Experience Sharing on Water Resource Management and Resilience Adaptation for Alternating Droughts and Floods

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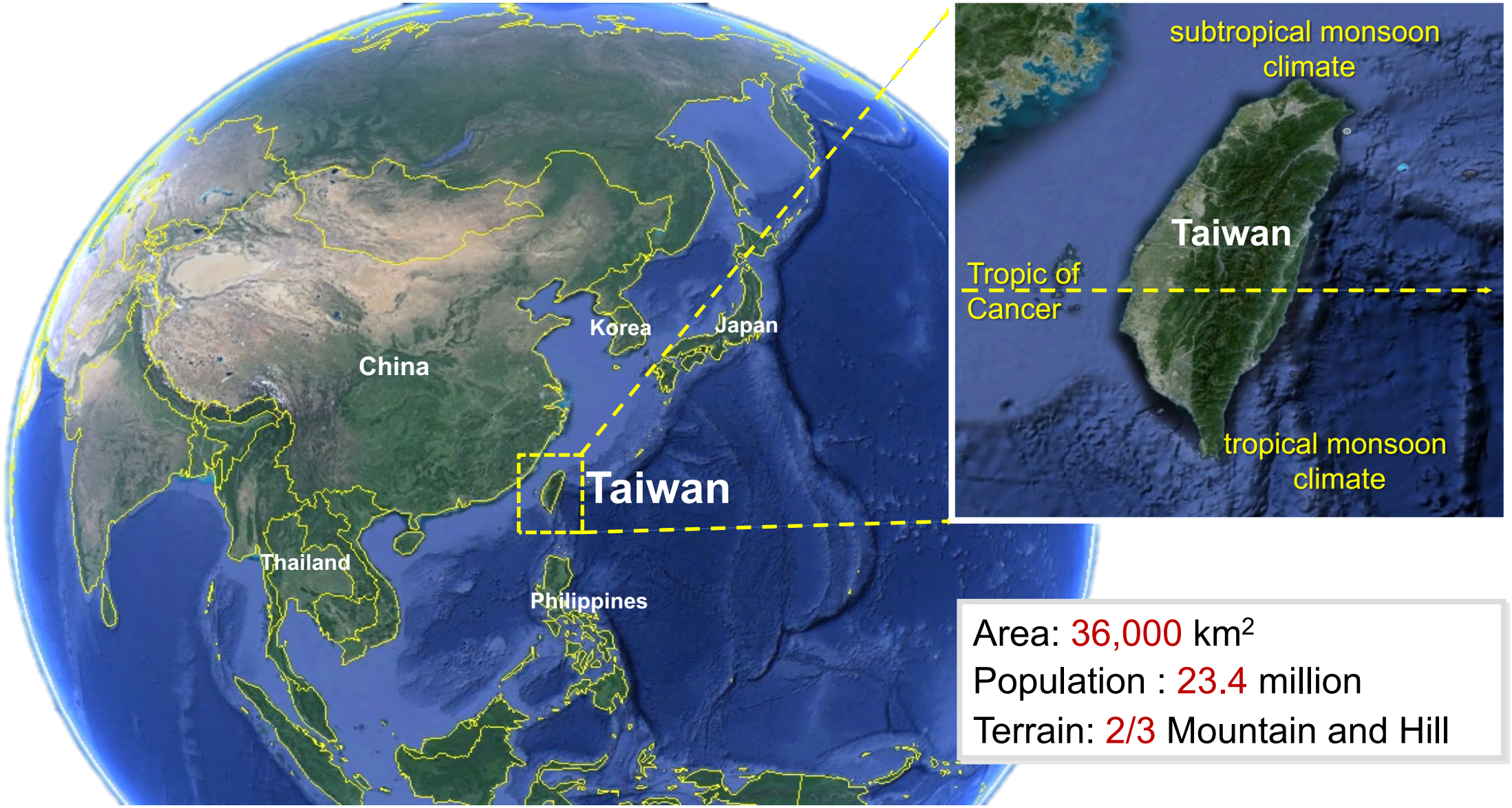
Ministry of Economic Affairs (MOEA) Taiwan

Vilnius, 11-12 February 2025

Contents

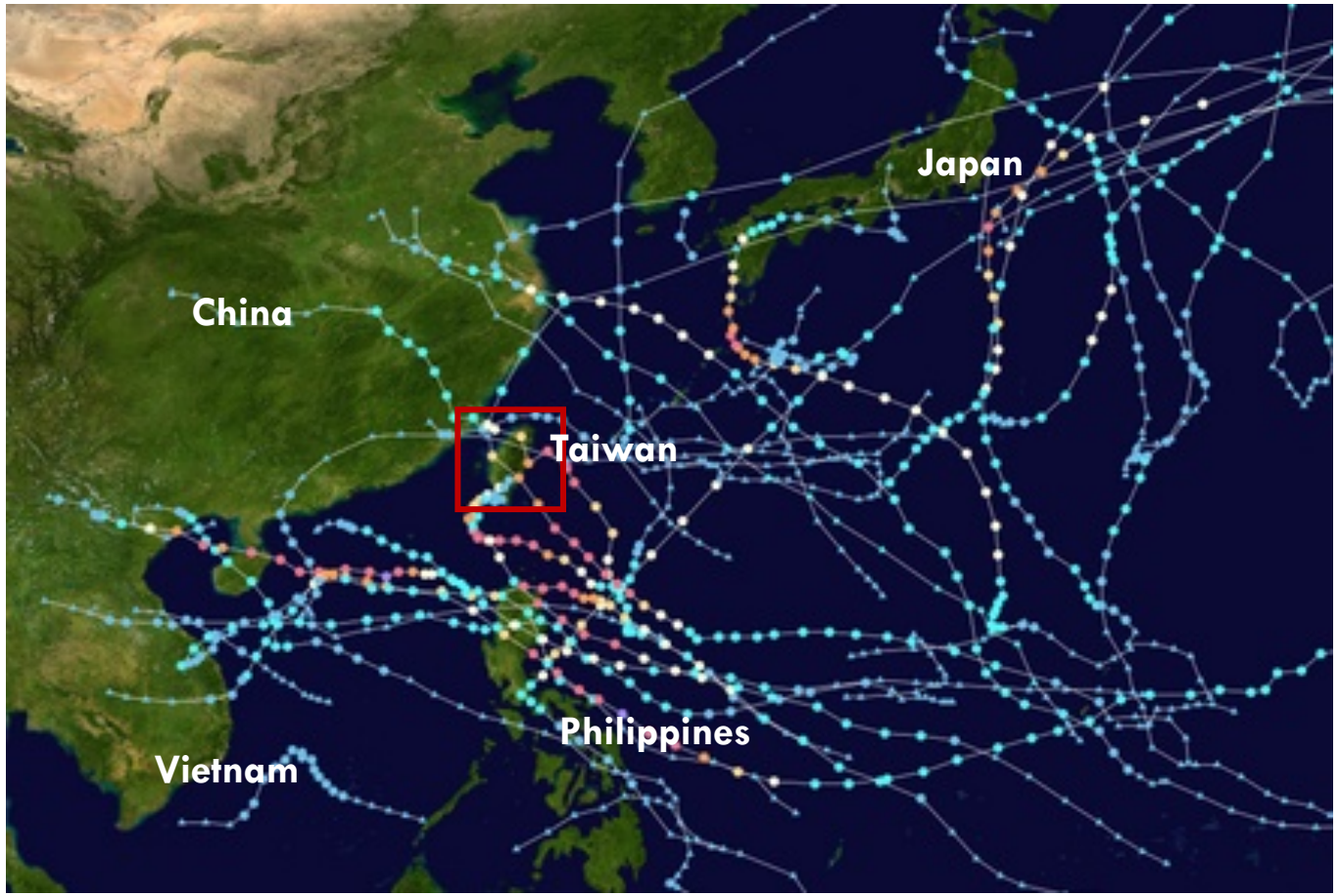
Geography / Population / Climate



Area: 36,000 km^2
Population : 23.4 million
Terrain: 2/3 Mountain and Hill

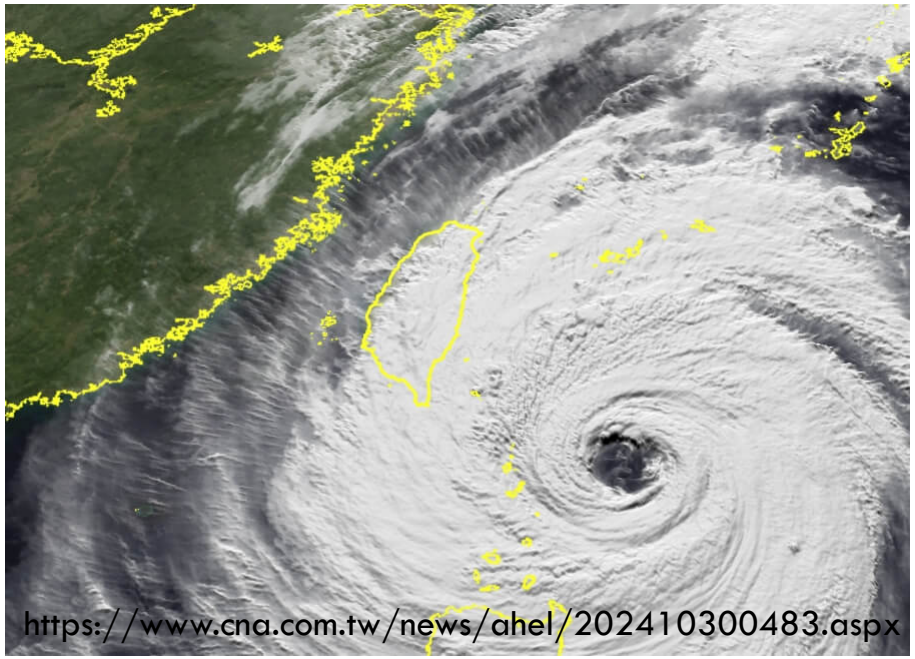
Taiwan - s Water Environment

Climate / Typhoons



2024 Western North Pacific Typhoon Summary: 26-4

(https://commons.wikimedia.org/wiki/File:2024_Pacific_typhoon_season_summary.png)

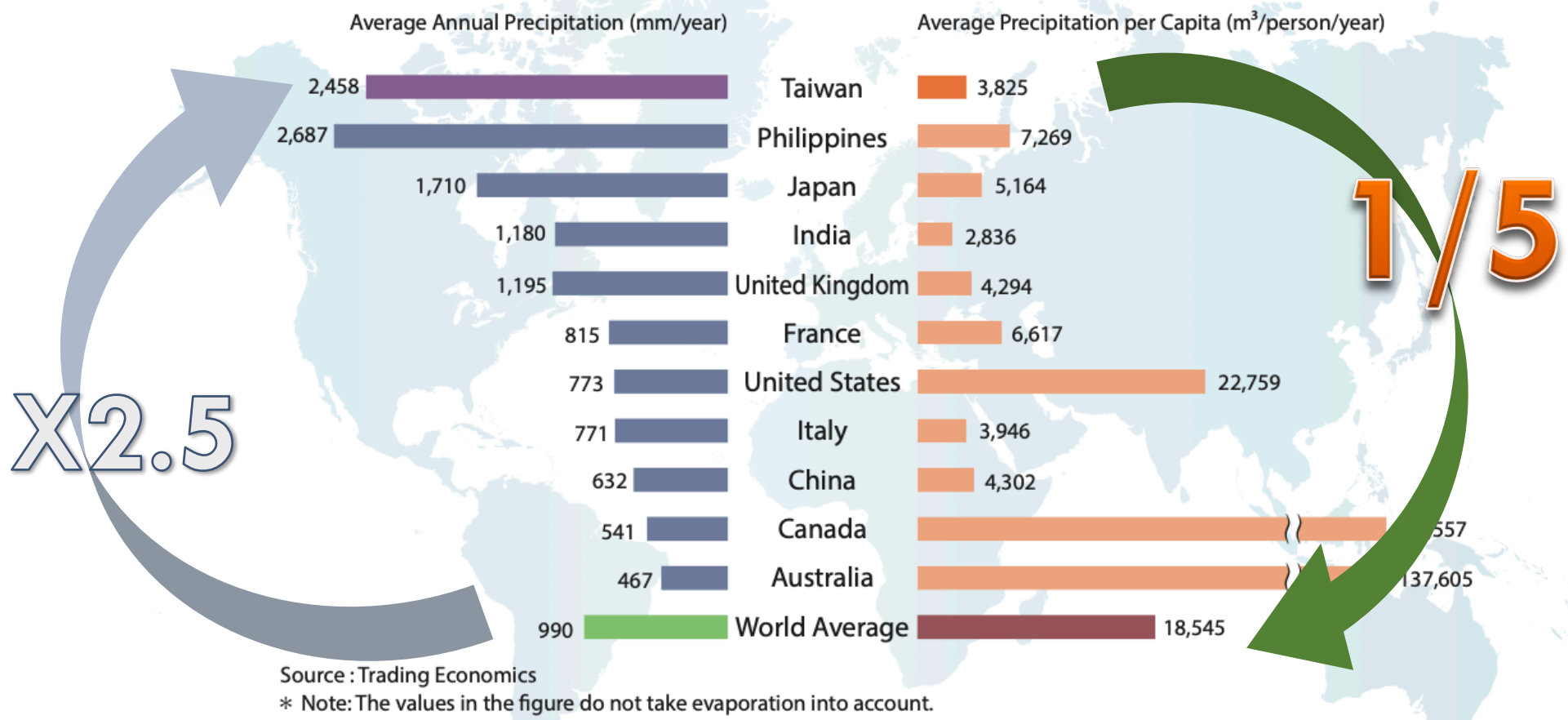


Typhoon Kong-rey on October 30, 2024, equivalent to a category 4 hurricane

Taiwan - s Water Environment

Annual Precipitation

Taiwan's average annual precipitation is around **2,458 millimeters**, which is approximately **2.5 times** the global average.



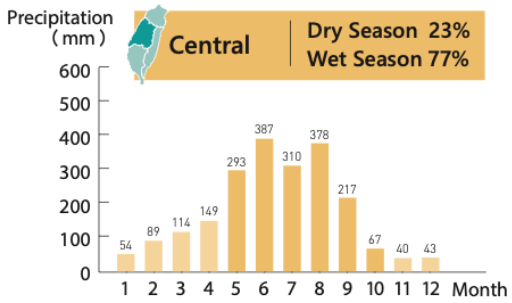
Source : Trading Economics

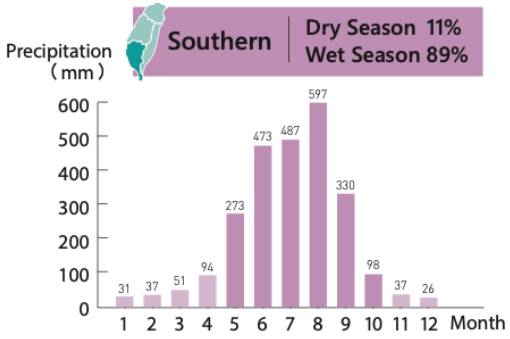
* Note: The values in the figure do not take evaporation into account.

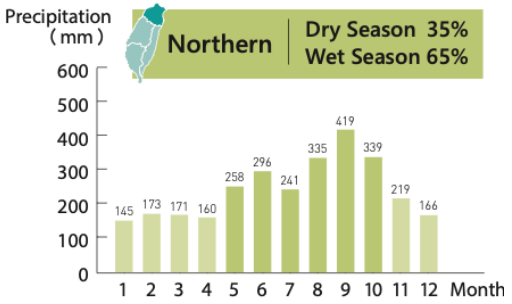
Taiwan - s Water Environment

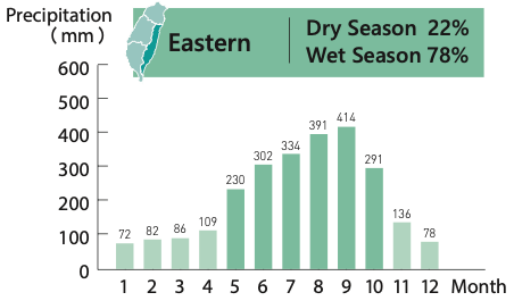
Characteristics of Precipitation

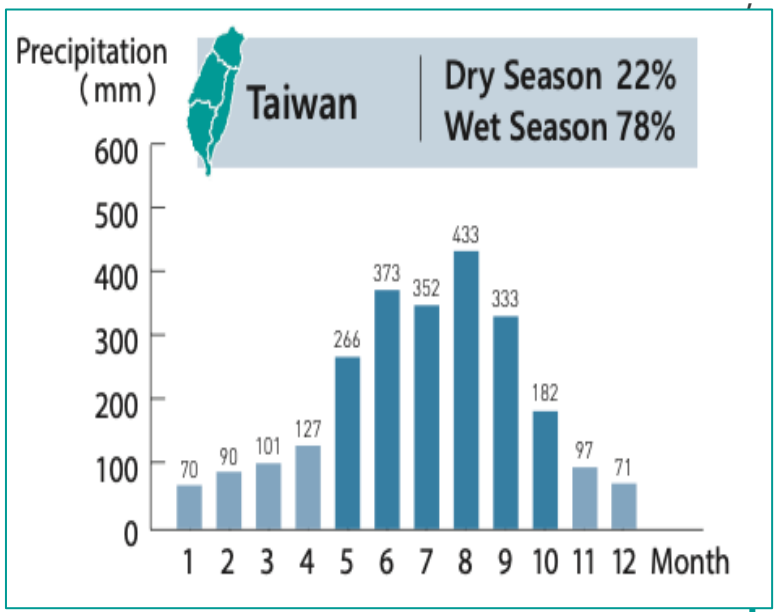
Uneven rainfall distribution in time and space – 78% in Wet Season









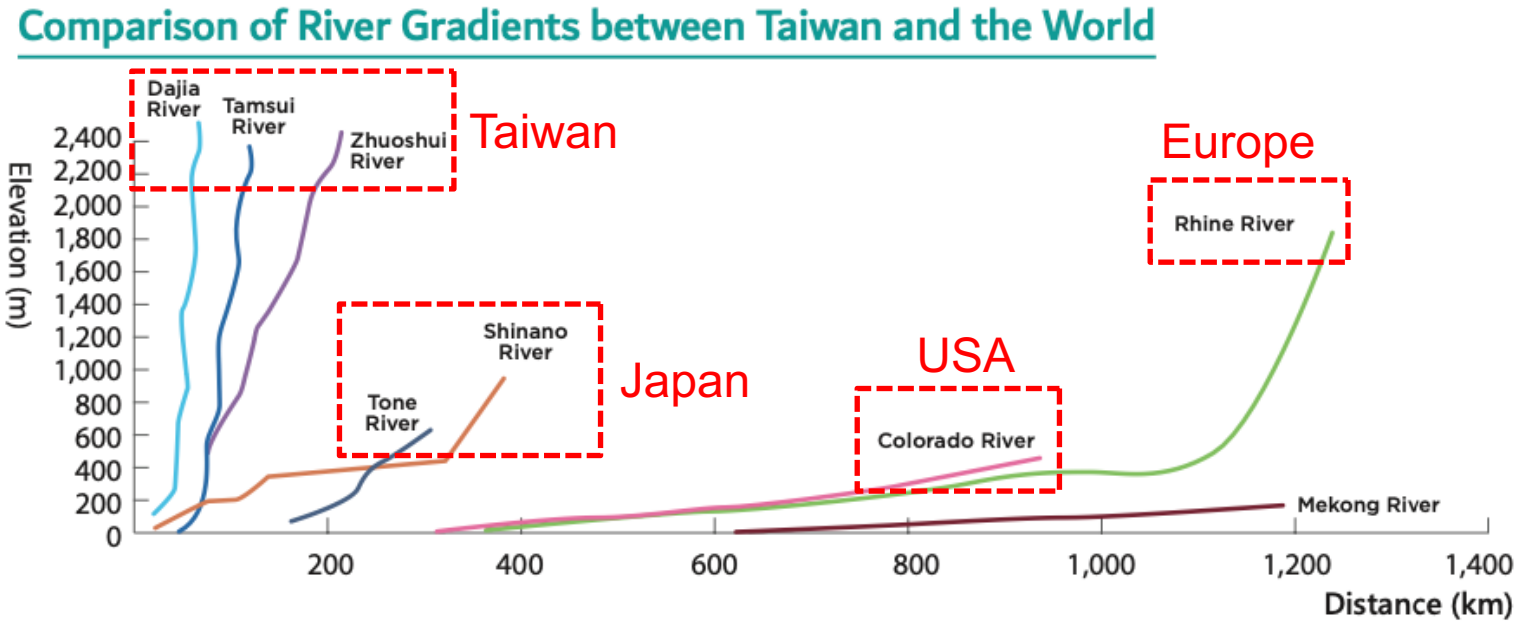


Taiwan's average annual precipitation during 1949 to 2023

*The wet season is from May to October, and the dry season is from November to April.

Steep River Slopes

- Short river with steep slopes **(1/100~1/500)**
- Weak geology of watershed
- Soil poorly Consolidated
- Rapid flow with high sediment concentration



Taiwan - s Water Environment

Reservoirs as a Key Water Management Strategy

Total 95 Reservoirs

with 66 located on the main island of Taiwan and 29 on the outlying islands

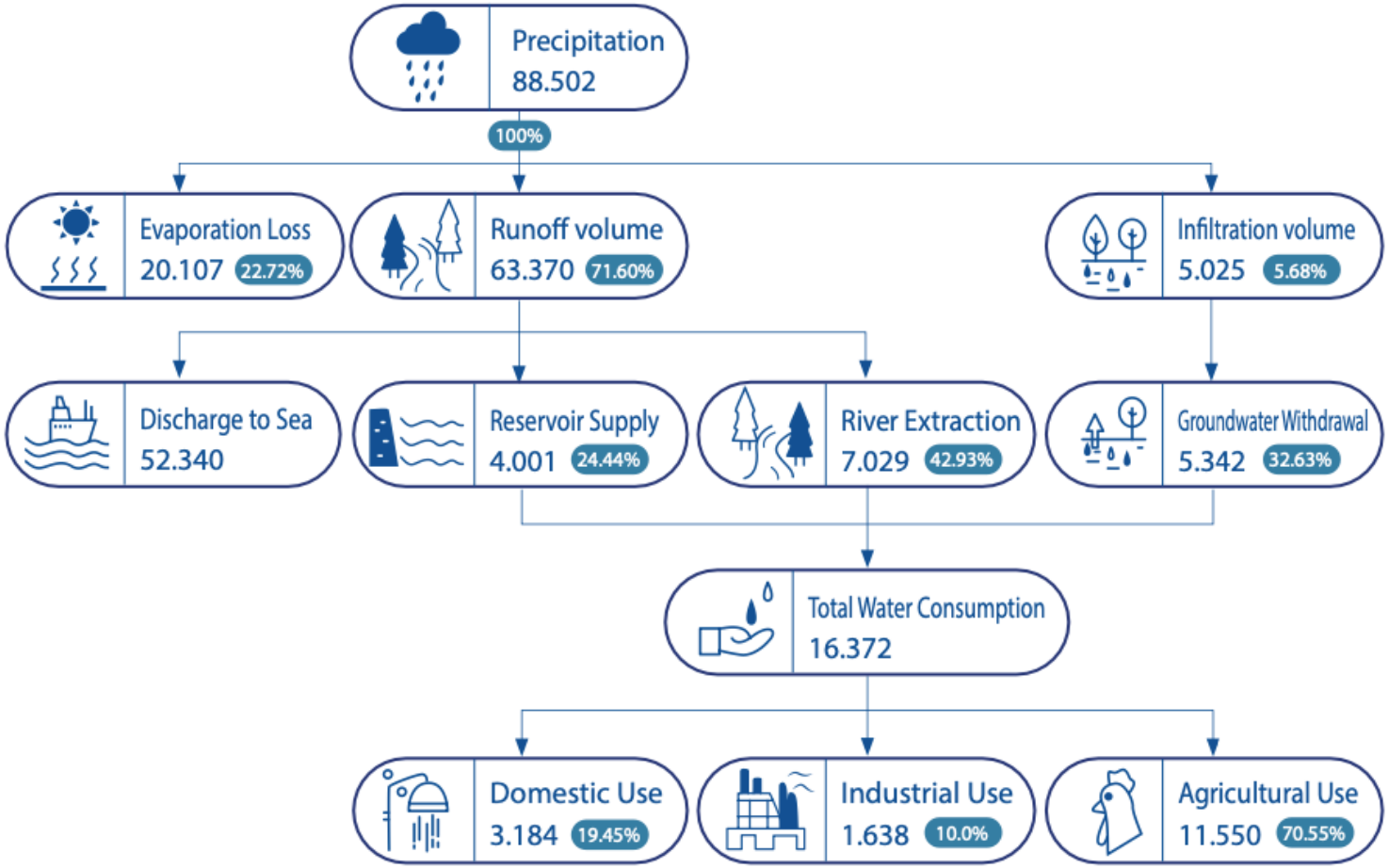
27 Major Water Supply Reservoirs

The largest is the Zengwen Reservoir, with an effective capacity of 504.75 million m^3.

Taiwan - s Water Environment

Water Supply and Usage

Rivers as the Largest Supply Source; Agriculture as the Largest Water User



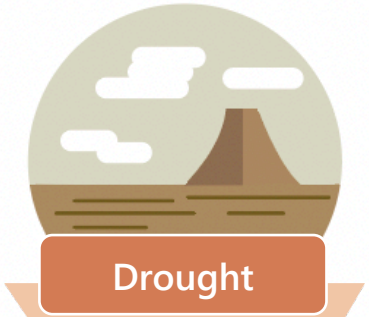
Average Water Resources and Utilization during 2013-2022

Taiwan - s Water Environment

Future Challenges

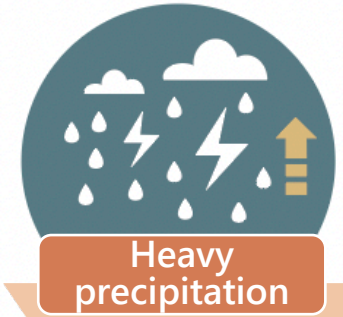
Challenges 1

Climate Change



Drought

Increases the number of days without rain



Heavy precipitation

Increases precipitation intensity

Extreme Weather Event

Typhoons will decrease in number, but increase in their intensity

Challenges 2

Increased Pressure on Water Supply Due to Industrial Development and Population Concentration

① Population distribution is changing, gradually concentrating in the northern, central, and southern metropolitan areas, which results in increased pressure on water supply in these urban areas.

② In addition, the continued growth of high-tech industries is driving further increases in water demand.

Challenges 3

Increased Public Awareness of Water Environment

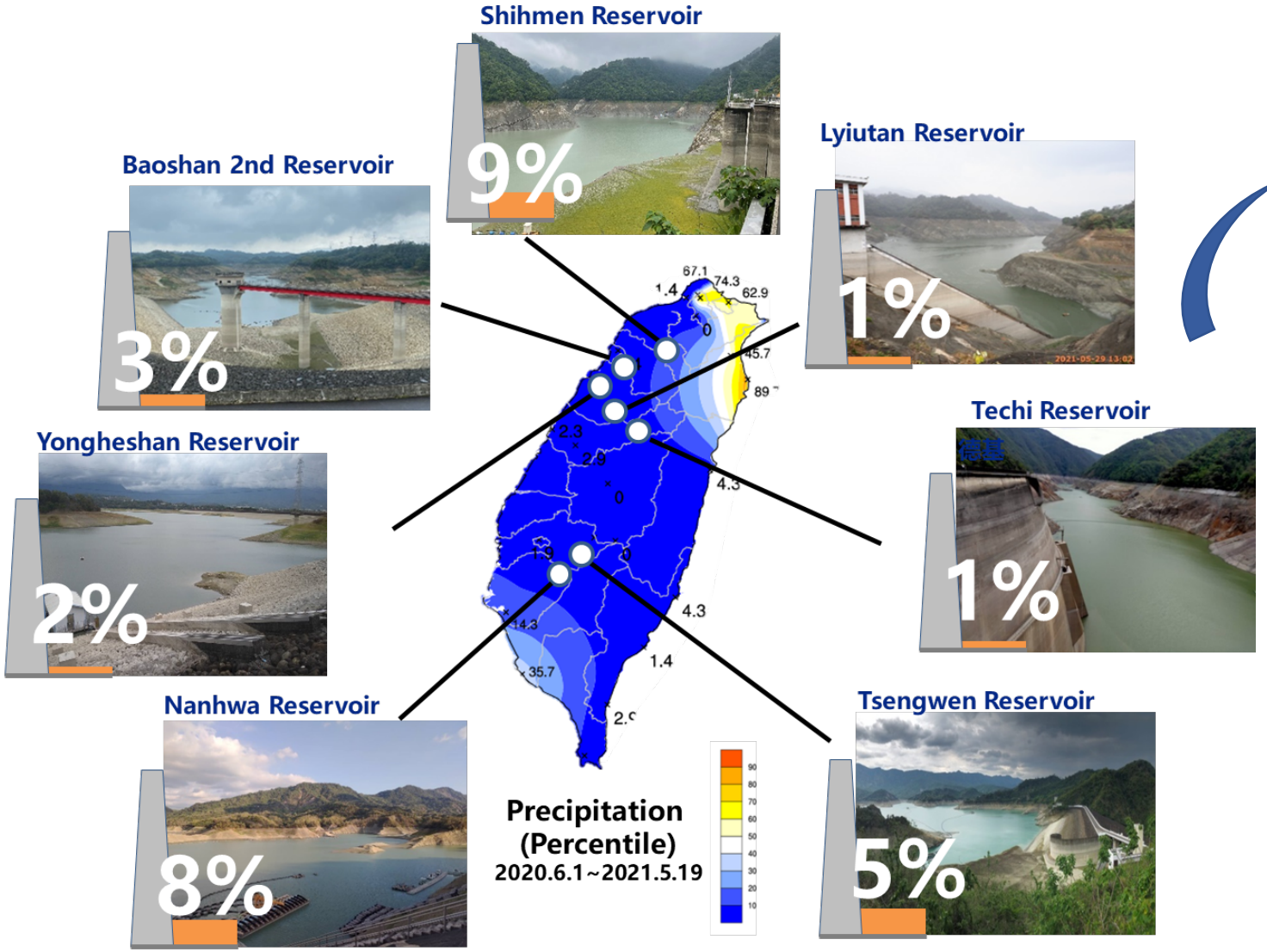
① Water management efforts should put water quality improvement, river habitat preservation, environmental conservation, cultural landscape, and natural scenery into consideration.

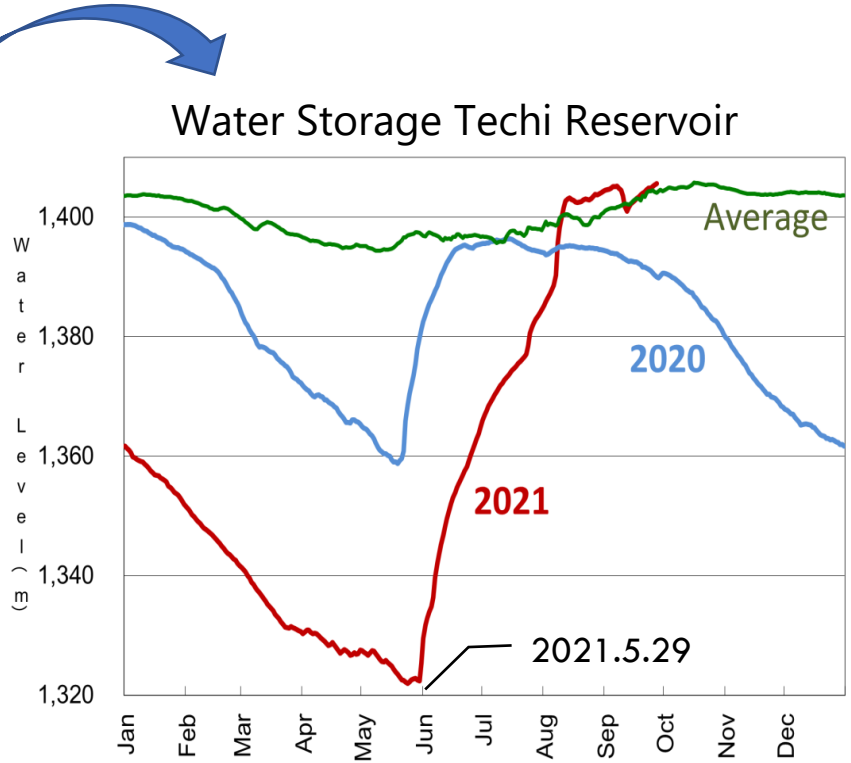
② The goal is to enhance the vitality of water environments and create water-friendly, scenic, recreational, and ecologically sustainable water environments.

Taiwan - s Water Environment


2
Ensuring Stable
Water Supply

Severe Drought in 2020- 2021





Ensuring Stable Water Supply

The Drought Caught the World's Eyes

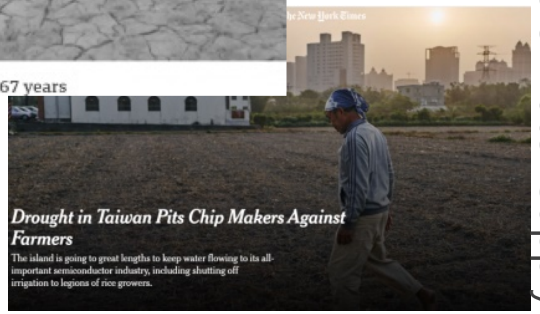
TOP BUSINESS NEWS (15 VIDEOS)

How island's historic drought could threaten the global economy

Taiwan has experienced one of its worst droughts in decades, with authorities limiting water supply as some reservoirs reported alarmingly low levels. The drough has threatened the island's valuable semiconductor industry, which could have global ramifications in the production of smartphones, cars and other electronic devices. CNN's Will Ripley talks to major companies like the TSMC on the challenge.

Source: CNN

Taiwan's worst drought in 67 years



Taiwan, the global chip manufacturing plant and home of TSMC, battles Covid and the climate crisis

Meteorologist lists 5 factors behind severe drought in Taiwan

Weather expert worries droughts will occur more frequently due to climate change

6079 Tweet 分享 分享 321

By Huang Tzu-ti, Taiwan News, Staff Writer
2021/05/24 10:33

AUTOS FEBRUARY 24, 2021 / 1:41 PM / UPDATED 4 MONTHS AGO

Chipmakers in drought-hit Taiwan order water trucks to prepare for 'the worst'

By Reuters Staff 2 MIN READ

TAIPEI (Reuters) - Taiwan chipmakers are buying water by the truckload for some of their foundries as the island widens restrictions on water supply amid a drought that could exacerbate a chip supply crunch for the global auto industry.

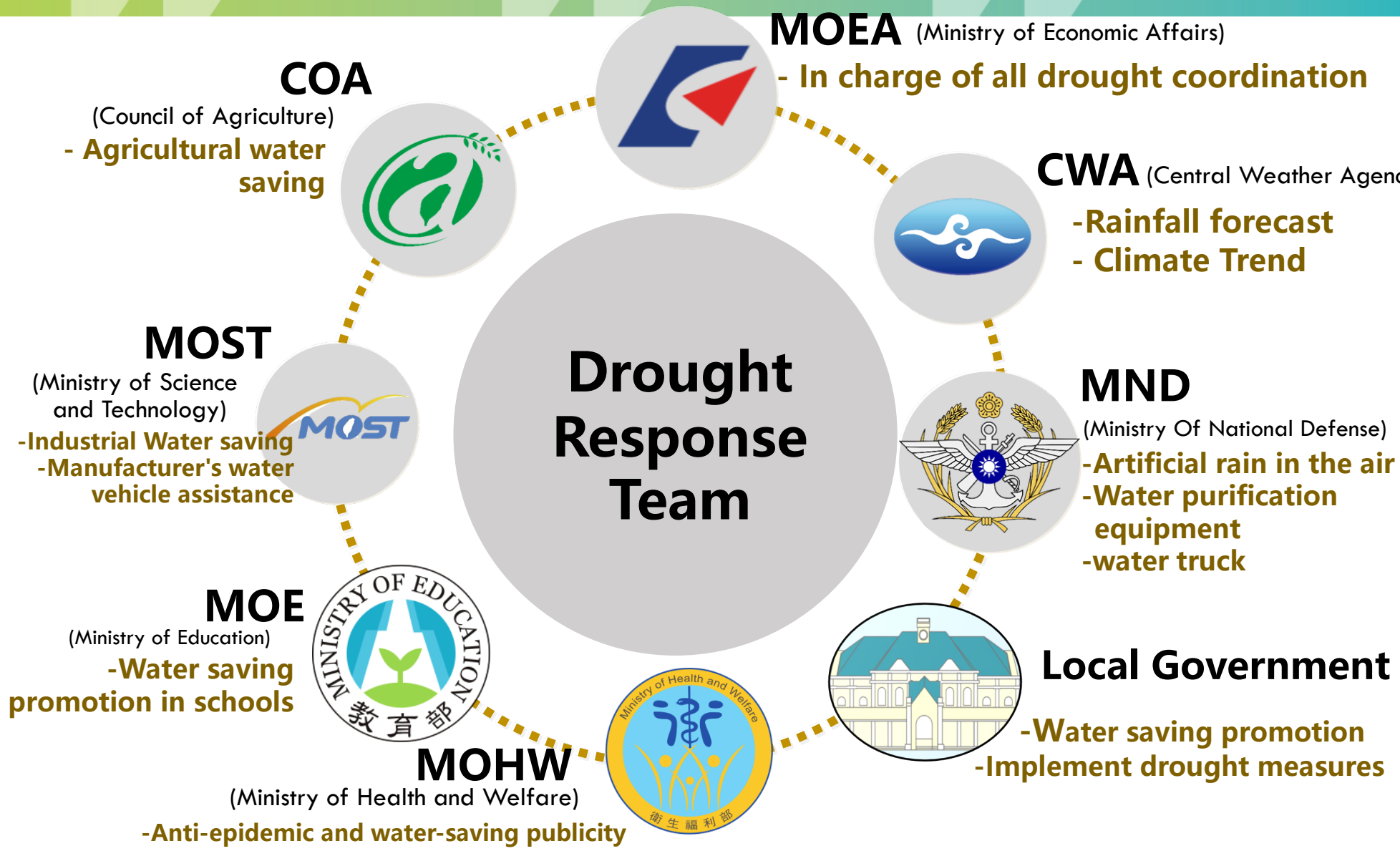
Ensuring Stable Water Supply

Drought Monitoring and Response

- ✓ - 13 Jul 2020：Countermeasures started
- ✓ - 16 Sep 2020：WRA Drought Emergency Response Team
- ✓ - 1 Oct 2020：MOEA Drought Emergency Response Team
- ✓ - 14 Oct 2020：The Central Emergency Operation Center

Ensuring Stable Water Supply

Drought Response Coordination



Ensuring Stable Water Supply

Drought Response Strategies

1 Save Water

2 Allocate Water

3 Find Water

Keep Water in Reservoirs

Increase 1.66 million m^3/day water supply to pass the drought successfully

Groundwater Wells

Hyporheic Flow

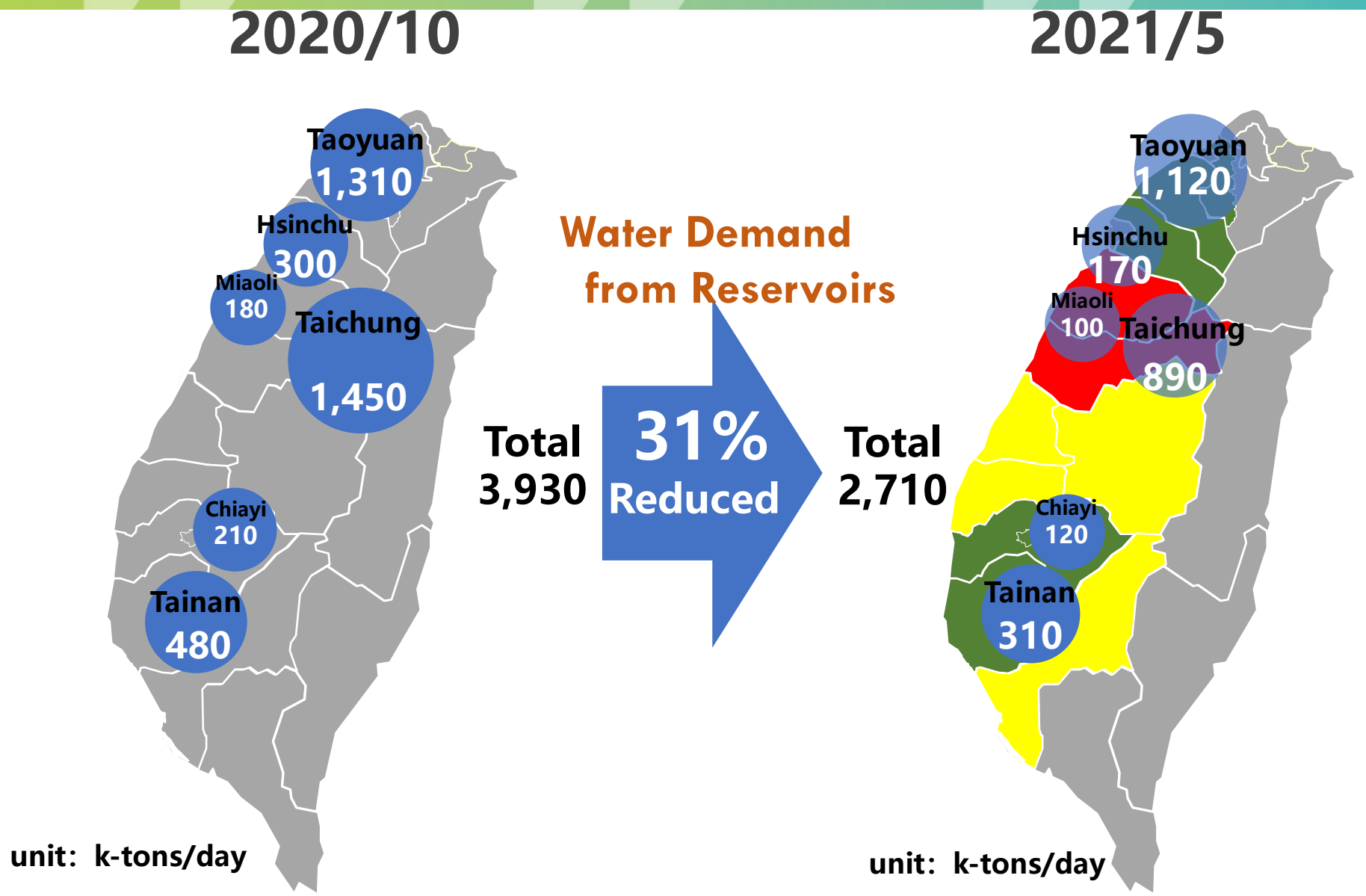
Desalination water

Groundwater from Construction Site

Inter-regional water supply pipeline

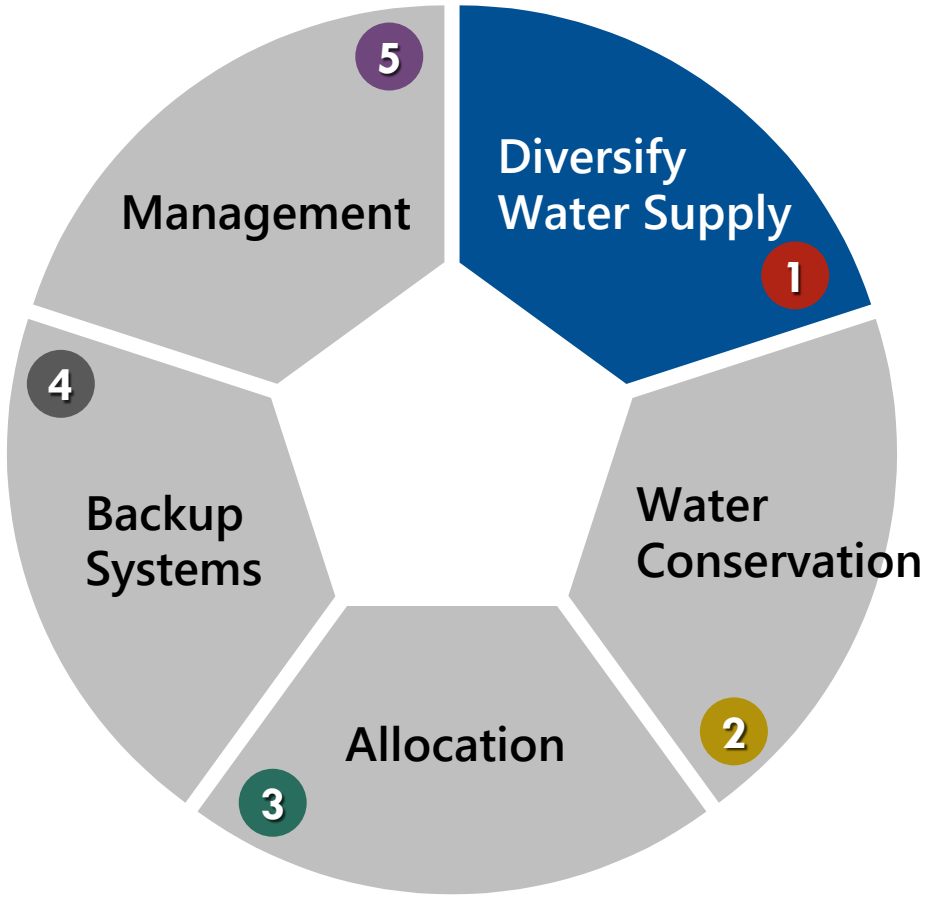
Ensuring Stable Water Supply

Outcomes of the Drought Response



Ensuring Stable Water Supply

Current Key Strategies to Ensure a Stable Water Supply



① Developed diverse water sources through the promotion of reclaimed water, seawater desalination, and constructing artificial lakes for water storage.

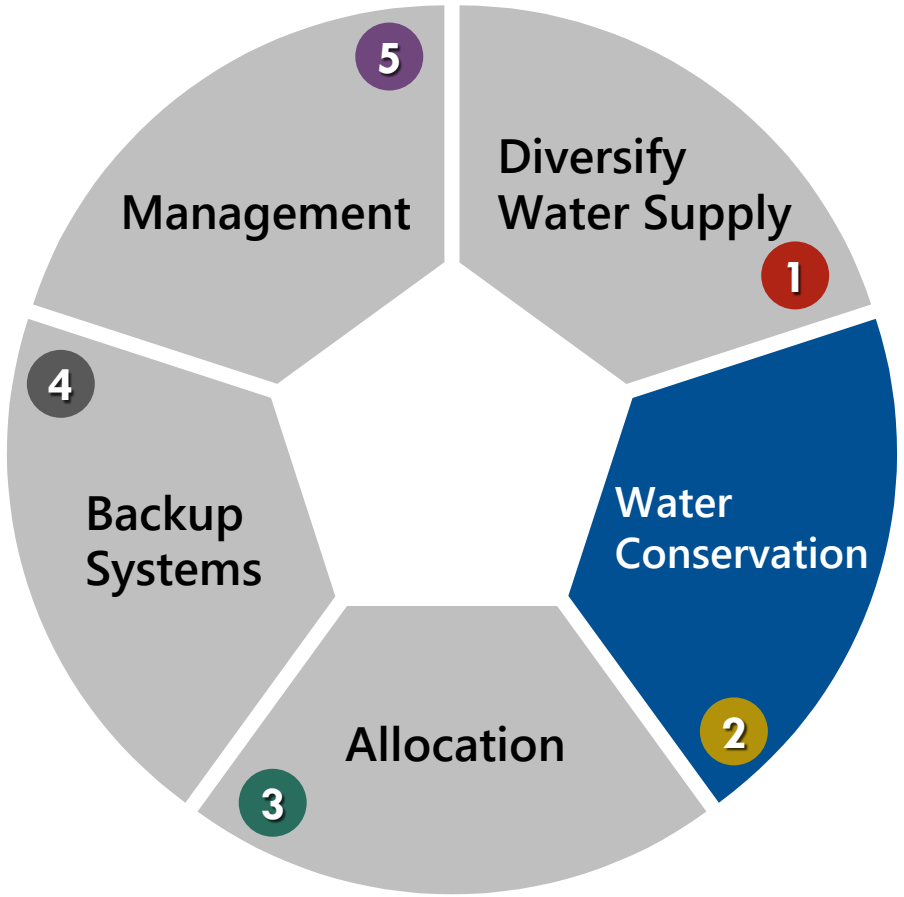
② Taiwan plans to establish 16 reclaimed water plants in the future to maintain regional water supply stability.

③ In addition to the facilities on the offshore islands, desalination plants are also planned in Hsinchu and Tainan.

(Left) Artificial Lake. (Right) 6000-ton Desalination Plant

Ensuring Stable Water Supply

Current Key Strategies to Ensure a Stable Water Supply



① Promoting Water Efficiency Labelling

② Reducing tap water leakage rates

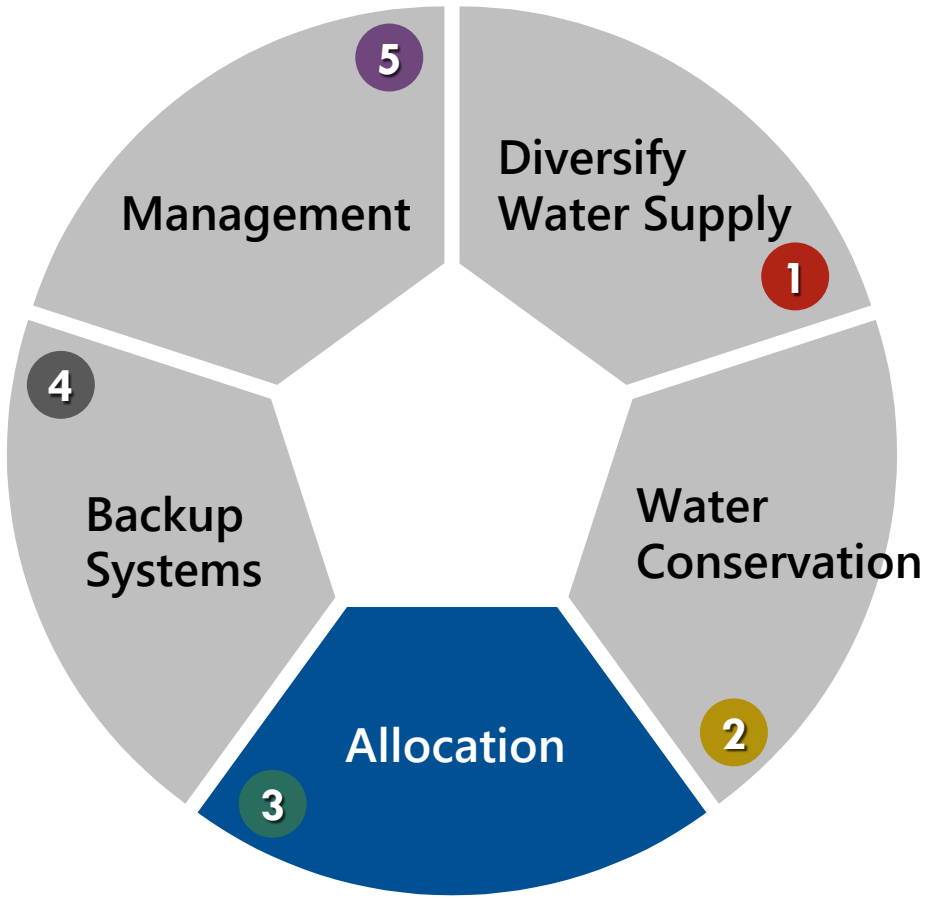
③ Strengthening agricultural water conservation

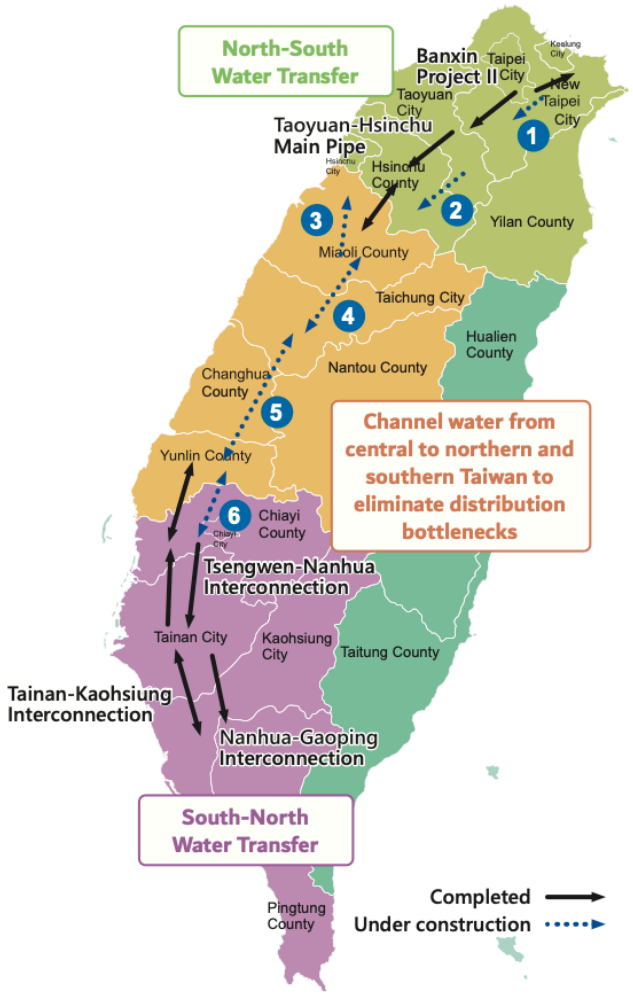
④ Improving industrial water recycling

⑤ Water Conservation Fee is imposed on high-volume water consumers

Ensuring Stable Water Supply

Current Key Strategies to Ensure a Stable Water Supply





Northern Region

Unit:1,000 Tons/Day

Expand the southward diversion of water from Xindian River

① Improve water supply network in Sanchong and Luzhou areas (Phase 1 in 2028 +65, full completion in 2031 +200)

② Interconnection pipeline from Shimen Reservoir to Hsinchu (To be completed in 2028, Shimen Reservoir backup for Hsinchu +300)

Central Region

Eliminate bottlenecks in central Taiwan

③ Liyutan water transfer to Miaoli (To be completed in 2025 +120)

④ Daan-Dajia River Interconnection (To be completed in 2026 +255)

⑤ Water allocation pipeline from Taichung to Yunlin (To be completed in 2026, expected allocation Taichung-Changhua +200, Yunlin-Changhua +120)

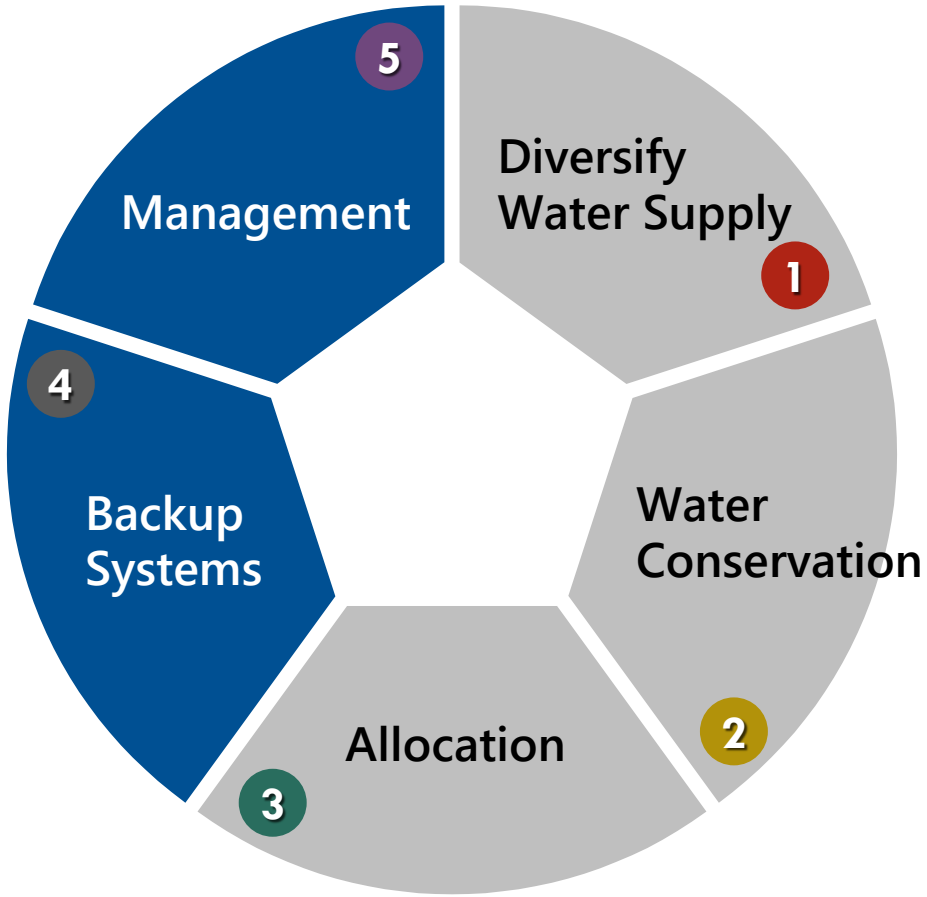
Southern Region

Expand north-south allocation, improve water resource utilization

⑥ Interconnect Zhuoshui Main Line and North Main Line (To be completed in 2025, expected to increase utilization of Tsengwen and Wushantou Reservoirs by 11 million tons/year)

Ensuring Stable Water Supply

Current Key Strategies to Ensure a Stable Water Supply



Backup Systems

① Develop subsurface water extraction systems

② Establish backup wells

Management

① Water supply monitoring、Reservoir sedimentation prevention and dredging are implemented to enhance storage capacity

② Watershed conservation and water source recharge

③ To strengthen water demand management through usage planning

Ensuring Stable Water Supply

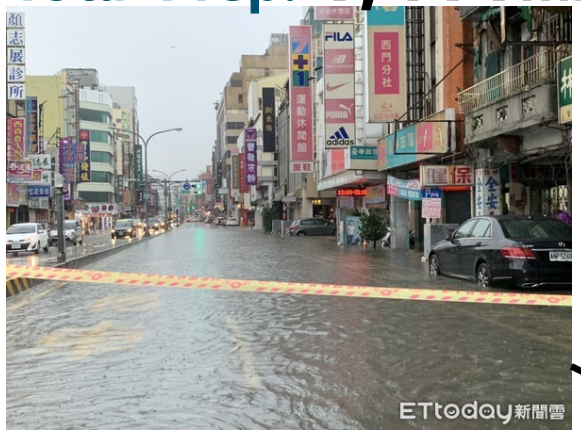

3
Improving Flood Resilience

From Drought to Heavy Rain in 2021…

From 2021.7.30-8.8

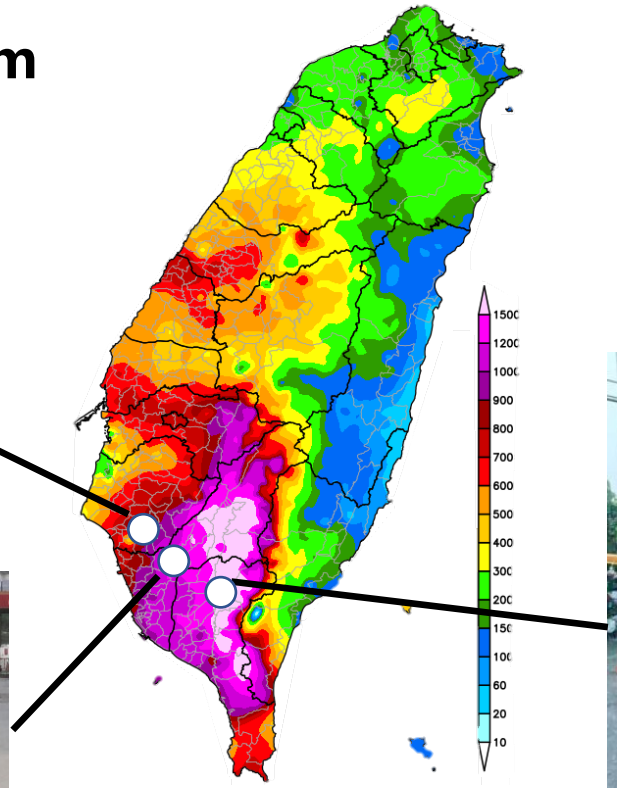
Tainan

Total Prep. 1,411mm



Kaohsiung

Total Prep. 2,313mm



Flooding Area: 774 ha

Pingtung

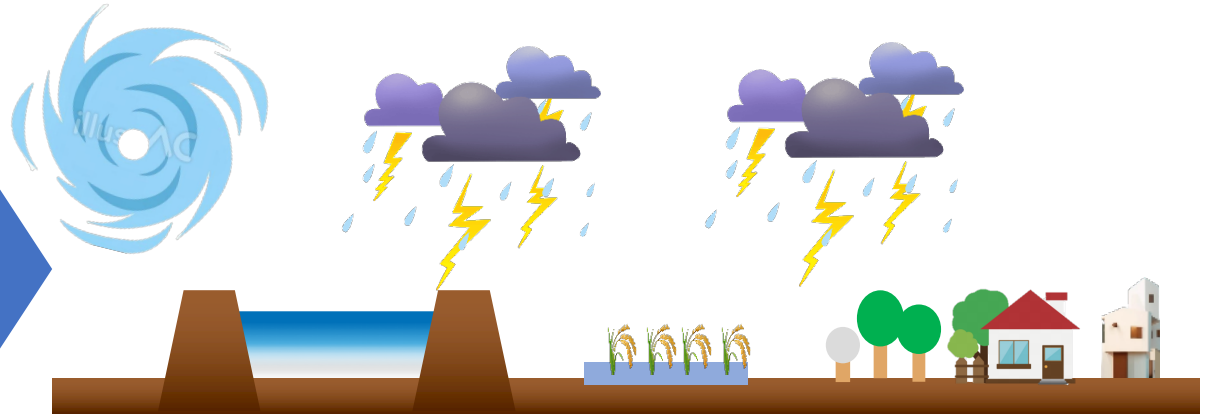
Total Prep. 2,427mm

Improving Flood Resilience

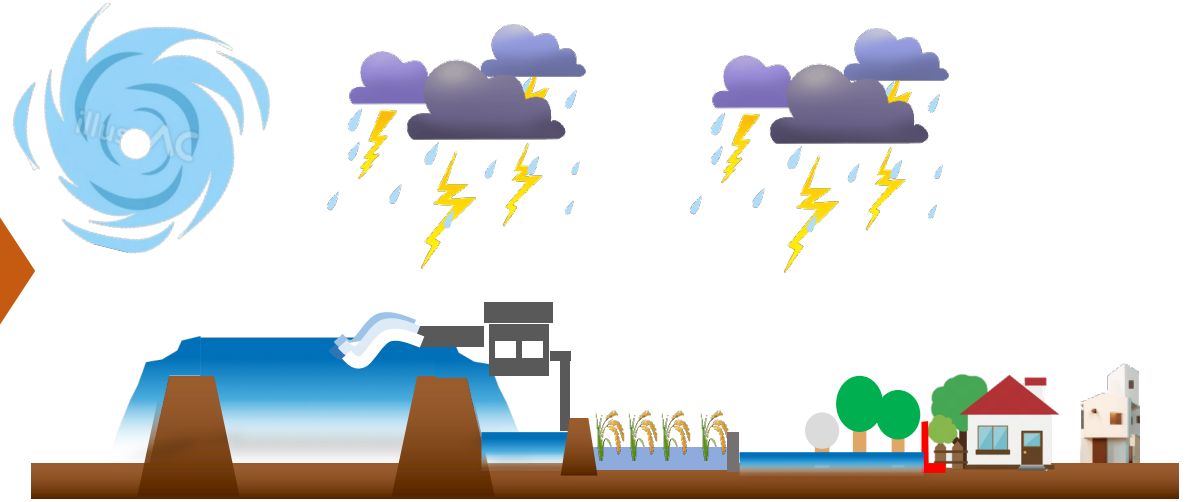
Digital Governance and Risk Management Strategies

Vision - Safe Water, No Disasters

No flooding under the protection standard

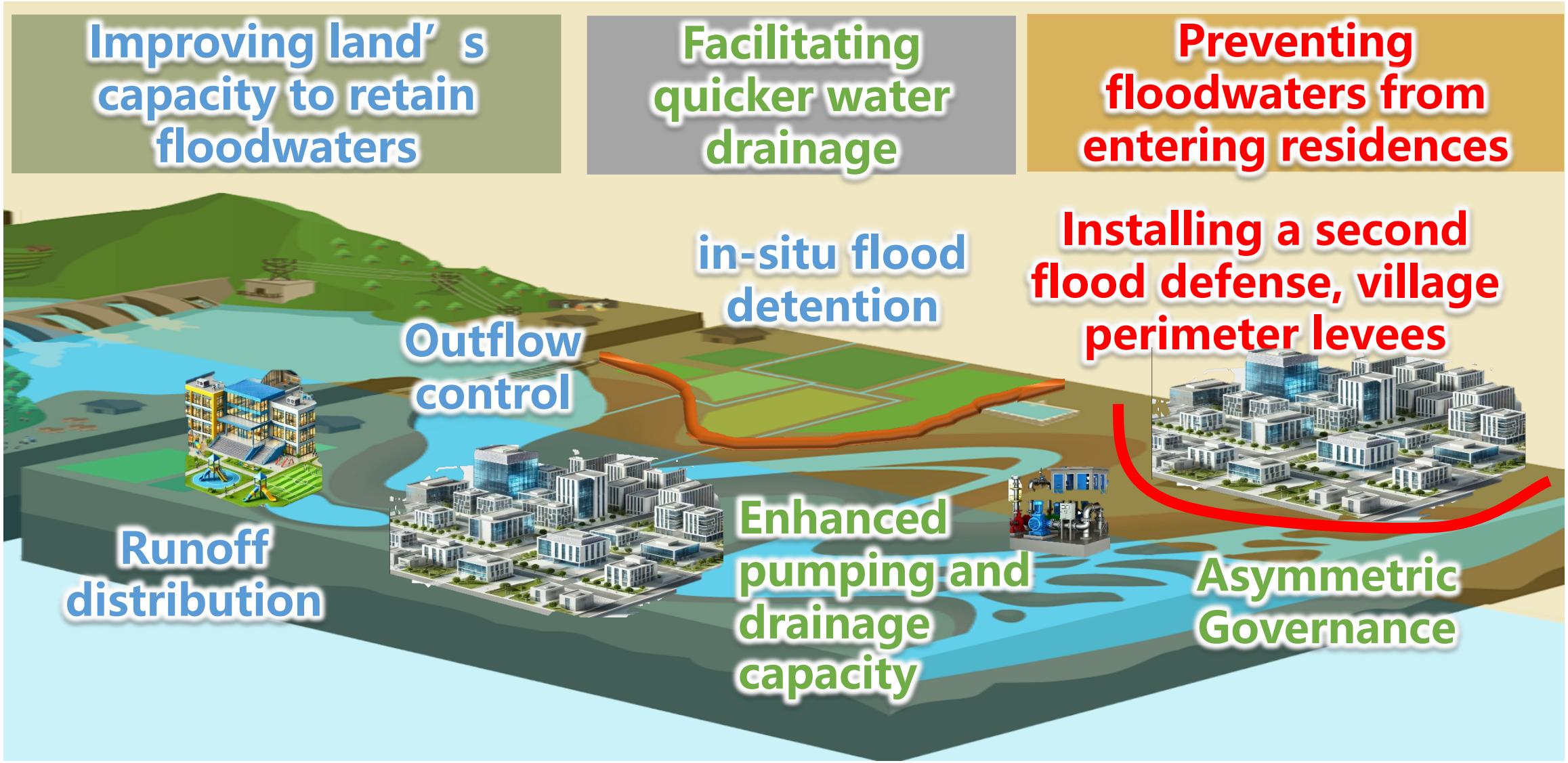


If standards are exceeded:
- Lower fatalities
- Minimize economic losses
- Enhance recovery speed



Improving Flood Resilience

Enhancing Flood Protection with Three Key Strategies



Improving Flood Resilience

Measures Taken for Flood Resilience

Flood Prevention and Mitigation

Carry out improvements in rivers administered by the Central Government, regional drainage systems, levees, and drainage channels.

Central Government

- 24 rivers administered by the Central Government, 2 inter-provincial rivers, with a management coverage rate of **90.55%**
- 35 centrally-administered regional drainage systems, with a management coverage rate of **81%**

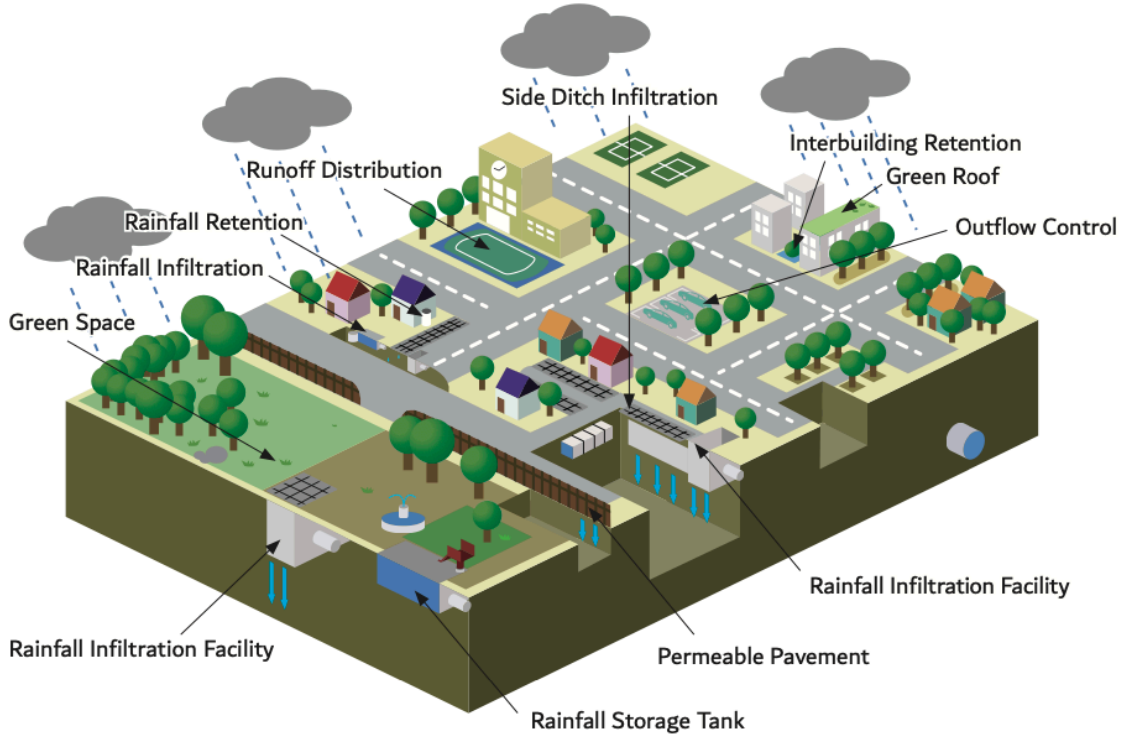
Local Governments

- 92 county/city-administered rivers, 1,663 county/city-administered regional drainage systems, with a management coverage rate of **42%**

*Note: Data as of the end of 2023.

Runoff Distribution

Distributing precipitation runoff within the watershed through waterways and land to share and reduce runoff burden, enhancing land flood resilience and reducing reliance on waterways for flood prevention.



Improving Flood Resilience

Enhancing Flood Protection with Three Key Strategies

Outflow Control

Reviews development projects and regulates developers to take social responsibility by installing flood mitigation facilities on-site to manage flood risk collaboratively.

In-situ Flood Detention

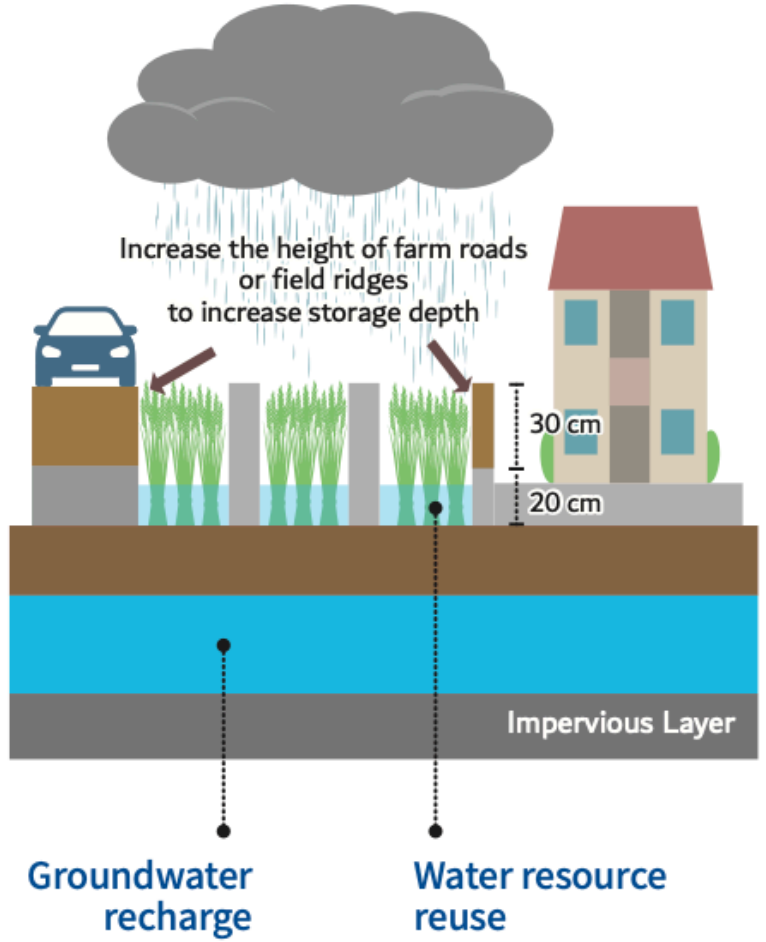
Raising embankments or road berms is used as a temporary flood control measure. By providing incentive and compensation, the Water Resources Agency encourages farmers to participate.

Asymmetric Governance

Targeted measures are implemented to strengthen adaptation capacity in high-risk areas based on local flood risk levels. Resources are also focused on improving flood-prone areas to achieve maximum benefits.

Public-Private Disaster Prevention Collaboration

By promoting the Self-Precaution Community Against Flood Project and the flood-protection volunteer brigade, disaster losses can be mitigated through self-help and mutual assistance.



Improving Flood Resilience

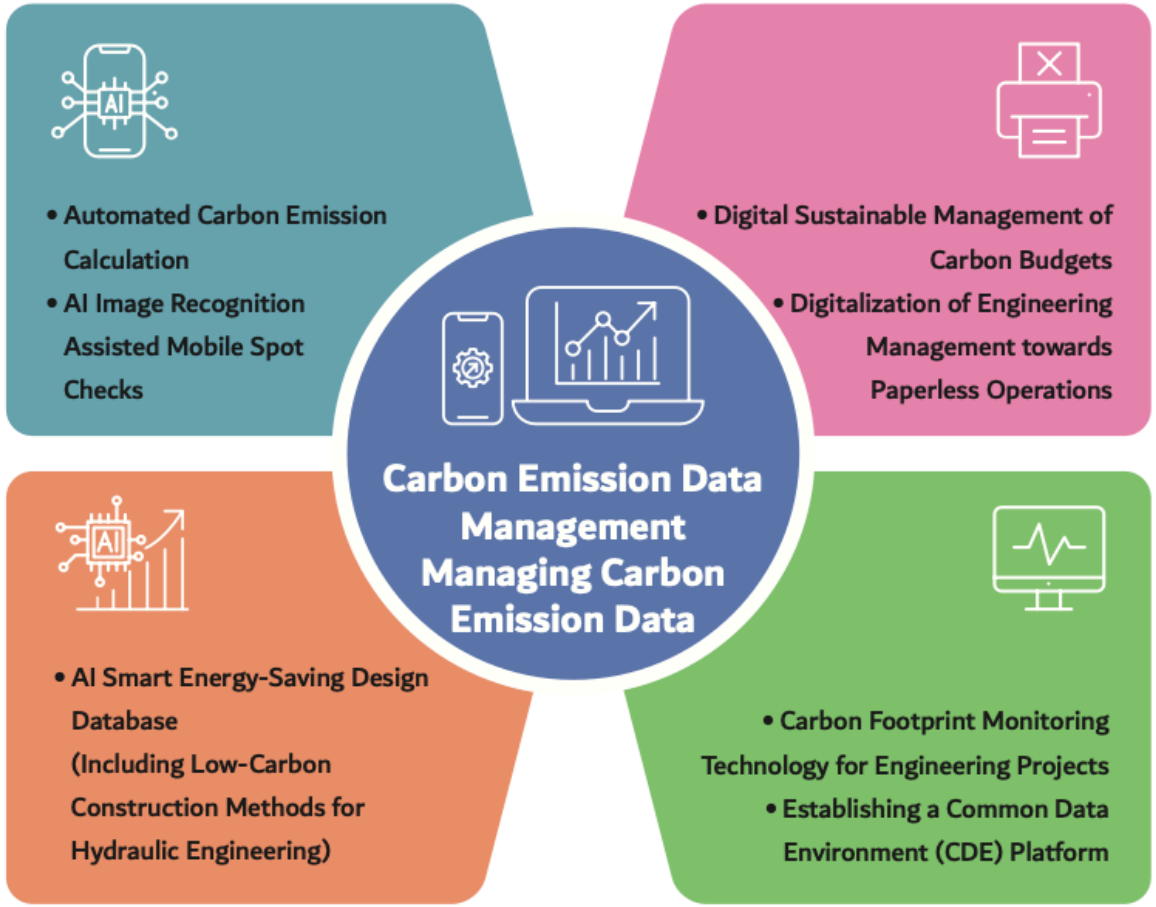

4
Sustainable
Water Future

Net-Zero Emissions and Ecological Conservation

Net-Zero Emissions

WRA is the 1st PAS2080 certified government agency in Taiwan

A smart carbon management platform is established to strive for net-zero emissions across all project lifecycles and achieve carbon neutrality through tree planting for carbon sequestration.



Ecological Conservation

avoidance	minimization
mitigation	compensation

Nature-based Solution, NbS

Sustainable Water Future

Water-friendly Environment and AI Applications

Water-friendly Environment

The Water Resources Agency aims to create natural water-friendly spaces and ecological habitats that integrate water and greenery, taking into account ecological needs while optimizing the water environment.

AI Applications

① Using digital management of flood risk maps and inundation potential maps improves flood warning accuracy.

② Real-time inundation information is collected through flood sensors and cloud-based water status monitoring platforms with AI-powered image recognition.

③ The Water Status Mobile App and the Water Resources Agency's AI robot Diana enable the public to access disaster prevention and response information promptly.

AI to identify flood information

Sustainable Water Future

Promoting ESG and International Cooperation

Implementing ESG

Micron Technology

① In 2022, signed an agreement to collaborate on the dredging of Shihmen Reservoir, extending the reservoir's lifespan.
② In 2023, signed an MOU to expand the scope of collaboration, focusing on the development of water resource restoration, river conservation, and coastal environment maintenance.

TSMC

① signed a letter of intent to initially address the windblown sand issues affecting the Zhuoshui River area.
② In the future, the collaboration will extend to projects such as afforestation, dust suppression, and coastal protection, with the aim of promoting flood control, water management, and water environment improvement.

International Cooperation

By actively exchanging and cooperating with countries such as the US, Japan, the Netherlands, and Germany, the Water Resources Agency regularly hosts international water resources forums.

International water forum are regularly hosted in Taiwan

Sustainable Water Future

Thank You

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