

Research on the Problems and Countermeasures of Unconventional Water Resources Utilization in Shaanxi Province

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Content

- Summarize
- Status of unconventional water resources utilization in Shaanxi Province
- Problems of unconventional water resources utilization in Shaanxi Province
- Countermeasures of unconventional water resources utilization in Shaanxi Province
- Conclusion and suggestion

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Research background

- The requirement of "Water-saving priority" policy and the national water-saving action
- The needs of solving the problem of water resources shortage and water environment pollution
- The problem of unconventional water utilization in Shaanxi Province

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Type of unconventional water resources in Shaanxi Province

- Reclaimed water
- Rain/flood water
- Brackish water
- Mine water



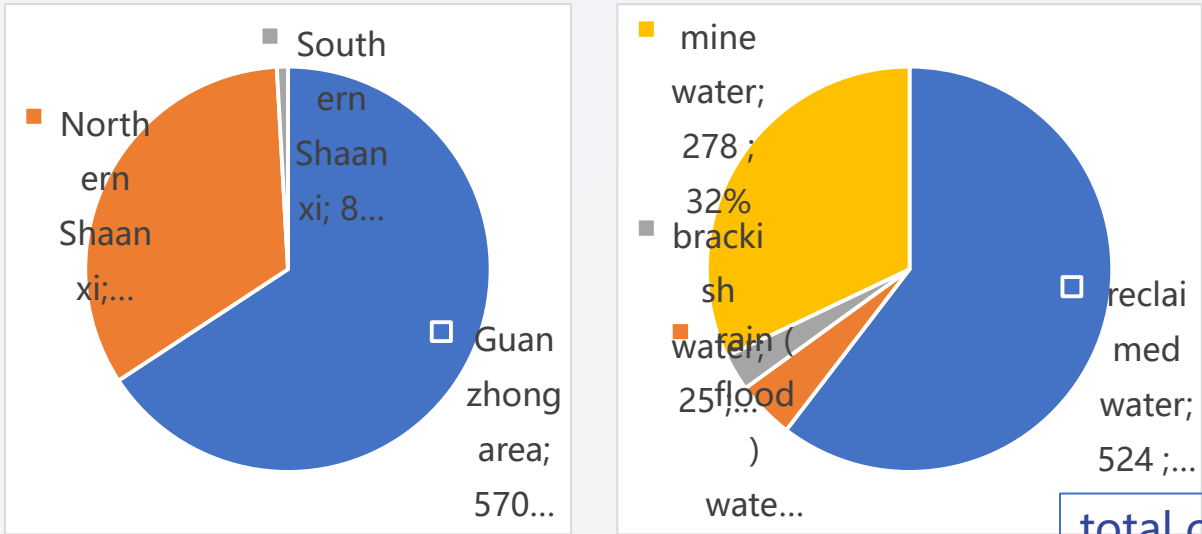
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Research contents

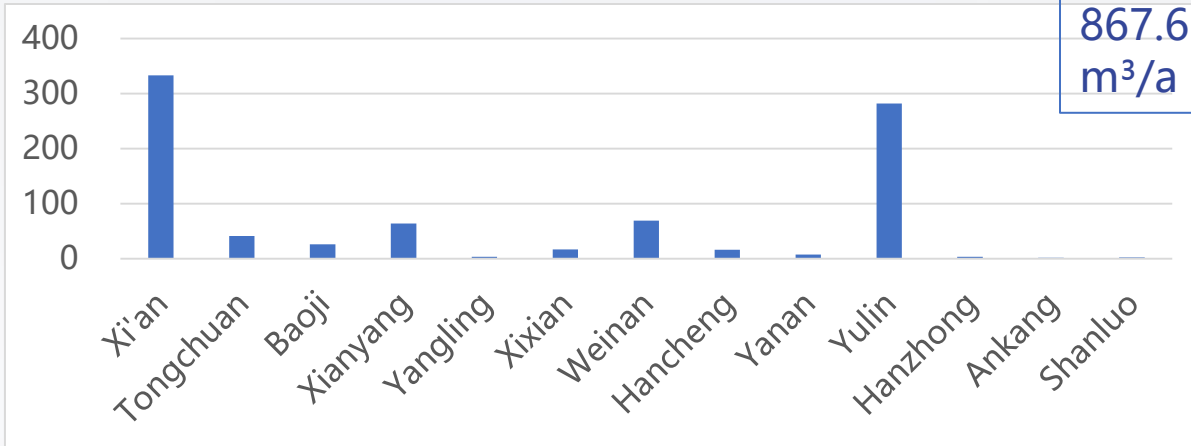
- Current status of unconventional water resources
- Problem of unconventional water resources utilization
- Countermeasures of unconventional water resources utilization

Status of unconventional water resources utilization in Shaanxi Province

Capacity of unconventional water supply projects



total capacity: 867.6 million m³/a

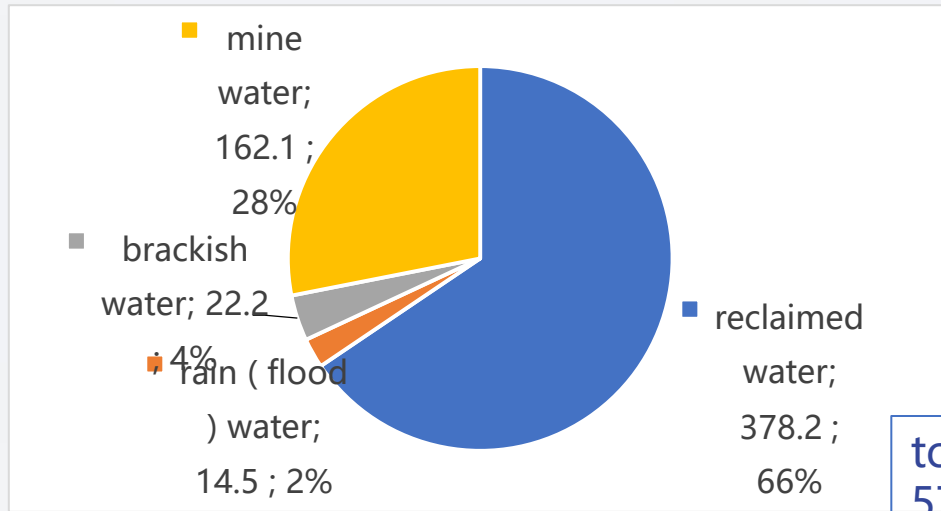


Unit : million m³

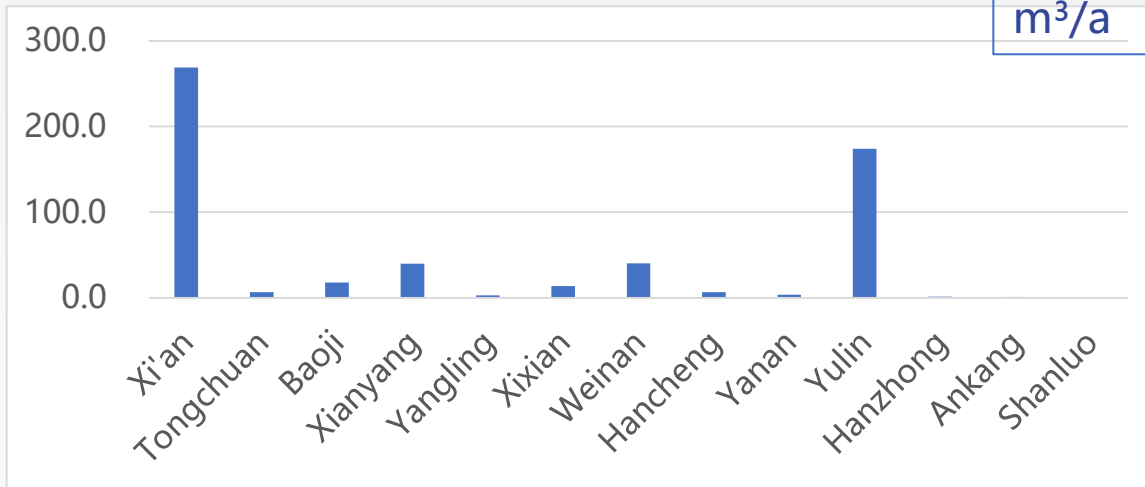


Status of unconventional water resources utilization in Shaanxi Province

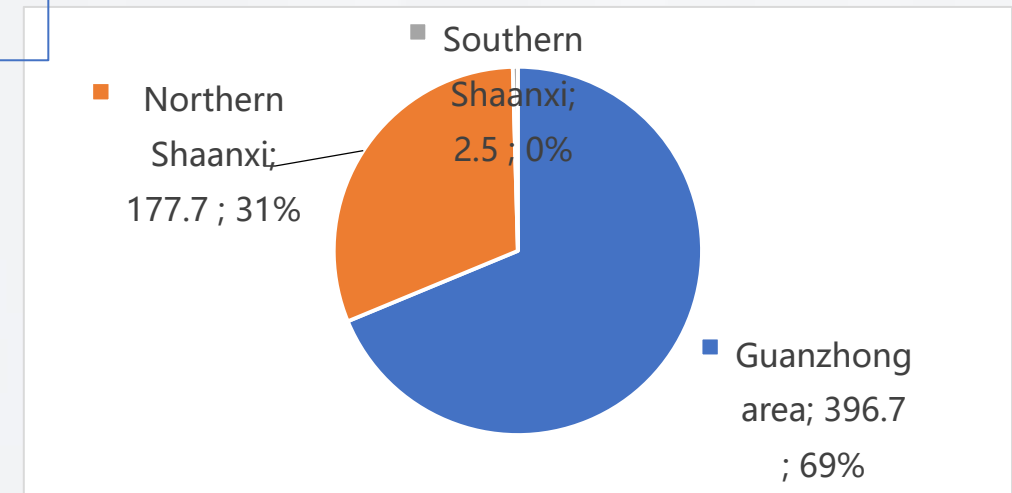
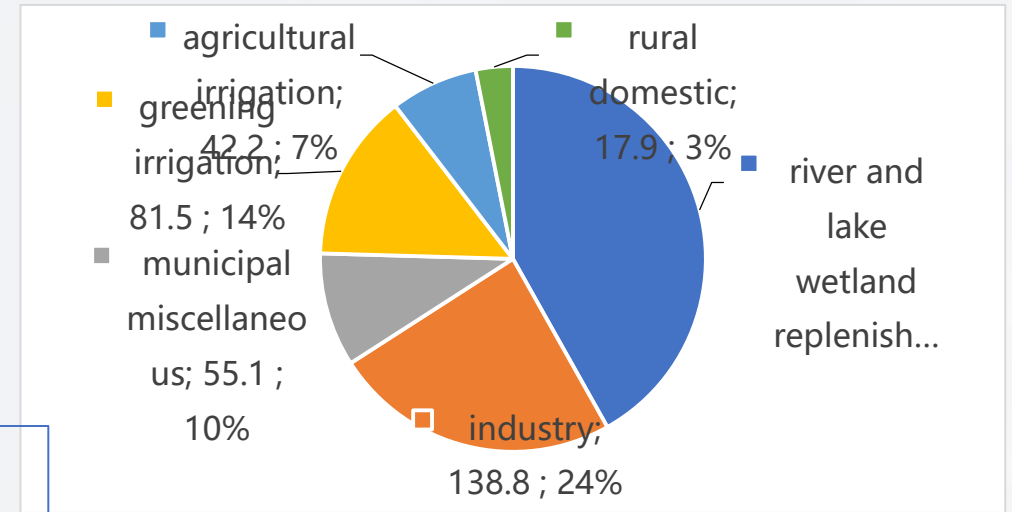
Unconventional water supply



total quantity: 577.0 million m³/a



Unconventional water consumption



Unit : million m³

Problems of unconventional water resources utilization in Shaanxi Province

Field research

- Xi'an City
- Tongchuan City
- Baoji City
- Xianyang City
- Yangling Demonstration Zone
- Weinan City
- Yan'an City
- Hanzhong City

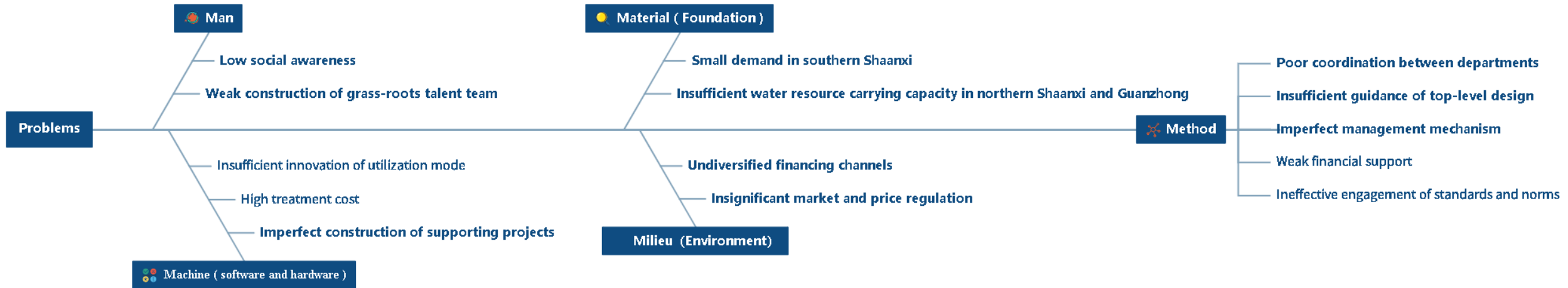


- Current status of centralized reclaimed water utilization
- Current status of distributed reclaimed water utilization
- State of rainwater utilization
- Policy of unconventional water utilization
- Planning for unconventional water use

Problems of unconventional water resources utilization in Shaanxi Province

Recognition methods

"Fish bone analysis method" + "5M factor method"



01 Reclaimed water utilization project

- In urban area, where there' s concentrated and large quantity of sewage, the **centralized sewage treatment and recycling projects** should be considered.
- Parks, colleges and universities, large bathing places, natatorium, hotels, large factories and mines, enterprises and institutions, hospitals, electroplating, printing, dyeing and other industries that discharge bacteria, corrosive and other pollutants, should focus on the **distributed sewage treatment and recycling projects**.
- In rural area, the sewage is scattered and the quantity is small, which is more suitable for the **distributed sewage treatment and recycling facilities**.

Engineering countermeasures



Centralized sewage treatment project



Distributed sewage treatment project

02 Rain and flood utilization project

Engineering countermeasures

- In southern Shaanxi, there is abundant rainfall and good vegetation, so **reservoir expansion projects and rainwater regulation reservoirs** should be implemented.
- The rainwater resources in the northern foothills of the Qinling Mountains are relatively abundant, valleys are suitable for reservoir construction, so the **rainwater regulation projects** can be considered.
- In the areas with high permeability and high porosity aquifer and impermeable clay layer, such as the alluvial fan area in the piedmont of the Qinling Mountains and the Shichuan River Basin, the **underground reservoir projects** can be considered.
- Combined with the construction of the Weihe River ecological zone and the management of the Yellow River, the **flood storage and detention project** can be used.
- The sediment concentration is large in the rain and flood in northern Shaanxi, so the utilization of rain/flood resources can be increased with the **silt arrest dam**.

02 Rain and flood utilization project

- In remote villages that uncovered by water conservancy projects, the **rain cellar projects** should be considered.
- For the large rainwater collection area and vacant lot, the construction of **rainwater collection pool, pond** can be considered.
- For areas with little open space, **permeable pavement, sunken green space, rainwater garden** can be considered to increase the infiltration and utilization of rainwater.



Underground reservoir



Silt arrest dam



Rain cellar



Pond



Rainwater collection pool



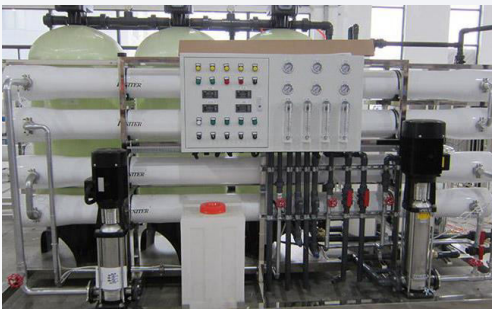
Sponge city

Engineering countermeasures

Engineering countermeasures

03 Brackish water utilization project

- Yulin City is rich in coal and solar energy resources, the **distillation** method can be considered.
- The energy cost in the northern Weihe basin is high, the brackish water mainly provides drinking water, the scale is small, the **membrane separation method** should be considered.



Brackish water distillation processing equipment



Brackish water membrane separation treatment equipment

04 Mine water utilization project

- All the coal mines should build **mine water self-use projects**.
- Mines in the northern Shaanxi can construct the **regulation reservoirs**, supply mine water to the surrounding industrial parks, energy and chemical industry bases, soil and water conservation and ecological restoration projects.
- Mine water in Guanzhong area can construct the **regulation reservoirs**, supply mine water to the surrounding domestic, industrial and agricultural.

Management measures



Policies and regulations

- Improve the system of laws and regulations
- Improve the rule system
- Improve the standard system



Mechanism

- Strengthen top-level design
- Give full play to the leading role of planning
- Develop the monitoring system
- Improve the management mechanism
- Improve the pricing mechanism



R&D innovation

- Strengthen R & D in science and technology
- Attach importance to scientific research strategic management



Financial guarantee

- Expand investment channels
- Choose financing model flexibly
- Increase capital investment



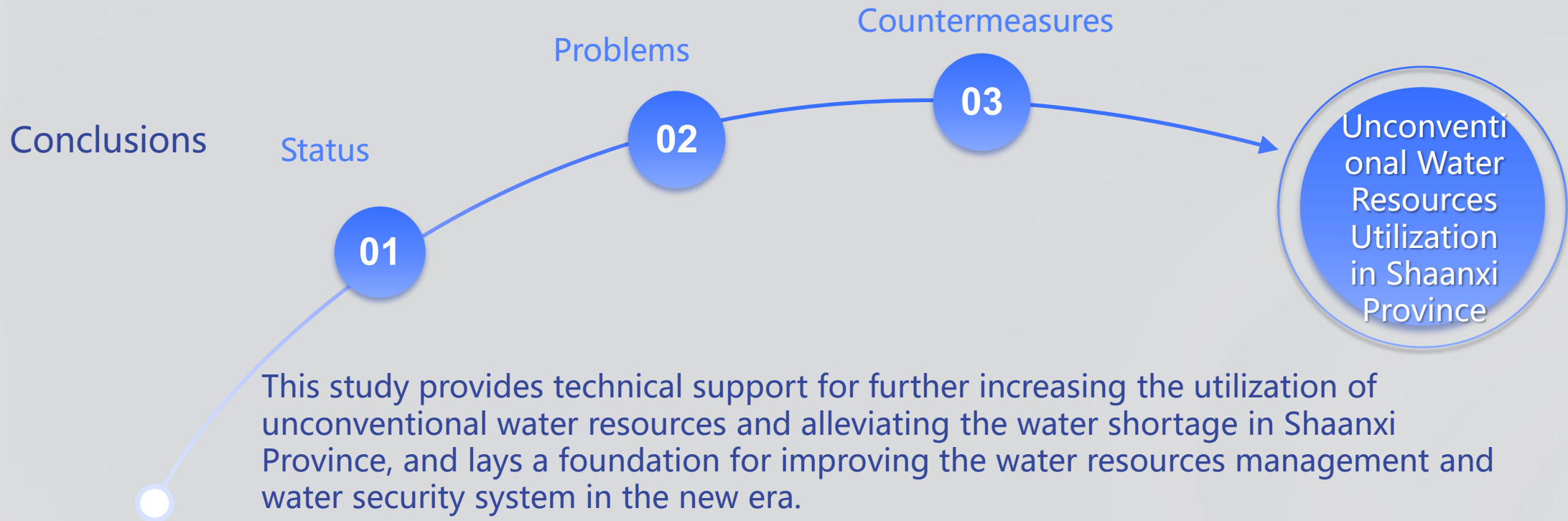
Team construction

- Strengthen the exchange and introduction of talents
- Improve the training system
- Improve the talent evaluation and incentive system



Propaganda and demonstration

- Enrich the way of publicity
- Increase public participation
- Play the leading role of demonstration



Suggestions

In the future, the treatment process should be optimized to reduce the treatment cost, the comprehensive utilization mode of unconventional water resources and new energy should be explored, and the construction and operation mode of unconventional water resources projects such as rainwater storage, groundwater storage and sponge city should be further explored.