Scientific Support for Sustainable Water Resources Management in China

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OUTLINE

- Emerging Changes of Water Resources
- Rational from Science to Proper Policy
- Major Works Bridging Science and Policy

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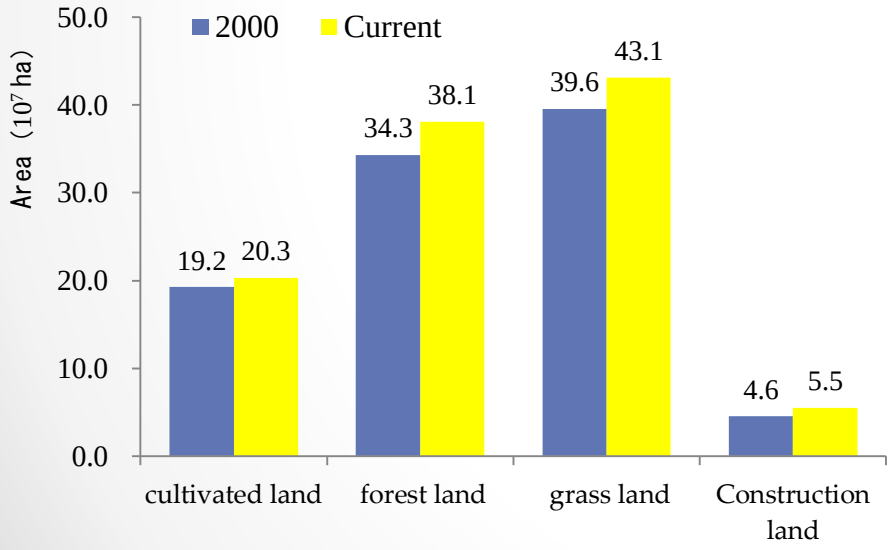
Emerging Changes of Water Resources

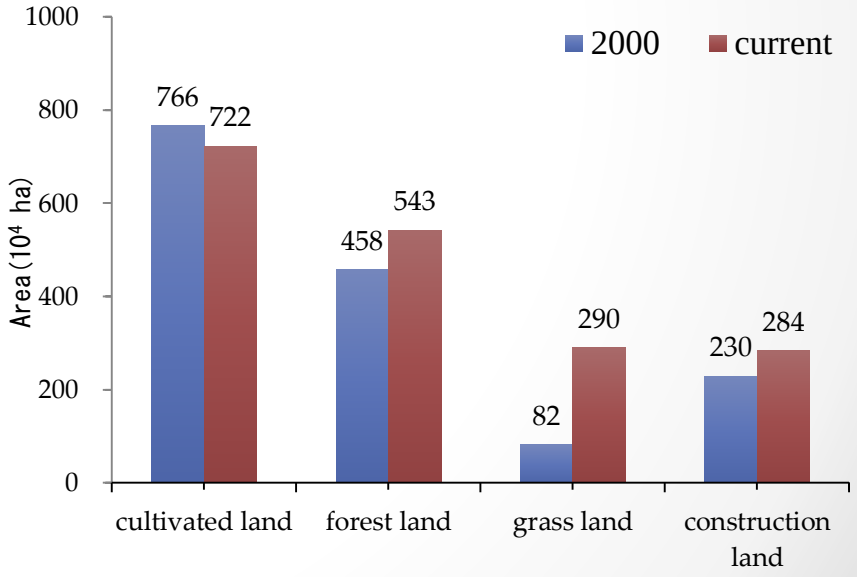
- Climate change and human activities impacts
- Increased load on natural resources & environment
- Change of eco-system' s structure and function
- Increasing of potential water related risks

❖ Climate change and human activities impacts

With rapid development of economy, urbanization and large-scale afforestation, the cultivated land, forestland and urban land have all increased significantly.



The Nationwide



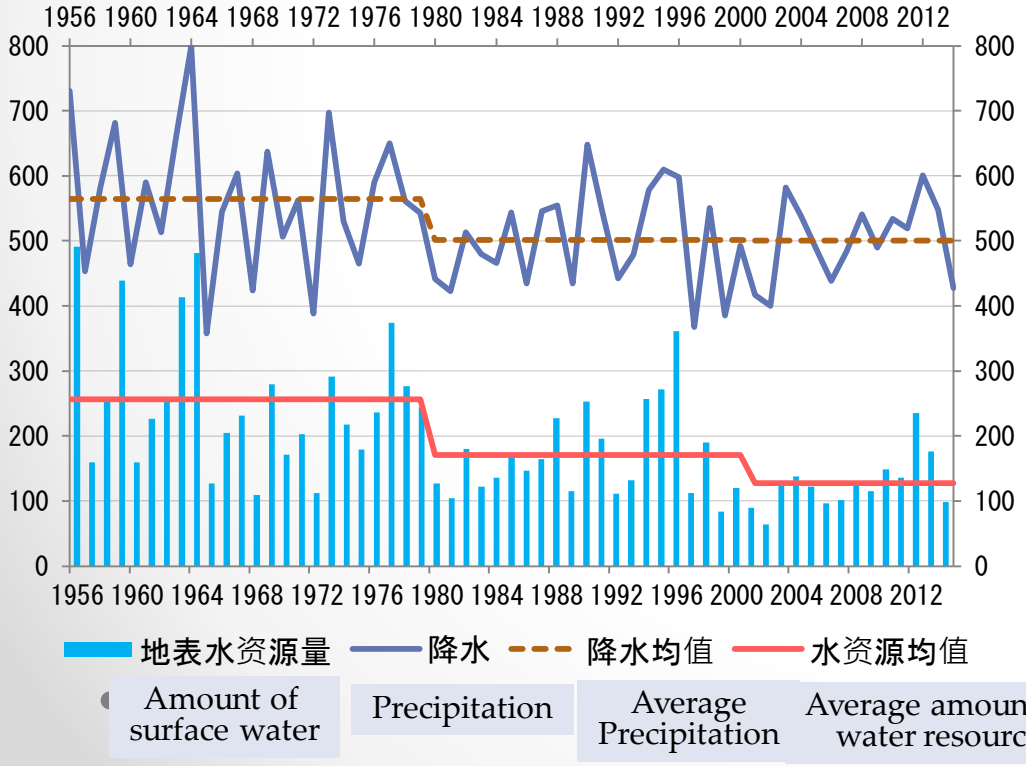
Beijing-Tianjing-Hebei Region

❖ Climate change and human activities impacts

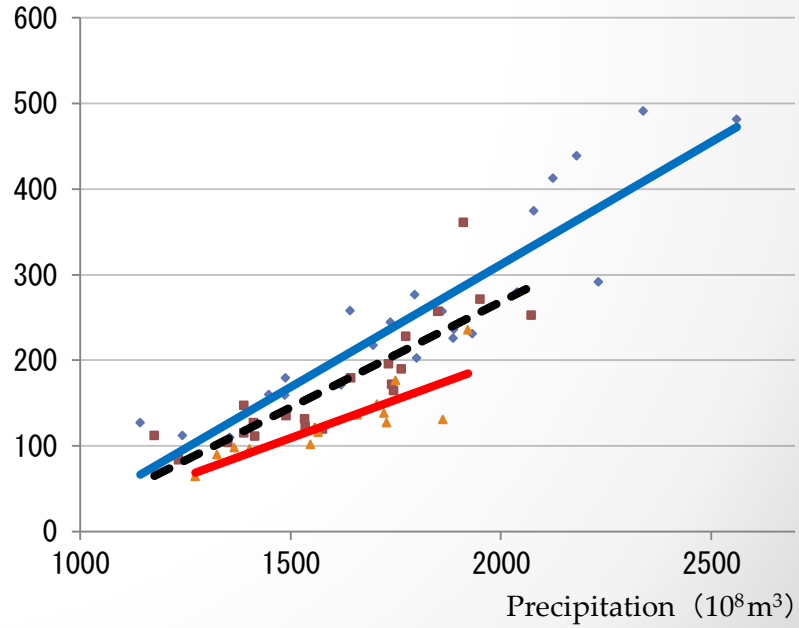
Impacted by the landscape change, the mechanism of runoff generation and assembling in many areas has been changed.

The Haihe river basin: the average annual rainfall in 2001-2014 was same as it was in 1980-2000, but the surface runoff was down by about 25%.

Rainfall - runoff graph

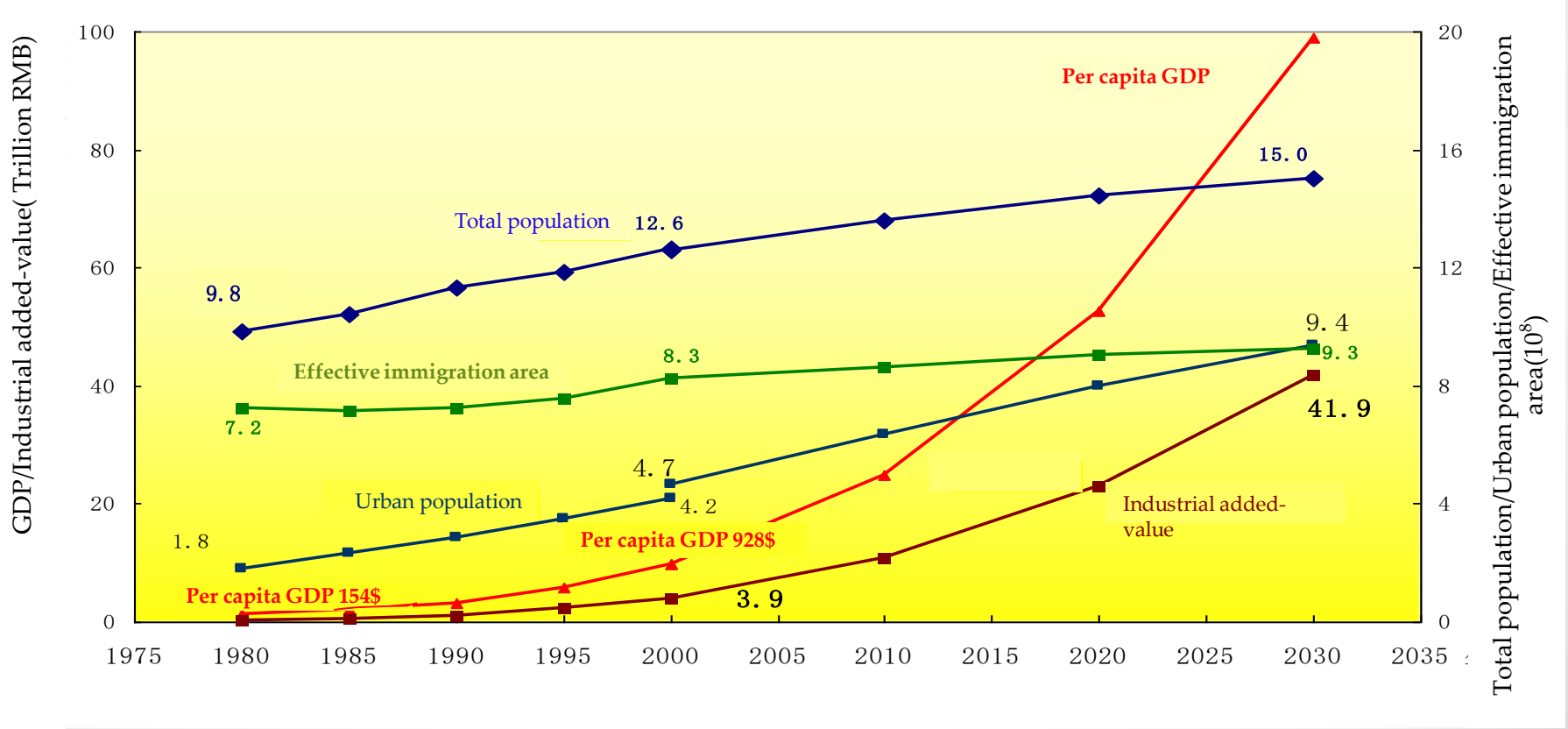


Linear relation of Rainfall- and runoff



❖ Increase load on natural resources and environment

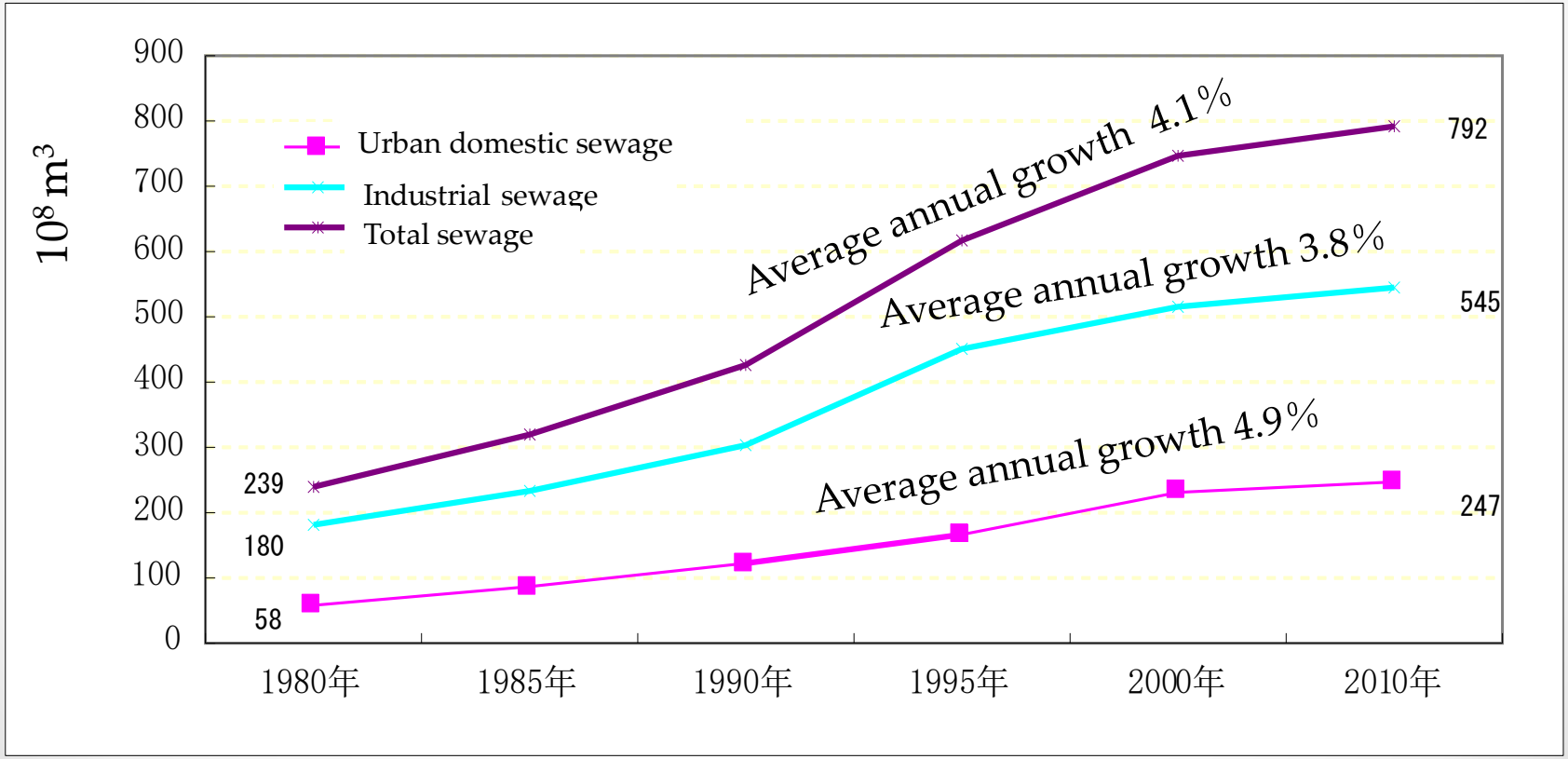
With the continuous growth of population and economy, water ecological space has been compressed.



Growth of population and economy

❖ Increase load on natural resources and environment

With economic development, load on water and environment are also significant increasing.



Change of sewage discharge

❖ Change of eco-system' s structure and function

➢ Shrinkage of aquatic eco-space

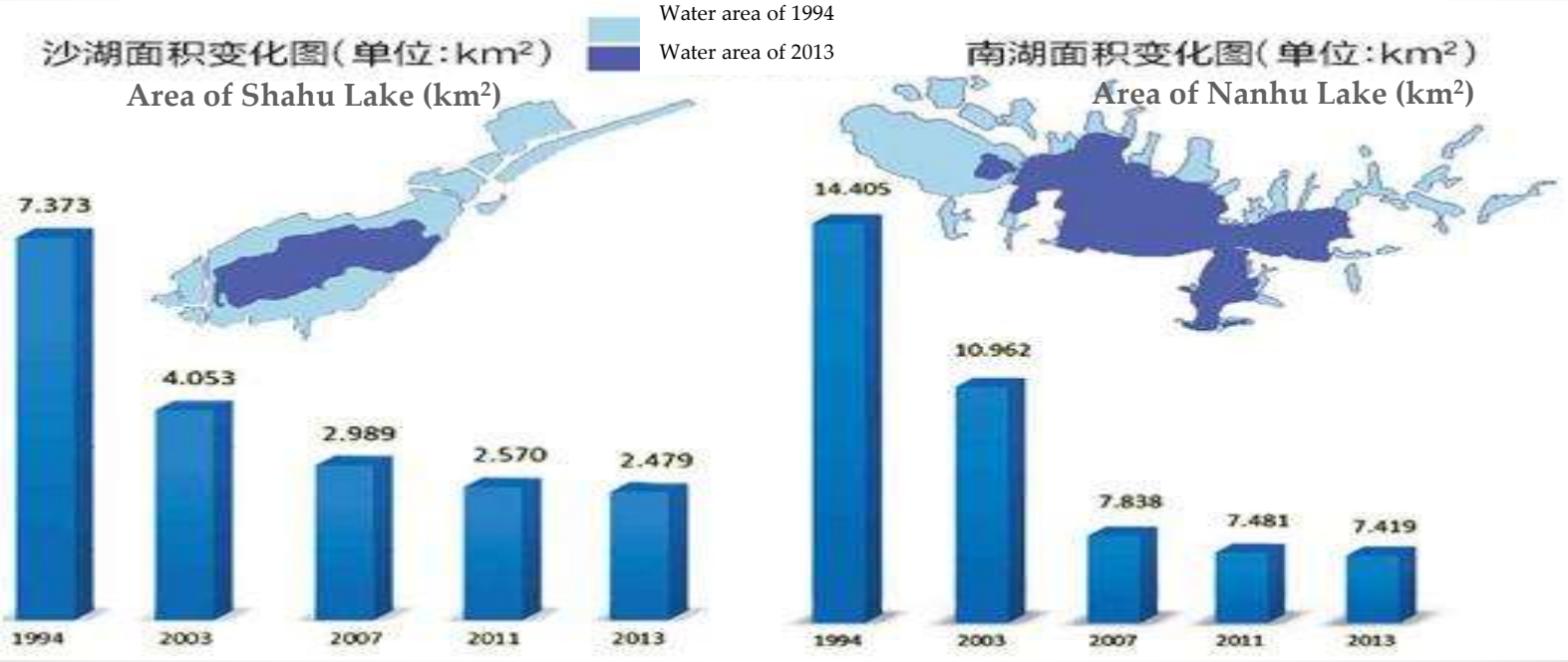
Urbanization & industrialization, farmland development cause the shrinkage of aquatic eco-space.

Since the 1950s more than 240 lakes with water area greater than 1 km2 have significantly shrunk. The total shrinking area has been estimated to be around 14,000 km^2. Lake water storage capacity has also been reduced by 51.6 billion m^3.

❖ Change of eco-system' s structure and function

➢ Shrinkage of aquatic eco-space

The number of natural lakes with areas of more than 6.67 hm^2 (100 mu) in the Hubei province has been reduced from 1,332 in 1960 to currently 728, a reduction of nearly 50%.

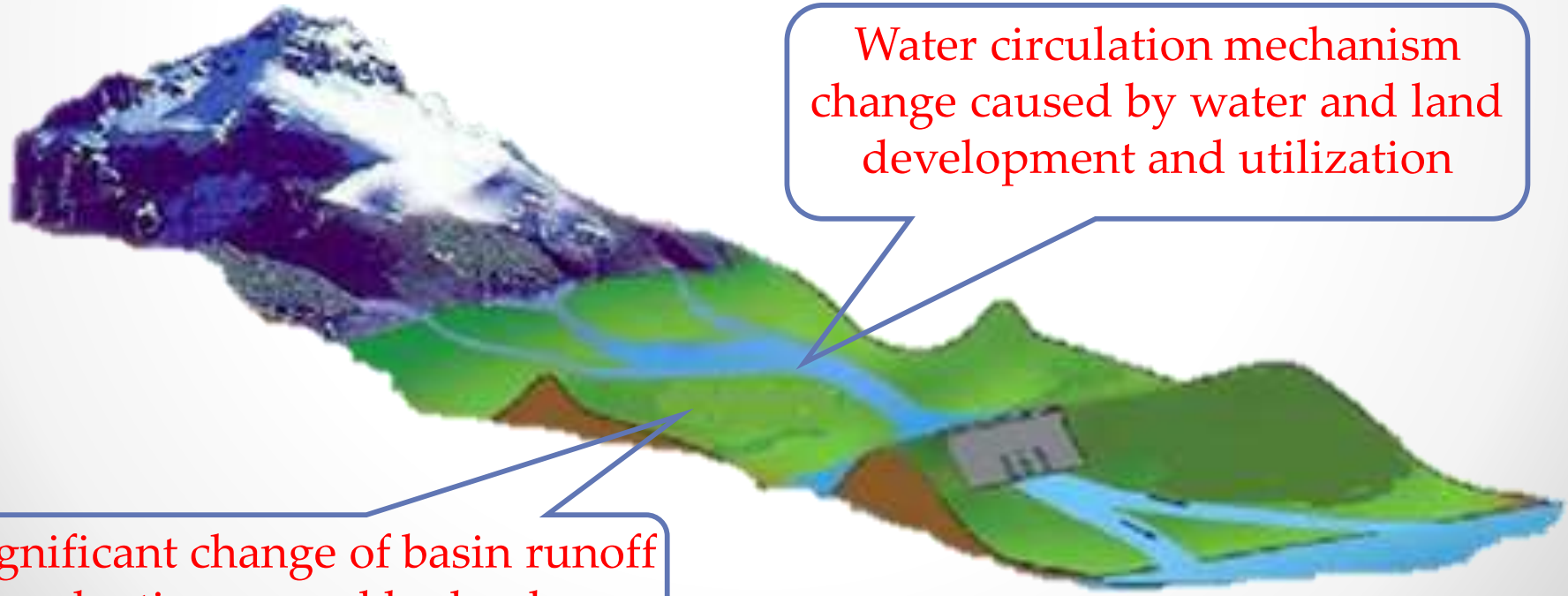


Area decrease of two lakes in Wuhan city

❖ Change of eco-system' s structure and function

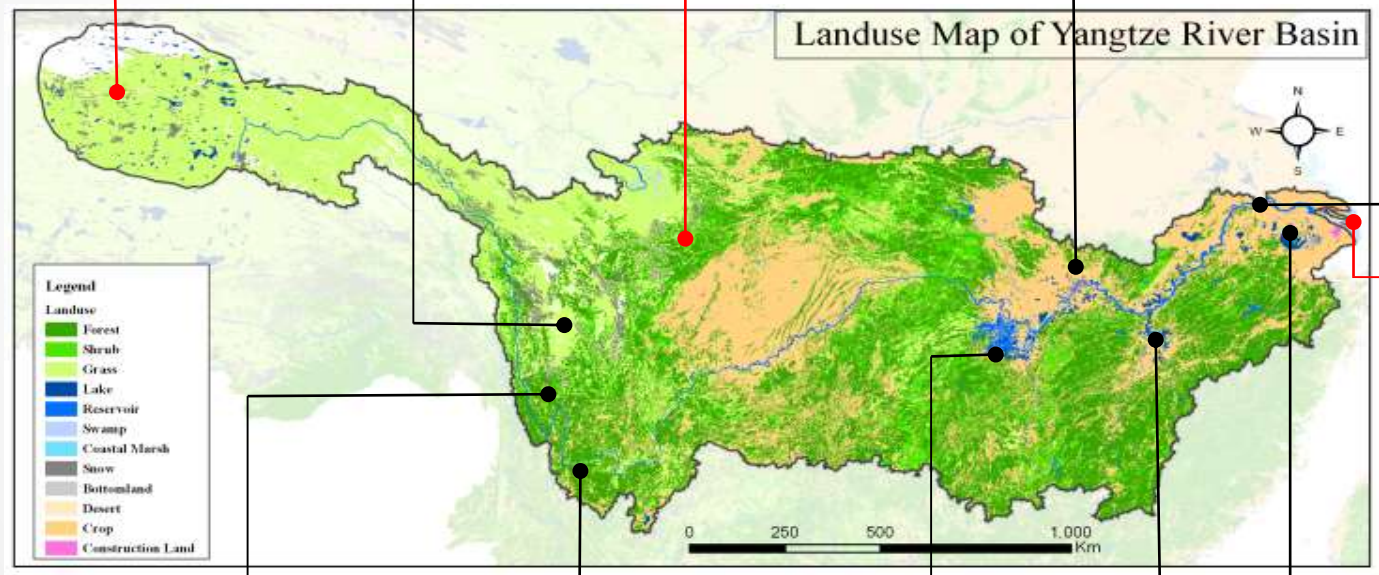
➢ **Changes of hydrological and ecological processes**

The development of water, land and mineral resources has led to the signicifient changes of water circulation mechanism and the process of water resources.



❖ Change of eco-system' s structure and function

➢ **Significant change of watershed hydrological and ecological processes and landscape patterns in Yantazge.**



Glacial melt

Tourism region

Extreme climate

Channel change

Wetland coverage

Sea-level rise

Connectivity change

Infrastructure: dams, mining industry, road

Deforestation & water and soil loss

Pollution

Reduction in biodiversity

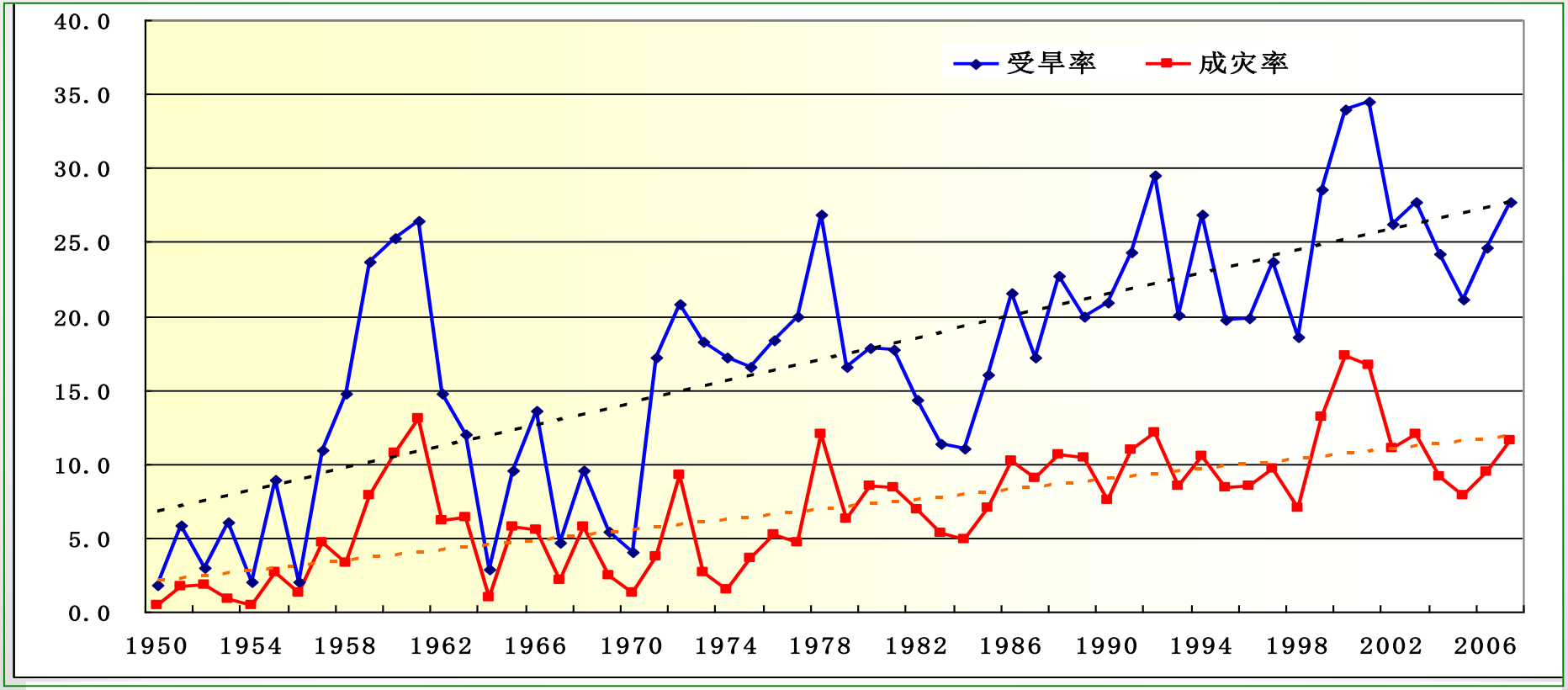
Notes

Climate change induced

Interfered by human

❖ Increasing of potential water related risks

- Drought and flushing flood impact area seems increasing and the pollution contaminated accidents are also increased



The rate of area affected by drought and the rate of area with drought disaster from 1950 to 2008

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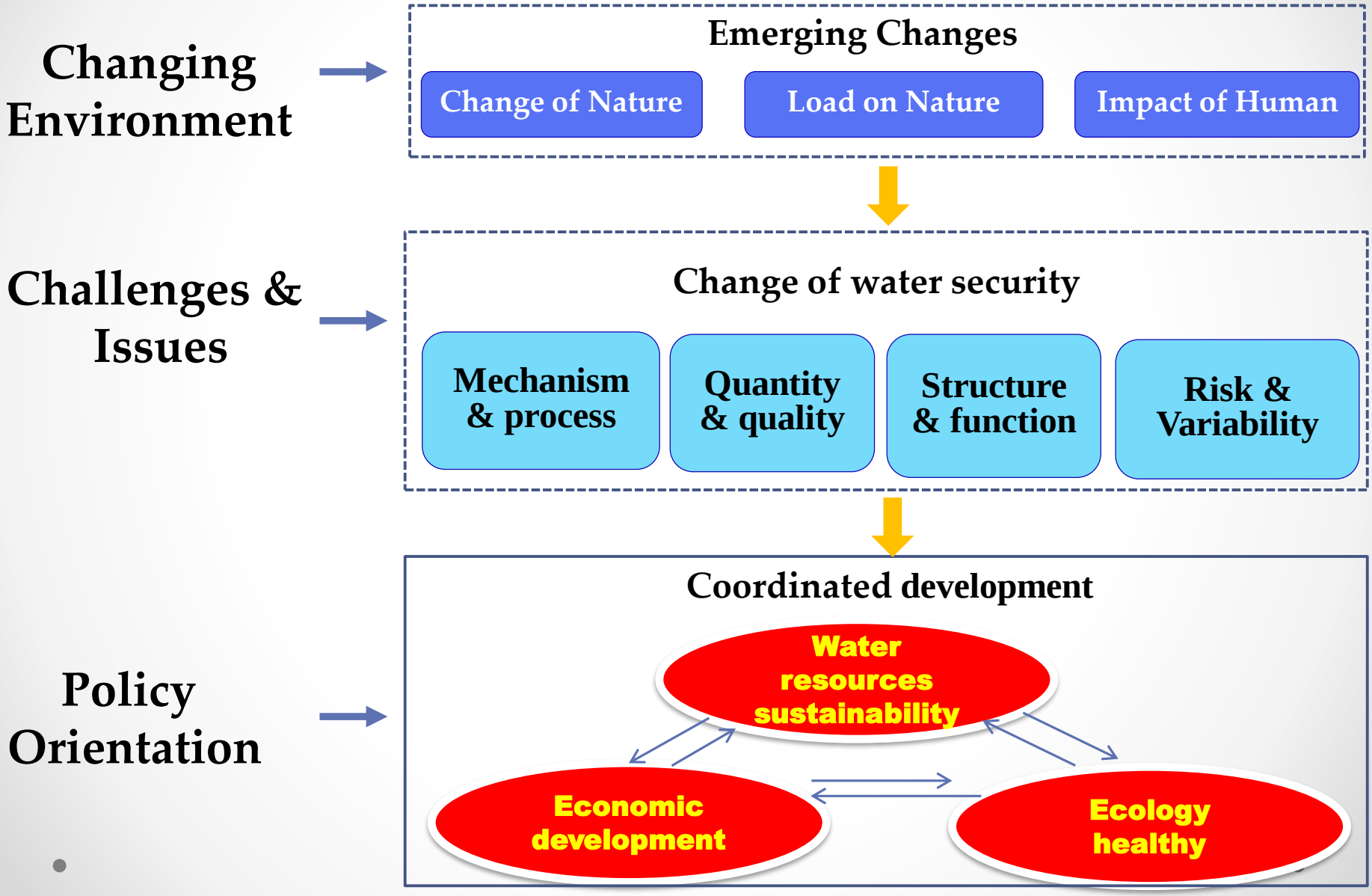
Rational from Science to Proper Policy



Rational from Science to Policy？ ？ ？ ？

Policy Orientation → **Coordinated development**

Basic Principle →

Balances

- Human and Nature
- carrying capacity and load
- Risks and Variability

Regulation focus →

Strengthening the regulation

- Nature: hydro-process & risk
- Human: demand, loads & impact
- Aquatic eco-space and function
- Hydro-process dynamic
- carrying capacity & load to nature
- Water right & water risks

Integrating Science & Policy → **Practical Polices Formulation & Implementation**

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- Emerging Changes of Water Resources
- Rational from Science to Policy
- **Major Works Bridging Science and Policy**

Major Works Bridging Science and Policy

- National Water Resources Assessment
- Balance sheet of water resources nature assets
- Evaluation on water resources carrying capacity
- Defining aquatic eco-space and redline
- River basin water allocation
- Implementing river chief system

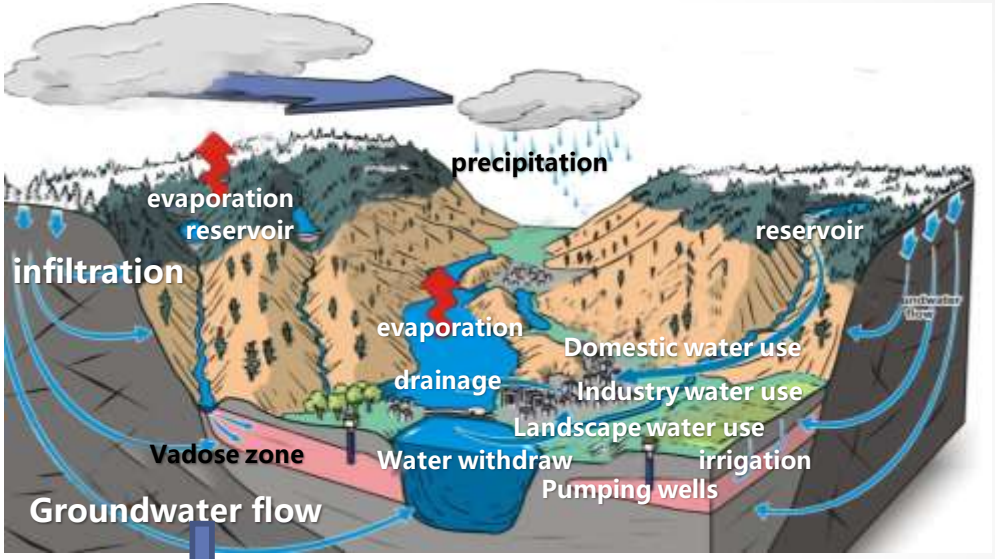
❖ National Water Resources Assessment-3rd round

Climatic change

Landscape pattern

Land utilization

Vegetation conditions

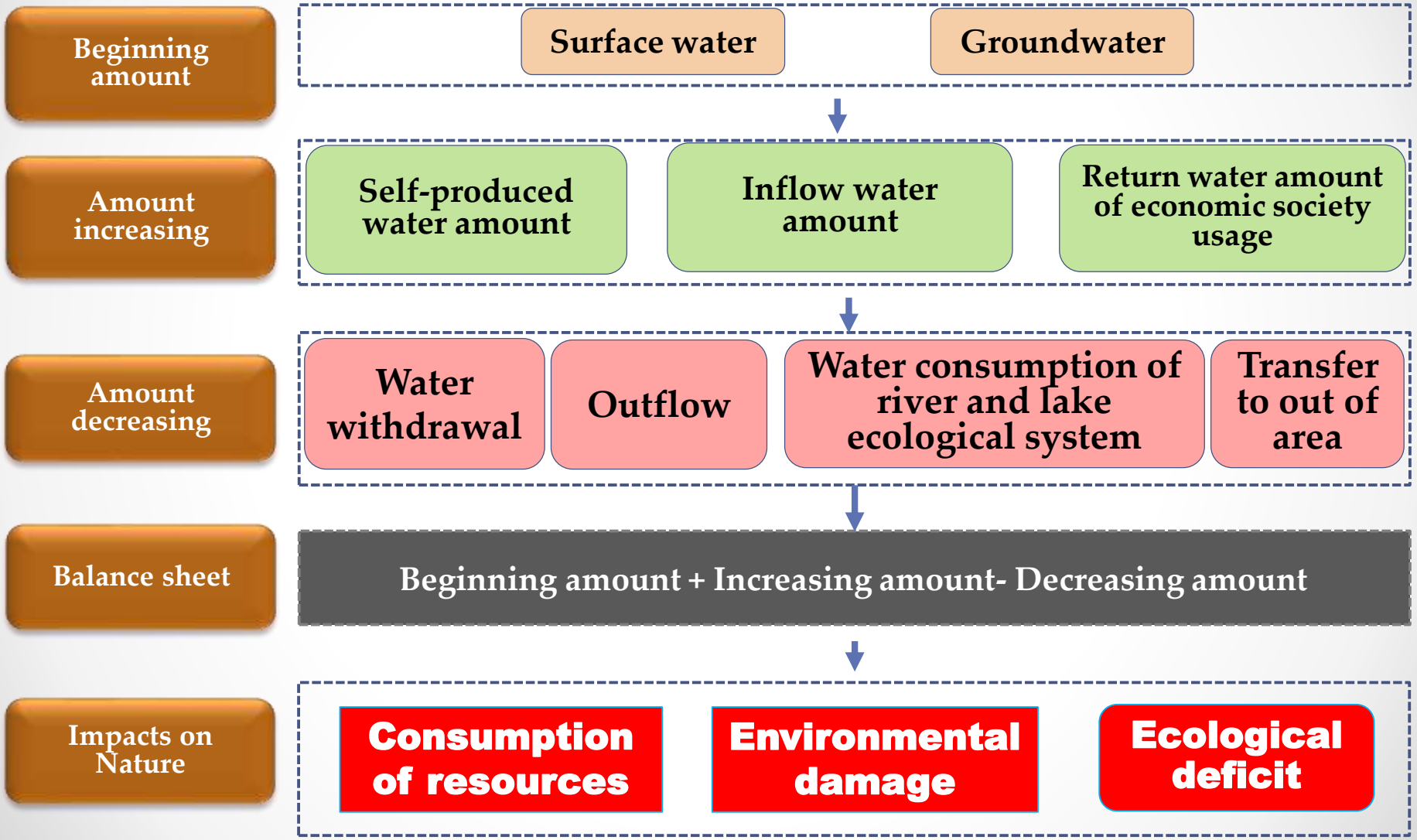


Water resources investigation and assessment

Water resources quantity	Water resources quality	Water resources developed	Water resources availability

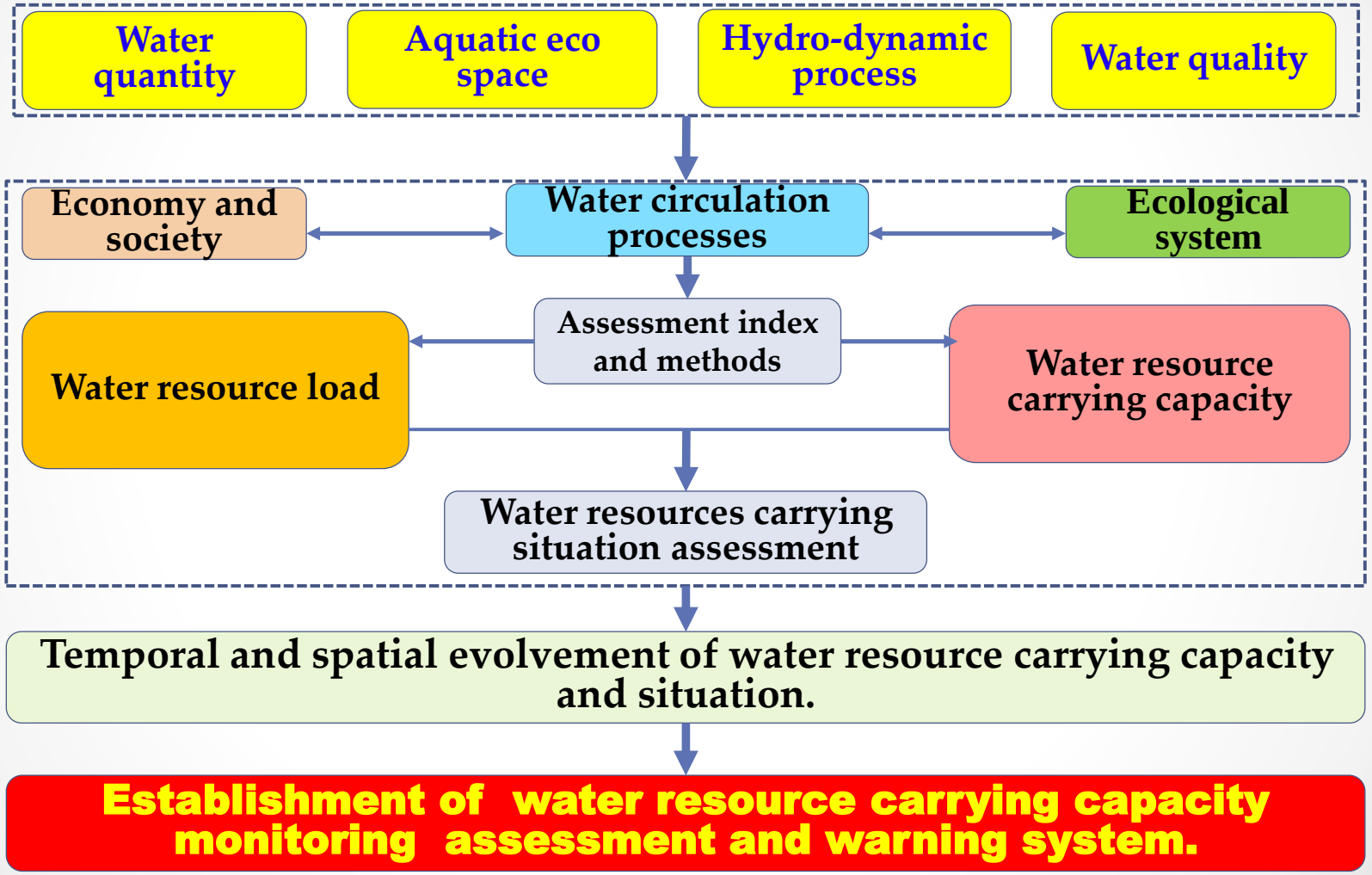
General Approach of Water Resources Investigation and Assessment

❖ Balance sheet of water resources nature assets



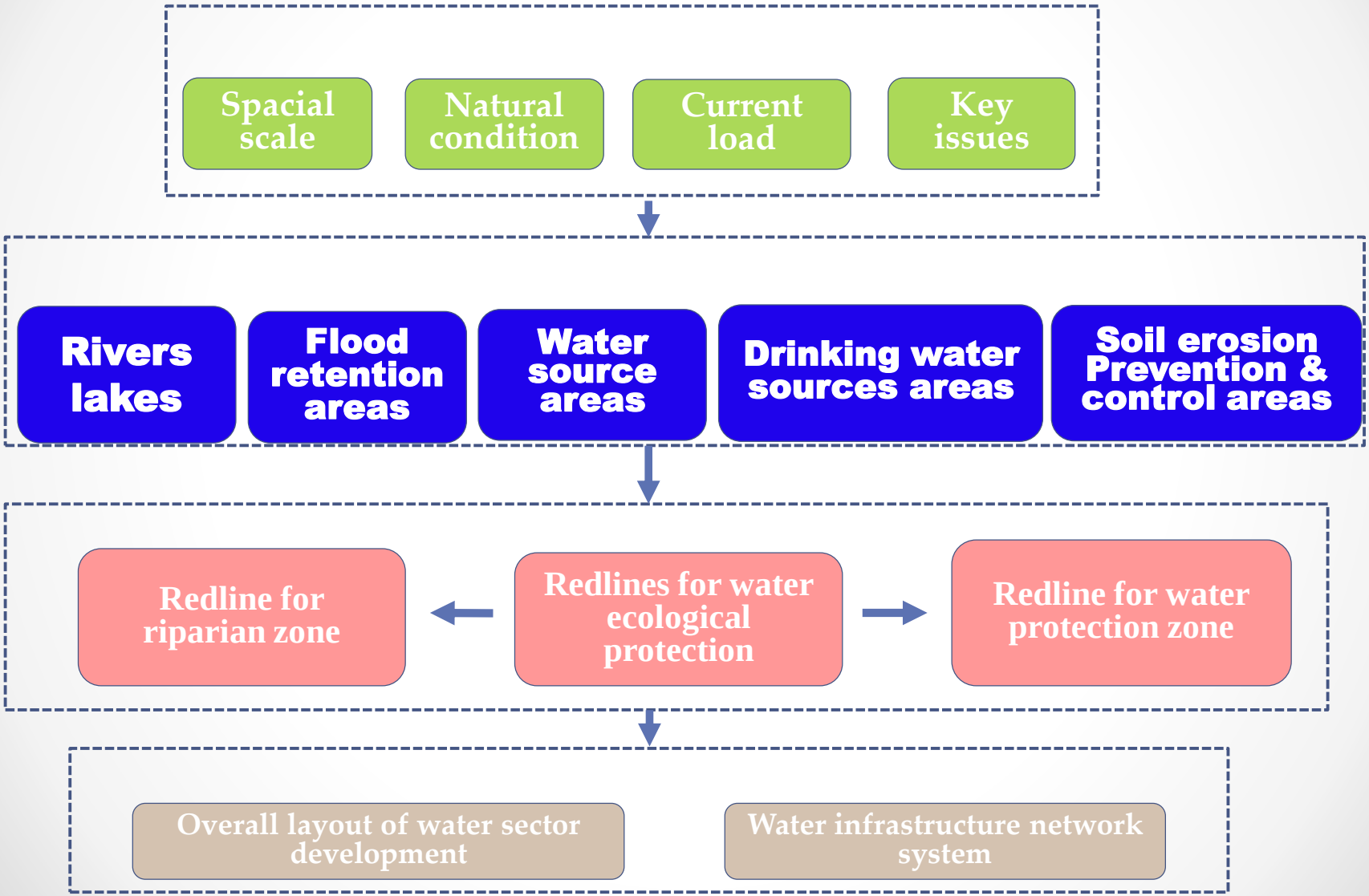
General approach of compiling balance sheet of water resources

❖ Evaluation on water resources carrying capacity



General approach of water resources carrying capacity warning system

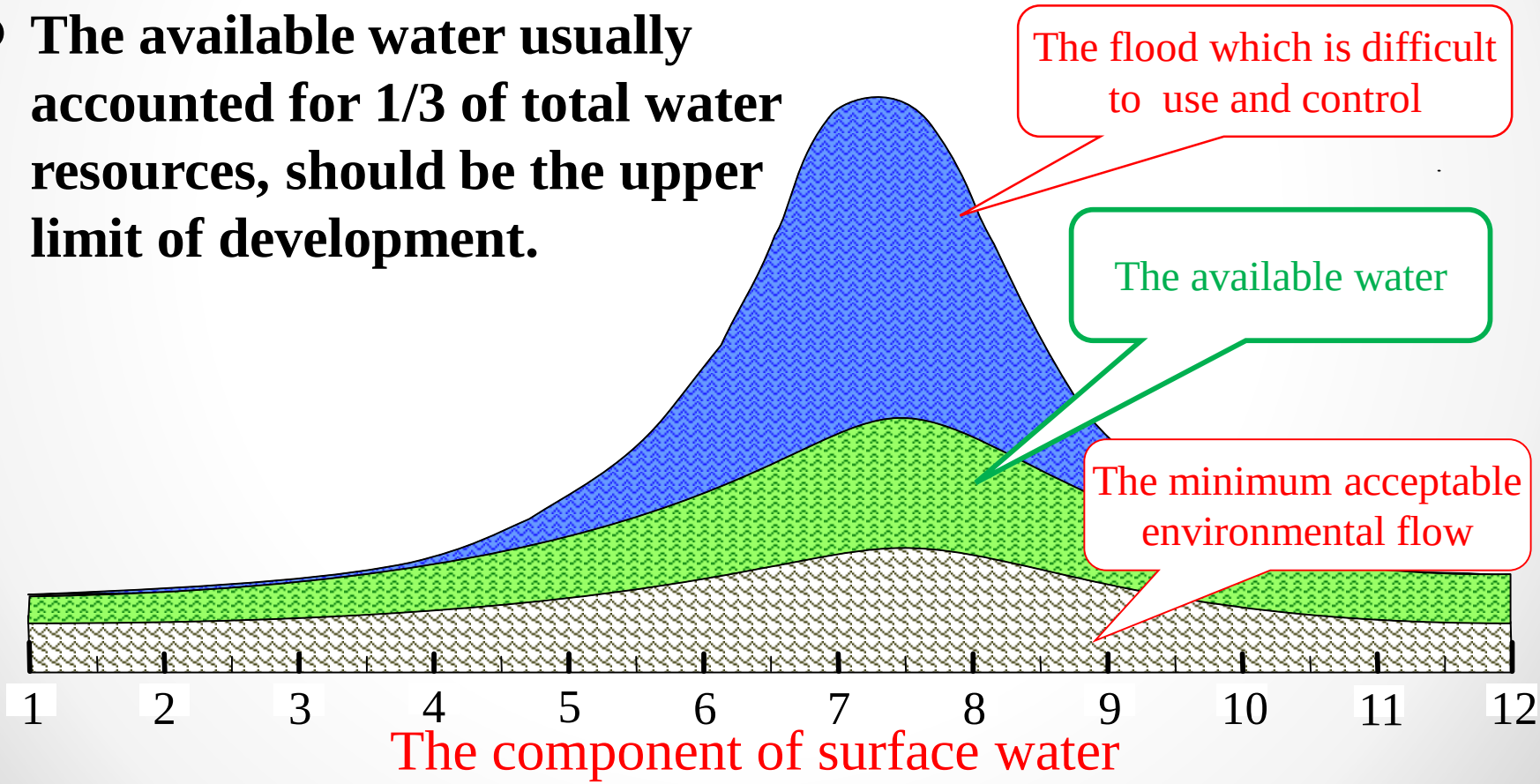
❖ Defining aquatic eco-space and redline



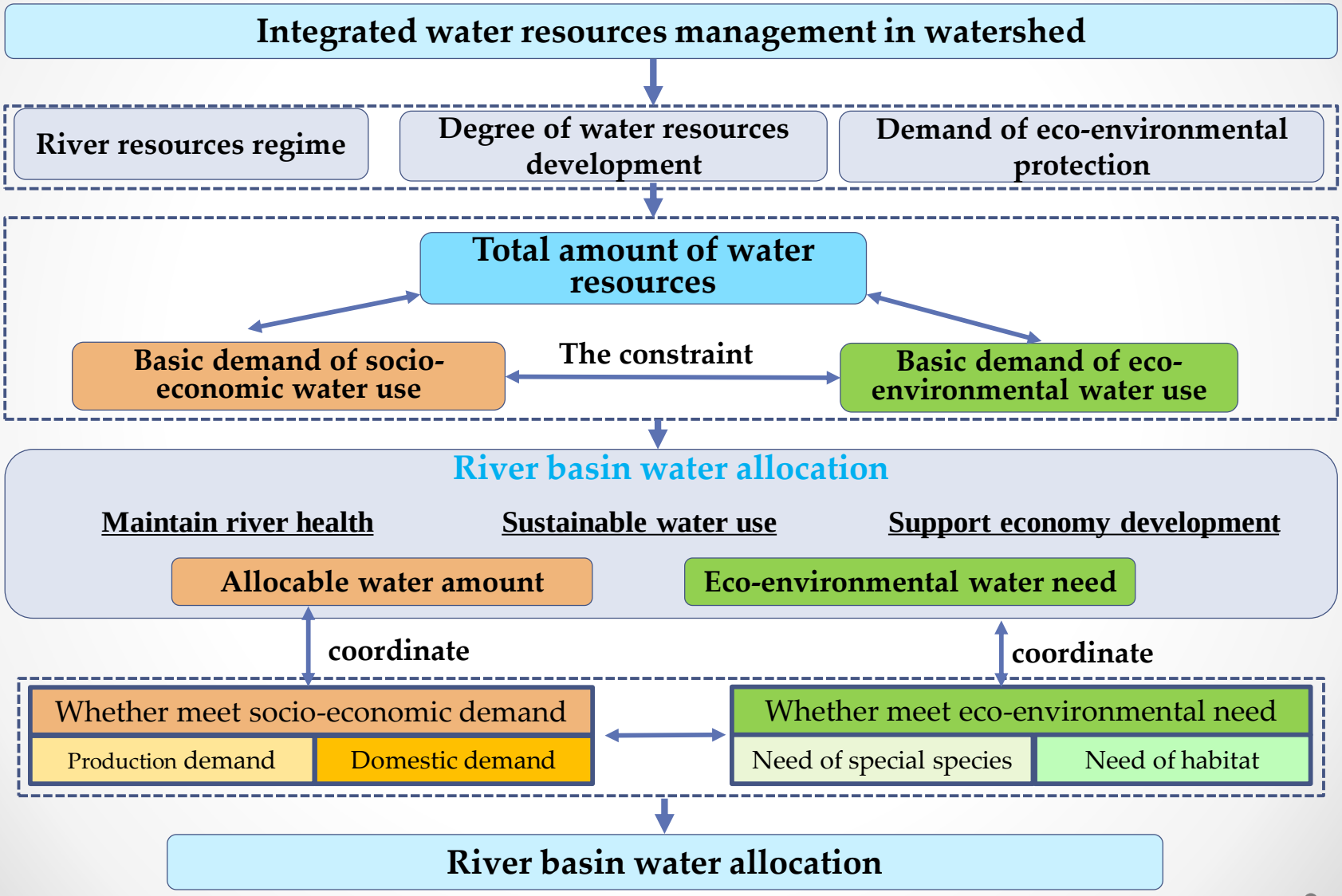
General approach of water ecological redline

River basin water allocation

- **The development of water resources can not exceed the amount of available water resources.**
- **The available water usually accounted for 1/3 of total water resources, should be the upper limit of development.**

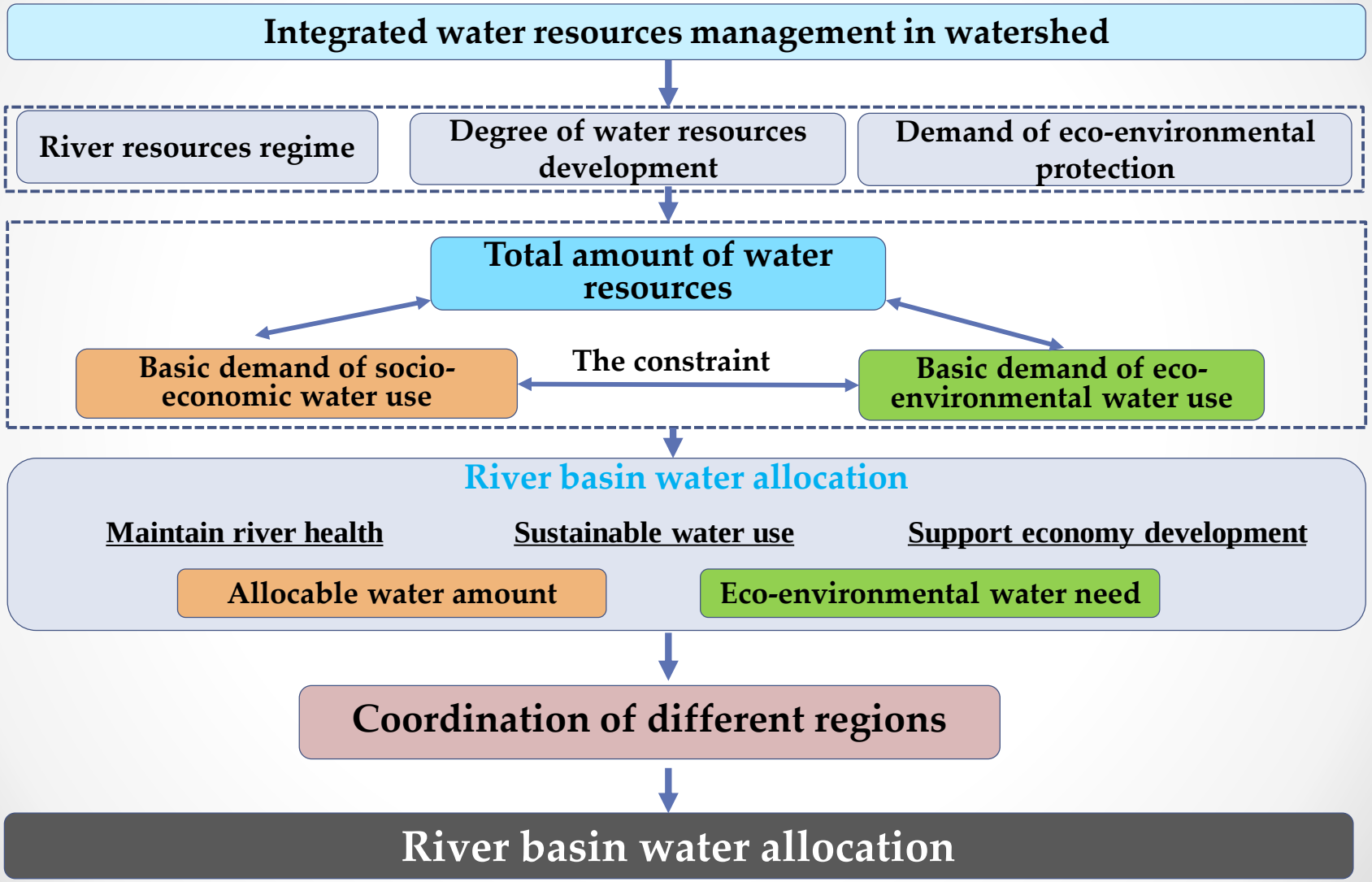


River basin water allocation



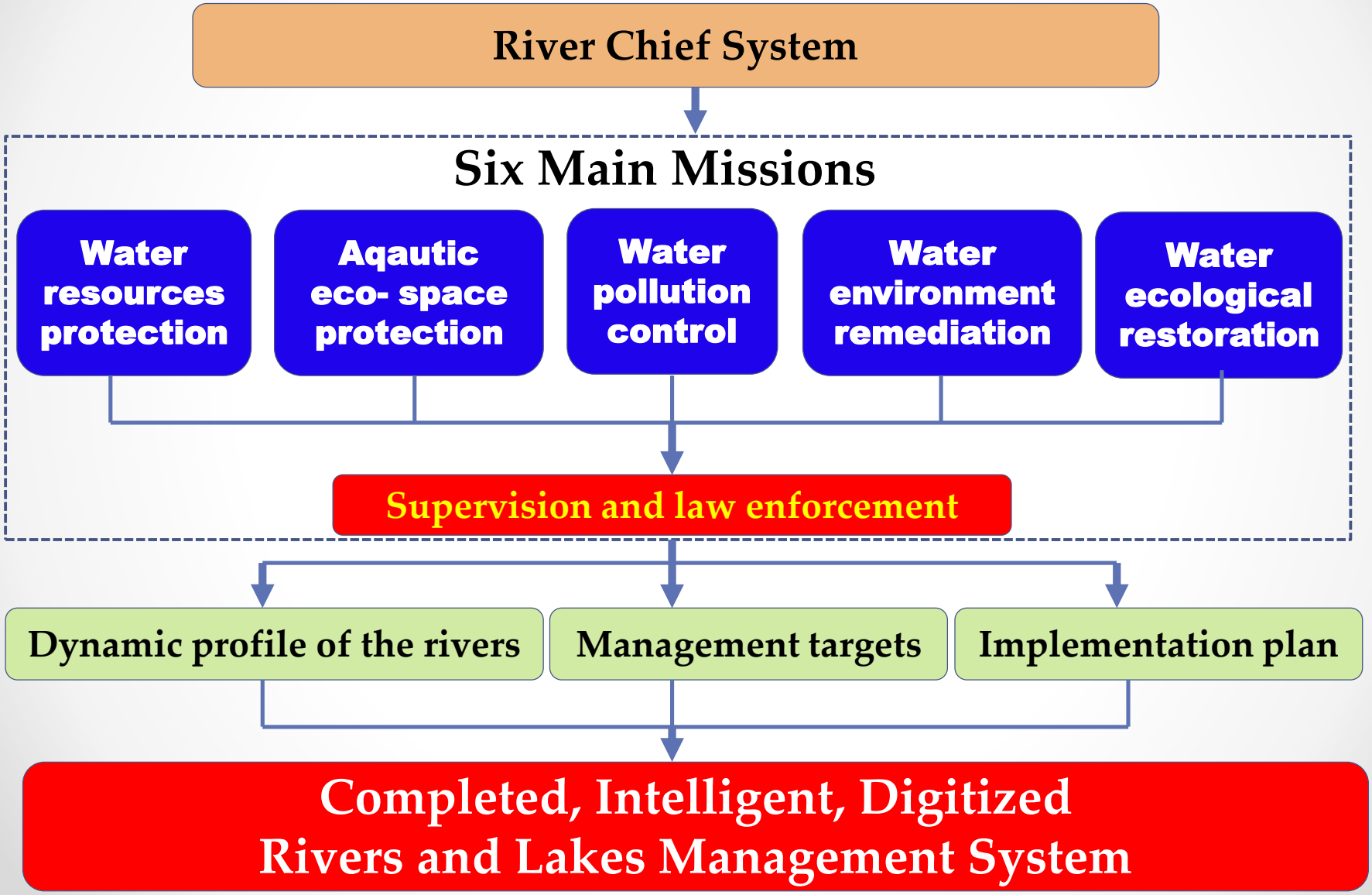
General approach of river basin allocation

River basin water allocation



General approach of river basin allocation

❖ Implementing river chief system



Thank you!