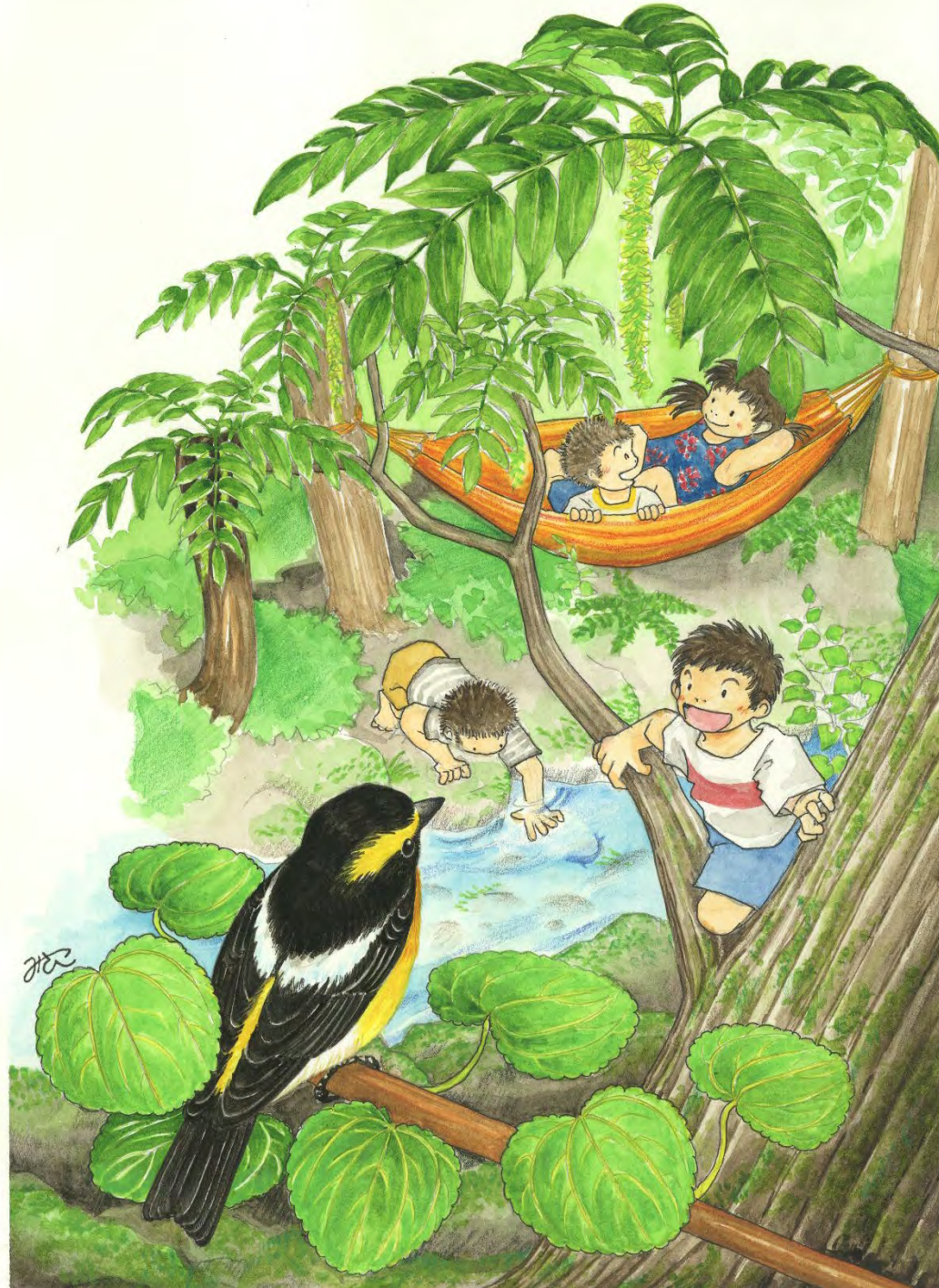
# Protecting Living Environments from Climate Change-induced Natural Disasters

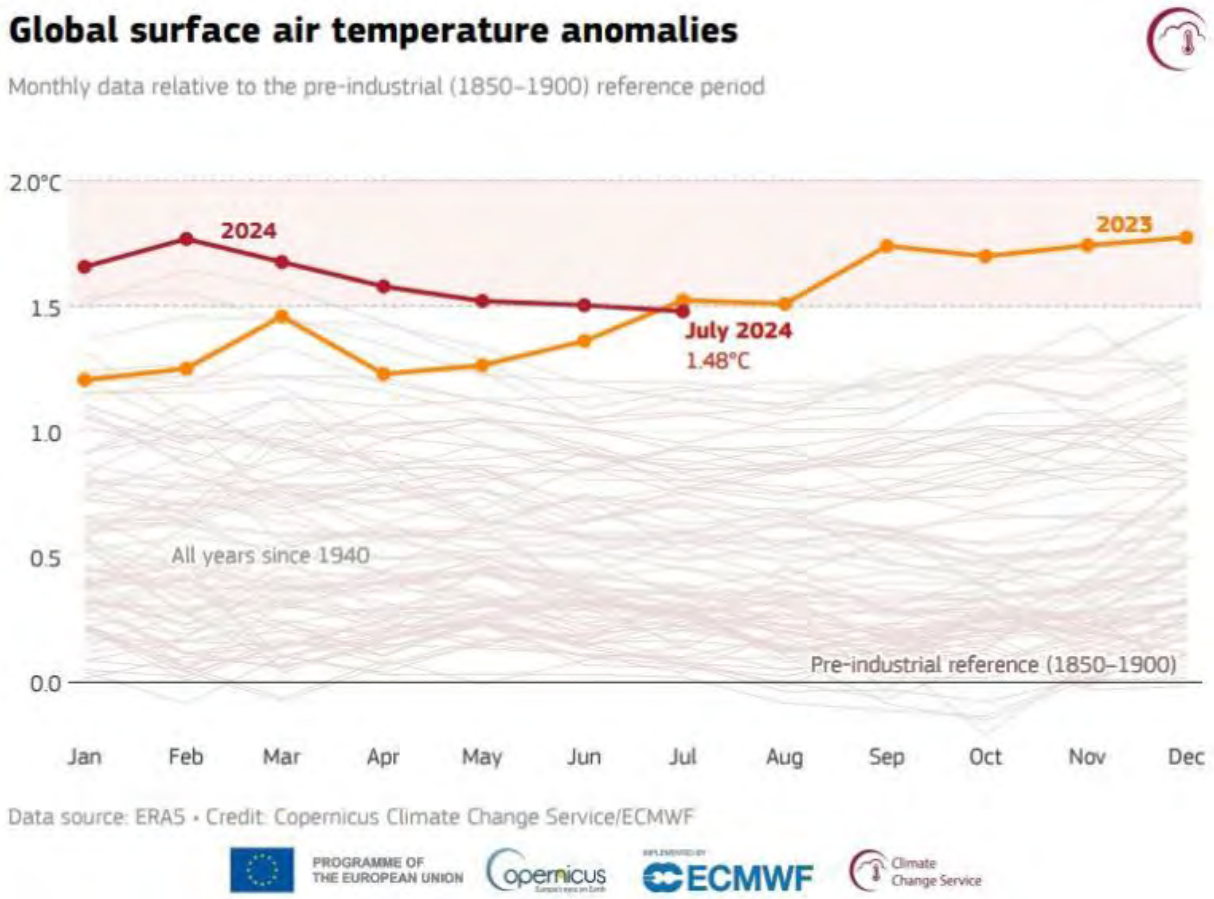
## - Forest Conservation as Eco-DRR-

Forestry Agency of JAPAN
Miho Echizen



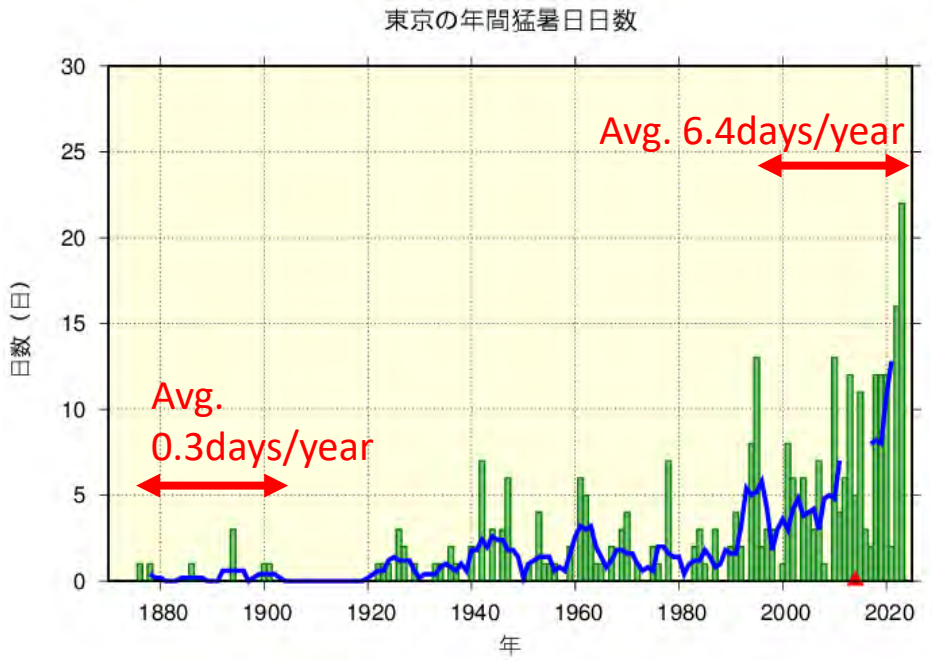
# Ongoing Climate Change

2024 summer was the hottest summer  in history.




Source: [WMO website]

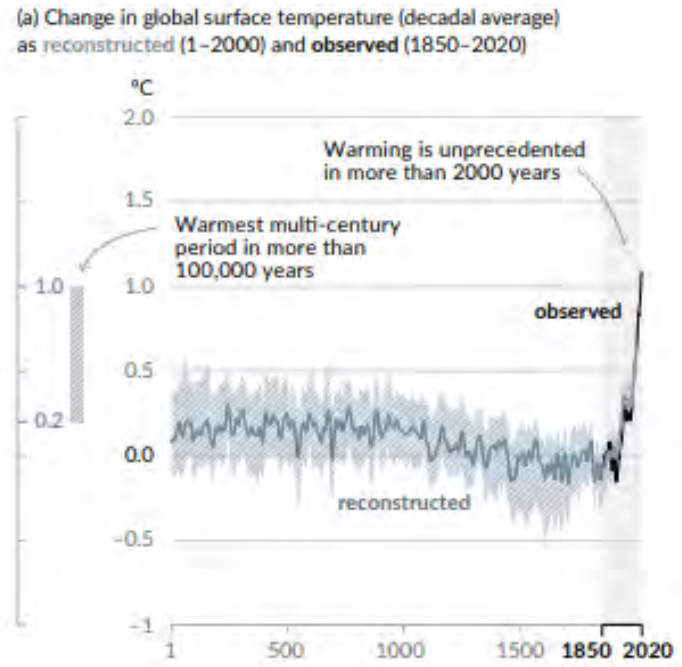
# of Extremely Hot day (35 ℃ or greater)/year in Tokyo

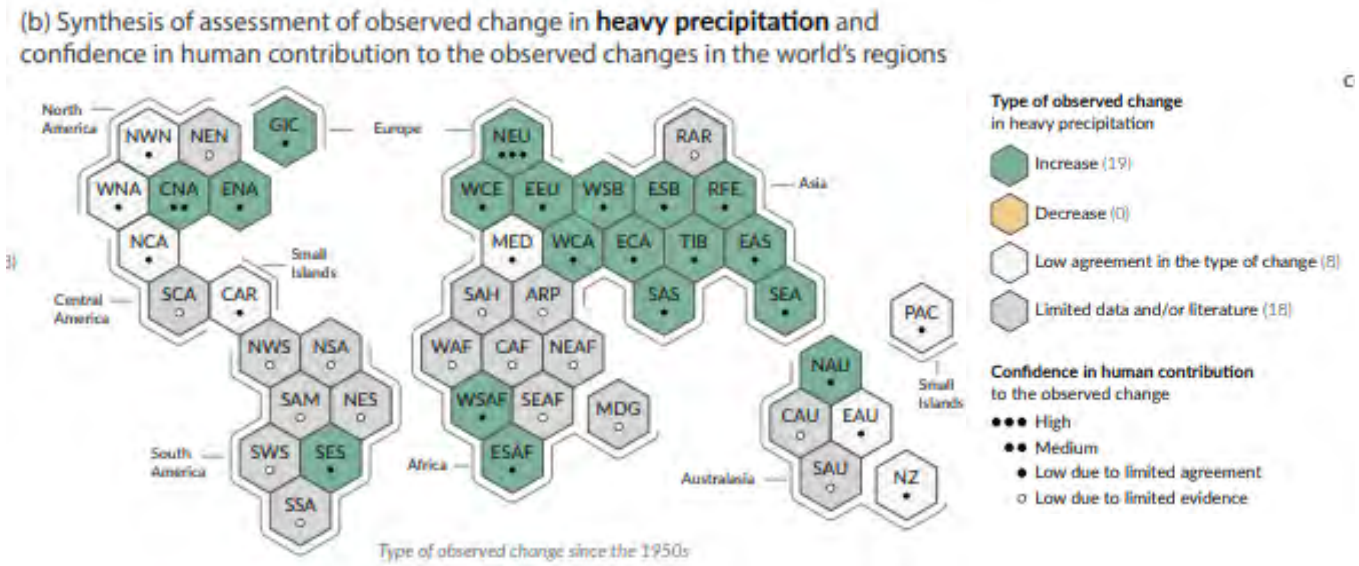



Source: Japan Meteorological Agency website

# Climate Change Affects Weather Patterns

The IPCC reports that climate change-induced weather extremes lead negative impacts on nature and people.



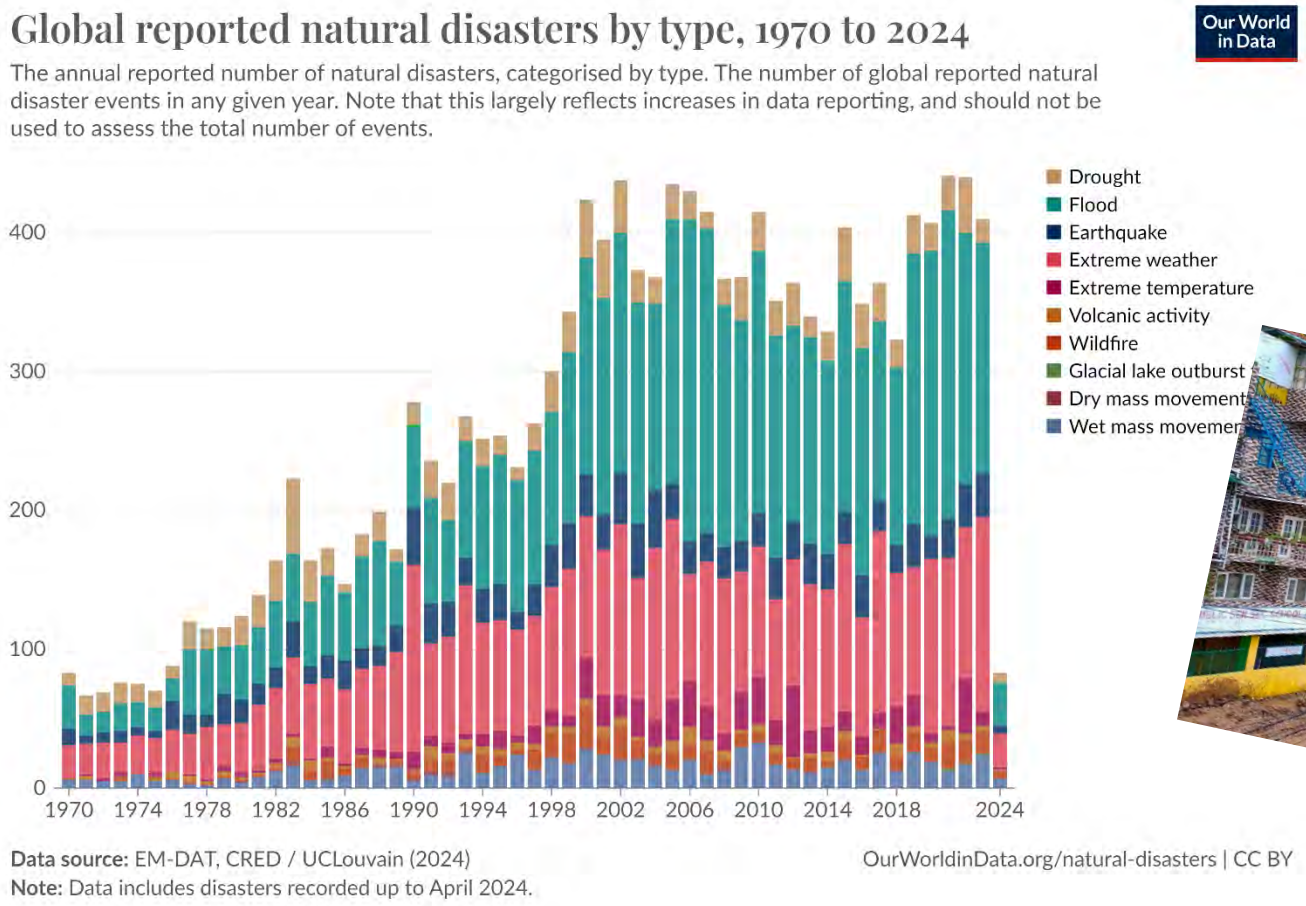




Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts and related losses and damages to nature and people (high confidence)

IPCC AR6 Synthesis Report A.2

# Extensive Natural Disasters Occur Around the World

Measures to protect living environments from intensified natural disasters are required.




# Utilizing Nature to Enhance Disaster Resilience

## Eco-DRR: Ecosystem-based Disaster Risk Reduction

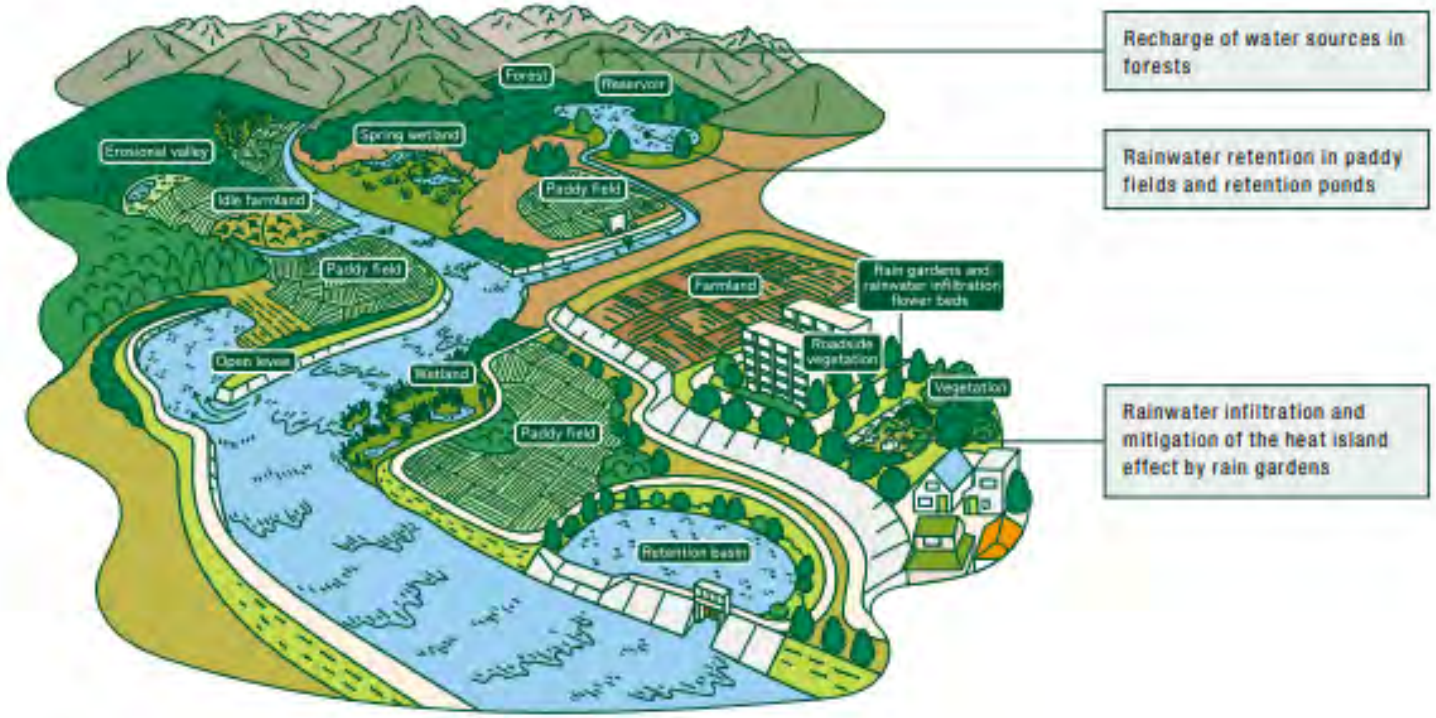
The approach that effectively utilizing nature to prevent or mitigate natural disaster

Civil-engineering facilities alone are not sufficient to cope with ever-intensifying extremes.
Enhancement of forest ecosystem function (e.g. flood mitigation, soil stabilization) to be integrated in DRR strategies.

Utilize nature,

➡ Co-benefits such as ecosystem conservation, landscape maintenance, and carbon sequestration etc.

➡ low installation & maintenance costs




A Guide to Eco-DRR Practices for sustainable Community Development(summary)
https://www.env.go.jp/content/000124850.pdf

# Forest-based Eco-DRR

Eco-DRR can be implemented using local ecosystems and materials and designed for each local situation.

Recharge of water source

Landslide prevention

Restoration of degraded mountain streams

Preventing soil erosion

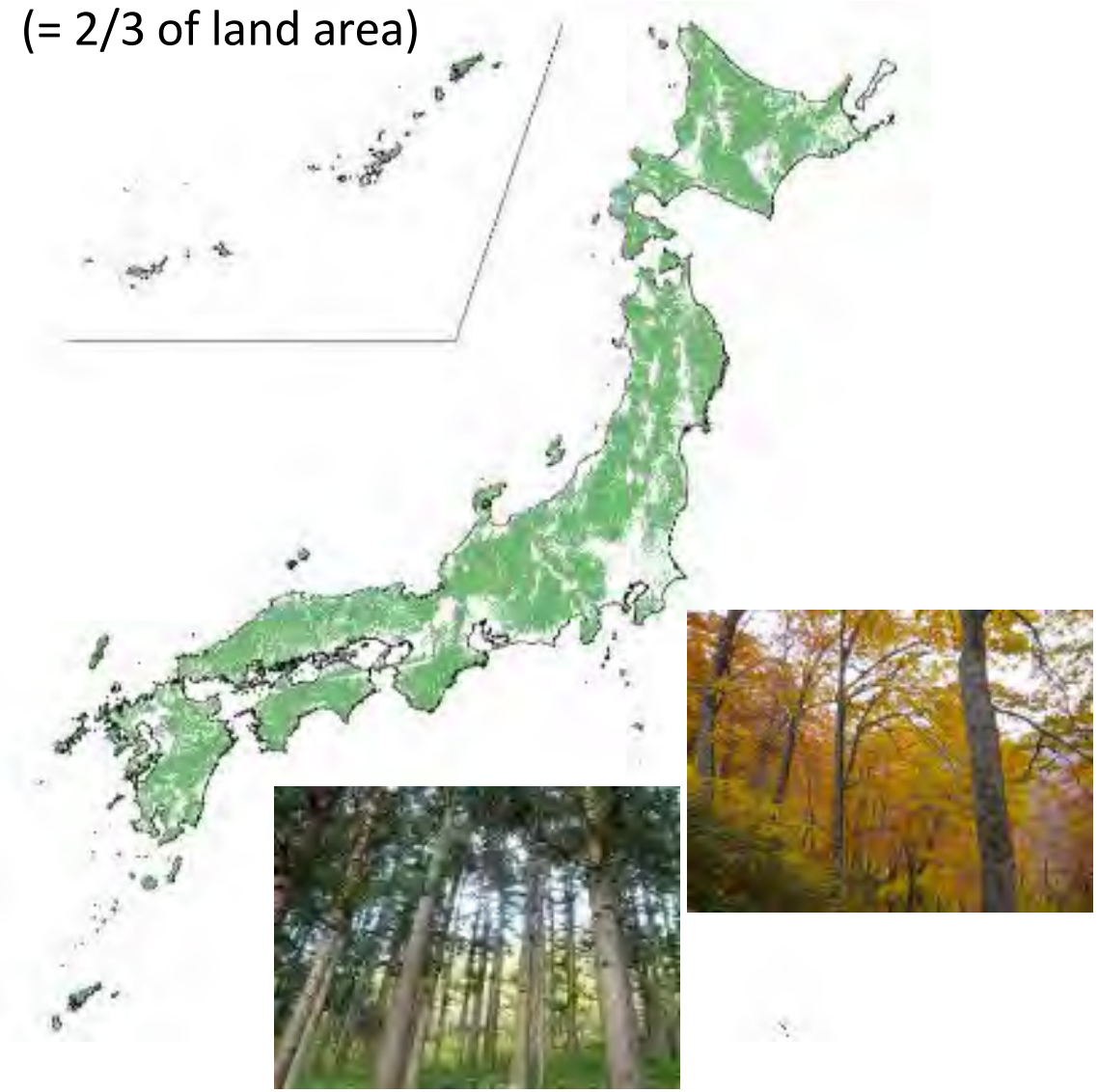
Tidal, sand, wind protection

Coastal protection

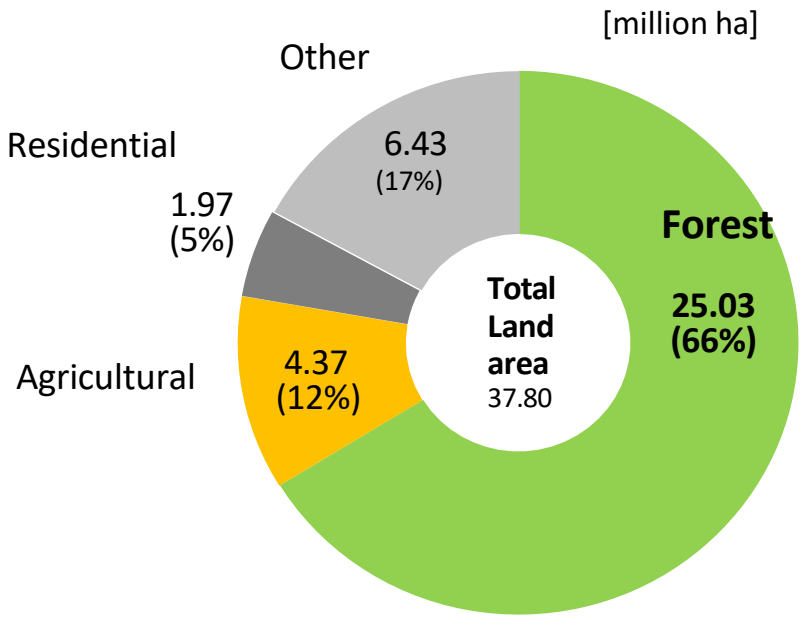
# State of Japan's Forest

## Forest area

(= 2/3 of land area)



## Land use




Source: Ministry of Land, Infrastructure, Transport and Tourism (MLIT) "White paper on Land 2024" (land area data are of 2020)

# Restoration Efforts on Devastated Forests

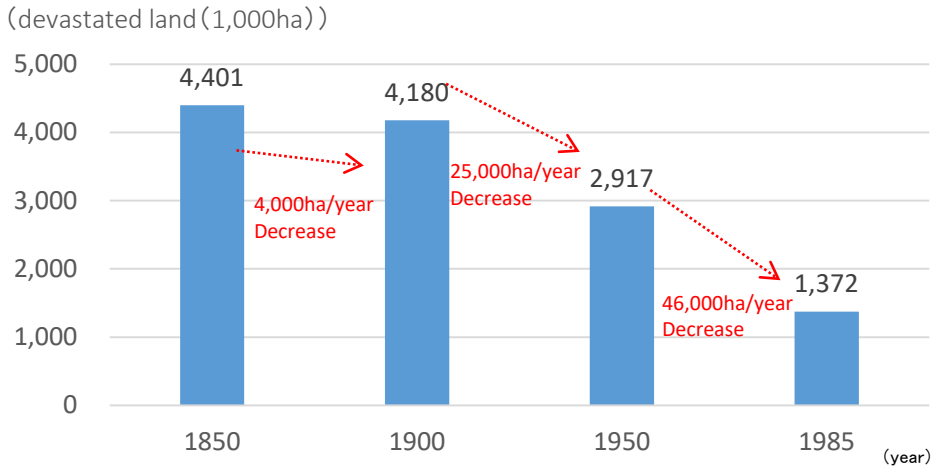
Population growth, industrial development, and wartime procurement of supplies led to excessive logging, and forest degradation was a serious social concern.

In order to restore forests forest conservation work was intensively implemented from the mid-1950s.

Devastated forest in 1950s, Okayama Pref.

Restored Forests, Present

Conservation work; Construct stair cutout




Source: Japan Chisan-Chisui Association

# Forest Restoration Decrease in Frequency of Mountain Disasters

Typhoon in 1958

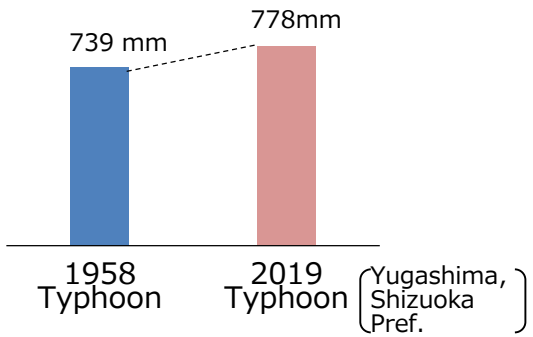
Flooding and stream devastation (Izu, Shizuoka Pref.)

Typhoon in 2019

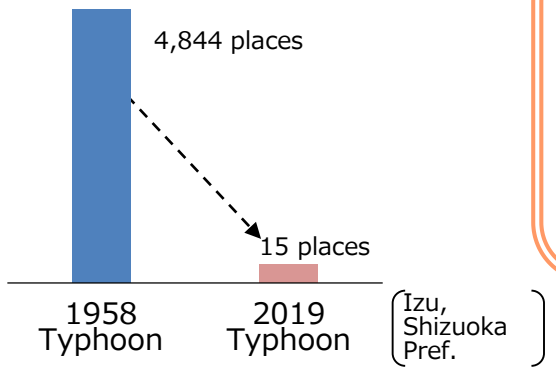
## Forest Restoration Efforts by CHISAN facilities

Continuous efforts of forest restoration utilizing CHISAN technologies have improved watershed protection by soil development.

**Precipitation**

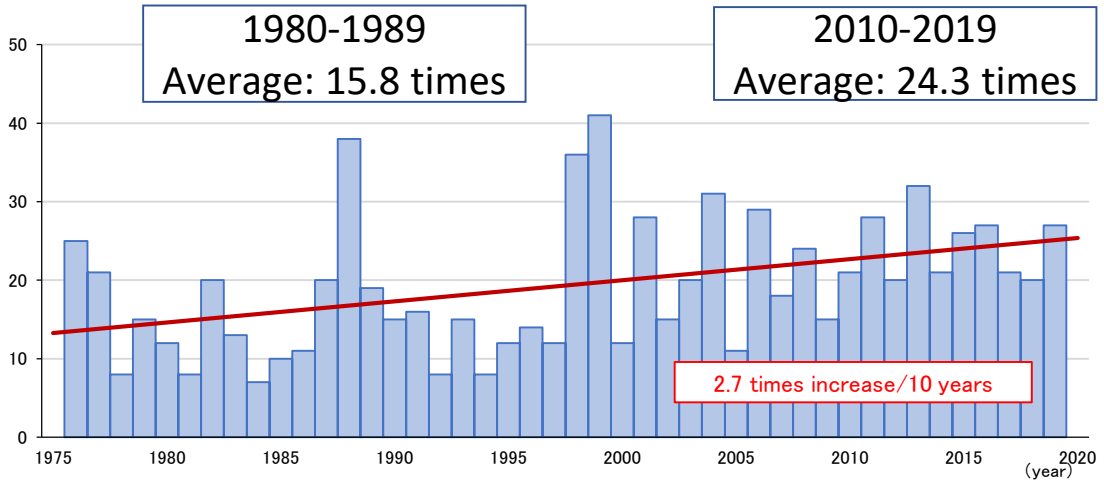



**Number of Mountain Disasters**



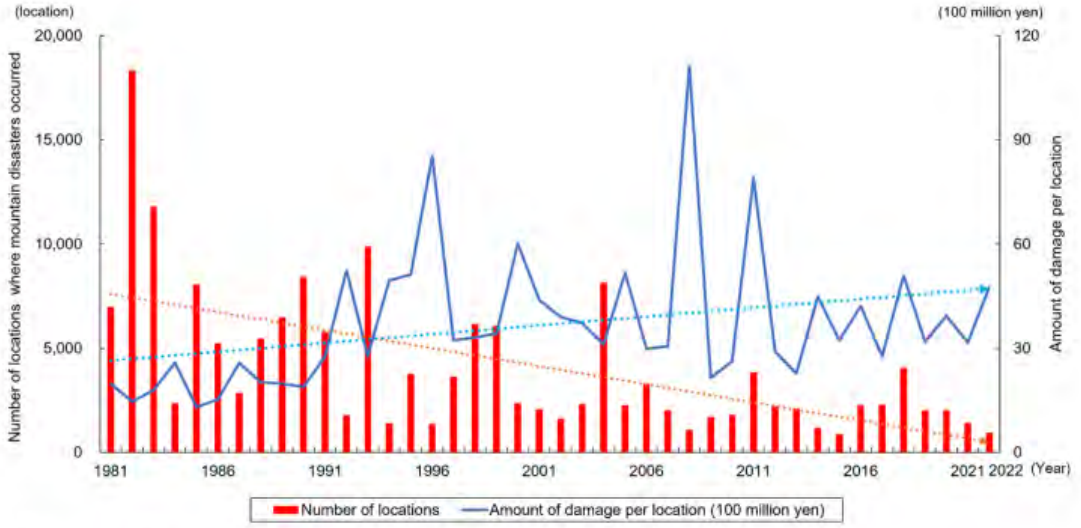

The 2019 typhoon had more precipitation than that of 1958, but far fewer mountain disasters occurred.

# Changes in rainfall patterns and expanding scale of mountain disasters




Source: Japan Meteological Agency

Fig. Frequency of heavy rainfall par year




Source: Survey by Forestry Agency

Fig. Number of Mountain Disaster Locations and Amount of Damages per Location

The number of mountain disasters has decreased with forest restoration efforts, but the extent of damage per locations has increased over years.

https://www.rinya.maff.go.jp/j/kikaku/hakusyo/r4hakusyo/attach/pdf/index-6.pdf

# Intensifying and Changing Patterns of Mountain Disasters

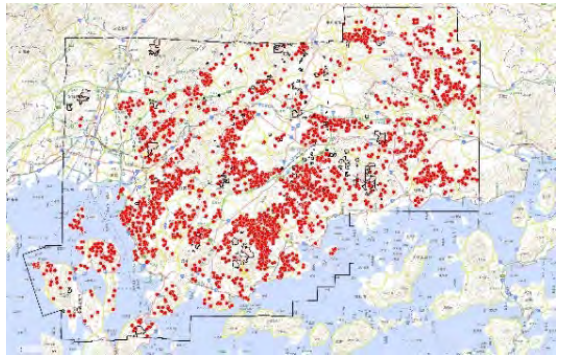
■ Increased sediment runoff due to collapse near the mountain ridge

July 2018 heavy rains (Hiroshima)

2019 East Japan Typhoon (Miyagi)

■ Multiple simultaneous collapses due to the formation of linear rainbands

July 2018 heavy rains (Hiroshima etc.)



■ Collapse of layer slightly below the surface layer due to long-term heavy rains

July 2020 heavy rains (Kumamoto)

■ Increasingly serious driftwood disasters due to increased flood flows

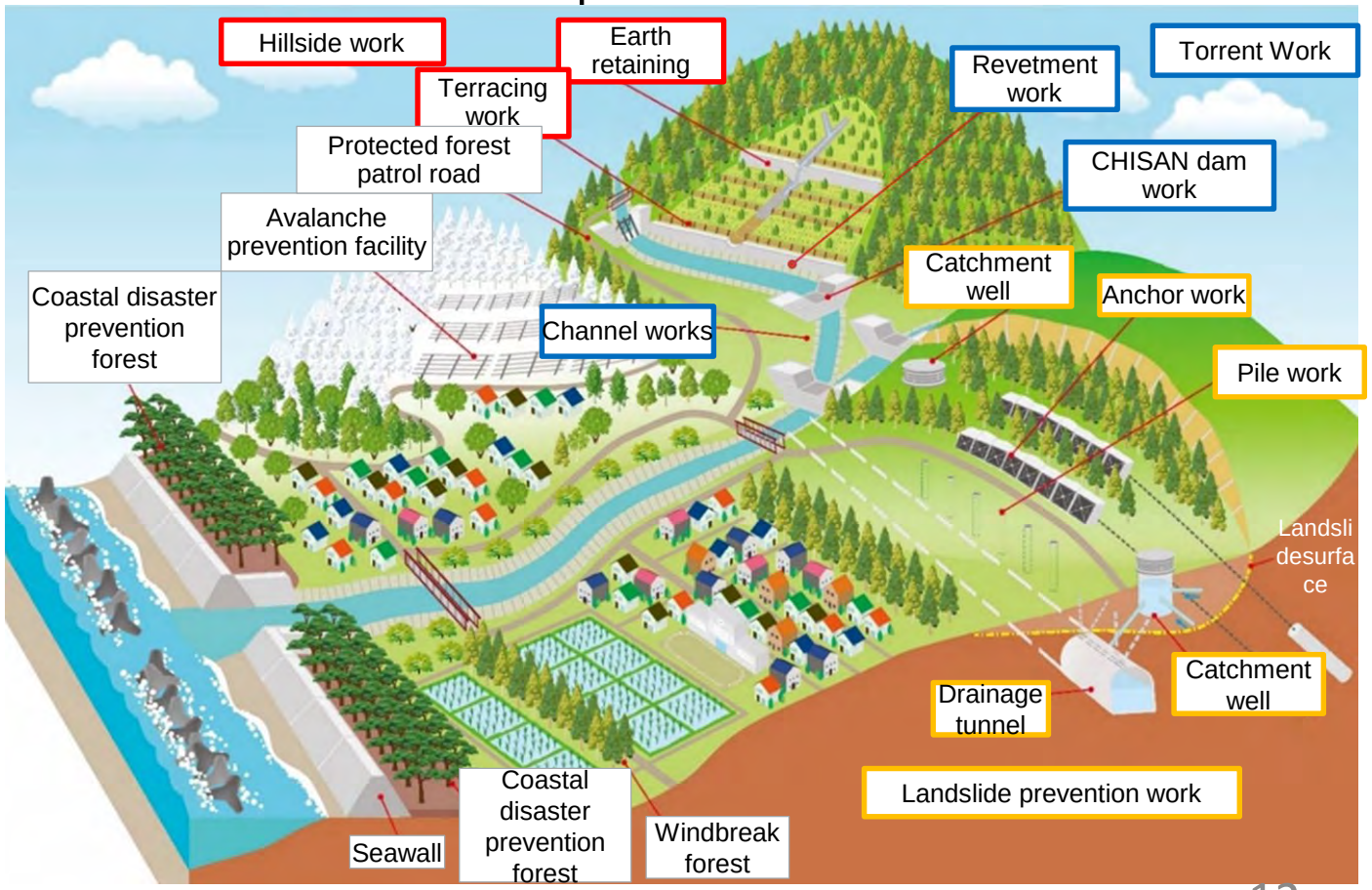
August 2021 heavy rains (Aomori)

(August 2022 heavy rains (Niigata))

# Countermeasures against Intensifying Mountain Disasters

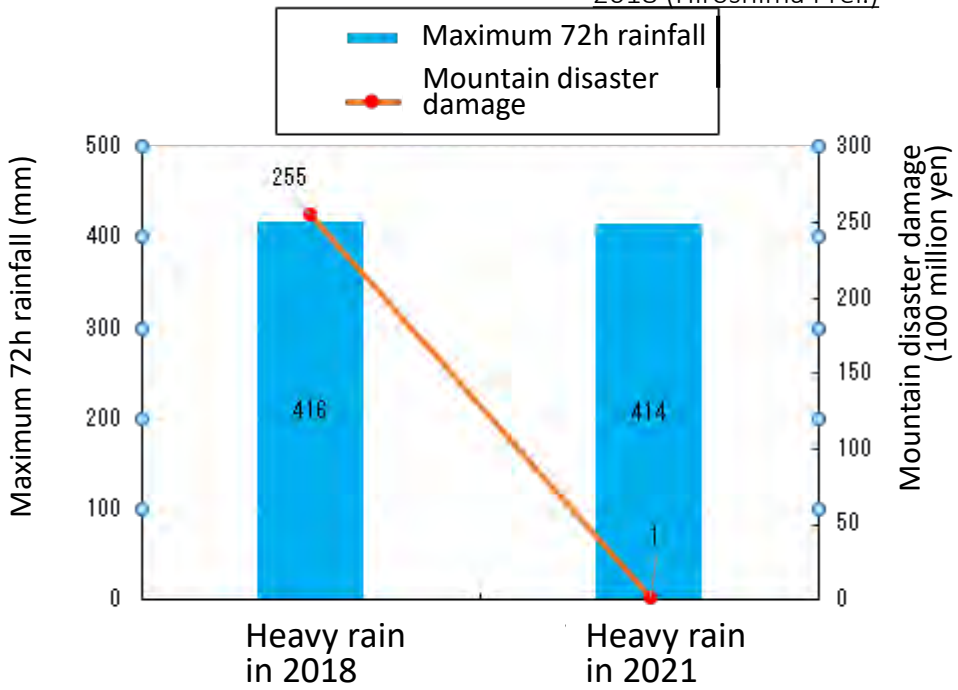
- The Fundamental Plan for National Resilience
  "Five-Year Road Program for Disaster Prevention, Mitigation and National Resilience".
- "Study Group on Future Forest Conservation Measures for Heavy Rain Disasters“
  Experts discussed the effective and efficient advanced disaster prevention countermeasures.

- Promoting forest conservation measures
- Collaboration with river basin disaster resilience
- Extending the lifespan of forest conservation facilities
- Utilizing new technologies



# Resilience Enhancement through Countermeasures

2018 (Hiroshima Pref.)




A road was impassable due to mudslides caused by a heavy rain in 2018.

Sediment runoff flood control dams were installed after the disaster and they prevented sediment runoff in subsequent heavy rains.

# International Cooperation through JICA

The Project for Natural Disaster Management in Forest Areas in Uttarakhand (2017-2024)


Aiming to establish and disseminate mountain control technology to prevent mountain disasters


Share our Eco-DRR measures together
and build a safe and well-being society!
Thank you for your attention