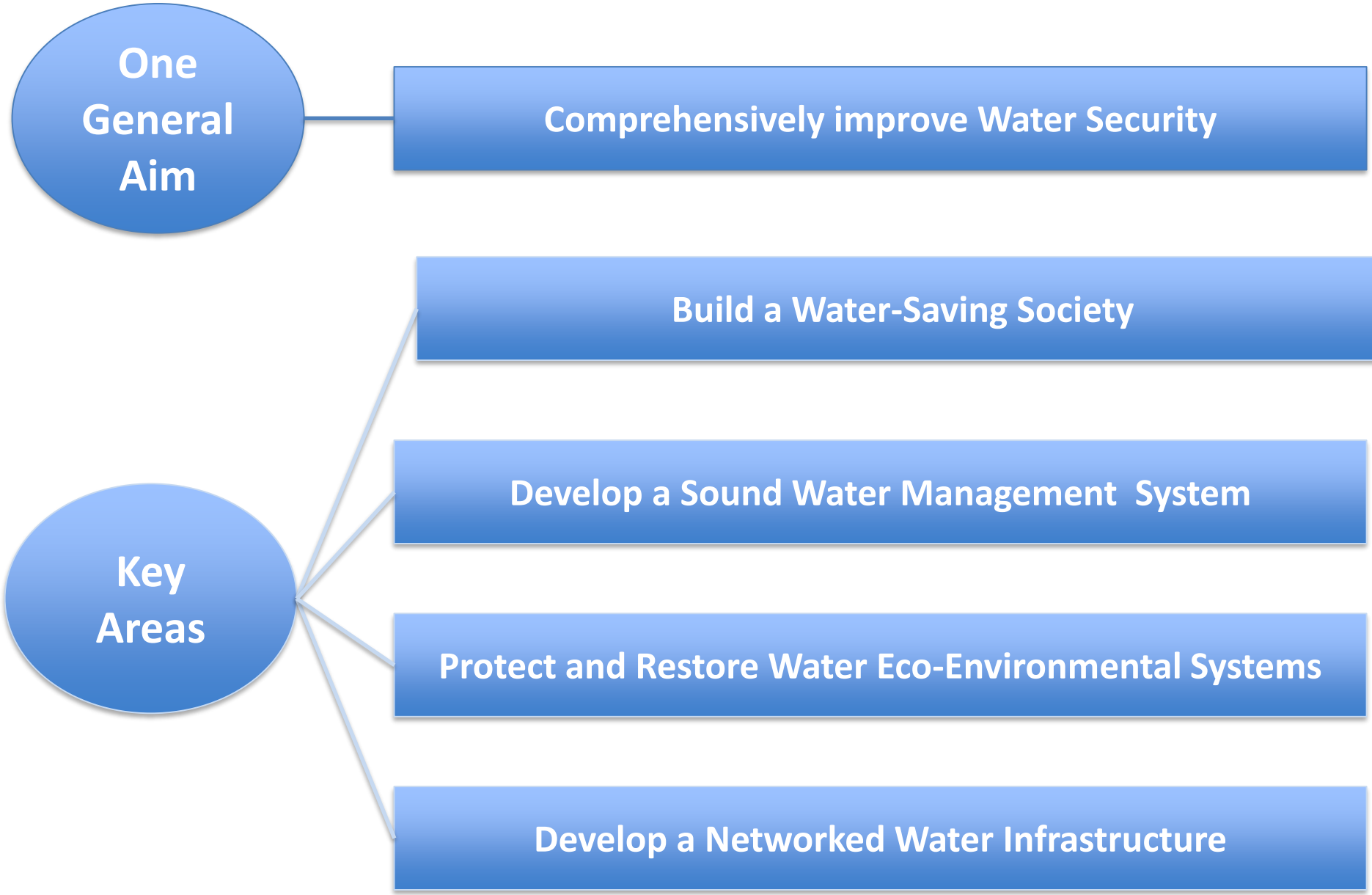
Part Ⅱ

Six key Objectives for the Future

Main Overall Thoughts

- Over-arching principles
  - **Necessity for Innovation, Coordination, Green, Open and Sharing**

- Guidance for developing the Water Sector
  - **Priority for Saving Water, Equitable Water Distribution, Integrated Governance, Combining Government Initiatives with Market Drivers**


One General Aim
Comprehensively improve Water Security
Key Areas
Build a Water-Saving Society
Develop a Sound Water Management System
Protect and Restore Water Eco-Environmental Systems
Develop a Networked Water Infrastructure

6 Main Principles

6 Main General Objectives

By 2020, build an Integrated Water Development System to support Social, Economic and Environmental Development, underpinned by National Water Security

- Build a Command-and-Control System for Flood Control and Drought Relief.
- Limit Total Annual National Water Use to 670 billion m^3.
- Improve the Volume of Water Supply to 27 billion m^3.
- Build or renovate 434 Large-Scale Farmland Irrigation Schemes.
- Ensure that 80% of National Rivers and Lakes Exceed Water Quality Standards.
- Build a complete, Integrated Water Management System

16 Main Specific Targets

Flood loss rate per year %	Drought loss rate per year %	Volume of total water use per year billion m^3	Water use per 10000 yuan GDP
• <0.6	• <0.8	• <670	• <23

Industry Water Use Decrease %	Efficiency coefficient in irrigation	Water supply ability billion m^3	Rural tap water penetration rate %
• 20	• 0.55	• 27	• 80

16 Main Specific Targets

water concentration supply for rural pop %	Additional efficient farm irrigation (10000mu)	Addiotional water-saving on irrigated farmland (10000 mu)	Additional Small (1000 Kw.h) Hydro-power schemes
• 85	• 3000	• 10000	• 500

New area for soil and water conservation (10000 km^2)	Irrigation water use metrical rate %	City and Industry water use metering rate %	Water quality reaching standard rate %
• 27	• 70	• 85	• 80

Part III

Four Main Water Innovation Priorities

Main Innovation Priority Areas

1. Prioritizing water conservation, and building a comprehensive water-saving society
2. Flood Control & Disaster Mitigation
3. Water Supply Guarantee System
4. Protection and Restoration of Aquatic Ecology

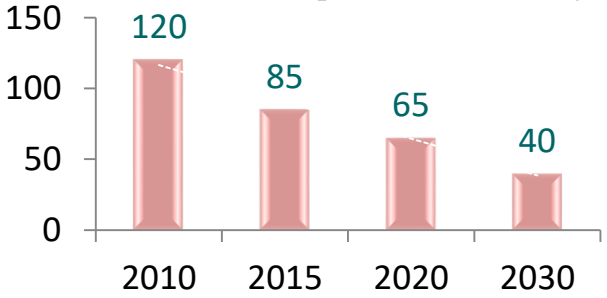
1. Prioritizing water conservation, and building a comprehensive water-saving society

water use quantity control

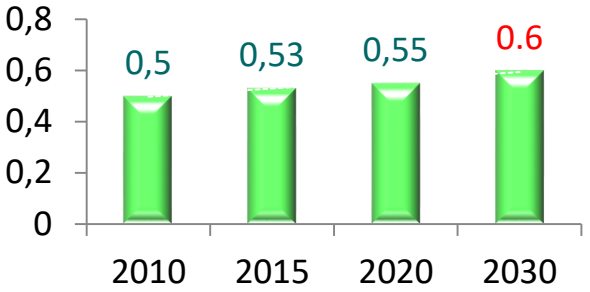
water use efficiency control

water function zone Pollution load control

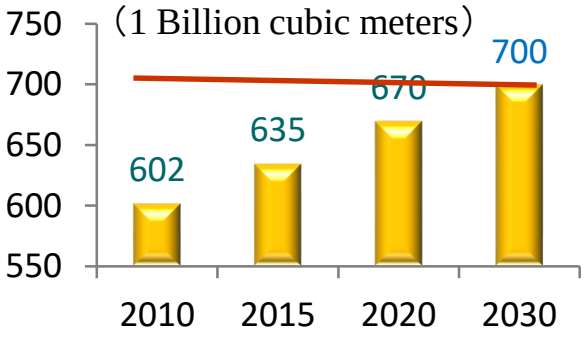
Water consumption of industry value-added per ten thousand yuan



Effective utilization of farmland irrigation water

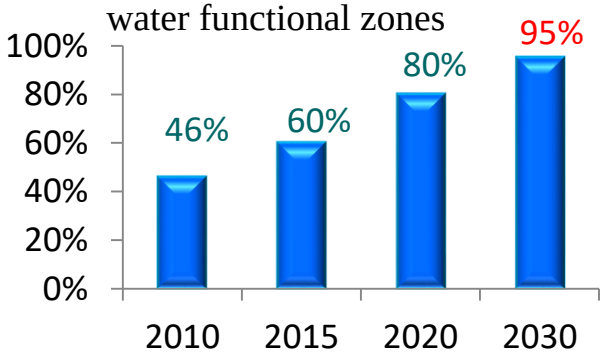


Water consumption （1 Billion cubic meters）



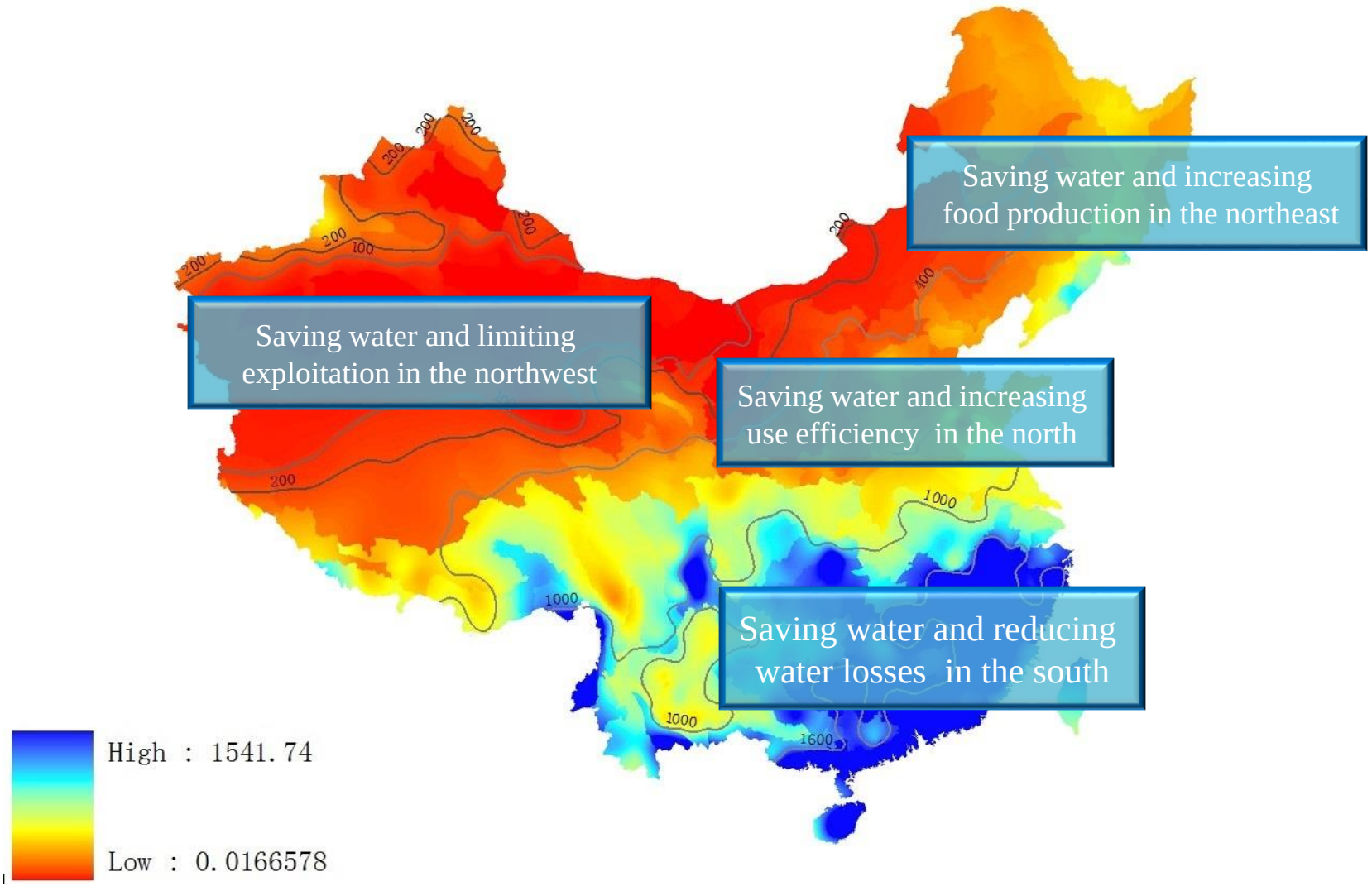
Four Key systems

Qualification rate of water functional zones

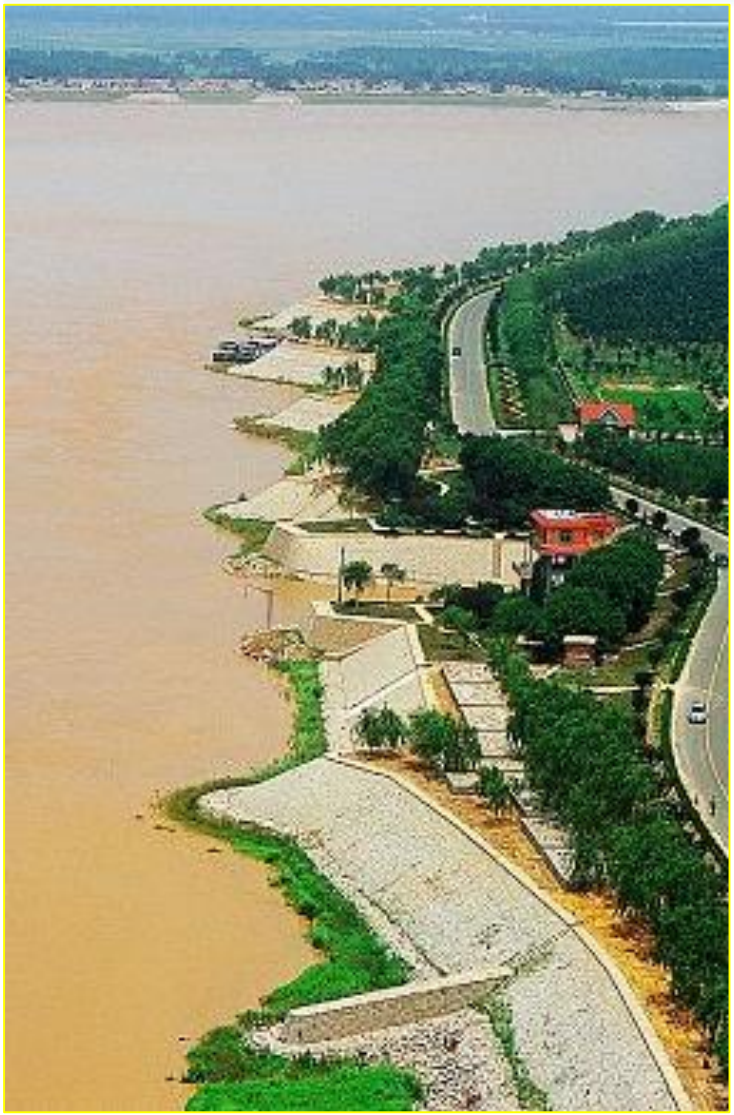


- **Total water quantity control system**
- **Efficiency control system**
- **Pollution discharge control system**
- **Responsibility and appraisal system**

➢Major agricultural water-saving projects



2. Flood Control & Disaster Mitigation



Structural measures

- New river embankment technology - more Environmentally-sound and Socially-acceptable
- Building “Sponge Cities”

Non-structural measures

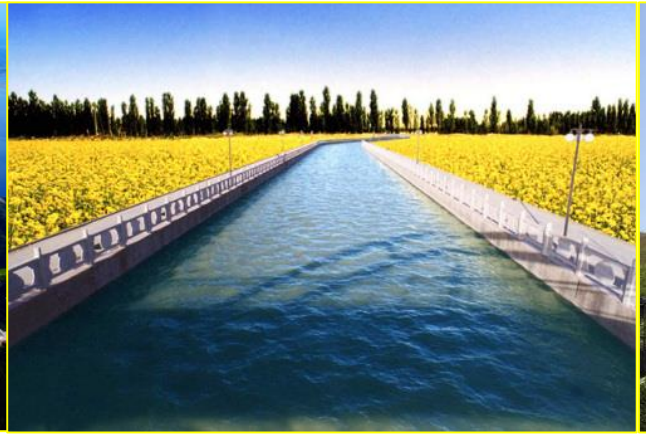
- Early warning system, decision support system.
- Emergency plan system for prevention and control of water disasters.
- Flood and Drought Disaster Risk Management.

3. Water Supply Guarantee System

(i) Networked connection of rivers, lakes and reservoirs

(ii) Irrigation for Food Security

(iii) Drinking Water Safety



(i) Networked connection of rivers, lakes and reservoirs

- **At the national level, to improve overall water allocation**

(i) Networked connection of rivers, lakes and reservoirs

- **At the regional level, to enhance the capacity of regional water resources regulation**

Rivers and Lakes interconnection project in Jilin province

Six Lakes interconnection project in Hanyang

(i) Networked connection of rivers, lakes and reservoirs

- **At the project level, to improve the level of the full scientific scheduling.**

To give full play to the comprehensive functions of economic development, flood control, water supply, river and lake management, water resource allocation, and restoration of the water ecological environment in connection projects designed to improve sustainable water utilization and its role for supporting sustainable development.

(ii) Irrigation for Food Security

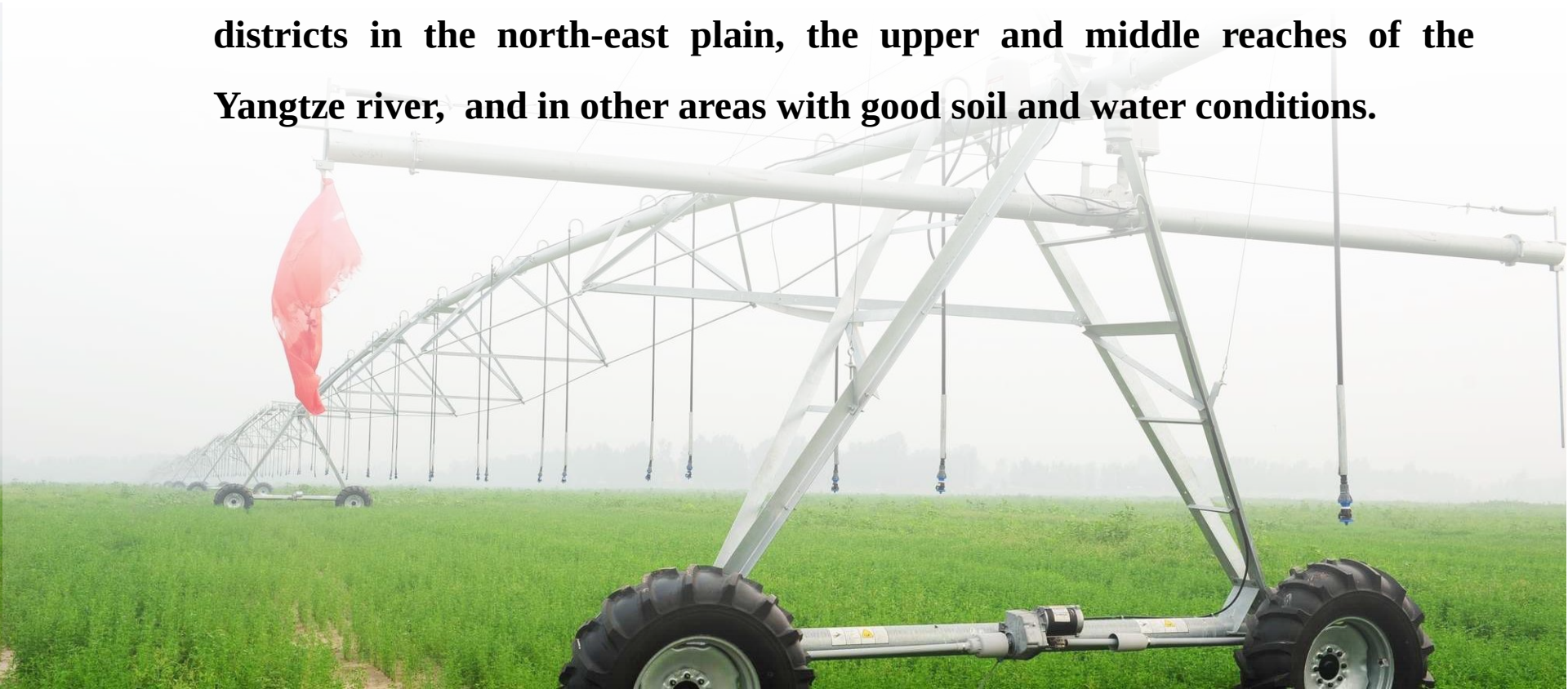
- **Effective, economic and sustainable irrigation techniques.**
- **Safe grey and waste water reuse and recycling techniques**

- **Irrigation water meters and supervision systems**

(ii) Irrigation for Food Security

➢Major irrigation areas

To construct a series of new water-saving, ecologically-friendly irrigation districts in the north-east plain, the upper and middle reaches of the Yangtze river, and in other areas with good soil and water conditions.



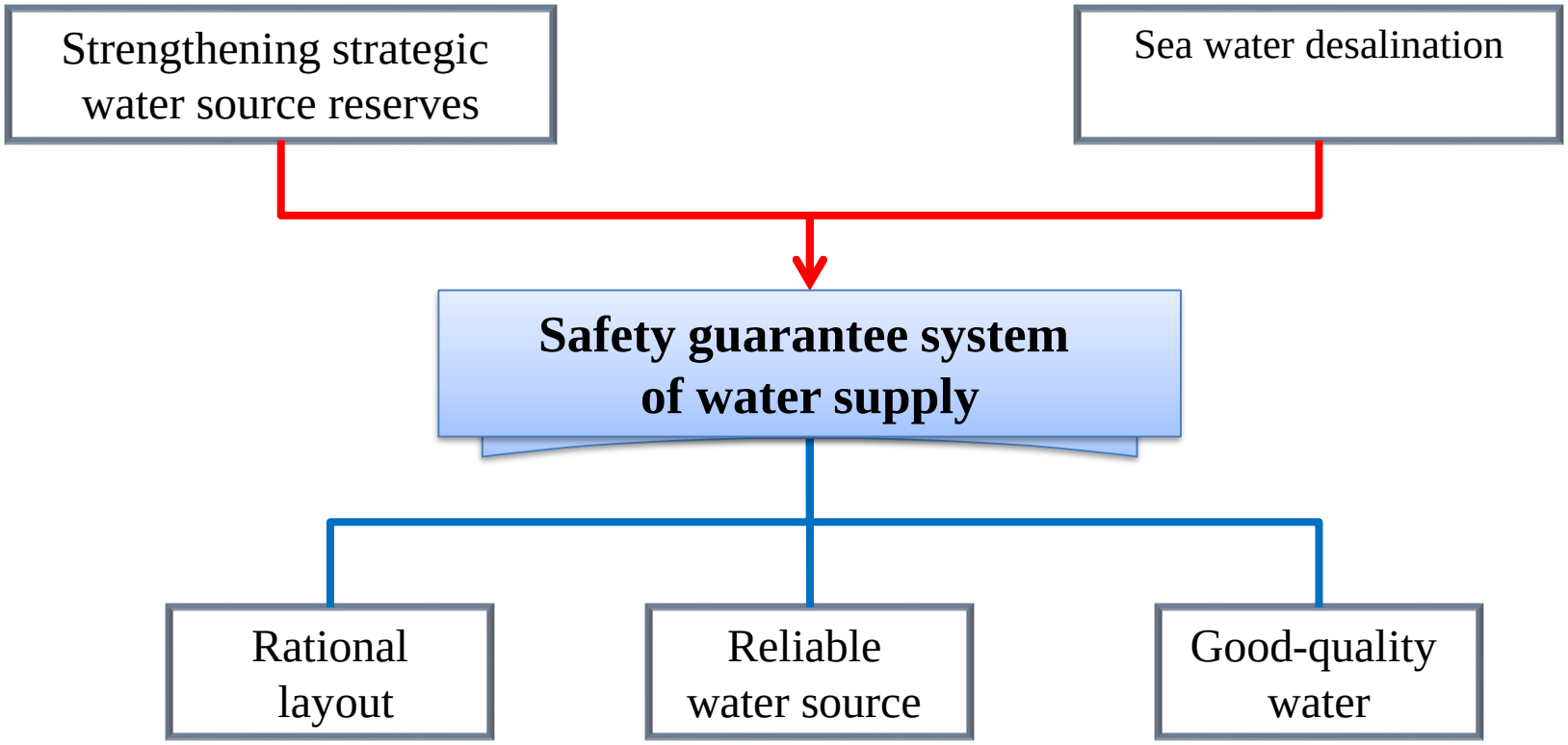
(iii) Drinking Water Safety

Rural Drinking Water Safety

- Rapid detection instruments for drinking water quality
- Centralized water supply infrastructure
- Anti-leak taps and other domestic water-saving equipment
- Improved drinking water supply in rural mountain areas
- Safe, efficient and economic drinking water treatment techniques
- Portable, small-scale drinking water treatment equipment

(iii) Drinking Water Safety

Water Source Protection



4. Water Ecological Protection and Restoration

- Comprehensive protection techniques
- Biological and ecological monitoring and assessment.
- Urban green and blue corridors

Strengthening ecological restoration, promoting water ecological progress

groundwater protection	define “exploitation-free areas” and “limited exploitation areas” for groundwater, to achieve a dynamic balance of groundwater resources
management of water environment	promote “sponge homes” and “sponge cities”; promote the development and conservation of “natural landscapes”.
water conservation	strengthen the protection of ecologically fragile areas, water conservation areas, and river source areas
protection of lakes and rivers	protect lakes and rivers for ecological purposes, promote the rehabilitation of lakes and rivers

Part IV

Two Main Water Management Reforms

Overall Aims of Reform

To solve China's complex water issues needs **both**
(i)Technological and Engineering measures (Hard Measures) and also
(ii) Reform of Policies, Institutions and Management (Soft Measures).
An additional core reform lies in learning how to handle the relationship between Government and Society.

- **Reinforcing Water Scientific and Technological Innovation**
- **Deepening water management practices; Institutional reform**
  - **Take full advantage of the power of Society**
  - **Improve the performance of Government**

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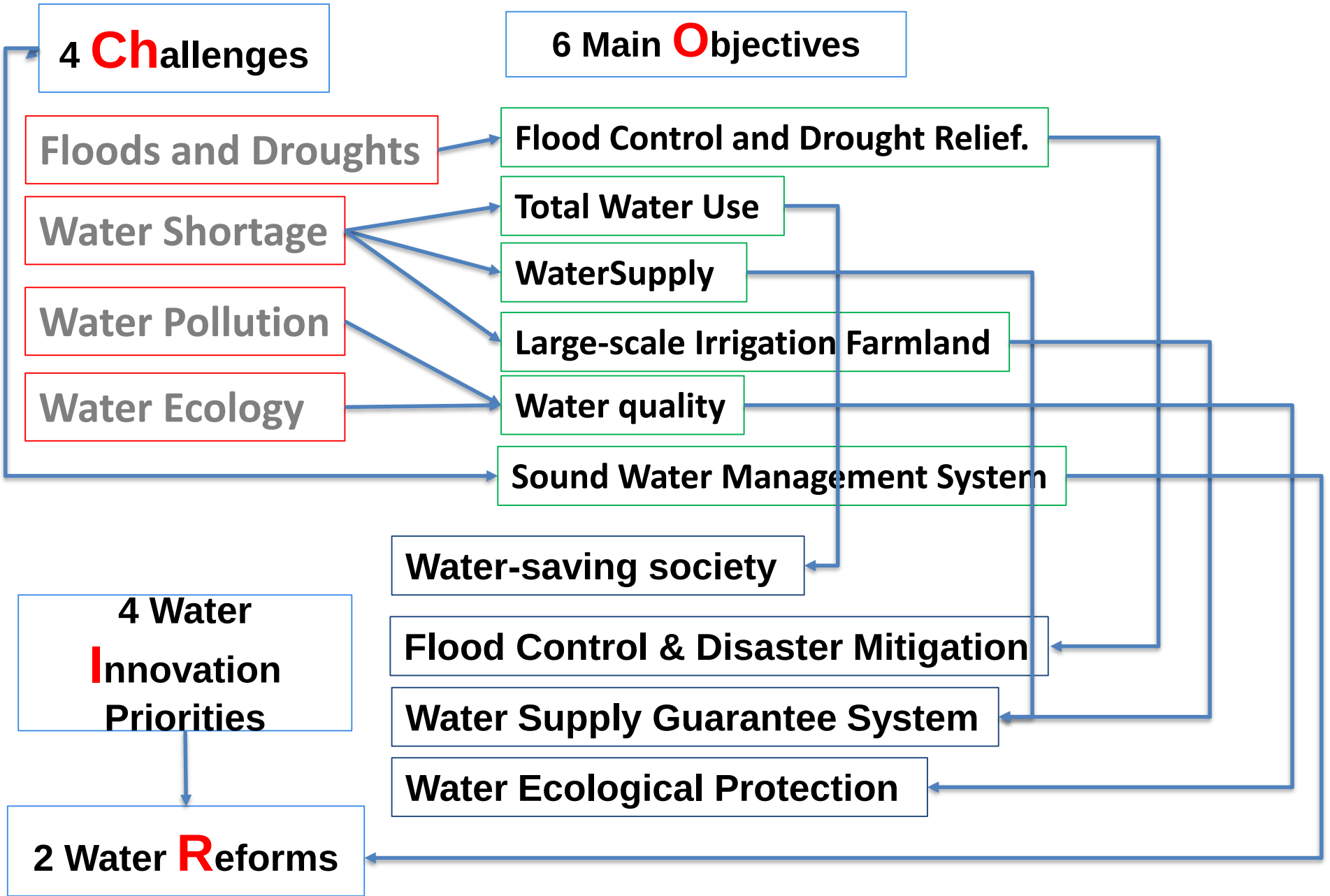


Thank For Your Attention!