World Bank

a) Brazil: Technical Assistance in Implementing a Pilot of Agriculture Drought Monitoring and Prediction (April 2018-December 2019)

The semi-arid region of northeastern Brazil suffered five consecutive years of drought beginning in 2012, resulting in historically low water levels in major reservoirs. At that time, however, Brazil lacked tools specifically designed to improve the management of agricultural drought. For this reason, the World Bank strongly supported the country's efforts to strengthen knowledge and capacity for advancing water security, with particular emphasis on establishing drought monitoring and prediction.



Figure 1 Location of Ceará State

In response, the World Bank took interest in ICHARM's drought monitoring and prediction system and, in April 2018, commissioned ICHARM to carry out a research project on agricultural drought monitoring and prediction in northeastern Brazil.

The project consisted of the following three components:

1) Development of a drought monitoring and prediction system for northeastern Brazil
2) Development of a drought monitoring and prediction system for Ceará State
3) Evaluation of project outcomes to develop strategies for applying the system to other states in Brazil and to countries in the LAC region

In June 2018, the first face-to-face workshop was held in Fortaleza, the capital of Ceará State, with participation from many organizations, including the World Bank, ICHARM, the Ceará State Meteorology and Water Resources Foundation (FUNCEME), the Secretariat of Agricultural Development of Ceará, the Federal University of Ceará, and the University of Brasília. [1)]



Photo 1 The first face-to-face workshop

Among these organizations, FUNCEME possesses high-resolution land-cover data, multi-site ground-based rainfall observations, and other key datasets, and serves as a leading research institution for meteorological drought monitoring and prediction. For these reasons, two of its researchers were recommended by the World Bank and stayed at ICHARM for one month in October 2018 to receive training. [2)]

On March 26, 2019, the second face-to-face workshop was held in Fortaleza [3]. At the workshop, ICHARM introduced the drought monitoring system developed for Ceará State and the WEB-DHM model for the Banabuiú River basin, and explained the importance of "science facilitators" in linking the systems developed under this project with individual farmers.



Photo 2 The second face-to-face workshop

On June 26, 2019, the Japan-World Bank seminar on water and disasters was held, followed by the Japan-World Bank Deep Dive into Agricultural Drought on June 27 in Washington, D.C. ICHARM presented not only the detailed outcomes of this project but also its past achievements and the latest developments related to its expansion in Africa. These opportunities allowed ICHARM to share the project's results in depth with World Bank counterparts.

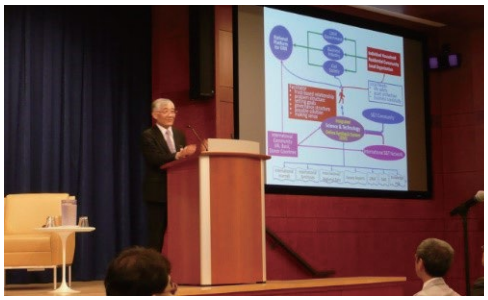


Photo 3 Japan-World Bank seminar on water and

For further details, see the respective issues of the ICHARM Newsletter listed below:

1) https://www.pwri.go.jp/icharm/publication/newsletter/pdf/icharm_newsletter_issue50.pdf
2) https://www.pwri.go.jp/icharm/publication/newsletter/pdf/icharm_newsletter_issue51.pdf
3) https://www.pwri.go.jp/icharm/publication/newsletter/pdf/icharm_newsletter_issue54.pdf

b) India: Technical Support for Advanced Rainfall Monitoring and Prediction with Satellites and Reservoir Inflow Prediction for Optimized Reservoir Operation"

In Kerala State, India, major floods occurred in both 2018 and 2019. In response to requests from the World Bank and the state government, ICHARM and JWA were commissioned to conduct a project demonstrating the potential for flood management through optimized operation of multipurpose reservoirs. The contract period spanned from January 7, 2022 to March 31, 2023.

This project carried out the following activities:

i) An overview of the advanced rainfall monitoring and rainfall and reservoir-inflow prediction system for optimizing dam reservoir operations
ii) Introduction of examples from Japan and/or other countries, along with trial demonstrations of satellite-based rainfall monitoring and prediction in Kerala when possible, or elsewhere if not
iii) Guidance on a recommended program for developing such an integrated system for Kerala, including required information and data, a proposed schedule, and estimated costs

On January 23 and 25, 2023, a workshop organized by the World Bank was held in Kerala with participation from officials of the state government, World Bank staff, and others. Executive Director KOIKE Toshio and several researchers from ICHARM, along with JWA staff, took part. ICHARM presented Japanese

technologies, as well as analysis results of the 2018 and 2019 floods in Kerala using ICHARM's methods. ICHARM also proposed, as the next step, collaboration among stakeholders based on the five "Co's": Co-integration, Co-analyzing, Co-learning, Co-designation and Co-development.





Photo 4,5 Presentation by Director KOIKE, Participants in the workshop organized by the World Bank in Kerala

c) Exchange of Views with the Global Director for Water

On November 20, 2023, Saroj Kumar Jha, the global director of the World Bank's Water Global Practice, visited PWRI together with two colleagues. They held an exchange of views with President FUJITA Koichi, the director of the International Affairs Office of MLIT, and students enrolled in ICHARM's educational programs. During the meeting, the global director made the following remarks:

- The World Bank has set a new vision, "World Free of Poverty on a Livable Planet." It defines a "livable planet" as one where everyone has access to clean water and where irrigation systems are in place to prevent extreme flooding or drought.
- The new vision includes an explicit reference to water – something unprecedented in the World Bank's history. The organization has identified water security one of its six global challenges and is acutely aware that climate change is intensifying the worldwide crises in water security and access.



Photo 6 World Bank officials with ICHARM staff and students

In addition, on January 30, 2024, an online seminar was held for World Bank staff to further promote mutual understanding.

d) South Sudan: Knowledge exchange on flood and drought management between South Sudan and Japan

ICHARM was commissioned for the project “Knowledge Exchange on Flood and Drought Management between South Sudan and Japan” through a single-source contract from the World Bank for the contract period from February 5 to August 31, 2025. The objective was to provide the Ministry of Water Resources and Irrigation and other institutions involved in flood and drought management in South Sudan with the following:

1) An overview of science and technology for flood and drought monitoring, forecasting and early warning, including practical examples
2) Trial demonstrations of integrated hydrological forecasting and recommendations for developing flood and drought monitoring and early warning systems in selected small river basins in South Sudan
3) Knowledge exchange through site visits and workshops in Japan aimed at capacity development for local staff

Regarding capacity development, in August 2025, about 20 trainees from South Sudan and neighboring countries visited Japan to observe flood-control and irrigation technologies in the middle reaches of the Tone River and in the Yoshida River and Naruse River basins in Miyagi Prefecture. ICHARM staff also delivered lectures on topics such as climate change and rainfall forecasting, and Professor HONMA Koki of Tohoku University gave a presentation on the impacts of climate change on agriculture. In addition, hands-on training was conducted using the RRI model to simulate flooding in a tributary of the Nile River near Juba.



Photo 7 Training Participants at the Watarase Retarding Basin



Photo 8 Training Participants at hands-on training

e) India: Technical Support for Advanced Forecast of Rainfall and Reservoir Inflow for Optimized Reservoir Operation

ICHARM implemented the World Bank–commissioned project “Technical Support for Advanced Forecast of Rainfall and Reservoir Inflow for Optimized Reservoir Operation” in India during the contract period from March 14 to December 31, 2025. The project was conducted in collaboration with JWA and involved the following activities:

1) Assessment of the feasibility of introducing an advanced rainfall and reservoir inflow forecasting system and identification of areas for improvement

2) Assessment of the feasibility of optimizing reservoir operations by introducing an advanced rainfall and reservoir inflow forecasting system
3) Two online knowledge-sharing training sessions on advanced rainfall and inflow forecasting and on integrated reservoir operation systems, as well as hybrid training sessions in Japan that included site visits
4) Proposal of a knowledge-exchange program to be conducted jointly with academic and research institutions in India

From May 12 to 16, 2025, Executive Director KOIKE and several ICHARM researchers visited India to conduct a field survey and hold discussions with relevant organizations in order to understand the challenges in dam operation and the needs for flood protection in the Krishna River basin, which spans the states of Karnataka and Andhra Pradesh, and to collect disaster records, observational data, and other information necessary for analysis.

From November 18 to 21, 2025, ICHARM organized site visits and workshops on integrated reservoir operation for dam groups in Japan. The program aimed to strengthen the basic capacity of Indian government officials in dam reservoir management through enabling them to observe Japan's advanced rainfall forecasting and reservoir operation systems, as well as through technical training provided by ICHARM and JWA. A total of eight participants from the Indian government and the World Bank, along with three from JWA, took part in site visits to dam facilities in the Shikoku and Kinki regions and attended lectures delivered by ICHARM researchers, Professor SUMI Tetsuya of Kyoto University, and JWA staff on topics such as climate change, rainfall forecasting, reservoir inflow prediction, sedimentation countermeasures, and dam safety management. The delegation also paid a courtesy visit to MLIT.



Photo 9 Meeting with the Karnataka Water Resource Department



Photo 10 Site visit to the Almatti Dam