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

Reference: EM-DAT
**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.

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Global warming above 1850～1900

- **1.5°C increase by 2030–2050 with current pace**
- Already 1°C increase

**Realize carbon-neutral society by 2050**

**2.6~4.8°C increase at the end of 21th century without counter measures** (IPCC fifth report in 2014)

With carbon-neutral by 2050s, achieve well below 2°C and try to limit to 1.5°C increase

Reference: Ministry of Environment, Japan
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)**

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</tr>
</thead>
<tbody>
<tr>
<td>(事件数)</td>
<td>203</td>
<td>204</td>
<td>241</td>
<td>249</td>
<td>247</td>
<td>206</td>
<td>268</td>
<td>309</td>
<td>367</td>
</tr>
</tbody>
</table>

Change from 1976 to 1985: 226 events

Reference: Japan Meteorological Agency

### Sea Surface Temperature Rise

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

<table>
<thead>
<tr>
<th>Month</th>
<th>Oct. in 1982</th>
<th>Oct. in 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>SST</td>
<td>SST</td>
<td></td>
</tr>
<tr>
<td>50N</td>
<td>25°C</td>
<td>28°C</td>
</tr>
</tbody>
</table>

Reference: Japan Meteorological Agency
Recent Natural Disasters across Japan

2015 to 2017

1. Inundation (The Kinu River) (Joso-city, Ibaraki)
2. Landslides (Minamiisao-village, Kumamoto Prefecture)
3. Inundation (The Omoto River) (Iwaizumi-town, Iwate Prefecture)
4. Inundation (The Katsura River) (Asakura-city, Fukuoka)
5. Inundation (The Oda River) (Kurashiki-city, Okayama)
6. Inundation at the Kobe Port (Kobe-city, Hyogo)
7. Landslides (Atsuma-town, Hokkaido)
8. Inundation (The Rokkaku River) (Omachi-town, Saga Prefecture)

2018

8. Inundation (The Rokkaku River) (Omachi-town, Saga Prefecture)
9. Collapsing utility poles and trees (Kamogawa-city, Chiba)
10. Inundation (The Chikuma River) (Nagano-city, Nagano)

2019

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

2020

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

Typhoon Lionrock (August, 2016)

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

Kumamoto Earthquake (2016)

Eastern Iburi Earthquake

Typhoon Jebi (September)

Heavy Rain (July)

Typhoon Faxai (September)

Typhoon Hagibis (October)

Heavy Rain (August)

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

<table>
<thead>
<tr>
<th>Impacts of Climate Change</th>
<th>Social Trends</th>
<th>Technological Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need to enhance measures for early improvement of safety</td>
<td>Need to achieve safe and secure Compact Plus Network urban planning</td>
<td>Need to utilize 5G, AI, Big Data, and IT technologies in disaster risk reduction</td>
</tr>
</tbody>
</table>

### 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.
2) Exposure Reduction

- 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

1) Flood Protection

- Improve rainwater storage functions
- Store flowing water through construction/upgrades/effective use of dams, etc.
- Ensure and improve the discharge capacity of river channels
- Reduce overflow

2) Exposure Reduction

- Guide residents to lower risk areas
- Promote safer ways of living
- Localize inundation areas

3) Disaster Resilience

- Improve land risk information
- Reinforce evacuation systems
- Minimize economic damages
- Promote safer ways of living
- Improve support systems for affected local governments
- Eliminate inundation promptly
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