Recurrent Water-related Disasters in Japan -their Mechanism and Future Trends-

Toshio Koike
Director, International Centre for Water Hazard and Risk Management (ICHARM)
Council Member, Science Council of Japan (SCJ), Cabinet Office of Japan
Professor Emeritus, the University of Tokyo
Chair, River Council of Japan
Western Japan Floods 2018

Maximum 48hrs Rainfall from June 28th to July 8th (JMA)

Okayama Pref. Flood Levee Breach

Ehime Pref. Sediment Disasters

Hiroshima Pref. Sediment Disasters

Overflow & Inundation
Western Japan Floods 2018

Mortality: 224
(the worst case after 1982)

Hiroshima
Okayama

by courtesy Dr. M. Ohara, ICHARM

Top 5 Floods by Typhoons and Frontal Activities.

Major River of each Prefecture

Maximum Flood by Typhoon
Anomalously Long Stay of Active Frontal Line.

Anomalous Evaporation and Wind from the Northern and Southern Anti-cyclones.

The Strongest Water Vapor Convergence since 1958.

Anomalous Patterns of the Polar Jet and the Sub-tropical Jet.

by courtesy Prof. H. Nakamura, U-Tokyo.
Recurrent Water-related Disasters in Japan
Events and Countermeasures

Oct., 2013
Izu Oshima Island (Sediment)
• 824mm/24hrs (Typhoon)
• Human Loss: 39
• evacuation warning

Aug., 2014
Hiroshima City (Sediment)
• 121mm/hr (Typhoon, Frontal Line)
• Human Loss: 74
• evacuation warning, land use

Sep., 2015
Kanto & Tohoku (Bank Breach)
• 551mm/24hrs (Typhoons)
• Human Loss: 8
• evacuated by helicopter: 1339 and by boat: 2919

Aug., 2016
Hokkaido & Tohoku (Bank Breach and Sediment)
• 251mm/72hrs (Typhoons)
• Human Loss: 27
• evacuation of physical handicaps
• local socio-economic impact

June, 2017
Northern Kyushu (Sediment)
• 299mm/6hrs (Frontal Line)
• Human Loss: 42
• sediment and flood complex

Nov., 2014
Amendment: Sediment Disasters Prevention Act

Jan., 2015
Policy Vision: Disaster Prevention and Mitigation against a New Stage

May, 2015
Amendment: Flood Risk Management Act
• Probable Maximum Rainfall for Life-Saving

Dec., 2015
Policy Vision: Rebuilding Flood-Conscious Societies: Class A Rivers
• Raising public awareness
• Structural measures for crisis management

Jan., 2017
Policy Vision: Rebuilding Flood-Conscious Societies: Class B Rivers
• Life-saving of physical handicaps
• Local socio-economical continuity

May, 2017
Amendment: Flood Risk Management Act
• Joint Stakeholder Committee for FRR
• Evacuation planning and drilling for handicap-accessible facilities
• Recovery by the national government
Torrential heavy rainfall happens everywhere more frequently. No exceptions. The areas where have not experienced heavy rainfall are likely to be seriously damaged. The June 2018 floods raised two new issues:
   1) Simultaneous events in the wider area.
   2) Longer duration.
Recurrent Water-related Disasters in Japan
Changing Society

Rapid Aging:
• increase of the number of those who should be supported.
• decrease of the number of those who can support.
Recurrent Water-related Disasters in Japan
Changing Society

Flood Hazard Map

Sediment Disaster Prevention Act
special alert area: **red zone**
alert area: **yellow zone**

**Mabi, Okayama Pref.**

Flood Levee Breach

**Kure, Hiroshima Pref.**

Debris Flow

Risk has been informed but not recognized.

Fully Collapsed: 17 houses
Death: 1
Recurrent Water-related Disasters in Japan
Changing Society

Direct Damage of the Western Japan Floods: \(~10\text{ Billion USD (QE)}\)
(the largest damage on record since 1961)

A follow-up survey of the Kanto-Tohoku Floods by courtesy Dr. M. Ohara, ICHARM

Can we recover fully from the devastating water-related disasters?
Recurrent Water-related Disasters in Japan

Our Challenges

Observation & Simulation

Community

Mutual Support  Self-Help

Virtual Reality

Training/ Exercise

preparedness

Infrastructure Planning

Monitoring & Prediction

Public Support

Climate Change

evacuation

Risk Reduction

Disaster Risk

Society Function

Build Back Better

Non-structural

Structural

response

recovery
Recurrent Water-related Disasters in Japan

Our Challenges

- **3,100ha** No Damage Sep. 1961 Sep. 2018
- **130,000** No Damage Sep. 1961 Sep. 2018

Infrastructure Investment Effect: 170Billion USD

- **Largest Storm Surge on Record**
  - Sep. 1961: 293cm
  - Sep. 2018: 329cm

- **Western Japan Floods in June 2018**

- **Kumano-cho Hiroshima Pref.**

- **Debris Flow** Stopped by the Debris Barrier

- **Estimated Damage without the Diversion**

- **Kumano-cho Hiroshima Pref.**

- **Without the Diversion** Actual in June 2018

- **Diversion**
Recurrent Water-related Disasters in Japan
Our Challenges

HEADLINE RECOMMENDATION
Shift focus of disaster management from response to preparedness and resilience.

- Political leadership
- Dialogue and community-based practices
- Long-term Planning
- Financing for and investment in water-related DRR to be doubled within the next five years.
- Integration of science and policy including higher education
- Biannual Special Thematic Sessions on Water and Disaster

by High-Level Panel on Water on March 14, 2018