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ICHARM Publication No.42

Meeting material of the 5th ICHARM Governing Board Meeting

June 2021

International Centre for Water Hazard and Risk Management under the auspices of UNESCO (ICHARM)

PUBLIC WORKS RESEARCH INSTITUTE (PWRI)

United Nations Educational, Scientific and Cultural Organization

International Centre for Water Hazard and Risk Management under the auspices of UNESCO

Public Works Research Institute, National Research and Development Agency, Japan

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by

International Centre for Water Hazard and Risk Management
under the auspices of UNESCO (ICHARM)

Synopsis:

水災害・リスクマネジメント国際センター（ICHARM）は、日本政府と UNESCO 間の協定に基づき、UNESCO カテゴリー2 センターとして 2006 年 3 月に土木研究所の一部門として設立された。2020 年 2 月にその協定が更新されたのを受け、協定第 6 条に基づいて 2021 年 5 月 12 日に 5th ICHARM Governing Board Meeting（第 5 回 ICHARM 運営理事会会合）を開催した。

理事会は、土木研究所理事長を含む 8 名で構成され、その手続規則「Rules of Procedure」の採択、2020 年 4 月から 1 年間の活動報告「ICHARM Activity Report」の審査、及び 2021 年度の具体的な事業計画「ICHARM Work Plan」の審査・採択が行われた。本稿は当該会合で了承された事項を会議資料としてまとめたものである。

Key Words: Water-related disaster, Activity Report, Work Plan

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AGREEMENT BETWEEN THE GOVERNMENT OF JAPAN AND THE UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO) REGARDING THE INTERNATIONAL CENTRE FOR WATER HAZARD AND RISK MANAGEMENT (ICHARM) (CATEGORY 2) UNDER THE AUSPICES OF UNESCO
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参考資料）
日本語版会議資料

ICHARM 5th Governing Board Meeting

Date: May 12, 2021, Wednesday, 16:00-17:30

Venue: Web Meeting

Agenda (Tentative):

- Opening by Chairperson, President of PWRI
- Self-introduction by Governing Board Members
- Rules and procedures for ICHARM Governing Board (Confirmation)
- Examination of ICHARM Activity Report
- Examination and adoption of ICHARM Work plan
- Closing

5th ICHARM Governing Board Meeting
Participants List

(Alphabetically order of the organization)

Akihiko TANAKA
President, National Graduate Institute for Policy Studies (GRIPS)

Eiji IWASAKI
Director General of Global Environment Department, Japan International Cooperation Agency (JICA), on behalf of Mr. Shinichi KITAOKA, President, JICA

Kunihiro YAMADA
Vice Minister for Engineering Affairs, Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

Kazuhiro NISHIKAWA (Chairperson)
President, Public Works Research Institute (PWRI)

Yuki MATSUOKA
Head of the United Nations Office for Disaster Risk Reduction (UNDRR) Office in Japan, on behalf of Ms. Paola ALBRITO, Chief of Branch, Intergovernmental Processes, Interagency Cooperation and Partnerships, UNDRR

Shamila NAIR-BEDOUELLE
Assistant Director-General for Natural Sciences, on behalf of Ms. Audrey Azoulay, Director-General, United Nations Educational, Scientific and Cultural Organization (UNESCO)

Kaoru TAKARA
Chair Holder, Research and Educational Unit of UNESCO Chair on Water, Energy and Disaster Management (WENDI), Professor, Graduate School of Advanced Integrated Studies in Human Survivability (GSAIS), Kyoto University

Elena MANAENKOVA
Deputy Secretary-General, World Meteorological Organization (WMO)

(Secretariat)
Yasuhito SASAKI, Vice President, PWRI
Toshio KOIKE, Executive Director, ICHARM
Shinji EGASHIRA, Research and Training Advisor, ICHARM
Hiroyuki ITO, Deputy Director of ICHARM,
Director of Water-related Hazard Research Group, PWRI
Tetsuya IKEDA, Deputy Director of ICHARM (International Coordination),
Director for Special Research, PWRI

Rules of Procedure for ICHARM Governing Board

Article 1 Intent

These Rules of Procedure (hereinafter referred to as "the Rules") shall state the necessary matters which shall guide proceedings of the International Centre for Water Hazard and Risk Management (ICHARM) Governing Board (hereinafter referred to as "the Governing Board") meeting, subject to Article 6 of the agreement between the Government of Japan and the United Nations Educational, Scientific and Cultural Organization (UNESCO) regarding the continuation, in Japan, of the International Centre for Water Hazard and Risk Management (category 2) under the auspices of UNESCO, signed on 13 February 2020 (hereinafter referred to as "the Agreement").

Article 2 Composition

1) The members of the Governing Board will be composed as provided for by Article 6 of the Agreement. The President of the National Research and Development Agency Public Works Research Institute, Japan will be designated as Chairperson of the Governing Board.
2) The members of the Governing Board shall be appointed by the Chairperson.
3) The term of office for each Governing Board member appointed by the Chairperson shall be three years. This term may be extended by re- appointment.

Article 3 Board Meetings, Quorum, and Minutes

1) The functions of the Governing Board shall be prescribed as provided for by Article 6 of the Agreement.
2) The Chairperson shall convene the Governing Board meeting. Participation by a majority of Governing Board members shall be necessary to proceed with the Governing Board meeting.
3) The majority agreement of all attendees shall be necessary for the adoption.
4) The official language of the Governing Board meeting shall be English.
5) The secretariat of the Governing Board (referred to in Article 4) shall take minutes of the Governing Board meetings.

Article 4 Secretariat

ICHARM shall function as the secretariat of the Governing Board.

Article 5 Amendment of the Rules

The Rules may be amended during a Governing Board meeting by consent of the majority of attendees. The Chairperson can ask for electronic votes when urgent decision issues relevant to the Rules arise between meetings. The decisions in such cases shall be made by consent of the majority of the members who have voted by deadlines.

Article 6 Miscellaneous Provisions

Miscellaneous provisions necessary for the management of the Governing Board but not included in the Rules shall be decided by the Chairperson in consultation with the Governing Board members.

Supplementary Provisions

The Rules shall be enacted on 12 May 2021.

ICHARM / PWRI

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

United Nations Educational, Scientific and Cultural Organization | International Centre for Water Hazard and Risk Management under the auspices of UNESCO | Public Works Research Institute, National Research and Development Agency, Japan

Organization & Budget

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

Executive Director (1)

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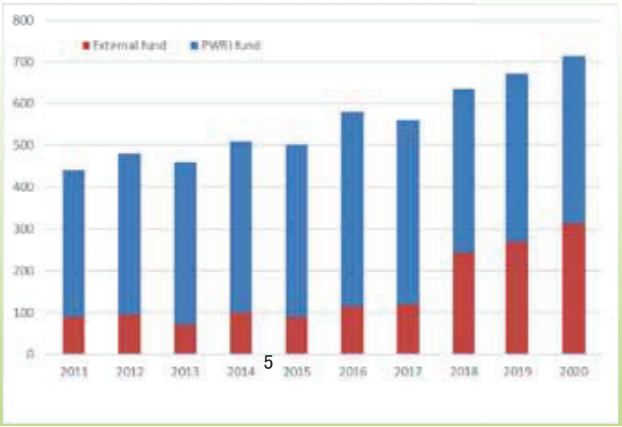
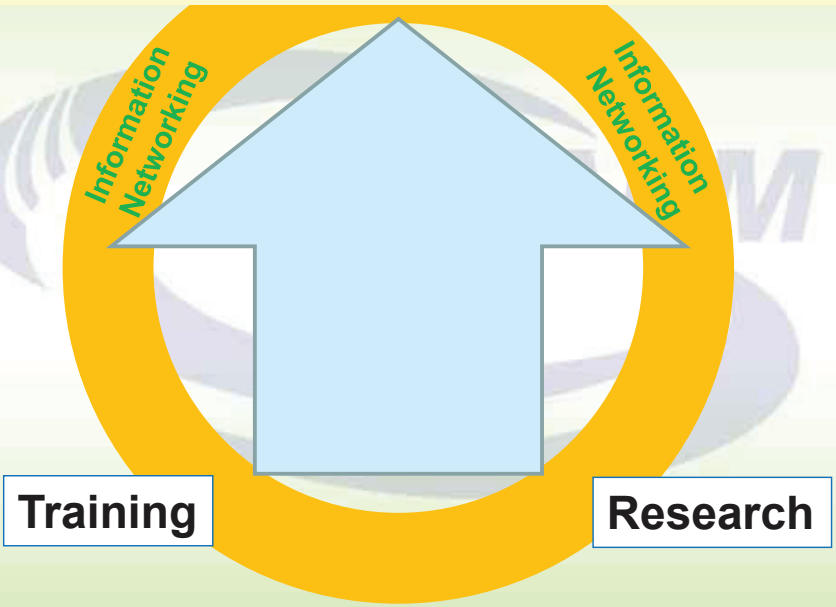
- Deputy Director of ICHARM (Director of Water-related Hazard Research Group) (1)
- Deputy Director of ICHARM (Director for Special Research) (1)
- Training & Research Advisor (1)
- Chief Researcher (Water-related Hazard) (1)
- Chief Researcher* (Risk Management) (1)
- Chief Researcher (Networking and PR) *serving concurrently
- Chief Researcher (Training) (1)
- Senior Researcher (7)
- Research Specialist (11)
- Researcher (2)
- Research Assistant (1)
- Administrative Staff (4)
- Administrative Assistant (14)

Budget (million yen)



Working to achieve Localism

Delivering best available knowledge to local practices



Long Term Targets

- Analyzing and formulating policy ideas
- Visualizing values of preparedness and investment efficiency

- Improving disaster literacy
- Promoting co-design and co-implementation among stakeholders

Support in Sound Policy-making

Support in Community of Practice

Risk Assessment

- Developing integrated disaster risk assessment
- Identifying locality and commonality

Risk Change Identification

- Monitoring and predicting changes in disaster risk
- Identifying locality and commonality

Data & Statistics

- Promoting data collection, storage, sharing, and statistics
- Integrating local data, satellite observations and model outputs

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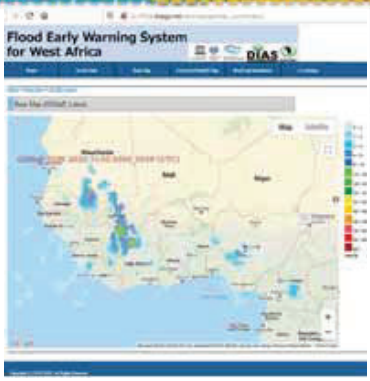
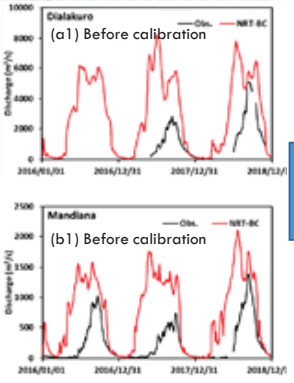
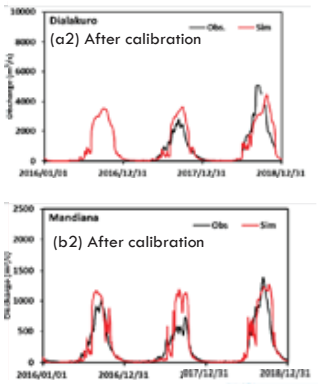
Effective Use of Satellite Products: GSMaP

NRT: near-real time precipitation available within 4 hours with hourly update.

NOW: quasi-real time precipitation with every 30 minutes update.







Bias Correction

E-M wave Characteristics

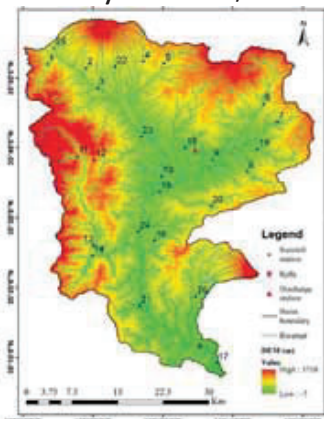
+

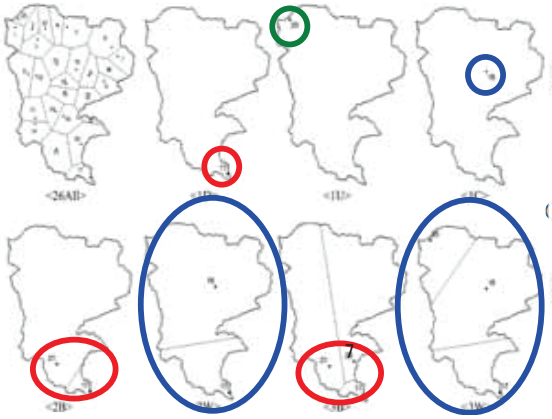
Statistical Bias Correction

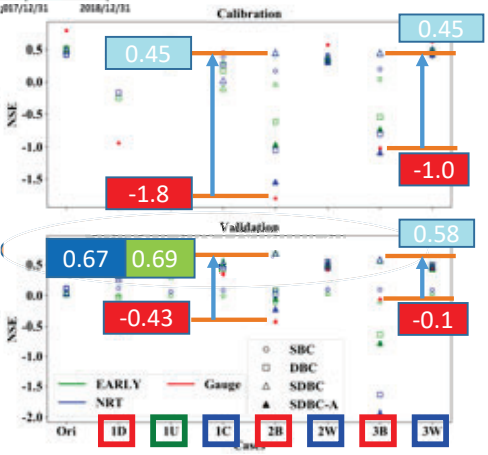
+

Dynamical Bias Correction

Density: **137** km²/station







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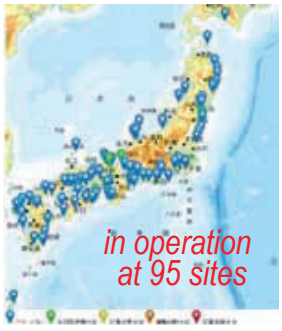
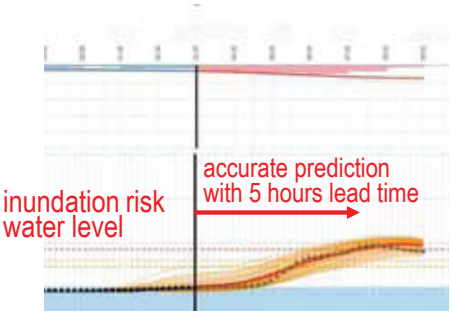
Flood early warning system for small & medium river basins

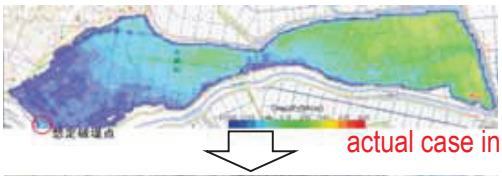
3L(low cost, long life, localized) Water Level Gauge + Data Assimilation + Rainfall Runoff Inundation (RRI) model





Traditional flood control with a new technology

Dramatical flood risk reduction by introducing "Nogoshi", a partial HWL Overflow Dyke, based on consensus building

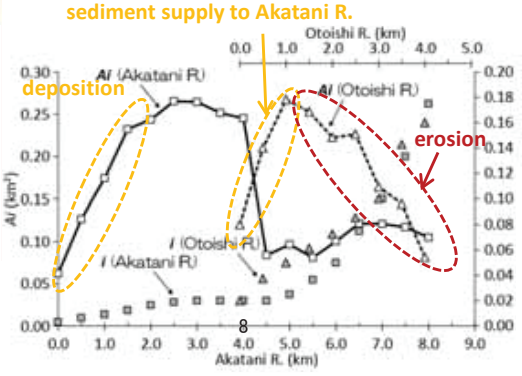


in collaboration with NILIM

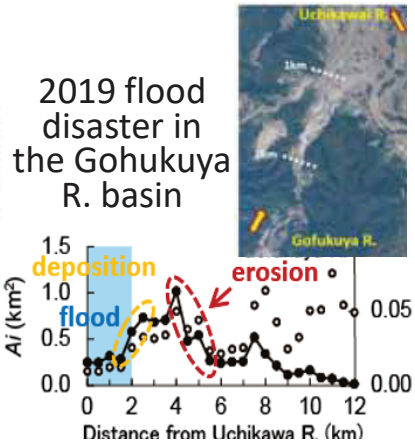
with "Nogoshi"

Ai is a parameter for sediment transport capacity. Increases in *Ai* indicate erosion while decreases in *Ai* indicate sediment deposition. *A*: Drainage area, *i*: energy slope or bed slope

2017 flood disaster in the Akatani R. basin



2019 flood disaster in the Gohukuya R. basin



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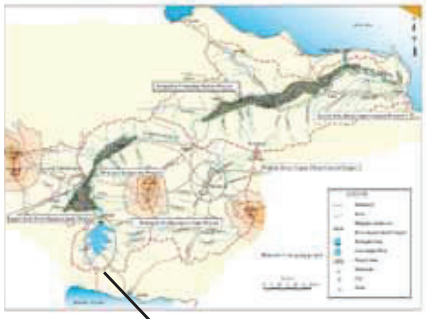
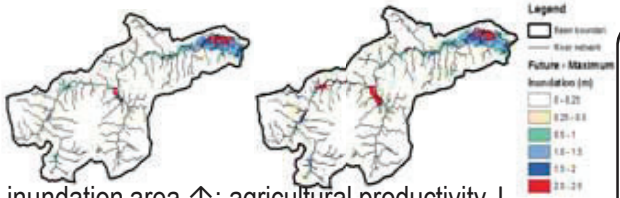
Climate Change Impact Assessment in the Solo River Basin, Indonesia



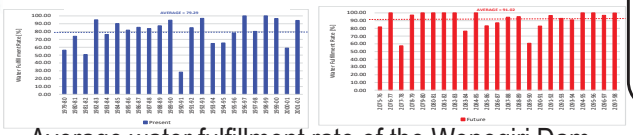
Wonogiri Dam
C.A.=1,350km²



inundation area ↑: agricultural productivity↓

irrigation water ↑: agricultural productivity ↑

Present: 79.3%　　Future: 91.0%



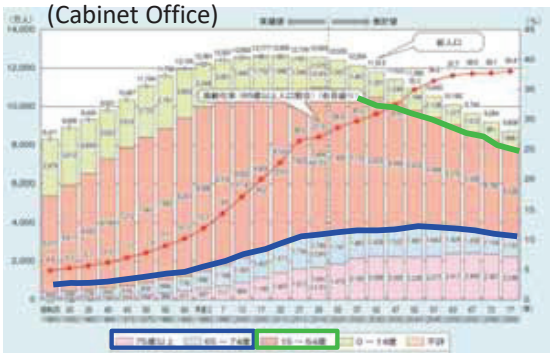
Average water fulfillment rate of the Wonogiri Dam

Input-Output Analysis

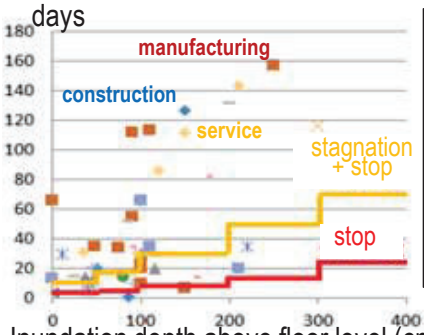
Direct effect of increasing paddy rice production:
237 billion rupiah
Induced production of other industries:
59.5 billion rupiah
Total economic effect:
296.5 billion rupiah
(2015 price)

Ratio of productive population (15~64) to aged population (65~)
3.9 in 2000
2.3 in 2015
1.4 in 2065

Person Needing Support ↑
Person Offering Support ↓

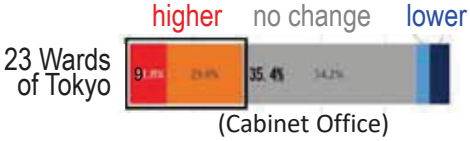


(Cabinet Office)



Inundation depth above floor level (cm)

Recent flood cases reveal that small and medium businesses need far more days to make a full recovery after the event, compared with the number of days (yellow and red lines) cited in the national survey manual.



(Cabinet Office)

Under COVID-19, interest in migrating to local areas rises among twenties and thirties in Tokyo, Osaka and Nagoya.

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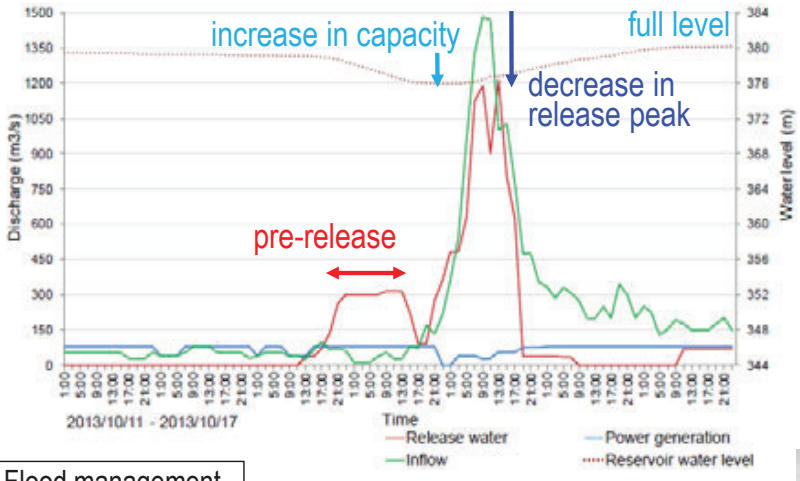
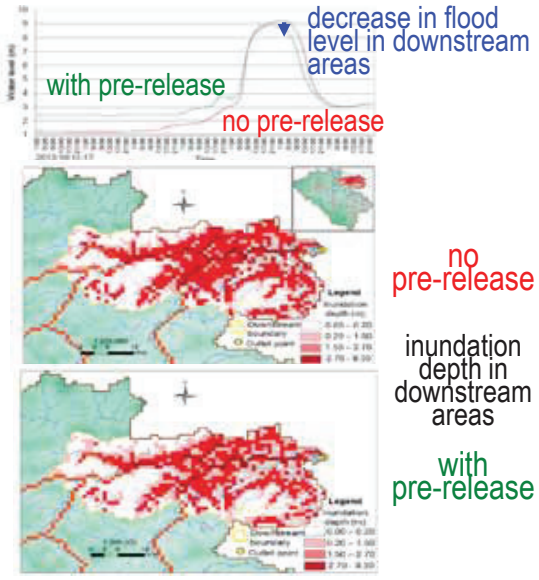
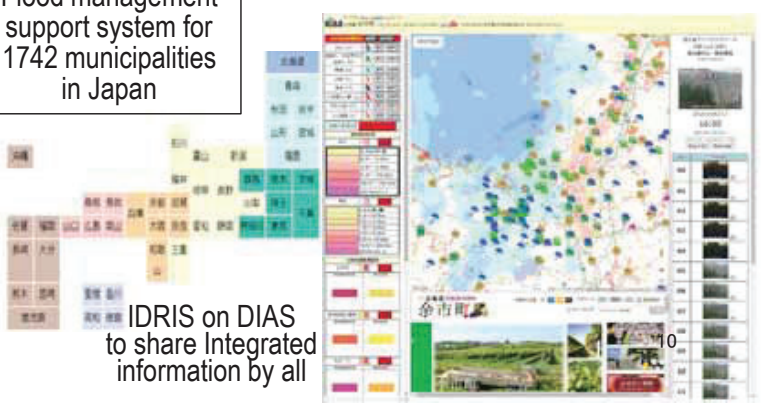
Evaluation of the effect of pre-release from a hydro-power generation dam on flood disaster risk reduction in downstream areas in central Vietnam.





Flood management support system for 1742 municipalities in Japan



IDRIS on DIAS to share Integrated information by all

People's capacity building using virtual reality

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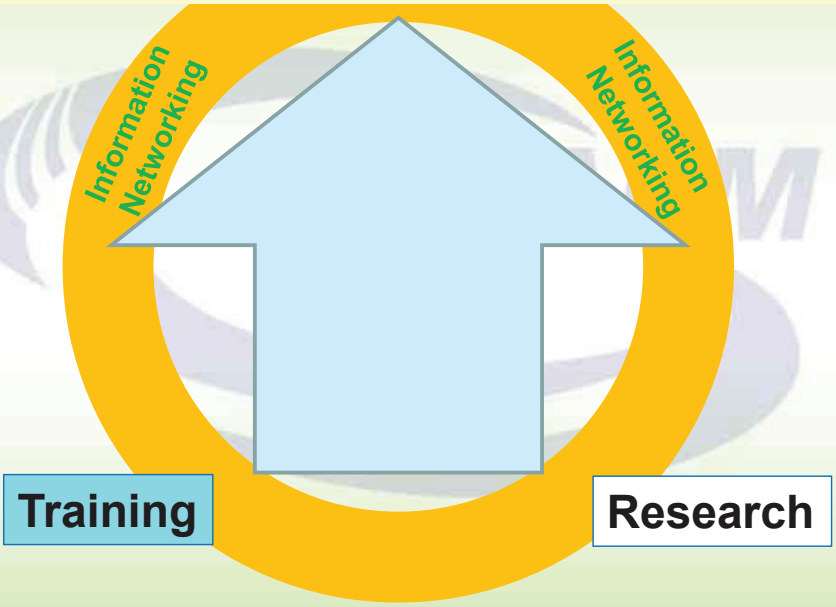
Working to achieve Localism

Delivering best available knowledge to local practices



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Thanks to the hard work on the learning side and the enthusiasm on the teaching side.


Online discussion with a supervisor


The 13th Closing Ceremony for JICA Knowledge Co-Creation Program on "Flood Disaster Risk Reduction"


Lecture using an electric whiteboard


Practicing social distancing


Students in a graduation gown at GRIPS


Hybrid hands-on training

Q: How do you feel about being caught in the COVID-19 pandemic during the training in Japan? And is there anything you have been doing to maintain your motivation to complete your master's thesis under this gloomy circumstance?

<Student A> I've been keeping myself busy with different tasks so that I can avoid thinking too much about the terrible conditions all over the world.

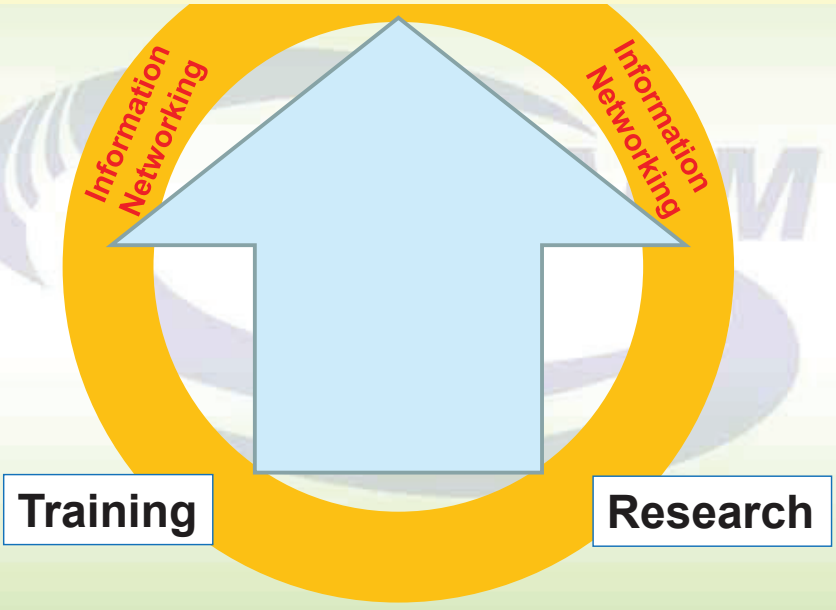
<Student B> COVID-19 has spread all over the world, so we have to tackle this situation by taking some precautionary measures, which I have been doing.

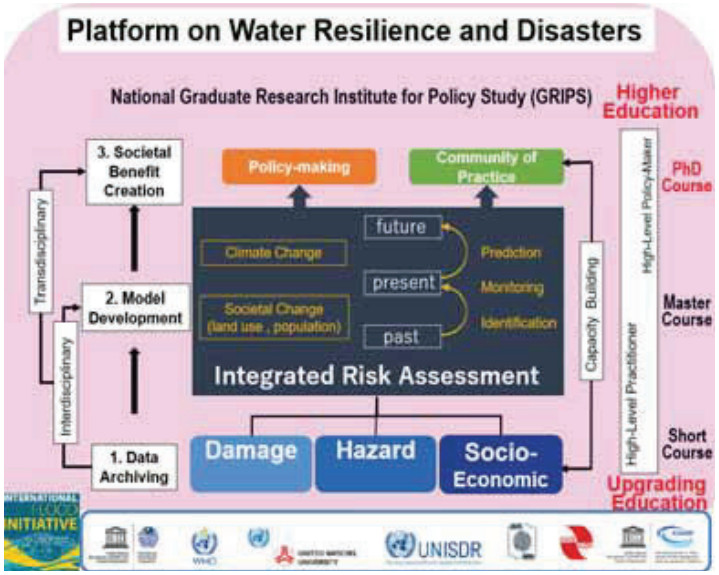
<Student C> I feel lucky because the COVID-19 situation in my country is far worse than in Japan, and here I don't have to practice as much confinement as my parents and colleagues do back home.

<Student D> I feel afraid of facing with COVID-19 because here in Japan, I have no family to take care of me. But on the other hand, Japan has better medical services than my country, and JICA and ICHARM have been taking really good care of us.

Working to achieve Localism

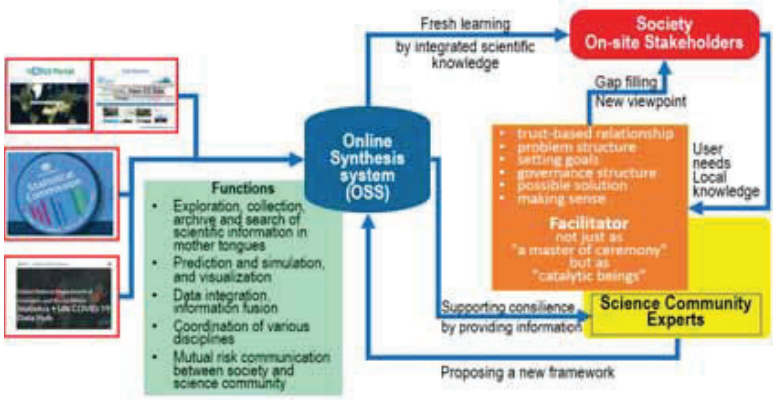
Delivering best available knowledge to local practices





High Level Panel on Water (HLPW)

Platforms on Water Resilience and Disasters among all stakeholders should be formulated in countries to facilitate dialogue and scale up community-based practices.



Implementation Strategy: OSS and Facilitators

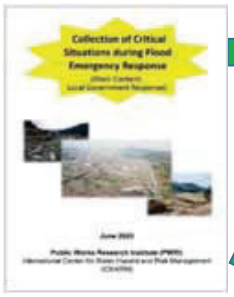
H.E. Dr. Basuki Hadimuljono, Minister, Public Works and Housing, Indonesia

Developing an "Online Synthesis System (OSS) and fostering "Facilitators" by making maximum use of e-Learning systems.

Collection of Critical Situations during Flood Emergency Response

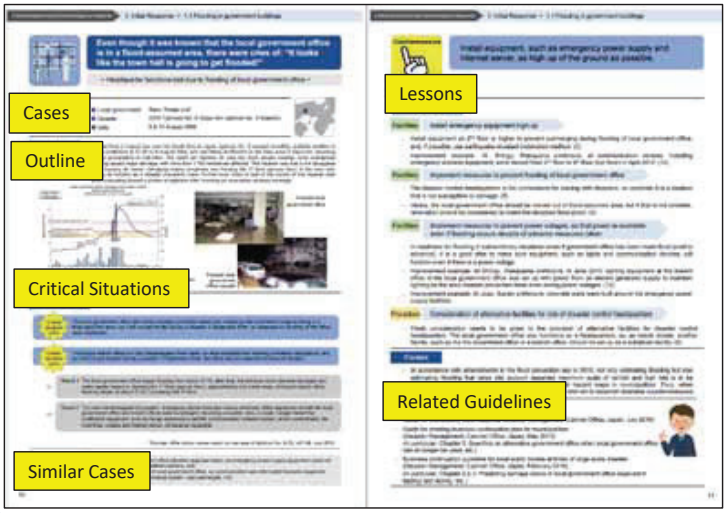
ICHARM has published a booklet entitled "Collection of Critical Situations during Flood Emergency Response" in June, 2020.

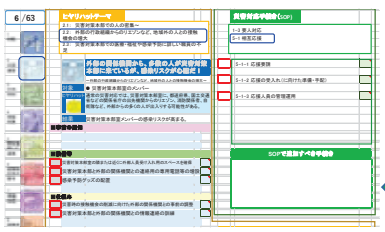
Main Content: local government response



28 cases of critical situations from the review reports of past flood disasters.

Appendix: local government response under COVID-19





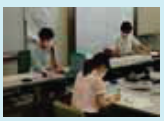
28 possible cases of critical situations considering several guidelines and manuals.

Support System for responsible sectors of municipalities in checking measures

Capacity Building

Outreach Activities

-Training for local governments
-Presentations at conferences
-Distribution of booklets, etc.



Training at a local government (Aug.7, 2020)

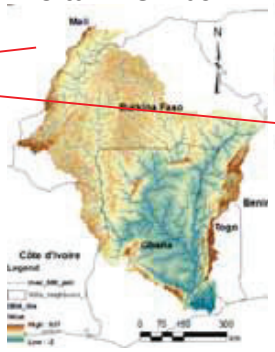
Online conference by High Level Experts and Leaders Panel on Water and Disasters (HELP) (Aug. 20, 2020), attended by their Majesties the Emperor and Empress of Japan together with 300 participants from 40 countries.

URL: https://www.pwri.go.jp/icharm/special_topic/20200625_flood_response_collection_e.html

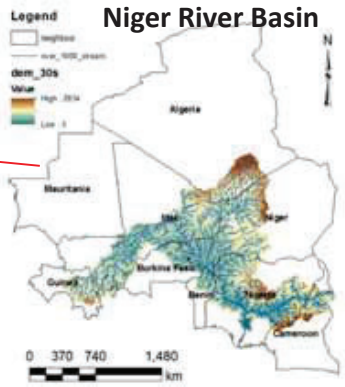
Water Disaster Platform to Enhance Climate Resilience in Africa (WaDiRe-Africa)

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 the Ministry of Foreign Affairs of Japan.

Volta River Basin



Niger River Basin

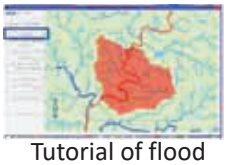


Kick-off Meeting in Lome, Togo, in June 2019

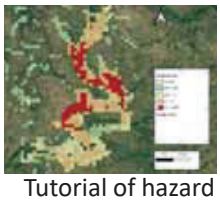
e-Learning Training Course

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

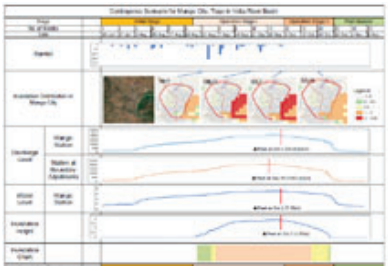
2.Training for Trainers
-Lecture, Q&A Session
-44 participants, 30 certificated



Tutorial of flood simulation



Tutorial of hazard mapping



Tutorial of Contingency Planning

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 (DIAS)

Image of River Basin Disaster Resilience and Sustainability by All

- Transition to River Basin Disaster Resilience and Sustainability by All, a new concept of flood management with the cooperation of all the stakeholders around basins
- Upgrade flood management plans with consideration for climate change impacts
- Promote the following integrated and multilayered measures: 1) Flood Prevention, 2) Exposure Reduction, and 3) Disaster Resilience

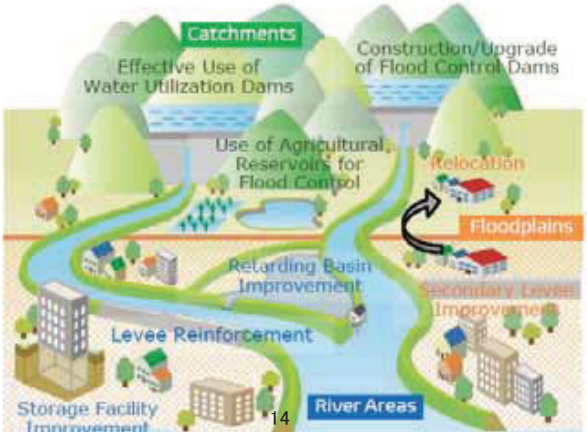
1) Flood Prevention

Catchments
- Improve rainwater storage functions

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

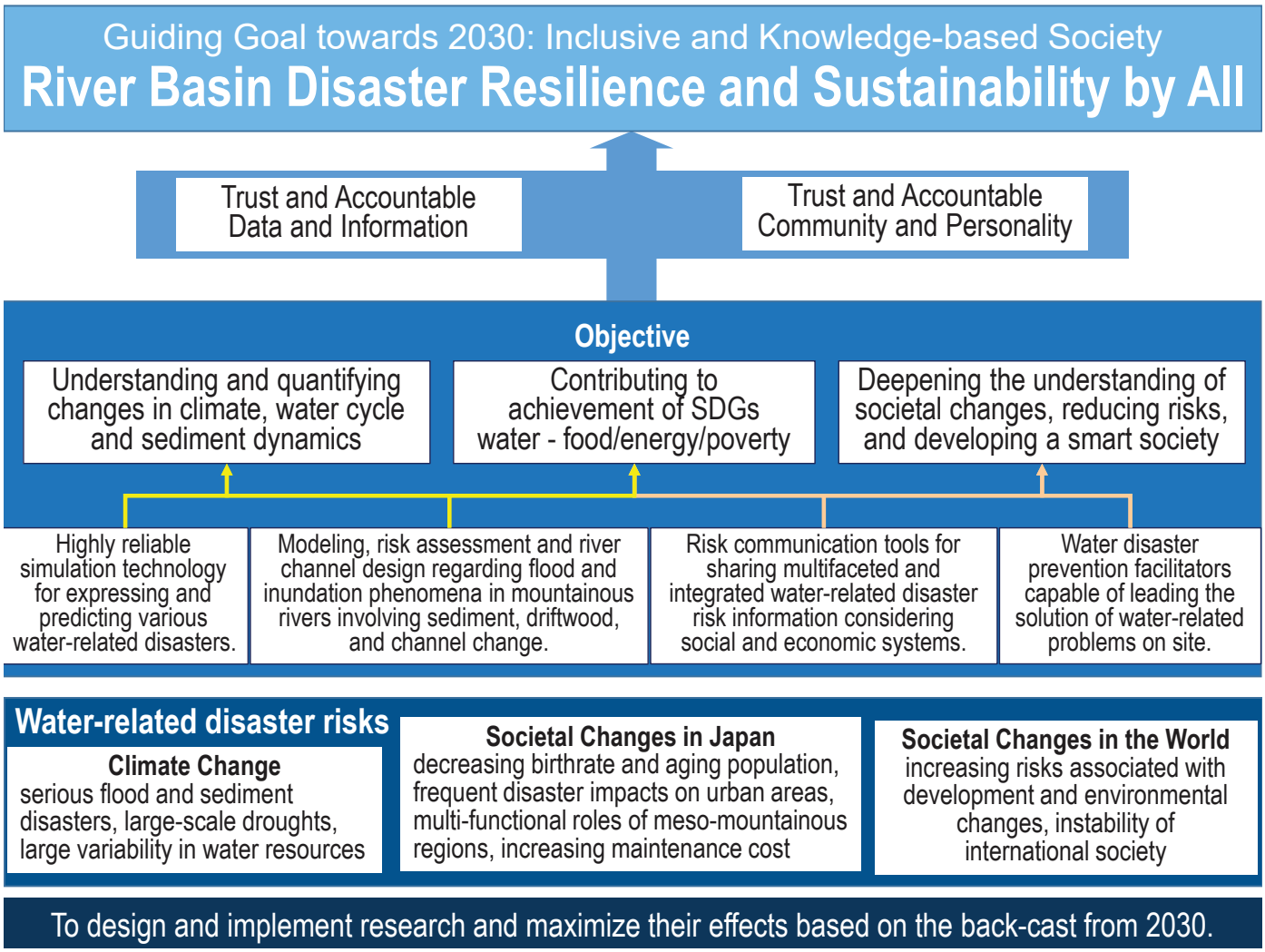
2) Exposure Reduction

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



3) Disaster Resilience

Floodplains
- 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


Guiding Goal towards 2030: Inclusive and Knowledge-based Society
River Basin Disaster Resilience and Sustainability by All
Trust and Accountable Data and Information
Trust and Accountable Community and Personality
Objective
Understanding and quantifying changes in climate, water cycle and sediment dynamics
Contributing to achievement of SDGs water - food/energy/poverty
Deepening the understanding of societal changes, reducing risks, and developing a smart society
Highly reliable simulation technology for expressing and predicting various water-related disasters.
Modeling, risk assessment and river channel design regarding flood and inundation phenomena in mountainous rivers involving sediment, driftwood, and channel change.
Risk communication tools for sharing multifaceted and integrated water-related disaster risk information considering social and economic systems.
Water disaster prevention facilitators capable of leading the solution of water-related problems on site.
Water-related disaster risks
Climate Change
serious flood and sediment disasters, large-scale droughts, large variability in water resources
Societal Changes in Japan
decreasing birthrate and aging population, frequent disaster impacts on urban areas, multi-functional roles of meso-mountainous regions, increasing maintenance cost
Societal Changes in the World
increasing risks associated with development and environmental changes, instability of international society
To design and implement research and maximize their effects based on the back-cast from 2030.

Appraisal of the ICHARM Work Plan

FY 2020 (2020.4 – 2021.3)

Appraisal of the ICHARM Work Plan adopted at Governing Board meeting on 2 June 2020

Category	Content	Activities and expected results in FY2020	Self-assessment of achievements S…Excellent, more than planned A…Good, as planned B…Satisfactory, less than planned C…Poor, far less than planned	FY2020 Achievements
(i) Innovative research				
(a) Technology for constantly monitoring, storing and using disaster information				
Methods will be proposed for disaster data collection and basic database development with their practical applications. This should eventually lead to data analysis using a Data Integration and Analysis System (DIAS). A data correction method will be also proposed to be used in the process of building a database using global data and near-real time data from satellites. The impact of disaster reduction will be assessed quantitatively by the disaster database including its use in model areas both in Japan and overseas.				
(i)-(a)-1. Research on simple methods for assessing the socio-economic impact of flood disasters	Develop a simple method for assessing the socio-economic impact of flood disasters	Continue economic impact assessment using a simple method developed by ADBI, based on the inundation depth and economic data collected in Joso City, flooded by the Kanto Tohoku torrential rainfall in 2015.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [B]	In collaboration with GRIPS, continued the development of an assessment method for indirect flood damage that compares multiple macroeconomic indicators between Joso City, which was inundated in the Kanto-Tohoku heavy rain disaster in September 2015, and other municipalities, which did not suffer any damage in the same disaster and whose economic activities are similar to the ones of Joso City.
	Among the developed simple methods for assessing the socio-economic impact of flood disasters, test a globally applicable method by estimating such impact at national and global levels.	Test the applicability of the ADBI economic impact assessment using the flood damage data collected in Davao, Mindanao Island, the Philippines.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	While remaining unable to conduct scheduled activities in the Philippines due to the COVID-19 pandemic, started developing an Online Synthesis System (OSS) for local stakeholders to strengthen flood response capabilities under climate change through an e-learning program and prepared a series of online lectures related to the Davao River basin of the Philippines in March 2021.
(b) Support system for early warning capable of providing accurate information in a shorter period of time				
More advanced application of a regional atmospheric model (WRF) and further improvement of IFAS and RRI will be achieved. Using these advanced technologies, a method will be developed for more accurate real-time prediction of rainfall, runoff and inundation to ensure over 10 hours of lead time necessary for evacuation in a wide area and dam discharges prior to rainfall. The developed method will be tested for applicability to river basins both in Japan and overseas with different conditions of data availability, climate and topography, and eventually used to establish an early flood warning and system. A technology will be developed to evaluate water disaster hazards by using satellites and sediment hydraulic models.				
(i)-(b)-1. Research on technologies for more accurate real-time prediction of runoff and	Improve the accuracy of the flood inundation prediction model by upgrading the flood	By applying the parameter optimization method to water level prediction systems of small and medium scale river using RRI models and improve the prediction accuracy and eliminate unnecessary work.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance	Applied the SCE-UA method to the RRI model as the parameter optimization method. Applied this method to about 60 rivers in FY2020, confirmed its effectiveness, and sorted out the problems. The method reduced the workload required for parameter fitting.

	inundation by complementing insufficient data availability	tracking method and introducing an automatic parameter optimization method.		[A] ④ Social significance [A] ⑤ Dissemination [A]	Studied the effect of changes in the optimization period and other factors to address the failure to obtain the desired effect due to problems related to the relationship between the flood scale and the optimizing period.
		Clarify the applicability of satellite rainfall data and develop a basin-specific data correction method.	Study correction technology of GSMaP in case real-time ground rain gauge data cannot be obtained. Examine the density of the ground rain gauge required to secure the accuracy of GSMaP.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [S] ⑤ Dissemination [A]	Applied GSMaP corrected with ground rain gauge data to obtain hourly precipitation for the Swa Chaung dam basin in Myanmar. Calculated the dam inflow using RRI model with the hourly precipitation data, compared the results with the observation data, and confirmed a good agreement between them. The series of achievements was highly evaluated by the World Bank. Established a system that automatically conducts GSMaP bias correction for the Niger and Volta river basins in West Africa by multiplying GSMap data obtained in real time by the correction coefficient calculated in advance using past ground rainfall observation data. Carried out runoff simulation for the Fuji river basin using the BTOP model and GSMaP, to which multiple correction methods were applied, and confirmed that, in terms of space, the correction by each GSMaP grid is more effective in producing accurate simulation results than the correction using the basin average rainfall and that, in terms of time, the correction using the 10-day average is more effective than the correction using the hourly or monthly average. The results were published in an international journal.
		Improve the accuracy of the WRF model for heavy rainfall prediction using X- and C-band MP radars and the Ensemble Kalman filter.	Evaluate the accuracy of heavy rain forecasting with a relatively long lead time, specializing in large-scale and important weather phenomena such as typhoons. Regarding localized torrential rain, examined a method to improve the accuracy of prediction by increasing the resolution of meteorological models.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Conducted ensemble forecasting by combining the WRF model and the Ensemble Kalman Filter and outflow prediction experiments using the RRI model for the 2019 Chikuma river flood caused by Typhoon Hagibis. The results confirmed that it is possible to accurately predict the time and scale of the flood peak from 5 days before the flood and suggested that the high accuracy of the JMA global weather forecasts used as the boundary condition is likely to be a major factor for obtaining highly accurate predictions. The results also suggested that it is possible to predict typhoon-induced floods with a relatively long lead time if accurate data and information are available. The results were published in the Annual Journal of Hydraulic Engineering of JSCE.
		Develop a method for real-time flood inundation forecasting using multiple rainfall forecasting approaches with prediction uncertainty.	Study effective dam operation rules using the prediction results obtained from the ensemble prediction with their distribution.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Established a Water and Energy based Rainfall-Runoff-Inundation (WEB-RRI) model for the Vu Gia Thu Bon river basin in Vietnam, considering the A Vuong dam and the Dak Mi 4 dam. Also established 33 ensemble models for 39 hour-ahead rainfall forecasting. Calibrated the models and studied effective dam operations by applying them to the historic flood event in October 2013. Calibrated the flow rate of WEB-RRI using on-site flow observation data and also calibrated the prediction of flooded area in the model using on-site inundation depth data and inundation area data estimated from synthetic aperture radar (SAR) mounted on the satellite Sentinel-1. Compared two scenarios with and without dam discharges prior to rainfall using inflow prediction information to examine the effect of the dam operation on flood control in the downstream area and confirmed that the dam operation can decrease inundation area and depth in the downstream area.

	(i)-(b)-2. Development of technologies using satellites and sediment hydraulic models for assessing the impact of water disaster hazards	Estimate sediment transport and develop an estimation method of river channel topography change.	In order to evaluate the behavior of riverbed sediments composed of fine sediment, establish a new evaluation method for sediment transport using density flow theory. By introducing it into numerical calculation, develop a method for estimating the change in river channel topography applicable to a riverbed composed of fine sediment.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [S] ④ Social significance [A] ⑤ Dissemination [A]	Established a new method for estimating the sediment flow using the density current theory to predict the behavior of riverbed sediment composed of fine sediment. Introduced this method to numerical calculations and developed a method for estimating river channel topography changes, which is applicable to riverbeds composed of fine sediment. Conducted hydraulic experiments to examine the validity of this method and presented the results at a Conference on Hydraulic Engineering of JSCE and IAHR-APD CONGRESS 2020 to disseminate them.
		Develop a flood damage risk mapping method that takes sediment hydraulic phenomena into account.	Verify the results of sediment, driftwood and flood analysis based on sediment hydraulic model experiments and field survey results.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [S] ④ Social significance [A] ⑤ Dissemination [A]	Conducted sediment hydraulic model experiments and field surveys to verify the analysis results of sediment and floods. Also conducted close examinations on two specific cases: the 2019 disaster in Marumori Town, Miyagi Prefecture and the 2020 disaster in Hitoyoshi City, Kumamoto Prefecture. The results found that the sediment from the mountainous areas deposited on the river channels in the plains, reducing the cross-sectional areas of the rivers and increasing the likelihood of flooding. The results were published in a journal, “Advances in River Engineering” of JSCE.
		Develop a method for mapping flood inundation risk in mountainous rivers	Propose a method to evaluate the inflow of sediment containing fine sediment in mountainous rivers, and create flood inundation risk maps by numerical simulation.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [S] ④ Social significance [A] ⑤ Dissemination [A]	Developed a prototype of a model for estimating the sediment runoff of the entire basin during a heavy rainfall event by integrating the RRI model and a model that calculates the sediment dynamics of the entire basin. The developed model enabled inundation calculation and flood inundation risk mapping. The results were published in River Flow 2020 and made efforts for dissemination of them. Found that it is possible to formulate the process of sediment erosion, transport, and deposition during flooding in mountain rivers using the product of watershed area A and river bed gradient i as an index. Confirmed the usefulness of this approach to identify areas prone to flood events involving a large amount of sediment by testing it on actual cases in 2018 and 2019. Published the results in a journal ”Geographical review of Japan” and made efforts for their wider dissemination.
(c) Assessment and planning technology for appropriate water resources management with insufficient information					
	A long-term water balance simulation technology will be developed to support optimal planning of water resources management both in Japan and overseas. This technology will offer a variety of functions to support highly technical dam operation integrating flood control and water use, water demand settings, soil moisture content settings based on satellite observation technology, application to a wide range of climate categories, input of highly detailed topographical, geological and other data.				
	(i)-(c)-1. Development of a simulation system to provide long-term support for integrated water resources management under different natural and topographical conditions	Improve technologies for integrated water resources management.	Evaluate on-site demonstration experiments jointly with the electric power companies and improve the system based on the evaluation results.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [S] ④ Social significance [A] ⑤ Dissemination [B]	Examined dam operation rules in cooperation with electric power companies for flood events in the warm seasons in the upper reaches of the Oi River (Chubu Electric Power Co., Inc.). Predicted the inflow to the dam and conducted simulations for downstream flood control and power generation increase for the year 2018 of Hatanagi Daiichi Dam by inputting 32 ensemble models of 39 hour-ahead rainfall forecasting to WEB-DHM. The results found that the current operation rules can reduce the dam discharges exceeding 600 m^3/s by 63.5% and increase the power generation by 12.5% in terms of power generation index. The results also found that the modified

					operation rules can reduce the dam discharges by 100% and increase the power generation by 12.7%.
		Study soil moisture content based on satellite data.	Evaluate and improve the drought monitoring and forecasting system by CLVDAS applied to the state of Ceará , Brazil, based on operation. Reflect the results of soil moisture observation by microwave radiometer to the microwave observation algorithm.	① Overall evaluation [B] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [B]	Achieved relatively good results from the verification of the drought monitoring and prediction system using CLVDAS for the state of Ceará, Brazil. However, unable to complete the evaluation and improvement of the system based on the test operation results due to the COVID-19 pandemic. Besides, applied the monitoring system to West Africa to verify its applicability to other regions and confirmed its proper operation. Improved the system for this application to evaluate the soil moisture profile up to a depth of 2 m in addition to that of the surface and rhizome layers. Also improved the microwave radiation transmission model, the core component for soil moisture estimation by microwaves, to reduce estimation uncertainties in the dry region and confirmed its effectiveness by verifying the results with the observation data obtained from experiments using a microwave radiometer.
		Improve the applicability of systems and models to rivers in Japan and overseas with different climate conditions.	By combining WEB-RRI and SIMRIW (Simulation Model for Rice-Weather Relations), the suitability of hydrological models to rice cultivation areas will be improved.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [B]	Developed a combined model of WEB-RRI and SIMRIW (Simulation Model for Rice-Weather Relationships) and currently testing the program of the combined model. This new combined model makes it possible to predict rice crop damage and rice yields associated with floods and droughts under climate change.
	(i)-(c)-2. Integrated Research Program for advancing Climate Models (TOUGOU) (MEXT program)	Assess water disaster risk in Asia and create information on adaptation measures.	Calculate future water cycle phenomena both in the present and future using WEB-RRI. Conduct forecast calculation of the future hazard such as floods and droughts, and assess the risk based on the results of hazard calculations and land use in the basin.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Conducted simulations to predict future water cycle phenomena in the Solo and Davao River basins using WEB-RRI. Also conducted simulations of flood and drought hazards and assessments of future risks considering land use and other factors of the basins.
(d) Technology for assessing the impact on local communities of water related disasters in flood plains and for evaluating the effect of investments in disaster risk reduction					
	A disaster risk assessment method will be developed to evaluate “strength against fatal damage” and “resilience for speedy restoration”. Indices will be proposed to help policy makers in Japan and overseas easily recognize local disaster risks and holistically evaluate the effect of investments on disaster risk reduction so that they can make informed investment decisions. A method will be proposed for building disaster resilient communities in Japan and overseas by using the developed risk indices.				
	(i)-(d)-1. Research on a multifaceted water disaster risk assessment for worldwide use and a disaster-resilient community building method based on the assessment	Propose a highly accurate and advanced method for multifaceted evaluation of disaster risk	Study a method to evaluate the risks particular to disaster cases in which floods occur concurrently across a wide area by analyzing questionnaire survey results on the resilience of the businesses in Okayama and Hiroshima prefectures, affected by the heavy rainfall in July 2018.	① Overall evaluation [A] ② Publication [B] ③ Scientific significance [A] ④ Social significance [A]	Analyzed survey responses regarding the resilience of local businesses in Hiroshima and Okayama prefectures after the heavy rain disaster in July 2018. Based on the analysis results, presently studying an assessment method for direct and indirect damage (losses from temporary closure, etc.) according to inundation depth, lifeline utility damage and other factors.

			⑤ Dissemination [B]	
	Propose risk indices to holistically evaluate the disaster risk reduction effect of disaster prevention measures and investments	Conduct risk assessment using the indicator developed to evaluate the level of damage at which a pre-disaster level of population and gross regional product can still be sustained after a disaster, based on the results of the questionnaire survey conducted in Iwaizumi Town, Iwate Prefecture, in the previous fiscal year.	① Overall evaluation [A] ② Publication [B] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [B]	Based on the results of the investigation conducted in Iwaizumi Town, Iwate Prefecture, currently studying a method to estimate post-disaster population outflow rates according to the intention to build a new house by household type and house damage levels. Also studying the level of flood damage at which communities can maintain themselves even after a flood disaster.
	Propose a method for building disaster resilient communities in Japan and overseas by using the developed risk indices.	Propose a list of approaches to build resilient local communities, based on the risk assessment explained above.	① Overall evaluation [A] ② Publication [B] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [B]	Studying approaches to build the resilience of local communities to possible hazards based on the estimation method that are being applied as mentioned right above.
(e) Technology for the effective use of water related disaster risk information to reduce disaster damage				
An information system, as well as communication tools such as disaster response timeline tables, will be developed to support disaster management efforts by administrators and local residents to prevent or mitigate flood and sediment disasters. The effective use of such a system and tools will be proposed.				
(i)-(e)-1. Research on a water disaster risk information delivery system to support local disaster management efforts in areas with insufficient water disaster information	Propose a method for identifying areas vulnerable to disasters (disaster hot spots) prior to disasters.	Review the method applied to Aga Town of Niigata Prefecture, Iwaizumi Town of Iwate Prefecture, and Calumpit of Bulacan Province, the Philippines. And improve the automatic risk-map creating tool using RRI-model output and revise the manual of this method.	① Overall evaluation [B] ② Publication [B] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [B]	Developed a flood risk assessment tool and tested its applicability in Iwaizumi Town in Iwate Prefecture.
	Propose a method for forecasting the possibility of a water-related disaster by community in real time.	Study the improvement of the Web-GIS information delivery system used to assess the possibility of water-related disasters at the community scale to achieve real-time prediction in the future.	① Overall evaluation [A] ② Publication [B] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Launched the ICHARM Disaster Risk Information System (IDRIS), proposed as a Web-GIS information delivery system in the previous year, at the experimental demonstration website of Aga Town, Niigata Prefecture, for the public use and presently preparing for a launch of IDRIS for Iwaizumi Town, Iwate Prefecture. Finalized the basic design of a smartphone application useful to provide information to residents on the possibility of flood disasters.
	Propose a Web-GIS water-related disaster risk information delivery system that helps accumulate and share various types of disaster	Analyze the technical issues that became apparent through the test operation of the WEB-GIS information delivery system for Aga Town and improve the system. Test the applicability of the system to other communities by applying it to Iwaizumi Town, Iwate Prefecture.	① Overall evaluation [A] ② Publication [B] ③ Scientific significance [A] ④ Social significance	Analyzed the factors causing IDRIS to malfunction on the open website mentioned right above and confirmed that IDRIS can recover from malfunctioning by updating the functions of the e-community platform, which is IDRIS's base system, and updating the site link regularly. Also confirmed that it is possible to ensure the operational stability (versatility) of

		risk information and deliver evacuation information.		[A] ⑤ Dissemination [B]	IDRIS by including regular system updating as part of the maintenance procedure.
		Propose the effective use of the Web-GIS information delivery system to stakeholders of local administrative bodies in Japan and overseas.	Study the system specifications to disseminate the Web-GIS information delivery system.	① Overall evaluation [A] ② Publication [B] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Studied ways to promote the widespread use of IDRIS using a cloud service. Built an IDRIS server (an IDRIS base system) using a cloud service and currently developing and standardizing a way to customize the IDRIS base system according to the characteristics of users' websites. Developed IDRIS on DIAS in collaboration with the Institute of Industrial Science, the University of Tokyo, to deliver wide-area flood disaster information and studied ways to make the system available for the public.
	(i)-(e)-2 Development of risk communication systems to increase public awareness of water-related disasters and risk management	Develop a DIAS-based simulation system that can seamlessly reproduce, predict and visualize meteorological and hydrological events and related damage.	Improve the DIAS-based simulation system for practical use. The system can seamlessly reproduce, predict and visualize meteorological and hydrological events and related damage.	① Overall evaluation [A] ② Publication [B] ③ Scientific significance [A] ④ Social significance [S] ⑤ Dissemination [A]	Started the development of a flood disaster information delivery system covering both wide areas and nearby locations by coupling an IDRIS-based system, capable of reproducing, predicting and visualizing flood disaster information of specific locations in detail, with IDRIS on DIAS, capable of reproducing, predicting and visualizing real-time information of wide areas. Conducted a basic study with the Institute of Industrial Science, the University of Tokyo, for linking IDRIS with the System for Human-resource Input and Functional Team (SHIFT) and the Business Operation Support System (BOSS). In this study, a prototype was developed by combining a disaster response standardization method with the Collection of Critical Situations during Flood Emergency Response (Appendix: Local Government Response under COVID-19). Then the prototype was experimentally used by the disaster management sections of seven local governments across Japan.
		Develop a more effective risk communication system by incorporating psychological factors.	Develop a VR flood simulation app for Hita City, Oita Prefecture, and Aga Town, Niigata Prefecture, to provide a system which can contribute to raising public awareness of safe evacuation from a flood by letting people experience evacuation in a virtual flood.	① Overall evaluation [A] ② Publication [B] ③ Scientific significance [A] ④ Social significance [S] ⑤ Dissemination [A]	Developed a high-end VR tool for Hita City, Oita Prefecture, which maximizes detailed numerical simulations of flood disasters and visual and auditory effects of VR technology. Also developed movies and a VR evacuation drill tool, through which people can virtually experience different flood situations according to the difference in time when they start evacuation. Conducted activities related to Aga Town, Niigata Prefecture: collected detailed spatial information by conducting surveys using drones and ground laser instruments; reproduced inundation events using the RRI and iRIC models; and integrated collected data and information using the Construction Information Modeling (CIM). Produced VR flood-experience contents based on the integrated information and developed a prototype of a VR evacuation drill tool using a cloud service, which allows several people to participate virtually.
		Collect and share important knowledge for flood disaster response	Collect and organize important knowledge for communities responsible for residents' lives and assets to take appropriate flood disaster response actions during a flood disaster, including safely leading residents to evacuation. Also create a list of key considerations regarding flood disaster response efforts under the COVID-19 pandemic.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [S] ④ Social significance [S] ⑤ Dissemination	Collect data and information from reports on disaster response efforts issued by local governments in the last 20 years and produced and published the "Collection of Critical Situations during Flood Emergency Response (Main Content: Local Government Response)." Also produced and published the "Collection of Critical Situations during Flood Emergency Response (Appendix: Local Government Response under COVID-19)" in a swift response to the COVID-19 pandemic.

				[S]	Published on June 25, 2020, the Japanese and English versions had 4,940 and 632 page views, respectively, by the end of December 2020, which indicates the worldwide use of the publications. They are also selected as one of the PWRI priority products for wide dissemination for FY2020 and distributed and advertised at technology exhibitions and other opportunities. They have been distributed to all 47 prefectures in Japan and even to all municipalities in some prefectures. Kawasaki City of Kanagawa Prefecture used the Japanese version at a training workshop for their crisis management officers on August 7, 2020. Presentations were also delivered online at meetings of HELP and the Asian Civil Engineering Coordinating Council (ACECC).
	(i)-(e)-3. Local practice using research results	Continue supporting JST-JICA SATREPS, a project to develop an Area-BCM (Business Continuity Management) system to strengthen the disaster resilience of Thailand's industrial parks.	Complete a development of flood inundation analysis model for the entire Chao Phraya River basin. Examine to develop an industrial park-scale flood inundation analysis model which creates detailed spatio-temporal information on disaster risk using the results as boundary conditions provided by the basin scale model. By collecting time series data of the inundation depth at the time of the 2011 flood and comparing the calculation results to them, conduct calibration and reproducibility verification of the model.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Completed the development, calibration and verification of the flood inundation analysis model for the entire Chao Phraya River basin. Collected highly-reliable topographical data needed for developing an industrial park-scale model for the Rojana industrial park in cooperation with our Thai counterpart, Chulalongkorn University's Faculty of Engineering, although on-site surveys were impossible due to the COVID-19 pandemic. Currently continuing the development of an industrial-park-scale high-resolution flood inundation analysis model. Also conducted hydrologic statistical frequency analysis on the characteristics of long-term rainfall events over the Chao Phraya River basin with the National Research Institute for Earth Science and Disaster Prevention (NIED). The results were published in the Journal of Disaster Research.
		JST-JICA SATREPS, The Project for Development of a Hybrid Water-Related Disaster Risk Assessment Technology for Sustainable Local Economic Development Policy under Climate Change in Philippines (new project)	Collect natural and social environment data, integrate hydrological and agricultural models for flood and drought risk assessment, and analyze local issues for the evaluation of water-related disaster resilience in the basins of the Pampanga River, the Pasig-Marikina River, and Lake Laguna in the Luzon Islands in the Philippines.	① Overall evaluation [A] ② Publication [B] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Continued the preparation for the project in cooperation with the organizations concerned in Japan and the Philippines, while remaining unable to make overseas trips due to the COVID-19 pandemic. For the project, scheduled to start in June 2021 as JICA's ODA project, one general meeting and seven group meetings were conducted with the Philippine counterparts as part of the preparation to have a common understanding among the participants. Developed a system to collect data on natural, social and other environments for the basins of the Pampanga, Pasig, Marikina and Lake Laguna in Luzon Island, the Philippines, and identified issues to solve for the realization of a flood disaster resilience assessment to be conducted for those basins. Currently merging source codes of hydraulic, hydrological and agricultural models to carry out flood and drought risk assessment and analyzing damage caused by Typhoon Ulysses (No.22) to Luzon Island when it landed there on November 12, 2020, using satellite and other data.
(ii) Effective Capacity Development					
(1) Train solution-oriented practitioners and Training-of-Trainers (TOT) instructors with solid theoretical and engineering competence who will contribute effectively to the planning and practice of disaster risk management at local and national levels.					
	(ii)-(1)-1. Capacity development for professionals who can train and supervise local researchers	Doctoral Course "Disaster Management"	2-3 students (2020-2021)	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance	From April to May 2020, students were given remote access to ICHARM's computers and were instructed to write treatises remotely. In case the trainees were unable to leave Japan, a framework was established to accept the remaining trainees. In September 2020, one student from one country (one from Bangladesh) completed the course.

				[S] ⑤ Dissemination [A]	We adjusted the employment of research assistant when he/she cannot come to Japan or during the waiting period after coming to Japan. After arriving in Japan, we made adjustments regarding how to move during the waiting period and how to secure a waiting place. In October 2020, two students from two countries (one from Ethiopia and one from Bangladesh) were enrolled. Currently, 5 people from 5 countries (1 from Sri Lanka, 1 from Vietnam, 1 from Japan, 1 from Ethiopia, 1 from Bangladesh) are enrolled. Due to the delay in coming to Japan due to the spread of COVID-19 infection, the lectures from October to November were conducted online during stay in their country of origin. In addition, the introduction of electronic blackboard has made it possible to take online lectures as if the blackboard was in front of them. In face-to-face lectures after December, the podium was disinfected when the lecturer was changed, and partitions were set up in the lecture room and the ICHARM auditorium to prevent COVID-19 infection.
(ii)-(1)-2. Capacity development for experts with practical solutions to local problems on water-related disasters	Master's Course "Water-related Disaster Management Course of Disaster Management Policy Program"	● 2020-2021: about 14 students from the candidate countries. ● Determine the candidate countries based on the results of a needs survey. ● Communicate closely with the candidate countries about the requirements for applicants, such as submission of a proof of English fluency.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [S] ④ Social significance [S] ⑤ Dissemination [A]	From April to May 2020, we conducted decentralized school attendance by academic advisor. And students were given remote access to ICHARM's computers and were instructed to write treatises remotely. We have put in place a framework for accepting residual trainees if they are unable to return to their countries. In September 2020, 11 people from 6 countries (2 from Bangladesh, 2 from Bhutan, 2 from Brazil, 2 from Myanmar, 2 from Nepal, 1 from Pakistan) completed the program. A treatise written by a trainee from Pakistan completed his master course program in September 2018, "Flood and Inundation Forecasting in the Sparsely Gauged Transboundary Chenab River Basin Using Satellite Rain and Coupling Meteorological and Hydrological Models," was published in the SCI Journal. In October 2020, 7 students from 6 countries (1 Bangladesh, 2 Bhutan, 1 Malaysia, 1 Mauritius, 1 Myanmar, 1 Tonga) were enrolled. Due to the delay in coming to Japan due to the spread of COVID-19 infection, the opening ceremony, inception report presentation, and lectures of October and November were held online from the time of staying in the country of origin. In addition, self-study using e-learning teaching materials was also conducted. Even now, we are giving lectures online to two people who cannot come to Japan yet. In addition, the introduction of electronic blackboards has made students possible to take online lectures as if the blackboard was in front of them. In face-to-face lectures after December, the podium was disinfected when the lecturer was changed, and partitions were set up in the lecture room and the ICHARM auditorium to prevent COVID-19 infection. Due to the re-spread of COVID-19 infection, lectures by outside lecturers were held remotely at home from January to March.

					In order to respond to the spread of COVID-19 infection, the location and schedule of field trips and the schedule of lectures are changed flexibly from time to time.
	(ii)-(1)-3. Days- and weeks-long training to learn knowledge and technologies for water-related disaster risk management	Short-term training	Provide lectures and exercises in cooperation with the JICA Knowledge Co-Creation Program on "Water Related Disaster Management (Preparedness, Mitigation and Reconstruction)".	① Overall evaluation [-] ② Publication [-] ③ Scientific significance [-] ④ Social significance [-] ⑤ Dissemination [-]	Due to the spread of COVID-19 infection, it will be implemented online in May 2021.
		Hold follow-up seminars for ICHARM master's program graduates and others.	Hold a follow-up seminar in a country of graduates.	① Overall evaluation [-] ② Publication [-] ③ Scientific significance [-] ④ Social significance [-] ⑤ Dissemination [-]	Due to the spread of COVID-19 infection, priority was given to giving lectures on the current master's course, so the seminar was canceled.
(2) Build and strengthen a network of local experts and institutions involved in water-related disaster management by providing knowledge and skills accumulated from research and local practice for training in international projects and ICHARM's educational and training programs.					
	(ii)-(2)-1. Follow up and encouragement for ex-trainees	Hold workshops in ex-trainees' countries.	● Create and update an alumni list. ● Continue strengthening the alumni network using the Internet and providing information on training programs. ● Organize follow-up seminars.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	We continuously created and updated the trainees list and built a network. The Facebook page was updated 10 times and continued to operate it.
(iii) Efficient Information Network					
(1) Collect, analyze and disseminate the records and experiences of major water-related disasters around the world as the comprehensive knowledge center for practitioners.					
	(iii)-(1)-1. Collection and organization of disaster-related records and documents	Promote collaboration with other organizations and collect water disaster information.	Develop a framework for the efficient collection of water-related disaster information by assessing and evaluating the socio-economic impact of flood disasters using big data processed by DIAS of the University of Tokyo and promote the sharing and effective use of the collected information.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Promoted the integration and archiving of the hazard data of water-related disasters using DIAS. Continued to collect rainfall and other data in real time in the IFI implementing countries such as the Philippines and Sri Lanka and studied ways for the further utilization of such data for flood management.
	(iii)-(1)-2. Collaboration with other organizations	Promote the collaboration with other organizations	Promote the collaboration for collecting abundant and reliable disaster information with international organizations (WMO,	① Overall evaluation [A] ② Publication	Actively participated in web meetings through which to track global trends and collect information on water-related disasters from other UNESCO

		and collect water disaster information.	UNDRR, etc.), the University of Tokyo and its DIAS project, and other UNESCO Centres and Chairs. Strengthen the collaboration with water-related disaster management agencies of each country through an IFI Platform on Water Resilience and Disasters.	[A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Centers and Chairs and international organizations, and strived to establish partnerships with these participating organizations. Established the partnership with WMO through the participation of ICHARM researchers in the Associated Programme on Flood Management and the Hydrological Advisers Forum for Regional Association II. Organized a webinar titled "ICHARM's efforts for addressing flood disasters considering the prevention of COVID-19 infection" on July 3, 2020, with over 60 participants from the IFI implementing countries, including high-level participants.
(2) Mainstream disaster risk reduction by disseminating knowledge and technology for water-related disaster risk management and building and maintaining a worldwide influential network such as IFI.					
	(iii)-(2)-1. Collaboration with relevant organizations	Fulfill the duties as the IFI secretariat.	● Carry out the responsibilities as the IFI secretariat in collaboration with the participating organizations by reviewing the concept of IFI and other issues at the Advisory Committee meeting scheduled in August 2020 and holding periodical teleconferences as the Management Committee meeting. ● Continue efforts to disseminate IFI activities at various major international conferences such as ICFM8 and AOGEO and in collaboration with relevant organizations such as ADBI. Promote the partnership with the IFI implementing countries and relevant organizations.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Shared information with UNESCO and the other IFI member organizations by continuously organizing web meetings whereas most international conferences were cancelled or postponed due to the COVID-19 pandemic. Coordinated the postponement of the plenary and special sessions led by ICHARM at ICFM8, which has also been postponed until August 2021. Actively disseminated information on ICHARM's efforts by participating in a webinar organized by the ICFM secretariat. Co-published a policy brief with ADBI in August 2020 based on the ADBI-ICHARM Policy Dialogue held in January 2020. Organized the AWCI online session in February 2021 with the participation of the representatives from relevant organizations in the IFI implementing countries. They shared information and opinions on their activities, and the results were reported at the AOGEO plenary meeting. ICHARM Executive Director was presented with the GEO Individual Excellence Award 2020 for his considerable contribution to the establishment and expansion of GEO in November 2020.
		Support local efforts led by IFI.	Support the Philippines, Myanmar, Sri Lanka, and Indonesia in establishing the Platforms on Water Resilience and Disasters and promoting related activities. Continue efforts to expand IFI activities to other Asian countries, Africa and Latin America.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Documented the outcomes of the Platform activities, and discussed and developed the future plans of the activities in collaboration with the relevant organizations of the IFI implementing countries. Discussed plans for the implementation of e-learning training courses with those organizations.
		Play a leading role in Typhoon Committee (TC).	● Fulfill the duties as the chair of WGH and promote AOP7 "Platform on Water Resilience and Disasters under International Flood Initiative" in collaboration with the WGH members. ● In promoting AOP7, enhance collaborative activities with JMA as a WGM member and the IFI-relevant organizations of the Philippines. ● Organize the 9th WGH meeting in Kyusyu, Japan, coinciding with the 4th APWS in October 2020 and participate in the 15th IWS meeting and the 52nd and 53rd	① Overall evaluation [S] ② Publication [A] ③ Scientific significance [A] ④ Social significance [S] ⑤ Dissemination [A]	Organized the 9th WGH meeting online in October 2020, though the 4th Asia Pacific Water Summit was postponed until April 2022. An ICHARM researcher chaired the meeting, summarized the discussions, and reported the progress of WGH's AOP, "Platform on Water Resilience and Disasters under the IFI." Actively participated in the 15th IWS and the 52nd-53rd Annual Sessions, all of which were held online. An ICHARM researcher chaired the sessions and reported the discussions. Presented with the "Dr. Roman L. Kintanar Award 2020" at the 53rd Annual Session, together with JAXA and IDI, for the long-term contribution to the TC activities.

			Annual sessions as WGH chair. In collaboration with the Members, summarize discussions on typhoon-related disasters in the TC region and contribute to developing and applying effective measures.		
		Japanese Ministry of Foreign Affairs (MOFA) and the International Atomic Energy Agency (IAEA)/Regional Cooperative Agreement (RCA) RAS/7/035 Project on "Assessing Deep Groundwater Resources for Sustainable Management through Utilization of Isotopic Techniques"	Based upon MOFA requests for participation in the IAEA activities, ICHARM will send a researcher to: 1) Represent Japan in the First Coordination of the RAS/7/035 Project to be held in summer 2020 in China to promote the application of isotope techniques in Japan. 2) Participate in the 1st Regional Training Course of the IAEA/RCA RAS/7/035 Project to be held in Thailand in fall 2020 as the IAEA lecturer and expert to give training to participants from the RCA member countries and provide expert advice for the specific study areas of the RCA member countries.	① Overall evaluation [B] ② Publication [B] ③ Scientific significance [A] ④ Social significance [B] ⑤ Dissemination [A]	1) Participated in the IAEA/RCA First Coordination Meeting of the project RAS/7/035, held on September 10-11, 2020, as co-representative on behalf of Japan with Professor Maki Tsujimura of the University of Tsukuba, together with representatives of 15 countries including Japan, and shared the proposed plan of isotope hydrology research in the Tokyo Metropolitan Area that ICHARM was engaged in the preparation. 2) All IAEA/RCA regional and national training courses were canceled due to the spread of COVID-19 infection, but coordination was made for next year's implementation.
	(iii)-(2)-2. Synergy effects enhanced by alumni networking	Alumni networking	● Continue updating the alumni list. ● Continue using SNS to network ICHARM alumni and facilitate the interaction among the alumni, as well as between ICHARM and the alumni. ● Keep in close touch with alumni by sending newsletters and other means.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Updated the ICHARM alumni list and used it when ICHARM researchers went on overseas business trips. Used Facebook to network ICHARM alumni and facilitated the interaction among them, as well as between ICHARM and the alumni. Started including articles contributed by graduates from ICHARM training and educational programs in ICHARM Newsletters.
	(iii)-(2)-3. Public relations	Maintain the ICHARM website.	● Actively disseminate the latest activities on research, training and international networking, and other information and announcements by posting them on the website in a timely manner. ● Continue to improve the contents based on the viewers' feedback. ● Reply to comments and inquiries from the viewers quickly and appropriately.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Updated the website with the latest information, including newsletters and event notices. Updated event-related information and articles as soon as possible, especially when they were about ICHARM-led activities. Created an inquiry/comment section for the viewers and replied to them as soon as possible.
		Publish the ICHARM newsletter.	● Publish the newsletter four times a year (January, April, July and October), and include various articles about ICHARM activities that are current and informative. ● Enrich and diversify the contents by promoting activities on research, training and international networking and collecting contributions from partner organizations and graduates, including feedback from the subscribers. ● Diversify and increase the subscribers by promoting various networking activities inside and outside Japan.	① Overall evaluation [A] ② Publication [A] ③ Scientific significance [A] ④ Social significance [A] ⑤ Dissemination [A]	Continued to be active in public relations by publishing quarterly newsletters, which update over 5,000 subscribers on a wide range of activities of ICHARM. Tried to enrich and diversify the contents of the newsletters by including contributions from ICHARM's partners and training program alumni despite the limitations to outreach activities due to the COVID-19 pandemic.

ICHARM Work Plan

FY 2021 (2021.4-2022.3)

Category	Content	Activities and expected results in FY2021
(i) Innovative research		
(a) Technology for constantly monitoring, storing and using disaster information		
Methods will be proposed for disaster data collection and basic database development with their practical applications. This should eventually lead to data analysis using a Data Integration and Analysis System (DIAS). A data correction method will be also proposed to be used in the process of building a database using global data and near-real time data from satellites. The impact of disaster reduction will be assessed quantitatively by the disaster database including its use in model areas both in Japan and overseas.		
(i)-(a)-1. Research on simple methods for assessing the socio-economic impact of flood disasters	Develop a simple method for assessing the socio-economic impact of flood disasters	In collaboration with GRIPS, assess the impact of indirect damage using a simple damage estimation method employing macroeconomic indicators for Joso City, which suffered extensive damage from the 2015 Kinugawa River flood, and its neighboring municipalities of a similar size, which did not suffer any damage.
	Among the developed simple methods for assessing the socio-economic impact of flood disasters, test a globally applicable method by estimating such impact at national and global levels.	While remaining unable to collect data from the Philippines due to the COVID-19 pandemic, continue to apply the simple damage estimation method to the Philippines and Indonesia. Also implement climate change adaptation measures in Davao, the Philippines, using the Online Synthesis System (OSS) with e-learning as the main component.
(b) Support system for early warning capable of providing accurate information in a shorter period of time		
More advanced application of a regional atmospheric model (WRF) and further improvement of IFAS and RRI will be achieved. Using these advanced technologies, a method will be developed for more accurate real-time prediction of rainfall, runoff and inundation to ensure over 10 hours of lead time necessary for evacuation in a wide area and dam discharges prior to rainfall. The developed method will be tested for applicability to river basins both in Japan and overseas with different conditions of data availability, climate and topography, and eventually used to establish an early flood warning and system. A technology will be developed to evaluate water disaster hazards by using satellites and sediment hydraulic models.		
(i)-(b)-1. Research on technologies for more accurate real-time	Improve the accuracy of the flood inundation prediction model by upgrading the	Develop methods for creating RRI models for rivers for which the relationship between the water level and the flow rate is unknown due to the lack of river channel and other information and rivers with no flood events or insufficient flood observation data. Develop methods for

	prediction of runoff and inundation by complementing insufficient data availability	flood tracking method and introducing an automatic parameter optimization method.	estimating parameters based on the characteristics of rivers by utilizing the verification results obtained so far.
		Clarify the applicability of satellite rainfall data and develop a basin-specific data correction method.	Continue verifying this method by applying it to different regions since the precipitation phenomenon varies locally to a great degree. Study issues related to the development of components, which will be applied to RRI and other models.
		Improve the accuracy of the WRF model for heavy rainfall prediction using X- and C-band MP radars and the Ensemble Kalman filter.	Improve the prediction accuracy for hard-to-predict phenomena such as rain fronts and localized heavy rains by evaluating possible effects that may be caused by increasing the number of ensemble members and the coverage and resolution of meteorological models, as well as by changes in other factors.
		Develop a method for real-time flood inundation forecasting using multiple rainfall forecasting approaches with prediction uncertainty.	Conduct real-time flood inundation forecasting, while considering uncertainties, for river basins in Japan and overseas by inputting ensemble rainfall forecasts to the flood inundation model in real time.
	(i)-(b)-2. Development of technologies using satellites and sediment hydraulic models for assessing the impact of water disaster hazards	Estimate sediment transport and develop an estimation method of river channel topography change.	Verify a new sediment transport evaluation method for usefulness by using it for the analyses of two-dimensional flood flows and riverbed changes in rivers. The method was developed last year to analyze the behavior of fine sediment by applying the entrainment theory to density currents.
		Develop a flood damage risk mapping method that takes sediment hydraulic phenomena into account.	Carry out detailed analyses of two-dimensional flood flows and riverbed changes, using the methods developed last year for the disasters such as the Kuma River flood in 2020. In particular, closely analyze riverbed changes in river channels, and propose a quantitative evaluation method for inundation risk due to riverbed rise.

		Develop a method for mapping flood inundation risk in mountainous rivers.	Apply the prototype of the model, developed last year to estimate the sediment runoff in the entire basin during a heavy rain event, to river basins such as Oi and Kurobe rivers and verify it using the sedimentation data of the dams. Also create estimated flood inundation maps for these river basins.
(c) Assessment and planning technology for appropriate water resources management with insufficient information			
	A long-term water balance simulation technology will be developed to support optimal planning of water resources management both in Japan and overseas. This technology will offer a variety of functions to support highly technical dam operation integrating flood control and water use, water demand settings, soil moisture content settings based on satellite observation technology, application to a wide range of climate categories, input of highly detailed topographical, geological and other data.		
	(i)-(c)-1. Development of a simulation system to provide long-term support for integrated water resources management under different natural and topographical conditions	Improve technologies for integrated water resources management.	Carry out water balance simulation by incorporating short-term rainfall forecasts (39 hours) and seasonal precipitation forecasts (1 month/3 months) and study highly optimized dam operations for flood control and water use, such as preliminary dam release and snowmelt flood control.
		Study soil moisture content based on satellite data.	Study a method to use soil moisture content and other factors, obtained from satellite remote sensing and data assimilation methods, in hydrological runoff modeling in order to improve the applicability to water resource management analysis.
		Improve the applicability of systems and models to rivers in Japan and overseas with different climate conditions.	Study the combination of more advanced evapotranspiration and snowmelt models with runoff analysis models to expand the applicability to river basins with different climate and land conditions.
	(i)-(c)-2. Integrated Research Program for advancing Climate Models (TOUGOU) (MEXT program)	Assess water disaster risk in Asia and create information on adaptation measures.	Continue the ongoing projects in Indonesia and the Philippines to produce future precipitation information using a dynamic downscaling method and estimate flood and drought damage risks using WEB-RRI by collecting data and information on topography, past inundation areas, land use, water use, etc., in cooperation with local researchers and government officials. Also develop and introduce OSS to support local experts in the implementation of climate change adaptation measures.
(d) Technology for assessing the impact on local communities of water related disasters in flood plains and for evaluating the effect of investments in disaster risk reduction			

	A disaster risk assessment method will be developed to evaluate “strength against fatal damage” and “resilience for speedy restoration”. Indices will be proposed to help policy makers in Japan and overseas easily recognize local disaster risks and holistically evaluate the effect of investments on disaster risk reduction so that they can make informed investment decisions. A method will be proposed for building disaster resilient communities in Japan and overseas by using the developed risk indices.		
	(i)-(d)-1. Research on a multifaceted water disaster risk assessment for worldwide use and a disaster-resilient community building method based on the assessment	Propose a highly accurate and advanced method for multifaceted evaluation of disaster risk	Establish an advanced risk estimation method considering the relationship between damage and resilience according to business type, inundation depth, lifeline utility damage and other factors, based on the results of the investigations conducted in Joso City after the Kanto-Tohoku heavy rain disaster in September 2015 and in Hiroshima and Okayama prefectures after the heavy rain disaster in July 2018. Upgrade the risk estimation method to factor in damaged parts of a house and inundation depth, based on the results of the investigations conducted in Joso City after the Kanto-Tohoku heavy rain disaster in September 2015 and in Iwaizumi Town, Iwate Prefecture, after Typhoon No.10 in 2016.
		Propose risk indices to holistically evaluate the disaster risk reduction effect of disaster prevention measures and investments	Propose an index capable of holistically evaluating flood damage to help determine whether communities can maintain themselves even after a disaster. The index will be devised from estimated population outflow rates calculated based on an investigation which asked disaster-affected residents in Iwaizumi Town, Iwate Prefecture, whether or not to relocate to other places. Also propose an index focusing on the damage level at which the pre-disaster regional gross product can be maintained, based on data on changes in the regional gross product of municipalities after past flood disasters.
		Propose a method for building disaster resilient communities in Japan and overseas by using the developed risk indices.	Study measures to build the resilience of local communities to possible hazards, based on the evaluation index proposed above.
(e) Technology for the effective use of water related disaster risk information to reduce disaster damage			
	An information system, as well as communication tools such as disaster response timeline tables, will be developed to support disaster management efforts by administrators and local residents to prevent or mitigate flood and sediment disasters. The effective use of such a system and tools will be proposed.		

	(i)-(e)-1. Research on a water disaster risk information delivery system to support local disaster management efforts in areas with insufficient water disaster information	Propose a method for identifying areas vulnerable to disasters (disaster hot spots) prior to disasters.	Apply the developed flood risk assessment tool to other municipalities (e.g., Tsukuba City).
		Propose a method for forecasting the possibility of a water-related disaster by community in real time.	Conduct a demonstration experiment using the ICHARM Disaster Risk Information System (IDRIS) developed as a Web-GIS information delivery system in the previous year. Also link IDRIS with short-term flood forecasts for small and medium rivers on DIAS.
		Propose a Web-GIS water-related disaster risk information delivery system that helps accumulate and share various types of disaster risk information and deliver evacuation information.	Improve IDRIS for more stable operation by routinizing its maintenance. Also update IDRIS to enhance its usability with recent WEB technologies and smartphones. Develop a new system to help optimize resources for water-related disaster response by sharing experiences and knowledge of water-related disaster response during and after the COVID-19 pandemic. This will be realized by coupling IDRIS on DIAS with BOSS and SHIFT.
		Propose the effective use of the Web-GIS information delivery system to stakeholders of local administrative bodies in Japan and overseas.	Improve the Web-GIS information delivery system into the one capable of assisting local governments in sharing information that contributes to their efforts in disaster prevention and mitigation by promoting cooperation among local disaster prevention officers in Japan and the IFI implementing countries.
	(i)-(e)-2 Development of risk communication systems to increase public awareness of water-related disasters and risk management	Develop a DIAS-based simulation system that can seamlessly reproduce, predict and visualize meteorological and hydrological events and related damage.	Apply the high-end VR developed for Hita City, Oita Prefecture, to the city and other areas. Continue to conduct activities related to Aga Town, Niigata Prefecture: collect detailed spatial information by conducting surveys using drones and ground laser instruments; reproduce inundation events using the RRI model and the sediment-driftwood-inundation model; and integrate collected data and information using the Construction Information Modeling (CIM). Also create a preliminary version of VR flood contents based on collected information to share flood experiences as well as record and hand down past events, experiences and knowledge to

			future generations.
		Develop a more effective risk communication system by incorporating psychological factors.	Identify prime determinants influencing people's psychological change and behavioral choice during evacuation by conducting experiments to observe evacuation behavior in a virtual flood event. The experiments will be conducted using a virtual evacuation drill tool developed in the previous year that allows several people to experience a virtual flood event at once using a cloud service. Also improve the IDRIS application to be a comprehensive flood risk communication tool by coupling the application with the VR evacuation drill tool.
	(i)-(e)-3. Local practice using research results	Continue supporting JST-JICA SATREPS, a project to develop an Area-BCM (Business Continuity Management) system to strengthen the disaster resilience of Thailand's industrial parks.	Develop a high-resolution flood inundation analysis model and conduct flood inundation analysis based on multiple flood scenarios for the Rojana industrial park in Ayutthaya Province, Thailand. Develop business impact analysis (BIA) and regional business continuity management (Area-BCM) for the industrial park, using the results of the flood inundation analysis. Also start developing a high-resolution flood inundation analysis model for Bang Pa-in, High Tech and other industrial parks.
		JST-JICA SATREPS, The Project for Development of a Hybrid Water-Related Disaster Risk Assessment Technology for Sustainable Local Economic Development Policy under Climate Change in Philippines (new project)	Test flood and drought risk evaluation for the basins of the Pampanga, Pasig, Marikina and Lake Laguna in Luzon Island, the Philippines, using a model developed by coupling the WEB-RRI model with SIMRIW, a crop-growth prediction model. Conduct test runs of simple calibration using satellite images since model calibration using local data is impossible due to the COVID-19 pandemic. Evaluate the post-disaster resilience of areas affected by Typhoon Ulysses (No.22), which made landfall on November 12, 2020, using data already available for the public and data available even under the pandemic and compare the areas' resilience to Typhoon Ondoy in 2009 and Typhoon Pedring in 2011.
(ii) Effective Capacity Development			
(1) Train solution-oriented practitioners and Training-of-Trainers (TOT) instructors with solid theoretical and engineering competence who will contribute effectively to the planning and practice of disaster risk management at local and national levels.			

	(ii)-(1)-1. Capacity development for professionals who can train and supervise local researchers	Doctoral Course "Disaster Management"	Accepts 2-3 people (2021-2022).
	(ii)-(1)-2. Capacity development for experts with practical solutions to local problems on water-related disasters	Master's Course "Water-related Disaster Management Course of Disaster Management Policy Program"	For 2021-22, we will accept about 14 people from the target countries decided based on the results of each country's request survey. Inform relevant countries of the thorough submission of English proficiency qualifications at the time of application
	(ii)-(1)-3. Days- and weeks-long training to learn knowledge and technologies for water-related disaster risk management	Short-term training	Conduct lectures and exercises in cooperation with JICA-sponsored thematic training "Measures for Mitigating Water Disaster Damage". Training for FY2020 will be conducted online from May 26-28, 2021.
		Hold follow-up seminars for ICHARM master's program graduates and others.	Visit one country and hold follow-up seminar. (We will also consider holding a web seminar for multiple countries about once every four years.)
(2) Build and strengthen a network of local experts and institutions involved in water-related disaster management by providing knowledge and skills accumulated from research and local practice for training in international projects and ICHARM's educational and training programs.			
	(ii)-(2)-1. Follow up and encouragement for ex-trainees	Hold workshops in ex-trainees' countries.	Create and maintain trainees list. Using Facebook, build a network of trainees and provide training activities information. Hold a follow-up seminar.
(iii) Efficient information network			
(1) Collect, analyze and disseminate the records and experiences of major water-related disasters around the world as the comprehensive knowledge center for practitioners.			
	(iii)-(1)-1. Collection and organization of disaster-related records and documents	Promote collaboration with other organizations and collect water disaster information.	Develop a framework for the efficient collection of water-related disaster information which support, for example, assessing and evaluating the socio-economic impact of flood disasters using big data processed by DIAS, and promote the sharing and effective use of the collected information.

	(iii)-(1)-2. Collaboration with other organizations	Promote the collaboration with other organizations and collect water disaster information.	Promote the collaboration for collecting abundant, reliable disaster information with international organizations (WMO, UNDRR, etc.), the University of Tokyo and its DIAS project, and other UNESCO Centres and Chairs. Strengthen the collaboration with water-related disaster management agencies of each country through an IFI Platform on Water Resilience and Disasters.
(2) Mainstream disaster risk reduction by disseminating knowledge and technology for water-related disaster risk management and building and maintaining a worldwide influential network such as IFI.			
	(iii)-(2)-1. Collaboration with relevant organizations	Fulfill the duties as the IFI secretariat.	Carry out the responsibilities as the IFI secretariat in collaboration with the participating organizations, including reviewing the concept of IFI and other issues at the Advisory Committee meeting at the opportunity of ICFM8 scheduled in August 2021 and holding periodical Management Committee teleconferences. Continue efforts to disseminate IFI activities at various major international conferences such as ICFM8 and AOGEO and in collaboration with relevant organizations such as ADBI. Promote the partnership with the IFI implementing countries and relevant organizations.
		Support local efforts led by IFI.	Support the Philippines, Myanmar, Sri Lanka, and Indonesia in establishing the Platforms on Water Resilience and Disasters, developing the implementation plans, and promoting related activities based on them. Continue efforts to expand IFI activities to other Asian countries, Africa and Latin America. Promote e-learning for engineers and other experts engaged in water-related disaster management and study issues toward developing the Online Synthesis System (OSS) and fostering Facilitators in collaboration with relevant organizations.
		Play a leading role in Typhoon Committee (TC).	Fulfill the duties as the WGH chairperson and promote the AOP7 “Platform on Water Resilience and Disasters under International Flood Initiative” in collaboration with the WGH Members. Enhance collaborative activities for promoting AOP7 with JMA, a WGM Member, and the IFI-relevant organizations of the Philippines. Organize the 10th WGH meeting in Japan in collaboration with MLIT and participate in the 16th IWS meeting and the 54th Annual sessions as WGH chairperson to summarize discussions

			on typhoon-related disasters in the TC region and contribute to developing and applying effective measures in collaboration with the Members.
		Japanese Ministry of Foreign Affairs (MOFA) and the International Atomic Energy Agency (IAEA)/Regional Cooperative Agreement (RCA) RAS/7/035 Project on "Assessing Deep Groundwater Resources for Sustainable Management through Utilization of Isotopic Techniques"	Participate in the following activities in response to the request from MOFA to participate in IAEA activities: 1) Participate on behalf of Japan in the interim review coordination meeting of RAS / 7/035 Project to be held in the summer of 2021 and provide the latest information on the research and application of isotopic techniques in Japan in collaboration with Japan's National Project Coordinator (NPC). 2) Participate as an IAEA instructor/expert in the IAEA Home Base Expert Mission held online for the IAEA / RCA RAS / 7/035 Project, and provide online training, advice, and guidance to representatives from three countries such as Mongolia. Also promote efforts in research on the water cycle process using isotopes and other means in connection with the IAEA project.
	(iii)-(2)-2. Synergy effects enhanced by alumni networking	Alumni networking	Continue updating the alumni list. Continue using Facebook to network ICHARM alumni and facilitate the interaction among them, as well as between ICHARM and the alumni. Maintain close contact with the alumni by sending newsletters and other means.
	(iii)-(2)-3. Public relations	Maintain the ICHARM website.	Actively disseminate information on the latest activities on research, training and international networking, as well as on other activities and announcements, by posting them on the website in a timely manner. Continue to improve the newsletter contents based on the viewers' feedback. Reply to comments and inquiries from the viewers quickly and appropriately.
		Publish the ICHARM newsletter.	Publish the newsletter four times a year (January, April, July and October), and include various articles about ICHARM activities that are current and informative. Enrich and diversify the newsletter contents by promoting activities on research, training and international networking and collecting contributions from partner organizations and educational and training program graduates, including feedback from the subscribers.

AGREEMENT BETWEEN THE GOVERNMENT OF JAPAN AND THE UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO) REGARDING THE CONTINUATION, IN JAPAN, OF THE INTERNATIONAL CENTRE FOR WATER HAZARD AND RISK MANAGEMENT (ICHARM) (CATEGORY 2) UNDER THE AUSPICES OF UNESCO

The Government of Japan, and The United Nations Educational, Scientific and Cultural Organization,

Recalling that the General Conference at its 33rd Session in 2005 approved the establishment of the International Centre for Water Hazard and Risk Management as a category 2 centre under the auspices of the United Nations Educational, Scientific and Cultural Organization, and that the Agreement between the Government of Japan and the United Nations Educational, Scientific and Cultural Organization (UNESCO) concerning the Establishment of the International Centre for Water Hazard and Risk Management under the Auspices of UNESCO (hereinafter referred to as the "2006 Agreement") was signed in Paris on 3 March 2006,

Considering that the 2006 Agreement expired at the end of the fifth year following its signature, and that the Agreement between the Government of Japan and the United Nations Educational, Scientific and Cultural Organization (UNESCO) regarding the International Centre for Water Hazard and Risk Management (ICHARM) (Category 2) under the auspices of UNESCO (hereinafter referred to as the "2013 Agreement") was signed in Paris on 23 July 2013,

Considering Decision 207EX/16.II of the Executive Board of the United Nations Educational, Scientific and Cultural Organization in 2019 by which the Executive Board decided to renew the status of the International Centre for Water Hazard and Risk Management as a category 2 centre under the auspices of UNESCO and authorized the Director-General of the United Nations Educational, Scientific and Cultural Organization to sign the corresponding agreement with the Government of Japan,

Desirous of defining the terms and conditions governing the framework for cooperation between the Government of Japan and the United Nations Educational, Scientific and Cultural Organization that shall be granted to the said Centre in this Agreement,

HAVE AGREED AS FOLLOWS:

Article 1
Definitions

In this Agreement,

1. "Government" means the Government of Japan.

2. “UNESCO” means the United Nations Educational, Scientific and Cultural Organization.

3. “Centre” means the International Centre for Water Hazard and Risk Management.

4. “PWRI” means the Public Works Research Institute, Japan.

5. “Contracting Parties” means Government and UNESCO.

Article 2
Continuation

The Centre originally established in 2006 in Japan by the 2006 Agreement shall continue under this Agreement. The Government agrees to take, in the course of the year 2020 and within the limits of the laws and regulations of Japan, appropriate measures that may be required for ensuring the continued functioning of the Centre established in 2006 in Japan, as provided for under this Agreement.

Article 3
Purpose of the Agreement

The purpose of this Agreement is to define the terms and conditions governing collaboration between the Government and UNESCO and also the rights and obligations stemming therefrom for the Government and UNESCO, within the limits of the laws and regulations of Japan.

Article 4
Legal Status

1. The Centre shall be independent of UNESCO.

2. The Centre shall be an integral part of PWRI, which enjoys, in accordance with the laws and regulations of Japan, the legal personality and capacity necessary for the exercise of its functions, including the capacity to contract, to acquire and dispose of movable and immovable property, and to institute legal proceedings, in relation to the activities of the Centre.

Article 5
Objectives and Functions

1. The objectives of the Centre shall be to conduct research, capacity building, and information networking activities in the field of water-related hazards and their risk management at the local, national, regional, and global levels in order to prevent and mitigate their impacts and thereby contribute to achieving sustainable development in the framework of the 2030 Agenda for Sustainable Development, promote integrated river basin management, and strengthen resilience to societal and climate changes.

2. In order to achieve the above objectives, the functions of the Centre shall be to:

(a) promote scientific research and policy studies and undertake effective capacity-building activities at the institutional and professional levels;

(b) create and reinforce networks for the exchange of scientific, technical and policy information among institutions and individuals;

(c) develop and coordinate cooperative research activities, taking advantage particularly of the installed scientific and professional capacity of the relevant International Hydrological Programme (IHP) networks, the World Water Assessment Programme, the International Flood Initiative and the relevant programmes of governmental and non-governmental organizations, as well as involving international institutions and networks under those auspices;

(d) conduct international training courses and educational programmes, especially for the policy makers, practitioners and researchers of the world;

(e) organize knowledge and information transfer activities, including international symposia or workshops, and engage in appropriate awareness-raising activities targeted at various audiences, including the general public;

(f) develop a programme of information and communication technology through appropriate data application;

(g) provide technical consulting services; and

(h) produce scientific and technological publications and other media items related to the activities of the Centre.

3. The Centre shall pursue the above objectives and functions in close coordination with IHP.

Article 6
Governing Board

1. The Centre will be guided and overseen by a Governing Board, which will be renewed every three years and will be composed of:

(a) the President of PWRI, as the Chairperson;

(b) a representative of the Government or his or her appointed representative;

(c) representatives of up to three other Member States of UNESCO that have sent to the Centre notification for membership, in accordance with Article 10, paragraph 2, and have expressed interest in being represented on the Board;

(d) representatives of up to five institutes or organizations relating to the activities of the Centre, who shall be appointed by the Chairperson; and

(e) a representative of the Director-General of UNESCO.

The Chairperson may invite a representative of the IHP Intergovernmental Council to

participate to the Governing Board meetings.

2. The Governing Board shall:

(a) examine and adopt the long-term and medium-term programmes of the Centre submitted by the Executive Director of the Centre, subject to paragraph 3 below;

(b) examine and adopt the draft work plan of the Centre submitted by the Executive Director of the Centre, subject to paragraph 3 below;

(c) examine the annual reports submitted by the Executive Director of the Centre, including biennial self-assessment reports of the Centre's contribution to UNESCO's programme objectives;

(d) examine the periodic independent audit reports of the financial statements of the Centre and monitor the provision of such accounting records as necessary for the preparation of financial statements;

(e) draw up and adopt any necessary internal regulations of the Centre, based on the relevant legislative and regulatory framework relating to PWRI; and

(f) decide on the participation of regional intergovernmental organizations, international organizations and other interested institutions in the work of the Centre.

3. The long-term and medium-term programmes, as well as the work plan, of the Centre shall satisfy the relevant legislative and regulatory requirements relating to PWRI; they will also be aligned with UNESCO's strategic programme objectives and global priorities, and conform to the Centre's functions as set out in Article 5.2.

4. The Governing Board shall meet in ordinary session at regular intervals, at least once every Japanese fiscal year; it shall meet in extraordinary session if convened by its Chairperson, either on his or her own initiative or at the request of the Director-General of UNESCO or of the majority of its members.

5. The Governing Board shall adopt its own rules of procedure.

Article 7
Staff

1. The Centre shall consist of an Executive Director and staff with experience in research on water hazard and risk management, as well as such staff as is required for the proper functioning of the Centre.

2. The Executive Director shall be appointed by the President of PWRI.

3. The other members of the Centre's staff shall be nominated by the Executive Director for the appointment by the President of PWRI.

Article 8
Contribution of UNESCO

1. UNESCO may provide assistance, as needed, in the form of technical assistance for the programme activities of the Centre, in accordance with the strategic goals and objectives of UNESCO, by:

(a) providing the assistance of its experts in the specialized fields of the Centre; and

(b) including the Centre in various activities which it implements and in which the participation of the latter seems in conformity with and beneficial to UNESCO's and the Centre's objectives.

2. In all cases listed above, such assistance shall not be undertaken except within UNESCO's programme and budget, and UNESCO will provide Member States with accounts relating to the use of its staff and associated costs.

Article 9
Contribution by the Government

The Government undertakes to take appropriate measures in accordance with the laws and regulations of Japan, which may be required for the Centre to receive all the resources, either financial or in-kind, needed for the administration and proper functioning of the Centre. The Centre's resources shall derive from sums allotted by PWRI, from such contributions as it may receive from any governmental, intergovernmental or non-governmental organizations, and from payments for services rendered.

Article 10
Participation

1. The Centre will encourage the participation of Member States and Associate Members of UNESCO which, by their common interest in the objectives of the Centre, desire to cooperate with the Centre.

2. Member States and Associate Members of UNESCO wishing to participate in the Centre's activities as provided for under this Agreement may send to the Centre notification to this effect. The Executive Director of the Centre shall inform the Government, UNESCO and its Member States that have notified their intention to participate in the Centre's activities of the receipt of such notifications.

Article 11
Responsibility

As the Centre is legally separate from UNESCO, the latter shall not be legally responsible for the acts or omissions of the Centre, and shall also not be subject to any legal process, and/or bear no liabilities of any kind, be they financial or otherwise, with the

exception of the provisions expressly laid down in this Agreement.

Article 12
Evaluation

1. UNESCO may, at any time, carry out an evaluation of the activities of the Centre in order to ascertain:

(a) whether the Centre makes a significant contribution to UNESCO's strategic programme objectives and expected results aligned with the four-year programmatic period of the Approved Programme and Budget of UNESCO (C/5 document) including the two global priorities of UNESCO, and related sectoral or programme priorities and themes; and

(b) whether the activities effectively pursued by the Centre are in conformity with the functions set out in this Agreement.

2. UNESCO shall, for the purpose of the review of this Agreement, conduct an evaluation of the contribution of the Centre to UNESCO's strategic programme objectives, to be funded by the Centre within annual budgets appropriated thereto and in accordance with the relevant and applicable laws and regulations of Japan.

3. UNESCO undertakes to submit to the Government, at the earliest opportunity, a report on any evaluation conducted.

4. Following the results of an evaluation, each of the Contracting Parties shall have the option of requesting a revision of its contents or of denouncing the Agreement, as envisaged in Articles 16 and 17.

Article 13
Use of UNESCO Name and Logo

1. The Centre may mention its affiliation with UNESCO. It may, therefore, use after its title the mention "under the auspices of UNESCO".

2. The Centre is authorized to use the UNESCO logo or a version thereof on its letterheaded paper and documents, including electronic documents and web pages, in accordance with the conditions established by the governing bodies of UNESCO.

Article 14
Entry into Force

This Agreement shall enter into force upon signature by the Contracting Parties. It shall supersede the 2013 Agreement.

Article 15
Duration

This Agreement is concluded for a period of six years as from its entry into force. This Agreement shall be renewed upon common agreement between the Government and

UNESCO, once the Executive Board made its comments based on the results of the renewal assessment provided by the Director-General.

Article 16
Denunciation

1. The Government and UNESCO shall be entitled to denounce this Agreement unilaterally.

2. The denunciation shall take effect 180 days after receipt of the notification sent by the Government or UNESCO to the other.

Article 17
Revision

This Agreement may be revised by written agreement between the Government and UNESCO.

Article 18
Settlement of Disputes

Any disputes between the Government and UNESCO regarding the interpretation or application of this Agreement shall be resolved through consultations between them.

IN WITNESS WHEREOF, the undersigned, duly authorized thereto, have signed this Agreement.

DONE in duplicate in Paris, this thirteenth day of February, 2020, in English.

For the Government of Japan:
For the United Nations Educational, Scientific and Cultural Organization:

参考資料

第 5 回 ICHARM 運営理事会

資料目次

議事次第・・・・・・・・・・・・・・・・・・・・・・・・ 日本語版　1

出席者名簿・・・・・・・・・・・・・・・・・・・・・・・ 日本語版　2

ICHARM 運営理事会手続規則（日英版）・・・・・・ 日本語版　3

ICHARM Activity Report （日本語版）・・・・・・・・・日本語版　4

ICHARM Work Plan（日本語版）・・・・・・・・・ 日本語版　27

Annex 1

国際連合教育科学文化機関の賛助する水災害の危険及び危機管理のための国際センター（第二区分）の日本国における継続に関する日本国政府と国際連合教育科学文化機関との間の協定(日英版) ・・・・・・・・・・・・ 日本語版　35

ICHARM 第 5 回運営理事会（Governing Board）

議事次第案

日時：令和 3 年（2021 年）5 月 12 日（水）16:00-17:30

場所：ウェブ会議

議事：

- 議長による開会挨拶
- 自己紹介
- ICHARM 運営理事会手続規則の確認
- ICHARM 活動レポートの審査
- ICHARM 事業計画の審査・採決
- 閉会

第 5 回 ICHARM 運営理事会
参　加　者　名　簿

（所属機関アルファベット順）

田中　明彦　Akihiko TANAKA
政策研究大学院大学 (GRIPS)　学長

岩崎　英二　Eiji IWASAKI
国際協力機構 (JICA)　地球環境部長（北岡伸一理事長代理）

山田　邦博　Kunihiro YAMADA
国土交通省 (MLIT)　技監

西川　和廣　Kazuhiro NISHIKAWA (議長)
土木研究所 (PWRI)　理事長

松岡　由季　Yuki MATSUOKA
国連防災機関 (UNDRR)　駐日事務所代表
（Paola ALBRITO 政府間プロセス・組織間協力・パートナーシップ課チーフ代理）

シャミラ・ナイア・ベドウェル　Shamila NAIR-BEDOUELLE
ユネスコ (UNESCO) 自然科学局　事務局長補
（Audrey Azoula ユネスコ事務局長代理）

寶　馨　　Kaoru TAKARA
水・エネルギー・災害教育研究ユネスコチェアユニット(WENDI) ユニット長
京都大学大学院総合生存学館（思修館）教授

エレナ・マナエンコバ　Elena MANAENKOVA
世界気象機関 (WMO) 副事務局長

（敬称略）

（事務局）
佐々木 靖人　Yasuhito SASAKI, 土木研究所　理事
小池 俊雄　Toshio KOIKE, 土木研究所 ICHARM　センター長
江頭 進治　Shinji EGASHIRA, 土木研究所 ICHARM　研究・研修指導監
伊藤 弘之　Hiroyuki ITO, 土木研究所 ICHARM　水災害研究グループ長
池田 鉄哉　Tetsuya IKEDA, 土木研究所 ICHARM　特別研究監

Rules of Procedure for ICHARM Governing Board
ICHARM 運営理事会　手続規則

As of 12 May 2021

English	（日本語対訳）
Article 1　Intent These Rules of Procedure (hereinafter referred to as "the Rules") shall state the necessary matters which shall guide proceedings of the International Centre for Water Hazard and Risk Management (ICHARM) Governing Board (hereinafter referred to as "the Governing Board") meeting, subject to Article 6 of the agreement between the Government of Japan and the United Nations Educational, Scientific and Cultural Organization (UNESCO) regarding the continuation, in Japan, of the International Centre for Water Hazard and Risk Management (category 2) under the auspices of UNESCO, signed on 13 February 2020 (hereinafter referred to as "the Agreement").	（趣　旨） 第１条　この規則は、2020 年 2 月 13 日に署名された国際連合教育科学文化機関の賛助する水災害の危険及び危機管理のための国際センター(第二区分)の日本国における継続に関する日本国政府と国際連合教育科学文化機関との間の協定（以下「協定」という。）第６条に規定する ICHARM 運営理事会（以下「運営理事会」という。）の開催について必要な事項を定めるものである。
Article 2　Composition 1) The members of the Governing Board will be composed as provided for by Article 6 of the Agreement. The President of the National Research and Development Agency Public Works Research Institute, Japan will be designated as Chairperson of the Governing Board. 2) The members of the Governing Board shall be appointed by the Chairperson. 3) The term of office for each Governing Board member appointed by the Chairperson shall be three years. This term may be extended by re- appointment.	（構　成） 第２条 1) 運営理事会は、協定第６条に規定した構成員により構成する。日本国の国立研究開発法人土木研究所理事長を議長とする。 2) 構成員は議長が委嘱する。 3) 議長が任命する構成員の任期は３年とし、再任を妨げない。
Article 3　Board Meetings, Quorum, and Minutes 1) The functions of the Governing Board shall be prescribed as provided for by Article 6 of the Agreement. 2) The Chairperson shall convene the Governing Board meeting. Participation by a majority of Governing Board members shall be necessary to proceed with the Governing Board meeting. 3) The majority agreement of all attendees shall be necessary for the adoption. 4) The official language of the Governing Board meeting shall be English. 5) The secretariat of the Governing Board (referred to in Article 4) shall take minutes of the Governing Board meetings.	（議事等） 第３条 1) 運営理事会は、協定第６条に規定した事項を行う。 2) 運営理事会会合は、議長が議事進行を執り行う。運営理事会会合は、構成員の２分の１以上の出席をもって成立する。 3) 採択にあたっては出席者の２分の１以上の賛成を要するものとする。 4) 運営理事会会合の公式言語は英語とする。 5) 運営理事会の事務局（第４条に規定する委員会の事務局をいう。）は、運営理事会の議事に関する記録を作成するものとする。
Article 4　Secretariat ICHARM shall function as the secretariat of the Governing Board.	（事務局） 第４条　運営理事会の事務局は、ICHARM に置く。
Article 5　Amendment of the Rules The Rules may be amended during a Governing Board meeting by consent of the majority of attendees. The Chairperson can ask for electronic votes when urgent decision issues relevant to the Rules arise between meetings. The decisions in such cases shall be made by consent of the majority of the members who have voted by deadlines.	（要領の改正） 第５条　この規則は、運営理事会会合においては参加者の過半数の同意をもって改正できる。会合と会合の間において、この規則に関連して緊急に決定する必要が発生した場合、議長は電子投票を求めることができる。その場合、期限までに投票のあった構成員の過半数の同意をもって決定するものとする。
Article 6　Miscellaneous Provisions Miscellaneous provisions necessary for the management of the Governing Board but not included in the Rules shall be decided by the Chairperson in consultation with the Governing Board members.	（雑　則） 第６条　この規則に定めるもののほか、運営理事会に関して必要な事項は、議長が運営理事会に諮って定める。
Supplementary Provisions The Rules shall be enacted on 12 May 2021.	（附　則） この規則は、2021 年 5 月 12 日から施行する。

ICHARM / PWRI

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

United Nations Educational, Scientific and Cultural Organization | International Centre for Water Hazard and Risk Management under the auspices of UNESCO | Public Works Research Institute, National Research and Development Agency, Japan

Organization & Budget

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)

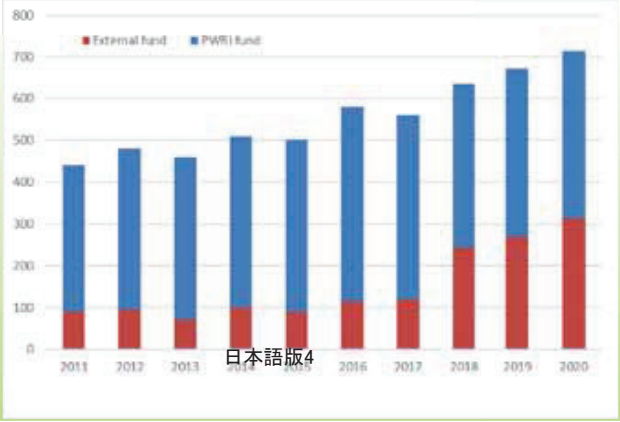
International Centre for Water Hazard and Risk Management (ICHARM)
officially established March 2006

Executive Director (1)

46

- Deputy Director of ICHARM (Director of Water-related Hazard Research Group) (1)
- Deputy Director of ICHARM (Director for Special Research) (1)
- Training & Research Advisor (1)
- Chief Researcher (Water-related Hazard) (1)
- Chief Researcher* (Risk Management) (1)
- Chief Researcher (Networking and PR) *serving concurrently
- Chief Researcher (Training) (1)
- Senior Researcher (7)
- Research Specialist (11)
- Researcher (2)
- Research Assistant (1)
- Administrative Staff (4)
- Administrative Assistant (14)

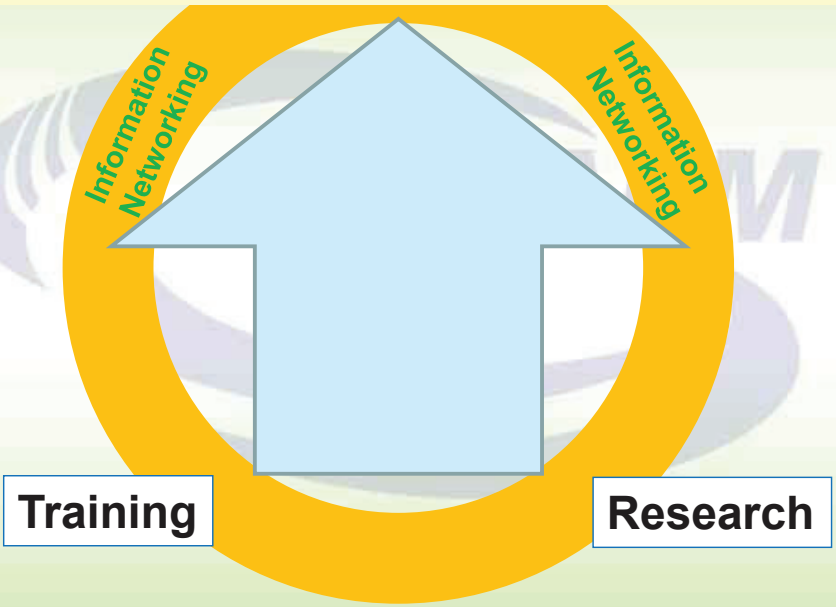
Budget (million yen)



日本語版4

Working to achieve Localism

Delivering best available knowledge to local practices



Long Term Targets

- Analyzing and formulating policy ideas
- Visualizing values of preparedness and investment efficiency

- Improving disaster literacy
- Promoting co-design and co-implementation among stakeholders

Support in Sound Policy-making

Support in Community of Practice

Risk Assessment

- Developing integrated disaster risk assessment
- Identifying locality and commonality

Risk Change Identification

- Monitoring and predicting changes in disaster risk
- Identifying locality and commonality

Data & Statistics

- Promoting data collection, storage, sharing, and statistics
- Integrating local data, satellite observations and model outputs

Long Term Targets

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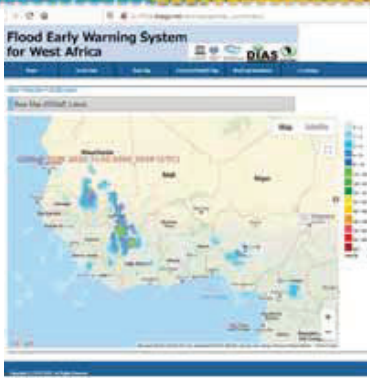
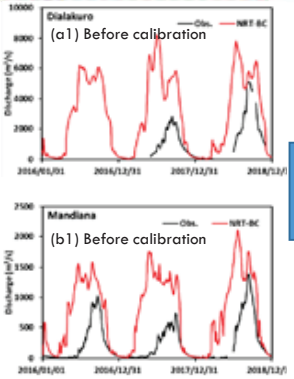
Data & Statistics

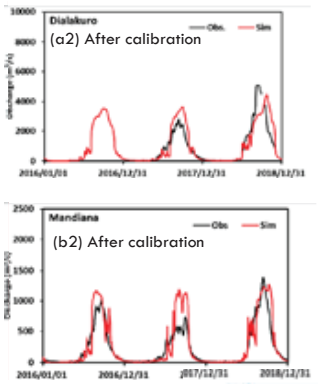
- Promoting data collection, storage, sharing, and statistics
- Integrating local data, satellite observations and model outputs

Effective Use of Satellite Products: GSMaP

NRT: near-real time precipitation available within 4 hours with hourly update.
NOW: quasi-real time precipitation with every 30 minutes update.







Bias Correction

E-M wave Characteristics

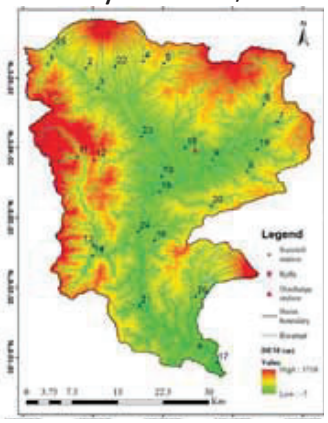
+

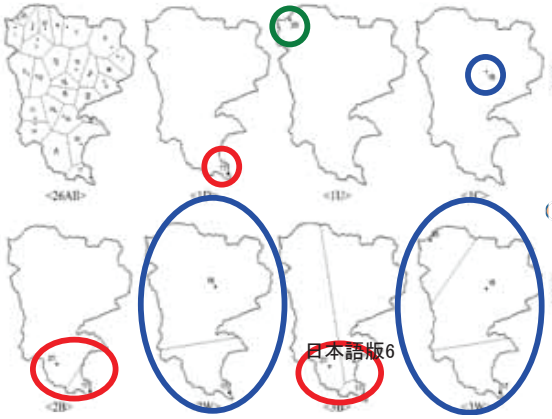
Statistical Bias Correction

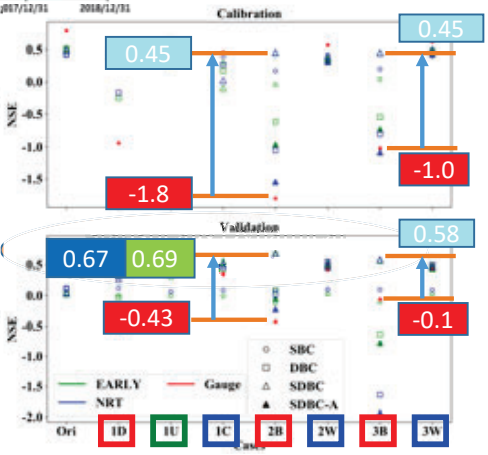
+

Dynamical Bias Correction

Density: **137** km²/station







Long Term Targets

- Analyzing and formulating policy ideas
- Visualizing values of preparedness and investment efficiency
- Improving disaster literacy
- Promoting co-design and co-implementation among stakeholders

Support in Sound Policy-making

Support in Community of Practice

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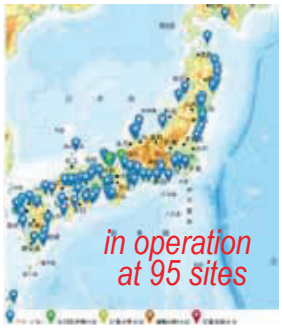
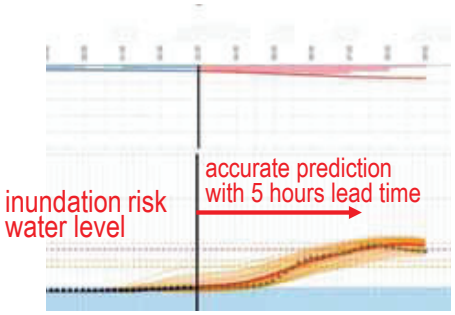
Flood early warning system for small & medium river basins

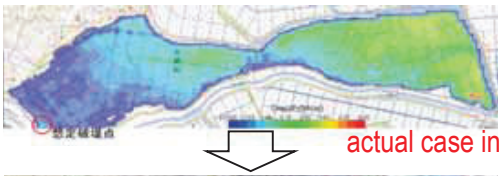
3L(low cost, long life, localized) Water Level Gauge + Data Assimilation + Rainfall Runoff Inundation (RRI) model





Traditional flood control with a new technology

Dramatical flood risk reduction by introducing "Nogoshi", a partial HWL Overflow Dyke, based on consensus building



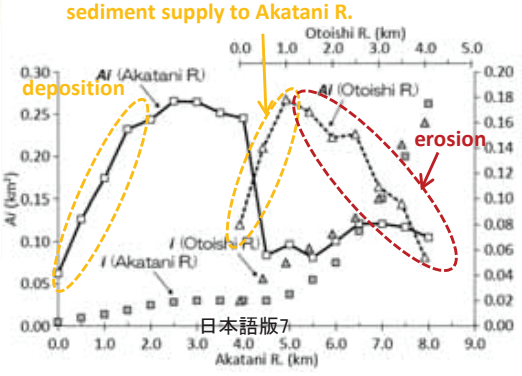
in collaboration with NILIM

with "Nogoshi"

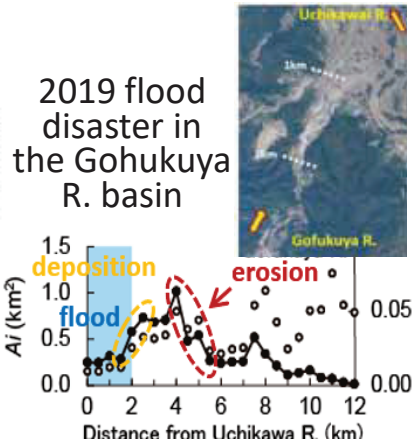
Ai is a parameter for sediment transport capacity. Increases in *Ai* indicate erosion while decreases in *Ai* indicate sediment deposition.

A: Drainage area, *i*: energy slope or bed slope

2017 flood disaster in the Akatani R. basin



2019 flood disaster in the Gohukuya R. basin



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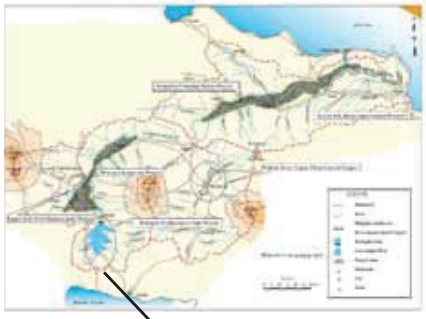
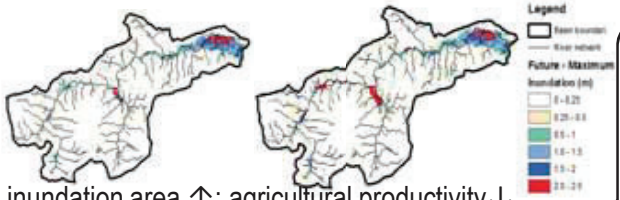
Climate Change Impact Assessment in the Solo River Basin, Indonesia

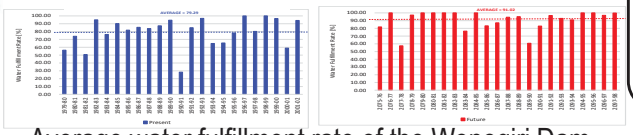


Wonogiri Dam
C.A.=1,350km²



inundation area ↑: agricultural productivity ↓
irrigation water ↑: agricultural productivity ↑

Present: 79.3%　　Future: 91.0%



Average water fulfillment rate of the Wonogiri Dam

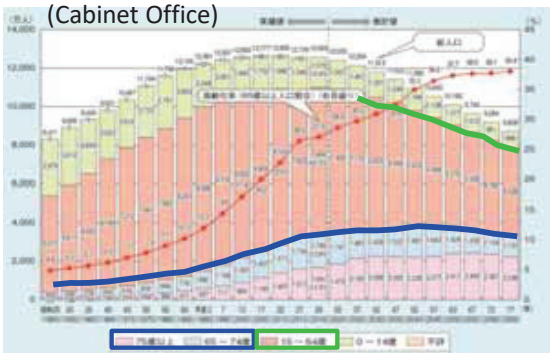
Input-Output Analysis

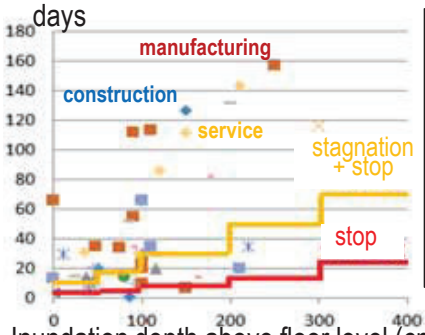
Direct effect of increasing paddy rice production:
237 billion rupiah
Induced production of other industries:
59.5 billion rupiah
Total economic effect:
296.5 billion rupiah
(2015 price)

Ratio of productive population (15~64) to aged population (65~)
3.9 in 2000
2.3 in 2015
1.4 in 2065

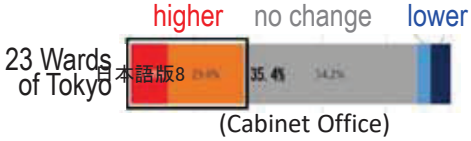
Person Needing Support ↑
Person Offering Support ↓

(Cabinet Office)





Recent flood cases reveal that small and medium businesses need far more days to make a full recovery after the event, compared with the number of days (yellow and red lines) cited in the national survey manual.



(Cabinet Office)

Under COVID-19, interest in migrating to local areas rises among twenties and thirties in Tokyo, Osaka and Nagoya.

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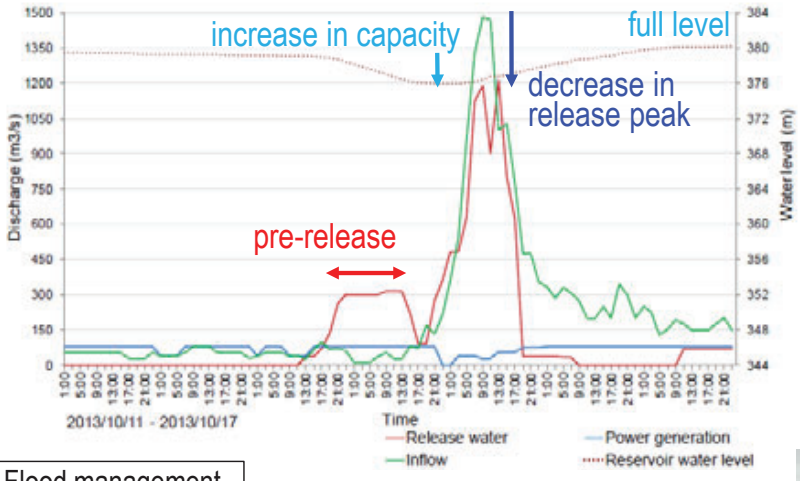
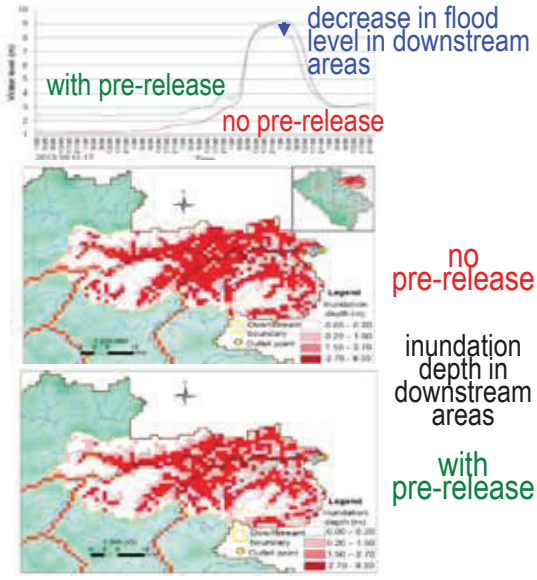
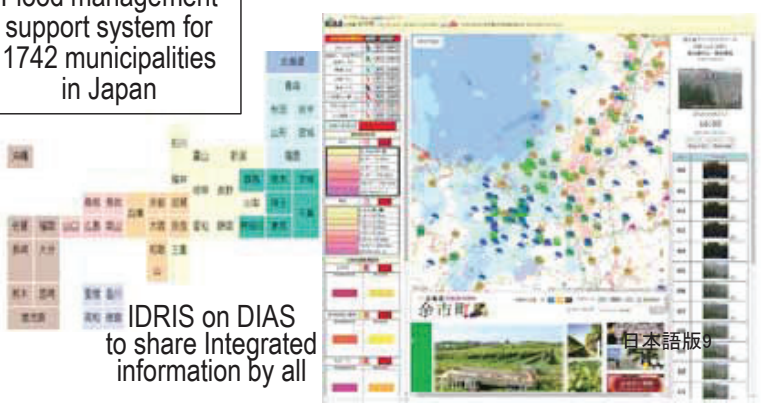
Evaluation of the effect of pre-release from a hydro-power generation dam on flood disaster risk reduction in downstream areas in central Vietnam.





Flood management support system for 1742 municipalities in Japan



IDRIS on DIAS to share Integrated information by all

People's capacity building using virtual reality

Long Term Targets

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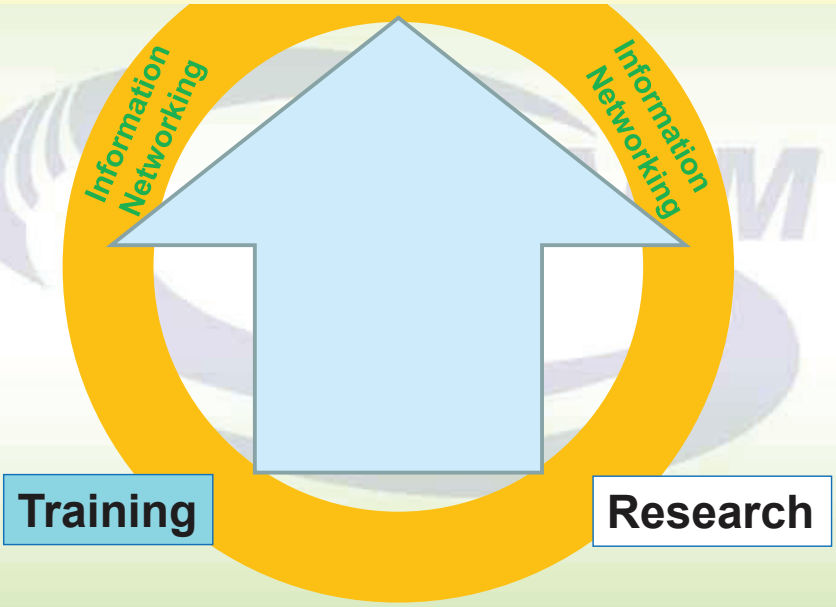
Working to achieve Localism

Delivering best available knowledge to local practices



日本語版10

Thanks to the hard work on the learning side and the enthusiasm on the teaching side.


Online discussion with a supervisor


The 13th Closing Ceremony for JICA Knowledge Co-Creation Program on "Flood Disaster Risk Reduction"


Lecture using an electric whiteboard


Practicing social distancing


Students in a graduation gown at GRIPS


Hybrid hands-on training

Q: How do you feel about being caught in the COVID-19 pandemic during the training in Japan? And is there anything you have been doing to maintain your motivation to complete your master's thesis under this gloomy circumstance?

<Student A> I've been keeping myself busy with different tasks so that I can avoid thinking too much about the terrible conditions all over the world.

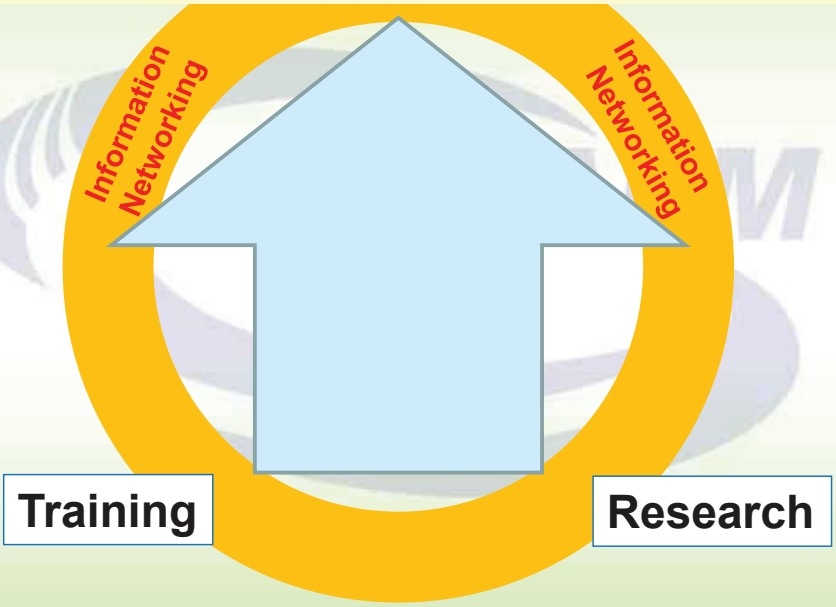
<Student B> COVID-19 has spread all over the world, so we have to tackle this situation by taking some precautionary measures, which I have been doing.

<Student C> I feel lucky because the COVID-19 situation in my country is far worse than in Japan, and here I don't have to practice as much confinement as my parents and colleagues do back home.

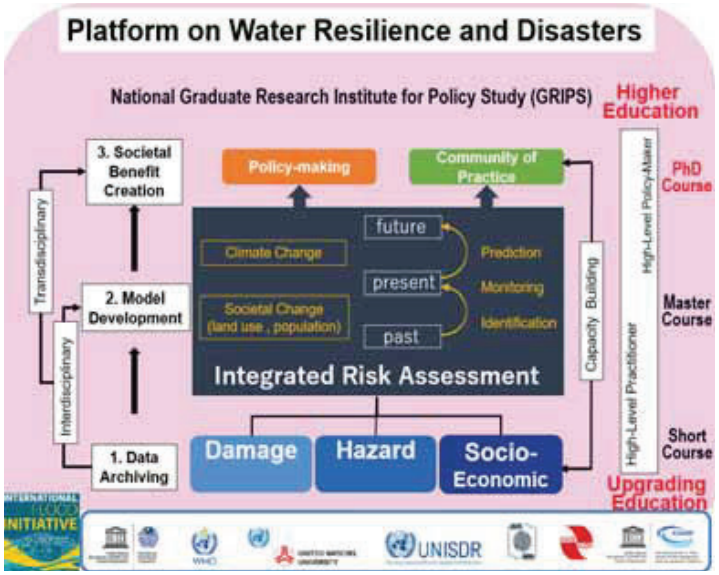
<Student D> I feel afraid of facing with COVID-19 because here in Japan, I have no family to take care of me. But on the other hand, Japan has better medical services than my country, and JICA and ICHARM have been taking really good care of us.

Working to achieve Localism

Delivering best available knowledge to local practices

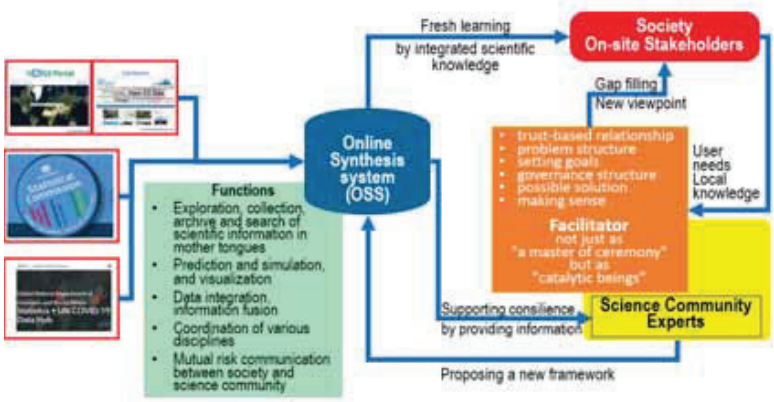


日本語版11



High Level Panel on Water (HLPW)

Platforms on Water Resilience and Disasters among all stakeholders should be formulated in countries to facilitate dialogue and scale up community-based practices.



Implementation Strategy: OSS and Facilitators

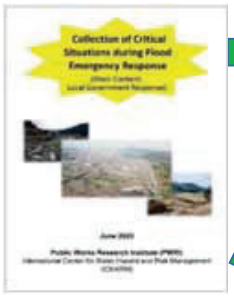
H.E. Dr. Basuki Hadimuljono, Minister, Public Works and Housing, Indonesia

Developing an "Online Synthesis System (OSS) and fostering "Facilitators" by making maximum use of e-Learning systems.

Collection of Critical Situations during Flood Emergency Response

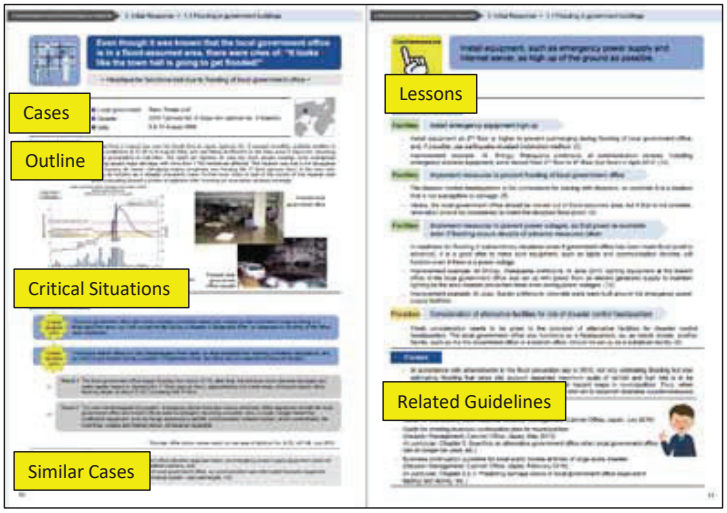
ICHARM has published a booklet entitled "Collection of Critical Situations during Flood Emergency Response" in June, 2020.

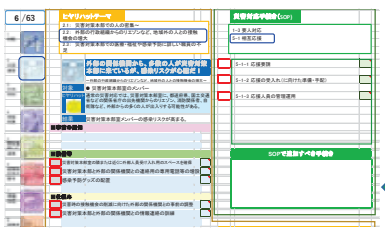
Main Content: local government response



28 cases of critical situations from the review reports of past flood disasters.

Appendix: local government response under COVID-19





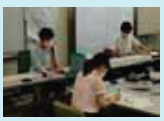
28 possible cases of critical situations considering several guidelines and manuals.

Support System for responsible sectors of municipalities in checking measures

Capacity Building

Outreach Activities

-Training for local governments
-Presentations at conferences
-Distribution of booklets, etc.



Training at a local government (Aug.7, 2020)

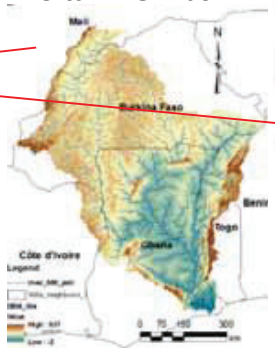
Online conference by High Level Experts and Leaders Panel on Water and Disasters (HELP) (Aug. 20, 2020), attended by their Majesties the Emperor and Empress of Japan together with 300 participants from 40 countries.

URL: https://www.pwri.go.jp/icharm/special_topic/20200625_flood_response_collection_e.html

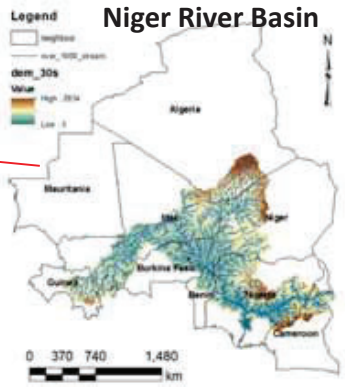
Water Disaster Platform to Enhance Climate Resilience in Africa (WaDiRe-Africa)

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 the Ministry of Foreign Affairs of Japan.

Volta River Basin



Niger River Basin

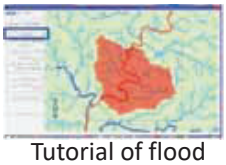


Kick-off Meeting in Lome, Togo, in June 2019

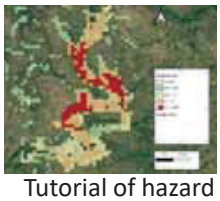
e-Learning Training Course

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

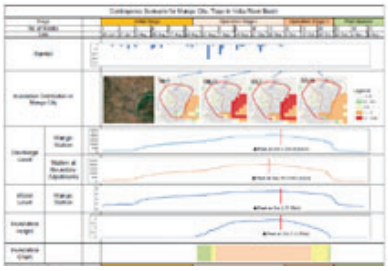
2.Training for Trainers
-Lecture, Q&A Session
-44 participants, 30 certificated



Tutorial of flood simulation



Tutorial of hazard mapping



Tutorial of Contingency Planning

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 (DIAS)

Image of River Basin Disaster Resilience and Sustainability by All

- Transition to River Basin Disaster Resilience and Sustainability by All, a new concept of flood management with the cooperation of all the stakeholders around basins
- Upgrade flood management plans with consideration for climate change impacts
- Promote the following integrated and multilayered measures: 1) Flood Prevention, 2) Exposure Reduction, and 3) Disaster Resilience

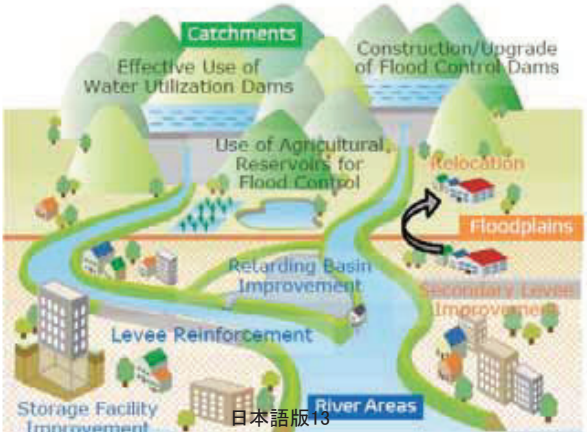
1) Flood Prevention

Catchments
- Improve rainwater storage functions

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

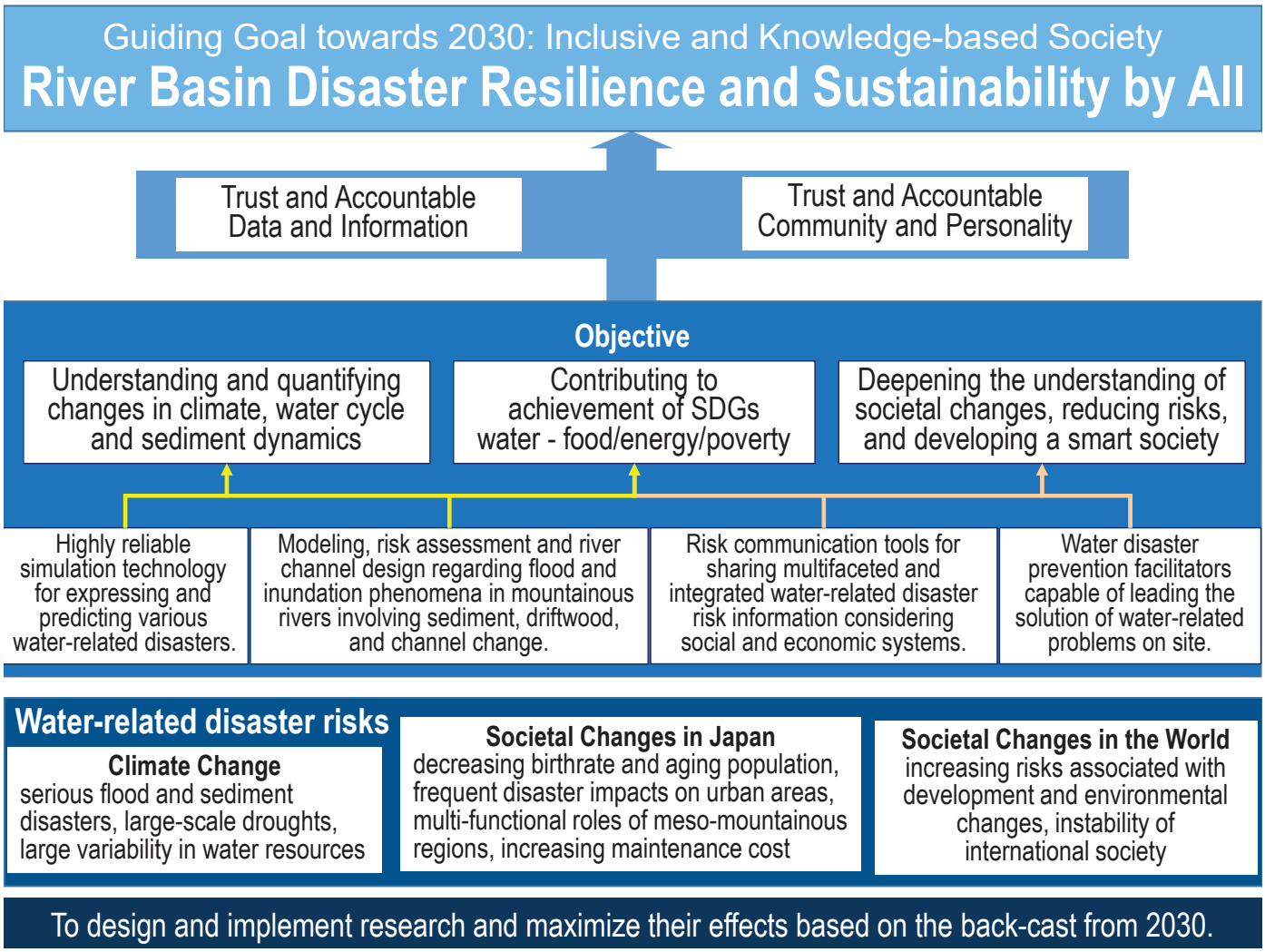
2) Exposure Reduction

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



3) Disaster Resilience

Floodplains
- 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


Guiding Goal towards 2030: Inclusive and Knowledge-based Society
River Basin Disaster Resilience and Sustainability by All
Trust and Accountable Data and Information
Trust and Accountable Community and Personality
Objective
Understanding and quantifying changes in climate, water cycle and sediment dynamics
Contributing to achievement of SDGs water - food/energy/poverty
Deepening the understanding of societal changes, reducing risks, and developing a smart society
Highly reliable simulation technology for expressing and predicting various water-related disasters.
Modeling, risk assessment and river channel design regarding flood and inundation phenomena in mountainous rivers involving sediment, driftwood, and channel change.
Risk communication tools for sharing multifaceted and integrated water-related disaster risk information considering social and economic systems.
Water disaster prevention facilitators capable of leading the solution of water-related problems on site.
Water-related disaster risks
Climate Change
serious flood and sediment disasters, large-scale droughts, large variability in water resources
Societal Changes in Japan
decreasing birthrate and aging population, frequent disaster impacts on urban areas, multi-functional roles of meso-mountainous regions, increasing maintenance cost
Societal Changes in the World
increasing risks associated with development and environmental changes, instability of international society
To design and implement research and maximize their effects based on the back-cast from 2030.

ICHARM 事業計画の自己評価

日本語版15

2020 年度 (2020.4 – 2021.3)

2020 年 6 月 2 日の第 4 回運営理事会で採択いただいた事業計画の自己評価

業務区分	内容	2020 年度 活動と想定される成果	自己評価 S…目標以上の達成・極めて優秀 A…目標どおり達成・適切 B…部分的な達成・やや不十分 C…未達成が多い・不十分	2020 年度 実施状況概略
(i) 革新的な研究				
(a) 災害情報を継続的にモニタリングして蓄積し活用する技術				
災害データの収集方法及び基本的なデータベースの構築手法について、それらの活用方法を踏まえて提案し、具体的に DIAS を使った解析につなげる。また同時にグローバルデータや衛星情報による準リアルタイムデータを活用したデータベース構築途上における補完手法についても提案する。これらにより、国内外のモデル地域において災害データベース及びその活用による減災効果の定量的評価を行う。				
(i)-(a)-1. 洪水災害による社会経済影響の簡易推計手法に関する研究	洪水被害による社会経済活動への影響について簡易推計手法を構築。	2015 年関東東北豪雨で浸水した常総市において、ADBI が開発した手法を用いて、浸水深と収集した経済データをもとに簡易推計手法による経済影響の推計を進める。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ A ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ B ］	GRIPS と連携し、2015 年関東東北豪雨で浸水した常総市と人口、経済活動等が類似しているが被害が無かった市町村を抽出し、両自治体のマクロな経済指標を比較することで洪水被害の間接影響を推定する手法の開発を進めた
	簡易推計手法のうち、国外でも適用可能な洪水被害による社会影響の簡易推計手法による国別及びグローバル推計を検証。	フィリピン国ミンダナオ島ダバオ市における洪水被害について、収集できたデータから上記経済影響評価について適用可能性の検討を進める。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ A ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ A ］	COVID-19 禍により、フィリピン国内での活動が困難となったことから、e-learning をベースとし気候変動も考慮した利害関係者の洪水対応能力向上を図る OSS[1]（Online Synthesis System）の構築を進めており、3 月にはフィリピン・ダバオ川流域を対象に講義を設計した。
(b) より早く、正確な情報を提供する早期警報支援技術				
WRF の応用と IFAS、RRI の機能強化により、広域避難やダムの事前放流を可能にする十数時間先までリードタイムを確保したリアルタイム降雨流出氾濫予測の精度向上技術を開発する。また、国外及び国内中小河川等のデータの不十分な地域、気候・地勢条件の異なる地域での適用性を検証し、早期洪水警報システムの手法を確立する。更に、人工衛星や土砂水理学モデルを活用し、水災害ハザードの推定技術を開発する。				
(i)-(b)-1. データ不足の補完等を考慮したリアルタイム流出氾濫予測の精度向上技術に関する研究	洪水追跡手法の精緻化及びパラメータ自動最適化手法の導入による洪水氾濫予測モデルの精度向上	パラメータ最適化手法を、RRI モデルを活用した中小河川水位予測システムへ活用することにより、予測精度の向上、作業省力化を図る。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ A ］ ③ 科学的見地での成果…	パラメータ最適化手法として、SCE-UA 法を RRI モデルに適用した。2020 年度は新たに約 60 河川にこの方法を適用し、手法の有効性を確認するとともに課題の整理を行った。これによってパラメータフィッティングの労力を軽減することができた。

日本語版16

[1] OSS(Online Synthesis System):日本学術会議が 2020 年 9 月にまとめた「災害レジリエンスの強化による持続可能な国際社会実現のための学術からの提言」において、構築すべきとされたシステム。災害レジリエンスの向上と持続可能な開発の推進に関するシンセシスの実施を支援するためには、国際的な学術団体、様々な現場の関係当事者や国連・国際機関と協力して、学術情報に加え、世界の各所から発信される優良事例や成功・失敗を含む経験情報、制度・政策に関する基礎情報等が必要となる。これらを各国の母国語で探索・収集・アーカイブ・検索する機能、さらには、データ統合・情報融合を実現し、予測・シミュレーションする機能、可視化等を含む効果的なリスクコミュニケーション機能、関係当事者間の情報交換・対話機能を有する OSS を、学際的な科学技術協力のもとで構築すべき、とされている。

				［　　A　　］ ④ 社会的見地での成果… ［　　A　　］ ⑤ 成果の普及… ［　　A　　］	さらに洪水規模と最適化期間の関係によっては効果が得られないことがあったことから、そのような場合は最適化期間を変えること等の検討を行った。
	人工衛星観測降雨データの適用性の明確化および流域に適した補正手法の開発	リアルタイム地上雨量計データが取得できない場合の GSMaP の補正技術について検討する。GSMaP の精度確保のために必要な地上雨量計密度について検討する。	① 全体の達成度… ［　　A　　］ ② 成果の発表… ［　　A　　］ ③ 科学的見地での成果… ［　　A　　］ ④ 社会的見地での成果… ［　　S　　］ ⑤ 成果の普及… ［　　A　　］	ミャンマーの Swa Chaung ダム流域を対象に時間降水量を得るために、地上雨量計データを用いて、GSMaP を補正したものを適用した。この結果を用いて RRI モデルを用いてダム流入量を算出して、実測値と比較したところ良好な結果を得た。一連の成果について、世界銀行からも高い評価を得た。 西アフリカのニジェール川・ボルタ川流域を対象に、過去の地上雨量観測データを用いて事前に計算していた補正係数をリアルタイムに得られる GSMaP データに掛け、GSMaP のバイアス補正を自動的に実施するシステムを構築した。 また、富士川流域において複数の補正手法を適用した GSMaP とそれを用いた流出シミュレーション（BTOP モデルを使用）を実施し、空間的には流域平均よりも GSMaP グリッドごと、時間的には毎時値や月平均値よりも 10 日平均値との比較による補正が有効であることを示した。この成果は、国際ジャーナルに掲載された
	X/C バンド MP レーダの活用やアンサンブルカルマンフィルタの応用による WRF モデルの豪雨予測の精度向上	台風等大規模かつ重要な気象現象に特化した比較的長いリードタイムでの豪雨予測精度の評価を行う。また、局地的豪雨については、気象モデルの高解像度化等による予測精度の向上について検討する。	① 全体の達成度… ［　　A　　］ ② 成果の発表… ［　　A　　］ ③ 科学的見地での成果… ［　　A　　］ ④ 社会的見地での成果… ［　　A　　］ ⑤ 成果の普及… ［　　A　　］	令和元年台風第 19 号により発生した千曲川洪水を対象に、WRF モデルとアンサンブルカルマンフィルタを組み合わせたアンサンブル予測と、RRI モデルによる流出予測実験を行った。その結果、洪水発生の 5 日前から精度良く洪水ピークの発生時刻と規模を予測することができた。今回の事例では、境界条件として用いた気象庁全球予報の精度が高かったことが、高い予測精度が得られた大きな要因と考えられる。台風に起因する洪水では、条件さえ許せば比較的長いリードタイムで洪水予測が可能であることが示された。この結果は、土木学会水工学論文集に掲載された。
	多様な降雨予測手法に基づく予測不確実性を反映したリアルタイム洪水氾濫予測手法の開発	アンサンブル予測から得られる予測結果とその分布を活用した効果的なダム運用ルールについて検討を行う。	① 全体の達成度… ［　　A　　］ ② 成果の発表… ［　　A　　］ ③ 科学的見地での成果… ［　　A　　］ ④ 社会的見地での成果… ［　　A　　］ ⑤ 成果の普及… ［　　A　　］	ベトナムの Vu Gia Thu Bon 川流域に A Vuong ダムと Dak Mi 4 ダム地点を考慮した水エネルギー収支に基づく降雨・流出・氾濫モデル（WEB-RRI）を構築した。また、39 時間先の 33 のアンサンブル降雨予測モデルを構築した。これらを 2013 年 10 月の歴史的な出水イベントに適用し、モデルのキャリブレーションと効果的なダム運用の検討をした。WEB-RRI の流量の補正には現地での流量観測データを、洪水氾濫域の補正には現地での氾濫浸水深データと人工衛星 Sentinel-1 に搭載された合成開口レーダ（SAR）から推定された浸水域データ用いた。 下流域の洪水調節に対するダム操作の効果を検討するために、流入量予測情報を用いた事前放流のダム操作がある場合とない場合の 2 つのシナリオを比較し、ダム操作により下流の浸水域と浸水深が減少することを示した。
	(i)-(b)-2.　人工衛星及び土砂水理学モデルを活用した水災害ハザード	流砂量の評価と河道地形変化の推定手法の開発	微細土砂で構成される河床堆積物の挙動を評価するために、密度流理論を用いた新しい流砂量の評価手法を確立する。これを数値計算	① 全体の達成度… ［　　A　　］ ② 成果の発表…	微細土砂で構成される河床堆積物の挙動を評価するために、密度流理論を用いた新しい流砂量の評価手法を確立した。これを数値計算に導入し、微細土砂で構成される河床に適用可能な河

	推定技術の開発に関する研究		に導入し、微細土砂で構成される河床に適用可能な河道地形変化の推定手法を開発する。	［　A　］ ③ 科学的見地での成果… ［　S　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　A　］	道地形変化の推定手法を開発した。また、水理実験を行い、本手法の妥当性に関する検討を行った。成果については、土木学会水工学講演会や IAHR-APD CONGRESS 2020 で発表し、普及に努めた。
		土砂水理現象を考慮した洪水被害想定域図の作成手法の開発	土砂水理模型実験、現地調査結果による土砂・流木・洪水の解析結果の検証を行う。	① 全体の達成度… ［　A　］ ② 成果の発表… ［　A　］ ③ 科学的見地での成果… ［　S　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　A　］	土砂水理模型実験、現地調査を行い、土砂・洪水の解析結果の検証を行った。特に、2019 年に災害のあった宮城県丸森町、及び 2020 年に災害のあった熊本県人吉市での検討を行った。その結果、山地区間から流入した土砂が平野部の河道に堆積することによって、河積が減少し、より氾濫が生じ易くなっていることを見出した。成果については、土木学会河川技術論文集に掲載された。
		山地河川における洪水氾濫想定域図の作成手法の開発	山地河川における微細土砂を含む土砂流入量を評価する手法を提案し、数値シミュレーションによって洪水氾濫想定区域図を作成する。	① 全体の達成度… ［　A　］ ② 成果の発表… ［　A　］ ③ 科学的見地での成果… ［　S　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　A　］	降雨流出モデル（RRI モデル）と流域全体の土砂動態を計算するモデルを統合することで、豪雨時の流域全体の土砂流出量について推定を行うモデルのプロトタイプを開発し、このモデルに基づいた氾濫計算、及び氾濫想定区域図を作成することを可能にした。成果については、River Flow 2020 で発表し、普及に努めた。 流域面積 A と河床勾配 i の積を指標とすると、中山間地河川の洪水に伴う土砂の浸食・輸送・堆積の過程を表現でき、土砂・洪水氾濫が起きやすいエリアを抽出するのに有効であることを、2018 年、2019 年に土砂・洪水氾濫が発生した河川を事例に確認した。成果については、地理学評論で公表し、普及に努めた。
(c)　限られた情報下で水資源管理を適切に実施するための評価・計画技術					
	国内外での適切な水資源管理計画検討に資するため、高度なダム運用（治水、利水の統合運用）、水需要の設定、衛星観測技術等による土壌水分量の設定、様々な気候区分への適用、高精度な地形・地質等のデータ入力などを可能にする機能の追加等、長期水収支シミュレーション技術を開発する。				
	(i)-(c)-1.　様々な自然・地勢条件下での長期の統合的水資源管理を支援するシミュレーションシステムの開発に関する研究	統合的水資源管理のための機能強化	電力会社との共同による現地実証実験の評価と評価結果を踏まえたシステムの改良を行う。	① 全体の達成度… ［　A　］ ② 成果の発表… ［　A　］ ③ 科学的見地での成果… ［　S　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　B　］	大井川上流域（中部電力）において暖候期を対象とした出水イベントを対象に電力会社と協力しながらダム運用ルールについて検討した。具体的には、畑薙第一ダムの 2018 年を対象に、39 時間先の 32 のアンサンブル降雨予測モデルを WEB-DHM に入力し、ダムへの流入量予測と下流の洪水調節と増電を目的としたシミュレーションを実施した。その結果、既存の操作規程に従った場合、洪水量（600m^3/s）以上の放流を 63.5％低減し、発電量指標で 12.5％の増電効果を示した。一方で、既存の操作規程を超えて検討した場合、洪水量を 100％低減し、発電量指標で 12.7％の増電効果を示した。
		衛星観測データによる土壌水分量の検討	ブラジル・セアラ州に適用した CLVDAS による干ばつ監視・予測システムの試験運用を踏まえた評価、改良を行う。マイクロ波放射計	① 全体の達成度… ［　B　］	ブラジル・セアラ州については、CLVDAS による干ばつ監視・予測システムの比較的良好な検証結果を得たものの、COVID-

			による土壌水分量観測結果をマイクロ波観測アルゴリズムに反映する。	② 成果の発表… ［ A ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ B ］	19 禍によりシステムの試験運用を踏まえた評価、改良まで至っていない。また他地域への適用の可能性を確認するために、同監視システムを西アフリカに適用し、正常な運用を確認した。その際、表層・根茎層だけでは無く、深さ 2m までの土壌水分量プロファイルを評価できるよう機能を拡張した。また乾燥域における推定の不確実性を解決するために、マイクロ波による土壌水分量推定の核となるマイクロ波放射伝達モデルを改良し、マイクロ波放射計を用いた観測実験により得られた観測データによる検証を通じて、その有効性を確認した。こうして CLVDAS を西アフリカに適用して土壌水分量や植生水分量等をシミュレートした。その結果、植生水分量とパールミレットの収穫量との整合性が示されるとともに両者にギャップが生じた年にはバッタの大量発生があったことが分かった。
		様々な気候区分を有する国内外の河川を対象とした適用性向上	WEB-RRI と SIMRIW（水稲生育予測モデル）の結合により、水文モデルの稲作地帯への適合性の向上を図る。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ A ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ B ］	WEB-RRI と SIMRIW（水稲生育予測モデル）との結合モデルを開発し、プログラムの検証段階にある。この新たな結合モデルにより気候変動下の洪水・渇水に伴う稲作被害と米の収穫量の予測が可能となる。
	(i)-(c)-2. 統合的気候モデル高度化研究プログラム（文科省プログラム）	アジアにおける水災害リスク評価と適応策情報の創生	WEB-RRI による将来の水循環現象の予測計算を実施する。また洪水・渇水等のハザード計算結果、流域の土地利用等を踏まえ、将来のリスク評価を行う。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ A ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ A ］	ソロ川流域及びダバオ川流域を対象に WEB-RRI による将来の水循環現象の予測計算を実施した。さらに洪水・渇水のハザード計算及び流域の土地利用等を踏まえた将来のリスク評価を実施した。
(d) 洪水氾濫原での水災害による地域社会への影響評価及び防災投資効果算定技術					
「致命的な被害を負わない強さ」と「速やかに回復するしなやかさ」を評価できる災害リスク評価手法の開発を行う。また政策決定者が適切な防災投資を選択できるよう、国内外の地域の災害リスクをわかりやすく表現し、投資による減災効果を総合的に評価できる指標を提案するとともに、リスク指標を活用した国内外における強靭な地域社会の構築手法を提案する。					
	(i)-(d)-1. グローバルに通用する多面的な水災害リスクの評価及び評価に基づく強靭な社会構築手法に関する研究	多面的な災害リスクの高精度・高度な推計手法の提案	2018 年 7 月豪雨に被災した岡山県・広島県における事業所の回復力に関する調査結果を分析することにより、広域的に発生する災害に特有の水害リスクに関する評価手法を検討する。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ B ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果…	2018 年 7 月豪雨に被災した岡山県・広島県における事業所の回復力に関する調査回答を分析し、浸水深さ及びライフライン被害等の程度に応じた直接被害・間接被害（休業損失等）の推計手法について検討している。

				［　A　］ ⑤ 成果の普及… ［　B　］	
		各種の防災施策・投資による減災効果を総合的に評価するリスク指標の提案	前年度行った岩手県岩泉町での調査結果をもとに、これまで検討してきた災害後の人口・地域総生産が維持できる被災レベルに着目した指標の適用を試みる。	① 全体の達成度… ［　A　］ ② 成果の発表… ［　B　］ ③ 科学的見地での成果… ［　A　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　B　］	岩手県岩泉町での調査結果をもとに、世帯属性に基づく住宅再建意向と被災程度に応じた被災後の人口流出率の推計手法を検討するとともに、被災後にコミュニティが維持できる被災レベルについて検討を行っている。
		リスク指標を活用した国内外における強靭な地域社会の構築手法の提案	上記で適用したリスク評価指標に基づき、強靭な地域社会の構築手法のメニューを提案する。	① 全体の達成度… ［　A　］ ② 成果の発表… ［　B　］ ③ 科学的見地での成果… ［　A　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　B　］	上記の推計手法に基づいて、想定される外力に対して地域の強靭性（レジリエンス）を確保するための対策メニューの検討を行っている。
(e)　災害被害軽減のための水災害リスク情報の利活用技術					
洪水や土砂災害等に対する防災担当者や住民による防災・減災活動を支援する情報システムや災害対応タイムラインなどのコミュニケーションツールを開発し、それらの利活用手法について提案する。					
(i)-(e)-1.　水災害情報が乏しい地域での防災・減災活動を支援する水災害リスク情報提供システムに関する研究		事前に災害に対して脆弱な地区（災害ホットスポット）を特定する手法の提案	新潟県阿賀町、岩手県岩泉町、フィリピン国ブラカン州カルンピット市で実施した本手法について総括し、RRI モデルの出力からの自動作成ツールの改良、マニュアルの改訂を行う。	① 全体の達成度… ［　B　］ ② 成果の発表… ［　B　］ ③ 科学的見地での成果… ［　A　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　B　］	洪水リスク評価ツールの開発を行い、岩手県岩泉町で適用実験を行った。
		発災前にリアルタイムで水災害発生可能性を地区単位で予測する手法の提案	将来のリアルタイム化を目標に、水害発生可能性と地区単位で予測するための「Web-GIS 型情報提供システム」の改良検討を行う。	① 全体の達成度… ［　A　］ ② 成果の発表… ［　B　］ ③ 科学的見地での成果… ［　A　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　A　］	過年度において、「Web-GIS 型情報提供システム」として提案した IDRIS（ICHARM Disaster Risk Information System）を実証実験サイトである新潟県阿賀町のホームページで公開するとともに、岩手県岩泉町で公開のための調整を行っている。 水災害発生可能性を一般住民に公開するのに有用と思われるスマートフォン対応アプリの基礎設計等を実施した。

		様々な災害リスク情報を「蓄積」「共有」し、避難情報を「発信」できる「Web-GIS 型水災害リスク情報提供システム」の提案	阿賀町での試用で顕在化した課題を整理し、改良を行う。また、岩手県岩泉町において適用して汎用性の確認を行う。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ B ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ B ］	上記の公開サイトにおいて、IDRIS の不具合が生じる要因分析を行い、IDRIS のベースシステムである e コミュニティプラットフォームの機能更新、サイトリンクの定期的更新で不具合が改良されることを確認した。定期的更新をメンテナンスに組み込むことで、IDRIS の動作安定性（汎用性）が担保されることを確認した。
		国内外における現地自治体関係者を交えた「Web-GIS 情報提供システム」の利活用手法の提案	開発した「Web-GIS 型情報提供システム」の普及に向けた仕様化の検討を行う。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ B ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ A ］	IDRIS の普及化のため、クラウドサービスを活用した普及化方法を検討した。クラウドサービスにベースとなる IDRIS サーバ（IDRIS ベースシステム）を構築し、適用サイトの特性に合わせた IDRIS ベースシステムをカスタマイズする方法の構築、仕様化を進めた。 同時に、広域水災害情報に関しては、IDRIS を DIAS 上に構築した IDRIS on DIAS を東京大学生産技術研究所と連携して構築し、一般への公開を行う基礎的な検討を行った。
	(i)-(e)-2. 水災害・危機管理意識の向上に資するリスク・コミュニケーションシステムの開発	DIAS を活用した、気象・水文・被害状況それぞれをシームレスに再現・予測・可視化できるシミュレーションシステムの開発	DIAS を活用した、気象・水文・被害状況それぞれをシームレスに再現・予測・可視化できるシミュレーションシステムの実運用に向けた改良を行う。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ B ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ S ］ ⑤ 成果の普及… ［ A ］	特定区域の詳細な水災害情報を再現・予測・可視化する IDRIS ベースシステム、広域かつリアルタイム情報を再現・予測・可視化する IDRIS on DIAS を組み合わせ、広域スケールから地先スケールまで、広域から地先レベルまでの水災害情報の提供システムの構築に着手した。 さらに、東京大学生産技術研究所と連携し、IDRIS に SHIFT（System for Human‐resource Input and Functional Team）、BOSS（Business Operation Support System）を連携させる基礎検討として、ヒヤリ・ハット事例集（新型コロナウィルス感染症への対応編）との災害対応標準化手法の組み合わせによるプロトタイプシステムを開発し、試行実験として、日本の 7 市町村の防災担当セクションに利用してもらった。
		心理プロセスを踏まえた効果的なリスク・コミュニケーションシステムの開発	疑似的な洪水体験が洪水に対する避難意識の向上に資するシステムの開発を行うため、大分県日田市、新潟県阿賀町において避難行動用の洪水体験 VR を開発する。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ B ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ S ］ ⑤ 成果の普及… ［ A ］	大分県日田市において、詳細な水災害状況の数値シミュレーション、VR の視覚・音響効果を駆使したハイエンドな VR を開発した。避難行動の開始時間の差で、浸水状況の違い等が体験できる映像コンテンツ・仮想避難訓練ツールを作成した。 新潟県阿賀町において、ドローン・地上レーザ測量を用いた詳細な空間情報の取得、RRI モデル・iRIC モデルによる浸水状況の再現を行うとともに、それらの情報については CIM（Construction Information Modeling）を用いて統合化した。これらの情報に基づき、洪水体験 VR コンテンツの作成と、クラウドサービスを利用した複数人の仮想避難訓練ツールの試作を行った。
		水害対応において重要な知見の集積・共有	水害発生時に、住民の命や資産を守るコミュニティが避難誘導等適切な対応を可能とするため、水害対応における重要な知見の収集・	① 全体の達成度… ［ A ］ ② 成果の発表…	過去 20 年間において自治体が公表してきた水災害対応検証資料を基に、「水害対応ヒヤリ・ハット事例集（地方自治体編）」をとりまとめ公表した。また、コロナ禍に鑑み、上記事例集の

			整理を行う。また、水害対応に当たっての新型コロナウイルス感染症に対する留意事項を速やかにまとめる。	［　A　］ ③ 科学的見地での成果… ［　S　］ ④ 社会的見地での成果… ［　S　］ ⑤ 成果の普及… ［　S　］	「新型コロナウイルス感染症への対応編」を緊急に作成、公表した。 本事例集を 2020 年 6 月 25 日に公開してから、12 月末までに、日本語版冊子のページには 4940 件、英語版冊子のページには 632 件のアクセスがあり、多くの方々活用いただいている。本事例集は土木研究所の令和 2 年度の重点普及技術に選定され、技術展等でも配布・周知を行っている。また、全 47 都道府県にも配布し、県下の全市町村に配布している地域もある。神奈川県川崎市では 2020 年 8 月 7 日に市の危機管理部局の職員向けの研修に提供された。 海外に対しても、水と災害に関するハイレベルパネル（HELP）やアジア土木学協会連合協議会のウェビナーで発表を行った。
	(i)-(e)-3.　研究成果を活かした現地実践	JST-JICA SATREPS タイ王国産業集積地のレジリエンス強化を目指した Area-BCM 体制の構築	チャオプラヤ川流域全体の洪水氾濫解析モデルの開発を完了させ、その結果を境界条件として詳細な災害リスクの時空間情報を創出する工業団地スケールの洪水氾濫解析モデルの開発を進める。また 2011 年洪水時の浸水深の時系列データを入手し、モデル解析結果と比較することで、キャリブレーションと再現性検証を行う。	① 全体の達成度… ［　A　］ ② 成果の発表… ［　A　］ ③ 科学的見地での成果… ［　A　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　A　］	チャオプラヤ川流域全体を対象とした洪水氾濫解析モデルの開発、キャリブレーション、検証を完了した。ロジャナ工業団地を対象とした工業団地スケールのモデル開発については、コロナ禍での現地調査が困難なため、タイ側研究者であるチュラロンコン大学工学部等と協力し高信頼度地形データを取得することができた。引き続き工業団地スケールの高解像度洪水氾濫解析モデルの開発を続けている。さらに、チャオプラヤ川流域の長期降雨特性について、防災科学技術研究所と共同で水文統計頻度解析を実施し、その成果が Journal of Disaster Research に掲載された。
		JICA-JST SATREPS 防災部門研究課題「気候変動下での持続的な地域経済発展への政策立案のためのハイブリッド型水災害リスク評価の活用」（新規）	フィリピン共和国ルソン島のパンパンガ川流域及びパッシグ川・マリキナ川・ラグナ湖流域を対象として、自然・社会環境データ等の収集、洪水・渇水リスク評価のための水理水文・農業モデルの統合化の検討、現地での水災害レジリエンス評価に向けた課題抽出等を行う。	① 全体の達成度… ［　A　］ ② 成果の発表… ［　B　］ ③ 科学的見地での成果… ［　A　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　A　］	COVID-19 禍により現地渡航が困難な状況下においても、日本国内やフィリピンの関係機関との間でプロジェクトの準備を進め、2021 年 6 月に JICA の ODA 事業として開始する予定である。このための準備対応として、フィリピン側メンバーとの全体会合を 1 回、グループ別を 7 回実施し、関係者間の共通認識を醸成した。 具体的な活動としては、フィリピン共和国ルソン島のパンパンガ川流域及びパッシグ川・マリキナ川・ラグナ湖流域を対象として、自然・社会環境データ等の収集システムを構築するとともに、現地での水災害レジリエンス評価に向けた課題抽出等を行った。また、洪水・渇水リスク評価のための水理水文・農業モデルのソースコードの結合を進めている。さらにルソン島に 2020 年 11 月 12 日に上陸した台風 22 号（Ulysses）について衛星データ等による被害状況の分析も進めている。
(ii)　効果的な能力育成					
(1)　国家から地域に至るあらゆるレベルで災害リスクマネジメントの計画・実践に従事し、確固たる理論的・工学的基盤を有して課題解決を行うことができる実務者育成を行うとともに、指導者の能力育成を行う。					
	(ii)-(1)-1.　研究者を育成、指導できる専門家の育成	博士課程 「防災学プログラム」	2〜3 名（2020〜2021 年）	① 全体の達成度… ［　A　］ ② 成果の発表… ［　A　］ ③ 科学的見地での成果… ［　A　］	2020 年 4〜5 月は、学生が ICHARM のコンピュータにリモートでアクセスできるようにしたほか、リモートで論文作成を指導した。 研修員が帰国できなかった場合に残留受入を行う枠組みを整備した。 2020 年 9 月に 1 カ国 1 名（バングラデシュ 1 名）が修了した。

				④ 社会的見地での成果… ［　　S　　］ ⑤ 成果の普及… ［　　A　　］	来日できない場合や、来日後待機期間中のリサーチアシスタントの雇用について調整した。来日後待機期間中の移動方法や待機場所の確保などについて調整した。 2020 年 10 月に 2 カ国 2 名（エチオピア 1 名、バングラデシュ 1 名）が入学した。 現在 5 カ国 5 名（スリランカ 1 名、ベトナム 1 名、日本 1 名、エチオピア 1 名、バングラデシュ 1 名）が在籍している。 COVID-19 感染拡大による来日遅れのため、10〜11 月の講義はオンラインで出身国滞在中から実施した。また、電子黒板の導入により、オンライン講義でも黒板が目前にあるかのように受講できるようになった。 12 月以降の対面講義においても、COVID-19 感染予防のため、講師交代時に演台の消毒を行っているほか、講義室と ICHARM 講堂にパーティションを設置した。
	(ii)-(1)-2.　地域レベルの水関連災害に係る問題に現実的に対処できる能力を備えた人材の育成	修士課程 「防災政策プログラム 水災害リスクマネジメントコース」	● 2020〜21 年について、対象国から約 14 名 ● 対象国は各国要望調査の結果を踏まえて決定する。 ● 関係国へ採用時の英語能力資格提出の徹底などを周知する。	① 全体の達成度… ［　　A　　］ ② 成果の発表… ［　　A　　］ ③ 科学的見地での成果… ［　　S　　］ ④ 社会的見地での成果… ［　　S　　］ ⑤ 成果の普及… ［　　A　　］	2020 年 4〜5 月は、指導教員別の分散登校を実施した。また、学生が ICHARM の計算機にリモートでアクセスできるようにしたほか、リモートで論文作成を指導した。 研修員が帰国できなかった場合に残留受入を行う枠組みを整備した。 2020 年 9 月に 6 カ国 11 名（バングラデシュ 2 名、ブータン 2 名、ブラジル 2 名、ミャンマー2 名、ネパール 2 名、パキスタン 1 名）が修了した。 2018 年 9 月に修了したパキスタンからの修士課程研修員著作の論文「Flood and Inundation Forecasting in the Sparsely Gauged Transboundary Chenab River Basin Using Satellite Rain and Coupling Meteorological and Hydrological Models」が SCI Journal に掲載された。 2020 年 10 月に 6 カ国 7 名（バングラデシュ 1 名、ブータン 2 名、マレーシア 1 名、モーリシャス 1 名、ミャンマー1 名、トンガ 1 名）が入学した。 COVID-19 感染拡大による来日遅れのため、10〜11 月の開講式、インセプションレポート発表会、講義はオンラインで出身国滞在中から実施した。また、e-learning 教材を活用した自主学習も実施した。 現在も、未来日の 2 名には、オンラインで講義を実施中。電子黒板の導入により、オンライン講義でも黒板が目前にあるかのように受講できるようになった。 12 月以降の対面講義においても、COVID-19 感染予防のため、講師交代時に演台の消毒を行っているほか、講義室と ICHARM 講堂にパーティションを設置した。 COVID-19 感染の再拡大を受け、1〜3 月は外部講師の講義を在宅リモートで実施した。 COVID-19 感染拡大への対応のため、Field Trip の場所およびスケジュール、講義のスケジュールは変更させている。
	(ii)-(1)-3.　水関連災害リスク管理に関する知	短期研修	JICA 主催の課題別研修「水災害被害の軽減に向けた対策」に協力し、講義並びに演習を実施する。	① 全体の達成度… ［　　－　　］	COVID-19 感染拡大を受け、2021 年 5 月にオンラインでの実施となった。

識と技術の習得を目的とした、数日から数週間の研修			② 成果の発表… ［ － ］ ③ 科学的見地での成果… ［ － ］ ④ 社会的見地での成果… ［ － ］ ⑤ 成果の普及… ［ － ］	
	ICHARM での修士課程修了生等へのフォローアップ研修	1 ヶ国を訪問	① 全体の達成度… ［ － ］ ② 成果の発表… ［ － ］ ③ 科学的見地での成果… ［ － ］ ④ 社会的見地での成果… ［ － ］ ⑤ 成果の普及… ［ － ］	COVID-19 感染拡大を受け、現修士課程の講義実施を優先させたため、開催しなかった。
(2) 研究活動及び現地実践を通じて蓄積したノウハウを国際プロジェクトにおける研修や ICHARM での教育研修活動に提供することにより、水関連災害に対応し、問題解決に取り組む現地専門家・機関のネットワークを構築し強化を図る。				
(ii)-(2)-1. 研修員に対する支援	研修員出身国でのセミナー開催	● 研修員名簿の作成・維持 ● インターネットを利用した研修員のネットワーク構築とトレーニングの情報提供 ● フォローアップ研修の開催	① 全体の達成度… ［ A ］ ② 成果の発表… ［ A ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ A ］	継続的に研修員名簿を作成・更新し、ネットワーク構築を行った。 Facebook ページも 10 回更新するなど、継続し運用を行った。
(iii) 効率的な情報ネットワーク				
(1) 実務者のための「災害情報の総合ナレッジセンター」として、世界の大規模水災害に関する情報・経験を収集・解析・提供する。				
(iii)-(1)-1. 災害関連資料の収集	災害情報の活用を通じた収集の促進	東京大学（DIAS）等と連携して、ビッグデータを用いた洪水等の水災害による社会経済影響を推計・評価するなど、水災害に関する情報収集を促進する枠組みを構築し、収集した情報を共有及び有効活用する。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ A ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ A ］	DIAS を用いて、水災害に関するデータの統合・アーカイブの推進に取り組んだ。また、フィリピンやスリランカ等の IFI 実施国を始めとして、引き続き、降水等のデータをリアルタイムで収集し、各国での洪水管理への更なる活用について検討を行った。

	(iii)-(1)-2. 各機関との連携	関連機関との連携による水災害情報の収集	豊富かつ精度の高い災害情報の入手を目的として、WMO、UNDDR などの国際機関、東京大学（DIAS）、他の UNESCO センター・UNESCO チェア等との連携を図る。 また、IFI 水のレジリエンスと災害に関するプラットフォームを通じて、各国の水災害に関係する機関との連携を推進する。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ A ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ A ］	主にウェブ会議等を通じて世界各国の UNESCO センター・チェアや国際機関などから水災害に関する国際的な動向や情報の収集に努めるとともに、それら参加機関との連携構築に取り組んだ。 また WMO に対しては、洪水管理連携プログラム（APFM）やアジア地区水文アドバイザリーフォーラムに ICHARM の研究者が参加し連携を図った。 更に 2020 年 7 月 3 日には「COVID-19 の感染防止を考慮した洪水災害に向けた ICHARM の取り組み」についてのウェビナーを開催し、IFI 実施国から幹部職員を始めとして 60 名以上が参加した。
(2) 水関連災害リスクマネジメントに関する技術の発信、影響力を有する IFI などの国際的ネットワークを構築、維持を通じて防災主流化に取り組む。					
	(iii)-(2)-1. 関係諸機関との連携	IFI 事務局	● IFI 参加機関との調整を図りつつ、2020 年 8 月に開催する Advisory Committee 会合で Concept 等の見直しを行うとともに、Management Committee 会合として定期的にウェブ会議を主催するなど、事務局としての機能を果たす。 ● ICFM8 や AOGEO などの主要な国際会議等において、また ADBI 等の関係機関と連携することによって、IFI の活動を積極的に情報発信するとともに、IFI 実施国及び関係機関との連携促進に取り組む。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ A ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ A ］	COVID-19 禍により、ほとんどの国際会議が中止・延期となったが、UNESCO や IFI 参加機関等とウェブ会議を継続的に実施することで情報の共有を図った。このうち、2021 年 8 月へと延期された ICFM8 について、ICHARM が主導する科学技術セッションの延期調整を行うとともに、ICFM 事務局が主催するウェビナーに参加し、ICHARM の取り組みについて積極的に情報発信を行った。 また、2020 年 1 月に開催した ADBI-ICHARM Policy Dialogue を踏まえて、8 月には政策提言集を ADBI と共同出版した。 更に 2021 年 2 月には IFI 実施国の各機関からの代表者とアジア水循環イニシアティブ（AWCI）セッションをオンラインで開催し、それぞれの活動について情報共有や意見交換を行い、その成果は AOGEO 本会議で発表した。 なお、GEO の設立や拡張への貢献に対して、2020 年 11 月、ICHARM センター長に GEO Individual Excellence Award 2020 が授与された。
		IFI に基づく地域での取り組み	フィリピン、ミャンマー、スリランカやインドネシアにおいて、水のレジリエンスと災害に関するプラットフォームの構築及びその活動推進を支援するとともに、他のアジア各国、アフリカや南米などで IFI 活動の展開が図られるよう取り組む。	① 全体の達成度… ［ A ］ ② 成果の発表… ［ A ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果… ［ A ］ ⑤ 成果の普及… ［ A ］	IFI 実施国の関係機関と連携しつつ、これまでのプラットフォームの活動成果を取りまとめるとともに、今後の活動計画について検討し、その策定に取り組んだ。また、オンラインでの e-learning 研修の実施に向けて関係機関と検討を進めている。
		台風委員会	● 台風委員会水文部会で議長としての職責を果たすとともに、メンバーとの連携を図りつつ、AOP 7「Platform on Water Resilience and Disasters under International Flood Initiative」を推進する。 ● AOP 7 の推進に当たり、気象部会のメンバーである気象庁やフィリピンの IFI 関係機関と連携し、協働的な活動を推進する。 ● 2020 年 10 月の第 4 回アジア・太平洋水サミットの開催と合わせ、第 9 回水文部会会合を九州で主催する。また、水文部会議	① 全体の達成度… ［ S ］ ② 成果の発表… ［ A ］ ③ 科学的見地での成果… ［ A ］ ④ 社会的見地での成果…	第 4 回アジア・太平洋サミットは 2022 年 4 月へと延期開催とされたが、2020 年 10 月には第 9 回水文部会会合をオンラインで開催し、ICHARM 研究者が水文部会議長として会議の進行及び取りまとめを行うとともに、AOP「IFI 水のレジリエンスと災害に関するプラットフォーム」の活動報告を行った。 また、いずれもオンラインでの開催であったが、第 15 回統合部会会合や第 52～53 回総会に主体的に参加し、会議の進行及

			長として第 15 回統合部会会合、第 52～53 回総会に参加し、メンバーと協働して、地域の台風関連災害に関する議論を取りまとめるとともに、対策の促進に貢献する。	［　S　］ ⑤ 成果の普及… ［　A　］	び発表を行った。 なお、台風委員会活動に対する ICHARM の長年にわたる貢献が評され、第 53 回台風委員会総会において、JAXA、国際建設技術協会（IDI）と共同で 2020 年の Kintanar 賞が授与された。
		外務省と国際原子力機関との地域協力協定 RAS/7/035：同位体技術の利用による地下水資源の効果的管理に関する地域的能力の向上	外務省からの要請に基づき、IAEA の以下の活動に参画する。 1) 日本代表として、2020 年夏に中国で開催される RAS/7/035 プロジェクトの第 1 回調整会合に参加し、日本での同位体技術の適用を推進する。 2) 2020 年秋にタイで開催される RAS/7/035 プロジェクトの第 1 回地域研修に参加し、IAEA の講師・専門家として、RCA メンバー国からの参加者に対する講義を行うとともに、同国での特定の研究分野に関する専門的アドバイスを行う。	① 全体の達成度… ［　B　］ ② 成果の発表… ［　B　］ ③ 科学的見地での成果… ［　A　］ ④ 社会的見地での成果… ［　B　］ ⑤ 成果の普及… ［　A　］	1) 2020 年 9 月 10-11 日に開催された IAEA/RCA プロジェクト RAS/7/035 の第 1 回調整会議に日本を代表して辻村真紀筑波大学教授が参加し、日本を含め 15 か国の代表者が参加し、ICHARM が作成に参画した首都圏における同位体水文研究の計画案を共有した。 2) COVID-19 禍により、IAEA/RCA の地域・国内トレーニングコースはすべて中止されたが、来年度の実施の向け調整を行った。
	(iii)-(2)-2.　研修員ネットワークによる相乗効果	研修員ネットワーク作り	● ICHARM で作成する研修員名簿を更新する。 ● SNS で研修員ネットワークを確立し、ICHARM と研修員間だけでなく研修員同士の交流にも活用する。 ● ICHARM Newsletter の送付など研修員との積極的な関わりを継続する。	① 全体の達成度… ［　A　］ ② 成果の発表… ［　A　］ ③ 科学的見地での成果… ［　A　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　A　］	研修員名簿を更新し、研修員とのネットワーク維持に活用した。 Facebook で研修員ネットワークを確立し、ICHARM と研修員間だけでなく研修員同士の交流にも活用した。 また、ICHARM ニュースレターについて、継続的に研修員からの投稿を掲載することによりネットワークの維持に取り組んでいる。
	(iii)-(2)-3.　広報活動	ICHARM ウェブサイト	● 研究や研修、国際ネットワークに関する最新の活動や各種の情報・案内について、迅速にウェブサイトへ掲載することにより積極的な情報発信を行う。 ● 閲覧者からのフィードバック等を通じて、その改善が図られるよう取り組む。 ● ウェブサイトを通じて寄せられた意見や問い合わせ等に対しては、迅速かつ丁寧に対応する。	① 全体の達成度… ［　A　］ ② 成果の発表… ［　A　］ ③ 科学的見地での成果… ［　A　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　A　］	ホームページに最新情報のアップデートを行うとともに、ニュースレターの掲載、研究活動の紹介等を行った。 また、閲覧者からの意見をうかがうサイトを継続的に運用し、問合せに対しては、迅速かつ適切に回答した。
		ICHARM ニュースレター	● 年 4 回（4 月、7 月、10 月、1 月）の発行を行うとともに、ICHARM の活動が的確に盛り込まれるよう取り組む。 ● 研究や研修、国際ネットワーク活動を促進させることにより、またパートナー機関、研修修了生等からの投稿や読者からのフィードバック等を通じて、内容の充実・多様化に取り組む。 ● 国内外における各種ネットワーク活動を促進させ、読者の多様化、読者数の増大を図る。	① 全体の達成度… ［　A　］ ② 成果の発表… ［　A　］ ③ 科学的見地での成果… ［　A　］ ④ 社会的見地での成果… ［　A　］ ⑤ 成果の普及… ［　A　］	ICHARM ニュースレターについては、年 4 回の発行を行い、ICHARM の活動内容を網羅的に盛り込むことにより、国内外で 5,000 名を超える読者に対して、継続的かつ積極的な情報発信を行った。 また、COVID-19 禍により対外的な活動が限られる中で、ICHARM のパートナーや研修員からの投稿を取り入れ、内容の充実、話題の多様化に取り組んだ。

ICHARM 事業計画

2021 年度（2021.4-2022.3）

日本語版27

業務区分	内容	2021 年度 活動と想定される成果
(i)革新的な研究		
(a)　災害情報を継続的にモニタリングして蓄積し活用する技術		
災害データの収集方法及び基本的なデータベースの構築手法について、それらの活用方法を踏まえて提案し、具体的に DIAS を使った解析につなげる。また同時にグローバルデータや衛星情報による準リアルタイムデータを活用したデータベース構築途上における補完手法についても提案する。これらにより、国内外のモデル地域において災害データベース及びその活用による減災効果の定量的評価を行う。		
(i)-(a)-1.　洪水災害による社会経済影響の簡易推計手法に関する研究	洪水被害による社会経済活動への影響について簡易推計手法を構築。	GRIPS と共同し、2015 年の鬼怒川決壊で大きな被害を受けた常総市と被害を受けなかった近隣の同規模の市町村を抽出し、マクロな経済指標をもとに簡易的推計手法を用いて、間接被害等の影響評価を行う。
	簡易推計手法のうち、国外でも適用可能な洪水被害による社会影響の簡易推計手法による国別及びグローバル推計を検証。	COVID-19 禍により対象国としていたフィリピンでの各種データ入手が困難となった。引き続き上記手法等をフィリピン・インドネシアへ適用するとともに、e-learning を中心とした OSS（Online Synthesis System）を用いることにより、フィリピン・ダバオにおける気候変動適応策の現地実装を行う。
(b)　より早く、正確な情報を提供する早期警報支援技術		
WRF の応用と IFAS、RRI の機能強化により、広域避難やダムの事前放流を可能にする十数時間先までリードタイムを確保したリアルタイム降雨流出氾濫予測の精度向上技術を開発する。また、国外及び国内中小河川等のデータの不十分な地域、気候・地勢条件の異なる地域での適用性を検証し、早期洪水警報システムの手法を確立する。更に、人工衛星や土砂水理学モデルを活用し、水災害ハザードの推定技術を開発する。		
(i)-(b)-1.　データ不足の補完等を考慮したリアルタイム流出氾濫予測の精度向上技術に関する研究	洪水追跡手法の精緻化及びパラメータ自動最適化手法の導入による洪水氾濫予測モデルの精度向上	河道情報が不十分など水位と流量の関係が不明な河川や、洪水イベントがない、あるいは洪水の観測データが不足している河川における RRI モデル構築手法を開発する。また、これまでの検証結果を活用し、河川の特徴からパラメータを推定する手法の開発を行う。
	人工衛星観測降雨データの適用性の明確化および流域に適した補正手法の開発	降水現象は地域特性が大きいため本手法の検証を各地で引き続き進める。それとともに、RRI モデル等への適用を前提としたコンポーネントの開発に向けて検討を行う。

		X/C バンド MP レーダの活用やアンサンブルカルマンフィルタの応用による WRF モデルの豪雨予測の精度向上	前線や局地的豪雨などの予測困難な現象を対象に、アンサンブルメンバー数の増加や気象モデルの領域拡大、高解像度化等の効果を評価し、予測精度の向上を図る。
		多様な降雨予測手法に基づく予測不確実性を反映したリアルタイム洪水氾濫予測手法の開発	国内外の河川流域を対象に、アンサンブル降雨予測をリアルタイムに洪水氾濫モデルに入力し、不確定性を考慮したリアルタイム洪水氾濫予測を行う。
	(i)-(b)-2.　人工衛星及び土砂水理学モデルを活用した水災害ハザード推定技術の開発に関する研究	流砂量の評価と河道地形変化の推定手法の開発	昨年度開発した、微細土砂の挙動を解析するための密度流における連行理論を用いた新しい流砂量の評価手法について、これを実河川の平面二次元洪水流及び河床変動解析に適用し、その有用性について検証する。
		土砂水理現象を考慮した洪水被害想定区域図の作成手法の開発	2020 年の球磨川洪水等の災害について、昨年度までに開発した手法を用いて詳細な平面二次元洪水流及び河床変動解析を実施する。特に、河道内の河床変動について詳細に解析し、河床上昇による氾濫リスクについて定量的な評価手法を提案する。
		山地河川における洪水氾濫想定区域図の作成手法の開発	昨年度開発した、豪雨時の流域全体の土砂流出量について推定を行うモデルのプロトタイプについて、これを大井川や黒部川といった実際の流域に適用し、ダムの堆砂データを用いて検証しつつ、これらの河川流域で洪水氾濫想定区域図を作成する。
(c)	限られた情報下で水資源管理を適切に実施するための評価・計画技術		
	国内外での適切な水資源管理計画検討に資するため、高度なダム運用（治水、利水の統合運用）、水需要の設定、衛星観測技術等による土壌水分量の設定、様々な気候区分への適用、高精度な地形・地質等のデータ入力などを可能にする機能の追加等、長期水収支シミュレーション技術を開発する。		
	(i)-(c)-1.　様々な自然・地勢条件下での長期の統合的水資源管理を支援するシミュレーションシステムの開発に関する研究	統合的水資源管理のための機能強化	短期降雨予測（39 時間）や季節降雨予測（1 ヶ月・3 ヶ月）を組込んだ、水収支シミュレーションを実施し、事前放流や融雪出水を考慮した高度なダム運用（治水、利水の統合運用）を検討する。
		衛星観測データによる土壌水分量の検討	水資源管理の解析のための適用性を向上させるために、衛星リモートセンシング・データ同化手法により求められた土壌水分量等を、水文流出モデルに反映させる手法を検討する。

		様々な気候区分を有する国内外の河川を対象とした適用性向上	様々な気候区分、土地条件の流域への適用性を広げるために、より高度な蒸発散、融雪モデルと流出解析モデルとの結合を検討する。
	(i)-(c)-2.　統合的気候モデル高度化研究プログラム（文科省プログラム）	アジアにおける水災害リスク評価と適応策情報の創生	インドネシア、フィリピンの対象流域において、力学的ダウンスケーリング手法による将来の降水情報の作成を継続し、現地研究者や政府関係者と連携しつつ、地形、過去の洪水浸水範囲、土地利用、用水量等の水利用状況のデータ収集を行い、WEB-RRI 等を活用した洪水・渇水被害リスクの推定を行う。 また、気候変動適応の現地実装を支援する OSS の構築と導入を図る。
(d)	洪水氾濫原での水災害による地域社会への影響評価及び防災投資効果算定技術		
	「致命的な被害を負わない強さ」と「速やかに回復するしなやかさ」を評価できる災害リスク評価手法の開発を行う。また政策決定者が適切な防災投資を選択できるよう、国内外の地域の災害リスクをわかりやすく表現し、投資による減災効果を総合的に評価できる指標を提案するとともに、リスク指標を活用した国内外における強靭な地域社会の構築手法を提案する。		
	(i)-(d)-1.　グローバルに通用する多面的な水災害リスクの評価及び評価に基づく強靭な社会構築手法に関する研究	多面的な災害リスクの高精度・高度な推計手法の提案	2015 年 9 月関東・東北豪雨災害後の常総市内での調査結果と 2018 年 7 月豪雨災害後の岡山県・広島県内での調査結果に基づき、事業所の業態や浸水深さ及びライフライン被害等の程度に応じた、被害と回復力との関係を考慮した高度なリスク推計手法を取りまとめる。 また、2015 年 9 月関東・東北豪雨災害後の常総市内での調査結果と 2016 年台風 10 号での岩手県岩泉町での調査結果とに基づき、住家の被害部位と浸水深さ等に応じたリスク推計手法の高度化を図る。
		各種の防災施策・投資による減災効果を総合的に評価するリスク指標の提案	岩手県岩泉町での被災者の継続居住・住宅再建意向に基づく被災後の人口流出率の推計結果に基づき、コミュニティが被災後も維持できるかどうかに着目した総合的な水災害の評価指標の提案を行う。 また、地域総生産に関しても過去の水災害後の市町村の地域総生産の変動データに基づき、地域総生産が維持できる被災レベルに着目した指標の提案を行う。
		リスク指標を活用した国内外における強靭な地域社会の構築手法の提案	上記で提案した評価指標に基づいて、想定される外力に対して地域の強靭性（レジリエンス）を確保するための対策について検討を行う。
(e)	災害被害軽減のための水災害リスク情報の利活用技術		
	洪水や土砂災害等に対する防災担当者や住民による防災・減災活動を支援する情報システムや災害対応タイムラインなどのコミュニケーションツールを開発し、それらの利活用手法について提案する。		

	(i)-(e)-1.　水災害情報が乏しい地域での防災・減災活動を支援する水災害リスク情報提供システムに関する研究	事前に災害に対して脆弱な地区（災害ホットスポット）を特定する手法の提案	洪水リスク評価ツールの適用を他の地方自治体で行う（つくば市等を予定）。
		発災前にリアルタイムで水災害発生可能性を地区単位で予測する手法の提案	過年度において、「Web-GIS 型情報提供システム」として構築した IDRIS（ICHARM Disaster Risk Information System）を用いて、実証実験を行う。また、DIAS 上で中小河川の短時間洪水予測との連携を図る。
		様々な災害リスク情報を「蓄積」「共有」し、避難情報を「発信」できる「Web-GIS 型水災害リスク情報提供システム」の提案	IDRIS の保守等のルーチン化を行い、安定稼働率を向上させるとともに、近年の WEB 技術への対応とスマートフォンへの対応を行う。 また、IDRIS on DIAS に BOSS・SHIFT の機能を加えることにより、With コロナ/After コロナにおける水災害対応の経験知を共有し、水災害対応資源の最適化を支援する新たなシステムを開発する。
		国内外における現地自治体関係者を交えた「Web-GIS 情報提供システム」の利活用手法の提案	国内の市町村防災担当者、IFI 参加国の防災機関担当者との連携を進め、連携する自治体における防災・減災に資する情報を共有するシステムへと改良する。
	(i)-(e)-2.　水災害・危機管理意識の向上に資するリスク・コミュニケーションシステムの開発	DIAS を活用した、気象・水文・被害状況それぞれをシームレスに再現・予測・可視化できるシミュレーションシステムの開発	大分県日田市において開発したハイエンド VR について、現地での実施及び他地域への適用を行う。また、新潟県阿賀町において、ドローン・地上レーザ測量を用いた詳細な空間情報の取得、RRI モデル・土砂・流木・洪水氾濫モデルによる浸水状況の再現を行うとともに、それらの情報については CIM（Construction Information Modeling）を用いた統合化を更に進める。同時に、これらの情報に基づき、水災害体験の共有を目的とした、過去の水災害を記録・伝承する洪水 VR コンテンツを試作する。
		心理プロセスを踏まえた効果的なリスク・コミュニケーションシステムの開発	過年度開発したクラウドサービスを利用した複数人の仮想避難訓練ツールを用いて、仮想洪水下の避難行動実験を行い、避難行動時の心理変化・避難行動選択の決定要因等を特定する。仮想避難訓練ツールを IDRIS アプリに連携させ、IDRIS アプリを総合的な水災害リスクコミュニケーション・ツールとする。
	(i)-(e)-3.　研究成果を活かした現地実践	JST-JICA SATREPS タイ王国産業集積地のレジリ	タイのアユタヤ県に位置するロジャナ工業団地を対象に高解像度洪水氾濫解析モデルを開発し複数の洪水シナリオに基づく洪水氾濫解析を実施する。洪水氾濫解析

		エンス強化を目指したArea-BCM 体制の構築	の結果は工業団地のビジネスインパクト分析（BIA）や地域事業継続性マネジメント（Area-BCM）の策定に活用する。さらに新たな工業団地（Bang Pa-in, High Tech）の高解像度洪水氾濫解析モデルの開発に着手する。
		JICA-JST SATREPS 防災部門研究課題「気候変動下での持続的な地域経済発展への政策立案のためのハイブリッド型水災害リスク評価の活用」（新規）	フィリピン共和国ルソン島のパンパンガ川流域及びパッシグ川・マリキナ川・ラグナ湖流域を対象として、WEB-RRI モデルと農作物成長予測モデル SIMRIW を連結させたモデルを用いた洪水・渇水リスク評価を試行する。コロナ禍により現地の観測データを用いたモデルのキャリブレーションができないため、衛星画像等を用いた簡易なキャリブレーション等の試行を行う。2020 年 11 月 12 日に上陸した台風 22 号（Ulysses）の被災地において、公表されている統計データやコロナ禍でも取得可能なデータを用いて、水災害後のレジリエンスの評価を行うとともに、過去の 2009 年台風 Ondoy や 2011 年台風 Pedring とのレジリエンスの比較を行う。
(ii)　効果的な能力育成			
(1)　国家から地域に至るあらゆるレベルで災害リスクマネジメントの計画・実践に従事し、確固たる理論的・工学的基盤を有して課題解決を行うことができる実務者育成を行うとともに、指導者の能力育成を行う。			
	(ii)-(1)-1.　研究者を育成、指導できる専門家の育成	博士課程「防災学プログラム」	2～3 名（2021～2022 年）を受け入れる。
	(ii)-(1)-2.　地域レベルの水関連災害に係る問題に現実的に対処できる能力を備えた人材の育成	修士課程「防災政策プログラム 水災害リスクマネジメントコース」	2021～22 年について、各国要望調査の結果を踏まえて決定した対象国から約 14 名を受け入れる。 関係国へ応募時の英語能力資格提出の徹底などを周知する。
	(ii)-(1)-3.　水関連災害リスク管理に関する知識と技術の習得を目的とした、数日から数週間の研修	短期研修	JICA 主催の課題別研修「水災害被害の軽減に向けた対策」に協力し、講義並びに演習を実施する。2020 年度分の研修を 2021 年 5 月 26～28 日にオンラインで実施する。
		ICHARM での修士課程修了生等へのフォローアップ研修	1 ヶ国を訪問して、フォローアップ研修を開催する。（4 年に 1 回程度の Web 会議による多数国対象の開催も検討する。）
(2)　研究活動及び現地実践を通じて蓄積したノウハウを国際プロジェクトにおける研修や ICHARM での教育研修活動に提供することにより、水関連災害に対応し、問題解決に取り組む現地専門家・機関のネットワークを構築し強化を図る。			
	(ii)-(2)-1.　研修員に対する支援	研修員出身国でのセミナー開催	研修員名簿を作成・維持する。 Facebook を利用した研修員のネットワーク構築と研修活動についての情報提供を行う。

			フォローアップ研修を開催する。
(iii)　効率的な情報ネットワーク			
(1)　実務者のための「災害情報の総合ナレッジセンター」として、世界の大規模水災害に関する情報・経験を収集・解析・提供する。			
	(iii)-(1)-1.　災害関連資料の収集	災害情報の活用を通じた収集の促進	DIAS を用いて、ビッグデータから洪水等の水災害による社会経済影響を推計・評価するなど、水災害に関する情報収集を促進する枠組みを構築し、収集した情報を共有及び有効活用する。
	(iii)-(1)-2.　各機関との連携	関連機関との連携による水災害情報の収集	豊富かつ精度の高い災害情報の入手を目的として、WMO、UNDDR などの国際機関、東京大学（DIAS）、他の UNESCO センター・チェア等との連携を図る。 また、IFI 水のレジリエンスと災害に関するプラットフォームを通じて、各国の水災害に関係する機関との連携・協働を推進する。
(2)　水関連災害リスクマネジメントに関する技術の発信、影響力を有する IFI などの国際的ネットワークを構築、維持を通じて防災主流化に取り組む。			
	(iii)-(2)-1.　関係諸機関との連携	IFI 事務局	IFI 参加機関との調整を図りつつ、2021 年 8 月に開催される第 8 回国際洪水管理会議（ICFM8）の機会に Advisory Committee 会合を主催して Concept 等の見直しを行うとともに、Management Committee 会合としてウェブ会議を継続的に開催するなど、事務局としての機能を果たす。 ICFM8 や AOGEO などの主要な国際会議等において、また ADBI 等の関係機関と連携することによって、IFI の活動を積極的に情報発信するとともに、各国の関係機関との連携促進に取り組む。
		IFI に基づく地域での取り組み	フィリピンやスリランカ、インドネシア、ミャンマーにおいて、水のレジリエンスと災害に関するプラットフォームの構築、実施計画の策定とそれに基づく活動の推進を支援するとともに、他のアジア各国、アフリカや南米などで IFI 活動の展開が図られるよう取り組む。 また、各国の関係機関と連携しつつ、水災害対策に携わる技術者等を対象として e-learning を推進するとともに、知の統合システム（OSS）開発、ファシリテーター育成に向けた検討を推進する。
		台風委員会	台風委員会水文部会で議長としての職責を果たすとともに、メンバーとの連携を図りつつ、AOP 7「Platform on Water Resilience and Disasters under International Flood Initiative」を推進する。 AOP 7 の推進に当たり、気象部会のメンバーである気象庁やフィリピンの IFI 関係機関と連携し、協働的な活動を推進する。

			国土交通省と連携を図りつつ、第 10 回水文部会会合を日本で主催する。また、水文部会議長として第 16 回統合部会会合、第 54 回総会に参加し、メンバーと協働して、地域の台風関連災害に関する議論を取りまとめるとともに、対策の促進に貢献する。
		外務省と国際原子力機関との地域協力協定 RAS/7/035：同位体技術の利用による地下水資源の効果的管理に関する地域的能力の向上	外務省からの IAEA 活動への参加要請に基づき、以下の活動に参画する。 1)2021 年夏に開催される RAS/7/035 プロジェクトの中間レビュー調整会議に日本代表の一員として参加し、日本の国家プロジェクトコーディネータ（NPC）と共同で、日本における同位体技術の研究応用に関する最新情報を提供する。 2)オンラインで開催される IAEA/RCA RAS/7/035 プロジェクトの IAEA ホームベース専門家ミッションに IAEA 講師・専門家として参加し、モンゴル等３カ国の代表者にオンライントレーニング、アドバイス、指導を行う。これらに関連して行った同位体等を使った水循環過程に関する研究成果の普及に努める。
	(iii)-(2)-2.　研修員ネットワークによる相乗効果	研修員ネットワーク作り	ICHARM で作成する研修員名簿を更新する。 Facebook で研修員ネットワークを確立し、ICHARM と研修員間だけでなく研修員同士の交流にも活用する。 ICHARM Newsletter の送付など研修員との積極的な関わりを継続する。
	(iii)-(2)-3.　広報活動	ICHARM ウェブサイト	研究や研修、国際ネットワークに関する最新の活動や各種の情報・案内について、迅速にウェブサイトへ掲載することにより積極的な情報発信を行う。 閲覧者からのフィードバック等を通じて、その改善が図られるよう取り組む。 ウェブサイトを通じて寄せられた意見や問い合わせ等に対しては、迅速かつ丁寧に対応する。
		ICHARM ニュースレター	年 4 回（4 月、7 月、10 月、1 月）の発行を行うとともに、ICHARM の活動が的確に盛り込まれるよう取り組む。 研究や研修、国際ネットワーク活動を促進させることにより、またパートナー機関、研修修了生等からの投稿や読者からのフィードバック等を通じて、内容の充実・多様化に取り組む。

AGREEMENT BETWEEN THE GOVERNMENT OF JAPAN AND THE UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO) REGARDING THE CONTINUATION, IN JAPAN, OF THE INTERNATIONAL CENTRE FOR WATER HAZARD AND RISK MANAGEMENT (ICHARM) (CATEGORY 2) UNDER THE AUSPICES OF UNESCO

国際連合教育科学文化機関の賛助する水災害の危険及び危機管理のための国際センター（第二区分）の日本国における継続に関する日本国政府と国際連合教育科学文化機関との間の協定

The Government of Japan (hereinafter referred to as “the Government”), and the United Nations Educational, Scientific and Cultural Organization (hereinafter referred to as “UNESCO”),
日本国政府（以下「政府」という。）及び国際連合教育科学文化機関（以下「ユネスコ」という。）は、

Recalling that the General Conference at its 33rd Session in 2005 approved the establishment of the International Centre for Water Hazard and Risk Management as a category 2 centre under the auspices of the United Nations Educational, Scientific and Cultural Organization, and that the Agreement between the Government of Japan and the United Nations Educational, Scientific and Cultural Organization (UNESCO) concerning the Establishment of the International Centre for Water Hazard and Risk Management under the Auspices of UNESCO (hereinafter referred to as the “2006 Agreement”) was signed in Paris on 3 March 2006,
二千五年の国際連合教育科学文化機関の総会がその第三十三回会期において、同機関の賛助する第二区分のセンターとしての水災害の危険及び危機管理のための国際センターの設立を承認し、及び二千六年三月三日にパリで、国際連合教育科学文化機関の賛助する水災害の危険及び危機管理のための国際センターの設立に関する日本国政府と国際連合教育科学文化機関との間の協定（以下「二千六年協定」という。）が署名されたことを想起し、

Considering that the 2006 Agreement expired at the end of the fifth year following its signature, and that the Agreement between the Government of Japan and the United Nations Educational, Scientific and Cultural Organization (UNESCO) regarding the International Centre for Water Hazard and Risk Management (ICHARM) (Category 2) under the auspices of UNESCO (hereinafter referred to as the “2013 Agreement”) was signed in Paris on 23 July 2013,

二千六年協定がその署名の時から五年目の年の末日に効力を失い、及び二千十三年七月二十三日にパリで、国際連合教育科学文化機関の賛助する水災害の危険及び危機管理のための国際センター（第二区分）に関する日本国政府と国際連合教育科学文化機関との間の協定（以下「二千十三年協定」という。）が署名されたことを考慮し、

Considering Decision 207EX/16.II of the Executive Board of the United Nations Educational, Scientific and Cultural Organization in 2019 by which the Executive Board decided to renew the status of the International Centre for Water Hazard and Risk Management as a category 2 centre under the auspices of UNESCO and authorized the Director-General of the United Nations Educational, Scientific and Cultural Organization to sign the corresponding agreement with the Government of Japan,
二千十九年の国際連合教育科学文化機関の執行委員会の決定第十六・Ⅱ号（第二百七回会期）によって、同委員会が、水災害の危険及び危機管理のための国際センターについて、同機関の賛助する第二区分のセンターとしての地位を更新することを決定し、及び同機関事務局長に対してその更新に係る日本国政府との協定に署名する権限を与えたことを考慮し、

Desirous of defining the terms and conditions governing the framework for cooperation between the Government of Japan and the United Nations Educational, Scientific and Cultural Organization that shall be granted to the said Centre in this Agreement,
日本国政府と国際連合教育科学文化機関との間の協力のための枠組みを規律する条件であって、この協定が同機関の賛助する水災害の危険及び危機管理のための国際センターに与えるものを定めることを希望して、

HAVE AGREED AS FOLLOWS:
次のとおり協定した。

Article 1
Definitions
定義

In this Agreement:
この協定において、

1.“Government” means the Government of Japan.
「政府」とは、日本国政府をいう。

2. “UNESCO” means the United Nations Educational, Scientific and Cultural Organization.
「ユネスコ」とは、国際連合教育科学文化機関をいう。

3. “Centre” means the International Centre for Water Hazard and Risk Management.

「センター」とは、水災害の危険及び危機管理のための国際センターをいう。

4. “PWRI” means the Public Works Research Institute, Japan.
土木研究所」とは、日本国の国立研究開発法人土木研究所をいう。

5. “Contracting Parties” means Government and UNESCO.
「両締約者」とは、政府及びユネスコをいう。

Article 2
Continuation
継続

The Centre originally established in 2006 in Japan by the 2006 Agreement shall continue under this Agreement. The Government agrees to take, in the course of the year 2020 and within the limits of the laws and regulations of Japan, appropriate measures that may be required for ensuring the continued functioning of the Centre established in 2006 in Japan, as provided for under this Agreement.
二千六年協定によって二千六年に日本国に設立されたセンターは、この協定に基づいて継続する。政府は、二千二十年中にかつ日本国の法令の範囲内で、この協定の定めるところにより、センターが引き続き機能することを確保するために必要とされる適当な措置をとることに同意する。

Article 3
Purpose of the Agreement
協定の目的

The purpose of this Agreement is to define the terms and conditions governing collaboration between the Government and UNESCO and also the rights and obligations stemming therefrom for the Government and UNESCO, within the limits of the laws and regulations of Japan.
この協定は、日本国の法令の範囲内で、政府とユネスコとの間の協力を規律する条件並びに政府及びユネスコについて当該条件から生ずる権利及び義務を定めることを目的とする。

Article 4
Legal Status
法的地位

1. The Centre shall be independent of UNESCO.
センターは、ユネスコから独立したものとする。

2. The Centre shall be an integral part of PWRI, which enjoys, in accordance with the laws and regulations of Japan, the legal personality and capacity necessary for the exercise of its functions, including the capacity to contract, to acquire and dispose of movable and immovable property, and to institute legal proceedings, in relation to the activities of the Centre.
センターは、土木研究所の不可分の一部を成す。土木研究所は、日本国の法令に従い、その任務を遂行するために必要な法人格及び法律上の能力（センターの活動に関連して、契約を締結し、動産及び不動産を取得し、及び処分し、並びに訴えを提起する能力を含む。）を有する。

Article 5
Objectives and Functions
目的及び任務

1. The objectives of the Centre shall be to conduct research, capacity building, and information networking activities in the field of water-related hazards and their risk management at the local, national, regional, and global levels in order to prevent and mitigate their impacts and thereby contribute to achieving sustainable development in the framework of the 2030 Agenda for Sustainable Development, promote integrated river basin management, and strengthen resilience to societal and climate changes.
センターは、水に関連する災害の危険の影響を防止し、又は緩和するために、また、これによって、持続可能な開発のための二千三十アジェンダの枠組みにおける持続可能な開発の達成に貢献し、統合的な河川の流域管理を促進し、並びに社会の変化及び気候変動に対する強靱(じん)性を強化するために、地方、国、地域及び地球規模の段階において、水に関連する災害の危険及びその危機管理の分野における研究、能力の開発及び情報網の構築活動を行うことを目的とする。

2. In order to achieve the above objectives, the functions of the Centre shall be to:
センターの任務は、１に規定する目的を達成するため、次のとおりとする。

(a) promote scientific research and policy studies and undertake effective capacity-building activities at the institutional and professional levels;
科学的研究及び政策の研究を促進し、並びに組織的かつ専門的な段階において、効果的な能力の開発に係る活動を行うこと。

(b) create and reinforce networks for the exchange of scientific, technical and policy information among institutions and individuals;

科学的、技術的及び政策的な情報を組織及び個人の間で交換するためのネットワークを構築し、及び強化すること。

(c) develop and coordinate cooperative research activities, taking advantage particularly of the installed scientific and professional capacity of the relevant International Hydrological Programme (IHP) networks, the World Water Assessment Programme, the International Flood Initiative and the relevant programmes of governmental and non-governmental organizations, as well as involving international institutions and networks under those auspices;
関連する国際水文学計画（以下「ＩＨＰ」という。）のネットワーク、世界水アセスメント計画、国際洪水イニシアチブ並びに政府機関及び非政府機関の関連する計画に備わった科学的及び専門的な能力を特に活用した上で、並びに国際的な機関及び国際的な機関が賛助するネットワークを関与させた上で、協力的な研究活動を発展させ、及び調整すること。

(d) conduct international training courses and educational programmes, especially for the policy makers, practitioners and researchers of the world;
特に世界の政策立案者、実務者及び研究者のために、国際的な研修及び教育計画を実施すること。

(e) organize knowledge and information transfer activities, including international symposia or workshops, and engage in appropriate awareness-raising activities targeted at various audiences, including the general public;
知識及び情報の移転についての活動（国際的なシンポジウム又はワークショップを含む。）を組織し、並びに一般公衆を含む様々な聴衆を対象とする適当な啓発活動に従事すること。

(f) develop a programme of information and communication technology through appropriate data application;
適当なデータの活用を通じた情報通信技術の計画を作成すること。

(g) provide technical consulting services; and
技術的な助言の業務を提供すること。

(h) produce scientific and technological publications and other media items related to the activities of the Centre.
科学技術的な出版物その他センターの活動に関する広報資料を作成すること。

3. The Centre shall pursue the above objectives and functions in close coordination with IHP.
センターは、ＩＨＰと緊密に調整して、１に定める目的を追求し、及び２に定める任

務を遂行する。

Article 6

Governing Board

運営理事会

1. The Centre will be guided and overseen by a Governing Board, which will be renewed every three years and will be composed of:
センターは、運営理事会の指導及び監督を受ける。同理事会は、三年ごとに更新されるものとし、次の者で構成する。

(a) the President of PWRI, as the Chairperson;
土木研究所の理事長（議長とする。）

(b) a representative of the Government or his or her appointed representative;
政府の代表者又は任命されたその代理人

(c) representatives of up to three other Member States of UNESCO that have sent to the Centre notification for membership, in accordance with Article 10, paragraph 2, and have expressed interest in being represented on the Board;
第十条２の規定に従ってセンターに対して参加する旨の通報を送付し、かつ、運営理事会に自国の代表者を出すことに関心を表明した日本国以外のユネスコの加盟国の代表者（三人を限度とする。）

(d) representatives of up to five institutes or organizations relating to the activities of the Centre, who shall be appointed by the Chairperson; and
センターの活動に関連する組織又は機関の代表者であって議長が任命するもの（五人を限度とする。）

(e) a representative of the Director-General of UNESCO.
ユネスコ事務局長の代理人

The Chairperson may invite a representative of the IHP Intergovernmental Council to participate to the Governing Board meetings.
議長は、ＩＨＰの政府間理事会の代表者を運営理事会の会合に参加するよう招請することができる。

2. The Governing Board shall:
運営理事会は、次のことを行う。

(a) examine and adopt the long-term and medium-term programmes of the Centre submitted by the Executive Director of the Centre, subject to paragraph 3 below;
３の規定に従うことを条件として、センターの所長が提出するセンターの長期及び中期の計画を審査し、及び採択すること。

(b) examine and adopt the draft work plan of the Centre submitted by the Executive Director of the Centre, subject to paragraph 3 below;
３の規定に従うことを条件として、センターの所長が提出するセンターの活動計画案を審査し、及び採択すること。

(c) examine the annual reports submitted by the Executive Director of the Centre, including biennial self-assessment reports of the Centre's contribution to UNESCO's programme objectives;
センターの所長が提出する年次報告書（ユネスコの計画の目的に対するセンターの貢献に関する二年ごとの自己評価報告書を含む。）を審査すること。

(d) examine the periodic independent audit reports of the financial statements of the Centre and monitor the provision of such accounting records as necessary for the preparation of financial statements;
センターの財務書類に関する定期的な独立の監査報告書を審査し、及び財務書類の作成に必要な会計帳簿の準備の状況を把握すること。

(e) draw up and adopt any necessary internal regulations of the Centre, based on the relevant legislative and regulatory framework relating to PWRI; and
土木研究所に関連する法令上及び規制上の枠組みに基づいて、必要なセンターの内部規則を作成し、及び採択すること。

(f) decide on the participation of regional intergovernmental organizations, international organizations and other interested institutions in the work of the Centre.
地域的な政府間機関、国際機関その他関心を有する機関によるセンターの活動への参加について決定すること。

3. The long-term and medium-term programmes, as well as the work plan, of the Centre shall satisfy the relevant legislative and regulatory requirements relating to PWRI; they will also be aligned with UNESCO's strategic programme objectives and global priorities, and conform to the Centre's functions as set out in Article 5.2.
センターの長期及び中期の計画並びに活動計画は、土木研究所に関連する法令上及び規制上の要件を満たすものとする。また、当該長期及び中期の計画並びに活動計画は、ユネスコの戦略的な計画の目的及び地球規模の優先事項に沿うものとし、並びに第五条２に定めるセンターの任務に合致するものとする。

4. The Governing Board shall meet in ordinary session at regular intervals, at least once every Japanese fiscal year; it shall meet in extraordinary session if convened by its Chairperson, either on his or her own initiative or at the request of the Director-General of UNESCO or of the majority of its members.
運営理事会は、定期的に、少なくとも日本国の各会計年度に一回、通常会期として会合する。同理事会は、その議長が、自己の発意により又はユネスコ事務局長若しくは同理事会の構成員の過半数の要請により招集する場合には、臨時会期として会合する。

5. The Governing Board shall adopt its own rules of procedure.
運営理事会は、その手続規則を採択する。

Article 7
Staff
職員

1. The Centre shall consist of an Executive Director and staff with experience in research on water hazard and risk management, as well as such staff as is required for the proper functioning of the Centre.
センターは、センターの所長、水災害の危険及び危機管理の研究について経験を有する職員並びにセンターが適切に機能するために必要な職員で構成する。

2. The Executive Director shall be appointed by the President of PWRI.
センターの所長は、土木研究所の理事長が任命する。

3. The other members of the Centre's staff shall be nominated by the Executive Director for the appointment by the President of PWRI.
センターのその他の職員は、センターの所長の指名に基づき、土木研究所の理事長が任命する。

Article 8
Contribution of UNESCO
ユネスコの貢献

1. UNESCO may provide assistance, as needed, in the form of technical assistance for the programme activities of the Centre, in accordance with the strategic goals and objectives of UNESCO, by:

ユネスコは、その戦略的な目標及び目的に従って、必要に応じ、センターの計画に基づく活動に対する技術的な援助の形態により、次のことによる援助を提供することができる。

(a) providing the assistance of its experts in the specialized fields of the Centre; and
センターの専門分野においてユネスコの専門家による援助を提供すること。

(b) including the Centre in various activities which it implements and in which the participation of the latter seems in conformity with and beneficial to UNESCO's and the Centre's objectives.
ユネスコが実施する各種の活動であって、センターが参加することがユネスコの目的及びセンターの目的に合致し、かつ、これらの目的のために有益であると認められるものにセンターを参加させること。

2. In all cases listed above, such assistance shall not be undertaken except within UNESCO's programme and budget, and UNESCO will provide Member States with accounts relating to the use of its staff and associated costs.
１に規定する援助については、ユネスコの計画及び予算の範囲内のものである場合を除くほか、行ってはならない。ユネスコは、加盟国に対し、ユネスコの職員の使用及び関連する費用に関する会計報告を提供する。

Article 9
Contribution by the Government
政府による貢献

The Government undertakes to take appropriate measures in accordance with the laws and regulations of Japan, which may be required for the Centre to receive all the resources, either financial or in-kind, needed for the administration and proper functioning of the Centre. The Centre's resources shall derive from sums allotted by PWRI, from such contributions as it may receive from any governmental, intergovernmental or non-governmental organizations, and from payments for services rendered.
政府は、日本国の法令に従い、センターがその運営及び適切な機能に必要な全ての資源（資金であるか現物であるかを問わない。）を受領するために必要とされる適当な措置をとることを約束する。センターの資源は、土木研究所が割り当てる資金、政府機関、政府間機関又は非政府機関から受領する拠出及びセンターが提供する役務に対する対価から構成される。

Article 10
Participation
参加

1. The Centre will encourage the participation of Member States and Associate Members of UNESCO which, by their common interest in the objectives of the Centre, desire to cooperate with the Centre.
センターは、センターの目的に関する共通の関心に基づいてセンターとの協力を希望するユネスコの加盟国及び準加盟国の参加を奨励する。

2. Member States and Associate Members of UNESCO wishing to participate in the Centre's activities as provided for under this Agreement may send to the Centre notification to this effect. The Executive Director of the Centre shall inform the Government, UNESCO and its Member States that have notified their intention to participate in the Centre's activities of the receipt of such notifications.
この協定に定めるセンターの活動への参加を希望するユネスコの加盟国及び準加盟国は、その旨の通報をセンターに送付することができる。センターの所長は、政府、ユネスコ及びセンターの活動に参加する意思を通報した他のユネスコの加盟国に対して、当該通報を受領した旨を報告する。

Article 11
Responsibility
責任

As the Centre is legally separate from UNESCO, the latter shall not be legally responsible for the acts or omissions of the Centre, and shall also not be subject to any legal process, and/or bear no liabilities of any kind, be they financial or otherwise, with the exception of the provisions expressly laid down in this Agreement.
ユネスコは、センターがユネスコから法的に独立していることから、センターの作為又は不作為について法的に責任を負わないものとし、また、いかなる訴訟手続の対象にもならず、及び財政上その他のいかなる責任も負わない。ただし、この協定に明示的に定める場合は、この限りでない。

Article 12
Evaluation
評価

1. UNESCO may, at any time, carry out an evaluation of the activities of the Centre in order to ascertain:

ユネスコは、次の事項を確認するため、いつでもセンターの活動についての評価を実施することができる。

(a) whether the Centre makes a significant contribution to UNESCO's strategic programme objectives and expected results aligned with the four-year programmatic period of the Approved Programme and Budget of UNESCO (C/5 document) including the two global priorities of UNESCO, and related sectoral or programme priorities and themes; and
センターが、ユネスコの二の地球規模の優先事項を含むユネスコの計画及び予算（C／五文書）の四年の計画期間に沿ったユネスコの戦略的な計画の目的及び所期の成果並びに関連する分野別又は計画別の優先事項及び課題に重要な貢献を行っているか。

(b) whether the activities effectively pursued by the Centre are in conformity with the functions set out in this Agreement.
センターが実際に遂行する活動が、この協定に定める任務に合致しているか。

2. UNESCO shall, for the purpose of the review of this Agreement, conduct an evaluation of the contribution of the Centre to UNESCO's strategic programme objectives, to be funded by the Centre within annual budgets appropriated thereto and in accordance with the relevant and applicable laws and regulations of Japan.
ユネスコは、この協定の見直しを行うことを目的として、ユネスコの戦略的な計画の目的に対するセンターの貢献に関する評価を実施する。当該評価は、日本国の関係法令に従ってセンターが自己に充当される年次予算の範囲内で供与する資金によって行う。

3. UNESCO undertakes to submit to the Government, at the earliest opportunity, a report on any evaluation conducted.
ユネスコは、実施した評価に関する報告書を政府に対してできる限り速やかに提出することを約束する。

4. Following the results of an evaluation, each of the Contracting Parties shall have the option of requesting a revision of its contents or of denouncing the Agreement, as envisaged in Articles 16 and 17.
いずれの締約者も、評価の結果を受けて、第十六条及び第十七条に定めるところにより、この協定の内容についての改正を要請し、又はこの協定を廃棄することができる。

Article 13
Use of UNESCO Name and Logo
ユネスコの名称及びロゴの使用

1. The Centre may mention its affiliation with UNESCO. It may, therefore, use after its title the mention “under the auspices of UNESCO”.
センターは、ユネスコとの協力関係について表示することができる。したがって、センターは、センターの名称の前に「ユネスコの賛助する」と表示することができる。

2. The Centre is authorized to use the UNESCO logo or a version thereof on its letterheaded paper and documents, including electronic documents and web pages, in accordance with the conditions established by the governing bodies of UNESCO.
センターは、ユネスコの管理機関が定める条件に従い、ユネスコのロゴ又はこれを用いて作成されたロゴをセンターの書簡用紙（センターの名称等を上部に印字したもの）及び文書（電子的な文書及びウェブページを含む。）に使用することを認められる。

Article14
Entry into Force
効力発生

This Agreement shall enter into force upon signature by the Contracting Parties. It shall supersede the 2013 Agreement.
この協定は、両締約者がこの協定に署名した時に効力を生ずる。この協定は、二千十三年協定に代わるものとする。

Article 15
Duration
有効期間

This Agreement is concluded for a period of six years as from its entry into force. This Agreement shall be renewed upon common agreement between the Government and UNESCO, once the Executive Board made its comments based on the results of the renewal assessment provided by the Director-General.
この協定は、その効力発生から六年の期間について締結される。この協定は、ユネスコ事務局長が提供する更新のための評価の結果に基づいてユネスコの執行委員会が意見を述べた後、政府とユネスコとの間の合意によって更新される。

Article 16
Denunciation
廃棄

1. The Government and UNESCO shall be entitled to denounce this Agreement unilaterally.
政府及びユネスコは、この協定を一方的に廃棄することができる。

2. The denunciation shall take effect 180 days after receipt of the notification sent by the Government or UNESCO to the other.
廃棄は、政府又はユネスコが他方の締約者に送付した通告の受領の後百八十日で効力を生ずる。

Article 17
Revision
改正

This Agreement may be revised by written agreement between the Government and UNESCO.
この協定は、政府とユネスコとの間の書面による合意によって改正することができる。

Article 18
Settlement of Disputes
紛争の解決

Any disputes between the Government and UNESCO regarding the interpretation or application of this Agreement shall be resolved through consultations between them.
この協定の解釈又は適用に関する政府とユネスコとの間の紛争は、両締約者間の協議によって解決する。

IN WITNESS WHEREOF, the undersigned, duly authorized thereto, have signed this Agreement.
以上の証拠として、下名は、正当に委任を受けてこの協定に署名した。

DONE in duplicate in Paris, this thirteenth day of February, 2020, in English.
二千二十年二月十三日パリで、英語により本書二通を作成した。

For the Government of Japan:
日本国政府のために

For the United Nations Educational, Scientific and Cultural Organization:
国際連合教育科学文化機関のために

土木研究所資料
TECHNICAL NOTE of PWRI
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本資料の転載・複写の問い合わせは

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