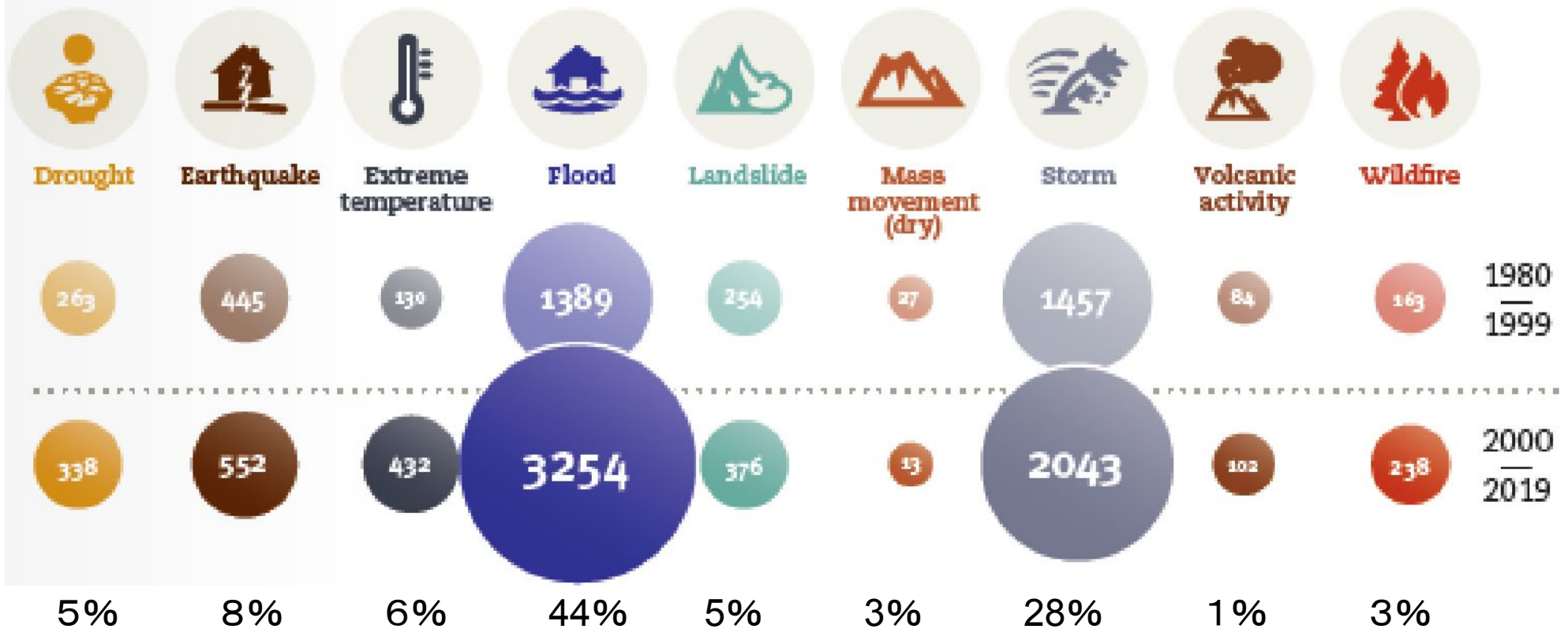


Water-related Disaster Risk Reduction Considering Climate Change
- Transition to River Basin Disaster Resilience and Sustainability by All -

Water and Disaster Management Bureau,
Ministry of Land, Infrastructure, Transport and Tourism, JAPAN

Disaster Events by Type in the World

Total disaster events by type: 1980-1999 vs. 2000-2019

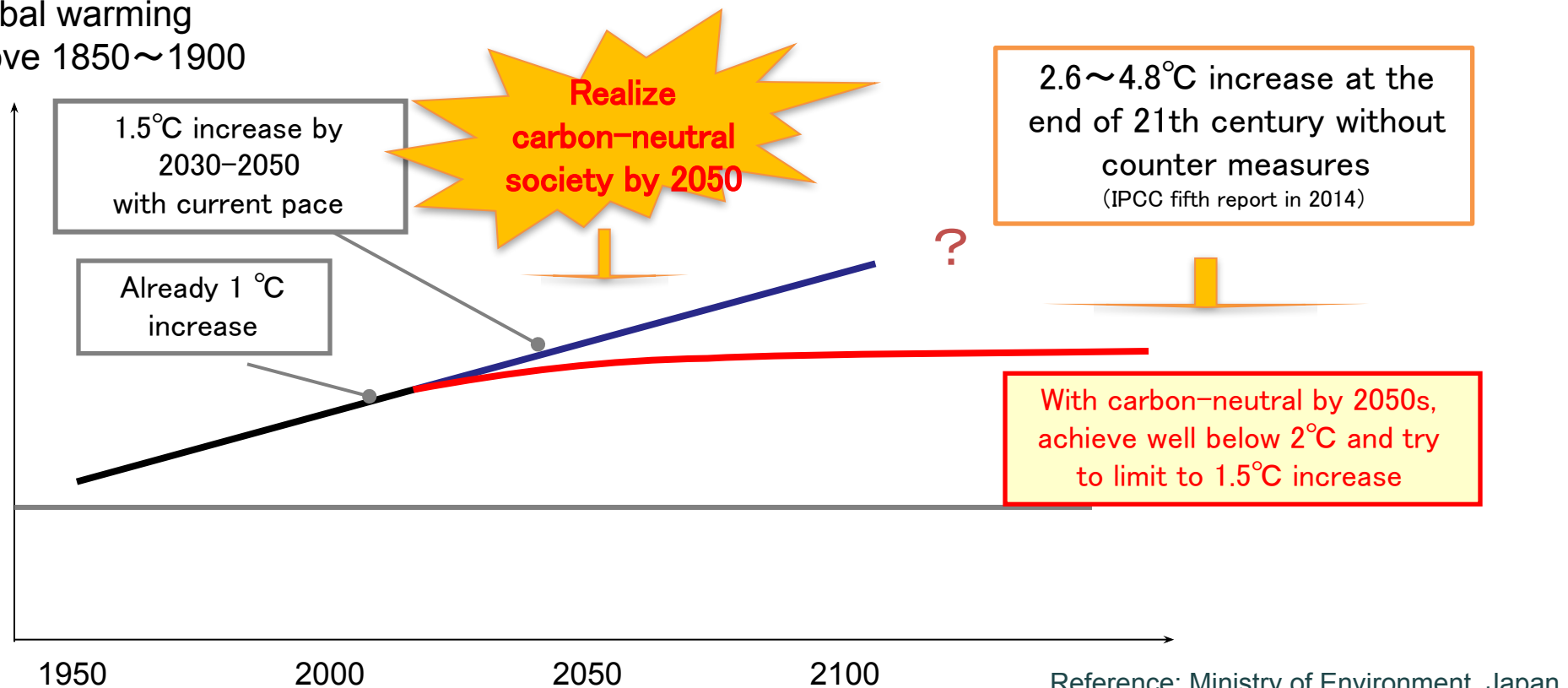


Water-related disasters (flood, storm, landslide, drought) weigh more than 80% of disaster events.

Challenge for Climate Change

- The Paris Agreement, legally binding international treaty on climate change, was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015, and entered into force on 4 November 2016.
- In 2020, Japan declared to aim to realize a carbon-neutral, carbon-free society by 2050.

Global warming
above 1850~1900

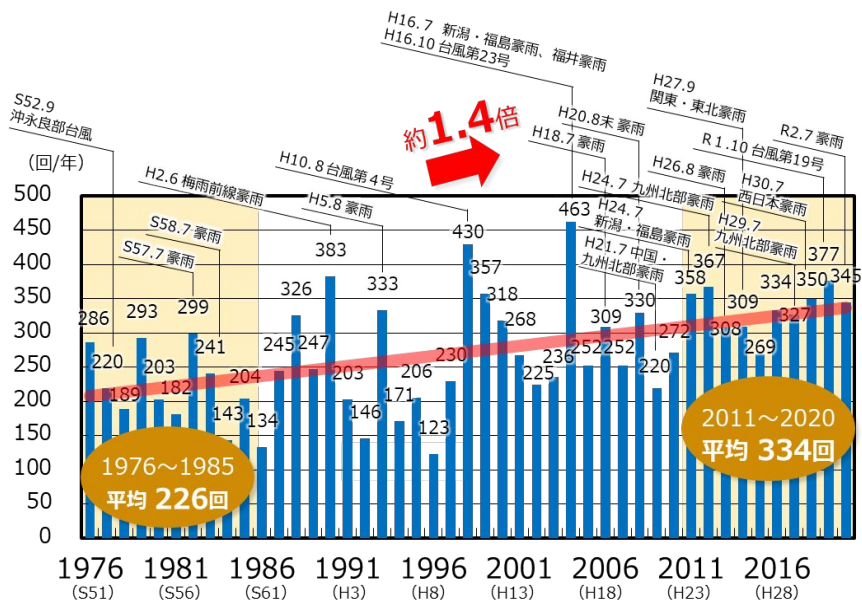


Impact of Climate Change becoming Apparent

- Occurrence of intense heavy rainfall events is increasing.
- Sea surface temperature rise may increase disasters by typhoon.

Increased Heavy Rain Events

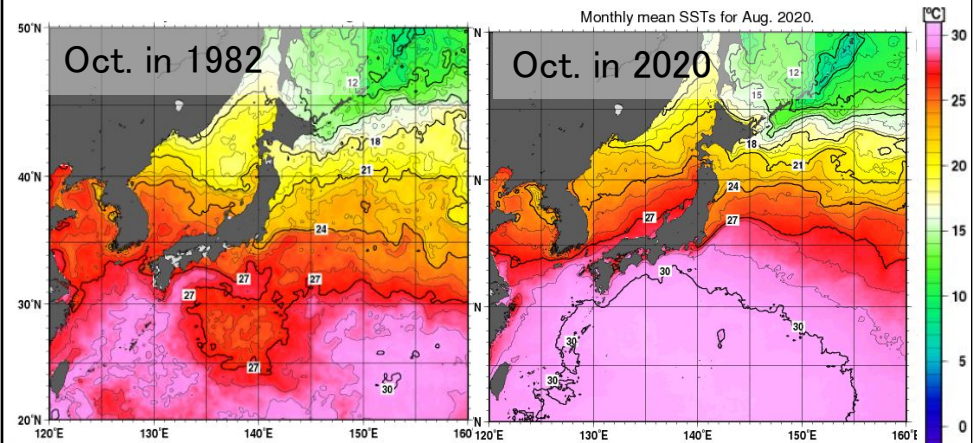
Change in Frequency of Heavy Rain Events
(Over 50mm/hour)



Reference: Japan Meteorological Agency

Sea Surface Temperature Rise

Change in Sea Surface Temperature
(Spreading Sea Surface Area over 27°C)



Reference: Japan Meteorological Agency

Recent Natural Disasters across Japan

2015 to 2017

Heavy Rain in the Kanto and Tohoku Regions
(September 2015)



① Inundation (The Kinu River)
(Joso-city, Ibaraki)

Kumamoto Earthquake (2016)



② Landslides
(Minamiaso-village, Kumamoto
Prefecture)

Typhoon Lionrock (August, 2016)



③ Inundation (The Omoto River)
(Iwaizumi-town, Iwate Prefecture)

Heavy Rain in the Northern Kyushu Region
(July, 2017)



④ Inundation (The Katsura River)
(Asakura-city, Fukuoka)

2018

Heavy Rain (July)



⑤ Inundation (The Oda River)
(Kurashiki-city, Okayama)

Typhoon Jebi (September)



⑥ Inundation at the Kobe Port
(Kobe-city, Hyogo)

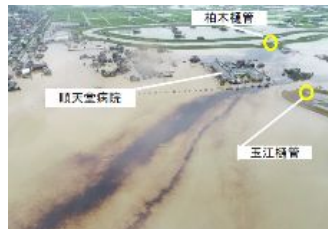
Eastern Iburi Earthquake



⑦ Landslides
(Atsuma-town, Hokkaido)

2019

Heavy Rain (August)



⑧ Inundation (The Rokkaku River)
(Omachi-town, Saga Prefecture)

Typhoon Faxai (September)

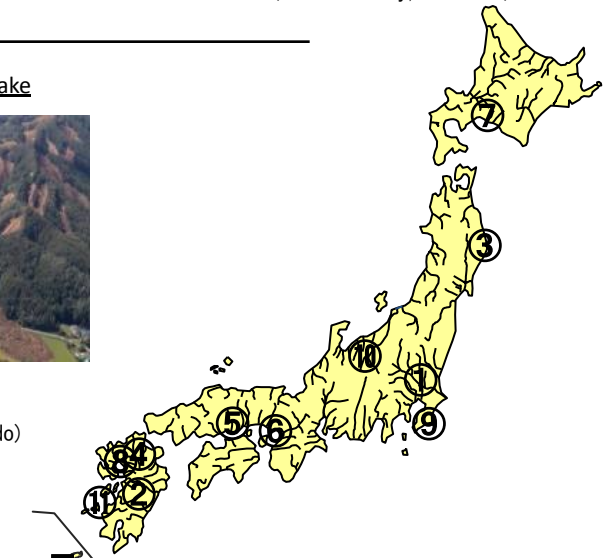


⑨ Collapsing utility poles
and trees
(Kamogawa-city, Chiba)

Typhoon Hagibis (October)



⑩ Inundation (The Chikuma
River)
(Nagano-city, Nagano)



2020

Heavy Rain (July)



⑪ Inundation (The Kuma River)
(Hitoyoshi-city, Kumamoto)

Direction of River Basin Disaster Resilience and Sustainability by All

- Comprehensive and Multi-layered Water-related Disaster Risk Reduction Considering Climate Change -

- **Shift to mainstream disaster prevention and mitigation for society**
- Promote the transition to River Basin Disaster Resilience and Sustainability by All, including businesses and households

Conventional Measures

- Rebuilding Flood-Conscious Societies
- Combination of Structural and Non-structural Measures

Changes

Impacts of Climate Change

Need to enhance measures for early improvement of safety

Social Trends

Need to achieve safe and secure Compact Plus Network urban planning

Technological Innovation

Need to utilize 5G, AI, Big Data, and IT technologies in disaster risk reduction

Important Perspectives for Measures

Resilience

Inclusion

Sustainability

Future Measures

Revise plans
considering climate change

Transition to **River Basin Disaster Resilience and Sustainability by All**

Revising Plans Considering Climate Change

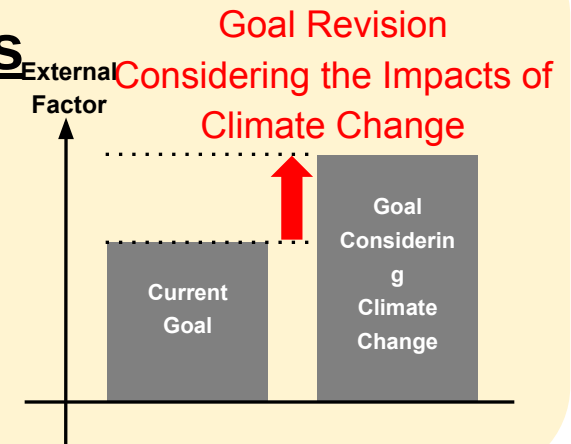
Plan Revision

The current defense plans against floods, etc. were developed based on past records of precipitation and tide levels

However,
they may not be able to secure safety considering the impacts of climate change,
such as rainfall increase and sea level rise

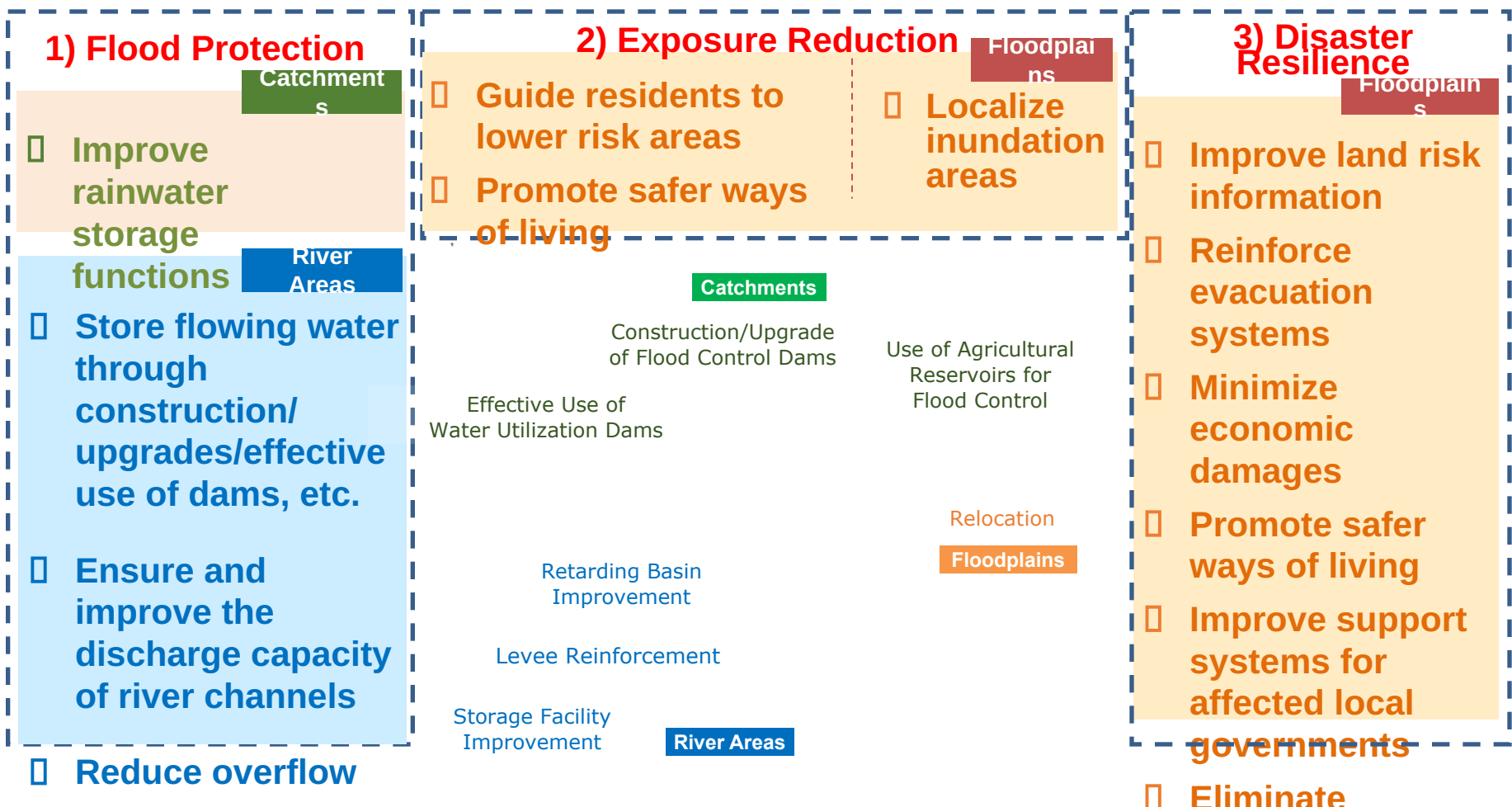
For the future,
revise the plans considering the impacts of climate change such as rainfall increase* and tide level rise

* In the scenario of global temperature rise below 2°C (the target scenario of the Paris Agreement on Climate Change), precipitation is likely to increase by a factor of 1.1



River Basin Disaster Resilience and Sustainability by All

- Flood management with the cooperation of all the stakeholders around basins
- Promote the following integrated and multilayered measures:
 - 1) Flood Protection, 2) Exposure Reduction, and 3) Disaster Resilience



Actions for addressing water security and resilience goals

To promote financing on water and disaster management and develop good projects

1. Make the water sector, including water-related disasters, a priority issue for each country and substantially increase the allocation of funds
2. Data collection and system development for medium- and long-term planning
3. System development and human resources development for efficient use of funds
4. Secure funding for science and technology and knowledge information systems to promote innovation