Plenary session II
RISK ASSESSMENT - Weighing Risk in Policymaking

Bridging Science and Society: Well-Informed Decisions on Water Resilience under Climate Change

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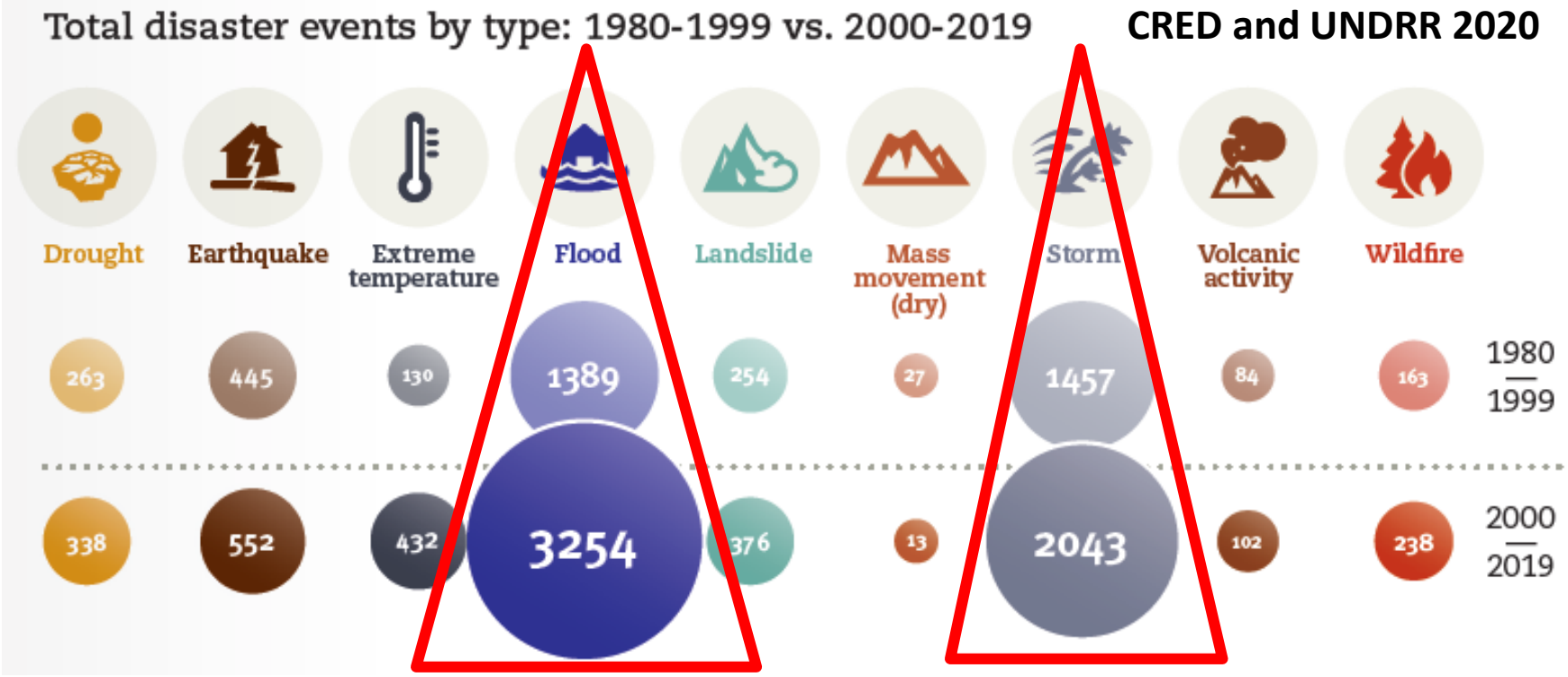
Council Member (2017-2023), Science Council of Japan, Cabinet Office

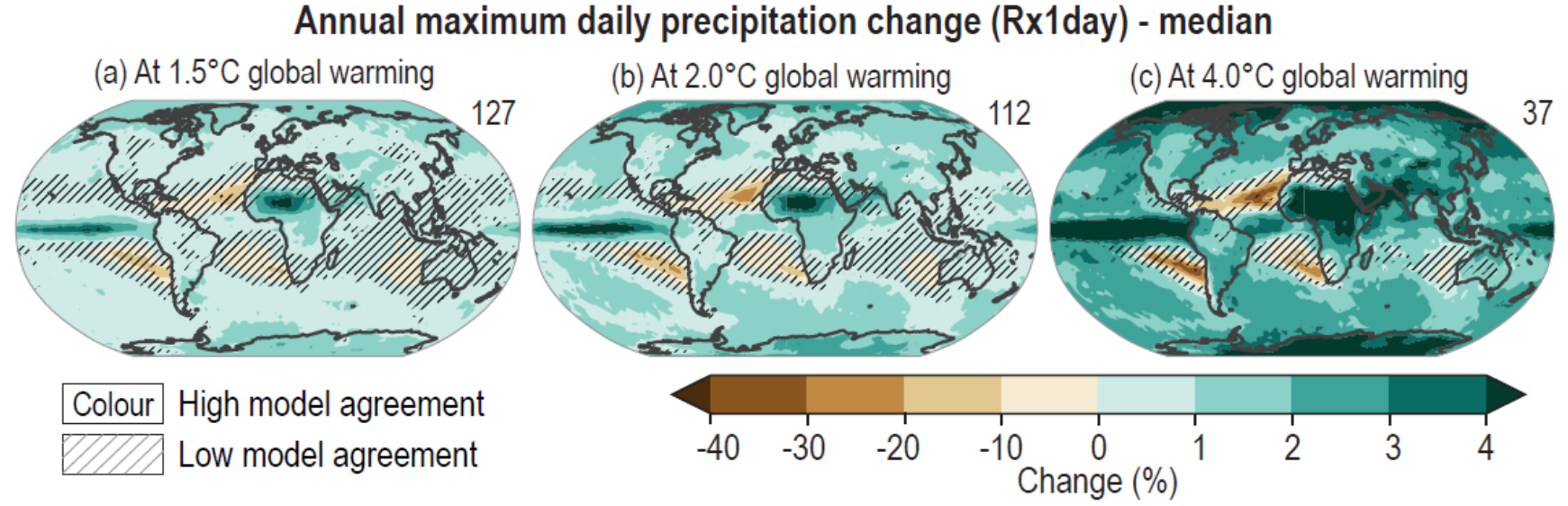
WORLD SCIENCE FORUM
BUDAPEST



IPCC/AR6/WG1, 2021

Climate change has increased the frequency and intensity of heavy precipitation events.

Extreme precipitation are projected to intensify by about 7% for each 1 ℃ of global warming



Projected changes in annual maximum daily precipitation at each global warming compared to the 1850-1900 baseline.

Recurrent Water-related Disasters in Japan

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: 77
- *evacuation warning, land use*

Sep., 2015
Kanto & Tohoku (Bank Breach)
- 551mm/24hrs (Typhoons)
- Human Loss：20
- *evacuated by helicopter: 1343 and by boat: 2919*

Aug., 2016
Hokkaido & Tohoku (Bank Breach and Sediment)
- 251mm/72hrs (Typhoons)
- Human Loss: 31
- *evacuation of physical handicaps*
- *local socio-economic impact*

June, 2017
Northern Kyushu (Sediment)
- 299mm/6hrs (Frontal Line)
- Human Loss: 44
- *sediment and flood complex*

Nov., 2014
Amendment: Sediment Disasters Prevention Act

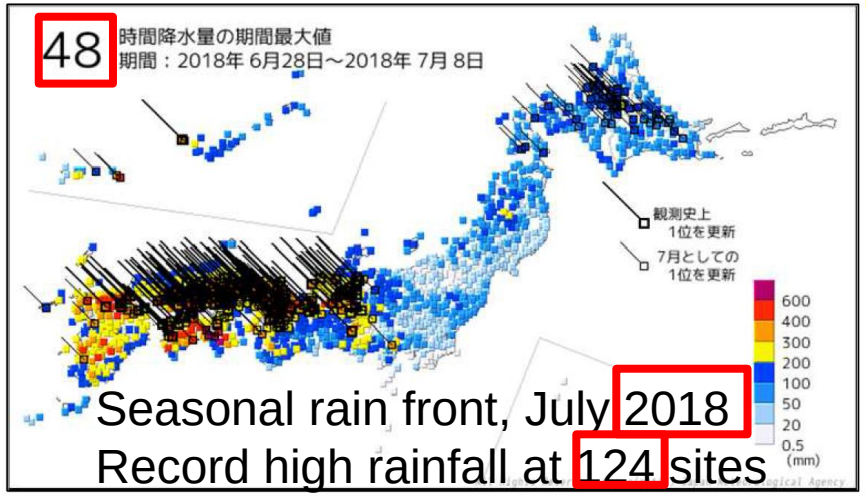
Jan., 2015：
Policy Vision: Disaster Prevention and Mitigation against a New Stage

May, 2015
Amendment: Flood Risk Management Act

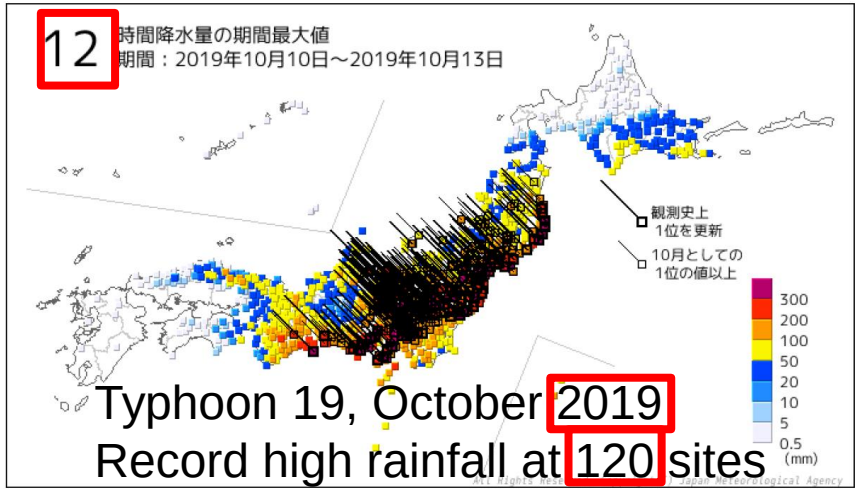
Dec., 2015
Policy Vision: Rebuilding Flood-Conscious Societies: Class A Rivers

Jan., 2017
Policy Vision: Rebuilding Flood-Conscious Societies: Class B Rivers

May, 2017
Amendment: Flood Risk Management Act

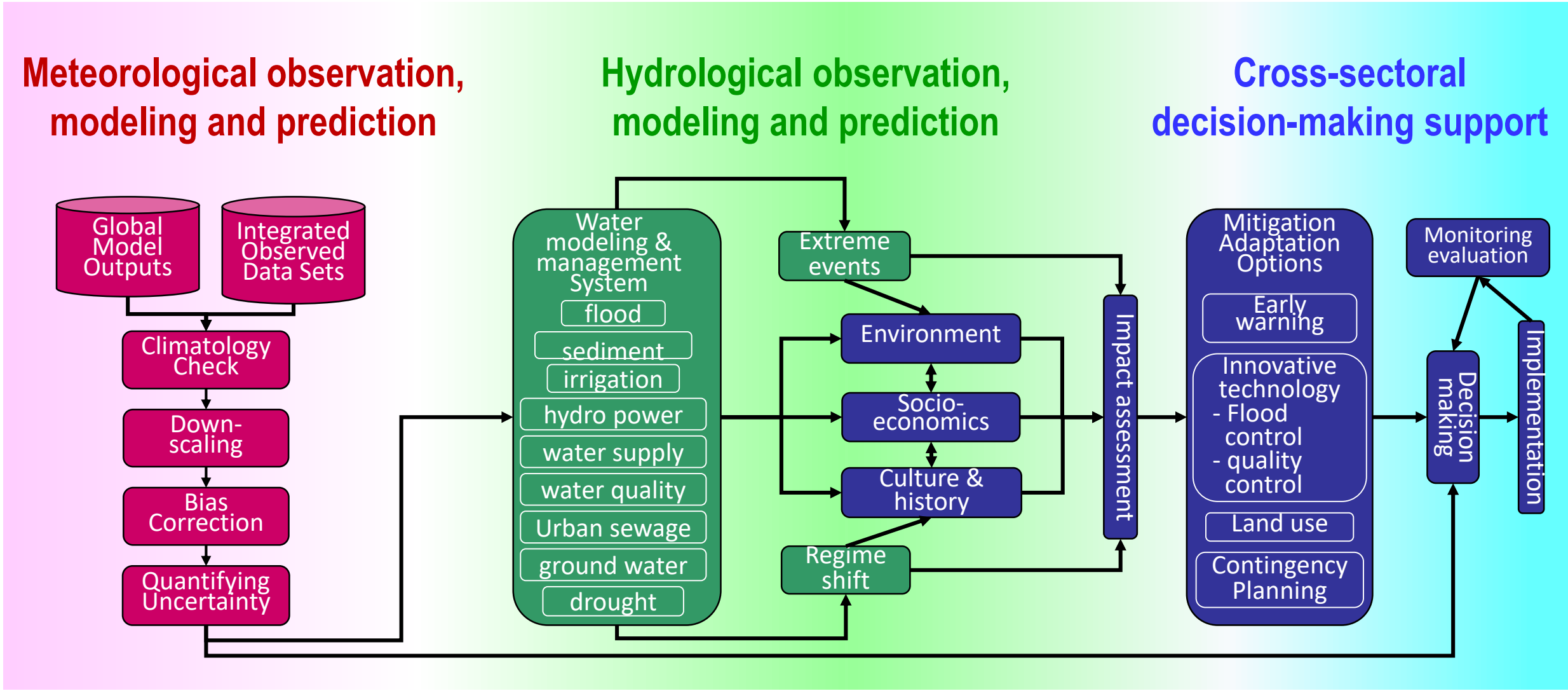


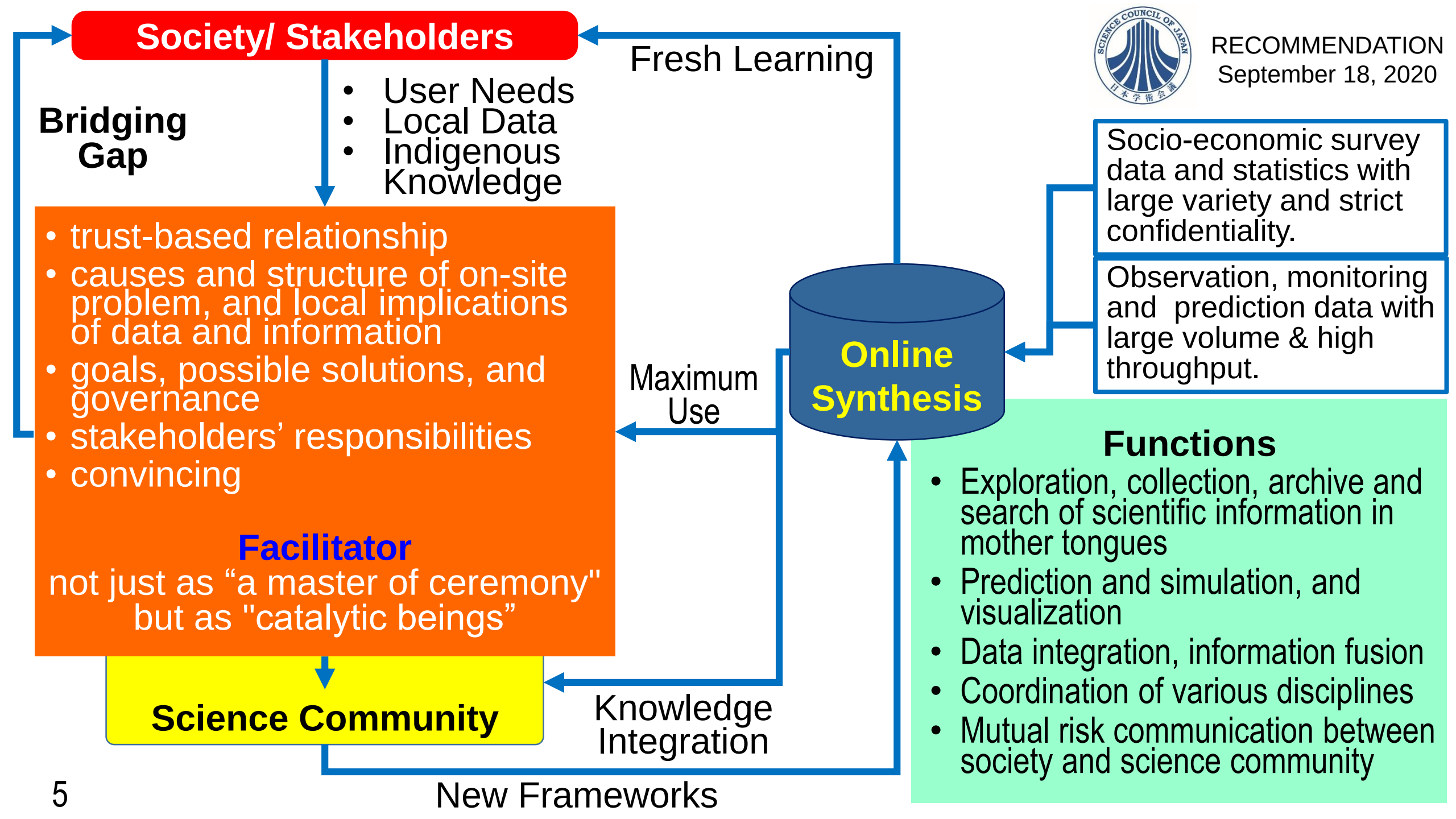
Seasonal rain front, July 2018
Record high rainfall at 124 sites



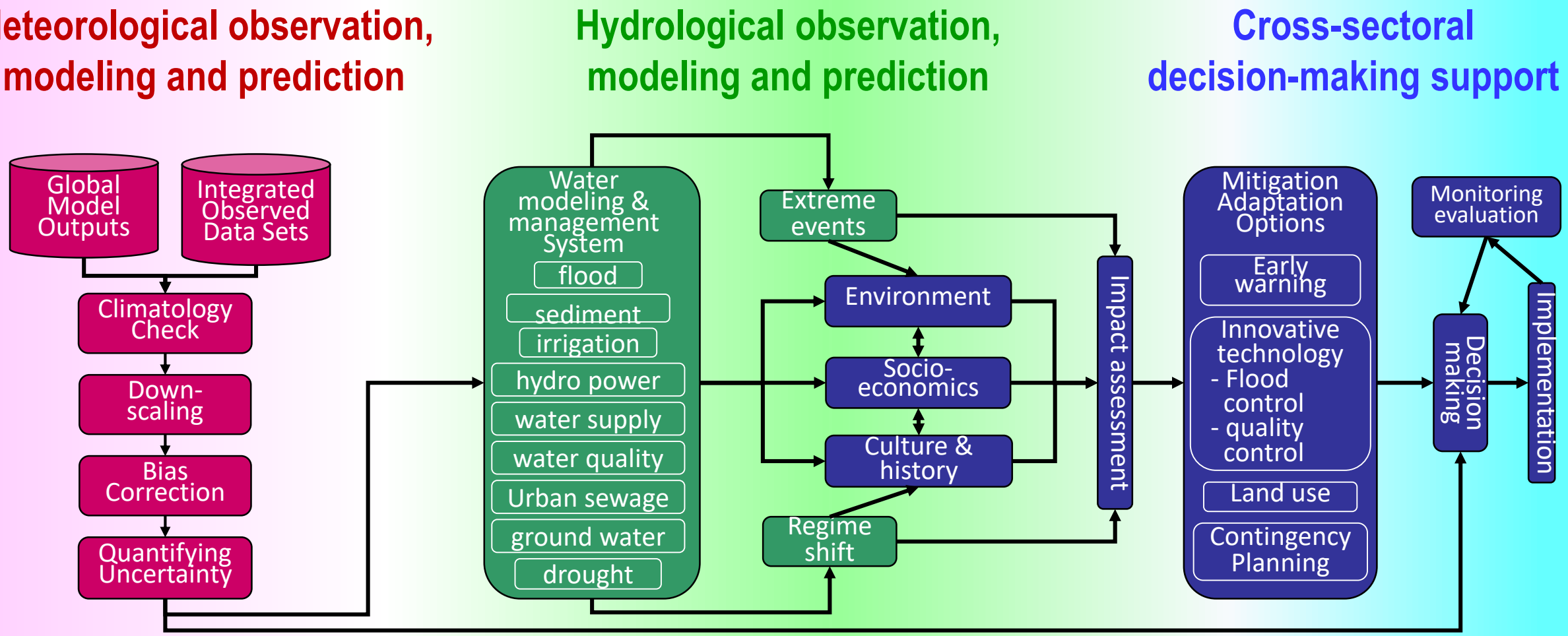
Typhoon 19, October 2019
Record high rainfall at 120 sites

Houses Inundated above the First Floor Level	7,173	8,129
Human Loss	245	107


Meteorological observation, modeling and prediction
Hydrological observation, modeling and prediction
Cross-sectoral decision-making support
Global Model Outputs
Integrated Observed Data Sets
Climatology Check
Down-scaling
Bias Correction
Quantifying Uncertainty
Water modeling & management System
flood
sediment
irrigation
hydro power
water supply
water quality
Urban sewage
ground water
drought
Extreme events
Environment
Socio-economics
Culture & history
Regime shift
Impact assessment
Mitigation Adaptation Options
Early warning
Innovative technology
- Flood control
- quality control
Land use
Contingency Planning
Monitoring evaluation
Decision making
Implementation


Society/ Stakeholders
Fresh Learning
RECOMMENDATION
September 18, 2020
Bridging Gap
• User Needs
• Local Data
• Indigenous Knowledge
Socio-economic survey data and statistics with large variety and strict confidentiality.
Observation, monitoring and prediction data with large volume & high throughput.
• trust-based relationship
• causes and structure of on-site problem, and local implications of data and information
• goals, possible solutions, and governance
• stakeholders' responsibilities
• convincing
Online Synthesis
Maximum Use
Facilitator
not just as "a master of ceremony" but as "catalytic beings"
Functions
• Exploration, collection, archive and search of scientific information in mother tongues
• Prediction and simulation, and visualization
• Data integration, information fusion
• Coordination of various disciplines
• Mutual risk communication between society and science community
Science Community
Knowledge Integration
New Frameworks

From Cutting-Edge Science to Local Actions: Taking End to End Approach



Promoting Knowledge Integration: Online Synthesis

Capacity Building and Education: Facilitator

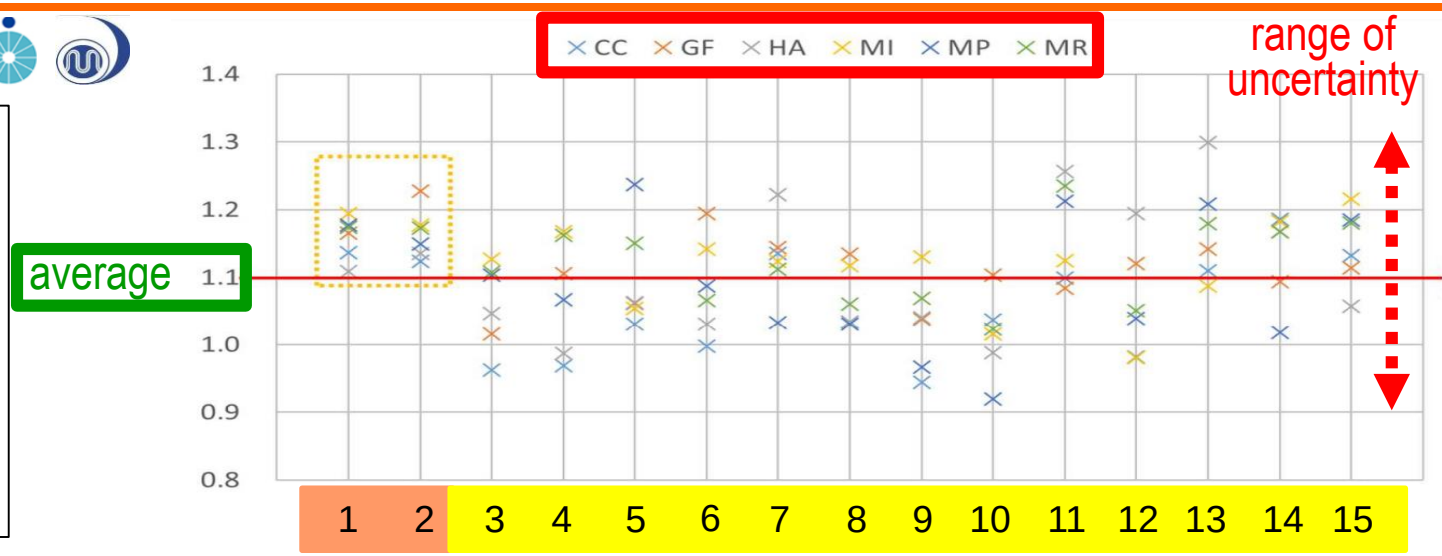
New River Planning: Observed Data and Climate Change Projections

Climate change projection by MEXT and JMA

"Database for Policy Decision-Making for Future Climate Change" (**d4PDF**)

- global：60km, 6000yr in past, 3240yr under 2d increase, 5400yr under 4d increase.
- Around Japan: 20km and 5km, 6000yr in past, 3240yr under 2d increase, 5400yr under 4d increase.

Data is available from DIAS

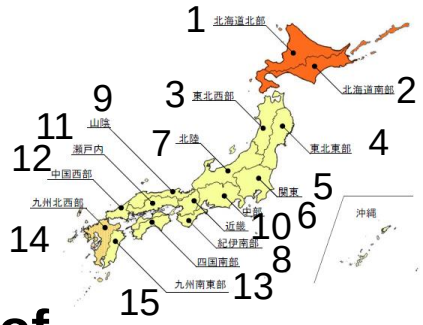


Revising Plans Considering Climate Change

by the Panel on Infrastructure Development of Japan in April 2021

Region	2℃	4℃	short
Hokkaido	1.15	1.4	1.5
Kyushu	1.1	1.4	1.5
Others	1.1	1.2	1.3

discharge	frequency
1.2 times	2 times
1.4 times	4 times



Increasing rate of the flood design rainfall: 1/100-1/200 return period

Average
→ Storage and River Channels

Range of Uncertainty
→ Exposure Reduction and Resilience

New River Management Policy: River Basin Disaster Resilience and Sustainability by All

1) Flood Prevention

Catchments

- **Improve rainwater storage functions** <P / M / E / R>
  Improve rainwater storage facilities and effectively use agricultural reservoirs for flood control

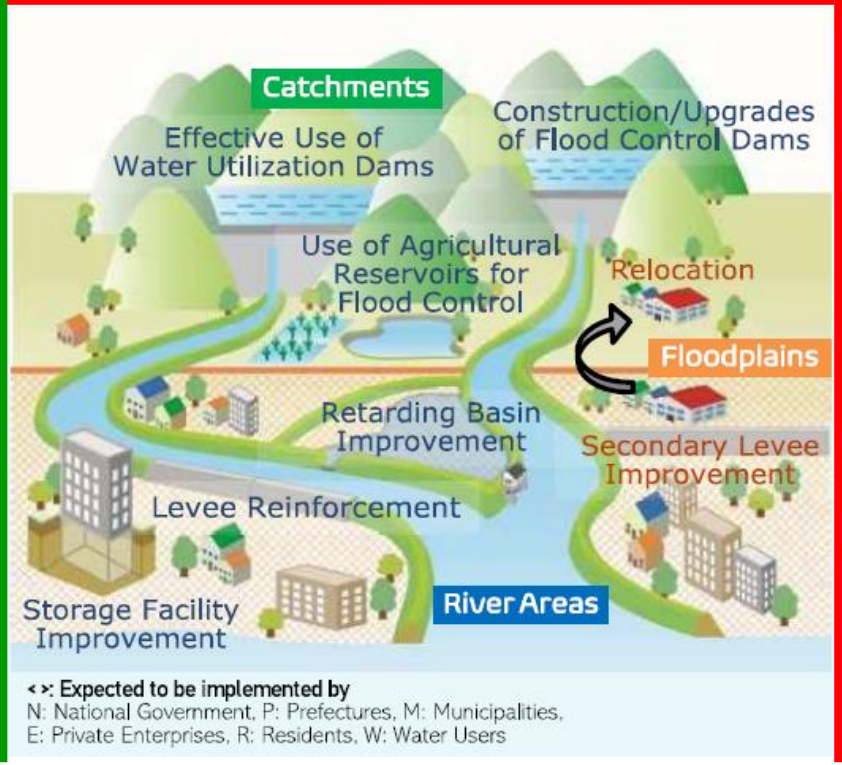
River Areas

- **Store flowing water** <N / P / M / W>
  Construction, upgrades, effective use of dams, and pre-discharge in water utilization dams for flood control
  <N / P / M>
  Upgrade retarding function integrally with land use
- **Ensure and improve the discharge capacity of river channels** <N / P / M>
  Channel excavation, setting back levees, and improvement of erosion control dams and rainwater drain facilities
- **Reduce overflow** <N / P>
  Strengthen levees to make them last a long time even when overlapping

2) Exposure Reduction

Floodplains

- **Guide residents to lower risk areas / Promote safer ways of living** <M / E/ R>
  Consider land use restrictions, encourage relocation, provide flood risk information in real estate transactions, and improve financial tools
- **Localize inundation areas** <N / P / M>
  Install banking structures and utilize existing facilities, which play the role of secondary levees



< >: Expected to be implemented by
N: National Government, P: Prefectures, M: Municipalities,
E: Private Enterprises, R: Residents, W: Water Users

3) Disaster Resilience

Floodplains

- **Improve risk information on land** <N / P>
  Promote the designation of probable inundation zones so there is sufficient area covered by risk information
- **Reinforce evacuation systems** <N / P / M>
  Develop long-term prediction technologies and acquire real-time inundation and breach detection technologies
- **Minimize economic damages** <E / R>
  Prepare anti-inundation measures in factories and buildings and develop BCPs
- **Promote safer ways of living** <E / R>
  Provide flood risk information in real estate transactions and promote anti-inundation preparedness through financial tools
- **Improve technical support systems for affected local governments** <N / E>
  Strengthen TEC-FORCE (Technical Emergency Control Force, managed by MLIT)
- **Eliminate inundation promptly** <N / P / M etc.>
  Improve sluice gates

The new policy proposed to the Minister, July 9, 2020

Governance

The Lower House
February 2021

The Upper House
April 2021

Amendment of the associated nine acts→ Unanimous adoption

Finance

Accelerating National Resilience
about 110B$ from 2021 to 2025

Society 5.0

"a human-centered society in which economic development and the resolution of social issues are compatible with each other through a highly integrated system of cyberspace and physical space."

Davao OS+ Facilitators

Decision-making | Policy-making | Society | Prior Investment | Local Practice

Facilitators

Discipline	1st WS	2nd WS
National Government	11	10
Local Government	2	4
Academe	11	13
Civil Society Organization	1	2
Private Sector	2	1
Media	2	1
TOTAL	29	31

e-Learning

CC & DRR | 2D & 3D FHM | Real-time System | CC Impact | Uncertainty | 3D FHM | COVID-19 | OSS Guide | Contingency Planning | Hazard Mapping | Effective Info | Translating OSS | Knowledge sharing | Communication Planning

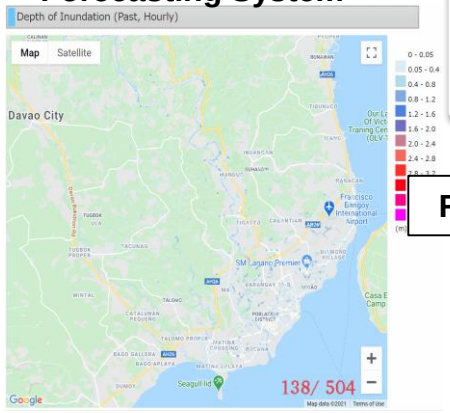
Introductory Lecture

Hands-on

Realtime Flood Monitoring & Forecasting

Barangay-scale | Basin-scale

Flood Monitoring & Forecasting System



PAGASA Server

Authorized Part

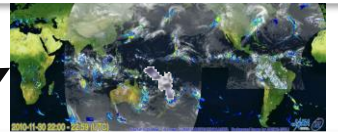
Realtime Access

DIAS

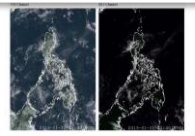
Data Integration & Analysis System

In-situ Gauge

Satellite Rainfall GSMaP

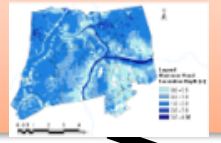


Cloud Image HIMAWARI-8



Climate Change Impact Assessment

High-resolution Hazard Map



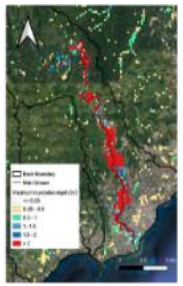
3D Flood Hazard Map on Google Earth

Risk Assess & Contingency

Basin-scale | Barangay-scale

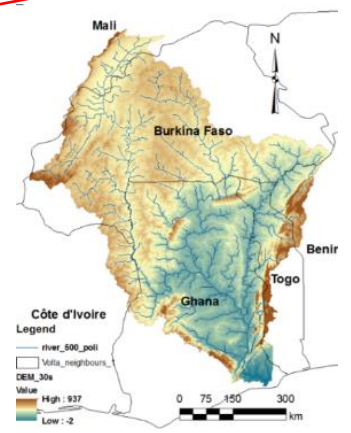
Climate Change Impact

Rain, WL, Discharge, Inundation



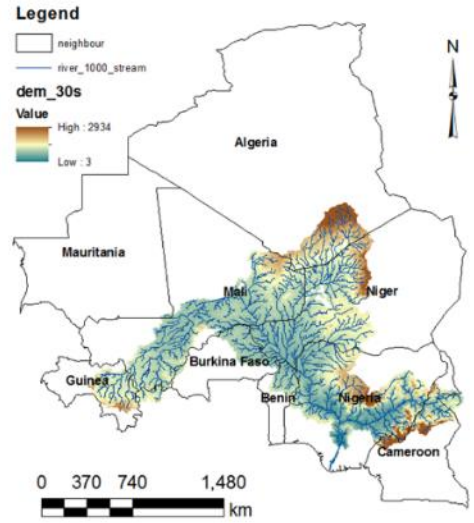
Water Disaster Platform to Enhance Climate Resilience in Africa (WaDiRe-Africa)

WaDiRe-Africa is a collaborative project with the UNESCO Intergovernmental Hydrological Programme (IHP), and the AGRrometeorology, HYdrology, METeorology (AGRHYMET) , the Niger Basin Authority (NBA), the Volta Basin Authority (VBA), and Ministry of Foreign Affairs of Japan.



Volta River Basin

Niger River Basin



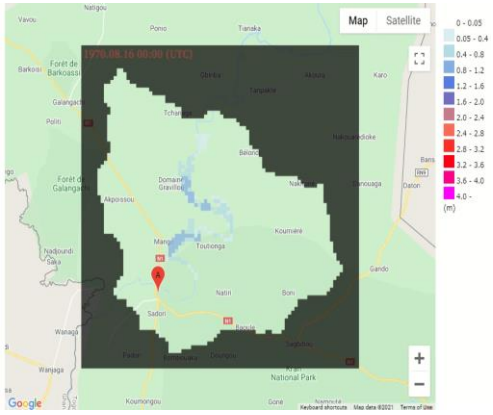
Kick-off Meeting in Lome, Togo, in June 2019

Development of Flood Early Warning System for West Africa

Near real-time flood simulation by Water and Energy Budget Rainfall-Runoff-Inundation Model （WEB-RRI Model) on Data Integration and Analysis System

GsMaP rainfall

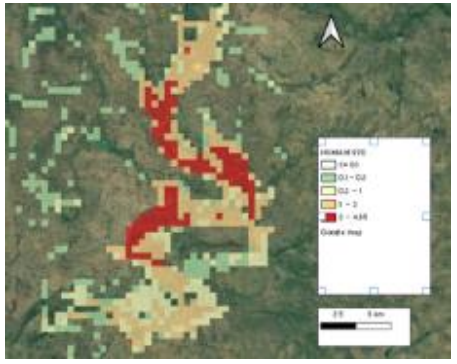
Inundation



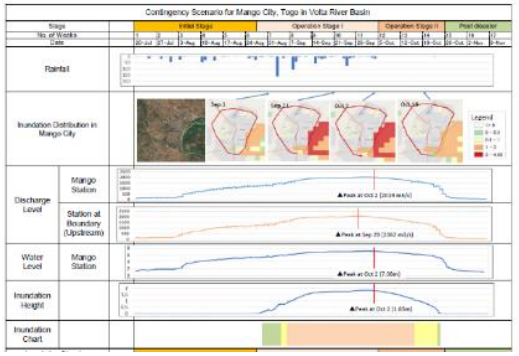
e-Learning Training Course

1.Training for Experts
-Lecture, Tutorials, Q&A Session
-288 participants, 197 certificated

2.Training for Facilitators
-Lecture, Q&A Session
-44 participants, 30 certificated



Tutorial of hazard mapping



Tutorial of Contingency Planning

Plenary session II

RISK ASSESSMENT - Weighing Risk in Policymaking

Bridging Science and Society: Well-Informed Decisions on Water Resilience under Climate Change

A water resilient future under climate change can be created by facilitation between science and society across disciplines and sectors based on quantified uncertainty and integrated knowledge.

Thank you for your attention.

unesco | International Science Council | AAAS Advancing Science, Serving Society | twas | iap Science Health Policy the interacademy partnership | European Academies easac Science Advisory Council

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