

Chinese experience in water-saving irrigation

Wu Jingwei Wuhan University, P.R.China Chile, 2019

Outline

DThe importance of irrigation in China

- **DWater-saving irrigation in the past twenty years**
- **DEffect from water-saving irrigation practices**
- **Dutlook for irrigation**



China is the most populous country in the world. (1.3958 billion in 2018) We need to feed ourselves and we did.





Irrigation contributes to the food security of China.

- ✓ Irrigation is totally required for stable output.
- ✓ Irrigation generally increase the yield by 1-2 times in China





Irrigation contributes to the food security of China.

- \checkmark China has the most irrigated lands in the world (65.87 million ha in 2018).
- ✓ Irrigated land(about 50% of the total) produce 75% cereals and 90% cash crops
- \checkmark 7% world arable land feed 20% world population .





Irrigation contributes to the social development.

- ✓ Irrigated agriculture employ 27% labors in 2018 and ensure the rapid development is rural development
- ✓ Irrigation projects provide 1/7 industrial and domestic water supply, covering 50% urban population.





Irrigation contributes to the social development.

✓ The development in irrigation is one important measure for poverty-relief



China promises to end poverty by 2020

1% in 2018

Poverty standard:

2018: Family's per capita net income < 3535 CNY Yuan

Irrigation play an important role in eco-environment protection.

 ✓ Oasis irrigation in arid areas greatly improves the living environment conditions for organism (plant, animals and human).













Irrigation play an important role in eco-environment protection. \checkmark The fertilizer consumption application rate is 3.7 times as the world average level \checkmark The ultilization application efficiency is less than 30%, half of the world average level



Copyright © Actualitix.com All rights reserved

Source: China Water Risk. MEP State of Environment Report various years



Irrigation play an important role in eco-environment protection.

✓ Suitable irrigation and drainage management can help reduce agricultural pollution.





Irrigation plays an very important role in the Water security of China.



.





- Political and policy support: building a water saving society.
- ✓ Protecting and saving water is the basic national policy, 1983.
- Promote water-saving irrigation as a revolutionary measure, The Third Plenary Session of the 15th CPC Central Committee, 1998
- ✓ Building a water saving society, the 10th Five-Year Plan for Economic and Social Development of the People's Republic of ,2000
- ✓ Water saving is focused in the No. 1 central document since 2004
- Applying the Strictest Water Resources Management system, "three red line", the No. 1 central document ,2011



Political and policy support: building a water saving society.

"Applying the Strictest Water Resources Management system, "three red line", the No. 1 central document ,2011

	Table 1. Future water planning targets			
	Targets	2015	2020	2030
Red line for total water use	Total water consumption must not exceed	635 billion m ³	670 billion m ³	700 billion m ³
Red line for water use efficiency	Industries will reduce their water use per US\$1,600 (CNY10,000) of industrial added value	30% below 2010 figures	65 m ³	40 m ³
	Irrigation efficiency must exceed	53%	55%	60%
Red line for controlling pollution	The number of water function zones complying with the water quality standard will be more than	60%	80%	95%
	All sources of drinking water will meet set standards for both rural and urban areas		Yes	Yes
	All water function zones will comply with water quality standards			Yes



• Law

- ✓ Water Law of the Peoples Republic of China
- ✓ Agricultural Law of the Peoples Republic of China
- ✓ Law of the PRC on the Popularization of Agricultural Technology

The people's governments at all levels shall implement water-saving irrigation methods and water-saving technologies, take necessary anti-leakage measures for agricultural water storage and water transfer projects, and improve agricultural water use efficiency.





Investment

Investments in irrigation by Five-Year Plans in China (1981-2020)



Investments in irrigation have been growing steadily and rapidly from the 6th Five-Year Plan period (1981–1985) to the now. The investment during the 12th Five-Year Plan (2011–2015) is about **200 times** as that during the 6th Five year Plan (1981-1985).

It is required that the local government should invest 10% of the land transfer fee in irrigation projects.



Central government financed water-saving plans for irrigation

- ✓ Water-saving and Efficiency-increasing Demonstration project (1996-2008)
 - 1230 demonstration plot with a total area of 0.27 million ha
- ✓ Rehabilitation of large & middle-scale irrigation schemes with the objectives of increasing irrigation efficiency and productivity (1998-2020)
 - 434 large-scale irrigation (Irrigated Area > 3 million mu, or 20000 hm²)
 - 2157 middle-scale irrigation (Irrigated Area 667~2000hm²)
 - 30 million ha effectively irrigated area is covered.
- ✓ National plan to increase production capacity of 100 million ton project (2009-2020)
 - Arable land ≈66.7 million ha
- ✓ Water saving irrigation in mountainous and pastoral area project (2011-2020)
- ✓ High efficient water-saving irrigation project (2012-2020)





Comprehensive water-saving measures

- ✓ Engineering measures
- ✓ Agronomic measures
- ✓ Irrigation management measures
- \checkmark Economic and policy measures



Comprehensive water-saving measures

 \checkmark Improve the efficiency in conveyancing and allocating water



pipe

Canal Control structure

Comprehensive water-saving measures

 \checkmark Improve the efficiency in field application



Improve surface irrgation efficiency

Improve surface irrgation efficiency

Film cover

land

Comprehensive water-saving measures

 \checkmark Improve the efficiency in field application



Drip irrigation

Drip irrigation Under film

Micro-sprinkle irrigation

Comprehensive water-saving measures

 \checkmark Improve the efficiency agronomic measures

Sowing with partial irrigation



Coupling water and fertilizer application

super absorbent polymer(SAP)

Conserve water by land covering

Comprehensive water-saving measures

2014-03-19 发7

✓ Improve irrigation management



Double control irrigation: Water application rate Total water consumption 农业灌溉用水定额 Agricultural irrigation water quota

新疆维吾尔自治区质量技术监督局

2014-04-19 实施

发布



Smart Irrigation: Soil/Water/Crop Sensing irrigation forecast Precision irrigation





Comprehensive water-saving measures

✓ Optimizing irrigation water resource





Economic and social measures

✓ Water user's association (WUAs)







Economic and social measures

Water tariff reforms: Water tariffs in China is below the price needed to recover the full financial cost of services, and much lower compared to other countries.
 2008, agricultural water tariff reform started



Economic and social measures

✓ Water right exchange

Started in 7 provinces in July, 2014

Contents: water right identification and registration; water right exchange and related rules

Dealer: inter-basin; upstream-downstream, regions; sectors; irrigators.

China water exchange established in 2016 and 2.774 billion m³ water have been exchanged.



About Us

China Water Rights Exchange Co., Ltd. (hereinafter referred to as the "water rights exchange) is to implement the Party Central Committee and the State Council on the deployment of water right and water market construction decision, with the approval of the State Council, by the Ministry of water resources and the Beijing Municipal Government jointly launched the establishment of national water rights trading platform. To give full play to the market in the allocation of water resources in the decisive function and better to play the role of government, promote the orderly conduct of the water rights trading norms, to enhance the efficiency and effectiveness of water resources utilization, provide strong support for sustainable utilization of water resources and sustainable development of economy and society.

Scientific and technic support:

✓ Irrigation experimental network



附图1 全国灌溉试验站网试验站点分布图

137 irrigation experimental stations have been built or rebuilt since 2003, providing standards for water saving





Scientific and technic support:

✓ Irrigation experimental network



 IS 13.060.99
 DB65

 新疆维吾尔自治区地方标准

 DB 65/ 3611-2014

农业灌溉用水定额

Agricultural irrigation water quota

2014-03-19 发布 2014

2014 - 04 - 19 实施

新疆维吾尔自治区质量技术监督局 发布



Scientific and technic support

✓ A series of technical standard for water-saving irrigation engineering have been set to guide water-irrigation practices



✓ Systematic Research

of irrigation water saving



-EC 🔀

Irrigated area increased from 55 million ha in 2000 to 68 million ha in 2018
The ratio of water-saving irrigation area increased from 30% to 52%.



• More efficient water saving technologies used





- Unit yield: increased from 4261 kg/ha to 5621 kg/ha. (+32%)
- Total yield: increased from 462 to 658 million ton. (+42%)
- Total water use for agriculture slightly declined especially in recent years





• The increases in agricultural productivity push the transformation of traditional agriculture to modern agriculture.

 \checkmark The percentage of transferred land is higher than 35%.







• Help to protect water-environment.

✓ Problems due to excessive irrigation are getting better, including soil salinity and water logging





• Help to protect water-environment.

✓ Over-exploited groundwater is been slightly recharged.







• Help to protect water-environment.

✓ Saved water has been used by ecological restoration of dried/polluted water bodies.







• Help to protect water-environment.

✓ The quality of surface water in the main rivers are getting better





• Help to protect water-environment.

✓ The farmer's living environment is getting much cleaner and more beautiful





Outlook for irrigation

Food security call for sustainable and more efficient irrigation.
Water saving irrigation becomes more important as the task is more difficult.
Nation water saving action plan was released in April 2019.







Outlook for irrigation

Environment

- Sound ecological environment is the most inclusive benefits to people's wellbeing.
- We want both golden, silver hill and clean water, green mountains as well.
- More consideration will be make when water saving is applied to irrigation.





Outlook for irrigation

Modernization

✓ Modernization of the State

✓ Urbanization









Thank you very much for your attention!

