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/7/030 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.