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Study on the transferable water quantity from the perspective of eco-technology-economy constraints

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Outline of Presentation

- **Inter-basin water diversion（IBWD） projects in China**
- **Transferable water quantity of IBWD project**
- **A model for calculating the transferable water quantity of IBWD project**
- **Case study**

1. Inter-basin water diversion projects in China

- Water scarcity shows high spatial inequality across regions in China.
- A national “water grid” is being developed
  - Chinese authorities issued a guideline for shoring up the construction of a national water network amid the country's efforts to enhance the capability to safeguard water security.
  - Based on natural water bodies, the network will be a comprehensive system that combines water resource allocation, disaster mitigation, water ecology and environment conservation.

1. Inter-basin water diversion projects in China

A multi-layered grid

The central government :responsible for the "main skeleton" of the system	Provincial governments: linking the major hydraulic infrastructure within the provinces to this national main skeleton	Municipal- and county-level governments: focus on linking irrigation areas and local urban water systems to the main provincial networks.

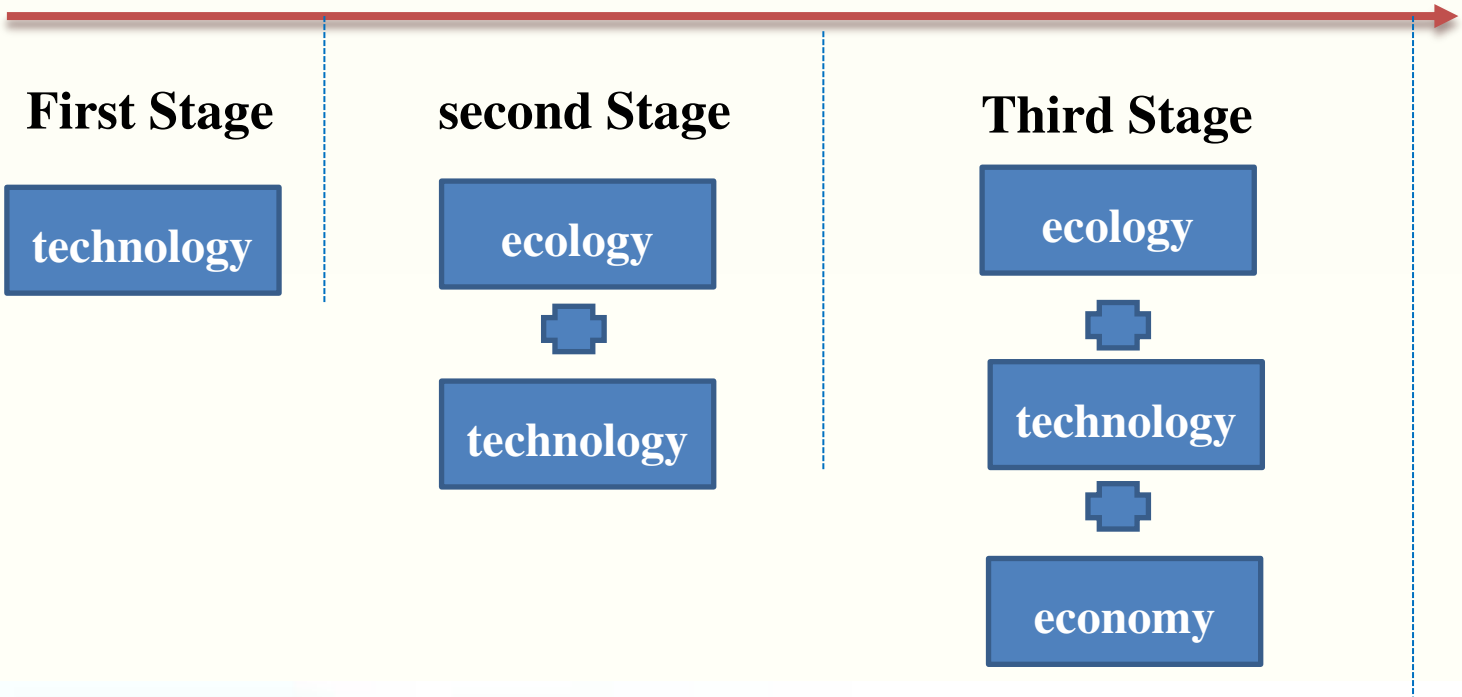
- **IBWD project, as an essential part of the National Water Grid to balance the spatial distribution of water resources, is one of the effective measures to tackle the issue of water scarcity in China.**
- **China has made great efforts in implementing numerous IBWD projects at the national level.**
- **The volume of water shifted by IBWD projects has steadily increased, reaching 48.5 billion m^3 per year by 2016 (equivalent to ~8% of national water use).**

2. Transferable water quantity of IBWD project

- The IBWD project is characterized by more ecological environment constraints, large project scale, and significant capital investment.
- The reasonable determination of transferable water quantity becomes the fundamental premise for the feasibility demonstration of the IBWD project.

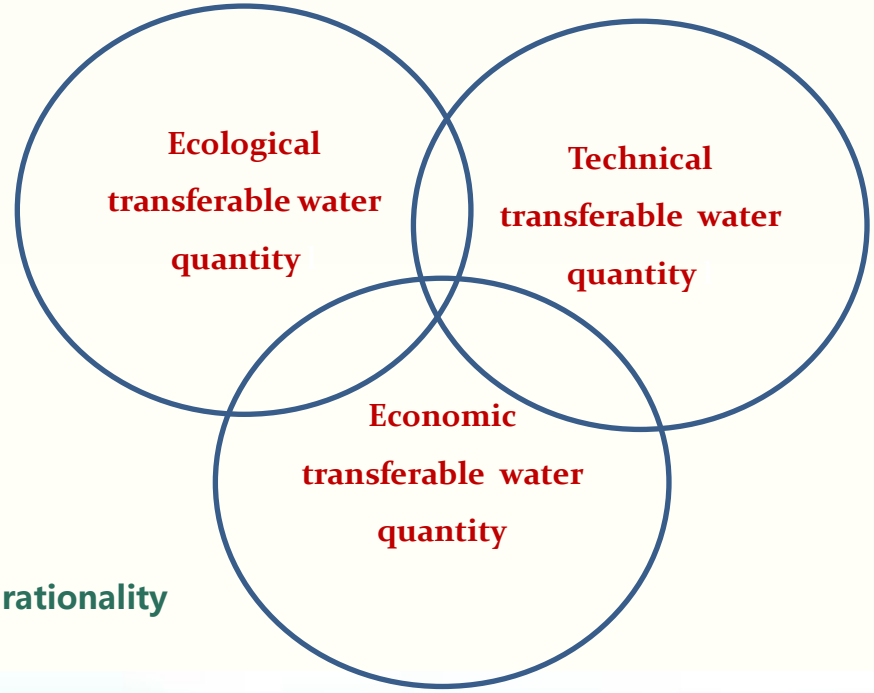
2. Transferable water quantity of IBWD project

- The calculation method has roughly gone through three stages of development.



3. A model for calculating the transferable water quantity of inter-basin water diversion project

- **A new model**



Sustainable development

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Hydological conditions

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Engineering design scheme

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Economic rationality

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3. A model for calculating the transferable water quantity of inter-basin water diversion project

Ecological transferable water quantity

- **Ecological transferable water quantity is determined, considering that the limit of surface water resources exploitation is not broken, ecological flow is guaranteed, and the adverse environmental impact is acceptable.**

Methodologies for ecological flow assessment: the Hydrological Index Methodologies, the Hydraulic Rating Methodologies and the Habitat Simulation Methodologies.

3. A model for calculating the transferable water quantity of inter-basin water diversion project

Technical transferable water quantity

- Considering the demand for water diversion and the design scheme of water diversion projects, transferable water quantity under the combination of different water source engineering and storage scales and water diversion project scale is analyzed and calculated.

- Hydrological condition/Runoff process
- Project scheme
- Demand for water diversion

3. A model for calculating the transferable water quantity of inter-basin water diversion project

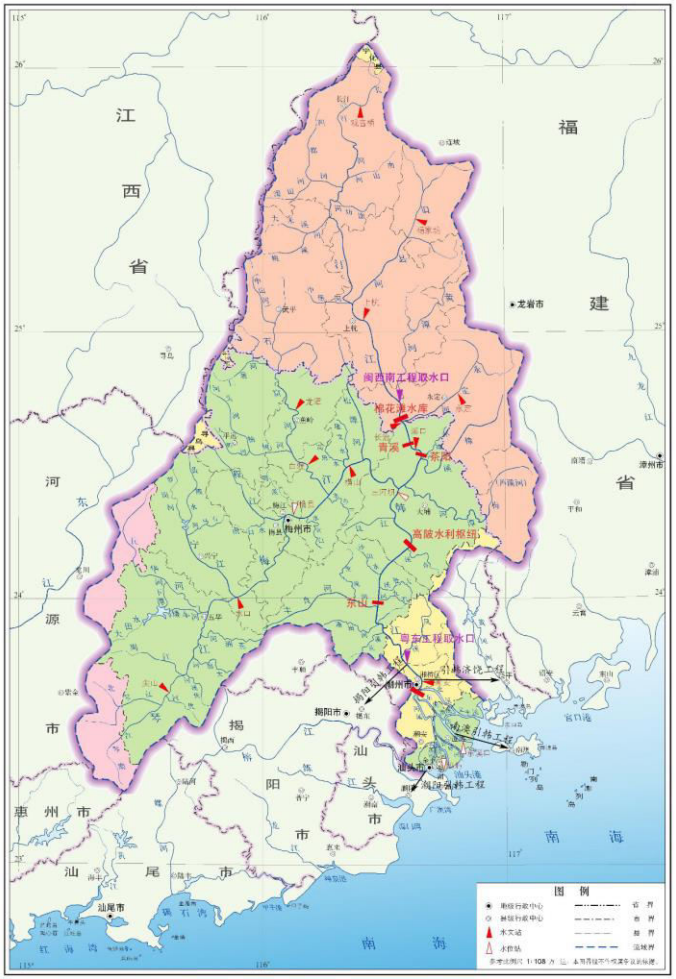
Transferable water quantity

- Considering the uncertainty in economic and social development, the economic rationality of project construction, and the uncertainty of dispatching and operation mode, indicators are adopted to carry out technical and economic analysis of different schemes of transferable water quantity.

- the total scale unilateral water investment
- the increased scale unilateral water investment
- the difference unilateral water investment
- ……

4. Case study

- Taking typical water transfer projects in southeast coastal areas of China as a case study, the model is verified and applied, which provides support for the formulation of a water resource allocation scheme.



Study area

Thank you!