ICHARM Work Plan

FY 2022-2023 (2022.4-2024.3)

Revised on 6th September, 2023

Mid-term Programme	Contents	Activities and expected results in FY 2022-2023
(1) Innovative research		
1) Data collection, storage, sharing and statistics on water-related disasters		
ICHARM will conduct research on technologies to collect and store data and information regarding hazards, exposure and vulnerability and share them among stakeholders. We will also actively support nations and communities in data collection, storage, and sharing by developing and helping them implement technologies to collect damage data that can be operated by themselves. Technical assistance will also be provided for nations to compile highly reliable statistical data.	Support runoff inundation analysis using global observation data ~~(Philippines, Argentina).~~	Improve the system continuity of the runoff inundation analysis system in the Philippines' Pampanga River basin by applying satellite rainfall data to prevent the system from disruption due to undelivered rain gauge data. Also, develop tools to support the implementation of a series of correction processes using ground rain gauge data. ~~Provide support for Buenos Aires, Argentina, and other cities to introduce the improved system and tools.~~
	Improve the resolution of soil moisture observation using global observation data.	Improve the resolution of land surface information (soil moisture content and vegetation biomass) up to about 1 km by combining a data assimilation system (CLVDAS) and a water energy balance model, apply the information system to different areas, and verify its effectiveness. Strive further to increase the resolution up to 100m by additionally using the synthetic aperture radar (SAR). Also, develop a model by combining CLVDAS and WEB-RRI-Veg for West Africa to establish drought monitoring
	Develop OSS-SR (Online Synthesis System for Sustainability and Resilience).	Develop and improve OSS-SR, accumulate water disaster statistics and other data, and build a data platform on DIAS while raising public awareness of water disaster prevention and providing facilitator training in the Philippines, Indonesia, and other countries. Select and coordinate target cities in Japan to carry out the same activities and start developing OSS-SR.
	Develop an information platform on which various types of information can be used on digital twins.	Start developing a methodology to create a platform for information sharing among related stakeholders while integrating different kinds of information on digital twins, including the specifications of ground conditions and artificial structures, urban development plans related to water-related disaster management, and data on agriculture, natural environment, and past disasters. ~~The Shirakawa River basin in Kumamoto Prefecture~~ The Kokai River basin in Ibaraki Prefecture is one of the candidates for this study.
2) Risk assessment on water-related disasters		

	ICHARM will develop and verify a method to combine water-related disaster assessment models with other models. We will also develop an index that can holistically indicate the basin-wide impact of water hazards. Case studies on the risk assessment of water-related disasters will be conducted at multiple locations both in and outside Japan while taking local conditions into account. Necessary assistance will be provided for local communities to perform risk assessments based on their needs and circumstances using the findings of the case studies, thereby achieving disaster risk reduction.	Upgrade future climate prediction technology using multiple models, downscaling GCMs, etc., and evaluate its regional applicability.	Examine methods for reproducing past heavy rainfall events on meteorological models and methods for estimating the severity of heavy rainfall events due to global warming. Propose an evaluation method for estimating the maximum rainfall suitable for regional meteorological characteristics, estimate the maximum rainfall using multiple methods, compare and verify the estimation results, and propose a valid evaluation method.
		Construct a water cycle model that can take into account basin characteristics and visualize the effects of community-led basin management measures.	Develop an elaborate water circulation model that can physically take into account the basin's conditions and flood control measures, aiming to simulate the effectiveness of individual facilities and structures in flood damage mitigation. Also, develop a model to evaluate the impact of levee breaches.
		Develop, upgrade, and apply hazard assessment of sediment, driftwood, and flood inundation in Japan and abroad.	~~Focusing on rivers in Bangladesh and Nepal, analyze the mechanism of inundation involving floodwaters, sediment, and driftwood, which occurs as a result of changes in stream channel bed and the volume of suspended sand and driftwood from the upstream end boundary, and evaluate the hazard's uncertainties associated with those factors. Also, evaluate numerical models for their reproducibility of channel fluctuations and study the need to introduce new factors such as lateral erosion to improve the reproducibility.~~ Apply sediment hydraulic models that can process basin, two-dimensional, and three-dimensional data to various rivers with different characteristics. Also, study methods for utilizing the analysis results to practice river management related to flood, sedimentation, driftwood, and erosion, more effectively.
		Study adaptation measures using integrated risk assessment methods.	Develop and apply a model created by integrating WEB-RRI and SIMRIW (Simulation Model for Rice-Weather Relationships) to basins with various land uses, such as those in the Philippines and Indonesia. Using this integrated model, develop quantitative risk assessment methods that can take into account water-related hazards under future climate scenarios and their direct and indirect impacts. Support local governments in conducting practical activities using risk

			assessment methods and starting discussions on measures to build a society resilient to water-related disasters.
		~~Develop a risk assessment model for water disasters that takes into account the linkage among deferent fields.~~	~~Study the relationship between water disaster risks and other fields, such as agriculture and city planning, and the possibility of combining models created in different fields. The candidates for this study include the Shirakawa River basin in Kumamoto prefecture (urban area) and the Omoto River basin in Iwate prefecture (mountainous area).~~
3) Monitoring and prediction of changes in water-related disaster risk			
	ICHARM will develop, verify and improve methods for monitoring and forecasting changes in hazards due to meteorological conditions with different temporal scales ranging from season to climate change and changes in exposure and vulnerability due to social development and economic changes. These methods will be applied to case studies at multiple locations both in and outside Japan, and the outcomes will be used to provide support for all stakeholders to select appropriate methods according to their needs and conditions to mitigate future risks of water-related disasters by themselves. The methods will be modified with various local adjustments and compared with each other for further improvement	Improve the accuracy of forecasting technology for multi-day-scale rainfall and flood events.	Improve the accuracy of rainfall and flood forecasting up to several days in advance. To this end, the data assimilation method will be upgraded using the WRF (Weather Research and Forecasting model)-LETKF (Local Ensemble Transform Kalman Filter) model, and the initial values of atmospheric and terrestrial water circulation forecast models will be improved.
		Develop a water circulation model that can represent low to high water, including the effects of seasonal and regional factors such as snow accumulation and snowmelt.	Apply the inflow forecasting model studied for the typhoon-caused flood events in the Oigawa River (2018, 2019) and the Saigawa River (2018) to typical typhoon flood events in other years to verify its accuracy. Also, apply the model to flood events caused by frontal rainfall to verify the accuracy of inflow forecasting in events with different rainfall patterns. In addition, develop water circulation models for other basins, such as the Tone River basin.
		Evaluate changes in exposure and vulnerability due to social changes.	Monitor the exposure and vulnerability of communities to water disasters, and analyze and evaluate risks associated with changes due to development and other social and economic conditions in the Philippines and Thailand.

	to eventually become globally applicable.		
4) Proposal, evaluation and application of policies for water-related disaster risk reduction			
	When developing policies that are practical under climate change, it is essential to consider stakeholders' understanding of disaster risk reduction measures, lifestyles, socio-economic activities, and possible changes in disaster risks. To achieve these, ICHARM will develop models to evaluate each policy's outcomes and socio-economic assessment methods applicable to different nations, as well as provide training for strengthening human resources to lead local consensus building and political decision making.	Develop OSS-SR for building a basin-wide consensus and nurturing facilitators.	Continue developing Area-BCM in industrial clusters and create scientific knowledge that will contribute to policy-making for mitigating water disaster risks in cooperation with related organizations in Thailand.
		Develop technologies to support the effective implementation of "River Basin Disaster Resilience and Sustainability by All".	Develop a method for assessing the economic impact of floods under climate change by utilizing the basin space created on digital twins and explore its applicability to the decision making process in the management and investment of the corporate and financial sectors from the flood management perspective and the policy-making process for town development. The Tokachi River basin in Hokkaido Prefecture ~~Tsuruoka City, Yamagata Prefecture,~~ is one of the model cases for this study.
5) Support in constructing the applicability of water-related disaster management			
	ICHARM will support local governments and citizens at several locations in Japan and overseas in the implementation of means for effectively sharing information from early warning systems and other sources among administrators and residents to facilitate coordinated disaster responses	Support building an early warning system by providing real-time water-level forecasts and information on flooding and other hazards.	Develop a manual to support river administrators in independently developing low-cost, simple models, based on the RRI model developed for small and medium-sized rivers, for forecasting water levels and gathering inundation information with uncertainties. In creating a manual, a test model will be presented before the flooding season, a trial run will be conducted, and the results and feedback will be collected and reflected in the manual to increase the usability of the model.
		Develop optimal operation methods for existing dams and	Study and test optimal operations for three dams built on a single river (the Takase~~gawa~~ River, upstream of the Sai~~gawa~~ River), which was expanded on the

	among different sectors. We will also develop, verify, and help them implement methods for preparing operation continuity plans based on local needs and conditions and improving interoperability during disaster response by liking administrative functions effectively at all levels.	other structures that contribute to flood control and support their implementation in target locations.	basis of the optimal operation using rainfall and flood forecasting developed to enhance the water-use and flood-control functions of a single dam originally built for power generation in the upper Oi~~gawa~~ River. Also, conduct research to prepare for applying this method to reservoirs in the state of Kerala, India.
		Develop technologies (e.g., VR) to effectively provide risk information.	Improve the virtual flood experience system using DIAS and study effective methods to increase its public accessibility with a view to utilizing it in emergency drills and awareness-raising activities conducted by governments and companies. Study approaches to promoting broader use of this system among the public, for example, preinstalling it in popular devices and creating applications.
		Compile knowledge for strengthening disaster response capabilities of local governments and other entities.	Revise the "Collection of Critical Situations during Flood Emergency Response (local government edition)" by collecting and organizing new cases from the disaster response review reports released by local governments in Japan from 2017 to 2020. In addition, produce a version for business establishments. Study AI and text mining methods for automating the collection of critical situations, as well as feedback systems from local governments.
		Research response to water disasters and support and enhancement of early recovery.	Develop a system to support preparation for an emergency response to water disasters. The system is built on a disaster risk information system and capable of helping those in charge of disaster management: - confirm what to do when water disaster risks increase, - check what to do and possible critical situations during the response effort in case of disaster, - compile a BCP, - collect and share information on damage and restoration, and - examine how best to allocate personnel and other water disaster response resources.
(ii) Effective capacity building			
1) Foster solution-oriented practitioners and Training-of-Trainers (TOT) instructors who will contribute effectively to the planning and implementation of disaster management with solid theoretical and engineering competence at all levels from local to international.			

	It is important to increase the understanding and collaboration of all stakeholders in river basins to build resilience and sustainability against increasingly intense water-related disaster risks. ICHARM will foster facilitators who can integrate and translate interdisciplinary scientific knowledge for all stakeholders to cooperate in building social consensus by employing a cross-sectoral approach in the public sector and encouraging the private sector for active participation.	Doctorial Course "Disaster Management"	Accept about 2-3 students every year
		Master's Course "Water-related Disaster Management Course of Disaster Management Policy Program"	Accept about 14 students every year from the countries selected based on the results of the needs survey administered to candidate countries.
		Start preparing for capacity development programs related to water-related disaster management policies	Start preparing for launching an a-month-long training course, tentatively named "Field Integration Course on River Basin Disaster Resilience and Sustainability by All." This course plans to accept about three trainees each from countries at a high water-disaster risk, who are in charge of river management, risk management, crisis management, or meteorology. They will study Japan's science and technology related to water disaster management in an integrated manner and learn how to organize well-coordinated actions among ministries and agencies across different sections to solve issues regarding water-related disaster management.
2) Train facilitators to acquire interdisciplinary scientific knowledge related to water-related disaster risk reduction and the capability to lead consensus building among various stakeholders.			
	It is important to increase the understanding and collaboration of all stakeholders in river basins to build resilience and sustainability against increasingly intense water-related disaster risks. ICHARM will foster facilitators who can integrate and translate interdisciplinary scientific knowledge for all stakeholders to cooperate in building social consensus by employing a cross-sectoral approach in the public	Provide e-learning, training, facilitator development through IFI and other networks.	Develop and improve OSS-SR, accumulate water disaster statistics and other data, and build a data platform on DIAS while raising public awareness of water disaster prevention and providing facilitator training in the Philippines, Indonesia, and other countries. Select and coordinate target cities in Japan to carry out the same activities and start developing OSS-SR.

	sector and encouraging the private sector for active participation.		
3) Maintain and enhance the capacity of local experts and institutions engaged in addressing water-related risks using accumulated knowledge and skills both in research and practice. ICHARM will support a global network of exemplary practitioners involved in water-related hazard and risk management.			
	Offering opportunities to research and practice water-related disaster management, ICHARM will support the graduates from its educational and training programs to become a leader in promoting water hazard and risk management in their own localities. The ICHARM alumni network across the globe has been facilitated through follow-up meetings and created knowledge hubs to contribute to water-related risk reduction around the world.	Expand a network by holding follow-up seminars for ICHARM master's program graduates and others.	Discuss ways to hold a follow-up seminar overseas in a graduates' country while considering the situation of COVID-19. At the same time, prepare to have a yearly meeting of the online follow-up seminar as we held last year.
(iii) Efficient information networking			
1) Accumulate, analyze and disseminate major water-related disaster records and experiences by maintaining and upgrading a worldwide practitioners' network.			
	ICHARM, as the global knowledge center for water hazards, will be working closely with the UNESCO IHP, the World Meteorological Organization (WMO), the Typhoon Committee (TC), the International Flood Initiative (IFI), and other domestic and international	Fulfill the duties as the IFI secretariat.	Carry out the responsibilities as the IFI secretariat, including holding regular meetings with the participating organizations, sharing and compiling water-related disaster information, and reviewing the concept of IFI and other issues at the Advisory Committee meeting on the occasion of ICFM9 through coordination with relevant organizations. Continue disseminating IFI activities by participating in major international conferences and projects and strengthening partnerships with relevant organizations.

	agencies, exchanging data, information, lessons and ideas regarding water-related disasters. By hosting and organizing International academic meetings, ICHARM will continue offering a place to collect and disseminate the most advanced knowledge for researchers around the world.		Promote collaboration with relevant organizations to reduce water-related disaster damage.
		Support local efforts led by IFI.	Support the Philippines, Sri Lanka, and Indonesia in establishing the Platforms on Water Resilience and Disasters and promoting related activities based on them. Continue expanding 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 on developing the OSS-SR and fostering facilitators in collaboration with relevant organizations of the countries participating in IFI activities.
		Play a leading role in Typhoon Committee (TC).	Fulfill the duties as the WGH chairperson, promote AOP7 in collaboration with the Members of WGH and the other working groups and the relevant organizations, and provide support for other related activities. Support Japan and other TC Members in organizing WGH meetings in collaboration with MLIT. Participate in IWS meetings and annual sessions as the 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 TC Members.
2) Integrate interdisciplinary scientific knowledge into a consilience of water-related risk management as a common asset of practitioners.			
	ICHARM will establish a system to collect accurate data and information by strengthening collaboration with organizations collecting and archiving scientific data, information and knowledge on water-related disasters and nations co-hosting ICHARM's training and research projects.	Collect water-related disaster information and support its accumulation and implementation.	Collect water-related disaster information from relevant organizations in each country through the Platforms on Water Resilience and Disasters under IFI and other regional and international networks. Support local implementation to reduce damage due to water-related disasters through accumulation of such information by using DIAS.

	Collected data and information will be sorted out and accumulated as meta-data and integrated into a "consilience of water-related disaster risk management" as a common asset of practitioners.		
3) Mainstream water-related disaster risk reduction by facilitating active collaboration and communication among experts and organizations through sharing cases and findings in water-related hazard and risk management.			
	ICHARM will continue contributing to worldwide efforts in implementing and mainstreaming disaster risk reduction in step with the Sendai Framework and the Sustainable Development Goals (SDGs), both adopted in 2015. By enhancing research, capacity building, and networking, we will continue stressing the importance of water-related disaster risk reduction and promoting the creation of a resilient, sustainable society by involving all stakeholders at local, national, and international levels.	Organize, participate in or contribute to major regional and international events.	Contribute actively to the 4th Asia-Pacific Water Summit by organizing the thematic session and summarizing discussions and hold the AWCI session of AOGEO and other workshops. Disseminate ICHARM's activities and their outcomes and develop and maintain our networks with participating organizations and experts by organizing technical sessions or providing presentations at major events hosted by UN agencies and regional and international organizations and also by participating in and contributing to regional and international projects. Convene ICFM9 in February 2023 in collaboration with relevant organizations inside and outside Japan, organize a High-Level symposium together with the HELP Secretariat and MLIT, and hold a general symposium open to the public to raise their awareness of water-related disasters.
		Public relations	Keep posting the latest information on the ICHARM website and improve the content based on readers' feedback. Publish the ICHARM newsletter four times a year (January, April, July and October) and keep upgrading its contents to be more interesting and informative for readers. Continue enriching newsletter contents by including more contributions from educational and training program graduates and collaborating experts and by reflecting readers' feedback collected through questionnaires.