SATREPS Project

SATREPS (Science and Technology Research Partnership for Sustainable Development) is a program in which the Japan Science and Technology Agency (JST) and the Japan Agency for Medical Research and Development (AMED), in collaboration with the Japan International Cooperation Agency (JICA), promote international collaborative research between Japan and developing countries to address global challenges.

ICHARM served as the lead research institution in the Philippines (until FY2022) and participated as a collaborating research institution in projects in Thailand, Argentina, and Ghana, conducting practical activities on the ground in cooperation with domestic and international government agencies and research institutions.

a) The Philippines

The Project for Development of a hybrid water-related disaster risk assessment technology for sustainable local economic development policy（HyDEPP-SATERPS）

In the Philippines, the human and economic damage caused by typhoons that occur every year is immense, and repeated damage to social infrastructure such as agricultural production and logistics has serious and long-term impacts on economic activity. In Metro Manila, where assets and capital functions are concentrated, disaster countermeasures are particularly urgent in order to mitigate and reduce economic damage, while water disasters are frequent in provincial cities, and socio-economic development is hindered due to a fragile infrastructure environment. In contrast, although the country is making progress in addressing climate change, concrete measures that contribute to reducing damage at the local level have not progressed. Therefore, it is necessary to promote balanced development throughout the country by promoting damage reduction measures through the creation and implementation of local climate change action plans, improving resilience to water disasters, and thereby promoting sustainable development.

Therefore, this project will promote proactive disaster prevention investment based on scientific knowledge by utilizing a hybrid evaluation model that combines climate change, hydrology, agriculture, and socioeconomic activity models, along with a big data platform. This "end-to-end approach" will consistently link observational and statistical data to the visualization of disaster risk and the effectiveness of disaster prevention investments. Through this, we will make policy recommendations aimed at promoting sustainable development by improving the water disaster resilience of local cities and fostering balanced national development by correcting the further over-concentration in Manila.

The research target river basins are the Pampanga River basin and the Pasig-Marikina River/Lake Laguna basin located on Luzon Island in the Republic of the Philippines. The policy recommendations will be compiled and published as policy recommendation documents for each river basin, with the aim of having them reflected in the policies and plans of central and local governments.

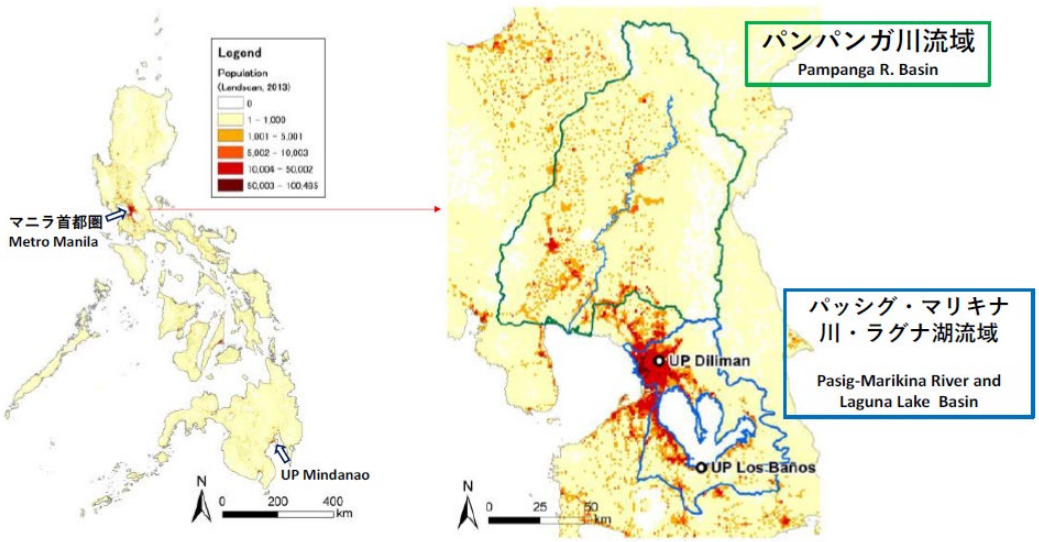


Figure 1　Target river basin of HyDEPP-SATERPS

This project was led by Professor Miho Ohara (Center for Integrated Disaster Prevention Information Research, Graduate School of Interdisciplinary Information Studies, University of Tokyo, and Senior Researcher at ICHARM until March 2023) and Professor Fernando C. Sanchez Jr. (University of the Philippines Los Baños). Participating domestic research institutions included the University of Tokyo, Tohoku University, Kyoto University, Shiga Prefectural University, Nagoya University, and ICHARM. Partner research institutions in the Philippines included the Center for Interdisciplinary Hydrological Studies (UPLB IdSCW) at the University of the Philippines Los Baños, the University of the Philippines Diliman, and the University of the Philippines Mindanao. Cooperating local government agencies included the Philippine Department of Science and Technology's Atmospheric, Geophysical and Astronomical Services Administration (DOST-PAGASA), the Department of Public Works and Highways (DPWH), the Laguna Lake Development Authority (LLDA), and the Metropolitan Manila Development Authority (MMDA).

The project began on April 1, 2020, as a JST project in Japan. However, due to the COVID-19 pandemic, the start of the JICA project in the Philippines was postponed, and activities in the Philippines for five years (until June 2, 2026) commenced on June 3, 2021.

This project is divided into four research groups, each with its own unique activities and deliverables necessary to contribute to the project. The groups are: Group 1: Data Collection and Integration; Group 2: Flood and Drought Risk Assessment using Hydraulic and Agricultural Models; Group 3: Water Disaster Resilience Assessment; and Group 4: Examination of Sustainable Economic Development Scenarios. ICHARM participated in Groups 2 and 3. The following are the main reports for each fiscal year.



Photo 1 Group photo of the kick-off meeting

<Fiscal Year 2021>

A kick-off meeting was held on June 30, 2021, and a Joint Coordination Meeting (JCC) by participating organizations from both countries was held online on November 17, 2021. In July-August 2021, e-learning on water disaster risk assessment methods was conducted, with 83 participants and 49 successfully completing the assignments.

On November 5, 2021, approximately one year after the devastating typhoon Ulysses, we held a webinar open to the public, with a total of 243 participants.

<FY2022>

In FY2022, the 2nd Joint Coordination Committee (JCC) meeting was held online on June 10th, and the 3rd JCC meeting was held in a hybrid format (in-person/online) for the first time in Quezon City, Metro Manila, on November 16th.



Photo 2 Group photo at 3rd JCC meeting

From July 28th to August 2022, e-learning training on general water disaster risk assessment technology was conducted for staff of collaborating government agencies in addition to the research participating institutions. Of the 93 registered participants, 63 completed Course 1 (Basic course on water disaster risk), 41 completed Course 2 (Hands-on training on flood analysis and hazard/risk mapping), and 53 completed Course 3 (Advanced course on hydraulic/hydrological, agricultural, and economic impact assessment models). 40 participants completed all courses.

During the second training visit to Japan for this project, on February 20, 2023, a "HyDEPP-SATREPS Special Session" was held as one of the special sessions of ICFM9, where research results were presented and opinions were exchanged with participants. Dr. Fernando Chinte Sanchez, Jr., the project representative on the Philippine side and Professor at UPLB, and others gave a report on the project's activities. A total of 50 people participated in the session, with 35 attending in person and 15 online.




Photo 3,4 "HyDEPP-SATREPS Special Session" in ICFM9(Left: Group photo, Right: Reporting the project)

<FY2023>

In FY2023, the 4th Joint Coordination Committee (JCC) meeting was held on June 22nd, and the 5th JCC meeting was held on November 20th, both using a hybrid format (combining in-person and online participation).

From July 24th to August 10th, 2023, instruction was provided to trainees who participated in the training program in Japan. Two trainees participated in each of five courses: two short courses on data management and flow rate observation (until August 3rd), and three long courses on hydraulic and hydrological models, flood hazard mapping and assessment, and economic growth forecasting models (until August 10th). A total of 10 people stayed at ICHARM. The format of learning with a supervisor allowed for a deeper understanding of water disaster risk assessment technology compared to the first and second training programs in Japan, making it a fruitful opportunity for members from both countries.



Photo 5 Closing session of the training program in Japan



Photo 6 The 6th Joint Coordination Committee

<FY2024>

In FY2024, the 6th and 7th Joint Coordination Committee (JCC) meetings were held on June 20 and March 7, respectively, both using a hybrid format, allowing in-person and online participation. We attended these meetings as project members to review the progress of our collaborative research and discuss its future direction.

From May 13 to 16, we conducted flow measurement training for tributaries flowing into Laguna Lake. The training was attended by 27 participants from the Philippines, who learned how to operate ultrasonic Doppler flow meters provided by Japan, as well as methods for data collection and analysis. Additionally, in response to local requests, we conducted similar training sessions in the Pampanga River basin on June 17 and 18, and nine participants completed the training.

In mid-July, eight Filipino members came to Japan to participate in the 9th Global Energy and Water Exchanges Open Science Conference held in Sapporo from July 8 to 12. On the 11th, JST and JICA organized a SATREPS Special Session, in which a doctoral student at ICHARM delivered a presentation. During this event period, members from both countries also had a meeting on the 10th and visited Lake Shikotsu near Sapporo to inspect the water environment there.



Photo 7,8 Flow measurement training

<FY2025>

In FY2025, the 8th and 9th Joint Coordination Committee (JCC) meetings were held on June 20 (on-site) and November 12 (on-site and online), respectively. During the meeting, the members reviewed the progress of collaborative research and had discussions for finalizing the research findings.



Photo 9 Groundwater measurement training

In June 16, ICHARM members conducted field survey for the river channel and bed materials for tributaries flowing into the Laguna Lake, with researchers and students of University of the Philippines Los Baños, the main counterpart of the project. ICHARM staffs continued regular guidance for the students who joined the survey, and finally 1 master course student and 1 Ph. D. student could finish their educational program in the University of the Philippines, by using ICHARM's RSR model. In addition, electrical resistivity equipment for groundwater monitoring and aquifer investigation were provided with a training program, and 34 participants could complete the training program.

To facilitate dialogue and gather input form stakeholders in the two target river basins, two workshops were held on September16 in the Pampanga River basin and on October 27 in the Municipality of Bay in Laguna Province, respectively. Based on the discussions in those workshops, the project members produced policy briefs as final outputs of the project, and held another workshop to disseminate the contents of policy briefs on November 12 in Quezon City in Metro Manila. In addition, the final workshop of the project was held on February 27 in Tokyo, and 13 Philippine invitees were stayed in Japan from February 24 to March 3. During the stay, they visited Osaki City, Miyagi Prefecture from February 25 to February 26 for observing a practical example of "River Basin Disaster Resilience and Sustainability by All" and also went to the Lake Kasumigaura in Ibaraki Prefecture on February 28.



Photo 10　Group photo with Osaki city Mayor



Photo 11　Final workshop at University of Tokyo

For more details about the project activities, please visit the SATREPS website.
https://www.jst.go.jp/global/english/kadai/r0109_pilipinas.html

b) Thailand

ICHARM participated in an international research project entitled "Regional Resilience Enhancement through Establishment of Area-BCM at Industry Complexes in Thailand (Principal investigator in Japan: WATANABE Kenji, professor at the Nagoya Institute of Technology)," which was conducted from 2018 to 2024. ICHARM Senior Researcher MIYAMOTO was involved in creating information that companies in industrial parks needed to assess flood risks and plan and implement business continuity management (BCM).

In this project, we first developed a rainfall-runoff-inundation (RRI) model targeting the entire Chao Phraya River basin in Thailand. We also developed a high-resolution inundation analysis model with a 40-meter grid for the Rojana Industrial Park in Ayutthaya Prefecture, which suffered significant damage during the 2011 flood. Then, the two models were connected using the results of the basin-scale model as boundary conditions. Figure 2 shows the inundation area and river discharge simulated by the basin-scale model. The reproducibility of the river flow shows high agreement; although slightly underestimating the inundation area, the simulated results were generally consistent with the range detected by satellites.

After experiencing the 2011 flood, flood walls were constructed around the Rojana Industrial Park to prevent floodwaters from entering the site. The industrial park scale model highlighted the effects of these flood walls, demonstrating that they can effectively protect the industrial park from floods similar to the 2011 flood. However, the simulation also revealed that in more extreme flood scenarios, such as when the maximum historical rainfall occurs simultaneously across all areas in the Chao Phraya River basin, the inundation depth could exceed the height of the flood walls (Figure 3). Like these simulations, we conducted multiple scenario analyses assuming various rainfall patterns, clarifying flood risks for industrial sites, residential areas, and commuting routes by examining the timing of flood onset and cessation, inundation extent, depth, and duration, and the flood control effects and limits of flood walls.

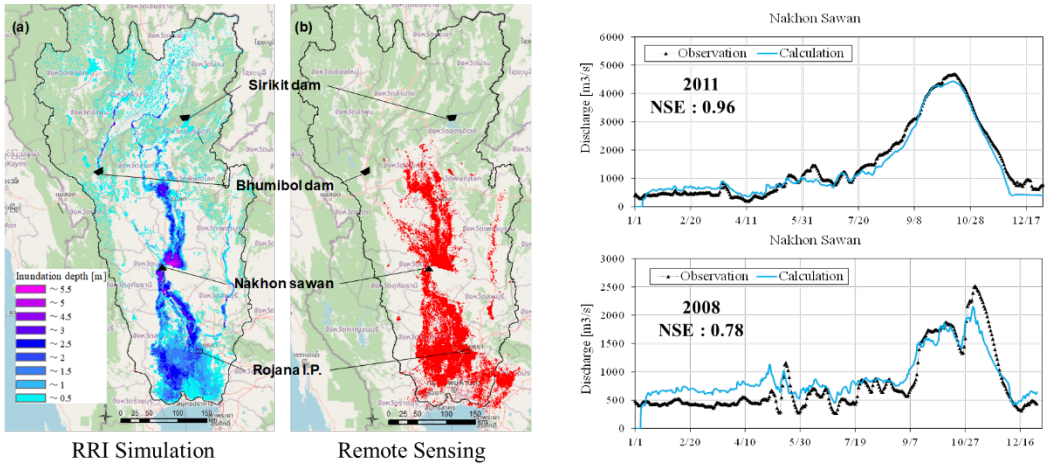


Figure 2 Results of simulations at the scale of the entire Chao Phraya River basin

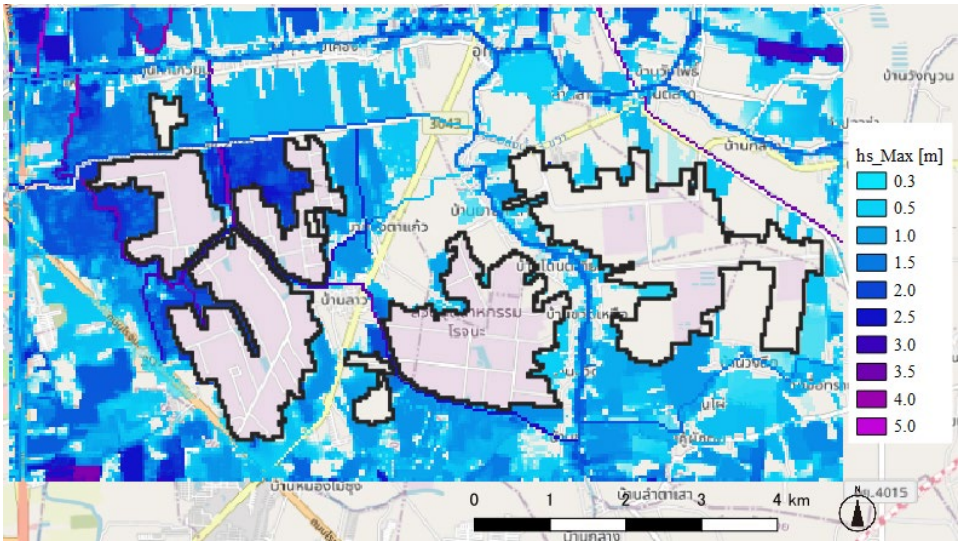


Figure 3 Estimated inundation depth in the Rojana Industrial Park

For more details about the project activities, please visit the SATREPS website.
https://www.jst.go.jp/global/english/kadai/h2908_thailand.html

c)Argentine

The Project “Numerical Weather Prediction and Warning Communication Systems for Densely -populated Areas Vulnerable to Meteorological Disasters" (Principal Investigator: Takemasa Miyoshi, Team Director, Predictive Science Research Team, Division of Mathematical Sciences, RIKEN Center for Mathematical Sciences) (JST Research Period: June 1, 2021 to March 31, 2027) aims to develop a total package of observation, prediction, communication, utilization, and action for heavy rain and flood disaster prevention, and to implement it in society targeting the metropolitan areas of Buenos Aires and Cordoba. To this end, the project will develop a meteorological and hydrological observation network and computers, develop prediction and communication systems, provide disaster prevention education to residents, and train specialized personnel. ICHARM, as a joint research institution, carried out the development of a hydrological prediction system in the target river basin and

accepted trainees from the partner country's institution.

From September 4 to 15, 2023, sixteen Argentine researchers, including Dr. Celeste Saulo, the director of the National Meteorological Service, who is the incoming secretary-general of the World Meteorological Organization, visited Japan, spending roughly one week each in the Kanto area and Kobe City for research meetings, visits to disaster prevention facilities, and other purposes. On September 4, a joint international symposium was held at the Hitotsubashi Auditorium in Tokyo. Executive Director KOIKE Toshio attended the event and delivered a speech as a guest of honor, along with the ambassador of Argentina, the director general of the Japan Meteorological Agency, the director of the Japan Science and Technology Agency (JST), the director of the Japan International Cooperation Agency (JICA), and the director of RIKEN.

On the morning of the 14th, they visited the Public Works Research Institute (PWRI). After observing its Dam Hydraulic Laboratory, Executive Director Koike briefly spoke about ICHARM's research and other activities. Then, the visitors tried out a VR flood experience program, following the instructions of Senior Researcher DENDA Masatoshi.





Photo 12,13 Group photo at ICHARM

An ICHARM research team of Senior Researcher USHIYAMA Tomoki, Senior Researcher NAITO Kensuke, Researcher YAMASHITA Daiki, and Research Specialist TAMAKAWA Katsunori visited Argentina to attend a Joint Coordination Committee (JCC) meeting, research meetings, workshops and field surveys held over 12 days from July 29 to August 9, 2024. During the trip, the team investigated rivers and sewerage systems in these cities, where the country plans to implement flood control measures, and collected information necessary for building a rainfall-runoff inundation model, such as river cross-sections.

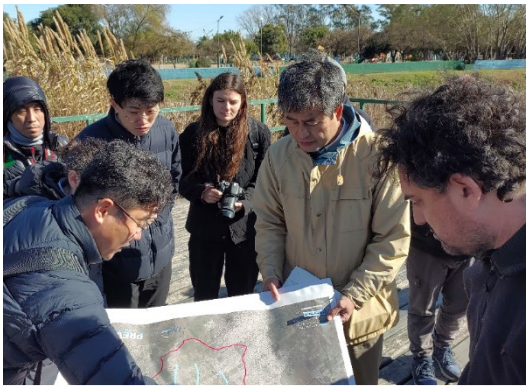




Photo 14,15 Researchers at work during the visit to the Sant Domingo River Basin,

Senior Researcher NAITO delivers presentation

From August 22nd to 31st, 2025, Senior Researcher Tomoki Ushiyama and Specialist Researcher Qin Menglu traveled to Argentina. First, they visited Cordoba, one of the target areas, to inspect the river conditions in the urban area. Next, they visited the National Water Institute (INA) in Buenos Aires Province to exchange ideas and inspect the target rivers in Buenos Aires Province.

Although the target rivers in Buenos Aires Province have a small drainage basin of 240 km², the sewage network is intricately intertwined, and there is a need to develop a method for rapidly calculating water flow, including sewage. Based on the discussions held here, they plan to develop a model using ICHARM in collaboration with the Argentinian researchers.





Photo 16,17 Research presentation by local researchers at the National University of Cordoba, ICHARM researchers (second and third from left) at INA

For more details about the project activities, please visit the SATREPS website.
https://www.jst.go.jp/global/english/kadai/r0309_argentine.html

d) Ghana

ICHARM is participating in the SATREPS research project titled “The Project for the Development of Integrated Sediment and Environmental Management Towards Sustainable Conservation, Disaster Risk Reduction, and Livelihood Improvements in Coastal Areas.” Led by Professor TAJIMA Yoshimitsu of the University of Tokyo, the project aims to address coastal erosion challenges in the Republic of Ghana. ICHARM is responsible for developing monitoring and prediction models for sediment runoff from rivers in the target area.

From September 28 to October 11, 2024, QIN Menglu, a research specialist at ICHARM, visited Ghana as a member of the Japanese research team to discuss and reach an agreement on the project implementation structure with the Ghanaian counterpart, the Cape Coast University Center for Coastal Management (ACECoR: the Africa Centre of Excellence in Coastal Resilience, Centre for Coastal Management), and local partner organizations. In addition to the meetings, the team, in collaboration with ACECoR, visited various study sites, including Volta River reaches downstream of Akosombo Dam and Densu River reaches downstream of Weija Dam, as well as coastal areas, for three days from October 3 to 5.



Photo 18　Visiting the lagoon area at the river mouth of the Volta River





Photo 19,20　A case of severe coastal erosion (left: October 2022; right: October 2024): A house was isolated from land in the last two years due to coastal erosion in the Volta River coastal area

From August 8 to 14, 2025, Research Specialist QIN Menglu visited Ghana to participate in the field survey and the first Joint Coordinating Committee (JCC) meeting. The field survey was conducted for a total of five days, from August 8 to 11 and on August 13. The project team navigated the estuaries of the Volta and Pra Rivers and continued several kilometers upstream along these rivers, while observing riverbed and riverbank conditions and performing trial bathymetric measurements using sonar sensors,





Photo 21,22　Houses destroyed by severe coastal erosion this year, The 1st Joint Coordinating Committee (JCC) Meeting

On October 23, 2025, five people, including Professor Yoshimitsu Tajima of the University of Tokyo, the project leader, Professor Moses Jojo Eghan of the University of Cape Coast (UCC), and Donatus Bapentire Angnuureng, the Ghanaian project manager from ACECoR (Africa Centre of Excellence in Coastal Resilience,

Centre for Coastal Management), visited ICHARM.



Photo 23 ACECoR researchers (three in the center) with accompanying professors and ICHARM researchers

From February 24 to March 17, 2026, Research Specialists QIN Menglu and ARNEZ FERREL Kattia Rubí conducted an ex tensive field campaign in Ghana, focusing on the Lower Pra and Volta Rivers. This work was carried out in collaboration with Ghanaian stakeholders from the Africa Centre of Excellence in Coastal Resilience (ACECoR).





Photo 24,25 Measurements in the Pra River, ICHARM and ACeCOR members during the measurements



Photo 26 ICHARM and ACeCOR members during the measurements

For more details about the project activities, please visit the SATREPS website.
https://www.jst.go.jp/global/english/kadai/r0610_ghana.html