Responses of Agricultural Water Management to Climate Change in Taiwan

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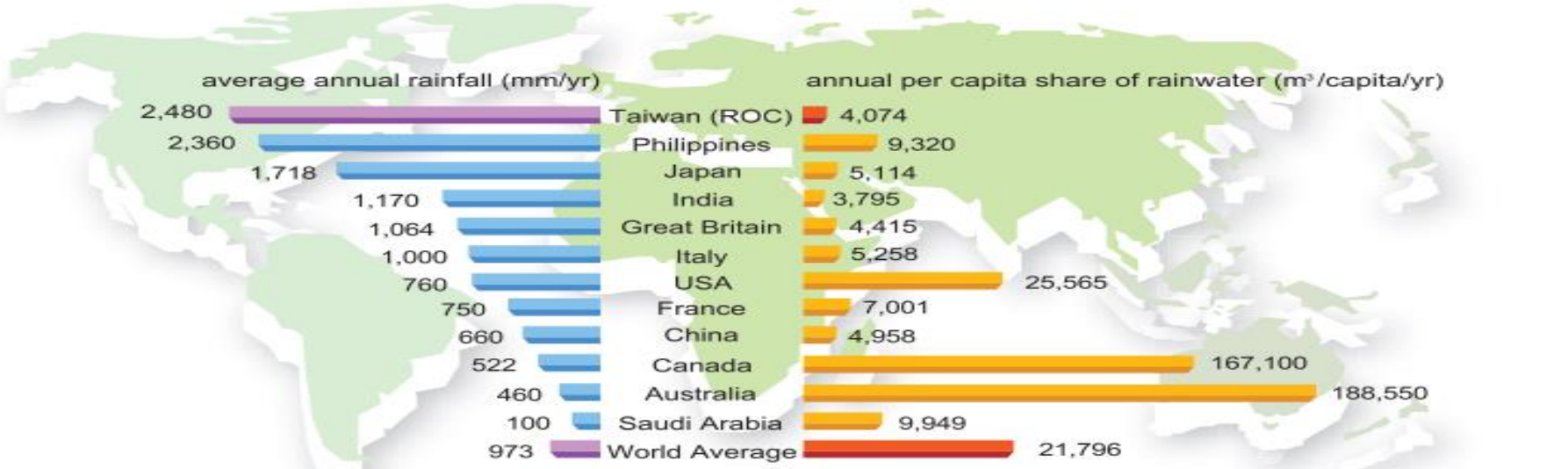
Climate and Rainfall

- The rainfall in Taiwan is approximately 2,500 mm/yr, which is about 2.6 times of the world average.
- Average per capita share of rainwater amounts to only 4,074 m^3 per year, which is less than one fifth of the world average.

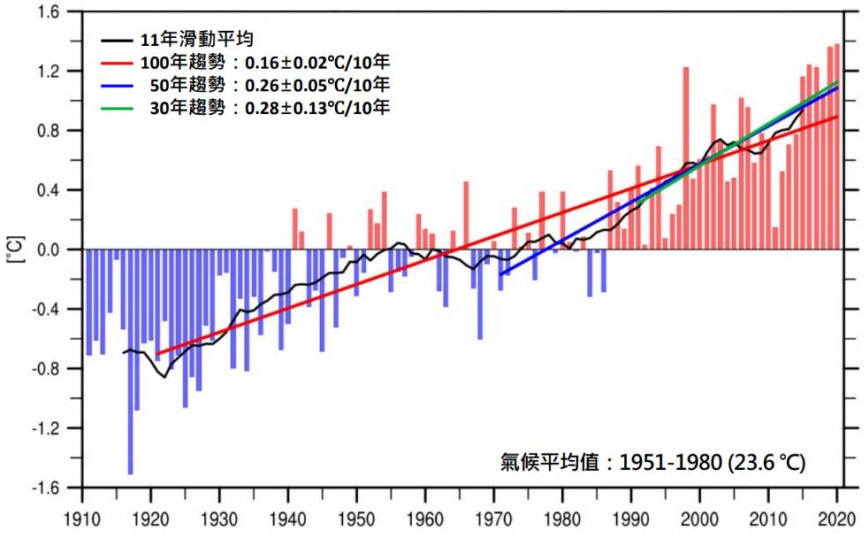


The Japanese Institute of Irrigation and Drainage，「A Message from Japan and Asia to the World Water Discussion —prepared for the 3rd World Water Forum」，2003。

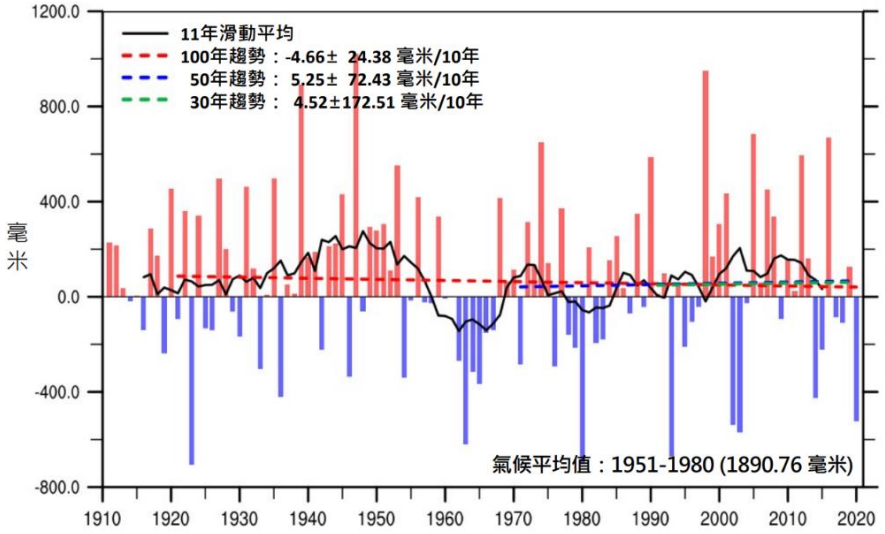
Climate Change in Taiwan

- Temperature increased 1.6℃ in the past 110 years (1911-2020) in Taiwan , and in recent 30 years, the trend accelerating
- Trend of annual rainfall did not change significantly in the past 110 years. However, less rainfall years increased between 1961-2020.

1911-2020 Temperature Anomaly



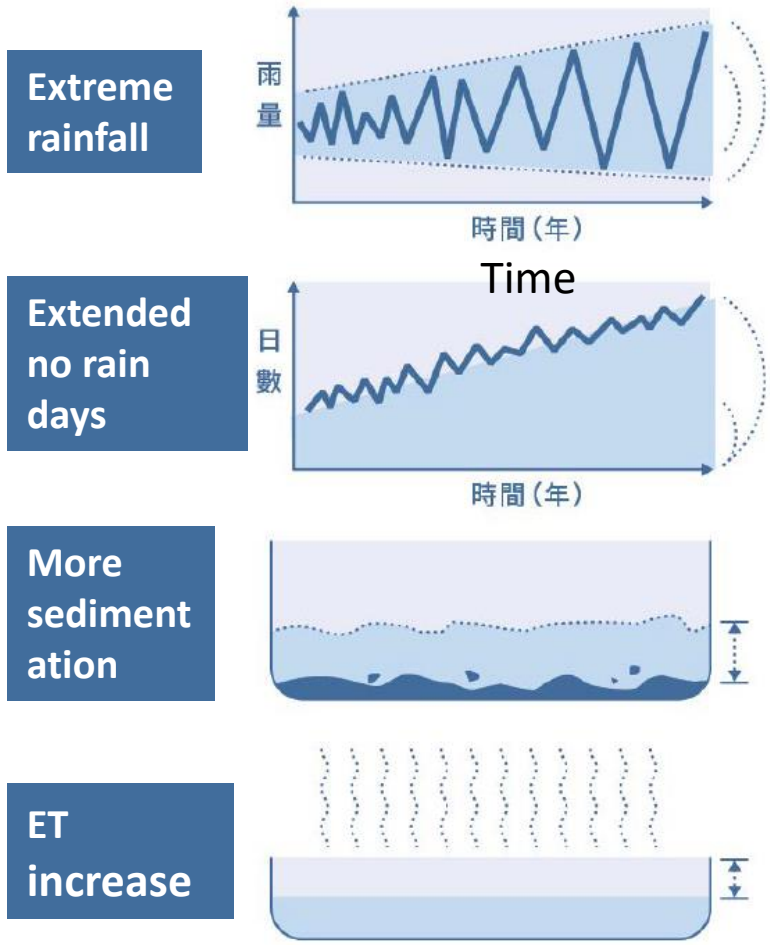
1911-2020 Precipitation Anomaly



Source: IPCC 6th Analysis Report, MOST / TCCIP · 2021

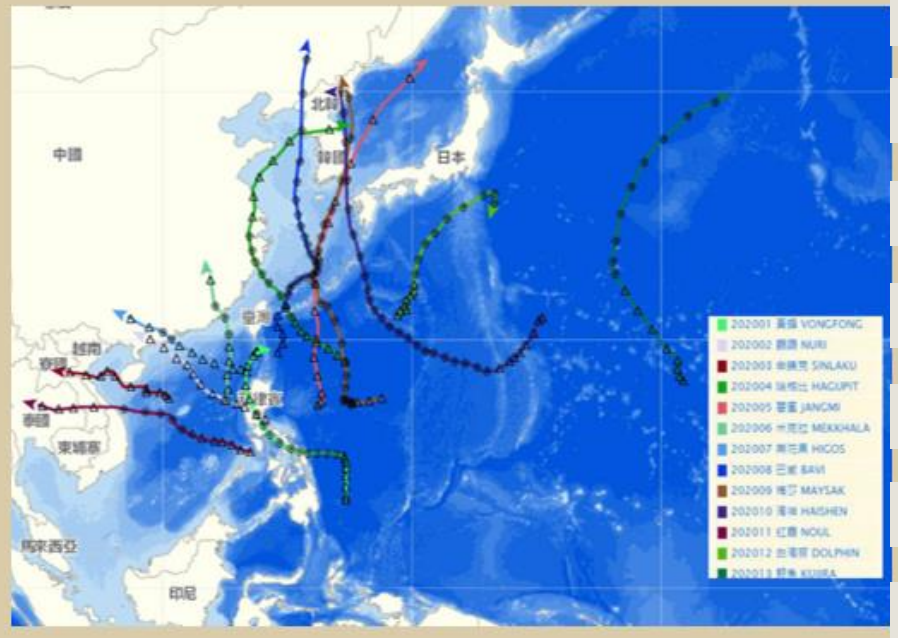
◆Impact of Climate Change to Water Resource

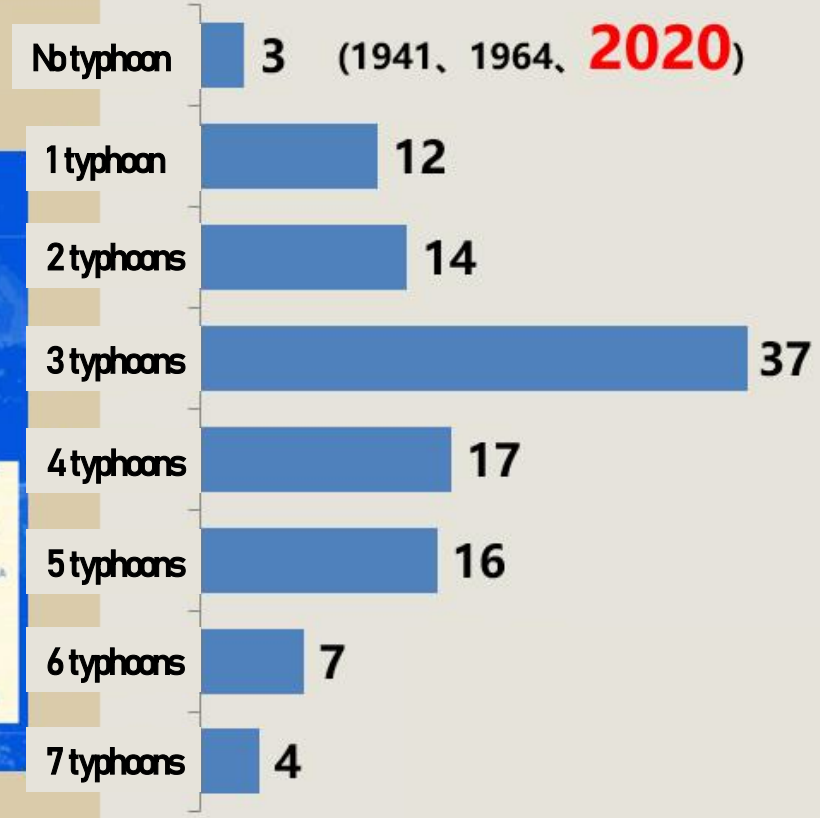
- Extreme rainfall causes more floods and droughts
- Extended no rainfall days is harmful to agriculture
- Heavy rain increases the amount of sand transportation in rivers and the accumulation in reservoirs
- Evapotranspiration increases as the temperature rises



First NO typhoon year since 1964

Average 3.5/year



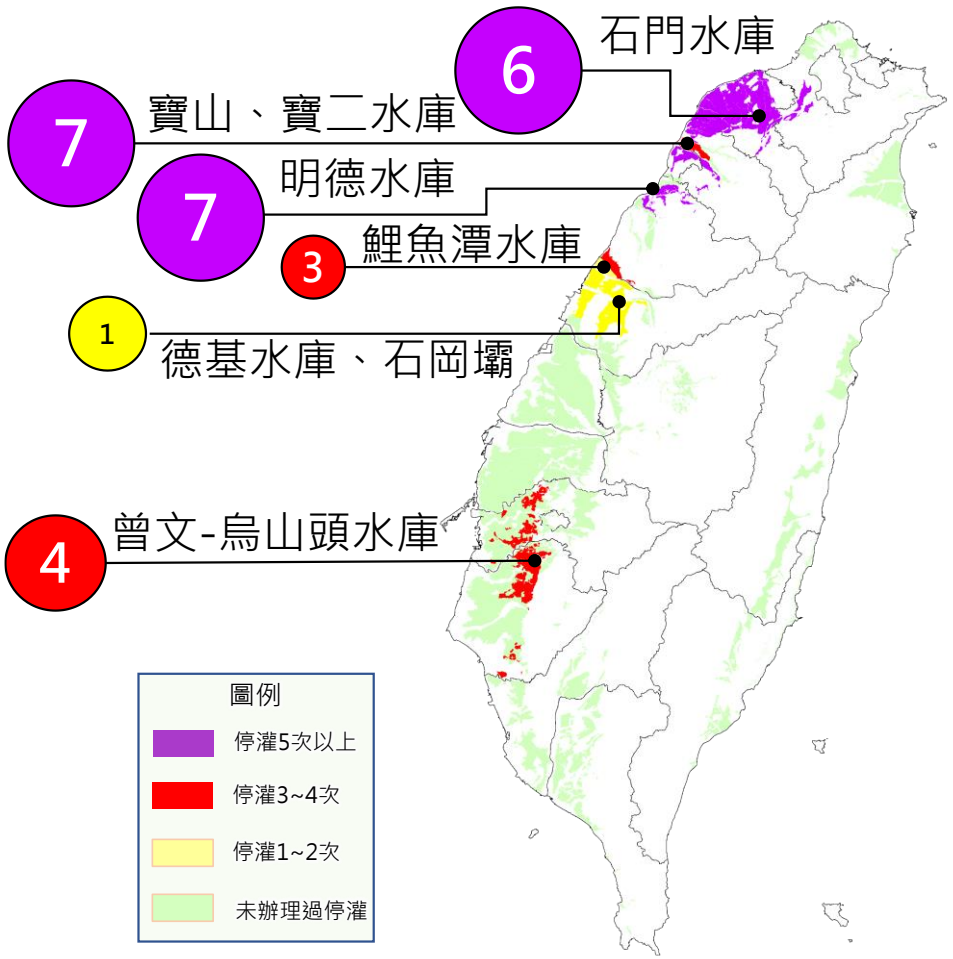


Source: CWB (data from 1911-2020)

◆ Cessation of irrigation in recent 20 years

- 9 times large scale cessation of irrigation
- Occurred in reservoir water supply areas, totally 300 thousands ha

Year	Crop	Cessation of irrigation (management office)	Area (ha)
2002	1st	SM, HC	14,778
2003	1st	TY, HC	27,646
2004	1st	TY, SM, HC, ML, CN	65,385
2006	1st	TY, HC, ML	30,828
2010	1st	ML, CN	22,366
2015	1st	TY, HC, ML, TC, CN	43,659
2018	1st	ML	1,175
2020	2nd	TY, SM, HC, ML, TC	19,000
2021	1st	TY, SM, HC, ML, TC, CN	74,375
Total			299,212



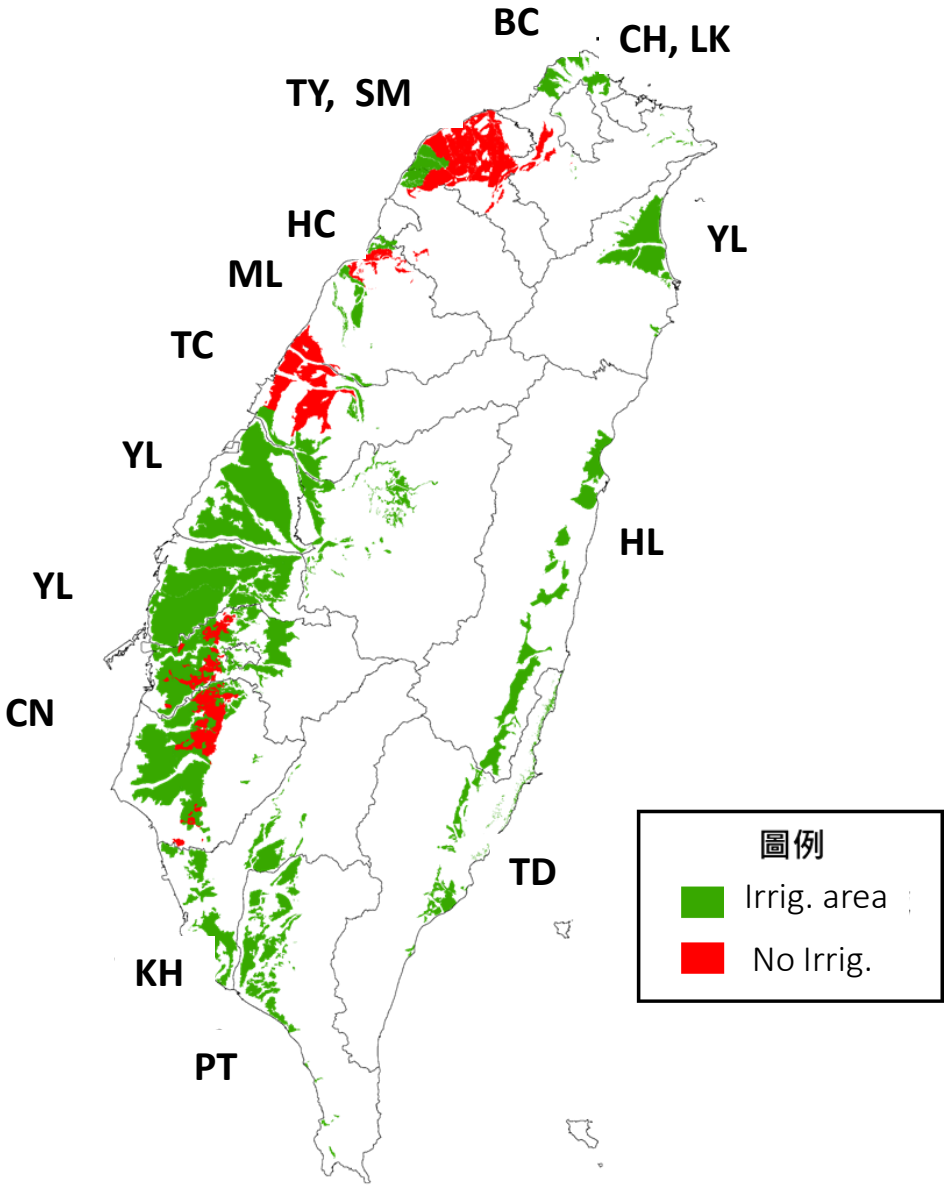
◆ 2021 First crop season water supply conditions

76% area maintain irrigation service

- 236K ha using multiple source water supply to maintain irrigation

Terminate irrigation service in reservoir-supplied areas

- 74K ha terminate irrigation in TY, SM, HC, ML, TC and CN Management Districts



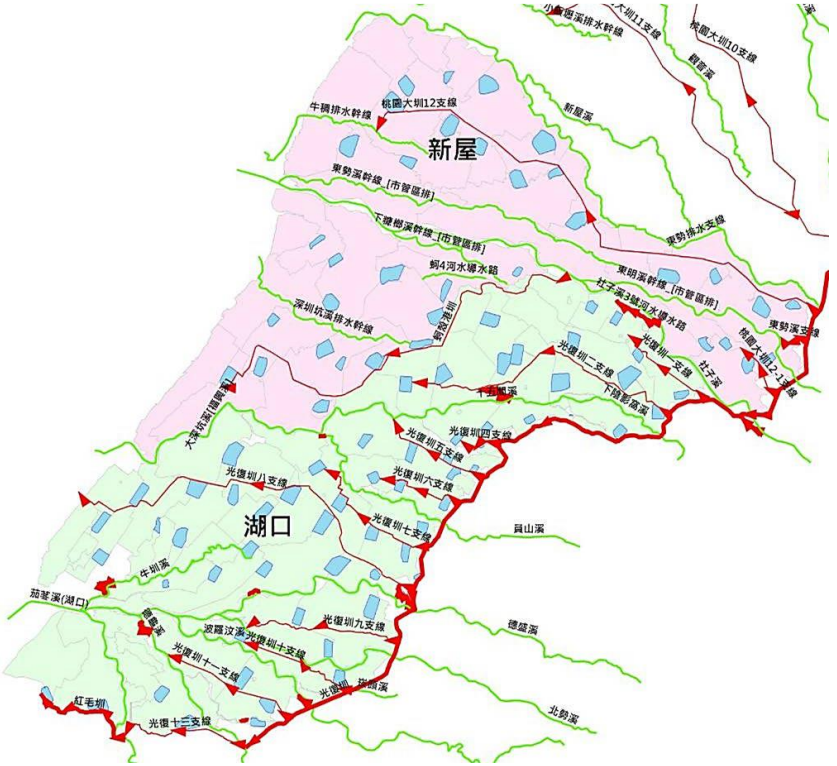
◆2021 Taoyuan 3rd District drought response during first crop season

TY Ⅲ Area

- 2020 1st crop grow upland crop
- 2020 2nd crop fallow

Supply irrigation water to avoid 3 consecutive seasons without irrigation

- TY III Irrigation district, 2700ha, about 1/3 of TY irrigation management area.
- Located at end of TY main canal, 56% water from Shihmen Reservoir, 44% from river, (25% return use)
- There are 100 ponds in the area, total storage of 1.527 million tons



Response to Climate Change

1. Pond Storage
2. Staggered tillage period
3. Dry ploughing
4. Use Return water
5. Use groundwater

Response to Climate Change

Pond Storage

- Actively store rainwater and surrounding streams to adjust agricultural water resources.
- Before the reservoir is released, give priority to the use of water storage in the pond for irrigation

Response to Climate Change

Staggered tillage period

- **Staggered tillage period to avoid water consumption at same time, rotational supply water to each farm.**
- **Reduce ploughing from 2 to 1 time.**
- **Reduce tillage water depth.**

Response to Climate Change

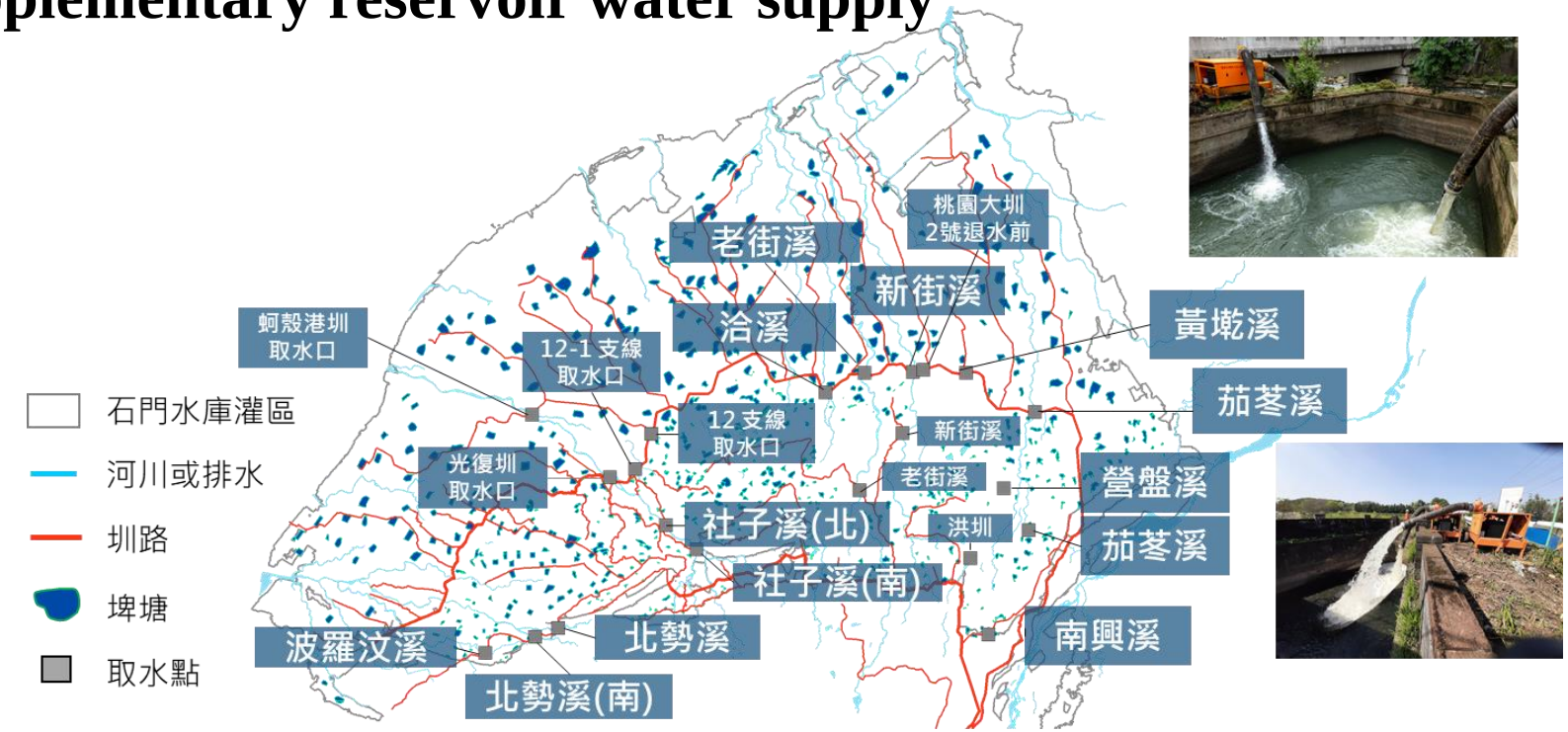
Dry ploughing

- **Adopt dry ploughing with minimum amount of water**
- **Transplanting immediately after ploughing**

Response to Climate Change

Use Return water

- **Inventory of rivers and regional drainage water sources (21 locations), pumping water to irrigation canals**
- **Supplementary reservoir water supply**

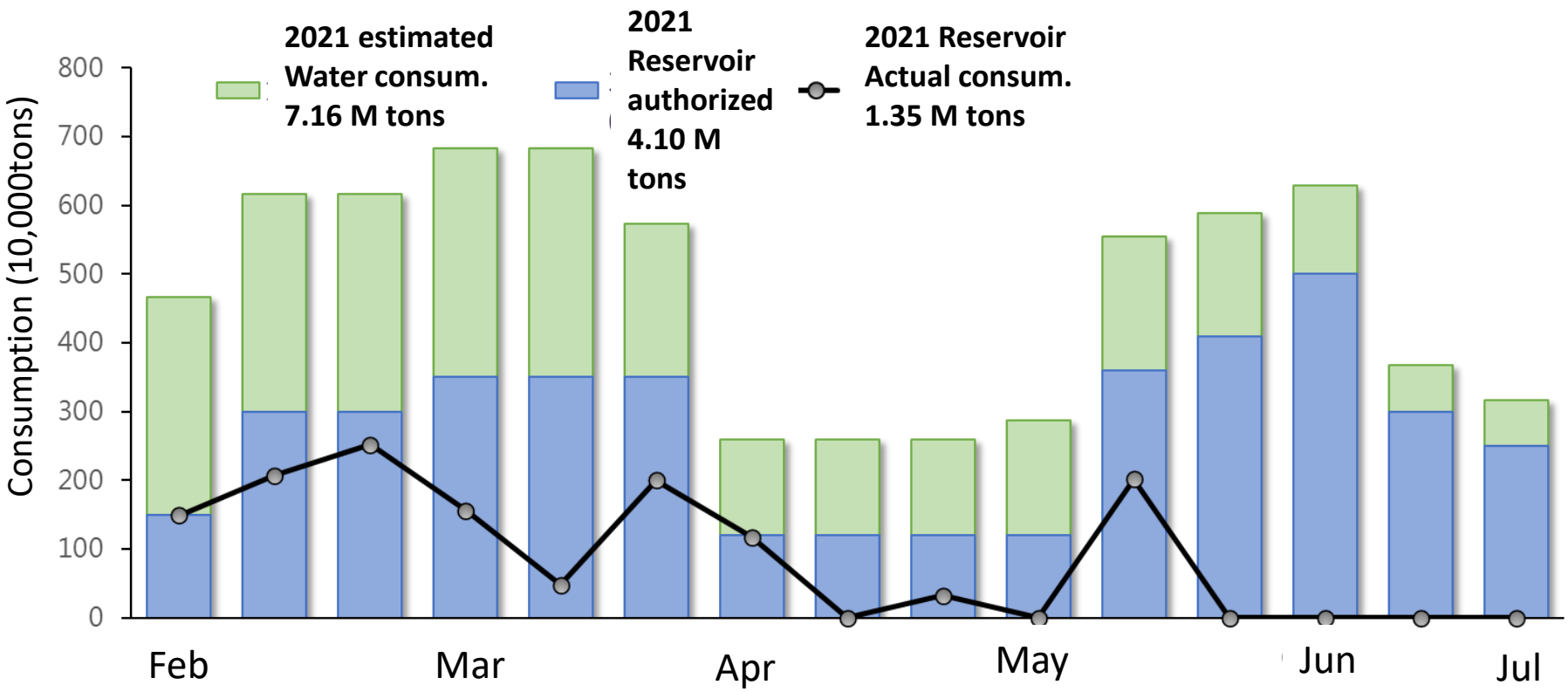


Response to Climate Change

Use groundwater

- **Activate drought-relief wells adjacent to canals for irrigation**
- **Use groundwater only at lack of reservoir, pond and river water**

- Those strategies reduced 2.75 M tons water consumption in 2021 1st crop season, and produced rice crop value up to NT$1.34 billion.



Thank you for listening

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