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

ICHARM

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ICHARM
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Message from Executive Director

Coevolution of sound water use and resilience to water-related disasters

At the 2nd Stakeholders' Consultation Meeting, the 10th World Water Forum (Bali, October 11-13 2023)
第 10 回世界水フォーラム
第 2 回関係者協議会にて
(バリ、2023 年 10 月 11-13 日)

The water cycle between the Earth's surface and the atmosphere plays a major role in the formation and conservation of the climate system and diverse ecosystems. Realizing this, humans have consistently strived to understand the temporal and spatial variability of the water cycle, to introduce regulatory functions for water storage, flow, and purification, and thus to stabilize water use and reduce the risk of water-related disasters.

Water is closely linked to food and energy, and this water-food-energy nexus underpins the critical dimensions comprising the quality of life, such as health, education, and labor. In addition, the water environment and water-related disasters are closely related to the natural environment on land and below water and to the human-made environment, including cities, consumption and production, and industry and infrastructure. All these factors underlie the social components such as poverty, gender, equality, and peace. In this respect, water has strong links with all SDGs. Therefore, it is necessary to build a cross-sectoral decision-making framework that transcends the boundaries of various goals, disciplines and sectors.

Human emissions of greenhouse gases have changed the natural variability of the climate, causing water-related disasters to occur more frequently with unprecedented severity in many parts of the world. As a result, natural hazards have exceeded the capacities of the water regulatory functions that were designed, constructed, and operated based on past observation data. Then, complex, cascading, and systemic risks that are usually implicit in social, economic, and environmental systems have suddenly emerged, threatening humanity beyond the boundaries of time and space.

Therefore, building a sustainable society requires enhancing its resilience to natural hazards whose intensities surpass design standards. We need to develop integrated strategies, such as rearranging natural spaces and urban areas, to maximize the roles and functions of ecosystems. It is necessary to restore and maintain the functions of water that can strike a balance between the activities of human society and the conservation of the natural environment, to enhance resilience to increasingly severe and frequent water-related disasters, and to create a society that can develop sustainably through the cooperation of all its members.

The future is still uncertain. Therefore, scientific knowledge must be actively utilized. Solutions must be found through cross-sectoral, evidence-based decision-making and implemented without imposing any extra burdens on specific regions, groups, or generations. To promote these efforts, it is essential to integrate knowledge across disciplines, create frameworks that link cutting-edge science and technology with individual actions, and develop human resources to drive these efforts forward.

October 31, 2023
KOIKE Toshio
Executive Director of ICHARM

水利用の健全性と水災害に対するレジリエンスの共進化

地球表層と大気中を循環する水は、地球の気候システムと多様な生態系の形成・維持に重要な役割を担っています。人々は、水循環の時間的・空間的変動とその動態の理解を進め、水を貯え、流し、浄化する調節機能を導入し、水を安定的に利用し、水災害リスクを軽減してきました。

水は食料、エネルギーと密接な関係を有し、これらの相互作用系によって、健康、教育、労働などの生活の質を支えています。また、水環境と水災害は、陸上、水中の自然環境や、都市、消費と生産活動、産業と社会基盤等の人工環境と深く関わりを持ちます。これら全ての要素によって、貧困、ジェンダー、平等、平和など社会的要素が成り立っています。このように水はすべての持続可能な開発目標と構造的に関係しています。したがって、様々な分野を超えて統合された意思決定の枠組み構築が必要とされています。

人類による温室効果ガスの排出によって、もともと自然の変動性を有する気候が変化し、水災害がより頻繁に、また過去に見られない深刻さで世界各地において発生しています。その結果、過去の観測データに基づいて設計、建設、運用されてきた水の調節機能を災害外力が超過し、いつもは社会、経済、環境システムの中で潜んでいる、複雑で、連鎖的で、構造的なリスクが突然姿を現し、時空間の境界を越えて人類に脅威を与えています。

したがって、持続可能な社会の構築には、設計値を超える外力に対するレジリエンスの強化が求められており、生態系の価値や機能を活用できるように自然空間や都市空間を再配置するなどの統合戦略が不可欠となっています。人間社会の営みと自然環境の保全に果たす水の機能が適切にバランスしている状態を回復・維持し、激甚化・頻発化する水災害に対するレジリエンスを高め、持続的に発展できる社会づくりを、社会のすべての構成員の協力によって実現する必要があります。

未来は依然として不確実です。したがって、科学的根拠を積極的に活用し、分野横断的で科学的根拠に基づく意思決定によって解決策を見出し、特定の地域、集団、世代へ皺寄せすることなく、実行することが求められます。その推進には、分野を超えた知の統合と、最先端の科学技術と一人ひとりの行動をつなぐ仕組みづくりと、それを推進する人材の育成が不可欠です。

Contents

Special Topics

7th ICHARM Governing Board Meeting
第 7 回 ICHARM 運営理事会会合を開催しました

ICHARM held its 7th Governing Board (GB) Meeting on September 6, 2023. In accordance with the agreement signed between the government of Japan and UNESCO on February 13, 2020, the GB meeting has since been held once a year to review and adopt the report on ICHARM's yearly activities and ICHARM's work plan. Like last year's, this year's meeting took place in a hybrid format, with the board members participating either in person or online.

Chaired by President FUJITA
議長を務めた土木研究所
藤田光一理事長

As the agreement speculates, seven GB members were present at the meeting, including President of PWRI FUJITA Koichi, who chaired the meeting.

Moderated by ICHARM Research Specialist NAGUMO Naoko, the meeting began with opening remarks by President Fujita. In his opening remarks, he noted that floods and other water-related disasters have become more frequent and severe worldwide due to climate change, and that the results of the research and other activities are expected to be applied and implemented in order to address this challenge. He continued that ICHARM, with its mission to reduce water-related disaster risks around the world, will execute each of its activities while embracing the pioneering spirit of PWRI and utilizing the wisdom and knowledge it has accumulated for over 100 years. Lastly, he asked the GB members to provide ICHARM with candid opinions and suggestions from a wide range of perspectives and expertise.

Then, Executive Director KOIKE Toshio and Research Specialist QIN Menglu explained the activities ICHARM carried out during FY2022, and the GB members examined them following the presentation.

The executive director also explained the revisions made to the ICHARM Work Plan for FY2022-2023, which had been adopted at the previous board meeting. The GB unanimously approved all the revisions after a thorough examination.

To wrap up the meeting, each GB member made an overall comment. Then, in his closing remarks, Vice President of PWRI KUBO Kazuyuki thanked all the GB members for their support, and announced that all the comments and suggestions provided by the GB members will be included in the ICHARM Work Plan and that, based on that, ICHARM will do its utmost to achieve the mission and meet the expectations through various projects and activities.

ICHARM will continue to work vigorously based on the revised work plan approved at this meeting and on the advice given by the GB members.

The documents and presentation slides used for the meeting are available at the following address:

https://www.pwri.go.jp/icharm/about/governingboard/governingboard_20230906.html

The following are the governing board members with a summary of their comments:

Groupphoto
集合写真

ICHARM は 2023 年 9 月 6 日に第 7 回 ICHARM 運営理事会会合を開催しました。この運営理事会会合は、2020 年 2 月 13 日に署名・締結された日本国政府とユネスコとの協定（以降、「協定」といいます）に基づき、ICHARM の活動に関する報告書の審査、及び事業計画を審査・採択するなどのために、年に一度開催しています。今回は前回と同様、対面方式とオンライン会議方式の両方を用いるハイブリッド方式で開催しました。

本会合には、協定の規定により、議長となる土木研究所・藤田光一理事長を含めて 7 名の委員が出席しました。

南雲直子専門研究員の司会のもと、まず藤田理事長が開会挨拶を行いました。開会挨拶では、気候変動の影響により世界各地で洪水などの水災害がますます頻発化・激甚化しつつあり、この課題に対処するためには研究等の活動成果を現場に適用・実装していく必要があること、世界の水関連災害の被害軽減を使命とする ICHARM は、100 年以上の蓄積を有する土木研究所の開拓精神を抱きつつ、各活動に取り組んでいきたいと考えていることを述べ、委員の皆様に対し広範な視点から意見や示唆を頂くようお願いしました。

次に、小池俊雄センター長および秦梦露専門研究員から、2022 年度の ICHARM 活動を報告し、その審査が行われました。

続いて、前回の運営理事会会合で採択された 2022-2023 年度の事業計画について、研究実施箇所などの変更を反映した修正版が審査され、満場一致で採択されました。

最後に、各委員から総括のコメントを頂いた後に、土木研究所久保和幸理事が閉会挨拶を行いました。閉会挨拶では、委員の支援に感謝の意を表するとともに、いただいたご意見を今後の ICHARM の活動に反映させ、期待に応えられるよう ICHARM として全力を尽くすことを宣言しました。

ICHARM では、本会合で採択いただいた事業計画に基づき、また委員の皆様よりいただいたご助言などを踏まえ、今後とも精力的に活動に取り組んで参ります。

なお、本会合での配布資料および発表スライドは、下記 ICHARM ホームページでご覧いただけます。

https://www.pwri.go.jp/icharm/about/governingboard/governingboard_j_20230906.html

以下、会合における委員の主なご発言です。

【政策研究大学院大学（GRIPS）理事・副学長　黒澤昌子委員】
- ICHARM の高い質の教育プログラムは高く評価。
- 特に昨年は、多くの GRIPS 学生が著名な政府関係者や国際機関職員と議論する機会を得ることができ、貴重な経験となった。

【国土交通省　技監　吉岡幹夫委員】
- 第 4 回アジア太平洋水サミット（2022 年 4 月）において採択された「熊本水イニシアティブ」の推進に際しては ICHARM の研究や国際ネットワークが重要。
- 国土交通省として ICHARM の活動を引き続き支援。

【国連防災機関（UNDRR）駐日代表　松岡由季委員】
- 今年 5 月に完了した仙台防災枠組の実施中間レビューの結果に鑑み、仙台防災枠組の実施をさらに加速化するためにも ICHARM の引き続きの貢献を期待。特に、UNDRR や WMO が大きな役割を担っている、国連事務総長が昨年立ち上げた「すべての人に早期警報システムを（Early Warning for All Initiative）」というイニシアティブに鑑み、早期警報に関する分野に期待。
- ICHARM 活動報告書にジェンダー関連の統計が含まれていることを高く評価。活動内でのさらなるジェンダーバランスの改善に期待するとともに、業績評価指標にジェンダーに関する指標を含めることを提案。

【ユネスコ 水科学局長兼政府間水文学計画（IHP）事務局長　アブ・アマニ委員】
- 世界に 35 あるユネスコセンターの中でも ICHARM は「卓越した（outstanding）」なセンターであり、国際洪水イニチアチブ (IFI) などの国際パートナーシップ活動は重要。
- ジェンダーとアフリカはユネスコの最優先事項。ICHARM がユネスコと協働して進めた西アフリカプロジェクトを更に推進したい。
- 成果を管理できる行動評価指標（performance indicator）の作成は重要。
- 協定 6 条に基づいて、ICHARM の活動に関心のある加盟国機関の招待の機会を持つべき。

【水・エネルギー・災害研究に関するユネスコチェア (WENDI) チェアホルダー　立川康人委員】
- RRI モデルを改良した降雨土砂流出モデル（RSR モデル）について、他国への適用に大きく期待。
- 防災・減災分野での ICHARM の世界的貢献や、特に ICHARM の教育課程の卒業生が自国へ彼らの経験や知識を持ち帰ることへの高い評価。
- ファシリテータを育成するためのプラットフォーム活動のベト

【KUROSAWA Masako, Vice President, National Graduate Institute for Policy Studies (GRIPS)】

- Highly recognizes ICHARM's quality educational programs.
- Particularly appreciates valuable experiences ICHARM provided for GRIPS students last year, especially the opportunity in which they had discussions with prominent officials of governments and international organizations.

【YOSHIOKA Mikio, Vice Minister for Engineering Affairs, Ministry of Land, Infrastructure, Transport and Tourism (MLIT)】

- Highly values ICHARM's research and network in promoting the Kumamoto Water Initiative, adopted at the 4th Asia-Pacific Water Summit in April 2022.
- Mentions MLIT's continued support for ICHARM.

【MATSUOKA Yuki, Head, United Nations Office for Disaster Risk Reduction (UNDRR) Kobe Office】

- Drawing attention to the outcome of the Mid-term Review of the implementation of the Sendai Framework for Disaster Risk Reduction which was completed in May this year, expresses expectations for ICHARM's contributions to further help accelerate the implementation of the Sendai Framework. In particular, the area of early warning is relevant in this context for ICHARM, considering the on-going "Early Warning for All Initiative" which was launched by the UN Secretary-General last year and has been led by WMO and UNDRR.
- Highly recognizes ICHARM's gender-related statistics in its activity report and suggests further improvement of gender balance within its activities and inclusion of gender related performance indicators.

【Abou AMANI, Director of the Division of Water Sciences and Secretary of the Intergovernmental Hydrological Programme, United Nations Educational, Scientific and Cultural Organization (UNESCO)】

- Praises ICHARM for being an outstanding center among the 35 UNESCO centers worldwide and mentions the importance of international partnership activities, such as the International Flood Initiative.
- Points out gender and Africa as UNESCO's top priorities. Wants further promotion of the West Africa project that ICHARM has been working on in collaboration with UNESCO.
- Advises ICHARM to prepare performance indicators to evaluate its achievements more objectively.
- Recommends inviting other member institutes that are interested in ICHARM's activities in accordance with Article 6 of the agreement between the Japanese government and UNESCO.

【TACHIKAWA Yasuto, Chair Holder, UNESCO Chair on Water, Energy and Disaster Management for Sustainable Development (WENDI)】

- Expresses high expectations to expand the application of the Rainfall-Sediment-Runoff (RSR) model, an improved version of the RRI model, to other countries.
- Praises ICHARM for worldwide contributions to disaster risk reduction and very impressed with the graduates from ICHARM's educational programs who contribute to disaster management in their native countries by bringing back the experiences and knowledge they learned.
- Hopes that the platform for facilitator training will also be implemented in Vietnam.

【Stefan UHLENBROOK, Director of Hydrology, Water and Cryosphere, World Meteorological Organization (WMO)】

- Highly recognizes the development of a model that can also be used to ensure food security and the study on an early warning system by a Sri Lankan doctoral student.
- Hopes that ICHARM will play a leading role in achieving the goals set by the Sendai Framework for Disaster Reduction.
- Expects ICHARM to support WMO in carrying out projects, such as the Associate of Flood Management Program (APFM).

(Written by KURIBAYASHI Daisuke)

ナムへの展開を期待。

【世界気象機関（WMO）水文・水および雪氷圏担当部長　ステファン・ウーレンブルック委員】

- 食糧安全保障にも貢献するモデル開発や、スリランカの博士学生が行った早期警報システムに関する研究などに対して高い評価。
- 仙台防災枠組の達成においてICHARMは重要な役割を負ってほしい。
- Associate of Flood Management Program (APFM) など WMO が運営しているプロジェクトに対するICHARMのサポートを期待。

Research

HyDEPP-SATREPS Project updates
HyDEPP-SATREPS プロジェクト活動報告

The Project for Development of a Hybrid Water-Related Disaster Risk Assessment Technology for Sustainable Local Economic Development Policy under Climate Change in the Republic of the Philippines (HyDEPP-SATREPS) is a joint research project between Japan and the Philippines under the Science and Technology Research Partnership for Sustainable Development (SATREPS). Under this project, ICHARM has been conducting various activities.

The following updates the recent activities of this SATREPS project, including reports about visits by Japanese members to the Philippines in June, August, and September 2023 and the training conducted for inviting Philippine members in Japan in July and August 2023. The training in Japan was provided for five groups organized by research theme. The representatives of each group report their activities.

Visits
June: the 4th JCC meeting and a field study in the Pampanga River basin

A group of ICHARM researchers, led by Executive Director KOIKE Toshio, attended a business trip to the Philippines on June 20-24, 2023. The members included Senior Researcher USHIYAMA Tomoki, Researcher NAITO Kensuke, Research Specialists TAMAKAWA Katsunori, Shrestha Badri Bhakta, Ralph Allen Acierto, AIDA Kentaro, and NAGUMO Naoko, and Research Assistant Ballaran, Vicente Jr. G. The purpose of this trip was to hold a workshop for stakeholders in the Pampanga River basin, attend the 4th Joint Coordination Committee (JCC) meeting, conduct a field study, and have research discussions with project members in the Philippines.

The workshop, entitled "Workshop on Flood and Agricultural Damage Monitoring Technology for Supporting Rapid Recovery," was held on June 20 in San Fernando City, Pampanga Province, and was attended by 64 participants, including officers from local governments and related agencies and university officials in the Pampanga River basin (Photo 1). In this workshop, the ICHARM members explained a flood monitoring system and an agricultural damage monitoring system using satellite images, both of which were developed mainly by ICHARM, and also conducted hands-on training on these systems.

At the 4th JCC meeting on June 22, each research group reported on their research progress, including the results of this workshop. This meeting provided a valuable opportunity for the Japanese and Philippine project members, as well as JICA officials, to meet face-to-face and discuss research plans and policies. Opportunities like this will contribute significantly to proceeding with this research project with a good understanding of each other (Photo 2).

ICHARM は、「地球規模課題対応国際科学技術協力プログラム(SATREPS)」に基づくフィリピンとの共同研究プロジェクト「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（略称：HyDEPP-SATREPS)」において、日比両国の研究機関とともに様々な活動を行っています .

今回は、6 月、8 月及び 9 月の日本側メンバーの現地訪問について報告、および 7 月から 8 月にかけてフィリピン側メンバーを招待して行われた訪日研修についての参加者の報告レポートを紹介します。訪日研修はテーマごとに全 5 グループに分かれて行われたため、各グループ代表 1 名、計 5 名からの報告レポートを紹介します。

現地訪問
6 月渡航：合同調整会議（JCC Meeting）およびパンパンガ流域現地視察

2023 年 6 月のフィリピン出張には、小池俊雄センター長ほか 8 名（牛山朋來主任研究員、内藤健介研究員、玉川勝徳専門研究員、Shrestha Badri Bhakta 専門研究員、Ralph Allen Acierto 専門研究員、会田健太郎専門研究員、南雲直子専門研究員、Ballaran, Vicente Jr. G. リサーチアシスタント）が参加しました。この出張の目的は、パンパンガ川流域の関係者を対象としたワークショップの開催、本プロジェクトの第 4 回合同調整委員会への出席、および現地調査で、フィリピン側プロジェクトメンバーとの研究打合せも行いました。

6月20日にパンパンガ州サンフェルナンド市で開催したワークショップ は、「Workshop on Flood and Agricultural Damage Monitoring Technology for Supporting Rapid Recovery」と題するもので、パンパンガ川流域の自治体および関係

機関、大学関係者らを含む 64 名が参加しました（写真 1）。このワークショップでは、ICHARM が中心となって開発している洪水モニタリングシステムや、衛星画像を使った農業被害モニタリングシステムを紹介するとともに，それらのハンズオントレーニングも実施しました。6 月 22 日の第 4 回合同調整会議では、各研究グループがこのワークショップの成果を含む研究進捗を報告しました。この会議は、日本側とフィリピン側メンバー、JICA 関係者らが対面で集まって研究計画や方針を議論する貴重な機会となり、この先の円滑な研究推進に大いに役立つと考えられます（写真 2）。

8 月渡航：ラグナ流域およびパンパンガ流域における現地視察

2023 年 8 月 21 日から 8 月 24 日にかけて、Abdul Wahid Mohamed RASMY 主任研究員と Ballaran Vicente Jr. G. リサーチアシスタントがフィリピンに渡航しました。今回の渡航は、1）ラグナ湖流域内の研究対象地域の視察、2）フィリピン大学ロスバニョス校における WEB-RRI モデル（水とエネルギー修士に基づく降雨氾濫流出モデル）のトレーニングの実施と実装環境の構築、3）パンパンガ川流域内の研究対象地域の視察，そして 4）研究対象流域内ヌエバエシハにある灌漑水路の視察を目的とし、次の活動を行いました。

2023 年 8 月 21 日はラグナ州サンタクルス市とベイ市の沿岸バランガイを訪問し、洪水関連情報を収集するために無作為の聞き取り調査を行いました。翌 8 月 22 日には、WEB-RRI モデルに関する基本的なトレーニングを 16 名の参加者を対象に開催し（写真 3）、さらに、フィリピン大学ロスバニョス校 のプロジェクトオフィスにて WEB-RRI モデル実装のための初期設定を行いました。8 月 23 日には、パンパンガ川流域カンダバ市のバランガイ、サンアグスティンから上流に向かってアラヤット橋とサンイシドロ橋の観測所までパンパンガ川流域の視察を行いました。最終日の 8 月 24 日には、パンタバンガンダム、マシウェイダム、発電所、リサールダムなどの構造物を含むパンパンガ川上流統合灌漑システム（UPRIIS）を視察し、その後 UPRIIS の洪水予測技術者と意見交換を行いました。

今回の現地渡航を通して、現在進行中の WEB-RRI モデルの開発・改良に貢献しました。

9 月渡航：現地観測

2023 年 9 月 10 日から 9 月 13 日まで、ICHARM、滋賀県立大学、名古屋大学の HyDEPP-SATREPS プロジェクトメンバー 7 名がフィリピンのラグナ湖流域を訪問しました。

最初の二日間はフィリピン大学ロスバニョス校（UPLB）チームに同行してもらい、ラグナ湖流域の洪水・土砂流出に関する現地調査及びフィリピン側のメンバーに観測手法の研修を実施しました。初日は、

Photo 1 Participants in the workshop in San Fernando City
写真 1　サンフェルナンド市で開催したワークショップの集合写真

Photo 2 Participants in the 4th JCC meeting
写真 2　第 4 回合同調整会議の集合写真

(Written by AIDA Kentaro and NAGUMO Naoko)

August: Field studies in the Laguna Lake basin and the Pampanga River basin

Senior Researcher Abdul Wahid Mohamed RASMY and Research Assistant Ballaran Vicente Jr. G. visited the Philippines from August 21 to 24 with the following objectives: 1) conducting ocular inspections at the Laguna Lake basin study sites; 2) providing basic WEB-RRI (Water and Energy Budget-based Rainfall Runoff Inundation) modeling training and starting framework setup at the project office in the University of the Philippines Los Baños (UPLB); 3) inspecting study sites in the Pampanga River basin; and 4) visiting the irrigation system in Nueva Ecija.

On August 21, the two researchers visited coastal barangays in Laguna's Sta. Cruz and Bay municipalities and conducted random interviews to gather flood-related information. On August 22, a basic training session on WEB-RRI modeling was held for 16 participants (Photo 3). Additionally, the initial setup of the WEB-RRI framework at UPLB's Water Center was carried out. On August 23, they conducted an ocular inspection in the Pampanga River basin, starting from Barangay San Agustin of Candaba and extending upstream to gauging stations at Arayat Bridge and San Isidro Bridge. On August 24, they visited the Upper Pampanga River Integrated Irrigation System (UPRIIS), including structures such as the Pantabangan Dam, the Masiway Dam, a power plant, and the Rizal Dam. They also had discussions with UPRIIS flood forecasting engineers.

Photo 3 Participants in the basic training session on WEB-RRI Modeling
写真 3　WEB-RRI モデルトレーニング参加者との集合写真

The trip successfully achieved its objectives, contributing to improving ongoing hydrologic modeling using the WEB-RRI model.

(Written by Ballaran Vicente Jr. G.)

September: a field survey

From September 10 to 13, seven members of the HyDEPP-SATREPS project visited the Philippines. Research Specialist QIN Menglu participated from ICHARM with the other members from the University of Shiga Prefecture and Nagoya University.

Photo 4 The on-site training of flow discharge measurement
写真 4　現場で行う流量観測トレーニングの様子

A field survey and on-site training were conducted during the first two days. We visited the flood-prone area of Bay City, accompanied by the University of the Philippines Los Baños (UPLB) team. With the assistance of UPLB members, we conducted interviews with local residents to gather information about floods and their experiences dealing with floods. The next day, we visited the Santa Maria River and the Pagsanjan River to investigate the basin-scale sediment runoff processes alongside UPLB members, and provided on-site training on measuring flow and sediment conditions, including water level, water discharge, and suspended sediment sampling (Photo 4). In addition to the field survey, we joined a workshop at UPLB to share research updates among project groups and conducted a training program on our recently developed model, i.e., the Rainfall and Sediment Runoff model (the RSR model).

Throughout the four-day field survey with the members from the Philippines, active discussions and a dynamic exchange of ideas among the members helped define the roles and directions of the research topics in each group and helped us approach the project's final goal.

(Written by QIN Menglu)

Bay City を訪問し、地元住民に水害に対する聞き取り調査を実施しました。翌日は、Santa Maria River と Pagsanjan River にて、流域の地理条件や河相などを把握するための調査を行い、流域の土砂条件、河道の水位、流量、浮遊砂の測定手法について、現地で研修を行いました。（写真 4）。それ以外に、グループ間で研究の最新情報と進捗状況を共有するためのワークショップに参加し、そして ICHARM が最近開発した降雨・土砂流出モデル（RSR-model）のトレーニングも実施しました。

４日間の現地訪問を通じて、日本・フィリピン両国のメンバーが共にラグナ湖流域の土地・社会条件を調査し、プロジェクトにおける各研究グループの役割や方向性を十分議論することができました。

Training in Japan
Group 1: Data management technology

Francis John Famarin FADEROGAO, University Researcher, University of the Philippines, Los Baños

Allan Tutanes TEJADA, Jr., MS Graduate Fellow, University of the Philippines, Los Baños

Two project members from the University of the Philippines Los Baños, Mr. Francis John F. Faderogao of the College of Public Affairs and Development and Engr. Allan T. Tejada, Jr. of the Interdisciplinary Studies Center for Water, participated in the Data Management Training for Water-related Disaster Risk Assessment from July 25 to August 2. The training included a series of lectures on hydro-climate access and visits to some of the advanced data server facilities in Japan. The activity is spearheaded by Dr. YASUKAWA Masaki of the University of Tokyo and Research Specialist TAMAKAWA Katsunori of ICHARM.

The participants attended an introductory lecture on the features of the Data Integration and Analysis System (DIAS, https://diasjp.net/), including climate model selection and rainfall bias correction. Six global climate models (GCMs) from CMIP5 model outputs were identified to have a good spatial correlation with the Philippine local climate, as per the lecture of Dr. TAMAKAWA. The dissemination and application of these future climate projections in the target basins of HyDEPP- SATREPS were identified. They also paid a visit to the server facilities of the University of Tokyo and

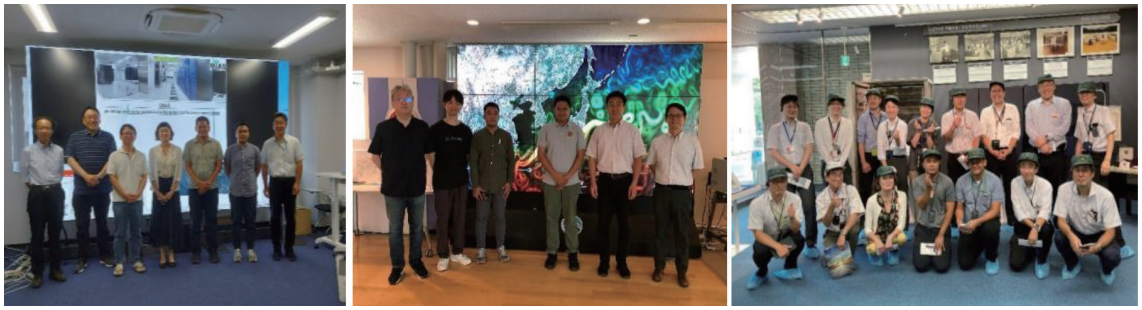


Photo 5 (left) Lectures on the features of DIAS at the University of Tokyo; (center) Visit to the Earth Simulator of JAMSTEC; and (right) Visit to the Hitachi Kanagawa Factory

the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), and to the server production facility of Hitachi. The participants learned about the available satellite-based global rainfall products during their visit to the Japan Aerospace Exploration Agency (JAXA). They are expected to re-echo the learnings and experiences from this training to the rest of the Group 1 members to work on the possible ways forward for the Philippine side.

(Written by Budz Tejada)

Group 2-a: Hydro-agricultural modeling technology

Bryan Clark Bulak HERNANDEZ, Research Fellow, University of the Philippines, Diliman

Joan Cecilia Catubig CASILA, Associate Professor, University of the Philippines, Los Baños

From July 25 to August 2, Dr. Joan Cecilia Casila from the University of the Philippines-Los Baños and Dr. Bryan Hernandez from the University of the Philippines Diliman participated in the HYDEPP-SATREPS Hydro-agricultural Modeling Technology Training program.

The intensive training aimed to enhance their understanding of hydro-agricultural modeling, covering topics like numerical modeling and practical experience in various hydrological regions in Japan. The participants highlighted the vital link between agriculture and climate, as rainwater is essential for crops like rice and wheat, while hydro-agricultural models aid in assessing historical patterns and projecting future water resources amidst climate change.

Photo 6 Training participants at the Naruko Dam (left) and with the lecturers (right)

Under the guidance of Senior Researcher Abdul Wahid Mohamed Rasmy of ICHARM, the two training participants explored the Water and Energy Budget-based Rainfall-Runoff-Inundation (WEB-RRI) model. This model enhances flood and drought risk assessment and integrates with climate models. They also improved their skills in handling hydrological data, using tools like the DIAS server, GRADS, and Google Earth Engine. Their discussions with Professor. HOMMA Koki of Tohoku University highlighted the adaptability of the simulation model for rice-weather relations (SIMRIW) and its integration with the WEB-RRI model. Visiting Professor. HOMMA's agricultural plots offered valuable insights into his research work. They were also grateful to ICHARM Research Specialists TAMAKAWA Katsunori, Ralph Acierto, and AIDA Kentaro for their time and expertise during the training.

This training program expanded the skills of the two participants as environmental modelers, equipping them to tackle various research challenges. At UP-NHRC, where they study watersheds of different sizes, the WEB-RRI-SIMRIW model can make significant contributions to hydro-agricultural modeling.

(Written by Bryan Hernandez)

Group 2-b: River monitoring technique

Rubenito Melendres LAMPAYAN, Professor, University of the Philippines, Los Baños

Roger Apuntar LUYUN, Jr., Professor University of the Philippines, Los Baños

From July 25 to August 2, Dr. Roger A. Luyun Jr. and Dr. Rubenito M. Lampayan, who are both professors from the University of the Philippines Los Baños and the group leaders of the HyDEPP-SATREPS project in the Philippines, attended a nine-day training course on River Flow Monitoring Technologies in Tsukuba, Japan. The training aimed at upgrading their knowledge of river flow monitoring technologies to support the river flow monitoring activities in the Philippines under the HYDEPP-SATREPS project.

Facilitated by ICHARM, the first four days of the training were devoted to lectures and discussions on river flow measurements with non-contact current meters, generating and maintaining an H-Q curve, and hands-on water river flow measurements. The following four days were devoted to site visits, and the final day to presentations of the learnings gained by the participants during the training. During the lecture and discussions, it was emphasized that any hydrological studies, including flood risk assessment, require reliable and high-quality river flow data. Good discharge data depends on a reliable H-Q curve, but maintaining or developing a reliable H-Q curve is not an easy task, especially under high flow conditions.

From July 29 to 31, the two participants took field trips to Osaki, Shiogama, Matsushima, and Fukushima, in which

they visited a dam, an irrigation system, rice fields, and flood control sites, as well as observed field experiments and rehabilitation projects. They also had a chance to visit the Sekiyado Castle Museum, the Metropolitan Outer Area Underground Discharge Channel, and the Japan Aerospace Exploration Agency in Tsukuba, from which they learned how the Japanese government strives to protect its citizens from disasters such as floods.

Photo 7 Participants taking a 10-second video with a cellphone to measure surface water velocity

The training provided the participants with fruitful learning experiences, and the new knowledge they gained will be integrated into their teaching syllabus and course curriculum. In addition, it will also be used as input in developing new research proposals that require river discharge measurements.

Meanwhile, they also enjoyed fantastic Japanese food and rich Japanese culture and deeply appreciated the kindness and hospitality of the Japanese people that they met at various places (including the trainers and ICHARM support staff), all of which made their short stay in Japan worth remembering.

(Written by Rubenito Lampayan)

Group 3: Flood hazard mapping and risk assessment technology

Paul Edrine Cruz MAPOY, Science Research Analyst, University of the Philippines, Los Baños

Christine Jane Escanillan RAMACULA, Science Research Analyst, University of the Philippines, Los Baños

From July 25 to August 2, two project members from the Philippine side, Christine Jane E. Ramacula, an engineer, and Paul Edrine C. Mapoy, a fellow science research analyst from the College of Economics and Management (CEM) of the University of the Philippines Los Baños (UPLB), attended the Group 3 long course training on flood hazard mapping and risk assessment technology. This course was supervised by Professor OHARA Miho of the University of Tokyo and Research Specialists Shrestha Badri Bhakta and NAGUMO Naoko of ICHARM. Activities included lectures, GIS mapping, and field visits to various facilities, agencies, and museums.

Photo 8 Participants in Joso City with a predicted water level sign (left) and with the lecturers (right)

The two training participants learned about the utilization of rainfall-runoff inundation model simulation, the river management system of Japan, the use of global satellite data, the generation of flood hazard maps, and the assessment of risks by identifying potential hazards that could negatively impact a particular area. During the closing ceremony at ICHARM, they were given the opportunity to present the learnings and training outputs, including flood hazard maps and identified critical facilities.

These learnings can be applied to their project, "Impact Assessment of Floods and Droughts in Selected Agricultural Municipalities in Laguna." Since the important facilities in the flood-prone barangays in the Bay, Pila, and Sta. Cruz municipalities in Laguna have already been identified and located, hazard maps and other important disaster information can be generated. Further analysis using the RRI model can also be applied in a watershed-level approach, specifically in the Pila and Sta. Cruz sub-basins. They are planning to re-echo the learnings to other Group 3 members and co-project staff at UPLB.

(Written by Christine Jane Ramacula)

Group 4: Local economic growth prediction modeling

Luisito Cagandahan ABUEG, Assistant Professor, University of the Philippines, Los Baños

Veronica Icaro CASTILLO, Assistant Professor, University of the Philippines, Los Baños

From July 25 to August 9, Assistant Professors Luisito Abueg and Veronica Castillo of the University of the Philippines Los Baños attended the training on Local Economic Growth Modelling under the supervision of Professor TANAKA Tomohiro of the Graduate School of Engineering, Kyoto University. The training worked on the agent-based model (ABM) developed by the professor. The model is assessed, improved, and revised to be implemented in the target local study sites in the Philippines.

The ABM interface is programmed to run on Linux, and post-processing is implemented using R-codes. Model improvements, such as definition of parameters, model assumptions, and future research applications, were identified. These iterations are

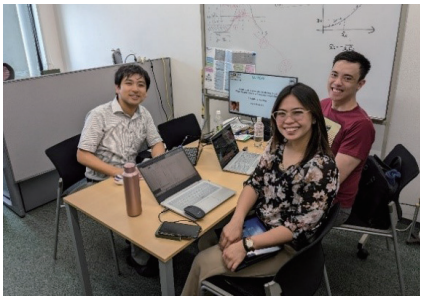


Photo 9 Participants in the training with Professor TANAKA (left) and with other trainees and lecturers at ICHARM (right)

to be further implemented and improved after a planned re-echo of the model to the Group 4 members at the University of the Philippines Los Baños.

Preliminary outputs from the revised agent-based model iterations were presented by the training participants during the closing ceremony of the training at ICHARM, Tsukuba City, on August 9.

(Written by Veronica Castillo)

Argentine researchers of SATREPS project visited Japan and PWRI
SATREPS アルゼンチン側研究者来日、土研訪問

SATREPS（地球規模課題対応国際科学技術協力プログラム）アルゼンチンプロジェクト「気象災害に脆弱な人口密集地域のための数値天気予報と防災情報提供システム」において、2023 年度研究打ち合わせと防災施設等視察のため、令和 5 年 9 月 4 日から 9 月 15 日の 2 週間、セレステ・サウロ気象局長官（次期 WMO 事務局長）を始めとする 16 名のアルゼンチン側研究者が来日しました。このプロジェクトは、5 年間で気象観測システムの高度化、現地観測データを同化した数値予報の開発、水文予測システムの開発、警戒情報伝達システムの開発などを行い、ブエノスアイレス市とコルドバ市の洪水氾濫多発地域の被害軽減を行うもので、今年は 2 年目にあたります。ICHARM は水文予測システムの開発を担当します。2 週間の間、関東と神戸に半分ずつ滞在し、会議や見学を行いました。牛山朋來主任研究員と会田健太郎専門研究員は全期間、柿沼太貴研究員は後半のみ参加しました。

最初に 9 月 4 日に東京の一橋講堂において国際共同シンポジウムが開催され、アルゼンチン大使、気象庁長官、科学技術振興機構（JST）理事、JICA 理事、理研理事とともに小池俊雄センター長が来賓として出席し、挨拶を行いました。

9 月 5 日以降は、内閣府、JICA 本部、気象庁、神戸の理化学研究所、神戸市灘区役所、都賀川、兵庫県庁、人と防災未来センター等の訪問や見学を精力的に行いました。第 2 週目は、理研神戸や大阪大学にて研究打ち合わせや研究施設視察を行いました。14 日午前中には土木研究所を見学していただきました。水理実験施設の見学の後、小池センター長から ICHARM の活動を紹介し、続いて傳田正利主任研究員による VR 洪水体験プログラムを体験していただきました。もともと水防災に強い関心をお持ちの皆さんにとって、避難のあり方をゲーム感覚で楽しみながら改めて考える機会となり、多くの質問が寄せられました。さらに、気象研究所と気象衛星センターを見学し、16 日には帰国の途につきました。2 週間という長い期間でしたが、

ICHARM has been involved for two years in the SATREPS* Argentina Project. This five-year project aims, in general, to develop a numerical weather prediction and warning communication system for densely populated and vulnerable cities, and, more specifically, to mitigate damage in flood-prone areas in Buenos Aires and Cordoba in Argentina by upgrading meteorological observation systems and developing advanced systems, such as a numerical forecasting system capable of assimilating field observation data, a hydrological forecasting system, and a warning information dissemination system. ICHARM is in charge of the development of a hydrological forecasting system.

Guests of honor and presenters in the symposium on September 4
9 月 4 日のシンポジウムにおける来賓と発表者

SATREPS: the Science and Technology Research Partnership for Sustainable Development

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. Senior Researcher USHIYAMA Tomoki and Research Specialist AIDA Kentaro of ICHARM accompanied them for the entire period, and Researcher KAKINUMA Daiki joined them in Kobe.

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.

In the rest of the first week, the Argentine researchers visited various destinations: the

Argentine researchers play the VR flood experience program (top photos) and pose for a group photo with ICHARM researchers
ICHARM における VR 洪水体験の様子と集合写真

Cabinet Office, the JICA headquarters, and the Japan Meteorological Agency in the Tokyo area, and RIKEN, the Nada Ward Office, the Toga River, the Hyogo Prefectural Government, and the Great Hanshin-Awaji Earthquake Memorial Disaster Reduction and Human Renovation Institution in the Kobe area. During the second week, the group had research meetings and toured research facilities at RIKEN Kobe and Osaka University. On the morning of the 14th, they were back in the Kanto area, visiting 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. Since they had a strong interest in flood disaster prevention, they seemed inspired to think more about evacuation while experiencing virtual flooding in a fun, game-like way. After playing the program, they asked many questions. They also visited the Meteorological Research Institute and the Meteorological Satellite Center the following day and finally left for home on the 16th. Though it was a busy, long two weeks, their visit was also fruitful for ICHARM, for they had a thorough discussion with the Argentine researchers and provided information about technologies that PWRI and ICHARM can offer.

(Written by USHIYAMA Tomoki)

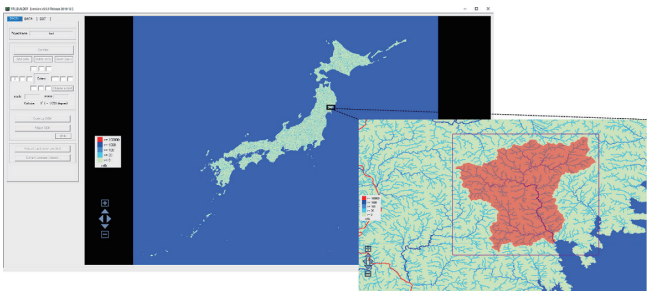
アルゼンチン側研究者と十分な議論を行うことができ、土研や ICHARM の技術を知ってもらうことができました。

Development of a new GUI for the RRI model with enhanced domestic-data compatibility
国内データとの親和性を強化した RRI-GUI の開発

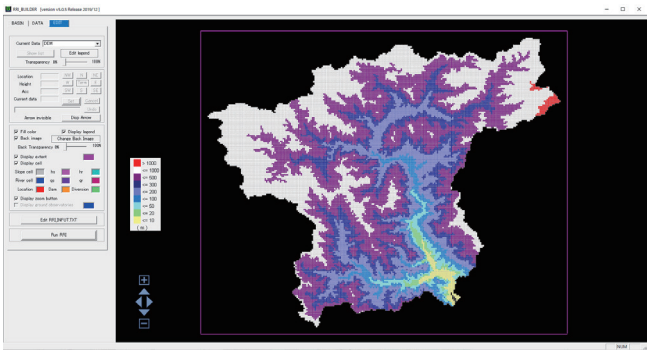
ICHARM has been developing a real-time flood forecasting model for small and medium-sized rivers. As one of the results of this project, we have developed an improved a graphical user interface for RRI (RRI-GUI) by incorporating more accurate domestic data and an extra function, and more user-friendliness. The following lists newly added data and function:

1. Topographical data: Japan Flow Direction Map (Spatial Resolution: 5 seconds, approximately 150 meters)
2. Land use data: Digital National Map by the GeoSpatial Information Authority of Japan (GSI) (FY 2014 ver.)
3. Precipitation data: Radar/Raingauge-Analyzed Precipitation (R/A), Immediate R/A by the Japan Meteorological Agency (JMA)
4. Function for fast watershed extraction

With this GUI, not only does it enable faster and more reliable modeling of domestic rivers, but it also makes it easier to incorporate domestic mesh rainfall data into the modeling. The RRI model with the new RRI-GUI can be downloaded from the RRI model download page. https://www.pwri.go.jp/icharm/research/rri/rri_top.html



Watershed Extraction Screen on RRI-GUI Using Japan Flow Direction Map
日本域表面流向マップを用いた RRI-GUI 上における流域の抽出画面



An Example of Extracted DEM Data on RRI-GUI (Spatial Resolution: Approximately 150 meters)"
RRI-GUI 上で抽出した DEM データの一例（空間解像度：約 150m）

(Written by KAKINUMA Daiki)

ICHARM では、RRI モデルをベースに、中小河川におけるリアルタイム水位予測モデルの開発に取り組んでいます（PRISM: https://www.pwri.go.jp/icharm/research/articles/project-prism_j.html）。この成果の一つとして、RRI 専用グラフィカル・ユーザー・インターフェイス（RRI-GUI）について、一層精度の高い国内データや新たな機能を追加し、操作性を向上させた改良版を作成しました。

具体的には、既存の機能は残しつつ、下記 4 つのデータ及び機能を新たに追加しました。

1. 地形データ：日本域表面流向マップ（解像度 5 秒：約 150m）
2. 土地利用データ：国土数値情報　土地利用細分メッシュデータ（平成 26 年度版）
3. 降雨データ：解析雨量，速報版解析雨量，高解像度降水ナウキャスト
4. 流域抽出機能の高速化

本 GUI を用いることで、これまでより高速かつ信頼性の高い国内河川のモデリングが可能となるだけでなく、国内のメッシュ雨量を簡便に取り込むことが可能となりました。

新しい RRI-GUI は、下記のページからダウンロード可能です。

https://www.pwri.go.jp/icharm/research/rri/rri_top.html

Introduction of ICHARM research projects / 研究紹介

ICHARMは、その使命を果たすため、世界及び地域での災害の傾向及び経験と災害対応に関する地域のニーズ、重要課題、開発段階等を踏まえつつ、自然、社会及び文化といった地域の多様性を考慮する原則というローカリズムを念頭に、研究、能力育成及び情報ネットワーク構築の3本柱を有機的に連携させて、現地実践活動を実施しています。

そのうち、研究としては

(1) 水災害データの収集、保存、共有、統計化
(2) 水災害リスクのアセスメント
(3) 水災害リスクの変化のモニタリングと予測
(4) 水災害リスク軽減の政策事例の提示、評価と適用支援
(5) 防災・減災の実践力の向上支援

の5つの柱のもと、革新的な研究活動を行っています。

本号では、(1)に関する取組例として筒井浩行専門研究員より「パナマにおける干ばつ検討」を紹介します。

ICHARM sets three principal areas of activity: research, capacity building, and information network. It plans and implements projects in these areas in order to fulfill its mission, always keeping in mind "localism", a principle with which we respect local diversity of natural, social and cultural conditions, being sensitive to local needs, priorities, development stage, etc., within the context of global and regional experiences and trends of disasters.

At present, ICHARM conducts innovative research in the following five major areas:

(1) Data collection, storage, sharing, and statistics on water related disasters
(2) Risk assessment on water related disasters
(3) Monitoring and prediction of changes in water related disaster risk
(4) Proposal, evaluation and application of policy ideas for water related disaster risk reduction
(5) Support in constructing the applicability of water-related disaster management

This issue introduces a researcher as listed below:

TSUTSUI Hiroyuki, Research Specialist

Research on drought in Panama

Research on drought in Panama
パナマにおける干ばつ検討

TSUTSUI Hiroyuki, Research Specialist
筒井浩行　専門研究員

気候変動に関する政府間パネル (IPCC) では、気候変動の問題として、ハドレー循環に伴う熱帯収束帯の南北シフトについて長期にわたり議論され、特にハドレー循環に伴う亜熱帯高圧帯における干ばつが重視されてきました。それに対して Lau and Kim (2015)* は、亜熱帯高圧帯だけでは無く、ハドレー循環の下降気流の広がりに伴なって熱帯降雨域が狭まり、熱帯収束帯においても干ばつ傾向が強まることを示唆しました。パナマ共和国は、コスタリカ共和国、コロンビア共和国、カリブ海、太平洋に囲まれる北海道よりもやや小さな約 75,000 km^2 の国家であり、まさに Lau and Kim (2015) が示唆した干ばつ傾向の強まる緯度帯に位置します。またパナマ運河では、水が最大の資源となっていますが、近年の干ばつに伴う水位の低下が問題となっています。さらに水位低下に伴うパナマ運河における通航料金の増額 (2020 年) は、日本商船隊の負担増を発生させ、日本にとっても深刻な問題となっています。

本研究では、第一に、パナマにおける干ばつの発生原因を調査するために、DIAS 鉛直断面解析ツールにより大気境界層の鉛直風速（図 1、1A・2A）・比湿（図 1、1B・2B）の南北鉛直断面 (南北緯 30° における西経 81° -79° の平均) を分析しました。パナマ運河（81-79° W）が位置する北半球に着目すると、熱帯収束帯において上昇気流が発生し、その後、ハドレー循環により乾いた空気が地表面に向かいます (1A・2A)。豊水年 (2007 年) の場合（1B)、パナマ運河を含む地表面が厚い湿った空

The Intergovernmental Panel on Climate Change (IPCC) has long been discussing the north-south shift of the Intertropical Convergence Zone (ITCZ) as a critical factor of climate variability, with a particular emphasis on droughts in the subtropical high associated with the Hadley circulation. On the other hand, Lau and Kim (2015)* suggested that not only in the subtropical high but also in ITCZ, the tropical rainfall region narrows as the downdrafts of the Hadley circulation expand, and as a result, the tendency for droughts increases. The Republic of Panama is a country of approximately 75,000 km^2, slightly smaller than Hokkaido of Japan, surrounded by the Republic of Costa Rica, the Republic of Colombia, the Caribbean Sea, and the Pacific Ocean, located exactly in the latitudinal zone that is prone to drought as suggested by Lau and Kim (2015). Naturally, for the Panama Canal, whose operation involves a huge volume of water, declining water levels due to recent droughts have become a crucial issue. This problem has also been affecting other countries, including Japan. The increase in tolls for the canal transit in 2020 associated with the decline in its water levels has since imposed a heavier burden on Japanese merchant fleets.

In this study, we first analyzed the north-south vertical cross-sections (average between 81° and 79° west longitude in a range of 30° north and south) of vertical wind speed (Figure 1, 1A and 2A) and specific humidity (Figure 1, 1B and 2B) in the atmospheric boundary layer using the DIAS vertical cross-section analysis tool in order to investigate the causes of drought in Panama. In the northern hemisphere, where the Panama Canal (81-79◦W) is located, updrafts occur in the tropical convergence zone, followed by dry air moving down

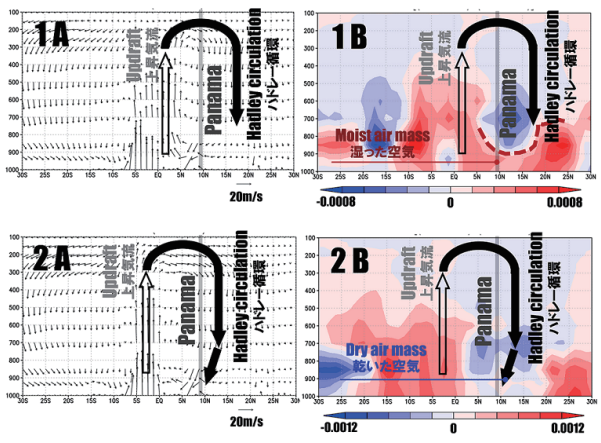


Figure 1 The north-south vertical cross-sections in the atmospheric boundary layer exhibiting the difference in vertical wind speed (A) and specific humidity between their 20-year average (B): the wet-year average (1A&B) and the drought year (2A&B)
図 1 大気境界層南北鉛直断面の鉛直風速 (A)・比湿の気候値とのバイアス (B): 豊水年 (1A&B), 干ばつ年 (2A&B)

to the ground surface due to the Hadley circulation (1A and 2A). In the case of a wet year (2007) (1B), thick, moist air covers the ground surface, including the Panama Canal, blocking dry air hanging over the area from reaching the ground, which prevents drought from occurring. On the other hand, in the case of a dry year (2019) (2B), no moist air covers the ground surface, consequently allowing dry air to descend to the ground and cause drought.

Countermeasures are needed to supply water during the dry season to alleviate the water level decline caused by drought in Panama. The Panama Canal is a lock-type canal that connects the Pacific Ocean and the Caribbean Sea. River water flows into the canal from eight rivers (Chagres, Boquerón, Pequení, Indio Este, Cirí Grande, Trinidad, Gatún, and Caño Quebrado) and is discharged into the Caribbean Sea through the Gatun Locks (Figure 2). This study applied the water and energy Budget-based Rainfall-Runoff-Inundation (WEB-RRI) model to the Panama Canal basin. For simulations, a model dam was put in place at the confluence of the Cirí Grande and Trinidad rivers (Figure 2). Experiments were then conducted in which a portion of the discharge from upstream was stored in the dam during the previous year's rainy season (October-December) and released into the Panama Canal during the dry season (January-June) of the following drought year. We investigated this simple measure for its effectiveness in mitigating the water level decline caused by drought (Figure 3). Since in-situ precipitation data after 2016 onwards were unavailable, though droughts occurred in Panama in 2015, 2016, and 2019, this study selected 2015 as the drought year. The results found that the water level rose only by an average of 4.2 cm (maximum: 30.8 cm, minimum: 1.1 cm) even in case 4, in which the largest volume of water is stored during the rainy season and released during the dry season, in the period from January to mid-April 2015, when the drought was at its most severe (Figure 4).

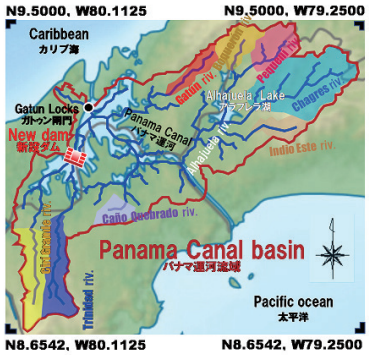


Figure 2 The Panama Canal basin and the model dam's location
図 2　パナマ運河流域とダム新設位置

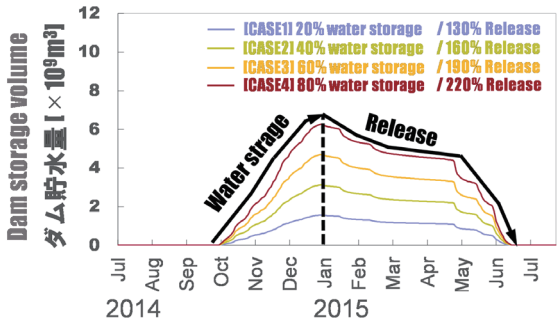


Figure 3 Four cases of hypothetical operation at the model dam: In the 2014 rainy season, the discharge from two rivers (Cirí Grande and Trinidad Rivers) is stored in the dam at different percentages (20, 40, 60, and 80%). In the 2015 dry season, the stored water is released at different percentages (30, 60, 90, and 120%) plus the runoff from the two rivers. These four types of operation are designated as cases 1 to 4, respectively.
図 3　新設ダムにおける 4 ケースの操作：2014 年雨季 (10-12 月) に 2 河川 (Cirí Grande・Trinidad 川) の流出量を 20%・40%・60%・80% カットしてダムへ貯水し、2015 年乾季 (1-6 月) にそれぞれ 30%・60%・90%・120% 割り増しした流出量をダムから放流。この 4 種の操作をそれぞれ Case1 から Case4 とした。

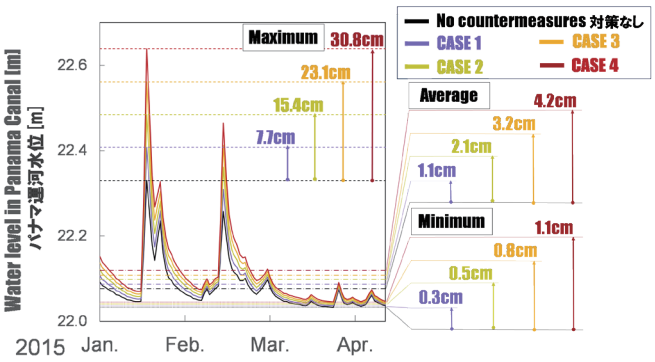


Figure 4 Water level fluctuations associated with dam operations
図 4　ダム操作に伴う水位の変動

To further improve the water level, it may also be necessary to supply water from a nearby lake (Bayano), desalinate seawater, or use treated water from sewage treatment plants, as the Panama Canal Authority has already proposed. If the problem cannot be resolved with these approaches, it may be necessary to consider introducing water transfer not only from other parts of Panama but also across national borders.

*: William K. M. Lau and Kyu-Myong Kim: Robust Hadley Circulation changes and increasing global dryness due to CO2 warming from CMIP5 model projections, PNAS, Vol.112, No.12, pp. 3630–3635, 2015.

気により覆われ、上空からの乾いた空気が入り込めないため、地表面に干ばつは発生しなません。一方、干ばつ年 (2019 年) の場合 (2B)、地表面に豊水年に見られるような湿った空気が存在しないために、上空からの乾いた空気が地表面の干ばつを引き起こすことが分かりました。

このようなパナマにおける干ばつに伴う水位低下を緩和させるためには、乾季に水を供給するための対策が必要となります。パナマ運河は、太平洋とカリブ海を結ぶ閘門式運河であり、8 つの河川 (Chagres・Boquerón・Pequení・Indio Este・Cirí Grande・Trinidad・Gatún・Caño Quebrado 川) から運河に流れ込んだ河川水が、ガトゥン閘門からカリブ海に放流されます (図 2)。そこで本研究では、パナマ運河流域に水・エネルギー収支 - 降雨・流出・氾濫モデル (WEB-RRI) を構築しました。そして Cirí Grande 川と Trinidad 川との合流地点にモデル上のダムを新設し (図 2)、前年の雨季 (10-12 月) に上流からの流出量の一部をダムに貯水して、干ばつ年の乾季 (1-6 月) に流出量を割り増ししてパナマ運河に放流させました。このような単純な対策がもたらす干ばつに伴う水位低下の緩和の効果を試算しました (図 3)。なおパナマにおける干ばつは 2015 年・2016 年・2019 年に発生しましたが、2016 年以降の現地降水量データを入手できなかったため、本研究では干ばつ年として 2015 年を対象としました。試算の結果、雨季に最も多くの貯水を行ない乾季に放流するケース 4 であっても、干ばつが最も深刻な 2015 年 1 月 -4 月中旬において、平均 4.2cm (最大 30.8cm・最小 1.1cm) しか水位を上昇させることができないことが分かりました (図 4)。

ゆえに、さらに水位を改善するためには、パナマ運河庁でも提案されている近隣の湖 (バヤノ) からの導水、海水の淡水化や下水処理場の処理水の利用が必要になる可能性があります。これらの対策でも解決できない場合は、パナマ共和国内だけでは無く、国境を越えた広域導水も視野に入れた対策も考える必要があろうかと考えられます。

Outline of the Doctoral thesis and comment for the course by each student
博士論文の概要と学生からのコメント

ICHARMは、2010年度から政策研究大学院大学（GRIPS）と連携して、水関連災害リスクマネジメントの政策立案と、その実行においてリーダーシップを発揮できる専門家の育成を目的とした博士課程「防災学プログラム」を実施しています。2023年9月までに17名の学生が修了しました。

以下では、今年9月に修了した2名の学生の研究内容を紹介します。

ICHARM started a doctoral program, "Disaster Management Program," in 2010 in collaboration with GRIPS to produce experts who are capable of developing policies on water-related disaster risk management and taking the leadership in implementing them. By September 2023, 17 students graduated from this program.

This section shows the research contents which were implemented by two students who has graduated this September.

A STUDY ON AN INTEGRATED WATER RESOURCES MANAGEMENT PRACTICE FOR SUSTAINABLE TRANSBOUNDARY RIVER BASIN DEVELOPMENT

Tedla Mihretab Gebretsadik, Ph.D. in Disaster Management, 3rd Grade
テドラ　ミヘラティブ　ゲブレザディック　博士課程３年

The African region is one of the most vulnerable landmasses to climate change and its variability. In transboundary river basins, climate change poses a substantial risk due to the different economic, political and social interests of the riparian countries. The Nile, known as the world's longest river, embodies the challenges of transboundary watershed management. The populations of the Nile basin countries are particularly susceptible to the consequences of climate change on water, food and energy. The construction of water infrastructure, such as the Grand Ethiopian Renaissance Dam (GERD), which is designed to meet the growing energy demand, has prompted a complex transboundary situation among upstream and downstream countries. Moreover, navigating the challenges of sustainable water management becomes an imperative component of adapting to climate change and pivotal for achieving the primary objectives outlined in the United Nations' Sustainable Development Goals (SDGs).

This research aims to fill the gaps identified in prior studies by providing an improved framework for future water resources management and climate change adaptation in the Nile basin. The basin's current development and status quo are considered to establish well-founded policy recommendations. The study centres on reliable assessment of climate impacts while harnessing globally accessible datasets for climate change adaptation, enhancement of water management practice, and comprehensive policymaking within the hydrologic system of the Blue Nile basin.

The study assessed the climate change impacts on the Blue Nile River using 30-year in-situ climate data (1981–2010) and five bias-corrected General Circulation Models (GCMs) for future climate projections (2026-2045) (Figure 2). The GCMs were selected based on their performance in the study area, compared with various observed and reanalysis meteorological datasets. An analysis of local and synoptic-scale climate variables in GCMs was also performed to understand the projection uncertainties. To evaluate the hydrological variables,

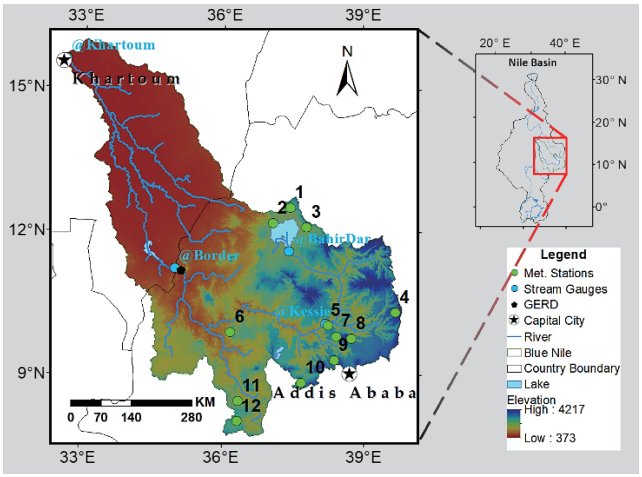


Figure 1 Blue Nile basin

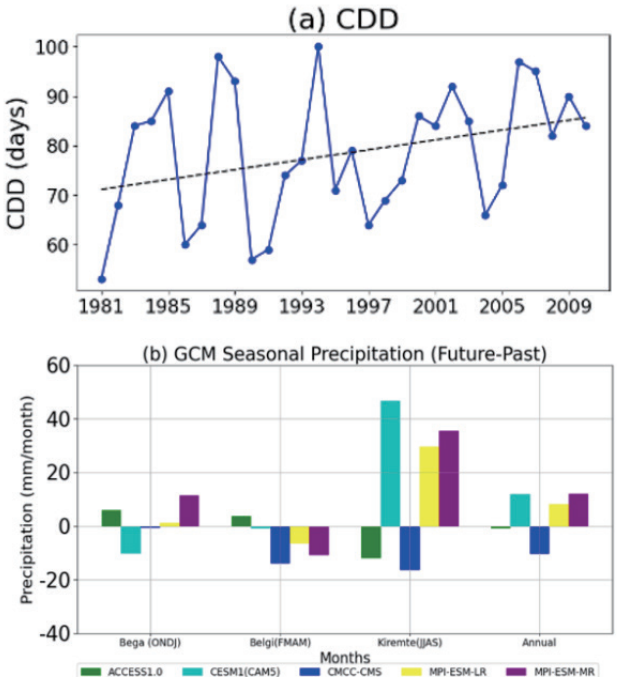


Figure 2 Projected climate change trend

the Water Energy Budget-based Rainfall-Runoff-Inundation model (WEB-RRI), a physically-based distributed model, was developed and validated with observed discharge data. Qualitative indices were used to classify climate change evaluations for ease of decision making.

Both observed historical trends and GCMs precipitation projections show inter-annual and spatial variability, with significant increases in the rainy season and a significant decrease in the dry season. The results suggest the probability of an increase in total precipitation, accompanied by an increase in the intensity and frequency of future extreme rainfall events. Moreover, the result of the flow simulation shows a likely increase in total river flow, peak discharges, and flood inundation, which will increase the risk of floods (Figure 3). The comparative assessment of changes in observed trends and the results of GCM projections provided in this study enables the qualitative assessment with a high confidence level. Assessments of socio-economic impacts of projected extremes pointed to an increase in the distractive effects of floods on communities, urban areas, and agricultural lands in the study area.

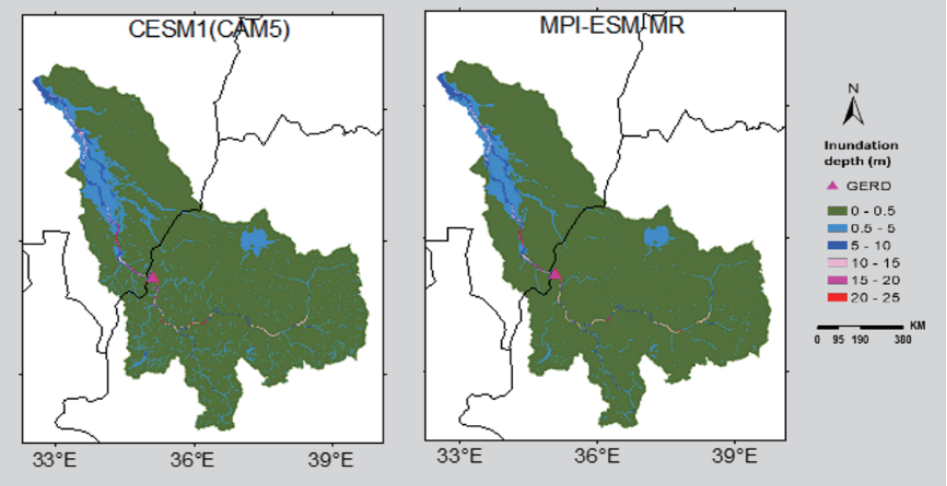


Figure 3 Flood inundation map for GCMs future simulation

Moreover, this study evaluated the performance of near-real-time satellite precipitation products (SPPs) and short-term numerical weather forecasts. The original real-time SPPs comparison in flood events shows significant improvement after statistical bias correction and flow simulation. Additionally, the numerical weather forecasting provided satisfactory results, indicating that the global datasets are very useful and capable of providing adequate lead time with a high level of accuracy (Figure 4). Furthermore, this study identified that the GERD dam, owing to its substantial storage capacity, is instrumental in accommodating the projected extreme flow volume to smoothen the high and low flow signals downstream. The policy suggestion of this study points to adaptive measures such as the implementation of early warning, reservoir operation, and informed decision-making for the enhancement of Integrated Water Resource Management practices in the Nile basin.

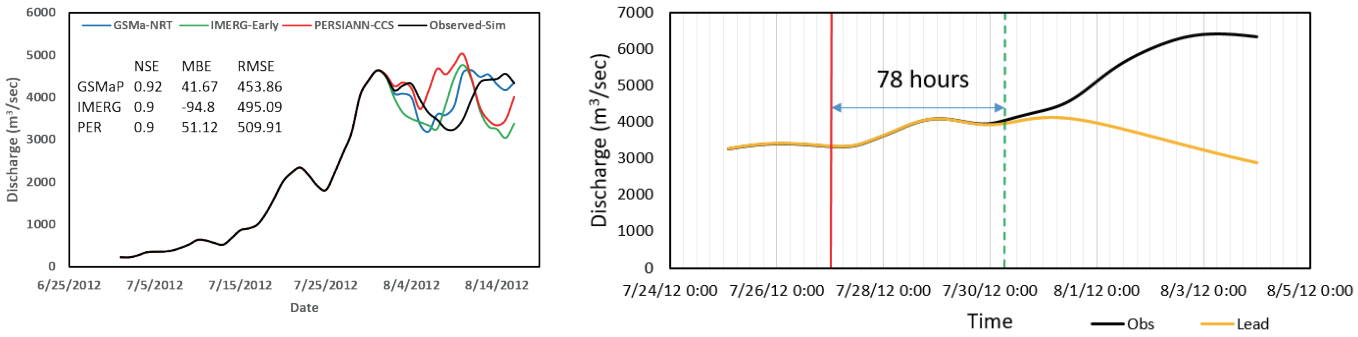


Figure 4 Real time SPPs and forecast simulation accuracy and lead time results

During my stay at ICHARM, I received a warm welcome and accommodation from all the staff. Although my three years in Japan were mostly during the COVID-19 pandemic, which led to restrictions on movement during states of emergency, I am very thankful to all the ICHARM researchers, administrative staff, and friends who supported me in achieving my goals. I would like to extend my sincere gratitude to the esteemed professors and my supervisors – Professor Mohamed Rasmy, Professor Toshio Koike, and Professor Kenzo Hiroki – for their guidance. It is an honour and privilege to have been the first individual from Africa to successfully complete the PhD in disaster management offered by GRIPS and ICHARM.

STUDY ON SEDIMENT RUNOFF AND MORPHOLOGICAL CHANGES IN THE SANGU RIVER BASIN, BANGLADESH

Md Majadur Rahman, Ph.D. in Disaster Management, 3rd Grade
モハマド　マジャドュール　ラーマン　博士課程３年

The Sangu River, whose basin area is about 3600 km2, is located in the south-eastern hilly region of Bangladesh, originating from the Arakan Hills, flowing northward, and discharging to the Bay of Bengal (Figure 1). Its longitudinal slope is very mild in the lower and middle reaches. Its bed material is predominantly sandy in the lower reach and consists of gravel in the upper reach and boulders in the uppermost reach. This river is an important source of drinking water, irrigation, navigation, fisheries, and biodiversity. In the upstream area, people prepare the land on the hill slope for cultivation by ploughing soil. The continued practice of deforestation and topsoil cutting in the upstream hilly region is driven by the need to fulfill various human requirements. During the monsoon season, floods due to heavy rainfall carry sediment from the upstream hilly area to the downstream low-lying area. As a result of siltation in the lower Sangu River, river conveyance decreases, flooding increases during the monsoon season, and water availability during the dry season declines, all of which contribute to navigability problems and water scarcity that adversely affect the natural environment (Figure 2a-c). The lower Sangu River also exhibits the characteristics of a low-lying meandering channel that is subject to the influence of tidal flow. Active channel change occurs in the lower reach, causing severe bank erosion in the areas where settlement is dense. Though the Bangladesh Water Development Board (BWDB) has implemented bank protection works in a number of locations, some of these require frequent repair work (Figure 2d). In order to gain insight into the future behavior of rivers, it is imperative to conduct scientific studies. Numerical modeling is a commonly employed method for comprehending the effects of tidal flow on river morphology. In order to address such issues and promote sustainable management, this study investigates the characteristics of sediment runoff in the basin and morphological changes in the lower reach and proposes countermeasures.

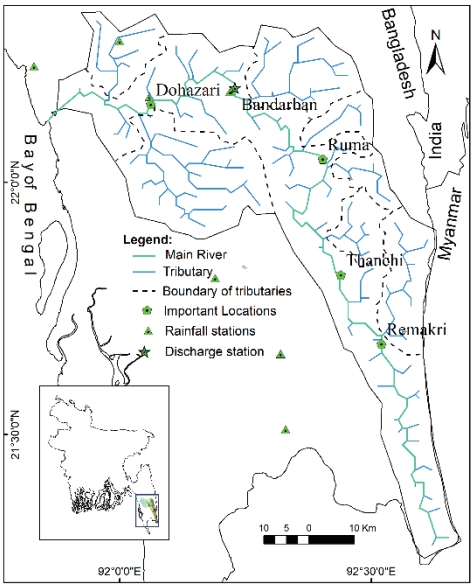


Figure 1 Sangu River basin in Bangladesh

Figure 2 Problems in Sangu river (a) Flood in 2015, (b) Bank erosion, (c) Sand bar, and (d) Damaged river bank protection works

In order to evaluate sediment runoff processes, a rainfall-sediment runoff (RSR) model was first developed by integrating a rainfall-runoff-inundation (RRI) model with a sediment-runoff model based on the unit channel concept. In the RSR model, the section with two inflow points and one outflow point is defined as a unit channel. A basin channel network is formed with a series of unit channels. One-year numerical simulations were conducted with two different sediment transport formulas, and the results were compared with an observed sediment size distribution and suspended sediment discharge. The results revealed that the Sangu River is a suspended dominant river and annually transports about 7.5x105 m^3 to 9.0x105 m^3 of sediment to the Bay of Bengal. In addition, longitudinal sediment sorting is evident in one case (Figure 3), while it is not in the other case. This difference between the two cases can be explained by the difference in the erosion rate of the suspended sediment formula. The sediment sorting significantly affects the results of the basin-scale sediment transport analysis. According to the model computation findings, a significant amount of sediment is transported from the upstream hilly region through different tributaries, and then deposits

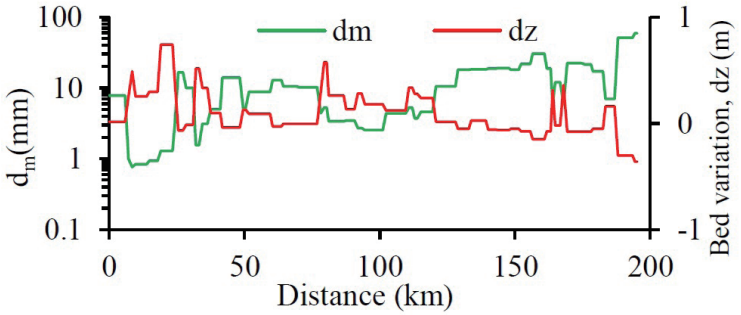


Figure 3 Mean diameter of bed material and bed variation along the main river at the end of simulation

and forms sandbars in the lower and middle stream reaches (Figure 3). Field surveys confirmed that a significant number of sandbars were visible during the dry season in the middle and downstream sections. These characteristics of the river are the primary contributors to flooding, bank erosion, and navigability issues.

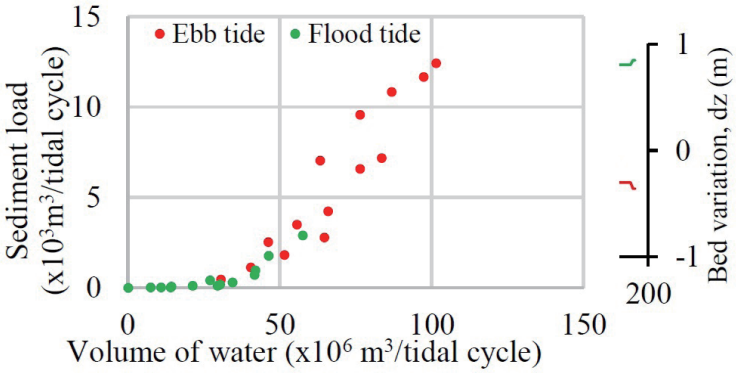


Figure 4 Bed Sediment load on each tidal cycle near the river mouth

In addition, a morphological study was conducted for the lower reach of the Sangu River using a 2D depth-averaged model. The 2D calculations for the area within 45 km from the river mouth showed that the channel change is strongly influenced by tidal motions, particularly in the area's downstream part, and that the spring tide is the main cause of the channel change in this area (Figure 4). On the other hand, the calculations also found that in the upstream part, flood flows, rather than tides, are the main factor causing channel changes and associated disasters.

Therefore, it is essential to control sedimentation effectively in the Sangu River basin in order to handle problems with flooding, erosion, deposition, navigation, and ecosystems. Finally, the RSR model was revised and updated to include structural countermeasures for sediment management within the river basin. Analyses with the improved model were performed to identify potential sites for check dam installation. The findings suggested that check dams can serve as effective measures for controlling sediment (Figures 5 and 6), and that regular maintenance of check dams by removing sediment can be a sustainable solution for sediment management. Moreover, given the significant demand for sediment in the region, this solution may generate a potential revenue source for the government by selling trapped sediment removed from check dams.

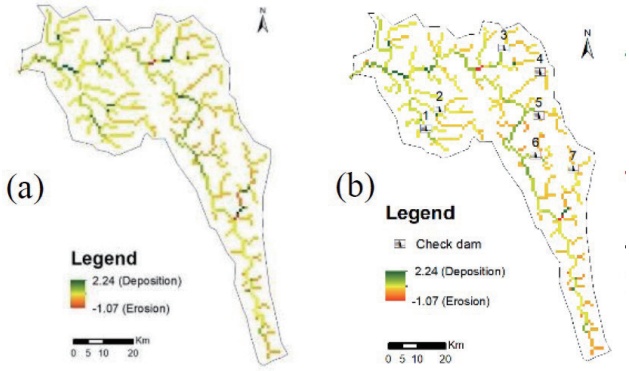


Figure 5 Bed deformation (a) without check dam and (b) with check dams.

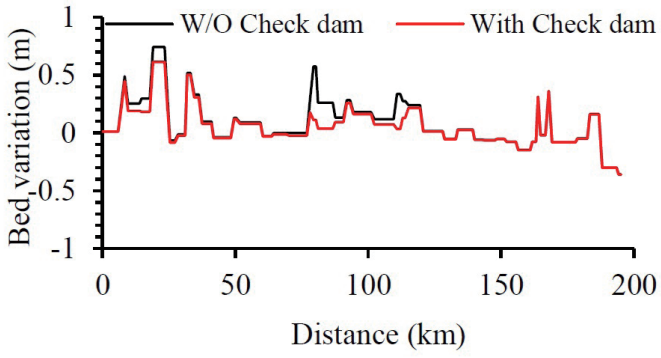


Figure 6 Bed variation along the main river at the end of simulation with and without check dam.

ICHARM is a global centre of excellence for water related disaster management research. Throughout my PhD studies at ICHARM, I had an excellent experience, and its academic excellence and its welcoming atmosphere have made an everlasting impression on me. The flexibility to pursue my academic interests has been one of the most enjoyable elements of my time at ICHARM. I have been inspired to think creatively and beyond the box, which has enabled me to make important contributions to my study area. Outside of the classroom, it boasts a thriving research culture. Participating in seminars, conferences, and workshops has given participants numerous chances to network with colleagues from different backgrounds who share their interests, which has enriched my knowledge. ICHARM will always hold a place in my heart as a special home. I feel privileged to be a member of ICHARM, where an affection of learning prevails.

Training & Education

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Educational program updates
教育・研修活動報告

ICHARM では 2007 年以降、国際協力機構 (JICA)、政策研究大学院大学 (GRIPS) と連携し、主に外国人行政職員を対象として、1 年間で学位を取得できる修士課程研修コースを設けています。例年、10 月から翌年 3 月までの 6 カ月は主に講義や演習が行われ、4 月から 8 月にかけて学生は論文執筆に取り組みます。

今回は、学生の論文提出後、学位を授与するまでに実施された様々なイベントのうち、いくつかについて、紹介します。

【IISEE ／ ICHARM 合同発表会　8 月 28 日】

建築研究所 (BRI) にて、今年で 3 回目となる合同発表会を行いました。過去 2 回は、コロナ禍のため、オンラインで行いましたが、今年ようやく対面で開催することが出来ました。選抜された各 3 名の学生、国際地震工学センター (IISEE) から、Mr. SAWI Paulo (フィリピン)、Mr. SULTHAN Faiz (インドネシア)、Mr. HARVAN Muhammad (インドネシア)、ICHARM から、Ms. RANAPURA DEWAGE Thilini Kaushalya (スリランカ)、Mr. PHUNTSHO Ugyen (ブータン)、Ms. OROGO Allen (フィリピン) が、各自の研究発表をしました。発表会には、GRIPS の先生方も、オンラインで参加されました。研究分野の違う発表を聞く、よい機会となりました。

【東京消防庁本所防災館視察　8 月 28 日】

合同視察初日は、東京消防庁管轄の本所防災館を訪問しました。まず、ICHARM の学生が、VR 防災体験に参加しました。ゴーグル等のバーチャル・リアリティ (VR) 機材を活用した、地震・風水害の臨場感あふれる疑似体験をすることが出来ました。

その後、IISEE と ICHARM の学生が、2 つのグループに分かれて、暴風雨・煙・都市型水害・地震体験コーナーにて、それぞれの体験をしました。暴風雨体験では、台風並みの強い雨と風を体験しました。煙体験では、火事の時に煙からどのように逃げるのかを学びました。都市型水害体験では、浸水した際に水圧でドアが如何に重く開けにくくなるのかを学びました。地震体験では、震度 7 レベルの実際にあった地震の揺れを体験しました。いずれの体験コーナーでも、学生はインストラクターの話をよく聞き、防災についてたくさんの学びを得ることができました。また、防災を一般の方々に広めようとする日本のこのような活動は、彼らにとって自国で防災行政を推進するうえで、End to End アプローチの一つとして参考になったことと思います。

【八ッ場ダムと富岡製糸場視察　8 月 29 日】

2 日目は、群馬県の八ッ場ダム管

Since 2007, ICHARM, in cooperation with the Japan International Cooperation Agency (JICA) and the National Graduate Institute for Policy Studies (GRIPS), has been offering a master's degree training course, designed for mainly foreign government officers to obtain a degree in one year. The students attend lectures and exercises in the first half from October to March and work on their theses in the second half from April to August.

In this issue, ICHARM introduce some of the various events that took place after completing their master's thesis and before graduation.

【IISEE/ICHARM Collaborative Research Presentation, August 28】

Collaborative Research Presentation
合同発表会の様子

The International Institute of Seismology and Earthquake Engineering (IISEE) and ICHARM organized the third Collaborative Research Presentation at the Building Research Institute (BRI). The event was held in person for the first time after the past two meetings that had to be held online due to COVID-19. The two institutes each selected three students for this occasion: Mr. SAWI Paulo (Philippines), Mr. SULTHAN Faiz (Indonesia), and Mr. HARVAN Muhammad (Indonesia) from IISEE, and Ms. RANAPURA DEWAGE Thilini Kaushalya (Sri Lanka), Mr. PHUNTSHO Ugyen (Bhutan), and Ms. OROGO Allen (Philippines) from ICHARM. Professors from GRIPS joined this event online. It was a good opportunity for both sides to hear presentations from different research fields.

【Life Safety Learning Center, Tokyo Fire Department, August 28】

IISEE and ICHARM also organized a joint study trip to several destinations. On the first day of the trip, the students from both institutes visited the Life Safety Learning Center of the Tokyo Fire Department. At its VR Disaster Section, ICHARM students put on virtual reality devices, such as goggles, and experienced realistic disaster situations created by simulated earthquakes, storms, and floods.

Rainstorm experience
暴風雨体験の様子

After that, the students of the two institutes were divided into two groups to go through the rainstorm, smoke, urban flood, and earthquake sections. In the rainstorm section, they experienced strong rains and winds like those caused by a typhoon. In the smoke section, they learned how to escape from smoke in case of a fire. In the urban flood section, they learned how difficult it would be to open doors under heavy water pressure in case of flooding. In the earthquake section, they experienced the shaking of an earthquake with the highest intensity of 7 on the Japanese seismic scale. In each section, the students listened intently to the instructors and learned a lot about disaster prevention. The activities at the center are excellent examples for the students to understand how Japan tries to disseminate the importance of disaster preparedness to the general public. The students also gained viable ideas from the activities to practice the end-to-end approach in promoting disaster management policies in their home countries.

【Yamba Dam and Tomioka Silk Mill, August 29】

On the second day, the students visited the Yamba Dam in Gunma Prefecture. At the dam management office, they first listened to the engineering deputy director of the Tone River Dams Integrated Control Office, who spoke about the history, construction, and importance of the Yamba Dam to the people in the area. They also had an opportunity to take a close look at the top and bottom of the dam body and study the structure of the dam.

At the Yamba Dam
八ッ場ダム前にて

The Yamba Dam is a concrete gravity dam with a height of 116m and a crest length of 290.8m, collecting water from a catchment area of about 711.4 km^2. Among the dams in the upper Tone River area, the Yamba Dam plays a vital role in preventing disaster damage in times of floods and heavy rainfalls caused by typhoons and supplying water up to about 22.209m^3/s for Gunma Prefecture and other downstream prefectures. The dam is also used to generate electricity and maintain the normal flow and functions of the downstream rivers as a multipurpose dam.

After the Yamba Dam, the students visited the Tomioka Silk Mill, a world heritage, in Gunma Prefecture. Local English-speaking guides showed them around the main spots at the site while explaining its historical and cultural backgrounds.

At the Tomioka Silk Mill
富岡製糸場にて

After its long isolation from foreign countries, Japan's main export was raw silk. However, raw silk production was painfully hard work for female workers. The government of the time decided to build a mill in Tomioka in 1872 as a model factory equipped with Western silk-reeling machines to produce quality raw silk, increase productivity, and ensure the safety of workers, especially female ones. The plan was also aimed at training technical supervisors. The students were deeply impressed by the Japanese government's forward-looking approach to improving the working environment, though the country was still at the very early stage of modernization.

(Written by SATO Akiko)

【PCM Follow-up Training: August 31, September 5】

A student delivering a presentation in the PCM training
PCM 研修において発表する学生

The students participated in a two-day follow-up training of the Project Cycle Management (PCM), which was conducted by the same expert moderators as those in the first training in March 2023.

In advance of the training, Executive Director KOIKE Toshio gave a lecture in order to motivate the students to plan high-quality projects. He also observed the students working on their individual work and presentations and provided technical advice to help them create a quality Project Design Matrix (PDM), an outline of the action plan for implementing the projects covered in each master's thesis, which the students were assigned to produce as the output of the training. The doctoral students who participated as assistants also provided advice to facilitate the master's students' understanding of their assignments.

After completing a PDM, the students had group discussions and presentations, vigorously exchanging comments and opinions while reviewing their products.

(Written by ONARI Rikako)

【Commemorative sakura tree planting ceremony, September 12】

It is an annual tradition at ICHARM that students graduating from the ICHARM master's and doctoral programs participate in a sakura tree planting ceremony before their graduation. This year, the ceremony took place on September 12, 2023. However, since a seedling of someiyoshino (a type of sakura) was already planted in March and had been growing for about half a year, the students gathered for the ceremony to place a commemorative plate on the tree, which signifies that the tree stands for the class of 2023. After placing the plate, Research and Training Advisor EGASHIRA Shinji told the students: "Your sakura tree will have a lot of blossoms again next spring. Sakura blooms from late March to early April, the time of farewells and meetings in Japan. We have planted this sakura tree to celebrate your departure from ICHARM

理支所を訪れました。初めに利根川ダム統合管理事務所副所長よりダムの歴史や建設、地域の人々にとっての重要性についてレクチャーを受けました。その後、八ッ場ダム堤頂部と堤体の内部及び下部を見学し、ダムの構造を間近で見る機会を得ました。

八ッ場ダムは、約 711.4km^2 の集水域をもち、堤高 116m、堤頂長 290.8m のコンクリート重力式ダムであり、利根川上流域のダムの一つとして、台風等による大雨の際の洪水対策や、群馬県をはじめとする下流県に最大約 22.209m^3/s の都市用水を供給する役割を担っています。また、発電施設も併せ持ち、さらに下流河川の流水の正常な機能を維持するための容量も確保している多目的ダムです。

その後、群馬県の世界遺産である富岡製糸場を訪れ、学生は地元の英語ガイドの案内で主要スポットを巡り、歴史的・文化的背景の説明を受けました。

長い鎖国後における日本の主要輸出産業は生糸でした。しかし、生糸の生産は、女性工員に過酷な作業を強いるものでした。明治政府は、生糸の品質向上、生産量の増加、技術指導者の養成、そして、特に女性工員が安全、安心に従事できるよう様々な工夫をこらした西洋式製糸機を備えた全国模範工場として 1872 年に富岡製糸場の設立を決定しました。学生は、発展途上にあった日本において、労働環境の改善を考えていた日本政府の先進性に深い感銘を受けていたようでした。

【PCM フォローアップ研修　8 月 31 日、9 月 5 日】

8 月 31 日、9 月 5 日と 2 日間に渡り、学生は 3 月に実施した「Project Cycle Management」（PCM）研修のフォローアップ研修に参加しました。

事前に小池俊雄センター長より、質の高いプロジェクト立案の動機付けに繋がる講義が行われ、本研修のアウトプットである、各自の修士論文で取り上げたプロジェクトを実施に移すためのプロジェクト計画概要表「Project Design Matrix」（PDM）の作成及び学生によるプレゼンテーションにおいて、技術的な観点からアドバイスがありました。

また、アシスタントとして参加した博士課程の学生からも、修士学生の理解を促す助言を行い、各学生は、グループディスカッションやプレゼンテーションにおいて、自身が作成した PDM をもとに、活発な議論や意見交換を交わしました。

【植樹セレモニーの開催　9月12日】

例年この時期に実施している、ICHARM 博士・修士課程修了生による植樹セレモニーを行いました。植樹セレモニーに先だって修了生らは、3月にソメイヨシノの苗木を購入し植えて育ててきました。今回は新たに記念プレートも設置しました。そして、江頭進治研究・研修指導監より「皆様の桜は、春にまた花を咲かせるでしょう。日本では桜の時期つまり3月の終わりから4月の始めは、お

別れと新たな出会いの時期になります。この桜は皆さんの博士号・修士号の取得をお祝いするものです。そして今の ICHARM スタッフは変わっていたとしても、この桜はここにあって皆さんを見守っているでしょう。当時を思い起し、友を想い、君たちと ICHARM の発展のために足を運んでください。」というお言葉をいただきました。

and the great achievement you have made here. People at ICHARM change over time, but this tree will always be here, praying for you. I hope you will come back one day to see your sakura tree again – to remember the days you spent here and the friends you made here, as well as to see how ICHARM has grown."

In front of their Sakura tree
桜の木の前で

(Written by FUJIKANE Masakazu)

Graduation Ceremony of the 16th ICHARM master's program
第 16 期 ICHARM 修士課程卒業式

2023 年 9 月 12 日、JICA 筑波において、ICHARM 第 16 期修士課程「防災政策プログラム水災害リスクマネジメントコース」の閉講式が執り行われました。チュニジアから 1 名、ブータン、パキスタン、スリランカ、東ティモールから 2 名ずつ、フィリピンから 4 名の計 13 名の学生がプログラムを修了しました。 JICA、GRIPS、ICHARM の三者で運営しているこの 1 年間の修士課程プログラムは、自国の政府機関で水や河川の管理に関連した実務経験を持つ人を対象に設計されています。式では睦好絵美子 JICA 筑波所長と小池俊雄センター長、片山耕治 GRIPS 教授から祝辞が述べられました。修了証書授与の後にはフィリピンのフリギラナ・ホレース・ホーガン氏が学生を代表して答辞を述べました。式では 2 つの賞も授与されました。学業と研究成果を称える最優秀研究賞はスリランカのラナプラ・デワゲ・ティリニ・カウシャリア氏とブータンのプンショ・ウゲン氏に贈られ、プログラム全体を通してクラスに最も貢献した尊徳賞はスリランカのラナプラ・デワゲ・ティリニ・カウシャリア氏に贈られました。

翌日の 9 月 13 日には GRIPS において学位記授与式が開催されました。修士学生たちは式に先立って卒業式用のガウンと帽子を着用し GRIPS 正門前で IISEE の学生らと記念撮影をしました。ICHARM スタッフ一同、卒業生の益々のご活躍を心よりお祈りしております。

The closing ceremony of the 16th ICHARM master's program, "Water-related Disaster Management Course of Disaster Management Policy Program," was held at JICA Tsukuba on September 12, 2023. Thirteen students from six countries, i.e., one from Tunisia, two each from Bhutan, Pakistan, Sri Lanka, and Timor-Leste, and four from the Philippines, graduated from the program. This one-year master's course, operated by JICA, GRIPS, and ICHARM, is designed primarily for those who have work experience related to water or river management at governmental agencies in their countries. In the closing ceremony, JICA Tsukuba Director General MUTSUYOSHI Emiko, ICHARM Executive Director KOIKE Toshio, and GRIPS Professor KATAYAMA Koji gave a congratulatory speech. Following the presentation of the certificates, Mr. FRIGILLANA Horace Hogan of the Philippines spoke in return on behalf of the students. The ceremony also presented two awards: the Best Research Award to Ms. RANAPURA DEWAGE Thilini Kaushalya of Sri Lanka and Mr. PHUNTSHO Ugyen of Bhutan to praise them for their excellent research work and academic performance, and the Sontoku Award to Ms. RANAPURA DEWAGE Thilini Kaushalya of Sri Lanka for her outstanding contribution to the class throughout the program.

Presentation of the Sontoku Award to Ms. Ranapura Dewage
ラナプラ・デウェイジさんへの尊徳アワードの授与

Students and guests after the closing ceremony at JICA Tsukuba
JICA 筑波閉講式後の学生と参列者

The next day, September 13, a graduation ceremony was held at GRIPS. The master's students had an opportunity to wear a graduation gown and hat in advance of the ceremony and have memorial photos with IISEE students in front of the main gate of GRIPS. All the staff at ICHARM wish the graduates all the best in their endeavors.

Graduating students in front of the main gate of GRIPS
GRIPS 正門前での卒業生たち

(Written by MIYAMOTO Mamoru)

Outline of the 13 theses and comment for the master's course by each student
研究論文13件と修士課程研修生のコメント

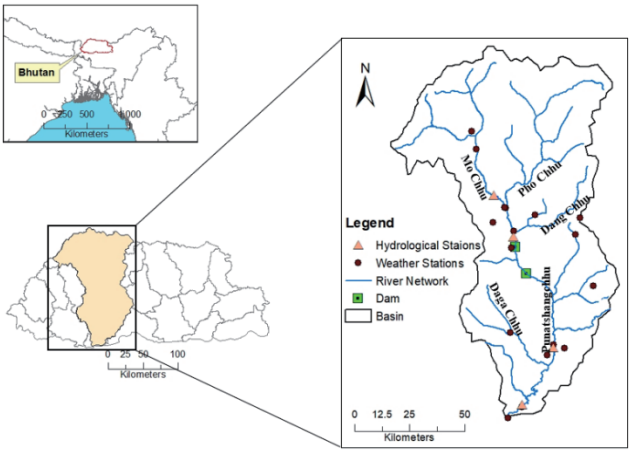
This section shows the abstracts of 12 master's theses and one individual study of the 13 students who had studied on the ICHARM master's course for a year.

修士学生13名がこの1年間で完成させた修士論文12件及び課題研究１件の概要と、コース全体の感想についてご紹介します。

BASIN-SCALE SEDIMENT TRANSPORT FOR SUSTAINABLE SAND MINING: A CASE STUDY IN PUNATSHANGCHHU BASIN, BHUTAN

Ugyen Phuntsho, from Bhutan
Engineer/Ministry of Works and Human Settlement

This study evaluated basin-scale sediment transport processes in the Punatshangchhu River basin in Bhutan, using the Rainfall-Sediment-Runoff model to investigate sustainable sand mining. The basin has provided 65% of the country's sand resources for infrastructure development since 2007; however, sand mining has been carried out without studying the basin's sediment budget. Numerical simulations were conducted for five with two cases: Case 1 considered only erosion from the riverbed, while Case 2 considered erosion from both the riverbed and hillslopes. Calculation results were compared with the observed discharge, suspended sediment concentration, and sediment size distribution. In Case 2, the total sediment runoff volume was 34 % more than that in Case 1. The study found that the sediment budget in the basin is in equilibrium. Therefore, sand mining is not sustainable in the present scenario, with riverbed degradation estimated at a considerable rate of 0.26 m/year due to mining activity. However, constructing a dam downstream could potentially allow for sustainable sand mining.



Punatshangchhu River basin

Keywords: Rainfall-sediment runoff, Basin-scale sediment transport, Sediment budget, Suspended sediment, Punatshangchhu River

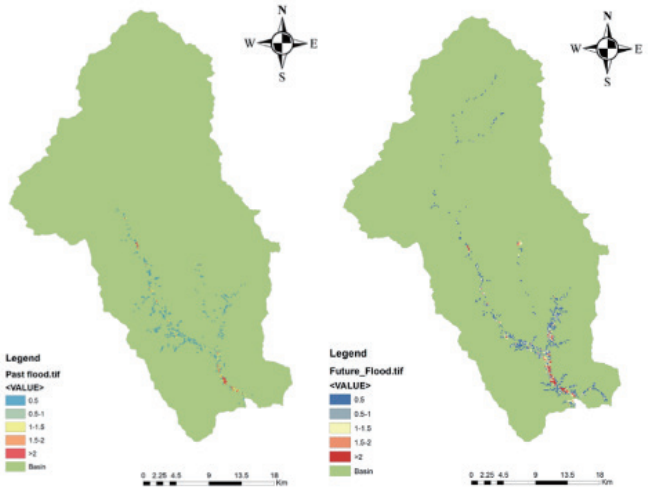
This one-year master's course has been an incredible journey for me, a journey that has truly transformed me in so many ways. It's been a whirlwind of experiences and opportunities, each adding to the diverse collection of my academic experiences and personal growth. The curriculum was nothing short of challenging, pushing me to question, analyze, and innovate constantly. It wasn't solely about gaining knowledge; it was also about developing critical thinking skills that would benefit me in any future endeavor. One of the most remarkable aspects of this journey has been the interactions within our diverse cohort. We came from different backgrounds, cultures, and walks of life, yet we all shared a common goal: to learn and be a better person. These interactions broadened my perspectives and deepened my understanding of global issues. Moreover, we had the opportunity to bridge the gap between theory and practice through field trips, workshops, and seminars. These experiences not only honed our skills but also gave us the confidence to tackle complex challenges in our future careers. As I reflect on this past year, I do so with a profound sense of accomplishment and gratitude. I've grown in ways I couldn't have imagined, made lifelong friendships, and gained the professional readiness I was seeking. Reflecting on this transformative journey, I would like to extend my heartfelt gratitude to my country (Royal Government of Bhutan), the Japan International Cooperation Agency (JICA), the International Centre for Water Hazard and Risk Management (ICHARM), and the National Graduate Institute for Policy Studies (GRIPS) for giving me the opportunity to pursue a one-year master's course on Disaster Management Policy (DMP), focusing on 'Flood Disaster Risk Reduction.' Finally, I would like to say 'Domo arigato gozaimasu' to JICA and ICHARM for taking care of and guiding me during this one year.



DEVELOPMENT OF FLOOD RISK MITIGATION STRATEGIES CONSIDERING CLIMATE CHANGE IMPACT IN THE PARO RIVER BASIN, BHUTAN

CHEDA Pema, from Bhutan
Executive Engineer/Ministry of Work and Human Settlement

Paro valley, located in north-western Bhutan, has a population of 46,316, and the span of Paro river basin area is 1,167 square kilometers. The Paro river, crucial for irrigation, is prone to flooding due to climate change. The basin has faced hydro-meteorological hazards in the past decades due to climate change. The 2009 flooding event and increased river discharges highlight the area's vulnerability to flooding posing a risk to the town, infrastructure, and socioeconomic activity, especially in the airport area, which may further increase due to insufficient flood protection measures. The study assessed the impact of climate change on flooding in Paro valley using General Circulation Models (GCM) and Rainfall-Runoff Inundation (RRI) hydrological models. The past and future rainfall outputs were assessed with Data Integration and Analysis System (DIAS) demonstrating the potential benefits of preventative action. The selected GCMs predictions show a potential rise in extreme rainfall and discharge that could lead to dangerous flash floods in the basin. The study also indicates an increase in inundation areas affected by a large number of populations. Strategies for coping with the scenario were researched by developing inundation maps with a 100-year return period. In addition, mechanisms to assess the impact of floods were devised, and structural and non-structural measures were also recommended because disaster recovery costs are extremely high.



Inundation map of Paro River basin for past and future (100-year Return period)

Keywords: climate change, rainfall, flood, damage, inundations

This master's programme has been an amazing experience for me, and it has transformed me in many ways. It has been a whirlwind of opportunities and activities, all of which have contributed to my intellectual growth and diverse range of acquaintances. The programme always challenged me to question, assess, and invent, which was nothing short of difficult. I wanted to not only learn new things, but also enhance my critical thinking skills so that I could use them in all my future endeavors.

Our unique cohort's interactions have been among the most remarkable aspects of this experience. Despite our diverse backgrounds, ethnicities, and jobs, we all shared the same goal: to learn and grow together. These discussions have broadened my perspectives and understanding of world issues. Furthermore, we were able to bridge the theoretical and practical divides through field trips, workshops, and seminars. These interactions not only honed our skills, but also provided us with the confidence to take on difficult tasks in our future jobs.

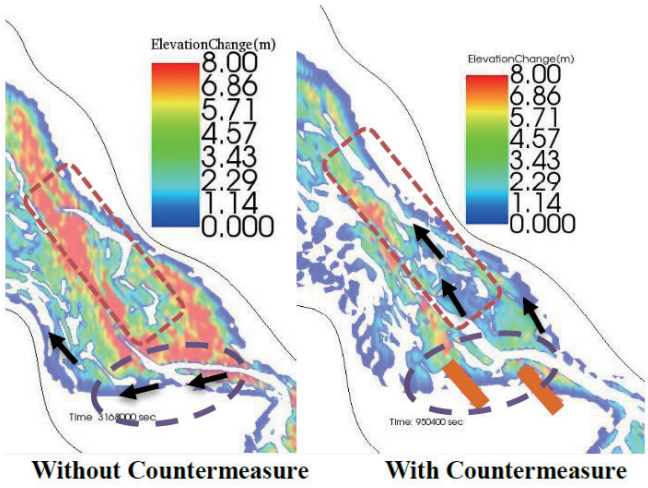
When I reflect on the past year, I get a strong feeling of accomplishment and gratitude. In addition to making lifelong friends and gaining the professional readiness I sought, I have grown in ways I did not anticipate. As I reflect on this life-changing experience, I want to thank the Royal Government of Bhutan (RGoB), my country, the Japan International Cooperation Agency (JICA), the International Centre for Water Hazard and Risk Management (ICHARM), and the National Graduate Institute for Policy Studies (GRIPS) for allowing me to pursue a one-year master's degree in Disaster Management Policy (DMP), with a focus on "Flood Disaster Risk Reduction."

Finally, I would like to thank JICA and ICHARM for looking out for me and mentoring me throughout this past year. Domo arigato gozaimasu and Trashi Delek.

STUDY OF MORPHOLOGICAL CHANGES AND EFFECTIVE COUNTERMEASURES BY USING SPUR DIKE FOR RIVER MANAGEMENT: A CASE STUDY AT INDUS RIVER SKARDU GILGIT-BALTISTAN

ABBAS Muhammad Yawar, from Pakistan
Executive Engineer/GILGIT BALTISTAN PUBILIC WORKS DEPERTMENT

The Indus River, which is heavily reliant on glacial melt, experiences an 80% increase in flow during summer, affecting Skardu City in Gilgit-Baltistan province of Pakistan. Settlements along its banks suffer from sediment deposition, and erosion of river banks owing to river channel changes, endangering agriculture, and vital infrastructure. This study aims to analyze river channel change using spur dikes as a countermeasure to assess flood mitigation measures. Using a 2D integrated model and satellite imagery, flow patterns, and erosion and deposition tendencies were simulated using various countermeasures in the Hoto and Sundus areas. Valuable insights have emerged, aiding proactive flood management to protect lives, livelihoods, and infrastructure while promoting sustainable development. This study serves as a vital resource for policymakers to make informed decisions and safeguard communities along the Indus River in the Hoto area of Skardu.



Comparison of sediment deposition height with and without countermeasures

Keywords: Glacier melt, Food disaster, River channel change, Spur Dike, Sustainable development

I am Muhammad Yawar Abbas from Pakistan. Today, I'm excited to share a transformative chapter in my life's journey. It's a story of support, learning, and a mission to make a difference.

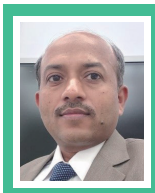
Thanks to the incredible backing of GRIPS, ICHARM, JICA, and my own Gilgit-Baltistan Public Works Department, I've been granted a golden opportunity to pursue a Master's degree in Flood Disaster Management.

This educational endeavor has been nothing short of enlightening. Living in a country that has endured major floods in the past, with the looming threat of future deluges, advanced knowledge in flood disaster management is an urgent need. I'm committed to using this knowledge to understand and tackle the flood-related challenges in my homeland. My ultimate goal is to serve my nation and contribute to global efforts to protect humanity from the devastating impacts of floods.

ICHARM, where I've had the privilege of studying, is a true leader in flood disaster management. The courses offered here are exceptional, equipping us with the best tools and strategies for tackling floods. What sets ICHARM apart are the eye-opening field visits and programs that have allowed me to immerse myself in Japan's innovative flood management solutions. These expevriences have been invaluable in shaping my understanding of effective flood management practices.

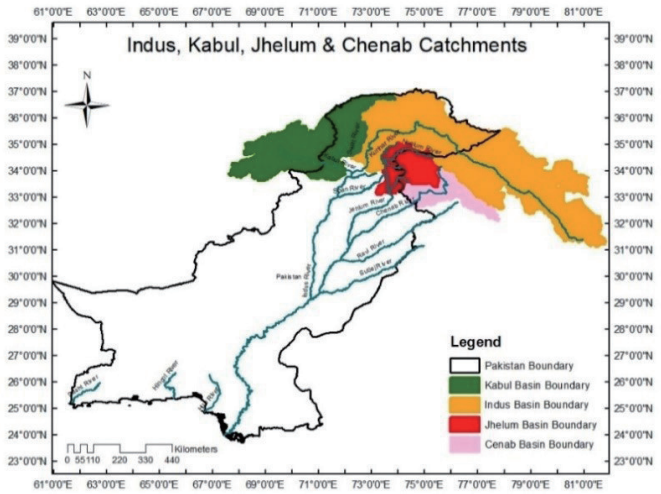
Moreover, the professors at ICHARM have been a constant source of inspiration. Their brilliance, dedication, and cooperative spirit have not only enriched my learning experience but have also fostered a sense of camaraderie among students.

In conclusion, I extend my heartfelt gratitude to those who made this educational journey possible. I am eager to apply the knowledge I've gained to address the unique challenges facing my country and beyond. With ICHARM as a guiding light, I am confident that together, we can build a safer, more resilient world in the face of flood disasters.



INTERCOMPARISON OF CLIMATE CHANGE IMPACT ON RAINFALL CHARACTERISTICS AND FLOOD MITIGATION STRATEGIES IN FOUR MAJOR RIVER BASINS OF PAKISTAN

FAROOQ Muhammad, from Pakistan
Senior Engineer (Civil) Water Resources Management/Pakistan Water and Power Depelopment Authority (WAPDA)



Study Area – Western Rivers of Pakistan

The Indus River basin and its tributaries, the Kabul, Jhelum, and Chenab (the western rivers of Pakistan), are crucial water resources for Pakistan, supporting its food and energy security. In addition to precious water resources, these rivers often produce huge floods causing havoc, as observed during the last decade from 2010 to 2015 and, most recently, in 2022, whereby flood events brought almost one-third of the country underwater. This multi-basin study employed the Data Integration and Analysis System (DIAS) for the selection of GCMs to assess the impact of climate change on the rainfall characteristics of each basin. The findings suggest decreased average annual rainfall and increased floods and droughts in the future under RCP 8.5. Flood simulations of the Jhelum River Basin using the Water and Energy Budget-based Rainfall Runoff Inundation (WEB-RRI) model predict future intensified flood events under changing climate. A comprehensive sensitivity analysis of the operation of Mangla Dam, the functioning of its purposely built flood storage zone, and the implementation of the Rohtas Dam Project indicate a significant reduction in flood inundation downstream of the dam, thereby mitigating potential flood damage in the basin. This study also proposes policy recommendations to provide decision-makers with evidence-based information to formulate policies for disaster risk reduction and aid sustainable water availability in the future.

Keywords: Climate Change, GCMs, WEB-RRI, Floods/Droughts, Reservoir Operation Optimization

I express my profound gratitude to the Allah Almighty for affording me the privilege to reside in Japan for one year. I am deeply appreciative of the opportunity to participate in this esteemed program, which has allowed me to establish invaluable connections with peers hailing from various corners of the globe who share a common understanding of water-related disasters. Additionally, I consider it an honor to have been a student under the tutelage of the distinguished professors and lecturers at ICHARM. Their imparted wisdom has equipped us to serve as conscientious stewards of our nations in the capacity of public servants.

Throughout the duration of this course, we had the unique chance to observe Japan's exemplary disaster management practices, spanning from the issuance of warnings to the development of hazard maps, and emergency drills, as well as the implementation of diverse structural countermeasures. These experiences have deepened our comprehension of the subjects elucidated in our lectures, and the knowledge we have gained shall undoubtedly prove invaluable upon our return to our respective homelands.

The insights garnered from this program were instrumental in the successful completion of my research, a feat made possible through the unwavering guidance of my benevolent supervisors. Acquiring my Master's Degree in Japan through the collaborative efforts of ICHARM, GRIPS, JICA, and WAPDA is indeed a momentous achievement and a profoundly enriching experience.

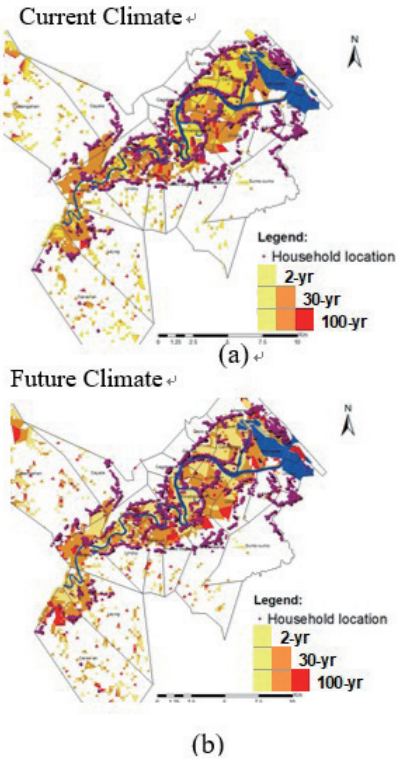
In addition to the academic knowledge gained, my journey offered me a deep insight into the rich tapestry of Japanese culture and traditions. The Japanese way of life gracefully intertwines the preservation of age-old customs with an open-hearted embrace of modernity, resulting in a captivating and perpetually evolving mosaic of human expression. I eagerly look forward to the day when I can return to Japan once more!

CLIMATE AND DISASTER RISK ASSESSMENT USING HYDROLOGICAL MODELING AND FREQUENCY ANALYSIS APPROACHES FOR MUNICIPALITIES IN THE TAGO RIVER BASIN, PHILIPPINES

CHU Lady Ella, from the Philippines
Local Government Operations Officer VI/Department of the Interior and Local Government

The hazard potential of the Philippines shaped by its location and archipelagic geography, has led to various types of hydrometeorological hazards, including floods, landslides, storm surges, sea-level rise, and drought. These catastrophic phenomena shifted the country's disaster management to a proactive approach by mandating local authorities to mainstream disaster risks and climate change in local development plans. This entails the utilization of a tool called the Climate and Disaster Risk Assessment (CDRA), a systematic process of factoring climate and disaster risk into development plans and programs. This study aims to provide recommendations for the enhancement of CDRA by incorporating the rainfall-runoff-inundation model and frequency analysis approaches. Data on the current climate and future periods of climate change for the Tago River Basin were utilized to produce the design rainfall for the 2-, 30-, and 100-year return periods. In this study, simulated design rainfall for current and future climate scenarios were used to quantitatively assess risk and generate exposure maps for the Municipalities of San Miguel and Tago. The results of this study demonstrate that integrating hydrological modeling and frequency analysis can be a valuable tool for a detailed and realistic approach to risk assessment at the local level. This provides a solid foundation for making well-informed decisions that prioritize risk reduction and resilience-building measures.

Keywords: climate, disaster, risk assessment, hydrological modeling, frequency analysis



Inundation exposure of population (a, b)

"Ichigo Ichie" (一期一会), a Japanese phrase which means "once in a lifetime". It carries a profound meaning and is a constant reminder to cherish each moment and make the most of every experience. I hold this phrase as my mantra during my one year stay here in Japan. Although paths were not always paved, these rocky trails and challenges pushed me to work harder and appreciate the beauty of learning new things. I am grateful to my fellow students and my wonderful professors and ICHARM staff for teaching me valuable knowledge and imparting their experiences.

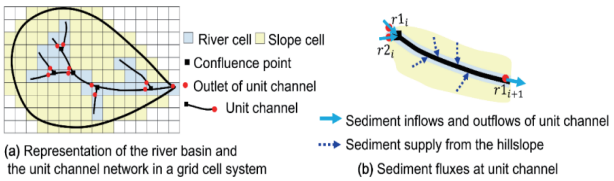
For almost a year, we were privileged to witness and learn remarkable disaster management structural and non-structural measures in the country. They are indeed worth emulating in our respective countries and offices. Each study trip was well-organized by ICHARM, JICA and GRIPS, ensuring that we were all comfortable and able to absorb significant information. Although I am not an engineer by profession, my professors were patient and approachable enough to accommodate my queries and tried simplified approaches to teaching. Moreover, ICHARM staff and researchers were very helpful and patient in making this journey more bearable.

Pursuing this study earned me not only additional technical knowledge but also personal growth. Living away from my comfort zone, immersing myself in different cultures, and witnessing the beauty of Japan are some of the things that kept me grounded and grateful. All these are worth sharing when I go back to the Philippines. No words could express how extremely thankful and indebted I am for this once in a lifetime opportunity.

INUNDATION PROCESSES OF FLOOD FLOW WITH SEDIMENT TRANSPORTATION IN THE AGNO RIVER MIDDLE STREAM, PHILIPPINES

FRIGILLANA Horace Hogan, from the Philippines
Engineer II/Department of Public Works and Highways Regional Office 01

Typhoon Parma caused the worst flood disaster in the Agno River Basin in 2009, from October 8 to 9. This study aimed to estimate the flood and sediment inundation process in the Agno River Basin middle stream area, where 14 dike breaches have been reported and observed with wide inundation, in order to gain a better understanding of flood hazard characteristics in that area and to support the improvement of the Agno River Basin flood risk management. A method was proposed by adapting the rainfall and sediment runoff analysis for the entire river basin to obtain the upstream boundary conditions (inflow discharges of water flow, bed load sediment, and suspended sediment flow) for two-dimensional flow and bed variation analysis in the flood-prone area. The rainfall and outflow discharge of the Ambuklao dam, located at the upstream end of the plain area of the Agno River, from September 27 to October 11, 2009, were used for rainfall and sediment runoff analysis. The simulation results were validated by observing the grain size distributions of riverbed sediment and the inundation area. The findings shed light on the difference in flooding patterns between the alluvial fan area and meandering plain area: the former exhibits shallow and high-velocity flooding, whereas the latter exhibits widespread and retarded flow in the lower land, resulting in a wide and long duration of inundation. It also reveals that wide inundation flows carrying fine sediment produce wide sedimentation in the inundated area, which is typically overlooked in flood risk assessment.



Unit Channel Principle for Rainfall-Sediment-Runoff Model (Qin et al., 2023)

Keywords: Flooding, Flood and sediment inundation, Rainfall and sediment runoff, Bed variation, Dike breach, Sediment sorting

My heartfelt and warmest thanks to JICA, GRIPS, and ICHARM for this wonderful learning opportunity and life-changing experience in Japan. To be selected as one of the scholars for the Masteral Studies on Flood Disaster Risk Reduction Management is a huge honor and privilege, not only for myself but for our Department of Public Works and Highways. Here, I have gained enormous knowledge, skills, and experiences that will be of great help in addressing our problems of flooding back in the Philippines. I had a deeper understanding of the dynamics of flooding and the different approaches to its management. As an engineer working on the design of flood control structures for our department's infrastructure projects, I learned that dealing with flood-related disasters is not only through structural but also non-structural approaches and must be harmoniously integrated with the principles of river risk management. Moreover, it must involve multiple sectors, not just a single sector or department working on its initiative.

Japan, like the Philippines, experiences natural hazard-induced disasters such as river flooding, landslides, debris flows, volcanic eruptions, and earthquakes, which have affected many lives and caused enormous damage to infrastructure and agriculture. Despite this, it is at the forefront of disaster management worldwide. I felt extremely fortunate to have this opportunity to learn about the Japanese and other countries' methods and practices of managing floods, not only through lectures but also through country presentations, experiments, a series of field visits, and the 9th International Conference on Flood Management (ICFM) held in Tsukuba in February 2023. I fully intend to adopt all these learnings and skills to improve our flood disaster risk reduction management in a Philippine setting.

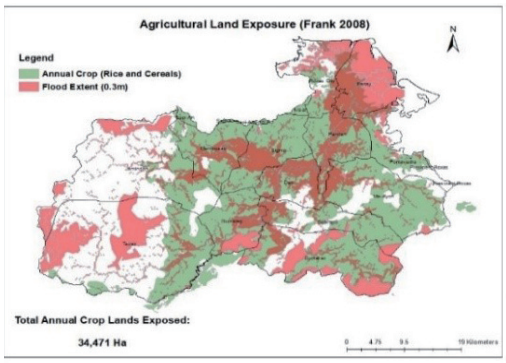
I learned that flood disaster risk reduction management is a multi-disciplinary approach. It involved the concepts and aspects of structural engineering, computer programming, climate science, socio-economics, and general risk management. I am extremely fortunate to have acquired such studies here at ICHARM. My heartfelt and warmest thanks and gratitude extend to all the professors and research specialists who have imparted their knowledge and skills for my individual development, especially to Egashira-sensei and most of all to Qin-sensei, for their wholehearted, dedicated, unceasing guidance and support of my studies. My heartfelt and warmest thanks go as well to all the ICHARM staff for their warm and generous support, guidance, and friendship.

Lastly, to all my classmates, I thank you for everything, and I will miss you all! I am sad that our time has come to part ways and go back to our normal lives, but I am looking forward to unceasing open communication. I hope to see you soon, and I wish you all the best and success. May you not forget to apply all that you have acquired here in Japan to dealing with flooding in our respective countries.

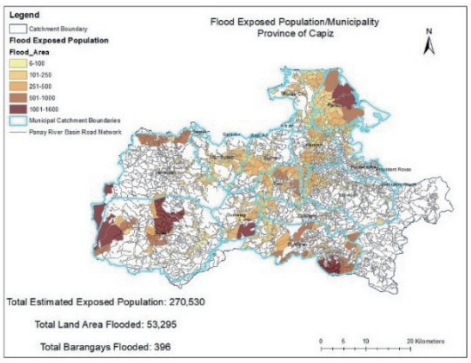
SOCIO-ECONOMIC IMPACT ASSESSMENT OF FLOOD DISASTERS USING HYDROLOGICAL MODELING IN THE PANAY RIVER BASIN, PHILIPPINES

LUSABIA John Paul, from the Philippines
Municipal Government Assistant Department Head II (LocalDisaster Risk Reduction Management Officer)/ Municipal Government of Manbusao, Capiz

Floods pose a significant threat to communities, particularly to those residing in river basins. Such incidents have devastating and debilitating effects with immense socio-economic consequences. This study examines the socio-economic impact of floods on communities living along the Panay River Basin in the Philippines and explores the consequences of recurrent flooding events, identifies the exposure of affected communities, and highlights potential preventive and mitigation strategies to counter the impacts of floods. Further, this study draws upon a comprehensive analysis using both scientific and ground-based approaches to provide a deeper understanding of the recurrent problem of flooding in these localities. The findings revealed the multifaceted nature of flood impacts that revolve around economic, social, and environmental aspects. This study concludes with recommendations for enhancing flood resilience and promoting sustainable development in flood-prone areas.



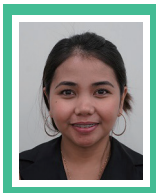
Agricultural Land Exposure



Population Exposure

Keywords: Flood Disasters, Flood Risks, Flood Hazards, Exposure, Flood Loss and Damages, Flood Countermeasures

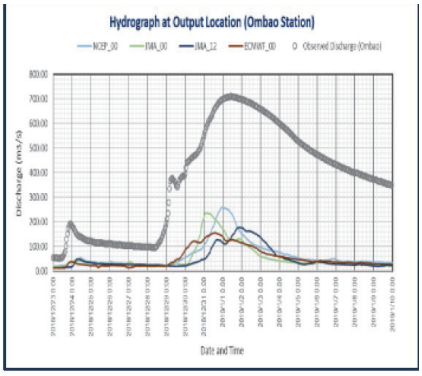
Time flies so fast and we have finally come to the end of our journey with ICHARM. It seems only yesterday when we stepped foot in this institution, all 13 master's students from different countries with different backgrounds and missions to see through. I, for one, came to Japan and to ICHARM with so much apprehension yet so much eagerness to learn about water related disasters. Flooding has been a long-standing problem in my locality and given such circumstances, the opportunity to learn from one of the world leaders in flood management was something I could never let pass. Indeed, I was right in my decision to pursue this study under ICHARM's most capable tutelage. I never felt short of knowledge as all Professors were adept in the field. I have always felt the guidance of everyone, even that of the staff, who would help me with my concerns. The time I spent in ICHARM was rather challenging yet fulfilling at the same time. Considering my non-engineering background, it took me twice the effort than my classmates, to finally finish each and every coursework and ultimately my final thesis. But it was fulfilling in the end, knowing that I was able to stand up to the challenge. The knowledge I gained from this one-year program will surely aid me, my office and my local government unit to move forward towards implementing an effective and efficient flood disaster management. It is my only wish that the same chance given to me by JICA, GRIPS, PWRI and ICHARM will also be given to all Local Disaster Risk Reduction Management Officers in my country, the Philippines, who have worked and continue to work tirelessly to build a resilient community in their respective localities. My heartfelt gratitude goes to everyone in ICHARM and I promise to make you all proud! Arigato Gozaimasu!



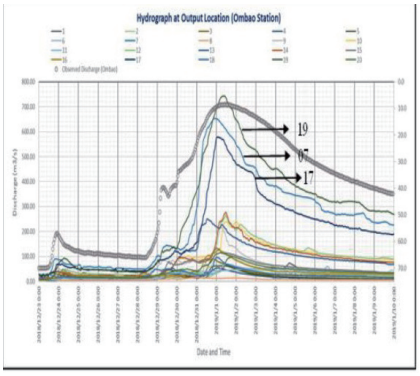
BASIN-WIDE FLOOD FORECASTING WITH NWP MODELS' RAINFALL FORECASTS FOR THE INTERACTION OF TROPICAL CYCLONE-MONSOON EVENTS IN THE BICOL RIVER BASIN

OROGO Allen, from the Philippines
Weather Specialist I/Philippine Atmospheric, Geophysical, and Astronomical Services Administration

There have been increasing cases of major flooding in the Bicol River Basin (BRB) that are not caused by tropical cyclone (TC) alone. Understanding the nature of these events requires thorough simulation of the reciprocal relationship between rainfall and flooding. Initially, this study evaluated the performance of numerical weather prediction (NWP) models in forecasting rainfall from the interaction of TC-monsoon. The research focused on the analysis of deterministic vs. ensemble forecasts. Given the primary goal of developing a flood-forecasting tool for such occurrences, these rainfall forecasts were simulated within the Rainfall-Runoff-Inundation (RRI) Model to assess how rainfall influences discharge outcomes. The simulation between rainfall and discharge forecasts was aimed at generating essential information, such as the time to flood peak, and the duration of flood. During the course of study there appeared to be difficulties in predicting the rainfall amount brought by the interaction between TC Usman and monsoon in the BRB using deterministic forecasts. The results show that there is a probability that this rainfall amount can be predicted within a high-resolution ensemble forecast. A total of 20 forecasts were executed, downscaled from the NCEP ensemble model, and the findings exhibited three forecasts that demonstrated the closest alignment with the observed rainfall data. Subsequently, the results indicated good agreement between the forecast discharge and observed discharge using these three ensemble members. The closest rainfall forecast was then utilized in the RRI model to establish more information such as when the flood (at knee-depth) will arrive at a certain municipality and how long will the flood last. These are crucial data in the context of operational flood forecasting because they serve as the basis for the issuance of flood warnings. The generation of these datasets will make the forecasting process simpler and easier to understand, initiating more cooperation and awareness on the part of the affected communities. This forecast information can serve as an essential tool for the Bicol River Basin Flood Forecasting and Warning System of the Philippine Atmospheric, Geophysical and Astronomical Services Administration to deliver its functions to the BRB community.



Simulated RRI model hydrographs using the downscaled GCM rainfall forecasts at 5km



Simulated RRI model hydrographs using the downscaled NCEP ensemble forecast at 5km

Keywords: Numerical Weather Prediction (NWP), Deterministic and Ensemble Forecasts, RRI Model

My trip to Japan was full of pleasant surprises. When I first came here, I didn't have many expectations, but Japan turned out to be an amazing place with lots of great things to offer.

During my time here, I learned a lot of new things that would help me in my job and personal life. I feel lucky to have had such a well-rounded experience in Japan. It wasn't just about work; I also explored and learned about the culture.

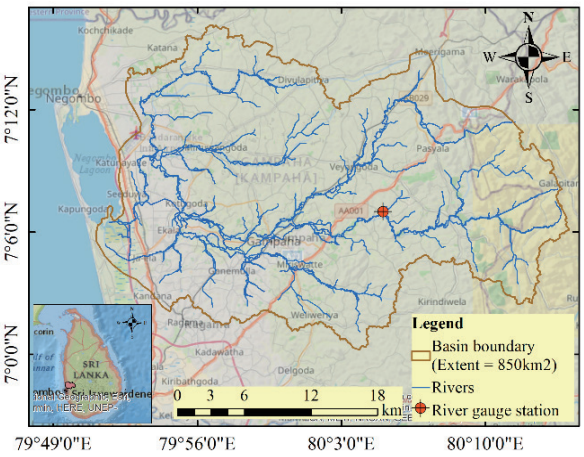
Studying and working in Japan was like a journey that made me a better person. It was more than just a regular trip; it was a special place where I found peace and happiness.

Looking back, Japan was a land of fantastic experiences. The people, the scenery, and the traditions all came together to create wonderful memories that I'll always cherish. Japan not only gave me great moments but also helped me find a sense of healing and renewal.

DESIGN OF ADAPTATION MEASURES BASED ON THE ASSESSMENT OF CLIMATE CHANGE IMPACTS ON EXTREME FLOODS IN THE ATTANAGALU OYA BASIN, SRI LANKA

JAYATHILAKA Ralapahana Mudalige Charya Prabodha Sri, from Sri Lanka
Engineer (Civil)/Sri Lanka Land Development Corporation

The Attanagalu Oya Basin experiences frequent flood hazards due to high-intensity rainfall events. Complex flow behavior, rapid infrastructure development, and high population density increase basin exposure, leading to severe damage. The proposed development activities are concentrated on low-lying regions and floodplains, requiring comprehensive basin-wide risk evaluation to assess their potential impact. To address these issues, this study presents a comprehensive approach for evaluating future rainfall variations to determine flood exposure and probable risk by employing bias-corrected climate-projected outputs from general circulation models (GCMs) and simulating the rainfall-runoff-inundation (RRI) model. These results indicate an increase in future extreme and long-duration rain events. The hydrological model results imply that inundation will increase, thereby increasing flood vulnerability. The findings emphasize that the flood-exposed population could increase from 13.8–22.5% and building exposure from 9.8–20% in the study area owing to climate change. The proposed risk matrix and land-use zoning are valuable for risk-based land-use planning, regulating urbanization in flood-prone areas and promoting resilient building practices. This study provides evidence-based information for policymaking, community awareness, and future flood exposure reduction, laying the groundwork for end-to-end approach to climate change adaptation.

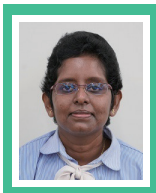


Study area (Attanagalu Oya Basin)

Keywords: Climate change, RRI model, Inundation, Risk matrix, Urbanization

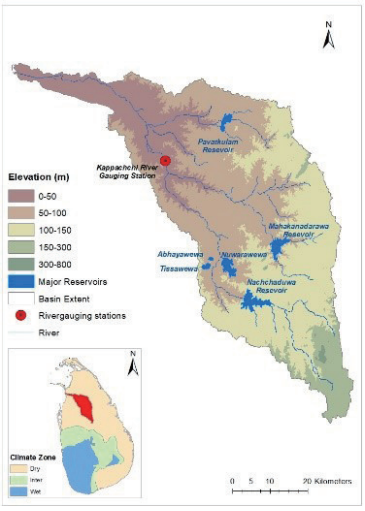
I am grateful to have been a part of this course and to have had the opportunity to meet newfound friends from different parts of the world who share similar experiences in dealing with water-related disasters. Furthermore, it was a privilege to be a student of the distinguished professors and lecturers from ICHARM and GRIPS. They imparted a wealth of knowledge and helped shape us into responsible citizens and public servants of our respective countries.

Throughout this course, we were fortunate to gain experience in Japan's flood disaster management practices, which encompassed preparedness, capacity building, countermeasures, and the concept of building back better through a combination of coursework and field trips. The knowledge we acquired will prove invaluable when we return to our home countries, as we can apply it to enhance our disaster management systems. The insights gained from this course also played a crucial role in the successful completion of my research work, with the guidance and support of my generous supervisors. Earning my master's degree in disaster management policy, through the collaboration of ICHARM, GRIPS, and JICA, has been a truly wonderful and fulfilling achievement.



DEVELOPMENT OF AN INTEGRATED WATER RESOURCES MANAGEMENT PLAN INCORPORATING THE CLIMATE CHANGE IMPACT ON THE MALWATHU OYA BASIN, SRI LANKA

RANAPURA DEWAGE Thilini Kaushalya, from Sri Lanka
Irrigation Engineer/Irrigation Department



Study Area – Malwathu Oya Basin

The Malwathu Oya Basin is the second largest river basin in Sri Lanka and is vital for the country's agricultural production and economic sustainability. This basin is prone to frequent flooding and droughts because of temporal and spatial climatic variations. Although some studies have individually examined the prevalent issues in this basin, this study holistically adopts an end-to-end approach encompassing climate change analysis, hydrological modeling, dam operational analysis, and disaster risk reduction assessment. Future climatic variations from 2050–2075 were explored through climate change analysis, considering the representative concentration pathway 8.5, and utilizing selected general circulation models (GCMs). These results imply that the basin will be more wetter in the future and vulnerable to extreme hydrometeorological disasters. A water energy budget-based rainfall-runoff inundation (WEB-RRI) model was developed to assess the basin's hydrological response. The model results suggest that the increased inundation extends downstream, indicating potential flood risks. Socioeconomic damage analysis was used to evaluate building and agricultural damage under extreme past and future conditions. Future projections indicate a significant increase in building and agricultural damage, necessitating proactive measures. The dam operational analysis focused on managing reservoir storage through pre-release and diversion strategies to transfer flood risks from urban areas and address flood and drought conditions. The research framework provides evidence-based information encompassing scientific, engineering, and socioeconomic assessments for developing the integrated water resource management (IWRM) plan to support policymakers in making informed decisions for sustainable water resource management in the Malwathu Oya Basin, emphasizing the urgency in adopting proactive measures for a more resilient and sustainable future.

Keywords: Climate change, flood and drought, WEB-RRI, dam operational management, IWRM

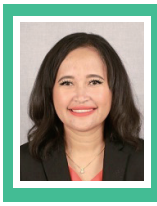
I am Thilini Kaushalya, an Irrigation Engineer working in the Irrigation Department in Sri Lanka.

My pursuit of a master's degree at ICHARM was an enriching journey that immersed me in academic excellence. Beyond that, I had the incredible opportunity to explore Japan's cultural heritage, which added a unique layer to my experience. Guided by distinguished educators, I was exposed to a wealth of knowledge and expertise that left an indelible mark on my academic path. Their guidance not only enhanced my understanding of my field of study but also imparted life skills invaluable for my engineering journey.

A milestone of my education was comprehensive research focusing on the development of an integrated water resources management plan that considers climate change impacts on the Malwathu Oya Basin in Sri Lanka. Under the expert guidance of Professor Mohamed Rasmy and Professor Toshio Koike, this endeavour solidified my capacity to tackle complex challenges using a multidisciplinary approach. Furthermore, the opportunity to participate in and present my research studies at the ICFM9 conference was a monumental highlight. This invaluable experience allowed me to share my insights with a wider audience and engage with peers on a global platform.

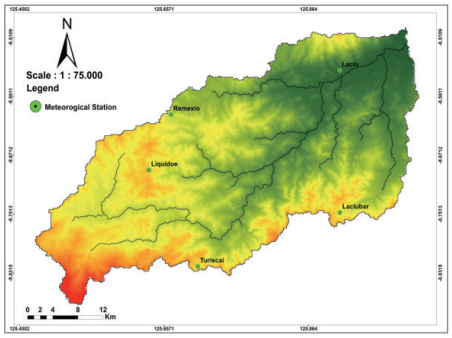
Amidst my academic journey, I had the privilege of experiencing the diverse beauty of Japan's four seasons witnessing the delicate cherry blossoms of spring and the vibrant tones of autumn leaves. I was exposed to the culture of Japan through traditional practices like calligraphy, origami, and ikebana, revealing artistic traditions that span centuries. The luminous grandeur of firework festivals and the elegance of sakura, peony blossoms and other flowering seasons etched lasting memories.

As I reflect on my transformative tenure at ICHARM, I am thankful for the academic growth and cultural insights that have left an indelible mark on my journey. It's not just education; it's a harmonious blend of education, culture, and nature that has broadened my horizons.



FLOOD INUNDATION ANALYSIS IN LACLO RIVER BASIN MANATUTO MUNICIPALITY, TIMOR LESTE FOR EFFECTIVE COUNTERMEASURES

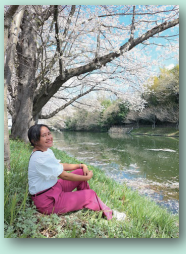
AMARAL SOARES Ligia Mediadora, from Timor-Leste
Engineer/Ministry of Public Works



Location of Meteorological station

Flooding remains a significant natural hazard in many regions worldwide, including the Laclo River Basin (LBR) in Manatuto Municipality, Timor Leste. The increasing frequency and severity of flood events have raised concerns about vulnerability of communities, infrastructures and ecosystems in the basin. To address these pressing issues, a comprehensive flood inundation analysis was conducted to identify countermeasures for mitigating flood impacts. The LRB is the second-largest river in Timor Leste. It is located in Manatuto Municipality and experiences near-annual flooding, which causes damage and interferes with everyday life. Flood damage occurs every year and flood countermeasures are insufficient. Structural countermeasures, such as embankments, have been implemented at several locations in the downstream area to reduce the impact of flooding; however, nonstructural countermeasures, such as flood early warning systems, are not yet well established in LRB. Flood inundation maps are essential for effective flood risk management. The hydrological method used in this study was the rainfall-runoff-inundation (RRI) model, which was employed for simulation to develop an inundation map, analyze the effectiveness of existing countermeasures, and propose new mitigation measures for future development. Flood simulations were conducted for various flood scales based on stochastic rainfall to understand how the spatiotemporal distribution of rainfall influences the extent of flooding and inundation depth. Flood events on April 4, 2021, were used in this study. Flood control with structural countermeasures should be implemented to prevent and reduce socioeconomic losses. To develop a new rainfall-runoff inundation model and perform a risk analysis, in addition to calculating statistical rainfall, considering future rainfall prediction data.

Keywords: Laclo River Basin, Flood Inundation, RRI Model, Risk Analysis, Countermeasures



Firstly, I thank GOD for the opportunity! I would like to express my gratitude to Timor Leste Government Ministry of Public Works (MPW), Japan International Cooperation Agency (JICA), International Center for Water Hazard and Risk Management (ICHARM), Public Work Research Institute (PWRI) and National Graduate Institute for Policy Studies (GRIPS) for nominating me to pursue this master degree in Water-related Disaster Management. Studying Water-related Disaster Management at ICHARM is a remarkable opportunity for me to address the critical challenges posed by water related disasters. ICHARM, as a specialized institution dedicated to this field, offers a unique environment for learning and research. Here, we studied practical approaches, were given research opportunities, and learned the application of solutions to achieve the resilience sustainability.

During my study at ICHARM PWRI, I gained valuable knowledge related to Water-related Disaster Management, including the use of software to support these efforts, and I had the opportunity to participate in field trips. This knowledge is incredibly valuable for me and my colleagues, as we can apply it in our respective countries. I also learned from my friends from different countries, such as Bhutan, Pakistan, the Philippines, Sri Lanka, and Tunisia.

In addition to the education, I had the privilege of learning about the Japanese culture and their approach to life in Japan. It was a stark contrast to my own country, particularly in terms of punctuation and discipline. Japanese people are known for their hardworking nature and efficient time management which I found truly inspiring.

Lastly, I would like to extend my sincere gratitude to my supervisors and all the Professors for sharing their knowledge and expertise with me as their student.

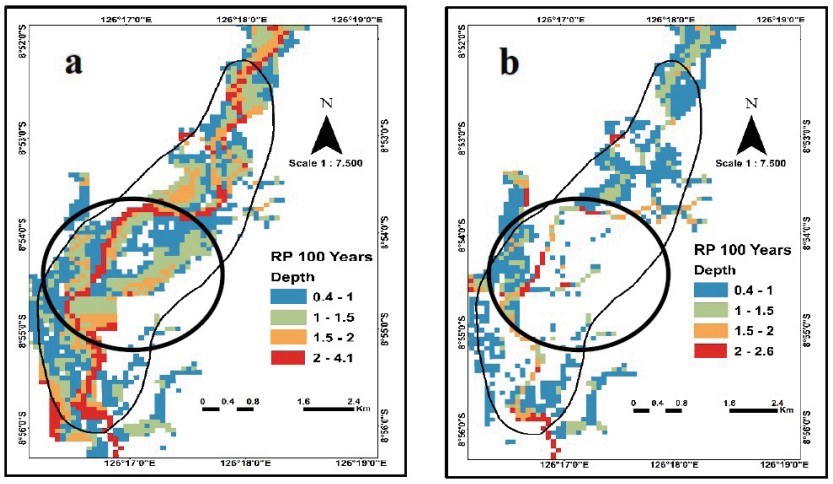
Domo Arigato Gozaimashita

Obrigada Barak

FLOOD INUNDATION AND RISK ASSESSMENT IN THE WELOLO RIVER BASIN, TIMOR-LESTE

DE FATIMA TILMAN Zeferino, from Timor-Leste
Assistant Officer GIS/Institute of Petroleum and Geology, Public Institute

The main objective of this study was to propose and assess the effectiveness of flood control measures, to minimize the impact of floods in the Welolo River basin using the Rainfall-Runoff-Inundation model. The Welolo River is the second-largest river in the Viqueque municipality, Timor-Leste, and its catchment has been suffering from frequent floods due to a tropical cyclone event of 2021. In this study, flood inundation scenarios were simulated with and without considering the influence of countermeasures. The total damage was estimated through analyzing the targeted 100-year flood return periods, and scenarios with and without the proposed countermeasure conditions were compared. The results showed that the levee was the most effective structural flood countermeasure.



(a) 100-year return period without countermeasure and (b) 100-year return period with countermeasure

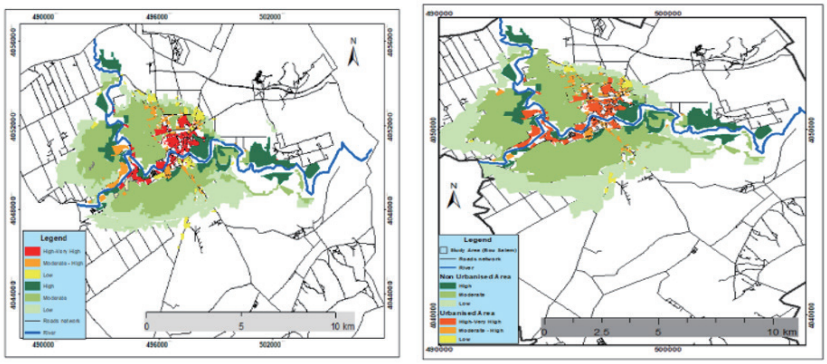
Keywords: Welolo river basin, RRI Model, Flood inundation, Flood risk management

First and foremost, I offer my sincere praise and gratitude to God. I feel very happy to be a part of this course, where I've had the opportunity to connect with newfound friends hailing from various corners of the world, all sharing a common experience in dealing with water-related disasters. Additionally, being a student under the guidance of the exceptional professors and lecturers at ICHARM has been a privilege. Their teachings have imparted valuable knowledge, shaping us into responsible citizens and dedicated public servants in our respective countries.

One year has swiftly passed, during which we have acquired a wealth of knowledge, experience, and friendships. I hope to utilize this newfound knowledge and experience as a foundation for advancing my career in the future, with the ultimate goal of making a significant contribution to our country. Finally, I wish to extend my heartfelt appreciation to GRIPS, ICHARM, and JICA for granting me this invaluable opportunity. I am also grateful to the Institute of Petroleum and Geology, which facilitated my journey to Japan. Lastly, I express my deep gratitude to all of ICHARM's Sensei and my supervisors, Prof. OHARA Miho, Dr. NAITO Kensuke, and Prof. KATAYAMA Koji, whose guidance enabled me to complete my research on schedule. To all my dear friends, I hope that this won't be our last encounter, and I look forward to seeing you again at another good opportunity.

ASSESSING FLOOD RISK UNDER CLIMATE CHANGE BY DOWNSCALING THE MAJERDA RIVER BASIN SCALE TO A MUNICIPALITY SCALE IN BOU SALEM, TUNISIA

YOUSSFI Housem, from Tunisia
Principal Engineer in Hydraulics/Ministry of Equipments and Housing

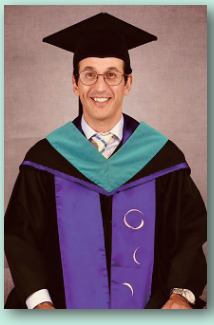


Flood risk maps of the present (left) and future (right) with a return period of 100 years

Bou Salem, a small municipality located in a large transboundary river basin shared between Tunisia and Algeria, has been severely affected by the flooding of the Majadra River several times during the past few decades. This study aims to assist decision-makers in establishing a comprehensive flood management plan in Bou Salem based on a risk assessment that considers the impact of climate change. Using a new hydrological methodology, this study attempts to identify, delineate, and assess the flood risk in Bou Salem in present and future situations, considering the effects of the upstream Majerda River basin. Climate change impacts were assessed through the statistical downscaling of general circulation models over the study area using CMIP5. All selected models consistently showed similar decreasing future annual rainfall trends. Heavy rainfall was predicted to increase in the future. Hydrological modeling with a distributed rainfall-runoff-inundation model revealed that Bou Salem was highly exposed to severe flood risk in the present situation and under the impact of climate change. Based on the research findings, mitigation measures that reduce the risk of floods in the Bou Salem municipality have been proposed at local and large basin scales. At the municipality scale, flood risk must be integrated into urban planning and urbanization must be controlled in high potential risk areas. At the large basin scale, river work improvement should be accomplished to increase river transport capacity. Moreover, the construction of new dams with integrated and optimized operation in large-scale basins could be effective as long-term flood risk reduction and climate change adaptation strategies.

Keywords: Climate change, flood, hydrological model, risk assessment, policy making

My name is Housem Youssfi, and I serve as the Principal Hydraulic Engineer at the Ministry of Equipment and Housing of Tunisia. Within the precincts of my professional realm, we grapple with an array of formidable challenges intertwined with flood risk mitigation for our communities and the pursuit of sustainable development, especially under the climate change impact. The one-year master's degree program was a really golden opportunity, offering me a splendid opportunity to delve deeper into my academic pursuits and fortify my professional acumen. This immersive experience unfolded under the guidance of distinguished and erudite lecturers hailing from diverse spheres of expertise. I also had a chance to learn about the relevant and unique Japanese experience in disaster management through many field trips to various facilities and projects related to water disaster management. There were also 12 other participants from Bhutan, Pakistan, the Philippines, Sir Linka, and Timor Lest coming from various fields. Therefore, I was able to learn about different experiences from them. Regarding my life in Japan, I learned things from Japanese culture, such as being punctual, time management and relying on myself. During this one year stay in Japan, I had to face language barriers, cultural differences, financial issues, no summer holidays during university, and exams on the day of Aid. But thanks to those challenges, I could taste the flavor of success and be happy about my accomplishments! I learned how to be independent, responsible, strong, and more tolerant. Finally, I would like to express my gratitude to supervisors and researchers for their support and encouragement for me to successfully complete the degree. I would also like to express my special gratitude to my main supervisor, Toshio KOIKE sensei, for his great support and guidance in overcoming complicated technical issues. I strongly recommend that all government officials and students pursue higher studies from ICHARM and GRIPS.



Action Reports from ICHARM Graduates

ICHARMでは、政策研究大学院大学（GRIPS）、国際協力機構（JICA）と連携して、世界各国から洪水対策の行政官を対象として、1年間の修士課程「防災政策プログラム　水災害リスクマネジメントコース」を実施するとともに、3年間の博士課程「防災学プログラム」を実施しています。これまで180名を超える実務者・研究者の方々が各課程を修了し、帰国後、本研修で習得された知識や経験を生かして、様々な分野において活躍されています。

ICHARMニュースレターでは、こうした卒業生の方々からご活躍の様子を寄稿していただいています。本号では2015-2016年（9期）修士課程卒業生であるSharma Gopal氏（ネパール）の寄稿文をご紹介します。

ICHARM provides graduate-level educational programs for foreign government officers in charge of flood risk management in collaboration with GRIPS and JICA: a one-year master's program, "Water-related Risk Management Course of Disaster Management Policy Program," and a three-year doctoral program, "Disaster Management Program."

Since their launches, over 180 practitioners and researchers have completed either of the programs. They have been practicing knowledge and experience acquired through the training in various fields of work after returning to their home countries. This section is devoted to such graduates sharing information about their current assignments and projects with the readers around the globe. SHARMA Gopal (Nepal), who graduated from the master's program in 2016, has kindly contributed the following article to this issue.

Sharma Gopal

Senior Divisional Engineer
Ministry of Water Resources and Energy Development, Nepal

In order to obtain a master's degree, I visited Japan in 2015. I learnt various issues related to flood disasters and earned a master's degree in disaster management under the Disaster Management Program managed by GRIPS, JICA, and ICHARM.

My research title during the course of my study at ICHARM was 'Method for predicting sediment runoff processes and channel changes in West Rapti River, NEPAL,' and I worked on it under the supervision of former Associate Professor Atsuhiro Yorozuya and Professor Shinji Egashira. Upon its culmination, I was involved in the river training project in the upstream area of the West Rapti River.

Figure 1 Nikas khola protection work, Surkhet

Since returning to my home country after the completion of my studies in Japan, I have worked on projects related to sediment issues at four different offices of the Government of Nepal in the positions of both engineer and senior divisional engineer. During this tenure, I have encountered challenges relating to sediment not only at the construction level but also at policy-making level and have thus felt a gap regarding proper sediment management studies.

Witnessing the lack of proper study on bridges built over fine gravel or sandy/silty profile and huge sediment load sweeping away the project superstructures and the non-restorable turning off of the cultivable land into stony beaches (Khaira Faant, West Rapti River Basin) during my term at the Ministry of Physical Infrastructure Development, Karnali Province, and the Water Induced Disaster Management Office, respectively, I came to understand the importance of studying sediment related issues.

Currently, I am working at the Ministry of Water Resources and Energy Development, Karnali Province, where I have been assigned to the planning of hydroelectric and irrigation projects, watershed management projects, and disaster mitigation projects, varying from resource allocation, policy drafting, and project appraisal to monitoring and supervision. I have always tried to incorporate sediment management, one of the major factors in project vulnerability, as it is a challenging aspect but often overlooked. Many projects are seen to be facing sediment-related issues. One example is a project under my supervision, the Garam River Irrigation Project in Jumla, where a natural drain passage beneath an aqueduct was completely blocked with unexpected sediment load some time ago that even triggered damage to certain portions of the aqueduct.

Figure 2 Bheri River Training Work, Surkhet

Figure 3 Sediment Sample collection in West Rapti River

In my study, I worked on the integration of one-dimensional and two-dimensional models for the West Rapti River of Nepal to evaluate the sediment load, both erosion and deposition at the point scale of the overall basin, for which I conducted research to estimate sediment loading. The equation is a crucial addition to the Nepalese society of science and engineering, especially for mountainous river basin management. Studying erosion and deposition rates makes the design of appropriate countermeasures sustainable, rational, and less cumbersome, which further leads to a substantial reduction in disaster risk, losses of lives, health problems, and economic, physical, social, cultural, and environmental assets. It is very helpful to fulfil one goal of the Sendai Framework for Disaster Risk Reduction, 2015-2030: "Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities including through developing their resilience by 2030".

As the major part of Nepal is inaccessible or poorly accessible for the people to live in, an under-privileged group of people choose plain lands along the banks of the rivers to live in. Many cities are established on or very near flood plains, too. Such cities are definitely enriched with culture and tourism and bustling socio-economic activities but, unfortunately, suffer from severe vulnerability and exposure to water and sediment induced disasters. As a reference, we can take the Melamchi flood of 2021. Correctly understanding debris-flow and mud-flow processes would be very helpful in managing such risk and reducing water-induced vulnerability to such societies.

In addition, I will recommend one Sediment Management Policy to address deposited sand as a resource with high economic value by predicting the volume of sediment transportation and area of aggradation and degradation. Riverbed variations and corresponding channel changes are happening due to uneven distribution and deposition of suspended sediment. Many people have already lost their lands, property, and lives due to landslides and flood disasters. If proper policies are introduced, deposited sediment can be used legally and scientifically for various purposes, and ultimately it helps strengthen the 3 E's of our country: economy, engineering, and environment. The in-depth study of this field will help navigate the probable locations for the generation of sediment, channel changes, degradation and aggradation zone, and the locations and ranges of bank erosion, which would be helpful in finalizing both the structural and non-structural countermeasures on the river to enhance the socio-economic development of the country. I am convinced that this study would contribute to both policy makers and technocrats to deal the sediment yield, sediment transportation, and sediment management.

Education, culture, cuisine, and development are important factors that have always helped nations to build the foundation for mutual trust and respect and establish strong bilateral relations. Promoting the exchange in development, research, and culture between Japan and Nepal is one step closer to strengthening the bilateral relation between the two countries.

I belong to Karnali Province, one of the provinces that have been very little touched by development in Nepal. We have only one university in the province, and I am encouraging the students of the university to be part of Japanese education culture and use the learning in our own country.

Being a part of ICHARM was simply a career-changing point for me, as the knowledge and education I garnered during my stay in Japan have always been beneficial for me while performing my jobs, ranging from planning to evaluating various projects. I would like to express my heartfelt gratitude to the professors, researchers, and staff for their unwavering belief and support shown towards me.

Information Networking

The 12th Annual Meeting of the Working Group on Hydrology of the Typhoon Committee
台風委員会水文部会の第 12 回年次会合への参加

2023 年 6 月 20 日から 22 日にかけて、タイ王立灌漑局（RID：Royal Irrigation Department）と国土交通省の共同開催により台風委員会（TC）水文部会（WGH）の第 12 回年次会合が、タイ・バンコクで開催されました。

会議は対面とオンラインのハイブリッド形式で行われ、14 のメンバー国・地域のうち 10 の国・地域（中国、香港、日本、ラオス、マレーシア、フィリピン、韓国、タイ、ベトナム、アメリカ）と ESCAP、台風委員会事務局から総勢約 50 人の参加者が集まりました。開催地であるタイからは、主催の RID だけでなく、国家水資源事務局（ONWR）やタイ気象局（TMD）、内務省防災軽減局（DDPM）などの関係機関からも多くの専門家が参加しました。日本からは国土交通省、国際建設技術協会、および ICHARM から水文部会議長を務める宮本守主任研究員と柿沼太貴研究員の 2 名が参加しました。

会合ではメンバー国・地域から今年の台風の状況や被害について報告されるとともに本年のテーマである「Community Outreach and Multi-stakeholder Engagement –Boosting Early Warning for All-」に係る取り組みが紹介されました。また、計 9 つの年次運用計画（AOP：Annual Operation Plan）および第 3 期標準作業手順の共同策定事業（SSOP III）について進捗と今後の計画が議論されました。これらの報告についての活発な議論を通して、台風委員会を地域の重要枠組みとする各国の連携の重要性が参加者によって再認識されました。ICHARM からは宮本主任研究員が、AOP7「水強靱性と災害に関するプラットフォームを通じた洪水強靱性の強化」と題したフィリピン・ダバオでの活動に関する発表を行い、特に開催国であるタイから次の連携国としての前向きな提案がありました。

会議の後半では、RID への訪問および現地視察が行われました。RID では、水管理・水文局長である Thanet Somboon 氏の歓迎を受け、タイ国内の洪水・渇水リスクを軽減するための対策やモニタリングシステムについての詳細な説明を受けました。現地視察ではパーサックダムやバンバン調節水門を訪れ、日本とは異なるダムの特徴（氾濫原近くに位置しているため広くて浅い）や運用方法、アユタヤ地域を守るための治水対策について説明を受け、メンバー国の関心を集めました。

今回は日本と韓国以外の国で開催する初めての WGH 会合であったこともあり、タイ国内での多くの関係機関が連携する水政策・マネジメントを各メンバーが直接学ぶことができました。これは ICHARM らが国際洪水イニシアティブ（IFI）の枠組みで推進する「水のレジリエンスと災害に関するプラットフォーム」における分野横断的連携にも通ずるガバナンスの実践でもありました。ICHARM では、台風委員会を水災害リスク軽減およびレジリエンス強化のための最も重要な国際的枠組みの 1 つと位置づけ、引き続き地域間協力の強化に貢献していく所存です。

The 12th Annual Meeting of the Working Group on Hydrology (WGH) of the Typhoon Committee (TC) was held in Bangkok, Thailand, on September 20-22, 2023, co-hosted by the Royal Irrigation Department of Thailand (RID) and the Ministry of Land, Infrastructure, Transport and Tourism of Japan (MLIT).

The meeting was conducted in a hybrid style, combining both in-person and online participation. About 50 participants joined from 10 nations and territories (China, Hong Kong, Japan, Lao PDR, Malaysia, the Philippines, the Republic of Korea, Thailand, Vietnam, and the United States), the Economic and Social Commission for Asia and the Pacific (ESCAP), and the TC Secretariat.

From the host country, not only officials from RID, the main organizer, but also experts from the Office of National Water Resources (ONWR), the Thai Meteorological Department (TMD), and the Department of Disaster Prevention and Mitigation (DDPM) participated. From Japan, in addition to officials from MLIT and the Infrastructure Development Institute (IDI), two researchers attended from ICHARM: Senior Research MIYAMOTO Mamoru, who presently serves as the chairperson of WGH, and Researcher KAKINUMA Daiki.

At the meeting, the representatives of the members reported on this year's typhoon events and damage. They also presented their efforts related to this year's theme, "Community Outreach and Multi-stakeholder Engagement – Boosting Early Warning for All –." Additionally, the meeting discussed the progress and plans regarding the nine Annual Operation Plans (AOPs) and the project for the joint development of the third phase of the Standard Operating Procedures (SSOP III). Through discussions on these reports, the participants reminded each other of the importance of collaboration among the members by recognizing TC as the key framework for the region. From ICHARM, Senior Researcher MIYAMOTO presented the activities in Davao, Philippines, as AOP7 "Flood Resilience Enhancement through the Platform on Water Resilience and Disasters." There was a positive proposal from Thailand that it should be the next country to join this platform project.

Figure 1 Participants in the WGH meeting
WGH 全体写真


Figure 2 Participants receiving an explanation at the Bang Ban Regulator
BangBan 調節水門前にて説明を受ける風景

In the latter half of the meeting, the participants visited RID and joined a study tour of local water-related structures. At RID, they were welcomed by Dr. Thanet Somboon, the director of the Water Management and Hydrology Department, and received a detailed explanation about measures and monitoring systems to mitigate flood and drought risks in Thailand. The destinations of the study tour included the Pasak Dam and the Bang Ban Regulator. The participants curiously learned about the unique characteristics of the dam (wide and shallow due to its location near the floodplain) and its operation methods, as well as flood control measures to protect the Ayutthaya region. This WGH meeting was the first of its kind held outside of Japan and the Republic of Korea, allowing the members to directly learn about the collaborative water policies and management involving many related agencies in Thailand. Thailand's case is an excellent example of practical governance that aligns with the cross-sectoral collaboration, which has been encouraged in the Platform on Water Resilience and Disasters, a project that ICHARM and other organizations promote under the framework of the International Flood Initiative (IFI).

ICHARM recognizes TC as one of the most important international frameworks for reducing water-related disaster risks and strengthening resilience to them. We will continue to support TC in strengthening the interregional cooperation needed to achieve its goals.

(Written by KAKINUMA Daiki)

Public Relations

Kids enjoyed VFES in Tsukuba Chibikko Hakase 2023
つくばちびっこ博士 2023 が開催される

"Tsukuba Chibikko Hakase 2023," was held from July 22 to August 31. This summer event is open to the students of elementary and junior high schools all over Japan during their summer break. The event is designed for the students to learn about research institutes in Tsukuba City and what they are doing. They are encouraged to become a "chibikko hakase," or a young expert, about the institutes and their activities by visiting or watching video clips about them and answering quizzes.

The Public Works Research Institute was one of the research institutes participating in this annual event, and this year ICHARM held a flood evacuation experience event entitled "Can you escape from flooding?" on August 4 (Figure 1), in which children tried out the Virtual Flood Experience System (VFES), which ICHARM developed and introduced to the public at an open symposium held as part of the 9th International Conference on Flood Management (ICFM9), which was convened in February 2023.

Figure1 ICHARM's event at Tsukuba Chibikko Hakase 2023
図 1 つくばちびっ子博士における ICHARM のイベント状況

VFES is programmed to reproduce the flooding conditions of a flood risk area in Tsukuba City. Users play a game-like flood evacuation program by manipulating an avatar, through which they are expected to learn important behaviors that they should know when evacuating, such as starting evacuation early, collecting information, taking useful and valuable items with them, checking on people who are likely to need help for evacuation, and providing support for physically-challenged people after evacuating to a safe place. In the August event, the young participants intently played VFES, learning how to act in case of flooding. Some of them even asked for additional time or another try when they couldn't reach the goal within the time limit.

The event was also meaningful for ICHARM, revealing problems that need improvements. Because the landscapes reproduced on the system are rather simple and monotonous, it was sometimes difficult for young children to figure out their whereabouts while finding a way to the goal point. Also, it was difficult for some children to operate the system using the mouse and the keyboard at the same time.

ICHARM has already started working on these problems. At ICFM9, ICHARM organized an event to which local schools were invited to try out VFES. Since then, ICHARM has begun a joint project with Namiki Secondary School, one of the local schools, to improve VFES. With VFES coupled with an educational computer program, landscapes have been improved by changing buildings' shapes and colors. Without colors or other characteristic features, the buildings reproduced on the system look like a bunch of boxes standing up (Figure 2A). However, they can be easily identifiable as what they are when colors and other features, such as walls, roofs and trees, are added (Figure 2B). By preparing several types of such realistic buildings and features and adding them to intersections and other key locations, the landscape as a whole can look more

A. Before improvements

B. After improvements

Figure2 A landscape reproduced by VFES before (A) and after (B) improvements
図 2 教育ゲームにおける景観改良の結果

つくばちびっ子博士は、2023年7月22日から8月31日まで開催されました。本イベントは、全国の小学生・中学生に、つくば市内の研究機関を開放し、つくば市内の研究機関等を訪問したり、紹介する動画を視聴したりしてクイズに答え、つくばちびっ子博士を目指す夏休みのイベントです。

土木研究所もつくばちびっ子博士に参加しており、ICHARMは「あなたは洪水から逃げ切れるか？」と題して、洪水避難体験イベントを開催しました。今年度は、参加いただいた子どもたちにICFM9で使用した仮想洪水体験システムを体験してもらいました(図1)。

つくば市で洪水が生じる可能性がある区域の洪水状況を仮想洪水体験システム上に再現し、洪水時の避難の際に重要な行動である、早く逃げる、情報の確認、必要な物を持っていく、避難が困難な方への声かけ、自分の身の安全を確保した後の補助等を学習してもらいました。仮想洪水体験システムは、参加いただいた子どもたちに大変好評で、とても集中してゲームに参加いただき、ゴールに辿りつけない場合には、時間の延長や再挑戦などを希望される方がおられました。

その反面、仮想洪水体験システム内の景色が単調なため、避難する方向がわからず迷子になる子どもたちがいたり、小学生低学年以下の子どもたちが、マウスとキーボードを同時に操作するのが難しい等、現在の仮想降水体験システムの問題点を把握することができました。

景色が単調な問題に関しては、建物形状や色相の工夫が考えられます。ICHARMでは現在、ICFM9をきっかけとして、並木中等教育学校と連携し、教育用ソフトを用いて仮想洪水体験システムの改良作業を行なっています。教育ソフトに取り込んだ3D都市モデルは、適切な加工を施さない場合、図のように色相を持たない立方体です。これらの3D都市モデルに建物や屋根の形状、壁の色、塀等を加えることにより、建物らしくなります(図2)。このような改良した建築物を複数パターン作り、交差点等に配置することにより、無機質な街並みが変化を持った街並みに改善することがわかってきました。

パソコンに慣れてない子どもたちの操作に関しては、マウス・キーボードを使う必要のないタブレットやスマートホンなどが有効と考えられます。上記の教育ゲームは、タブレット版やスマートホン版もあるため、パソコン操作になれていない方の仮想洪水体験システムの体験に有効であると考えています。

このイベントを通じ、仮想洪水体験システムを誰でも体験しやすくするよう改善に取り組む必要性を確認でき

ました。今後、現状の仮想洪水体験システムの完成度を上げるとともに、仮想洪水体験システムのコンテンツを教育ゲームへ移植する等の過程を、教育機関等の参画を得ながら進めるモデルケースの構築に取り組んでまいります。

realistic and recognizable, and players can quickly locate themselves in virtual reality.

For children who are not very familiar with the use of PCs, tablets and smartphones can be more viable options. Since educational computer programs designed for these devices are widely available, coupling VEFS with such software will increase its user-friendliness and help young users learn about flooding through the system.

Overall, this kids event was an excellent opportunity for ICHARM to be clear about the problems of the current version of VFES. ICHARM will continue to improve the system and seek to increase its user-friendliness, for example, by combining it with educational software, while also establishing a collaborative project model to conduct a project in cooperation with schools and other organizations.

(Written by DENDA Masatoshi)

First participation in ADB e-Marketplace 2023
ADB e-Marketplace2023 に初めて参加しました

アジア開発銀行 (ADB) が開催する e-Marketplace は、ADB の水セクターグループが管理する「Water Resilience Hub」のパートナーが共催して開催されます。ADB の加盟国各国から産官学の関係者が集まり、“スマート”、“レジリエント”、“安全”、“包括的”な水管理とサービスを提供するための、最新のデジタル技術と優良事例について紹介し、関心を持った方との連携のきっかけを作ることを目的にしています。

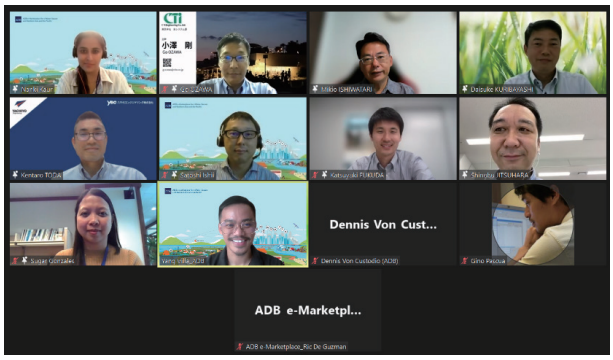
2023 年 7 月 25 日には、日本水フォーラム・環境省・経済産業省の共同開催のもとで、「ADB e-Marketplace 2023」の第 3 回目のセッション「Focus on Japanese solutions」が開催され、ICHARM を含む 6 者がプレゼンテーションを行いました。ICHARM からは栗林大輔上席研究員が、ICHARM が推進する「革新的な研究」の一環として、日本の中小河川における洪水予測研究、VR 技術を活用した仮想洪水体験システム (VFES)、フィリピン・ダバオ市で展開している Online Synthesis System for Sustainability and Resilience (OSS-SR) の取組を紹介しました。

フロアからは、中小河川の洪水システムや OSS-SR は他国でも適用可能かなどの質問があり、それぞれについて、水文データが乏しくてもモデルの構築は可能、他国での展開を目指している、との回答を行いました。

ICHARM が「e-Marketplace」に参加するのは初めてでしたが、他の研究機関の発表やフロアとの質疑もあり、良い活動紹介の機会となりました。

なお、当日のウェビナーの様子は、下記サイトからご覧いただけます。

https://hub4r.adb.org/index.php/sessions/session-3-focus-japanese-solutions



Participants in the ADB e-Marketplace
参加者集合写真

The Asian Development Bank (ADB) e-Marketplace is held annually, cohosted by the partners of the Water Resilience Hub, which is managed by the water sector group of ADB. Stakeholders in the private, government, and academic sectors from ADB's member countries gather to discuss the latest digital technology and best practices to deliver smart, resilient, safe, and inclusive water management and services and launch collaborative activities.

On July 25, 2023, the ADB e-Marketplace held its third session, "Focus on Japanese solutions," jointly organized with three Japanese agencies: the Japan Water Forum, the Ministry of Environment, and the Ministry of Trade, Economy and Industry. Six participants gave presentations. From ICHARM, Chief Researcher KURIBAYASHI Daisuke spoke about ICHARM's innovative research, such as developing a flood forecasting system for small and medium-sized rivers in Japan and a virtual flood experience system (VFES) using VR technology and making efforts utilizing the Online Synthesis System for Sustainability and Resilience (OSS-SR) in Davao City, the Philippines.

Questions from the floor included whether the flood forecasting system and the OSS-SR can be applicable in other countries. Kuribayashi replied that it is possible to develop models even if hydrological data are insufficient and that ICHARM is promoting their widespread use in other countries.

Although it was the first time for ICHARM to participate in this event, it was a good opportunity to publicize its latest activities, as well as listen to presentations from other research institutions and exchange questions and comments.

The webinar of the event is available for more information at the following address:
https://hub4r.adb.org/index.php/sessions/session-3-focus-japanese-solutions

(Written by KURIBAYASHI Daisuke)

Miscellaneous

Comments from a foreign visiting researcher, internship students, and summer course students

外国人受け入れ研究者、インターン生および夏期インターンシップ生からのコメント

ICHARM accepted one foreign visiting researcher, Dr. Narakula Srinivasa Rao from CSIR-National Geophysical Research Institute (NGRI), two internship students, Mr. Yao-Sheng Huang from National Taiwan University and Ms. Samna Osti from University of Toronto, and summer course students, Mr. HIURA Naoki from the University of Tokyo, Mr. UGAJIN Ryuto from Fukushima University, and Mr. KOJIMA Yukinori from the University of Tokyo.

They kindly contributed short messages as below while looking back at their activities at ICHARM.

ICHARMでは、外国人受け入れ研究者としてNarakula Srinivasa Raoさん（CSIR-National Geophysical Research Institute (NGRI)）、またYao-Sheng Huangさん（National Taiwan University）、Samna Ostiさん（University of Toronto）をインターン生として、また夏期インターンシップ生として日浦直紀さん（東京大学大学院）、宇賀神瑠杜さん（福島大学）、児島幸紀さん（東京大学）を受け入れました。

ICHARMでの活動を振り返ってコメントをいただきました。

Foreign Visiting Researcher

Dr. Narakula Srinivasa Rao (CSIR-NGRI)

Stay period: June 12 - August 29, 2023

I would like to share my incredible experience at ICHARM, Tsukuba. Over the last three months, I have had the privilege of being a visiting foreign researcher of this prestigious institution through the UNESCO/Keizo Obuchi Research Fellowship.

Working with the esteemed Professor Koike Toshio has been an incredibly enriching experience in every aspect. In particular, I am proud of earning the fellowship and receiving valuable suggestions during our research meetings along with him. During my time at ICHARM, I have gained access to a plethora of knowledge and wonderful opportunities for collaboration with distinguished researchers such as Dr. Yohei Sawada (University of Tokyo), Prof. Md Rasmy A Wahid, Dr. Tsutsui Hiroyuki, Prof. Ushiyama Tomoki, and Dr. Tamakawa Katsunori. I never could have imagined such an experience before my visit. The diverse group of researchers I work with has expanded my knowledge by introducing me to various perspectives on water-related hazards like droughts and floods.

Collaborating with specialists in extreme events has been a source of inspiration. Our collaborative efforts have led to significant milestones in our research of the Godavari River, India. Together, we have adopted a precise hydrological model (WEB-RRI), GRACE estimates and data assimilation (CLVDAS) for drought monitoring and seasonal prediction that can benefit stakeholders and decision-makers by providing information on soil moisture and groundwater trends. This achievement would not have been possible without the brilliant minds and resources available at ICHARM. I am grateful for the guidance and mentorship I have received from many colleagues here. I want to thank everyone at ICHARM who has made my stay memorable. Their support has been invaluable to me.

As I depart and return to my home institution, I am filled with a sense of fulfilment and excitement about the possibilities of our ongoing research collaboration. The bridges we have built between our institutions are strong, and I am confident they will continue to grow and flourish.

In closing, this adventure at ICHARM has been transformative for me both professionally and personally. Beyond scientific work, my time here has also been a cultural immersion. I have met wonderful people from the International research scholars from Asian countries at ICHARM, made lasting friendships, and gained a deeper understanding of the rich culture of their countries. Experiencing the Tsukuba Mountains, Science Tour, Iconic Tokyo city, field trips, Matsuri Tsukuba festival and local food has been a truly eye-opening and heart-warming experience. Thank you ICHARM for being a part of this remarkable journey with me. Here is to the future, filled with more exciting collaborations and endeavours!

Internship Student

Mr. Yao-Sheng Huang (National Taiwan University)

Stay period: June 12 - September 4, 2023

My name is Yao-Sheng Huang, and I am currently a master's student in the Department of Civil Engineering at National Taiwan University. With the support of a scholarship from the Ministry of Education in Taiwan (R.O.C) and the opportunity provided by ICHARM, I had the chance to do an internship at ICHARM this June.

Taiwan faces multiple water-relevant issues, and I am especially interested in inundation disasters. The focus of my internship project is using the RRI model to simulate flood events in the Gaoping River Basin in southern Taiwan and apply the Natural Water Retention Measures in combination with other countermeasures to prevent flood disasters. The findings of this project hold the potential to serve as a robust reference for Taiwan's future endeavors in flooding prevention. I as well acquired a wealth of valuable knowledge through the lessons, regular research seminars, and the opportunity of many field trips.

Visit the Metropolitan Area Outer Underground Discharge Channel

I have sincere appreciation to Koike-sensei, Rasmy-sensei, and Kakinuma-sensei for their guidance and support, which provide me with an in-depth understanding of flooding prevention. I also express gratitude to Dr. Nagumo for the arrangements of field trips, and thankful to Nemoto-san for assisting me with many aspects of daily life in Japan. It has been a pleasure to get acquainted with everyone I have met during this internship period, and I have thoroughly enjoyed a fulfilling experience in Japan.

Internship Student

Ms. Samna Osti (University of Toronto)

Stay period: July 31 - August 28, 2023

I am Samna Osti, an international scholar enrolled at the University of Toronto. I am currently going into my final years of undergraduate studies. My academic pursuit revolves around a Major in Forest Conservation and Biomaterial Sciences, which I have complemented with two minors, one in Urban Planning and the other in Political Science. This combination of disciplines has afforded me a comprehensive and multifaceted academic foundation.

I am delighted to share an insightful account of my recent experience at the International Centre for Water Hazard and Risk Management (ICHARM), where I delved into the crucial subject of the "Role of Forestry in Sediment and Flood Disaster Mitigation." This unique opportunity opened doors to a world of knowledge, innovation, and practical applications that connect to disaster mitigation.

A highlight was my visit to Japan Aerospace Exploration Agency (JAXA), unveiling cutting-edge remote sensing techniques. Safelight images illuminated precipitation data interpretation, highlighting technology's role in disaster monitoring. We further explored Japanese forests at the Forest Research and Management Organization, revealing their vital role in curbing sedimental disasters. This reaffirmed the link between forestry practices and disaster prevention, showcasing the impact of prudent land management. I was able to go on a field visit to the Ashio area to further understand effects of upstream afforestation on downstream channel impacts, which I have found my great interest in, and hope to continue my graduate studies in.

Field Trip to Ashio Mountain Area and Watarase River

One of the most captivating revelations during my time at ICHARM was the synergy between forestry and the center's core work in addressing sediment disasters and landslides. This exploration led me to discover numerous interconnections, demonstrating that the solutions lie at the intersection of nature and science. The fusion of remote sensing, Geographic Information Systems (GIS), and the innovative use of the Rainfall-Runoff-Inundation (RRI) model stood out as a formidable approach to tackle these challenges.

For me, this experience held immense significance as we strive to integrate this newfound knowledge into my academic journey. The wealth of insights gained from ICHARM, I am committed to applying these lessons to Canadian ecosystems. My aim is to contribute to the protection and preservation of our environment through the application of advanced technologies, sustainable forestry practices, and an understanding of disaster dynamics.

Final Presentation at ICHARM

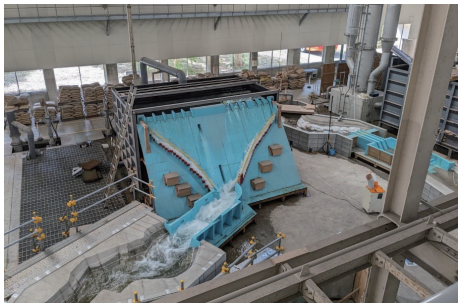
I am so grateful for my supervisor Egashira-Sensei, and my teaching team who have contributed to my growth (Dr. Nagumo, Dr. Aida, Dr. Tsutui, Dr. Harada, Dr. Shrestha, Dr.Qin). Thank you as well to the training team for making my stay at ICHARM so pleasant and every member for making my time here so great.

Summer Course Student

Mr. HIURA Naoki (the University of Tokyo) / 日浦直紀（東京大学大学院）

Stay period: August 21 - September 1, 2023

I participated in a two-week internship at ICHARM and studied various fields, such as meteorology, hydrology, and sediment transport systems. It was a fruitful experience to engage in discussions with researchers who are experts in these fields and to have the opportunity to ask them questions directly. Thank you very much.



Hydraulic experimental facility in PWRI we visited during the training
研修中に見学した土木研究所内の水理実験施設

ICHARMでは2週間という長期間にわたってインターンシップ生としてお世話になり、気象・水文・土砂動態などの分野について実習に取り組みました。様々な分野で活躍されている研究者の方々に直接お話を伺い、気になった点をすぐにご質問できる環境での実習は大変実り多いものとなりました。ありがとうございました。

Summer Course Student

Mr. UGAJIN Ryuto (Fukushima University) / 宇賀神瑠杜（福島大学）

Stay period: August 21 - September 1, 2023

At ICHARM, I was able to see many researchers in the field of water-related disasters gathering and discussing. Being a researcher has been my dream career since I was a child, so being in an environment full of researchers during the two-week internship was totally fascinating to me. I learned a lot at ICHARM - knowledge, dedication, and professional attitude toward research. I will use all these as a foundation for my research in the future. Thank you very much for your support.

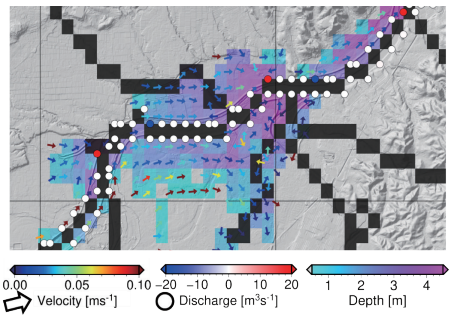


Figure visualizing the improved inundation levels due to the RRI model lecture
RRI モデル指導により改善された浸水位を可視化した図

ICHARMでは水災害の研究者の方がたくさん集まり、たくさん議論されているのを目の当たりにすることができました。小さいころから憧れていた研究者の皆さんがたくさんいる環境に2週間インターンという形でいさせていただき、刺激を受ける日々でした。これからの自分自身の研究を、ICHARMで学んだ知識に加え、研究への姿勢や考え方を手本として励んでいきます。大変お世話になりました。ありがとうございました。

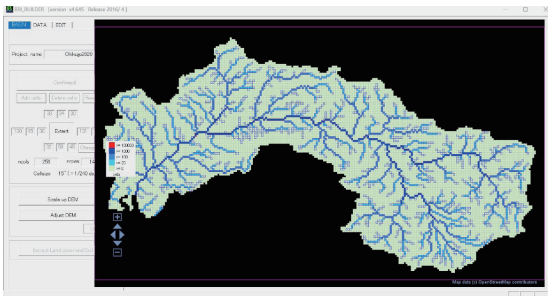
Summer Course Student

Mr. KOJIMA Yukinori (the University of Tokyo) / 児島幸紀（東京大学）

Stay period: August 21 - September 1, 2023

Through my internship at ICHARM, I learned new concepts related to climate prediction, sediment and landform change. I learned that rainfall, which is predicted to intensify in the future, is treated probabilistically and ensemble data is generated, and that a WEB-RRI model incorporating sediment and driftwood is being constructed. I also learned about the basic theory of quicksand.

In the RRI model training, I was also able to learn how to handle the RRI-GUI and understand the effects of initial conditions on the results by simulating the Chikugo River, which is my hometown. In the future, I would like to try my hand at handling the RRI-CUI and improve the model in a more applied way for my own research.



I applied the RRI model to the Chikugo River watershed.
RRI モデルを筑後川流域に適用しました。

This internship was also a great opportunity to see the other two interns diligently working on their research projects. It was truly inspiring to see these excellent role models, and I hope to be like them soon as I pursue my academic career.

Thank you so much for all your support.

ICHARMでのインターンシップを通じて，気候予測・流砂・地形変動に関する新しい概念を学びました。激甚化が予測される降雨を確率論的に扱い，アンサンブルデータを生成することや，土砂・流木を組み込んだWEB-RRIモデルを構築していることを学び，水害に関連する様々な事象が連動的に研究されている現場の姿に刺激を受けました。また，流砂の基本理論を学ぶこともできました。

また，RRIモデル研修では，地元である筑後川のシミュレーションを行うことで，RRI-GUIの扱いや，初期条件の結果に与える影響を学ぶことが出来ました。今後はRRI-CUIの扱いにも挑戦し，より応用的にモデルを改良することで自分の研究に役立てたいと考えています。

私以外の2人のインターン生はいずれも自らの研究に取り組んでおり，私が数年後にそうあるべき姿をみて大変刺激を受けました。

2週間本当にありがとうございました。

Personnel change announcements
人事異動のお知らせ

Leaving ICHARM

- **AIDA Kentaro:** Research Specialist
  Earth Observation Research Center (EORC),
  Japan Aerospace Exploration Agency (JAXA)

○**会田　健太郎**　専門研究員
宇宙航空研究開発機構（JAXA）
第一宇宙技術部門 地球観測研究センター

Business trips / 海外出張リスト

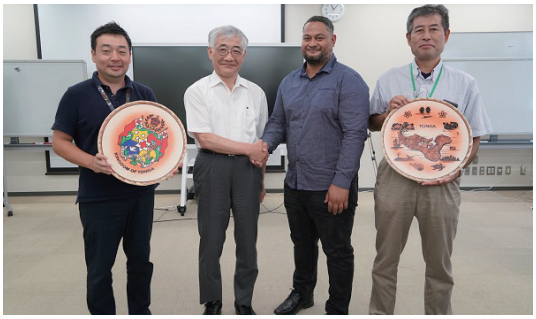
* July - September 2023

- *July 10-16, KOIKE Toshio, Delft, Netherland and Berlin, Germany, (1) to meet with Rector of IHE Delft (2) to attend the 28th International Union of Geodesy and Geophysics General Assembly (IUGG 2023)*
- *July 30-August 4, USHIYAMA Tomoki, July 31-August 4, Abdul Wahid Mohamed RASMY, Singapore, to attend and to have a presentation at AOGS2023 in Singapore*
- *August 20-27, QIN Menglu and August 22-25, HARADA Daisuke, to attend and to have presentations at 40th IAHR World Congress in Austria*
- *August 20-25, Abdul Wahid Mohamed RASMY and August 20-29, Ballaran, Vicente Jr. G., (1) to conduct training at UPLB (2) to visit Pampanga River Basin, Pasig-Laguna Basin, and Irrigation System*
- *September 9-14, YOROZUYA Atsuhiro, NAITO Kensuke, and QIN Menglu, the Philippines, (1) to conduct field surveys of Laguna Lake and Pagsanjan River Basin (2) to organize a workshop at UPLB (3) to visit related organizations for SATREPS project (LLDA and UP Diliman)*
- *September 10-16, NAGUMO Naoko, Nevşehir, Turkey, to attend and to have a presentation at IAG Regional Conference on Geomorphology Cappadocia 2023*
- *September 18-23, MIYAMOTO Mamoru and KAKINUMA Daiki, Bangkok, Thailand, to participate the 12th Working Meeting of TC Working Group on Hydrology*

Visitors / 訪問者リスト

* July - September 2023

- *Visited by HyDEPP-SATREPS project members from the Philippines, July 25, 2023* ***See Research on page 5.***
  Purpose: HyDEPP-SATREPS Training 2023 in Japan
- *Visited by Delegates from National Meteorological Service, INA, CIMA, CONICET, and IDIT, September 14, 2023* ***See Research on page 10.***
  Purpose: Courtesy visit to ICHARM, Tour of hydraulic experiment facility, VR flood system experience
- *Visited by Mr. Tevita Aho, September 29-30, 2023*
  Purpose: Courtesy visit and discussion with master's students



Publications / 対外発表リスト

* July - September 2023

1. Journals, etc. / 学術雑誌（論文誌、ジャーナル）

None / 該当者無し

2. Oral Presentations (Including invited lectures) / 口頭発表（招待講演含む）

- *KOIKE Toshio, Promoting water cycle consilience, IUGG Berlin 2023, July 11, 2023*
- *USHIYAMA Tomoki, Mohamed Rasmy Abdul Wahid, Ralph Allen Acierto, TAMAKAWA Katsunori, KUBOTA Keijiro, and KOIKE Toshio, Challenges in forecasting heavy rainfall during 2018 and 2019 floods in Kerala, India、ASIA OCEANIA GEOSCIENCES SOCIETY (AOGS) 2023, 20th Annual Meeting, Asia Oseania Geoscienes Society, July 30, 2023*
- *Mohamed Rasmy Abdul Wahid, USHIYAMA Tomoki, AIDA Kentaro, TAMAKAWA Katsunori, KUBOTA Keijiro, and KOIKE Toshio, Challenges in Monitoring and Forecasting Flood Hazards in Developing Countries, ASIA OCEANIA GEOSCIENCES SOCIETY (AOGS) 2023, 20th Annual Meeting, Asia Oseania Geoscienes Society, July 30, 2023*
- *HARADA Daisuke and EGASHIRA Shinji, Methods to evaluate sediment-driftwood runoff processes during heavy rainfall and its application to the hazard prediction, 40TH IAHR WORLD CONGRESS 2023, August 21, 2023*
- *MITSUHASHI Hisashi, Practical Integration of Science and Technology to Water-related DRR in Cities, International Training Workshop on Smart Cities for Building Inclusive, Resilient, Livable, and Sustainable Cities and Communities in Asia and the Pacific, August 31, 2023*
- *下田一太、山田和芳、久保純子、本村充保、南雲直子、藤木利之、森　勇一、山口博之、中西利典、カンボジア中部サンボー・プレイ・クック遺跡群の古環境復元調査、日本第四紀学会2023年大会、日本第四紀学会、2023年9月1日*
- *NAGUMO Naoko, NAITO Kensuke, QIN Menglu, HARADA Daisuke, YOROZUYA Atsuhiro, and EGASHIRA Shinji, The formation and sediment size characteristics of natural levees along an artificial channel, Regional Conference on Geomorphology 2023, September 12, 2023*
- *KUBO Sumiko, SHIMODA Ichita, NAGUMO Naoko, FUJIKI Toshiyuki, MORI Yuichi, MOTOMURA Mitsuyasu, So Sokuntheary, and YAMADA Kazuyoshi, Geomorphological survey around the World Heritage site of Sambor Prei Kuk, Cambodia: with LiDAR and trench excavations, Regional Conference on Geomorphology 2023, September 12, 2023*
- *大原美保、南雲直子、内藤健介、Shrestha Badri Bhakta、宮本 守、新屋孝文、安川雅紀、Patricia Ann J. SANCHEZ、洪水ハザードマッピング・リスク評価技術のためのeラーニングの実践、第42回日本自然災害学会学術講演会、September 17, 2023*

- *Kattia Rubi Arnez Ferrel, HARADA Daisuke, and EGASHIRA Shinji, Characteristics of bank erosion in meandering river、River, Coastal, and Estuarine Morphodynamics (RCEM2023), September 25, 2023*
- *小藪剛史、傳田　正利、3次元測量・3次元CADを用いたオープンデータの補正・統合化による景観再現に関する研究、第48回土木情報学シンポジウム、土木学会、2023年9月28日*

3. Poster Presentations / ポスター発表

- *QIN Menglu, HARADA Daisuke, and EGASHIRA Shinji, Influences of hillslope erosion on basin-scale sediment transport processes, 40TH IAHR WORLD CONGRESS 2023, August 21, 2023*

4. Magazines, Articles / 雑誌、記事（土技資含む）

None / 該当者無し

5. PWRI Publications / 土研刊行物（土研資料等）

- *No. 4441 第9回洪水管理国際会議（The 9th International Conference on Flood Management (ICFM9)）実施報告書、2023年8月*

6. Other/ その他

None / 該当者無し

Editor's Note
編集後記

今年の夏は、猛暑日の数が大幅に増加し、暑さが 9 月末まで続く記録的な暑い夏になりました。新潟では渇水のため稲の生育被害があり、梅雨期には各地で線状降水帯による大雨被害がありました。今後の気候変動に不安を覚えるとともに、私たちの役割の重要性を再認識しています。

ICHARM では、海外協力研究に関するイベントがいくつかありました。6 月には SATREPS フィリピンの枠組みで、現地調査や定例会議開催のため 10 数名でパンパンガ川流域やフィリピン大学ロスバニョス校を訪れました。その後 IFI の枠組みでダバオ市を訪問しました。8 月には訪日研修でフィリピン側研究者 10 数名が来日しました。SATREPS アルゼンチンの枠組みでも、アルゼンチン研究者 15 名が来日し、ICHARM にも見学に訪れました。9 月には修士課程と博士課程学生が卒業し、10 月には新年度の学生たちが来日しました。この夏には、3 名の海外からのインターン研修生と国内から 3 名の夏期インターン生の滞在もありました。

今後も色々なイベントを通して、水災害リスク軽減の技術の伝達に努めてまいります。引き続きよろしくお願いいたします。

This summer, Japan saw a significant increase in the number of extremely hot days, and the heat lasted until the end of September, making it the hottest summer on record. Because of these unusual weather conditions, drought damaged rice growth in some areas, such as Niigata, one of the main rice-producing prefectures, while linear precipitation zones formed more frequently during the rainy season, causing extreme rainfall in other areas. We are concerned about future climate changes and are reminded of the importance of our role as experts involved in disaster-related issues.

ICHARM's summer was quite busy. We had several events related to overseas cooperative research projects. In June, within the framework of SATREPS Philippines, a dozen ICHARM researchers visited the Pampanga River basin and the University of the Philippines, Los Baños, to conduct field surveys and hold regular meetings. Some members also visited Davao City within the framework of IFI. In August, a dozen Filipino researchers visited Japan for study tours. Fifteen Argentine researchers also came to Japan in the framework of SATREPS Argentina and visited ICHARM. We also accepted three intern researchers from abroad, and three summer interns from Japan. Additionally, in September, master's and doctoral students graduated, and in October, new students joined the master's and doctoral programs.

We at ICHARM will continue our efforts to transfer practical technologies and approaches for water-related disaster risk reduction through various events. Thank you for your continued support.

ICHARM Newsletter Editorial Committee
USHIYAMA Tomoki

Request to participate in online survey on ICHARM Newsletter
ICHARMニュースレター読者アンケートのお願い

ICHARM では、2006 年 3 月の設立以降、最新の動向をお知らせする「ICHARM ニュースレター」を、年 4 回発行しています。

ついては、一層の内容の充実を図るべく、読者の皆様にアンケートをさせて頂きたく以下のサイトにアクセス頂き、アンケートにお答え頂ければ幸いです。

https://forms.gle/sVNe6H33eA6ZA9156
回答期限：2024 年 1 月 30 日まで
回答時間（目安）：5 分程度

Thank you for subscribing ICHARM Newsletter. ICHARM has been publishing the quarterly newsletter since its establishment in March 2006 to deliver the latest news about research, projects and other activities to readers around the world. As we are currently working on the improvement of the newsletter, we would be grateful if you could spare time to answer the following questions and let us hear your voices about our publication.

Survey posted at: https://forms.gle/sVNe6H33eA6ZA9156
Survey to be done by: January 30 2024
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