

ICHARM / PWRI

International Centre for Water Hazard and Risk Management
under the auspices of UNESCO,
Public Works Research Institute (PWRI), Japan

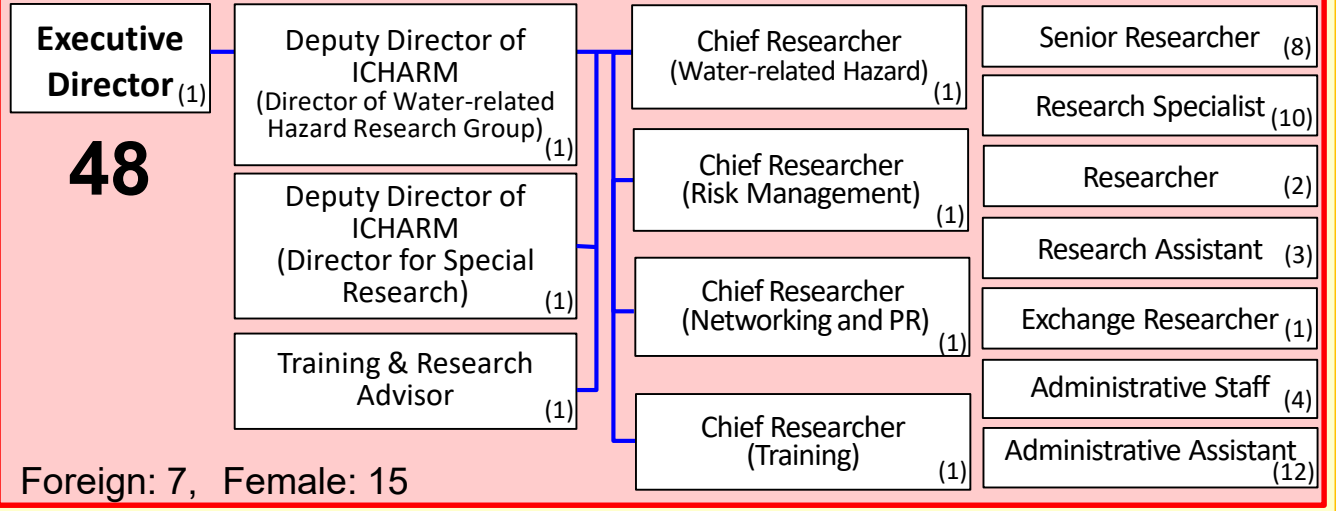


Organization

Public Works Research Institute (PWRI)

- President
- Tsukuba Central Research Institute
 - Civil Engineering Research Institute for Cold Region (CERI)
 - Center for Advanced Engineering Structural Assessment and Research (CAESAR)
 - Innovative Materials and Resources Research Center (iMaRRC)

International Centre for Water Hazard and Risk Management (ICHARM) officially established March 2006



To serve as the Global Centre of Excellence for Water Hazard and Risk Management by:

- observing and analyzing natural and social phenomena;
- developing methodologies and tools;
- building capacities;
- creating knowledge networks; and
- disseminating lessons and information

in order to assist governments and all stakeholders in managing risks of water-related hazards at global, national, and community levels.



UNESCO IHP-IX Priority areas (2022-29)

PWRI fifth medium- to long-term plans (2022-27)

- Step up innovative research by taking an End-to-End approach
- Improve its capacity building programs and offer training for local experts to become “facilitators”
- Promote information networking

3. Mid-term Programme (6 years) and Workn Plan 2022-23

(1) Innovative research

1) Water-related disaster data	Satellite rainfall data set corrected with ground data, Couple Land and Vegetation Data Assimilation System (CLVDAS), etc.
2) Water risk assessment	Water-Energy-Budget Rainfall-Runoff-Inundation model (WEB-RRI), Simulation Model for Rice-Weather Relationships (SIMRIW), etc.
3) Water risk monitoring	Weather Research and Forecasting model (WRF), Local Ensemble Transform Kalman Filter (LETKF), etc.
4) Policy proposal and evaluation	Area-Business Continuity Management, Economic damage analysis on digital twins, etc.
5) Water-related disaster management	Realtime runoff-inundation forecast for small-scale rivers, Virtual Reality for risk education, Lessons of Flood Emergency Response, etc.

(2) Effective capacity building

1) Doctorial Course, Master's Course, Short-term trainings
2) Online Synthesis System for Sustainability and Resilience (OSS-SR), Facilitator training
3) Follow-up seminar for graduates

(3) Efficient information networking

1) International Flood Initiative (IFI) Secretariat, Typhoon Committee WG of Hydrology
2) Platforms on Water Resilience and Disasters under IFI
3) ICHARM News Letter, Public relations

3. Mid-term Programme (6 years) and Workn Plan 2022-23

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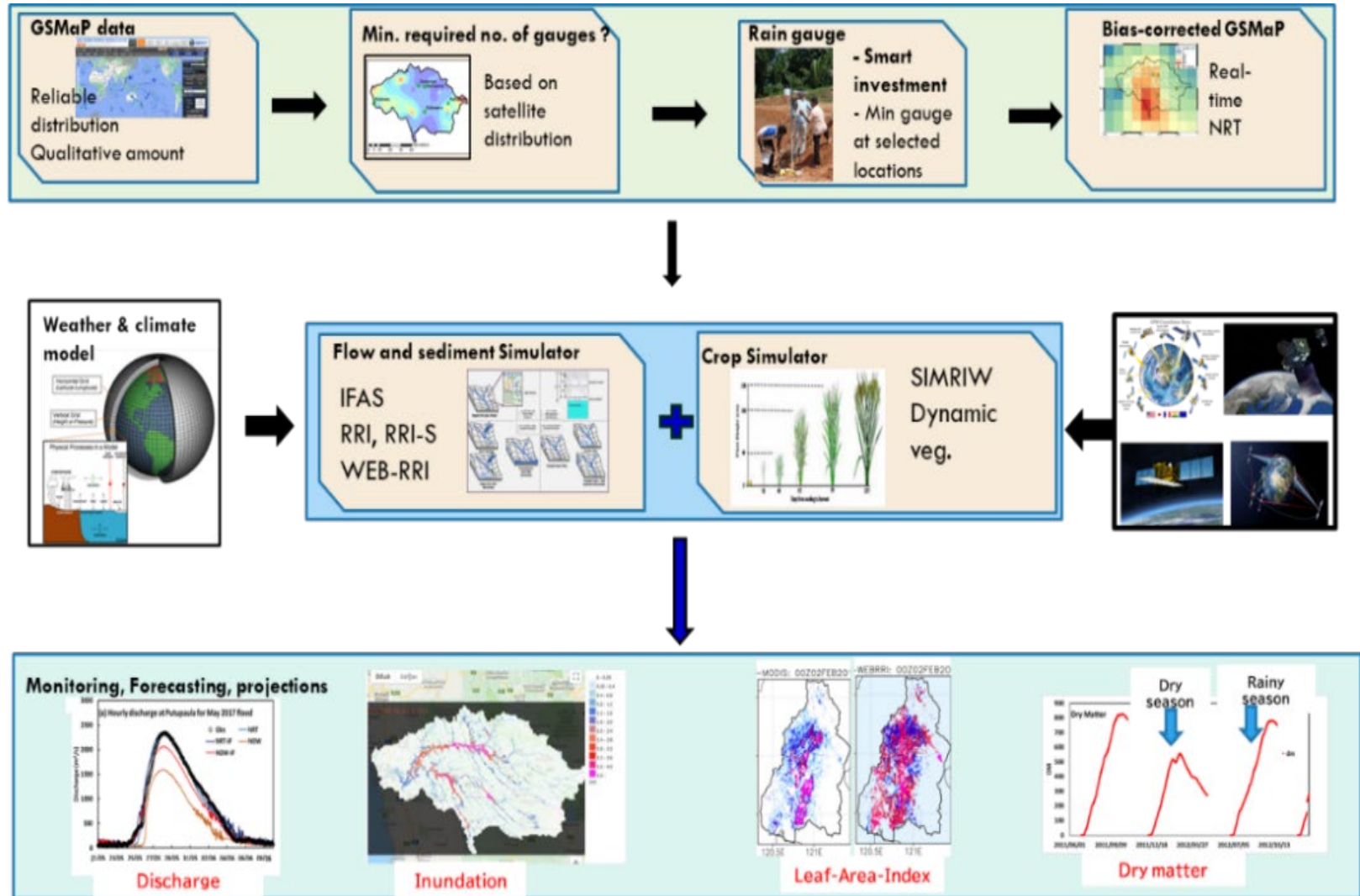
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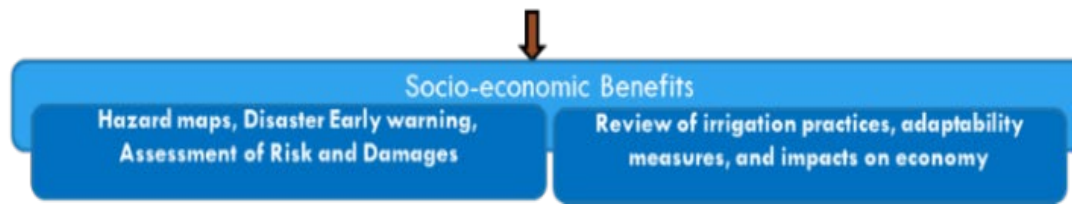
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1. Innovative Research

1) Water-related disaster data: *Integrated observation-modeling system*



- Sendai Framework
- Paris agreement
- SDGs



3. Mid-term Programme (6 years) and Workn Plan 2022-23

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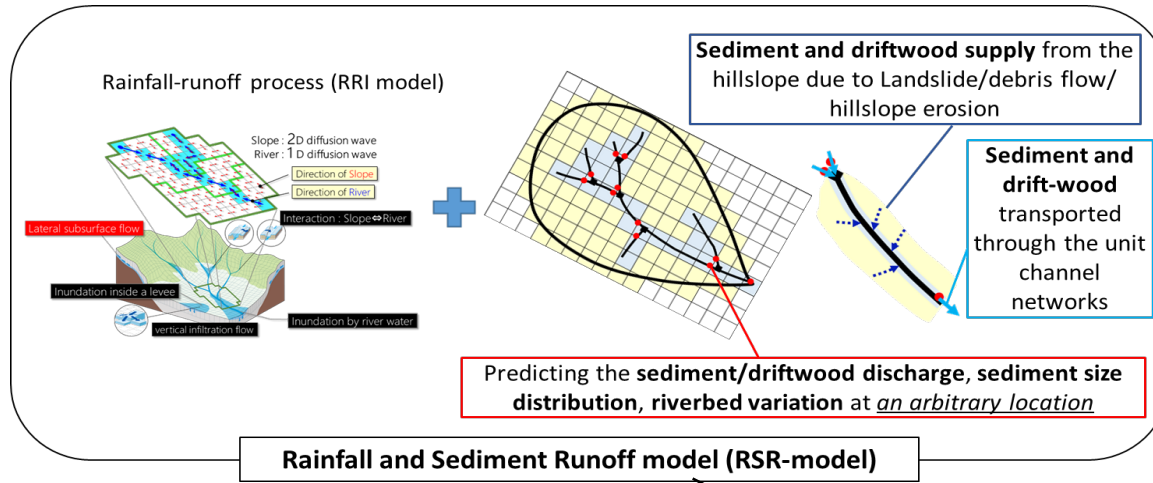
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1. Innovative Research

2) Water risk assessment: *Development of RSR-model*



Prevention and mitigation of sediment related flood disaster



Inundation disaster with sediment, driftwood

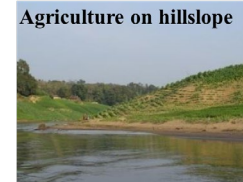


Wide inundation disaster in plain area due to large bank erosion and dyke breach

Comprehensive sediment management in river basins scoped on the issues in dam, river channel, structures and coast management



Sedimentation in dam reservoirs



Soil loss in the river basin

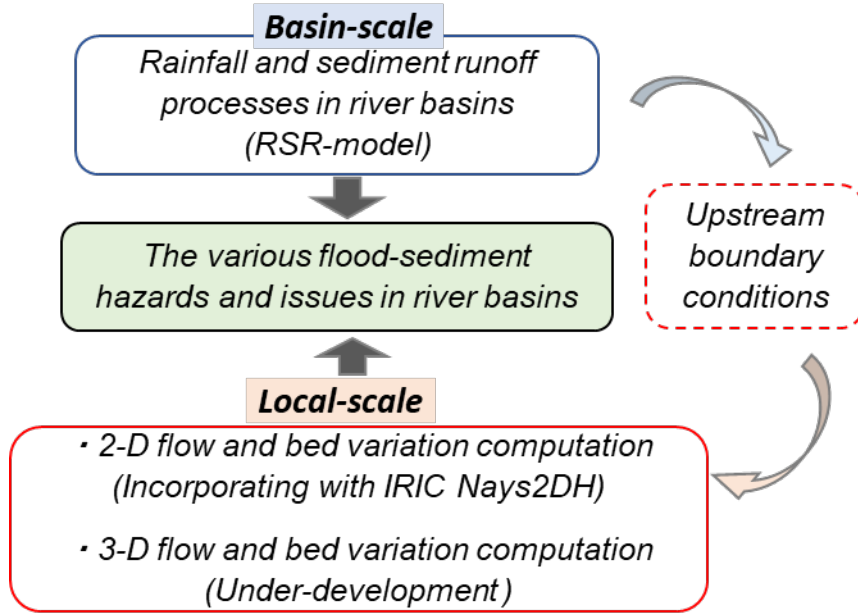


The scouring of the bridge pier



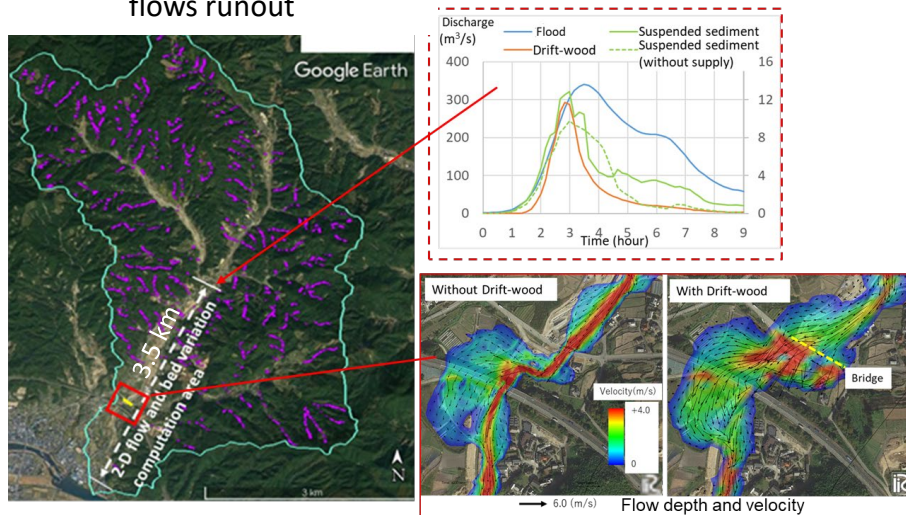
Coastal erosion

Bridging top-down and bottom-up approaches to address river basin flood-sediment issues



Terauchi Dam Reservoir Basin (51km²), 2017 Northern Kyushu Heavy Rainfall

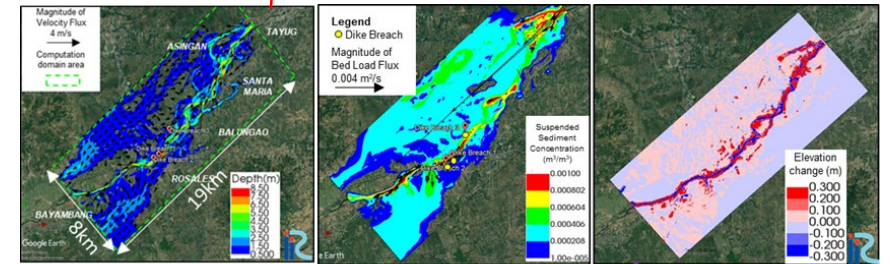
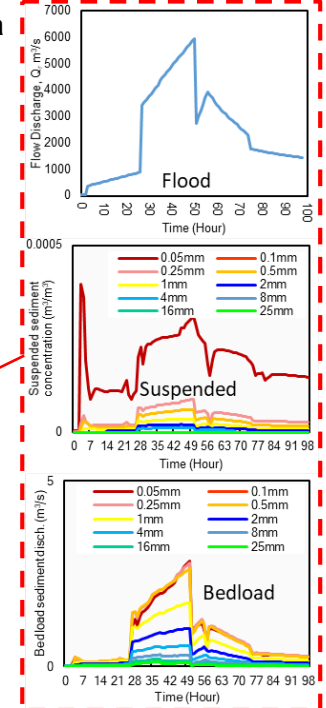
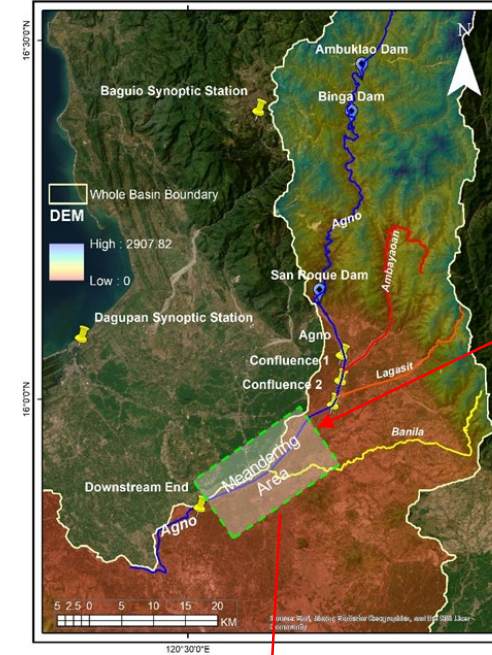
Predicted landslides and Debris flows runoff
Upstream-BCs for 2-D cal.



Agno River (3000km²), 2009 Flood (Philippines)

Upstream-BCs for 2-D cal.

Rainfall and sediment runoff analysis area



Flow depth and velocity | SSC and bed load flux | Sediment deposition depth



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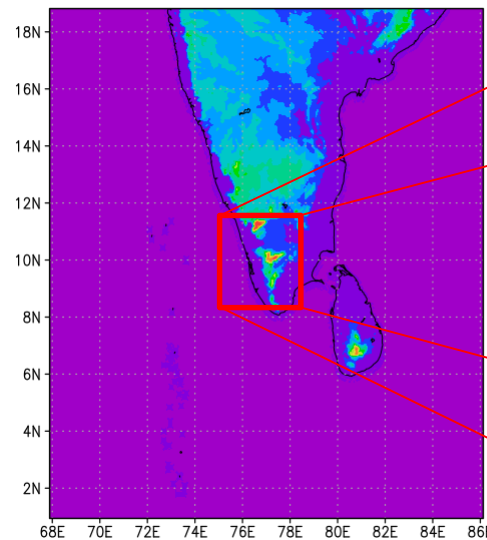
1. Innovative Research

3) Water risk monitoring: *World Bank Kerala Project*

Method

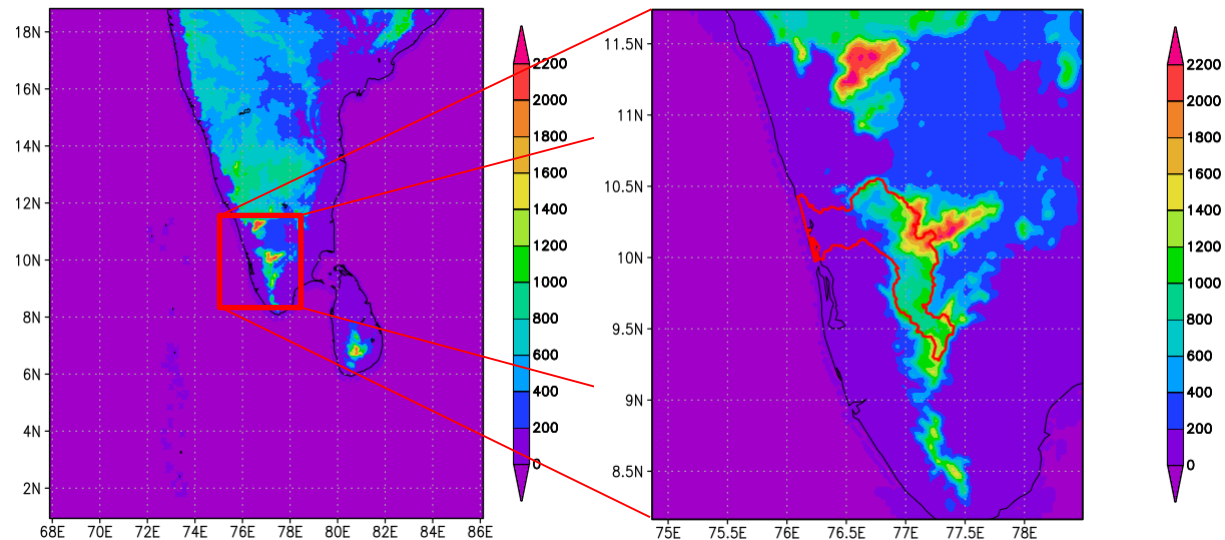
- Diagnostic simulation: Downscaling ERA5 reanalysis by ECMWF (0.25 degree resolution)
- Prognostic simulation: Downscaling GEFS ensemble forecast by NCEP/NOAA. (1 degree resolution)
- Regional model WRF ver.3.7.1
 - Outer domain: grid interval:15km, 401x401x40 grid (6000km x 6000km)
 - Inner domain: grid interval: 1.6km, 241x241x40 (400km x 400km)
 - Parameterizations: CPS off, WRF double moment 6-class ice microphysics, Noah land surface scheme, MYNN2.5 PBL scheme, LW radiation RRTM, SW radiation Dudhia scheme

Domain $\Delta x=5\text{km}$



Domain $\Delta x=1.6\text{km}$

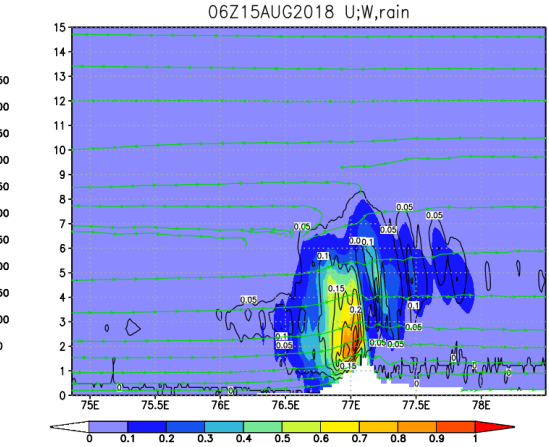
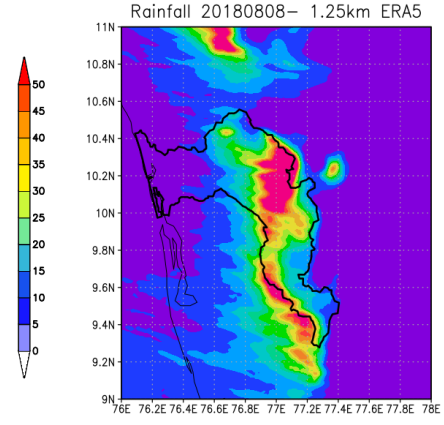
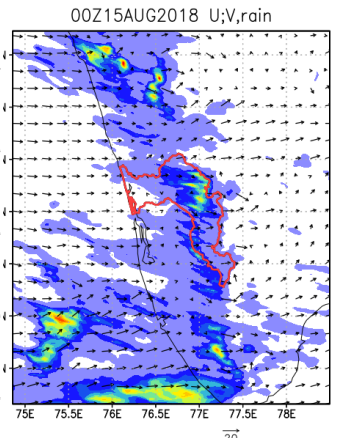
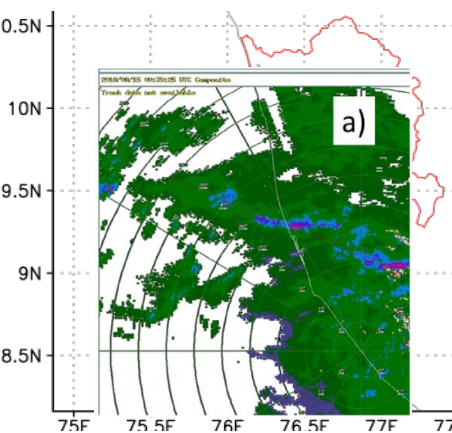
Terrain 2.5km



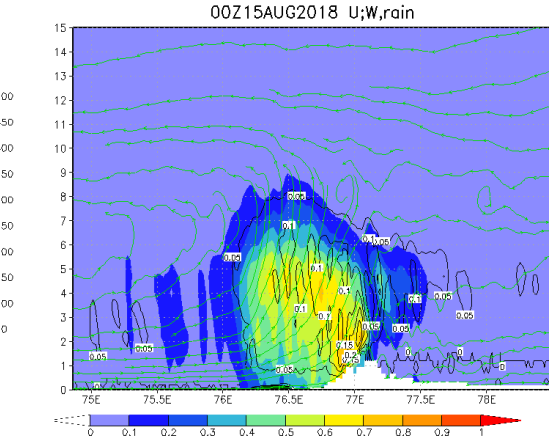
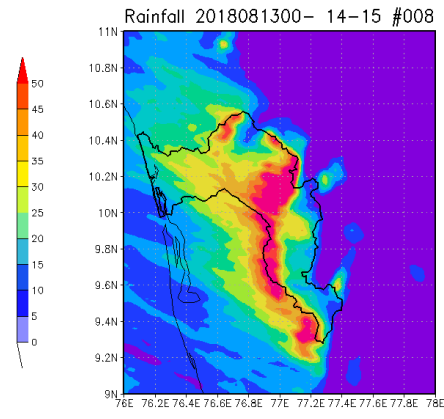
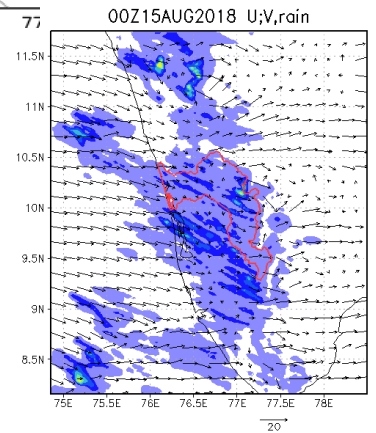
1. Innovative Research

3) Water risk monitoring: *World Bank Kerala Project*

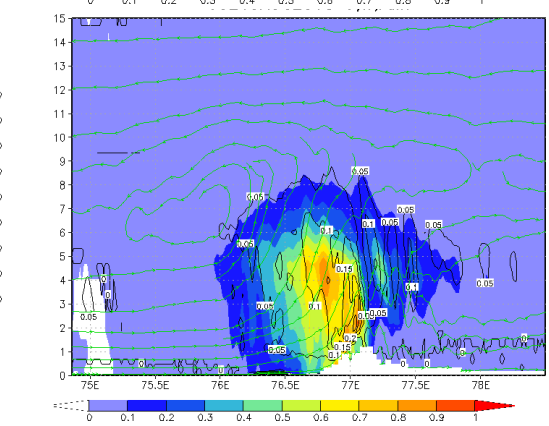
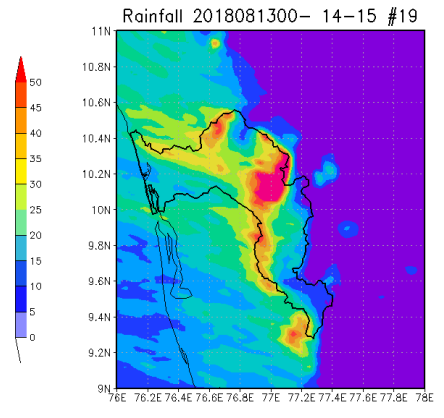
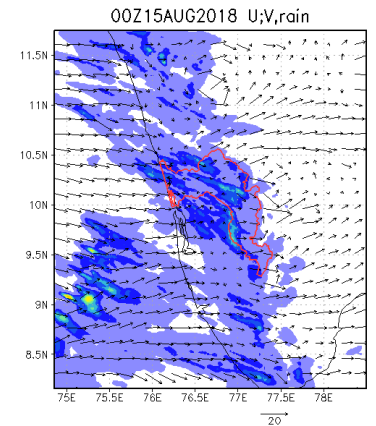
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3. Mid-term Programme (6 years) and Workn Plan 2022-23

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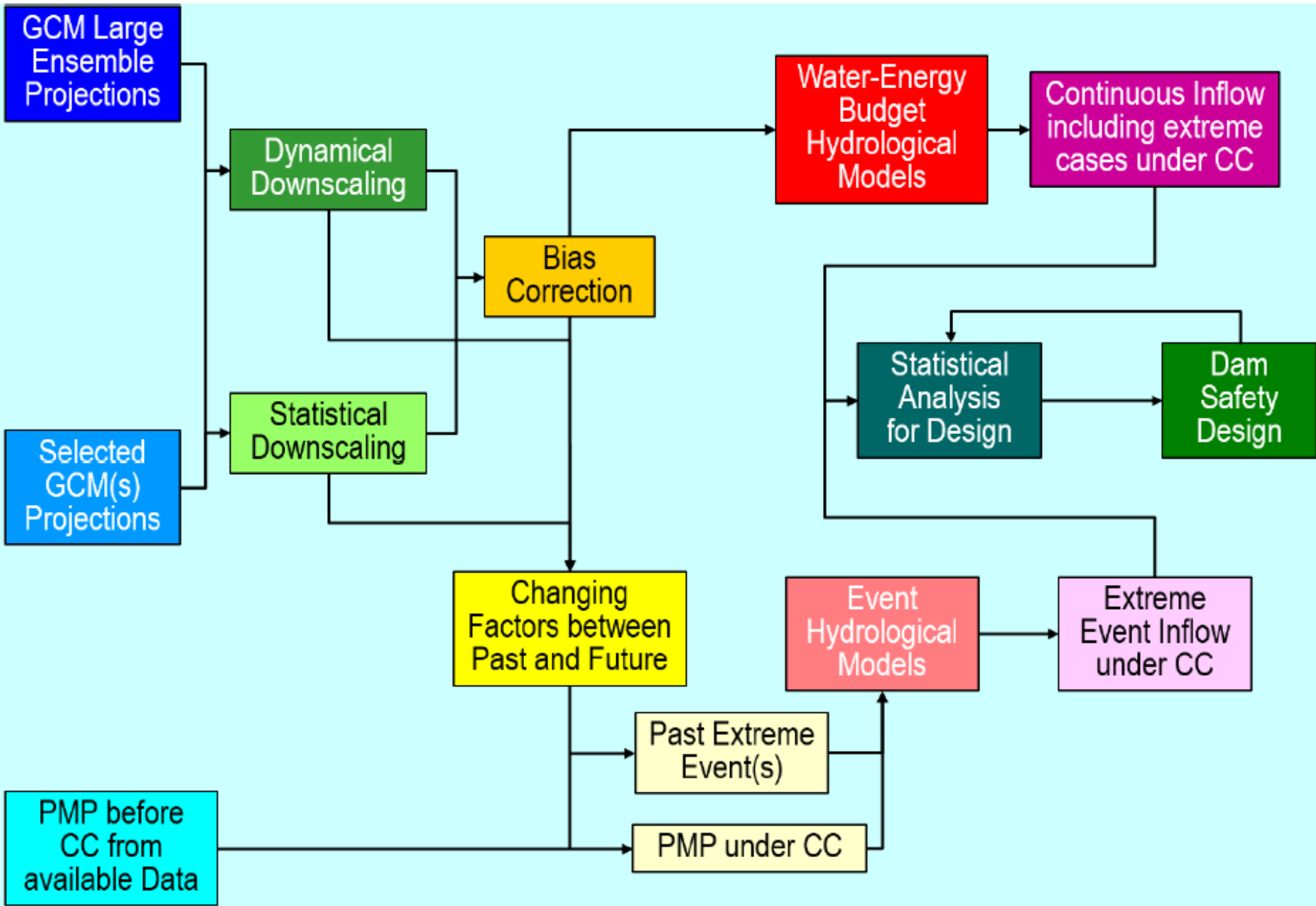
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1. Innovative Research

4) Policy proposal and evaluation: *World Bank Dam Safety Project*



1. Innovative Research

4) Policy proposal and evaluation: *World Bank Dam Safety Project*

Data and Methods	Options	1	2	3	4	5	6	7	8	
Data	a) Past design rainfall									
	b) Selected GCM(s)									
	c) GCM large ensembles									
Downscaling	a) Statistical									
	b) Dynamic									
Coping with uncertainty	a) Change factor									
	b) Bias correction									
Rainfall-runoff conversion	a) Event focus									
	b) Continuous time focus									
Applicability	Observational data	L	L	M	M	M	H	M	H	
	Expertise	L	L	M	M	M	H	H	H	
	Computational cost	L	L	L	M	M	M	H	H	

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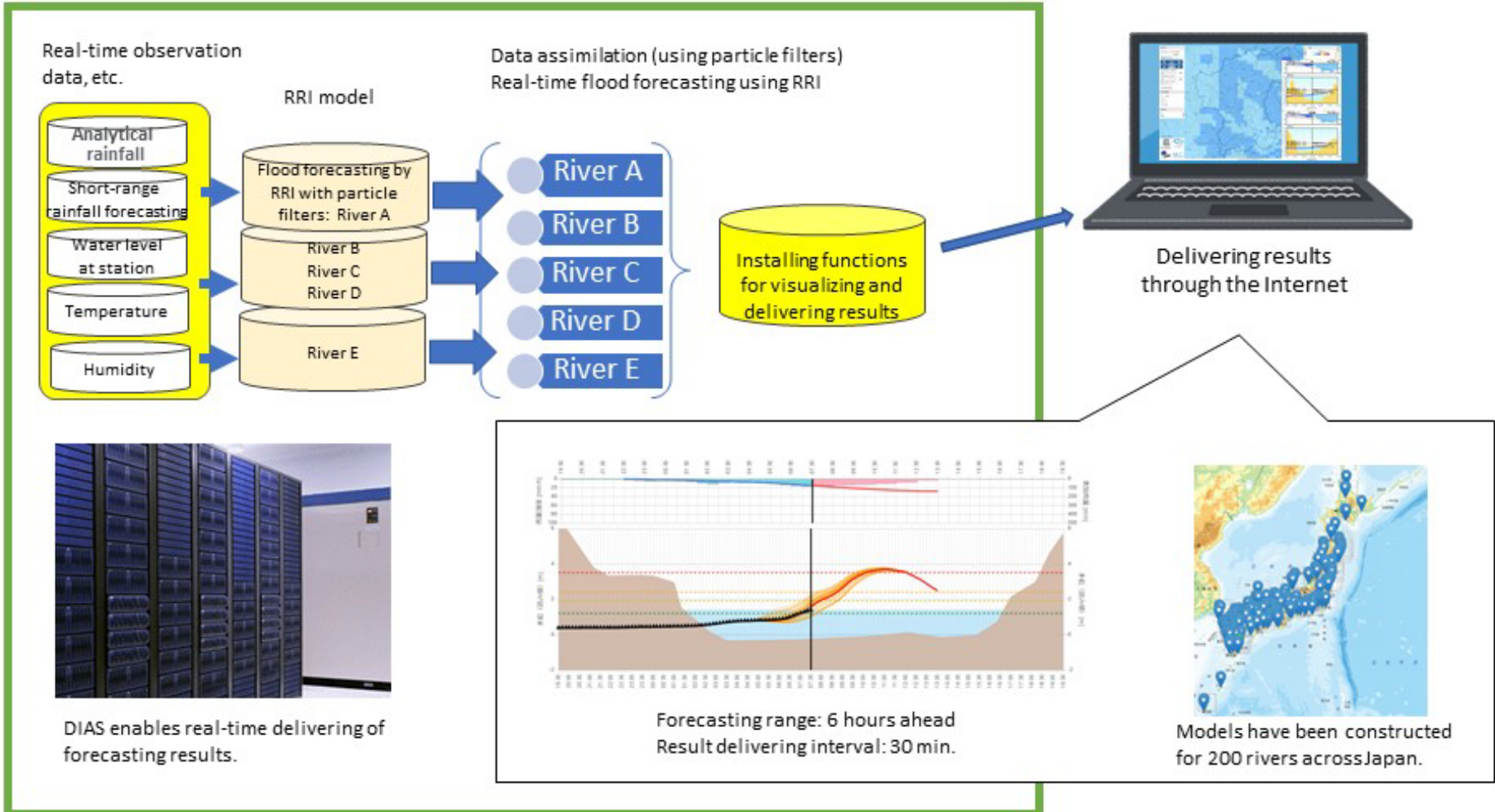
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1. Innovative Research

5) Water-related disaster management: *Flood Forecasting System for Small and Medium Rivers*

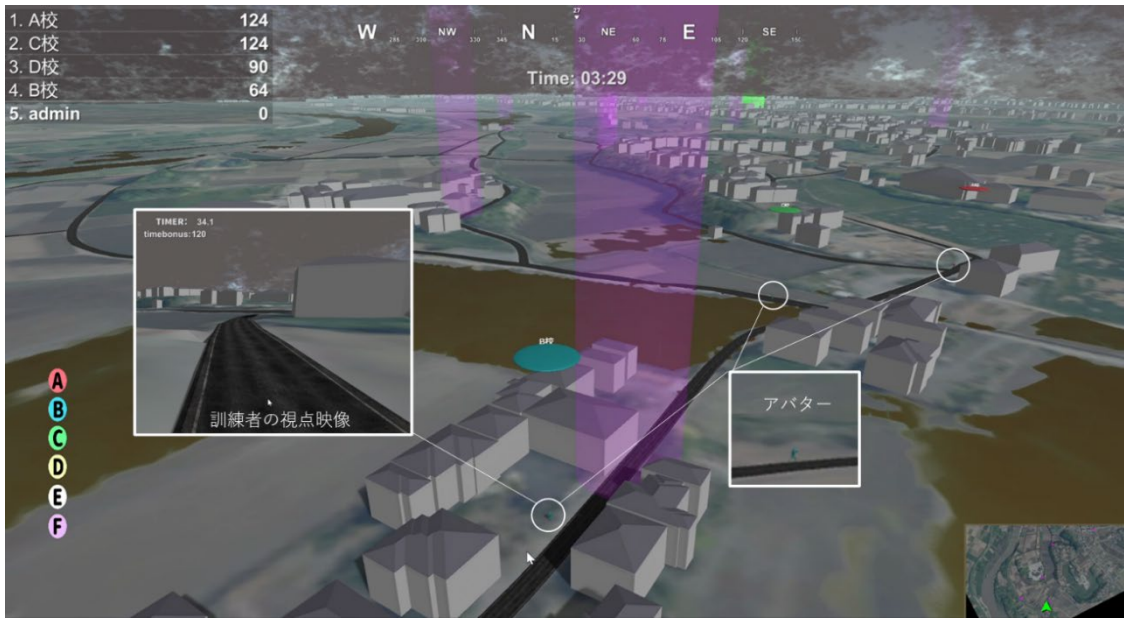


total events: 291

- 252 (86.6%): meeting the demanded performance specifics
- 13(4.5%): expected to meet the demanded performance specifics

1. Innovative Research

5) Water-related disaster management: *Virtual Flood Experience System*



A simulated view of Kamigo District of Tsukuba City in the Kokai River basin. The view displayed on the VFES operator's monitor is shown to participants (The small green structure in the far background is the designated evacuation shelter, Kamigo Elementary School (the goal of the competition).



An esports-like competition to promote VFES with students of junior high and high schools and a university at the ICFM9

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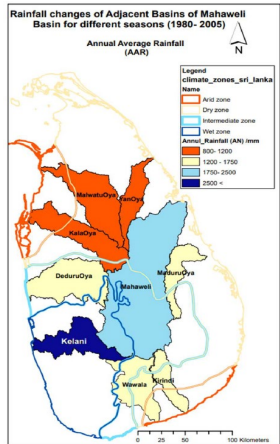
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2. Effective capacity building

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Five Principles

accepted by the Journal of Hydrology

1. The climate models used for decision-making should accurately represent the current regional climate;
2. When using GCMs at the regional or local scale, downscaling and bias correction should be implemented;
3. The climatic sensitivity of climate models should be identified;
4. The discrepancies in outcomes among climate models should be understood; and
5. Climate models should be able to address diverse environments.

Details of Basins					INSITU (PAST)(1980-2005)					NF (2025-2050)					MF(2050-2075)					FF(2075-2100)																			
No	Basin Name	Position with Mahaweli Basin	Basin Specified area	Relevant Climatic Zone	Average Rainfall (mm) / Climate Trend					Likelihood / Simple Average Magnitude % (DOD)																													
					IM1	SWM	IM2	NEM	AN	IM1	SWM	IM2	NEM	AN	IM1	SWM	IM2	NEM	AN	IM1	SWM	IM2	NEM	AN															
										> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)	> 0 (increasing) < 0 (decreasing)												
1	Walawa	South	BA	A,D,I,W	375	432	511	363	1674	2	-3	3	-2	4	-1	3	-1	4	-1	1	-4	4	-1	5	0	3	-2	5	0	1	-4	5	0	5	0	3	-2	5	0
2	YanOya	North	BA	D	130	237	415	405	1178	1	-4	3	-2	4	-1	2	-3	4	-1	1	-4	4	-1	3	-2	2	-3	4	-1	0	-5	4	-1	5	0	3	-2	5	0
3	MalwatuOya	North West (North)	BA	D,A	169	210	419	326	1116	1	-4	4	-1	5	0	4	-1	4	-1	1	-4	5	0	4	-1	1	-4	4	-1	1	-4	5	0	5	0	2	-3	4	-1
4	KalaOya	North West	BA	I,D,A	217	213	449	319	1190	1	-4	3	-2	4	-1	3	-1	4	-1	1	-4	5	0	5	0	2	-3	4	-1	1	-4	5	0	5	0	2	-3	4	-1
5	DeduruOya	West	BA	I,W	291	443	558	257	1544	1	-4	3	-2	2	-3	3	-2	3	-2	2	-3	3	-2	5	0	3	-2	4	-1	1	-4	4	-1	5	0	3	-2	4	-1
6	MaduruOya	East	BA	I,D	176	261	484	718	1618	3	-2	3	-2	3	-2	3	-2	4	-1	1	-4	5	0	5	0	2	-3	4	-1	1	-3	5	0	5	0	2	-3	4	-1
7	Kelani	West (upper)	BA	W	512	1715	848	382	3455	2	-3	3	-2	4	-1	3	-2	3	-2	2	-3	2	-3	5	0	3	-2	4	-1	1	-4	3	-2	5	0	3	-2	4	-1
8	KirindiOya	South	BA	A,D,I	284	273	482	315	1347	3	-2	3	-2	4	-1	4	-1	4	-1	2	-3	4	-1	5	0	3	-2	5	0	1	-4	5	0	5	0	3	-2	5	0
9	Mahaweli	Own	BA	W,I,D	216	497	524	643	1863	3	-2	5	0	4	-1	4	-1	5	0	4	-1	5	0	5	0	3	-2	5	0	3	-2	5	0	5	0	2	-3	5	0

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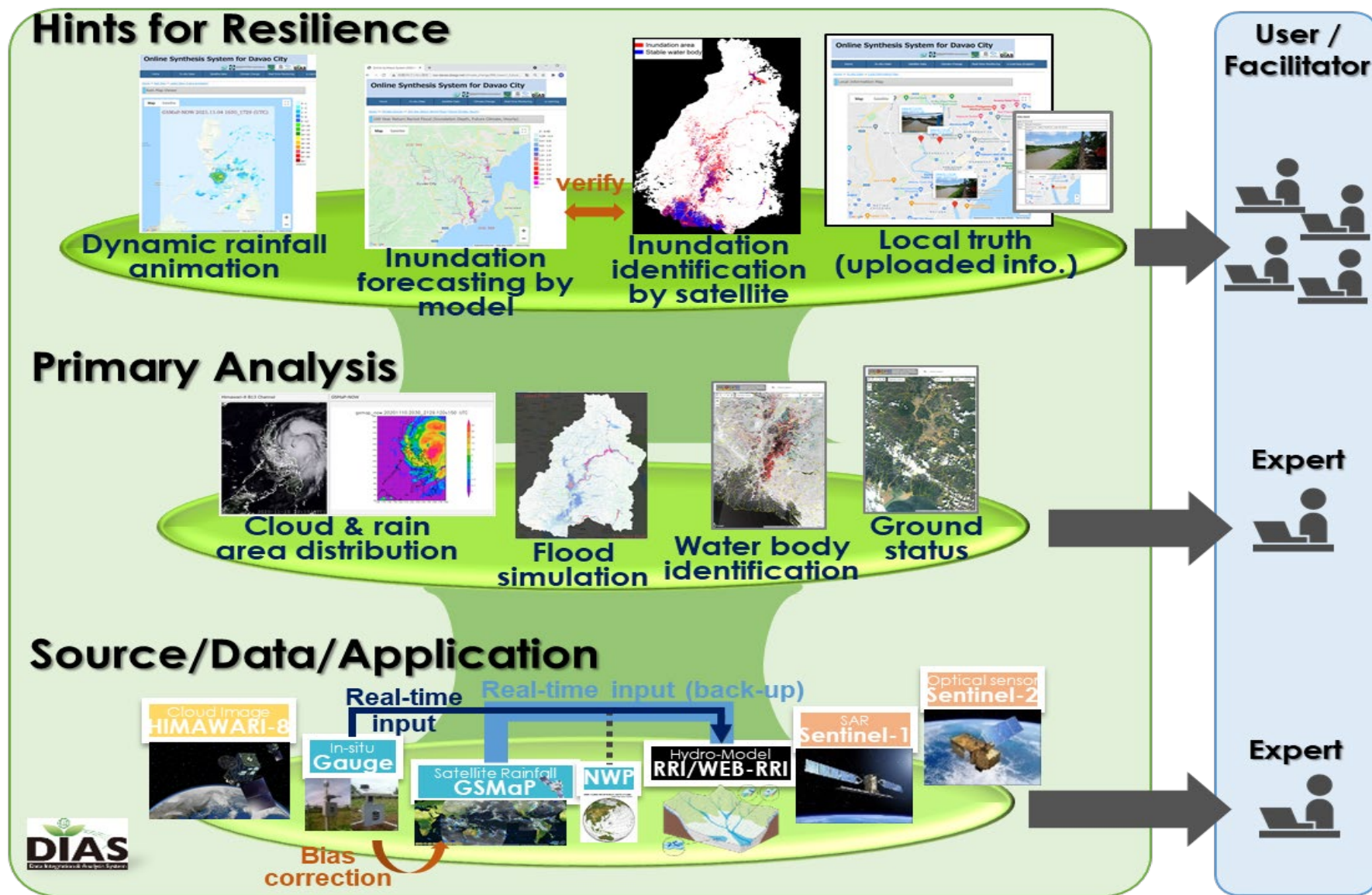
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Davao and the surrounding areas of Manila in the Philippines, West Africa

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2. Effective capacity building 3) Follow-up seminar for graduates

09:30-12:30, February 22, 2023 CHARM

Participants:

17 alumni who came to Japan to present at ICFM9

Faculty members, current DMs, DMPs, training teams, and others

Agenda

- | | |
|---|--|
| Opening Remarks | Director general of JICA Tsukuba Center, Emiko Mutsuyoshi
Former Director of ICHARM, Kuniyoshi Takeuchi |
| Part I: Keynote Address | Executive Director of ICHARM, Toshio Koik |
| Part II: Topics to be discussed by 2 or 3 alumni | |
| Part III: Interaction between alumni and current students | |
| Special Lecture | Former Director of ICHARM, Kuniyoshi Takeuchi |



Discussion during the Follow-up Seminar



Participants in the Follow-up Seminar

3. Mid-term Programme (6 years) and Workn Plan 2022-23

(1) Innovative research

1) Water-related disaster data	Satellite rainfall data set corrected with ground data, Couple Land and Vegetation Data Assimilation System (CLVDAS), etc.
2) Water risk assessment	Water-Energy-Budget Rainfall-Runoff-Inundation model (WEB-RRI), Simulation Model for Rice-Weather Relationships (SIMRIW), etc.
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(2) Effective capacity building

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2) Online Synthesis System for Sustainability and Resilience (OSS-SR), Facilitator training
3) Follow-up seminar for graduates

(3) Efficient information networking

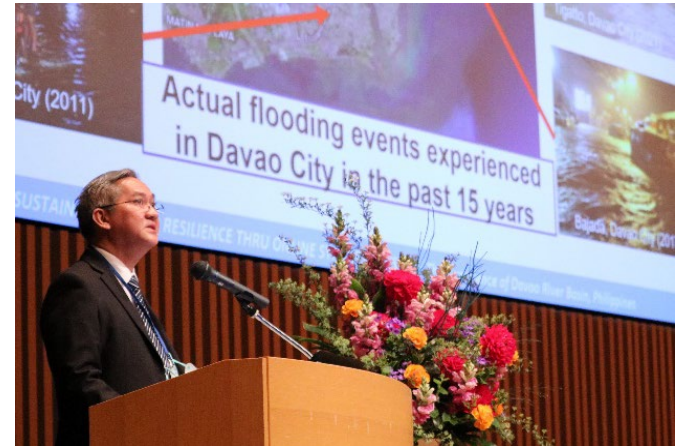
1) International Flood Initiative (IFI) Secretariat, Typhoon Committee WG of Hydrology
2) Platforms on Water Resilience and Disasters under IFI
3) ICHARM News Letter, Public relations

3. Efficient information networking

1) International Flood Initiative (IFI) Secretariat, Typhoon Committee WG of Hydrology



ICHARM staff (left) reporting to Dr. Renato U. Solidum, Jr., the undersecretary of DOST



Dr. Anthony C. Sales speaks about the Platform on Water Resilience and Disasters at Davao City, the Philippines at a parallel session of ICFM9

UNESCAP/WMO Typhoon Committee (TC)



The 11th annual WGH meeting in Tokyo on October 18, 2022

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- The 9th International Conference on Flood Management (ICFM9) hosted by ICHARM, at the Tsukuba International Congress Center in Tsukuba, on February 19-22, 2023
- Participants: 394 flood experts (212 from Japan, 100 from Asia, 78 from the rest of the world, including four unknown) from 41 countries.



High-level symposium on "Integrated Water Cycle Management in the Post COVID-19 Era" at GRIPS, attended by His Majesty the Emperor of Japan.

- 4 plenary sessions
- 24 parallel sessions
- 143 oral presentations
- 48 poster presentations
- 5 special sessions
- Booth for the technology exhibition
- Public symposium, "Can You Survive Unexpected Floods?"

Post-conference special issues:

- Journal of Flood Risk Management (JFRM) : 21
- Proceedings of the International Association of Hydrological Sciences (PIAHS) : 63

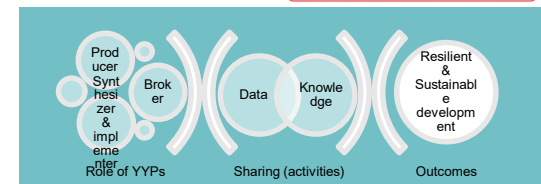
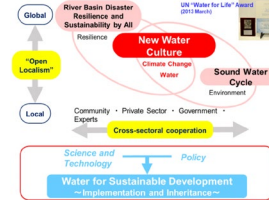
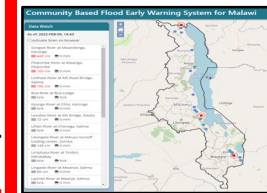


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The 6th UN Special Thematic Session: Connecting Midterm Reviews of Water and Disaster Risk Reduction under Climate Change

10:00-10:05	1. Opening remarks and introduction of the Session -Opening remarks: H.E. Dr. Han Seung-Soo, Former Prime Minister of the Republic of Korea / Chair of the High-level Experts and Leaders Panel on Water and Disasters (HELP) / Member of WCL
10:05-11:30	2. High-level Panel Discussion "Connecting Midterm Reviews of Water Action Decade and DRR under Climate Change" -Moderator: H.E. Mr. Mark Harbers, Minister of Infrastructure and Water Management, the Netherlands / Member of WCL
11:30-13:00	3. Science and Technology Panel "Showcases of Science and Technology application, connecting, water, DRR, and climate change" -Moderator: Prof. Toshio Koike, Executive Director, The International Centre for Water Hazard and Risk Management -Keynote: <u>Mr. Abou Amani</u> , Director of the Division of Water Sciences, UNESCO and Secretary of the Intergovernmental Hydrological Programme (IHP) -Presentations from Honduras, Malawi, Japan and Youth (U-Inspire) -Comments: <u>H.E. Dr. Han Seung-soo, Former Prime Minister of the Republic of Korea / Chair of the High-level Experts and Leaders Panel on Water and Disasters (HELP) / Member of WCL; Ms. Yoko Kamikawa MP, Special Envoy of the Prime Minister of Japan / Former Minister of Justice, Japan; Ms. Eileen Burke, Global Lead for Water Resources Management, World Bank</u>
15:00-16:45	4. Plenary Session -Opening remarks -Remarks: His Majesty Willem-Alexander, the King of the Netherlands -Keynote lecture: His Majesty Naruhito, the Emperor of Japan -Keynote speeches -Presentations
16:45-17:45	5. Special Session on Water, DRR and Climate Change -Moderator: Dr. Stefan Uhlenbrook, Director Hydrology, Water and Cryosphere, Water and Cryosphere Branch, World Meteorological Organization (WMO)



UN 2023 Water Conference

New York, March 22-24, 2023

I believe that the building process of a sound water cycle itself can also contribute to peace-building.



The key for breakthrough is, among other things, the Open Science Policy, facilitation between science and decision making, end-to-end approach, and water cycle integration.

Mr. Sewilam and Ms. KAMIKAWA

Co-chairs, Interactive Dialogue

Water for Climate, Resilience and Environment

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ICHARM R&D Seminar held in FY2022



Dr. Anthony C. Sales



Prof. Andras Szollosi-Nagy

The Open Day 2022 was held as a webinar, just like the last year's, to prevent the spread of the COVID-19 infection. A total of 91 students joined this online event from Ibaraki Prefectural Takezono High School and Ibaraki Prefectural Namiki Secondary School.

In FY2022, we published four issues of newsletter from No. 64 to No. 67. The number of readers has reached about 5,000 worldwide. Easy access to the more than 1,000 articles since 2006 through the ICHARM web-site.

No.	Date	Speaker	Affiliation (at the time of seminar)	Title
68	Apr. 26, 2022	Dr. Anthony C. Sales	Regional Director, DOST, Regional Office No. XI, Philippines	Advanced Activities for Flood Resilience in Davao City, Philippines
69	Oct. 11, 2022	Prof. András Szöllösi-Nagy	National University of Public Service, Budapest, Hungary	The Global Changes and their Impacts on the Hydrological Cycle

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