Newsletter

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Hazard and Risk Management
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ICHARM

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

Message from Executive Director

Roles of the science and technology community in transformation in society

Introduction of the theme at the 15th Academy of Science Presidents' Meeting, Science and Technology in Society (STS) forum 2022, 3rd October, 2022
STS フォーラム 2022、科学アカデミープレジデント会議における趣旨説明（2022 年 10 月 3 日）

Climate disasters are likely to become more frequent and intense. Complex, cascading and systemic risks that are usually implicit in social, economic and environmental systems can suddenly emerge and threaten humanity beyond boundaries in space and time. They directly cause serious damage to natural and artificial environments. At almost the same time, their impacts extend to the water-food-energy-nexus and the quality of life, including health, education, labor and poverty. Once society falls into such circumstances, more problems arise in such areas as gender, equality, and peace to a great degree. For humanity to survive such systemic risks and make society resilient, sustainable and inclusive, society should strengthen inter-sectoral cooperation and take coordinated actions. What roles should the science and technology community play in assisting leaders in making cross-sectoral decisions?

To respond to the inquiry from the heads of states and governments at the 4th Asia-Pacific Water Summit held in Kumamoto, Japan, in April 2022, the summit participants agreed to take the following three actions after discussing the matter from various aspects and sharing experiences.

First, the science and technology community should promote water cycle consilience, particularly focusing on the fields of observation, modeling, and data and information. This interdisciplinary knowledge integration is called "consilience." Second, to bridge the gap between society and on-site stakeholders and science and technology, the science and technology community should foster "Facilitators," who can work like catalytic beings to lead the way toward resolving problems by providing professional advice on-site using a broad range of scientific and indigenous knowledge. Third, the science and technology community should also support society in promoting cooperation beyond sectors at each level, i.e., local, national, regional and global, while taking an "end-to-end approach," which interlinks cutting-edge science with local actions.

Then, on-site stakeholders should take coordinated actions through cross-sectoral decision making by sharing the understanding of systemic risks through interactive dialogues, discovering the cause-and-effect relationship between preparedness, resilience and sustainability holistically, and understanding them quantitatively. Concrete support from the science and technology community should play a key role in transformation in society.

October 31, 2022
KOIKE Toshio
Executive Director of ICHARM

社会変容における科学技術コミュニティの役割

気候災害がより頻繁に発生し、その影響が厳しさを増しています。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。直接的な被害は自然や人工環境に現れますが、ほぼ同時に水―食料―エネルギー結合系に及び、そして健康、教育、労働、貧困などの生活の質にも広がります。いったん社会がそのような厳しい状況に陥りますと、ジェンダーや平等性、平和といった社会問題も生じます。人類がこのようなリスクを生き抜き、レジリエントで持続可能で、だれ一人取り残さない社会に変容させるには、分野横断的な協力を進め、互いに協調した行動をとらなければなりません。指導者によるこのような分野横断的な意思決定に、科学技術コミュニティはどのような役割を果たすべきでしょうか。

2022 年 4 月に熊本で開催された第 4 回アジア・太平洋水サミットに集まった首脳から投げかけられたこの問いに対し、いろいろな角度から議論が行われ、具体事例が共有されて、以下の 3 つの行動をとることが合意されました。

第一に、科学技術コミュニティは、特に観測、モデル、データ統合に焦点を当てて、水循環にかかわる「知の統合」を進めるべきです。第二に、社会や現場での関係当事者と科学技術のギャップを埋めるために、科学技術コミュニティは「ファシリテータ」を育成するべきです。ここでいう「ファシリテータ」とは、科学的、伝統的な知識を幅広く使った専門的な助言によって、問題解決の道を示すことにできる触媒的存在のことです。第三に、科学技術コミュニティは、最先端の科学と現場での行動をつなぐ「エンドトゥエンドアプローチ」を取り入れて、地方、国家、地域、世界の様々な段階で分野を超えた社会の協力を支援すべきです。

以上によって現場の関係当事者は、分野間の相互対話を通して構造的なリスクを共有し、事前の対応とレジリエンス、持続可能性の因果関係を包括的に発見し、さらにはそれを定量的に理解することができます。それによって、分野横断的な意思決定に基づいて相互に協調した行動がとれるようになります。社会の変容における科学技術コミュニティの具体的支援は重要です。

Contents

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/Hb2iszdyvQ5GSDtL6
回答期限：2023 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/Hb2iszdyvQ5GSDtL6
Survey to be done by: 30 January 2023
Time required: about 5 minutes

Special Topics

Revised ICHARM Programme
改定された ICHARM プログラム

As reported in the previous issue of the ICHARM Newsletter, the 6th ICHARM Governing Board Meeting was held on June 21, 2022, and the board adopted the revised ICHARM Programme.

The ICHARM Programme consists of four components: the Mission; the Long-term Programme, a plan for about ten years; the Mid-term Programme, a plan for about six years that is aligned with PWRI's mid-to-long-term plans; and the Work Plan, an activity plan for the next two years. This article briefly explains the Mission and the Long-term Programme.

Scheme of ICHARM Programme
ICHARM プログラムの構成

In the Mission, ICHARM sets the three primary pillars: "innovative research," "effective capacity building," and "efficient information networking," and proclaims its intent to globally serve as a knowledge hub for best national and local practices and a policy-making advisor.

In the Long-Term Programme, ICHARM states its aims to carry out projects in line with the five priority areas listed in the ninth phase of the UNESCO Intergovernmental Hydrological Programme (IHP-IX), which runs until 2029, and support the achievement of the targets of the UN 2030 Agenda (SDGs) and the UN Sendai Framework for Disaster Risk Reduction. ICHARM will also contribute to implementing Japan's new flood control strategy. In 2020, a group of experts made recommendations to the Japanese government on flood control planning to cope with climate change impacts, proposing shifting its flood management policy to "River Basin Disaster Resilience and Sustainability by All," which calls for concerted efforts by all stakeholders in the basin in consideration of climate change impacts and social changes.

To achieve all these goals, ICHARM will step up innovative research by taking an End-to-End approach, which covers the entire research process from data collection to the analysis, assessment and prediction of natural phenomena to socio-economic impact assessment, thereby creating a scientific knowledge base, which helps increase communities' water-related disaster resilience and sustainability.

ICHARM will provide graduate-level programs to foster practitioners who can understand and create scientific knowledge on water hazard and risk management and also offer training for local experts to become "facilitators" who can provide practical ideas on site to help communities improve resilience and sustainability by utilizing the water disaster consilience.

To strengthen information networking, ICHARM will continue updating its action plans by identifying, visualizing, and mapping challenges to be addressed to achieve the resilience and sustainability goals listed in the 2030 Agenda, the Sendai Framework, the IHP-IX, and Japan's new flood control policy. ICHARM will also continue implementing projects while incorporating the outcomes of its research and capacity-building projects through the International Flood Initiative and other networks.

*Click the address below for the full versions of the Mission, the Long-term Programme, the Mid-term Programme, and the Work Plan.
https://www.pwri.go.jp/icharm/program/index.html

(Written by KURIBAYASHI Daisuke)

前号で紹介したように、6月21日に第6回ICHARM運営理事会を実施し、改定されたICHARMプログラムが採択されました。

ICHARMプログラムは、「使命」、約10年間の「長期プログラム」、土木研究所の中長期計画と期間をそろえた約6年間の「中期プログラム」、および2か年の活動計画である「事業計画」の4つから構成されています。以下、「使命」と「長期プログラム」の内容について簡単にご紹介します。

「使命」においては、これまで通り、ICHARM活動の3本柱として「革新的な研究」「効果的な能力育成」「効率的な情報ネットワーク」が規定され、それらによって「ICHARMは国家、地域における現場実践の知的拠点、および実社会での政策立案における助言者としての役割を世界において果たす」こととしています。

「長期プログラム」においては、2029年までの計画であるUNESCO第9期政府間水文学計画(IHP-IX)の5つの優先分野を実行し、2030年を目標としている国連2030アジェンダ（SDGs）や国連仙台防災枠組の目標達成を支援します。また、2020年に取りまとめられた答申「気候変動を踏まえた水災害対策のあり方」において、気候変動の影響や社会状況の変化などを踏まえてあらゆる関係者が協働して流域全体で対応する「流域治水」への転換を進めることが示されたことを踏まえ、「流域治水」の推進に貢献します。

上記研究分野では、水災害のレジリエンスの強化と持続可能な社会の構築に資する科学知を統合するEnd to End（データの取得から、自然現象の解明・評価・予測、社会・経済への影響評価までの一気通貫の研究）の研究を実施します。

能力育成分野では、これまでの大学院教育とともに、水災害のレジリエンスと持続可能性の向上に関わる取り組みを総合的な科学知に基づいて助言するファシリテータを育成します。

情報ネットワーク分野では、国連2030アジェンダ、仙台防災枠組、UNESCO IHP-IX、日本の治水強靭化において、水災害のレジリエンスと持続可能性の課題を見える化しマッピングして、ICHARMの行動計画を随時更新するとともに、IFIの枠組み等を活用して研究分野・能力育成分野と統合・連携し社会実装を推進します。

※「使命」、「長期プログラム」、「中期プログラム」、「事業計画」の全文については、下記ICHARM HPをご覧ください。
ICHARMプログラム
https://www.pwri.go.jp/icharm/program/index_j.html

Strengthening international networks: Signature of Memorandum of Understanding between ICHARM and UMSS

Mayor de San Simón 大学と協定書を締結

2022 年 6 月 23 日、ICHARM とボリビア・Mayor de San Simón 大学 (UMSS) は、水災害研究に関する協定を締結しました。締結に当たっては、ICHARM・小池俊雄センター長と UMSS 水理学研究所・Andrés Gonzales 所長がオンラインで署名を行いました。

本協定は、自然災害に対するレジリエンスに関する研究開発強化を目的としており、共同研究の枠組みは 4 つの研究テーマで構成されています。

1. ボリビア・Ichilo 川における洪水、干ばつ、土砂輸送などの水災害に関する事象の理解。
2. Ichilo-Mamoré 川の水運に関し、モニタリングと浚渫工事の評価手法の開発。また、河岸侵食やその対策の立案。
3. 自然災害のリスクマネジメント：森林火災や森林伐採が土砂輸送過程や河川形態変化に与える影響、またそれが社会に与える影響の評価。
4. 自然災害とリスクマネジメントに対応した都市計画：ボリビア・コチャバンバ市におけるケーススタディ。水リスク評価における衛星画像の活用。都市内の樹林による熱制御など熱環境の分析。

同日開催された第 1 回会議では、両機関の研究者が各自の研究についてプレゼンテーションを行いました。UMSS からは、研究所の背景やコチャバンバ市での研究テーマの紹介、ICHARM からは、土砂輸送や水文モデリングなどに関する研究の紹介がありました。

この協定により、水災害に対するレジリエンスと防災に関する共同研究の枠組みを確立し、さらには、自然災害に対する回復力を強化するためのツールの開発を進めることで、今後、両機関の協力関係が強化・発展されることとなります。

LHUMSS について

LHUMSS（Mayor de San Simón 大学水理研究室）は、1986 年、UMSS、国営電力会社（ENDE）、ルーバン・カトリック大学の三者による合意のもと、ボリビア・コチャバンバ市に設立されました。水資源の持続可能な開発を支援し、科学技術、経済、文化、政治の変化を促進しつつ、地域社会の健全な発展を実現することを使命としています。

ICHARM and the Mayor de San Simón University (UMSS) signed a Memorandum of Understanding (MoU) on June 23, 2022, to formalize a cooperation agreement to work on water disaster-related matters concerning both institutions.

The cooperation pact was signed online between Prof. KOIKE Toshio, the executive director of ICHARM, and Dr. GONZALES Andrés, the director of the Laboratory of Hydraulics of the UMSS (LHUMSS).

This collaboration aims to strengthen research and development knowledge on resilience to natural disasters. This joint research framework to study water-related disasters will encompass four research topics:

1. Water-related disasters in the Ichilo River in Bolivia, such as flooding, droughts and sediment transport.
2. Improvement of the Ichilo-Mamoré waterway, aiming at developing a framework for monitoring the Ichilo River and evaluating dredging works. In addition, the study of bank erosion and possible countermeasures is proposed.
3. Natural disaster risk management, aiming to evaluate the effect of forest fires and deforestation on sediment transport processes and changes in the morphology of rivers, and their impact on society.
4. City planning for natural hazards and risk management. Case study: Cochabamba-Bolivia. In this study, satellite imagery will be used for the assessment of water risks. In addition, an analysis of the thermal environment, e.g., urban forestry for heat control, is proposed.

During the kick-off meeting, researchers from both institutions gave presentations about the important topics on which they had been working. The researchers from the UMSS introduced a brief background about their institution and shared their research topics developed in the city of Cochabamba, Bolivia, where the university is located. In the same manner, the researchers from ICHARM shared their knowledge regarding different topics such as sediment transport processes and studies on hydrological and climatological phenomena.

The UMSS-ICHARM team during the online ceremony for the signature of the memorandum of understanding
UMSS と ICHARM のオンライン署名式の様子

This collaboration will foster the empowerment and development of international relationships to develop more advanced tools that will help society to strengthen its resilience to natural disasters.

About LHUMSS

The LHUMSS, located in Cochabamba, Bolivia, was founded in 1986 as a result of an agreement between UMSS, the National Company of Electricity (ENDE), and the Catholic University of Louvain in Belgium. Their mission is to support the sustainable development of water resources and facilitate scientific, technological, economic, cultural, and political changes that will, in turn, promote the progress and well-being of the community in general.

(Written by Kattia Rubi ARNEZ FERREL and HARADA Daisuke)

International Flood Initiative (IFI)

The International Flood Initiative (IFI) is a worldwide framework to promote collaboration in flood management among international organizations such as UNESCO, the World Meteorological Organization (WMO), the United Nations University (UNU) and the United Nations Office for Disaster Risk Reduction (UNDRR). ICHARM has been its secretariat since the establishment of IFI.

In October 2016, the Jakarta Statement towards an interdisciplinary and transdisciplinary partnership to consolidate flood risk reduction and sustainable development, was adopted by the member organizations of IFI. As part of this effort, the Philippines, Sri Lanka, Pakistan and Myanmar have already decided to establish a Platform on Water Resilience and Disasters involving various government agencies, and ICHARM has been supporting their decision as facilitator.

This article reports the AWCI Session prior to the 15th AOGEO Symposium.

国際洪水イニシアティブ（International Flood Initiative: IFI）はユネスコ（UNESCO）、世界気象機関（WMO）、国連大学（UNU）、国連防災機関（UNDRR）などの国際機関が世界の洪水管理推進のために協力する枠組みで、ICHARM は、IFI の事務局を担当しています。

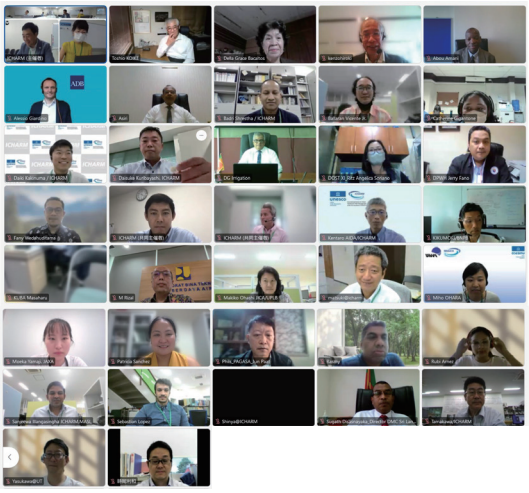
2016 年 10 月に承認された「洪水リスク軽減と持続可能な開発を強固にするための学際的な協力に向けた宣言文（ジャカルタ宣言）」を受け、各国および関係機関と協働しながら、統合洪水マネジメントに貢献する活動を進めています。特に、フィリピン・スリランカ・パキスタン・ミャンマーにおいては、各国の関係機関による「水のレジリエンスと災害に関するプラットフォーム」の構築に向けた取り組みが始まり、ICHARM はファシリテーターとしてその活動の促進を図ってきました。

本号では、第 15 回 AOGEO シンポジウム分科会・アジア水循環イニシアティブ（AWCI）セッションについて報告します。

ICHARM hosted the AWCI Session prior to the 15th AOGEO Symposium
第 15 回 AOGEO シンポジウム分科会・アジア水循環イニシアティブ（AWCI）セッションを開催

The Asian Water Cycle Initiative (AWCI) Session was convened online on September 21, 2022, as a sectional meeting of The 15th Asia-Oceania Group on Earth Observations (AOGEO) Symposium. More than 50 people participated, including relevant stakeholders in the Philippines, Sri Lanka, and Indonesia, UNESCO-IHP, GRIPS, JAXA, GWP, ADB, and ADBI.

In this session, in addition to the reports on IFI platform activities by individual countries, the participants shared the latest progress and discussed the direction regarding AWCI activities towards the United Nations 2023 Water Conference in the context of the Kumamoto Initiative for Water, the Kumamoto Declaration, and the Chair's Summary, which were adopted in the 4th Asia Pacific Water Summit, held on April 2022 in Kumamoto City, Japan. Moreover, three thematic presentations introduced cutting-edge research and development cases in science, governance, and finance.



The participants of the AWCI session
AWCI セッションの参加者

The results of the session were presented at the 15th AOGEO symposium from September 28 to 30 and included in the statement of the symposium.
https://aogeo15th.com/

The agenda and the presentation files of the meeting are available at the following address: https://www.pwri.go.jp/icharm/special_topic/20220921_aogeo_awci.html

(Written by MIYAMOTO Mamoru)

2022 年 9 月 21 日にアジア・オセアニア地域地球観測に関する政府間会合（AOGEO）の分科会としてアジア水循環イニシアティブ（AWCI）セッションをオンラインで開催し、フィリピン、スリランカ、インドネシアの関係機関や UNESCO-IHP、政策研究大学院大学、宇宙航空研究開発機構、世界水パートナーシップ、アジア開発銀行、アジア開発銀行研究所等から 50 名以上が参加しました。

同セッションでは、2022 年 4 月に熊本市で開催された第 4 回アジア・太平洋水サミットにおいて採択された「熊本水イニシアティブ」、「熊本宣言」、「議長サマリー」を受け、各国の IFI プラットフォームのこれまでの活動と 2023 年国連水会議に向けた方向性が共有・議論されました。さらに、テーマ別発表ではサイエンス、ガバナンス、ファイナンスの側面から最先端の研究開発や取り組みが紹介されました。これらの成果は 9 月 28 ～ 30 日に開催された第 15 回 AOGEO シンポジウムにおいても紹介されました。
https://aogeo15th.com/

アジェンダ・発表資料等については以下をご参照願います。
https://www.pwri.go.jp/icharm/special_topic/20220921_aogeo_awci_j.html

Research

Research trip to Argentine for a SATREPS project
SATREPS アルゼンチン出張報告

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、研究代表：理化学研究所三好健正主任研究員」において、キックオフミーティングと現地調査のため、令和 4 年 6 月 25 日から 7 月 8 日の 14 日間アルゼンチンに出張しました。このプロジェクトは、今後 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います。我々 ICHARM は水文予測システムの開発を担当します。

洪水予測の対象となる流域として、コルドバ市街地と Suquia 川を含む Suquia – Villa Paez (SVP) 流域、およびブエノスアイレスの Sarandi – Santo Domingo (SSD) 流域を視察しました。コルドバの Suquia 川は川幅 50m 程度の小さな河川ですが、年 2 回ほど発生する洪水では大幅に水位が上がり、同時に内水氾濫による水が道路にあふれて水の行き場がなくなり被害が長期化するということでした。上流にある San Roque ダムでは、洪水被害軽減操作を行うことができるのですが、操作規定が無いため所長の判断で操作を行っているということです。今後は気象予測を利用したダム操作を行いたいということでした。ダム上流域の山岳地帯では、土壌層が非常に薄く、岩盤がしばしば露出しているほどで、降雨後の斜面流出が迅速であると予想されました。また、現地の 3 つの小学校を訪問し、プロジェクトの重要性を伝えました。

2 つ目のブエノスアイレスの SSD 流域は、都市域の小規模な河川流域です。比較的収入の少ない人々が住む地域であるためか、ゴミの投棄が問題となっており、訪問箇所では多数の市職員が重機も用いて河川内の大量のゴミを片付けていました。洪水時にはこのゴミが川の流れを妨げ、氾濫を増大させているということです。

また、大学の会場でお互いの研究発表を行い、これまでの成果や問題点を共有し、今後のプロジェクト推進に関する目的や手段の意思統一をはかることができました。

An ICHARM research team of Senior Researcher USHIYAMA Tomoki, Researcher KAKINUMA Daiki, and Research Specialist AIDA Kentaro visited Argentine for 14 days, from Jun. 25 to Jul. 8, 2022, to attend a kick-off meeting and conduct a field survey. Both events were planned under the Science and Technology Research Partnership for Sustainable Development (SATREPS). The team has been specifically assigned to the project for numerical weather prediction and warning communication systems for densely-populated, vulnerable cities, led by Principal Investigator MIYOSHI Takemasa, a senior researcher of RIKEN. This project aimed to mitigate the impact of flood inundation disasters in two cities, Buenos Aires and Cordoba, by improving weather observation systems and developing numerical weather prediction systems with local data assimilation, hydrological forecasting systems, and alert information dissemination systems for the next five years. ICHARM is expected to contribute to developing hydrological forecasting systems.

The research team investigated two target areas: the Suquia-Villa Paez basin including downtown Cordoba and the Suquia River and the Sarandi-Santo Domingo basin in Buenos Aires. The Suquia River is a small river with a 50 m width, but a significant water-level rise occurs roughly twice a year and causes flooding. When it happens, inland flooding coincides in the downtown area near the river. The floodwaters in the area have no way out to the river, resulting in a long-lasting urban inundation. The San Roque dam upstream in the Suquia-Villa Paez basin can be operated for flood mitigation outlet control; however, the head officer operates the dam only using his own judgments since they have no operation manuals. Thus, they hope to establish an optimal dam operation based on numerical weather prediction. Investigating the area upstream of the dam, the team found that the soil layer was quite thin, often exposing the base rock. This suggests a rapid run-off flow after rainfall. The team also had opportunities to visit three local elementary schools and explain the importance of the project.

The field survey in Cordoba's regularly inundated area
コルドバ市内の氾濫多発地域を視察

A river in Buenos Aires with a lot of garbage
ゴミでいっぱいのブエノスアイレス市内の河川

The Sarandi-Santo Domingo basin is a small urban river basin. In this basin, resided mainly by relatively lower-income residents, garbage dumping into the river has been posing a serious problem to flood management. When we visited the area, many municipal staff members were clearing a huge amount of garbage from the river, with some even using heavy machinery. The garbage piled up in the river blocks the water flow, making inundation far worse at the time of flooding.

In the science discussion meeting, the team and local experts shared research findings and problems, which helped build a consensus about the purposes and methods to proceed with the project.

(Written by USHIYAMA Tomoki)

World Bank project "Capacity Building for Drought Monitoring and Planning in Pakistan under Present and Future Climates"

世界銀行プロジェクト　『現在・将来気候におけるパキスタンの干ばつの監視と計画のための能力開発』

In the 21st century, agricultural activities have been drastically affected by drought disasters in Pakistan. To address this issue, the World Bank commissioned ICHARM to conduct a project, "Capacity Building for Drought Monitoring and Planning in Pakistan under Present and Future Climates" in September 2021. ICHARM, in cooperation with the World Bank and the Pakistan National Drought Monitoring Centre (NDMC), started the project to strengthen the country's capacity for drought monitoring, prediction and management. On November 18, 2021, ICHARM held an online workshop (Figure 1) in which local technical specialists were provided with lecture on the most advanced comprehensive hydrological prediction, an e-learning program on flood early warning systems, and agricultural drought monitoring and prediction. After sharing the latest science and technology for monitoring and predicting droughts, ICHARM prepared a questionnaire of 17 questions about Pakistan's drought management which NDMC distributed to various water-related agencies in the country. 20 answers were collected from various organizations and sorted out and analyzed by ICHARM. On May 16, 2022, an online workshop for policy makers and managers (session 1) was held. Dr. Dushmanta DUTTA (Department of Planning and Environment, New South Wales (NSW) government, Australia) was invited as a keynote speaker and lectured about the most advanced drought management practiced in NSW, Australia. Session 2 was held on May 23, 2022, by inviting Dr. Valentin AICH (Senior water and climate specialist in the Global Water Partnership) as keynote speaker, who lectured on the latest integrated drought management. ICHARM reported the analysis results of the questionnaire and suggested potential strategies and frameworks for strengthening drought management in Pakistan. A striking difference was found in the question about the evaluation of the nation's drought management framework. The demand group (agriculture and irrigation/drainage) answered that the framework is "insufficient" while the supply group (meteorology and disaster management) answered "sufficient". Dr. Dushmanta explained that key agencies responsible for developing and implementing a regulatory framework for water management in NSW designed a policy approach to formulating water resources strategies. ICHARM suggested that such water management as practiced in NSW should be a good example to close the gaps in the drought management framework in Pakistan. Furthermore, ICHARM suggested about the approach to developing a disaster management platform that focus was shifted from "response" to "preparedness and resilience" in the High-Level Panel on Water (HLPW) (Figure 2). Given that phrases such as "foster Facilitators" and "work together beyond disciplines and sectors among different levels while taking an end-to-end approach" are included in the Chair's Summary of the fourth Asia Pacific Water Summit, ICHARM also suggested that Pakistan's drought management agencies should act as a facilitator to improve the drought management framework in the country by helping the gaps to close and the different sides to join together.

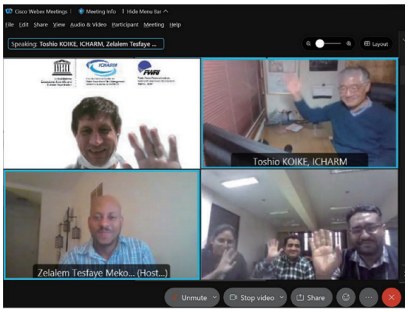


Figure 1 Online workshop for technical specialists
図 1　技術専門家に向けたオンラインワークショップ

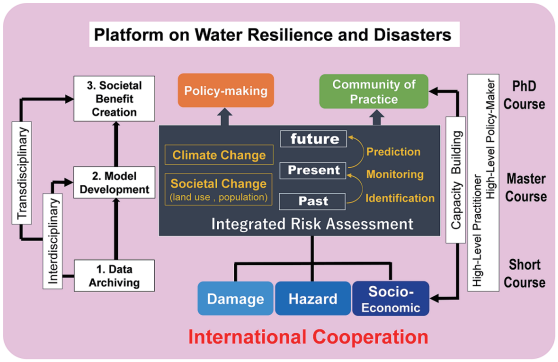


Figure 2 Development process for a disaster management platform that focuses on "preparedness and resilience"
図 2　「備え・回復」に着目した災害管理プラットフォームの開発アプローチ

(Written by TSUTSUI Hiroyuki)

21 世紀、パキスタンにおける穀物生産は、深刻な干ばつにより大きな打撃を受けました。この問題に対処するために、2021 年 9 月、世界銀行は、ICHARM に「現在・将来気候におけるパキスタンの干ばつの監視と計画のための能力開発」プロジェクトを委託しました。ICHARM は、世界銀行とパキスタン国立干ばつ監視センター (NDMC) と協力し、干ばつ監視・予測と管理能力の強化プロジェクトを開始しました。2021 年 11 月 18 日、ICHARM は、オンラインワークショップ (図 1) を開催し、現地の技術専門家を対象に、「最先端の包括的な水文学的予測」・「最先端の早期警報システムに関する e- ラーニング」・「農業的干ばつ監視・予測」に関する講義を提供しました。干ばつ監視・予測のための最先端の科学技術の共有後、ICHARM は、パキスタンにおける干ばつ管理に関する 17 の質問から成るアンケートを準備し、NDMC は、国内の様々な水関連機関に配布しました。様々な組織から 20 の回答が収集され、ICHARM により整理・分析されました。2022 年 5 月 16 日、政策立案者・管理者に向けたオンラインワークショップ (セッション 1) が開催され、Dr. Dushmanta DUTTA (オーストラリアニューサウスウェールズ (NSW) 州政府計画環境局) が基調講演者として招待され、オーストラリア NSW 州において実践されている最先端の干ばつ管理について講演しました。セッション 2 は、2022 年 5 月 23 日に開催され、Dr. Valentin AICH (世界水パートナーシップシニア水文・気候専門家) が基調講演者として招待され、最先端の統合干ばつ管理について講演しました。ICHARM は、アンケートの分析結果を報告し、パキスタンにおける干ばつ管理を強化するための戦略・フレームワークについて提案しました。国内の干ばつ管理フレームワークの評価に関する質問では、顕著な相違が見られました。需要グループ (農業、灌漑・排水) は「不十分」と回答し、供給グループ (気象、災害管理) は「十分」と回答しました。Dr. Dushmanta は、NSW 州における水管理の規制に関するフレームワーク開発と運用を担当する主要機関が、水資源戦略を開発するための政策アプローチを立案したことを説明しました。ICHARM は、NSW 州において実施されているような水資源管理は、パキスタンの干ばつ管理フレームワークのギャップを解消する良い例であることを提案しました。また ICHARM は、水ハイレベルパネル (HLPW) において焦点が「対応」から「備え・回復」に移行された災害管理プラットフォームを開発するためのアプローチを提案しました (図 2)。第 4 回アジア・太平洋水サミットにおける議長総括には、「ファシリテータの育成」と「end-to-end アプローチによる様々なレベルの分野・セクターを超えた協力」などが含まれていることから、ICHARM はさらに、パキスタンの干ばつ管理機関が、ギャップを埋めて様々な側面の協力を援助することにより、国内の干ばつ管理フレームワークを改善するためのファシリテーターとして行動する必要があることを提案しました。

The second e-learning courses of HyDEPP-SATREPS
フィリピン共和国 HyDEPP-SATREPS プロジェクトにおいて第２回 e ラーニングを実施

ICHARM では 2021 年 6 月 3 日より、フィリピンにおいて JICA・JST の「地球規模課題対応国際科学技術協力プログラム（SATREPS）」の研究プロジェクト「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）」を実施しています。このプロジェクトの一環として 2021 年の第 1 回に続き、2022 年 7 月 28 日から 8 月 25 日に第 2 回の e ラーニングを実施しました。この e ラーニングは 5 か年にわたるプロジェクトの推進に向けた知識やスキルの共有を目的としたもので、現地のプロジェクト参画機関であるフィリピン大学ロスバニョス校（UPLB）、フィリピン大学ディリマン校（UP Diliman）の研究者や学生、連携機関である科学技術省（DOST）所管のフィリピン天文気象庁（PAGASA）やフィリピン火山地震研究所（PHIVOLCS）、公共事業道路省（DPWH）、ラグナ湖開発公社（LLDA）、メトロマニラ開発公社（MMDA）の職員などが参加しました。

第 1 回目と同様に、e ラーニングの教材は DIAS（Data Integration and Analysis System） 上に開発された OSS-SR システム（Online Synthesis System for Sustainability and Resilience）に置かれました。表 1 に示すように、第 2 回 e ラーニングは 3 つのコースから構成されます。コース 1 はプロジェクトを推進する上で必要な基礎的な講義であり、水文モデルや気候変動の基礎、洪水ハザードと災害リスク軽減のアプローチが含まれます。コース 2 は洪水ハザードマッピングとリスク評価に関する演習で、DIAS における降雨流出氾濫モデル（RRI モデル）を用いた解析やデータ管理、2D および 3D 洪水ハザードマッピング、ハザードおよびリスク評価が含まれます。そしてコース 3 は水文・農業・経済モデルの講義と演習で、水・エネルギー収支降雨流出氾濫モデル（WEB-RRI モデル）の講義、作物生育シミュレーションモデル（SIMRIW）の講義、経済成長予測モデルの講義、衛星画像解析の演習から成ります。

この e ラーニング実施期間中には、オープニングとクロージングを含む全 4 回のオンラインセッションが開催されました。1 回目は 7 月 28 日に開催されたオープニングセッションで、e ラーニング実施にあたってのあいさつとコース 1 の説明が行われ、89 名が参加しました（図 1）。2 回目は 8 月 10 日に開催され、コース 1 の Q&A セッションとコース 2 およびコース 3 の紹介が行われ、71 名が参加しました。そして、3 回目は 8 月 18 日に開催され、コース 2 およびコース 3 の Q&A セッションが行われ、63 名が参加しました。4 回目は 8 月 25 日に開催されたクロージングセッションで、46 名が参加

Since June 3, 2021, ICHARM has been leading "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)" under the Science and Technology Research Partnership for Sustainable Development (SATREPS) in the Philippines. As part of the project, ICHARM conducted the first e-learning program in 2021 and the second program from July 28 to August 25, 2022. These e-learning programs aimed to share the knowledge and skills necessary to implement the activities of the 5-year-long HyDEPP-SATREPS project. The participants of the second e-learning program were primarily the researchers and students of cooperative universities such as the University of Philippines (UP) Los Baños and UP Diliman and also the officers of cooperative government organizations, such as the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) and the Philippine Institute of Volcanology and Seismology (PHIVOLCS) under the Department of Science and Technology (DOST), the Department of Public Works and Highways (DPWH), the Laguna Lake Development Authority (LLDA), and the Metropolitan Manila Development Authority (MMDA).

For both e-learning programs, the course materials were made available on the "Online Synthesis System for Sustainability and Resilience (OSS-SR)," an online system developed on the Data Integration and Analysis System (DIAS). Table 1 shows the details of the second e-learning program. The program consisted of three courses. Course I provided lectures on basic knowledge needed to carry out the project, including ones on the basics of hydrological models, climate change, and approaches to flood hazard and disaster risk reduction. Course II offered tutorials on flood hazard mapping and risk assessment, including ones on flood simulation using Rainfall-Runoff-Inundation (RRI) model, data management on DIAS, 2D and 3D flood hazard mapping, and hazard/risk assessment. Course III contained lectures and tutorials on hydro-agriculture-economic models, including lectures on an advanced hydrological model such as the WEB-RRI model, a crop growth simulation model, and an economic model, and a tutorial on satellite image analysis.

Course I: Basic lectures		
BL-1	Lecture on the HyDEPP-SATREPS Project	Prof. Patricia Ann J. Sanchez (UPLB)
BL-2	Lecture on the integrated approach for climate change and flood disaster risk reduction in the Philippines	Prof. Toshio Koike (ICHARM)
BL-3	Lecture on the basics of hydrological models and the Rainfall-Runoff-Inundation model (RRI Model)	Assoc. Prof. Mamoru Miyamoto (ICHARM)
BL-4	Lecture on the use of hazard/risk information for flood disaster risk reduction in Japan	Prof. Miho Ohara (ICHARM)
BL-5	Lecture on 3D flood hazard mapping for disaster risk reduction	Dr. Takuya Inoue (Former, CERI, PWRI)
Course II: Flood hazard mapping and risk assessment (Tutorial)		
F-1	Tutorial on flood simulation using Rainfall-Runoff-Inundation (RRI) model	Dr. Shrestha Badri Bhakta (ICHARM)
F-2	Tutorial on data management on DIAS (Data Integration and Analysis System)	Dr. Masaki Yasukawa (The University of Tokyo) and Dr. Katsunori Tamakawa (ICHARM)
F-3	Tutorial on 2D flood hazard mapping	Dr. Kensuke Naito (ICHARM)
F-4	Tutorial on 3D flood hazard mapping	Dr. Naoko Nagumo (ICHARM)
F-5	Tutorial on hazard/risk assessment for Barangay	Prof. Miho Ohara (ICHARM)
Course III: Hydro-Agriculture-Economic Models (Lectures and Tutorial)		
M-1	Lecture on the Water and Energy Budget RRI model (WEB-RRI model)	Prof. Abdul Wahid Mohamed Rasmy (ICHARM)
M-2	Lecture on the Crop Growth Simulation Model (SIMRIW)	Prof. Koki Homma (Tohoku University)
M-3	Lecture on economic development scenario prediction	Dr. Tomohiro Tanaka (Kyoto University)
M-4	Tutorial on satellite image analysis by using Google Earth Engine (GEE)	Dr. Kentaro Aida (ICHARM)

Table 1 Details of e-learning courses and lecturers
表 1　e ラーニングのコースと講義

During the second e-learning program, an online workshop of four sessions, including opening and closing ceremonies, was also held. The first session took place on July 28, 2022, for the opening ceremony and the introduction of Course I, attended by 89 participants. Figure 1 shows a group photo of the participants at the opening session. The second session was held on August 10, attended by 71 participants, for questions and answers about Course I and the introduction of Courses II and III. Then, the third session met on August 18, attended by 63 participants, for questions and answers about Courses II and III. Finally, the closing session was held on August 25 with 46 participants.

The total number of registered participants was 91 for Course I, 89 for Course II, and 88 for Course III. After completing the lectures and tutorials, the participants were required to take online exams and score at least 80% to pass Courses I and III. To pass Course II, they needed to submit an assignment report on RRI model simulation

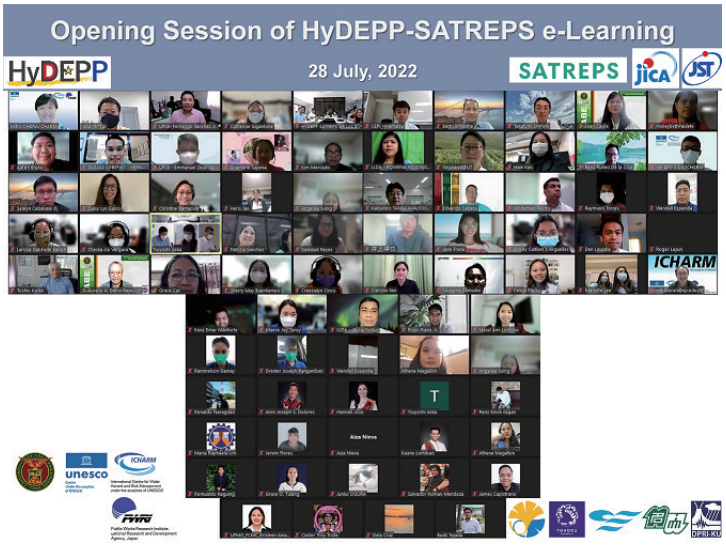


Figure 1 Group photo of the opening session of the 2nd HyDEPP-SATREPS e-learning program
図 1　第 2 回 HyDEPP-SATREPS e ラーニングのオープニングセッションにおける集合写真

results, including 2D/3D flood hazard mapping and expected disaster situations in the selected Barangay. At the end of the second e-learning program, 63 participants completed Course I, and 41 and 53 completed Courses II and III, respectively. Figure 2 compares the number of participants who passed each course in the first program in 2021 and the second program in 2022. Forty participants passed all three courses in the second program. The certificate of completion for each course was issued at the closing ceremony on August 25 for those who completed the courses before the closing session (Photo 1). The certificates were also issued for those who failed to complete the courses by August 24, only when they completed them by the second deadline set on September 12.

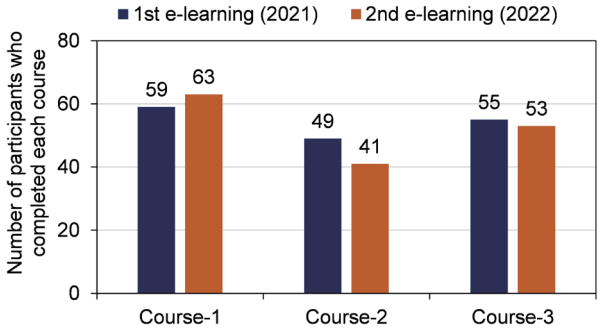


Figure 2 Comparison of the number of participants who successfully completed each e-learning course in the first e-learning program held in 2021 and the second e-learning program held in 2022
図 2　2021 年開催の第 1 回 e ラーニングと 2022 年開催の第 2 回 e ラーニングにおける各コース修了者数の比較

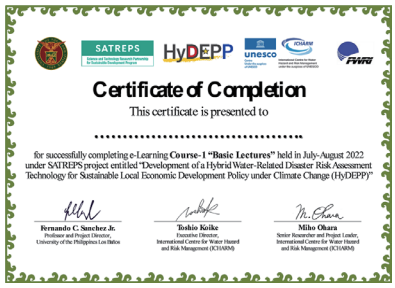


Photo 1 Example of certificate of completion that was issued for those who successfully completed the courses
写真 1　各コース修了者に授与された修了証書の例

These e-learning training programs have contributed to promoting the capacity development of future human resources in the counterpart country. Training such as these helps participants enhance their knowledge and experience in the fields of hydrology, flood hazard mapping, and risk assessment and support them in building their individual capacity as well as the capacity of co-research organizations of the HyDEPP-SATREPS project. The skills and knowledge acquired through the e-learning programs will be useful for the participants in pursuing their careers and implementing the activities of the project.

(Written by Shrestha Badri Bhakta and NAGUMO Naoko)

しました。

このｅラーニングに登録した参加者数は、コース 1 が 91 名、コース 2 が 89 名、コース 3 が 88 名でした。ｅラーニングの講義と演習の終了後、参加者にはオンライン試験を受験してもらい、80%以上の正答率を得た参加者はコース 1 とコース 3 を修了したとみなされました。また、コース 2 の修了にあたっては、参加者は 2D/3D 洪水ハザードマップを含む RRI モデルのシミュレーション結果と、選択したバランガイにおける予想される災害状況について課題レポートを提出し、講師から評価を受ける必要がありました。最終的に、コース 1 の修了者は 63 名、コース 2 の修了者は 41 名、コース 3 の修了者は 53 名となりました。図 2 は 2021 年に開催された第 1 回ｅラーニングと 2022 年に開催された第 2 回ｅラーニングの各コースの修了者数を比較したものです。第 2 回ｅラーニングの 3 コースすべてを修了した受講者は 40 名でした。8 月 25 日のクロージングセッションでは、このセッションまでに各コースを修了した参加者に修了証が授与されました（写真 1）。また、2 回目の期限である 9 月 12 日までに各コースを修了した参加者にも修了証が発行されました。

このようなｅラーニングは、カウンターパート国の人材育成に貢献するものと考えられます。参加者が水文学、洪水ハザードマッピング、リスク評価の分野における知識と経験を高めるとともに、個人および HyDEPP-SATREPS プロジェクトの共同研究機関の能力向上を支援することができます。このｅラーニングプログラムで習得した技術や知識は、参加者のキャリアの追求や HyDEPP-SATREPS の活動実施に役立てられることが期待されます。

ICHARM joins advanced studies of climate change prediction
「気候変動予測先端研究プログラム」の開始

ICHARM は今年度から、国立大学法人京都大学等と連携して文部科学省「気候変動予測先端研究プログラム」に参画し、気候変動に関する研究を継続実施します。

本プログラムは、「統合的気候モデル高度化研究プログラム」（H29-R3）および「気候変動リスク情報創生プログラム」（H24-H28）などによる研究をさらに発展させる形で実施されます。具体的には、気候変動予測シミュレーション技術の高度化等による将来予測の不確実性の低減や、気候変動メカニズムの解明に関する研究開発、気候予測データの高精度化等からその利活用までを想定した研究開発を一体的に推進することで、気候変動対策（気候変動適応策・脱炭素社会の実現に向けた緩和策）に活用される科学的根拠の創出・提供を目指すこととされています（文部科学省 HP より）。

本プログラムは、4 つの領域課題で構成されており、その中の領域課題 4「ハザード統合予測モデルの開発」の実施機関（主管機関）に京都大学が決定され、防災研究所が中心となって実施されます。

ICHARM は、そのうちの課題 D.「アジア太平洋地域でのハザードおよびリスク評価と国際協力」において、フィリピンにおける水循環モデルの構築や、現地の実情に応じたオンライン知の統合システムの構築に着手します。研究活動の進捗については、適宜このニュースレターでも報告します。

ICHARM has participated in advanced studies of climate change prediction, a new research program launched in June 2022 by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and will continue conducting research on climate change in collaboration with Kyoto University and other organizations.

MEXT has launched this new research program to step up climate change studies by building on the achievements of the Integrated Research Program for Advancing Climate Models (2017-2021) and the Program for Risk Information on Climate Change (2012-2016). Research projects aim to reduce the uncertainty in future predictions by improving climate-change prediction simulation technologies, to increase the understanding of the climate change mechanism, and to advance the integrated research and development of systems for better quality and more effective use of climate prediction data, thereby creating and providing scientific evidence essential to plan adaptation measures and mitigation measures that help realize a decarbonized society.

The new program consists of four areas of research. Kyoto University has been selected as the principal research organization for the development of integrated hazard prediction models (Research Area No.4), and its Disaster Prevention Research Institute has been playing the leading part in this area.

ICHARM has been assigned to Task D of Research Area No.4 and will be studying the evaluation of hazards and associated risks in the Asia-Pacific regions and the promotion of international cooperation in this respect. ICHARM soon begins the development of a water cycle model in the Philippines and an online knowledge integration system tailored to their local needs and conditions. The progress of the program will be reported from time to time in the ICHARM Newsletter.

(Written by KURIBAYASHI Daisuke)

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、内藤健介研究員の「アンデスの川を測る」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:

NAITO Kensuke, Researcher

Unveiling rivers in the Peruvian Andes

Unveiling rivers in the Peruvian Andes
アンデスの川を測る

NAITO Kensuke, Researcher
内藤健介　研究員

1. Introduction

In this article, I would like to share my experiences in conducting measurements in the Peruvian Andes, where I worked before joining ICHARM in April 2021. In the Amazon River Basin, which is known as one of the largests in terms of size and water discharge, the Andes occupies only 14% of the area. However, more than 90% of sediment discharged to the Atlantic Ocean is yielded in the Andes (e.g., Goulding et al., 2003). The active technic uplift, high slopes, and heavy seasonal rains create this highly erosive setting in the Andes. In fact, there are a countless of landslides and debris flows occur in the area, particularly during a rainy season, which is between December to March, and channels are filled with sediment (Figure 1b, c).

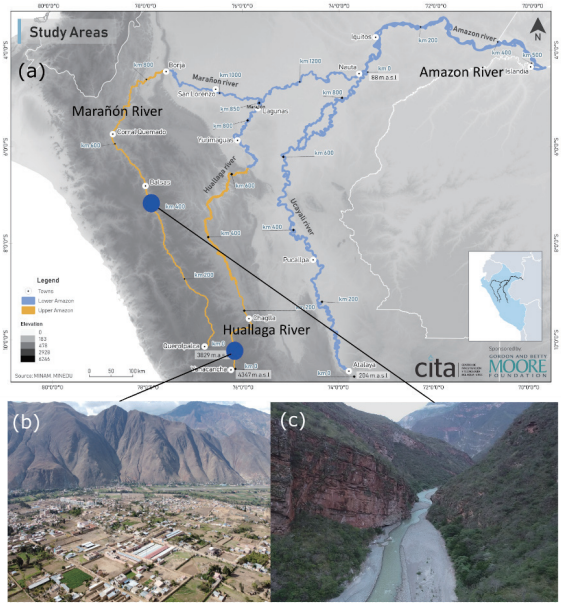


Figure 1 (a) Location of the Marañón River, the Huallaga River, and the Amazon River. Orange color indicates the Andean part of the river. (b) A picture of the highly erosive mountains that are found at the elevation of 3,000m near the Huallaga River (c) A picture of the Maranon River at the elevation of 1,000m

図 1 (a) Marañón 川、Huallaga 川、Amazon 川の地図。オレンジ色は Andes 山脈を流れる部分を示す。(b) 標高約 3,000m での Huallaga 川周辺の浸食の激しい山々 (c) 標高約 1,000m の Marañón 川

In recent years, the Andean Rivers have seen rapidly increasing number of dam constructions. Currently 142 dams are either under operation or construction, and 160 more dams are under planning in the Andean area of the Amazon River Basin (Latrubesse et al., 2017). The problem is that these plannings do not involve careful field measurements, making it difficult to conduct an accurate environmental impact assessment. This is due partly to lack of a methodology to characterize a river such as ones flowing in the Andes. Given this background, my colleagues and I conducted a series of work aiming to develop a comprehensive methodology to produce baseline information on the geomorphological characteristics of the Peruvian Andean rivers. The methodology included the use of i) direct field measurement, ii) CCTV cameras and satellite images for continuous monitoring, iii) UAVs (drones) for developing a topographic map, and iv) numerical models (Photo 1).

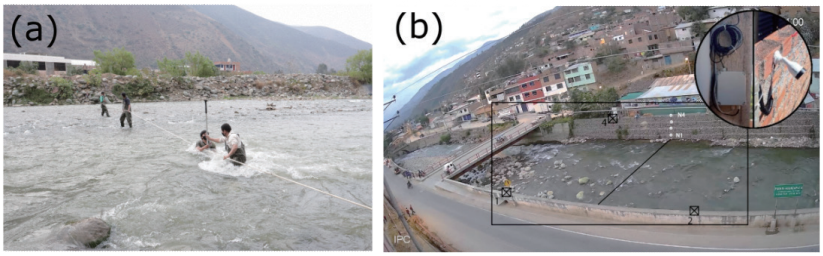


Photo 1 Examples of schemes that we implemented for the comprehensive measurement and monitoring of the Andean Rivers (a) Direct measurement using a current meter and (b) continuous monitoring using a CCTV camera

写真 1　アンデス河川の観測とモニタリングに用いた手法の例 (a) 流速計を用いた計測と (b) CCTV カメラを用いたモニタリング

This article presents a methodology that we implemented to measure sediment transport in the headwater of the Huallaga River, a Peruvian Andean River. It is one

1. はじめに

本記事では、2021 年 4 月に ICHARM に入る以前に、ペルーのアンデス山脈で河川の観測を行った際の経験を紹介します。世界最大級であるアマゾン川流域において、アンデス山脈が占める面積は約 14% であるのに対し、海に到達する土砂の実に 90%近くはアンデス山脈で生産されています。(例えば Goulding et al., 2003 年)。活発な隆起、急傾斜、および激しい季節的降雨がアンデス山脈における侵食の激しい環境を作り出しています。実際に 12 月から 3 月の雨季には土砂崩れや土石流が数えきれないほど発生し、また、流路は大量の土砂で埋め尽くされています（図 1b、c)。

近年、アンデス山脈を流れる河川（ここではアンデス河川と呼ぶ）ではダム建設が急増しています。現在アマゾン川流域に属するアンデス河川だけでも 142 のダムが操業中もしくは建設中であり、さらに 160 のダムが計画中です（Latrubesse et al. 2017)。問題は、これらの計画では入念な現地観測が行われていないため、正確な環境影響評価を行うことが困難な点です。これは、アンデス山脈のような大山脈を流れる河川形態の特性を把握するための手法が確立されていないことも一因です。このような背景から、ペルーのアンデス河川の河川形態に関する基礎的情報を作成するための包括的な手法を開発することを目的とした研究を行いました。この手法には、i) 現地での直接測定、ii) CCTV カメラと衛星画像による継続的モニタリング、iii) UAV（ドローン）による地形図の作成、iv) 数値モデルの利用が含まれています (写真 1)。

本稿では、ペルーのアンデス山脈を流れる Huallaga（ウアジャガ）川の源流域における土砂輸送を測定するために我々が実施した手法を紹介します。Huallaga 川は、後にアマゾン川となる Marañón（マラニョン）川の主要な支流の 1 つです（図 1a)。

2. 土砂流量観測

土砂輸送の評価も、アンデス河川の特徴を明らかにするために重要な課題でした。アンデス山脈のような山岳地帯では、主な土砂輸送形態は、大小さまざまな礫が川床で回転、滑動、躍動することにより移動するベッドロードです。対象河川においては、Helly-Smith 型サンプラーを用いた従来のベッドロード計測手法は、河床材料の大きさや川底へのアクセスの困難さから、適用不可能でした。また、小規模な源流域の土砂輸送研究に一般的に適用されている

電波発信器型土砂トレーサーの使用も不可能でした。

そこで、Toniolo（2020）によって近年提案された手法を導入し、ベッドロードの定量化を試みました。この手法は、河床流下方向に体積が既知の溝を掘り、地形測量を繰り返すことで体積の時間変化を明らかにし、溝に捕捉された土砂を定量化するものです。2019 年 10 月（乾季の低水量時）に重機で溝を作り、RTK-GPS 測量で溝の地形測量を行いました（写真 2）。掘った溝の中には、長さ約 20 メートル、幅約 5 メートル、深さ約 3 メートル（= 300m^3）と非常に大きなものもありました。なお、河床を掘った際に採取した土砂は、河床材料の粒径分布把握に用いられました。粒度分布の算出には、河床材料の写真と物体検出アルゴリズムを利用したデジタル光学式粒度分布測定法という手法を導入しました。

その後、定期的な地形測量を行う予定でしたが、COVID-19 をとりまく社会情勢により、残念ながら掘った溝の地形変化を行うことができず、1 年後の 2021 年 11 月に再び現場に戻った時には、すでにいずれの溝も土砂で完全に埋まっていました。しかしながら土砂輸送量の定量化には至らなかったものの、いかに大量の土砂が輸送されているかを実感するとともに、アンデス河川の土砂輸送量定量化の手法としては有用であるという手応えを得ることができました。

3. おわりに

私のペルー滞在は、当初目標としていたアンデス河川における河川形態の特性把握のための手法開発の達成を見ることなく終了してしまいました。しかし、私たちの活動は、アンデス河川における土砂輸送の重要性に対する認識を高めることに貢献したと信じています。実施した手法の一部は、ペルーにおけるアンデス河川の河道形態特性の手法に関する文書（UTEC-CITA, 2021）にまとめられているので、興味がある方はご参照下さい。なお、これらの観測は現地河川管理者の許可を得たうえで行いました。

of the major tributaries to the Marañón River, which later becomes the Amazon River (Figure 1a).

2. Measuring sediment transport rate

Evaluating the sediment transport was one of the most crucial tasks to characterize the geomorphological features of the Andean rivers. In mountain areas like the Andes, the principal mode of sediment transport is bedload, in which large gravels and boulders roll, slide and jump on the riverbed. Conventional bedload measurement methodologies, such as using Helly-Smith type samplers, were not applicable to the target rivers due to sediment size and limited access to the rivers during high flow events, during which the bedload transport is the most active. Given the scale of the rivers, radio transmitter sediment tracers, which are typically used in sediment transport studies in small headwater streams, were not suitable for this case, either.

Therefore, we selected a recently-developed robust technique by Toniolo (2020) to quantify the bedload transport. This technique involves digging a trench of a known dimension and volume in the riverbed. Repeated topography surveys can reveal changes in volume, making it possible to quantify the sediment captured in the trench. In October 2019, which corresponds to a dry and low-flow season, we first created a series of trenches with a heavy machine. The bathymetry of these trenches was then surveyed using an RTK-GPS (Photo 2). Some trench was as large as 20m long, 5m wide, and 3m deep (thus 300 m^3 volume). Excavated bed materials were also analyzed to quantify the size distribution of the bed material. To do so we implemented a methodology named digital optical granulometry technique, which utilizes object-detect algorithm.

Photo 2 Making a trench with a heavy machine (a) and conducting a topographic survey of the trench (b)
写真 2　重機で川底に溝を掘っている様子（a）と溝の地形測量を行っている様子（b）

Unfortunately, the COVID-19 situation prevented us from continuing the bathymetry survey. By the time we went back to the site after more than one year in November 2021, the trench had already been filled with sediment. Although the bedload transport was not characterized quantitatively, this taught us how much sediment the Andean rivers are transporting. Moreover, we were confident that this methodology could be utilized for the characterization of the bedload transport in the Andean rivers.

3. Summary

My time in Peru ended without seeing the end of our study to develop a series of methodology to characterize geomorphological features of the Andean Rivers. However, I believe that our activities have contributed to rising awareness of importance of sediment transport in characterizing a river, particularly in the case of Andean Rivers. Some of the techniques that we employed are summarized in a document as the recommended techniques to characterize the geomorphological features of the Andean rivers (UTEC-CITA, 2021). It should lastly be noted that these measurements were conducted with permission from local authorities.

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Training & Education

https://facebook.com/icharmtrainingcourse/

Educational program updates
修士課程研修　活動報告

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.

【Joint study trip with IISEE students, August 29-30】

The students studying at ICHARM took an overnight joint study trip with the students of the International Institute of Seismology and Earthquake Engineering (IISEE) of the Building Research Institute (BRI). The event was the first of its kind that ICHARM had ever carried out for its master's program students. The destinations were selected to be beneficial for both groups of students.

Life Safety Learning Center, Tokyo Fire Department, August 29

The first destination was the Life Safety Learning Center, managed by the Tokyo Fire Department. The students were divided into three groups to go through individual booths. They watched a video explaining past earthquakes in Japan and their impact on people and the role of the fire department in saving lives during those events. Then, they experienced how difficult it would be to open a car or room door against water pressure during flooding. They learned that it would be very difficult when the water is only 30 cm deep and almost impossible when 60 cm deep, which means that one would be trapped in a car, for example. This experience taught them the true meaning of 30 or 60 cm of water depth, which would otherwise tend to be reduced to the mere numbers resulting from runoff inundation simulation.

After experiencing other activities, such as a fire drill and fire evacuation simulators, they also experienced earthquakes of different Japanese intensity scales of 4 to 7, which simulated the Great Hanshin-Awaji Earthquake and other strong earthquakes. All this made the students realize again the importance of the disaster prevention response provided by the fire department and the usefulness of simulated experiences to educate the public about disaster prevention awareness on a daily basis.

Water Pressure experience
水圧体験の様子

Yamba Dam and Tomioka Silk Mill, August 30

The second destination was the Yamba Dam in Gunma Prefecture. They first visited its management office and 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 711.4km^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

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。

【建築研究所国際地震工学センターとの 1 泊 2 日の合同視察　8 月 29 日～ 30 日】

学生は、建築研究所国際地震工学センター (IISEE) の学生と一緒に、両学生が共通して学べる視察箇所を訪れる機会を得ました。宿泊を伴った合同視察は、本コースにおいて初めて実施されました。

（東京消防庁本所防災館視察　8 月 29 日）

まず、東京消防庁管轄の本所防災館を訪問しました。学生は、3 つのグループに分かれてそれぞれのブースを体験しました。まず、過去の震災とそれが日本人に与えた影響、これらの出来事の際に人命を救う消防の役割についての説明ビデオを見た後、水圧によって、部屋や自動車のドアが開かなくなるというシミュレータを体験しました。水深が 30 ｃｍでもかなり力が必要で、60 ｃｍになるとほとんどドアが開けられず、自動車から脱出できないということで、学生は流出氾濫シミュレーションによる浸水深の計算結果を、身をもって体感しているようでした。

その他、消火訓練や火災時の煙からの避難訓練シミュレータの体験のあと、最後に、地震体験室を訪れ、参加者全員が交代で震度 4 から震度 7 まで、及び阪神淡路大震災等複数の実際の過去の地震波形を再現した揺れを体験しました。消防署が提供する防災対応の重要性がより明確になり、また、日ごろから市民にむけて防災への啓発を行うための疑似的体験の重要性を学ぶことができました。

（八ッ場ダムと富岡製糸場視察　8 月 30 日）

次の日は、群馬県の八ッ場ダム管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 の集水域に、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、洪水や台風による大雨の際の防災対策や、群馬県をはじめとする下流県に最大約 22.209m³/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、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ダムでもあります。建設には約 68 年もの歳月をかけて完成したことに、学生からは建設期間の長さに驚きの声が上がっていました。またその美しさから、群馬県ではダムや周辺の観光地を訪れる人が多く、観光の面でも注目されています。

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。

日本は長い鎖国のあとの主要輸出産業は生糸でした。しかし、生糸の生産は特に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　9月6日～7日】

9月6日、7日と2日間に渡り、学生は1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。同じく専門のモデレーターのもと、本ワークショップを同一コースにおいて2回実施したのは、今回が初めてでした。

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、また、個人作業においては各学生の Supervisor も参加し、本研修のアウトプットであるプロジェクト計画概要表「Project Design Matrix」(PDM) の作成に技術的な観点からアドバイスを行うともに、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　9月9日】

例年この時期に実施している植樹セレモニーを行いました。学生は、彼らの桜の木の前で、江頭進治研究・研修指導監より植樹の意義について、次のような話を受けました。

「記念植樹は、古くから山地を保全し洪水災害の防止を祈念し、あるいはお祝い事を記念し、あるいはまた建設工事等が安全に運ぶことを願う行事として行われております。日本人は満開の桜が大好きであり、桜はお祝い事を記念してよく用いられます。皆様の桜は、修士号の取得をお祝いするとともに、皆さんが ICHARM に再訪されたとき、この場において記憶をたどり、桜と語らい友を思う桜でもあります。」

supplying water up to about 22.209m³/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. Learning that it took 68 years to build the dam, students were very surprised. Today, the dam even contributes to promoting tourism for Gunma Prefecture; many people attracted by its beauty travel to the dam and its surrounding tourist spots.

At the Tomioka Silk Mill
富岡製糸場にて

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.

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.

【PCM Follow-up Training, September 6-7】

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 January 2022. The ICHARM master's program held the PCM training twice in one program year for the first time.

In advance of the training, Prof. KOIKE Toshio, the executive director of ICHARM, gave a lecture in order to motivate the students to plan high-quality projects. Supervisors also joined their students in working on their individual work, providing technical advice for creating a quality Project Design Matrix (PDM), an outline of the action plan, which the students were assigned to produce as the output of the training. In the group discussions and presentations, the students engaged in lively discussions and exchanged ideas and opinions based on the PDMs they created.

Individual work with supervisors
Supervisor との個別作業

【Commemorative tree planting ceremony, September 9】

A tree planting ceremony was held before graduation, as usual. In front of the student's sakura tree, Training Advisor EGASHIRA Shinji told them what it means to plant a tree together:

"Japan has a long history of tree planting. We plant trees for various reasons: to conserve mountains and prevent flood disasters, celebrate a specific occasion, or pray for construction and other projects to end safely. Japanese people love to see sakura, or cherry blossoms, in full bloom, so sakura trees are very popular for this kind of ceremony, especially when celebrating something happy. Today, we plant a sakura tree to congratulate you on earning a master's degree. The sakura tree we plant today is also for you to remember the days you spent here at ICHARM. In the future, when you have a chance to come back to ICHARM, talk to the sakura tree and think about the friends you studied together."

In front of their Sakura tree
桜の木の前で

(Written by MIYAZAKI Ryosuke)

Graduation Ceremony of the 15th ICHARM master's program

Prior to the graduation ceremony, the closing ceremony of the 15th ICHARM master's program, "Water-related Disaster Management Course of Disaster Management Policy Program," was held at JICA Tsukuba Center on September 13, 2022. Thirteen students from eight countries, i.e., one each from the Philippines, Malawi, Nepal, Bhutan, and Indonesia, two each from Bangladesh and Malaysia, and three from Sri Lanka, graduated from the program and then departed from Japan to their home countries. This one-year master's course program, operated by ICHARM and GRIPS with support from JICA, is designed primarily for those who hold a bachelor's degree and have work experience related to water or river management at government organizations in their countries.

At JICA Closing Ceremony

JICA Tsukuba Director General MUTSUYOSHI Emiko and ICHARM Executive Director KOIKE Toshio made a congratulatory speech. GRIPS Professor SUGAHARA Masaru also made a speech online. Mr. CABRAL Erwin Rafael of the Philippines spoke in return on behalf of the students. In the ceremony, the Best Research Award was presented to Mr. ALAM Md Shariful of Bangladesh and Ms. Siti Adabiyah Binti SULAIMAN of Malaysia this year. The award was given by ICHARM and GRIPS to praise them for their excellent research work and academic performance. The Sontoku Award was presented to Mr. HAFIZH Abdul of Indonesia. This award is given every year by ICHARM to a student selected by their fellow trainees for their outstanding contribution to the class throughout the program.

A certificate was presented by Ms. MUTSUYOSHI Emiko, Director General of JICA Tsukuba

For the first time in the last three years, the graduation ceremony was held in person at GRIPS on September 14, 2022. Unfortunately, on behalf of the ICHARM education team, only the executive director attended the ceremony due to the continuing alert on the COVID-19 spread in Japan. The master's students had an opportunity to wear a graduation gown and hat in advance of the ceremony and have memorial photos with GRIPS Prof. SUGAHARA Masaru and Prof. HIBINO Naohiko, as well as with IISEE students, in front of the main gate. GRIPS awarded a master's degree in disaster management to all 13 students of the 15th master's program in the ceremony. GRIPS also presented the prestigious Dean's Award to Mr. Hasan Md Khairul (Bangladesh) for his outstanding academic performance and excellent research work. All the staff at ICHARM pray for the future success of the 13 graduates in their countries.

The Dean's Award was presented to Mr. Hasan Md Khairul (Bangladesh) at GRIPS (right side)

In front of the main gate of GRIPS

(Written by Mohamed Rasmy Abdul Wahid)

Outline of the Master's thesis and comment for the course by each student
修士論文の概要と研修生からのコメント

以下では、修士学生13名がこの1年間で完成させた修士論文の概要と、コース全体の感想についてご紹介します。

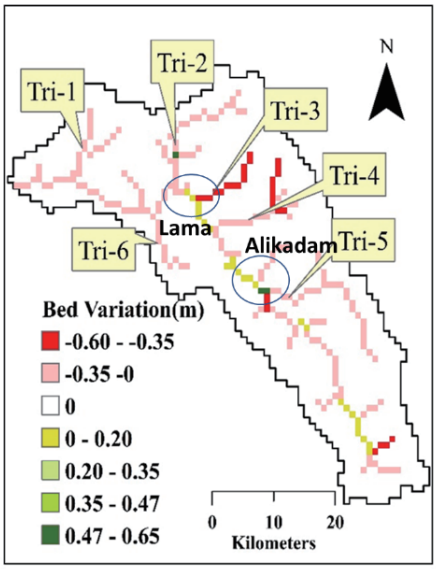
This section shows the abstracts of the master's theses of the 13 students who graduated in September this year and their comments on the ICHARM master's course, in which they studied for a year.

NUMERICAL STUDY TO PREDICT SEDIMENT RUNOFF PROCESS IN THE MATAMUHURI RIVER BASIN, BANGLADESH

ALAM Md Shariful, from Bangladesh

Downstream of the Matamuhuri River basin is currently experiencing river bed erosion, bank line shifting, siltation, and flooding due to a huge onrush of sediment-laden water during the monsoon. The present study focuses on prediction of sediment runoff processes in the Matamuhuri Basin using the rainfall runoff inundation model-based sediment transport model called rainfall sediment runoff. The model evaluates the basin-scale sediment production, transportation, bed variation, and sediment sorting. The study basin was simulated for a seven-month wet-dry period in 2020. The model predicted high sediment deposition in the middle part of the basin, where the main channel is flat and has a low sediment carrying capacity. The tributaries and upstream reaches with high slope gradients produce a lot of sediment, among them, three tributaries have higher sediment production (approximately 40% of total) than other tributaries, which implies the effectiveness of check dams for these tributaries. The model also predicts the amount of change in bed erosion at the tributary and deposition at the main channel that can occur if the countermeasures are implemented.

Keywords: Sediment production, Sediment transport, Bed Erosion, Deposition, Countermeasure



Bed Variation

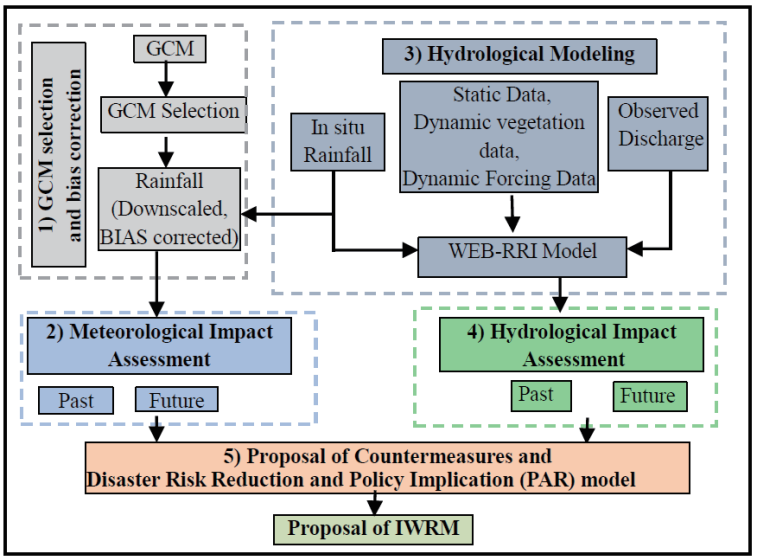
I am Md Shariful Alam from Bangladesh. Bangladesh Water Development Board (BWDB), where I work as a sub-divisional engineer since 2014, is responsible to protect people from water-related disasters by constructing hydraulic structures. We also ensure that crops are protected from flooding, prevent saline water intrusion, and enable surface water irrigation. ICHARM is a great place to pursue a Master's Degree in water-related disaster and risk reduction. I consider myself fortunate to have the opportunity to learn from the professors and researchers at ICHARM. In my opinion, this master's course is well designed with respect to the time frame. In addition to the theoretical courses, my thesis work helps me understating how to think deeply on basin scale problem analysis, especially on sediment-related problems. This course helps improve my analytical ability to address hydro-morphological issues in our country. I highly appreciate the detailed and profound knowledge. I also appreciate the teaching techniques of the teachers of ICHARM as well as their continuous cooperation and inspiration.

We were successful in finishing the thesis works on time. Through my organization, I intend to apply the knowledge I've learned for the benefit of my nation. I highly recommend government officials and students to take this one-year DMP course; they will understand how practical, usefully diverse, and different it is from the usual university courses. I extend my gratitude to ICHARM, GRIPS, and JICA for this invaluable opportunity.

DEVELOPMENT OF AN INTEGRATED WATER RESOURCES MANAGEMENT PLAN FOR THE SANGU RIVER BASIN UNDER CLIMATE CHANGE

Hasan Md Khairul, from Bangladesh

The Sangu river basin contributes to national economy significantly, however, exposures to water-related hazards frequently. It is expected that water-related disasters will be increased in manifold in the future due to accelerated water cycle by global warming, rapid basin development, and lack of evident-based information for policy making that will hamper the sustainable development of the region. Accordingly, this study investigated an end-to-end approach (i.e. scientific, engineering and economic analyses) to develop an Integrated Water Resources Management (IWRM) plan and to increase the confidence level in decision-making under climate change in the basin. This study scientifically selected five Global Climate models (GCMs) to include the model climate sensitivity and statistically bias-corrected their outputs to reduce biases from coarse resolutions. The analysis of the GCMs indicated that monsoon rainfall will increase in the future. The extreme rainfall events and drought will be more severe and frequent in the future. The Water and Energy Budget based Rainfall-Runoff-Inundation (WEB-RRI) model was used to simulate hydrological responses of the basin under changing climate. The model outputs indicated that annual daily maximum discharge, mean monthly discharge during monsoon and high flow will increase in the future, whereas annual daily minimum discharge and low flow will decrease. These results indicate more frequent and intensified floods and droughts in the future. To mitigate these identified water-related disasters and to maximize the water usage under climate change, several countermeasures has been investigated in this study. The proposal of river capacity enhancement can reduce the future floods and the dam can increase the agricultural productivity. Finally, Pressure and Release (PAR) model was used to develop disaster risk reduction policies in this basin.



Methodology

Keywords: climate change, GCMs, RCP8.5, WEB-RRI model, flood and drought

To prevent new and reduce existing risks, the Government of Bangladesh recognizes the seven global targets of the Sendai Framework for Disaster Risk Reduction (SFDRR) and has formulated a comprehensive development plan, the Bangladesh Delta Plan (BDP-2100), focusing on economic growth, environmental conservation, and enhanced climate resilience. According to the Standing Orders on Disaster (SOD), the Bangladesh Water Development Board (BWDB), where I work as a sub-divisional engineer, has the responsibility for disaster risk reduction and emergency response. For the successful implementation of BDP-2100 and to properly follow the SOD, it is vital to develop harmony between local practices, and advanced knowledge, tools and technologies. ICHARM is a great place with the availability of advanced knowledge, tools and technologies. Pursuing a Master's degree here in ICHARM is a great opportunity for me to learn about advanced models and technologies. The course content is well designed and the experienced professors and researchers make the course more beneficial for us. The knowledge we acquired here will help us to analyze the disaster risk and how to prevent new and reduce the existing risk.

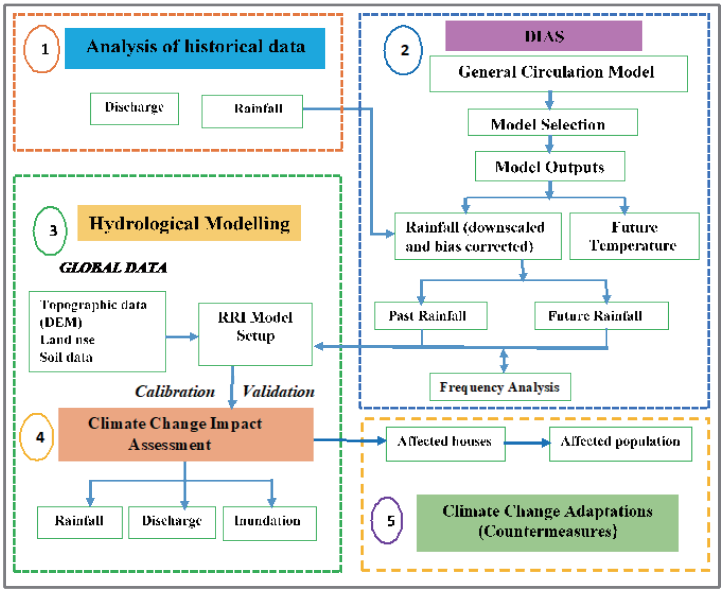
In my research work, I used advanced tools (DIAS) and models (WEB-RRI) to understand the disaster risk under changing climate and proposed countermeasures to reduce the risk by using an end-to-end approach in the Sangu river basin. To lessen disaster risk, we can use a similar approach in other basins.

I would like to take this opportunity to express my gratitude to my supervisors and researchers for their continuous support and encouragement to successfully complete the degree. The knowledge I learned from ICHARM is invaluable. I suggest all government officials and students to pursue higher studies from ICHARM, as ICHARM has high-quality researchers and advanced tools and technologies.

ASSESSMENT OF CLIMATE CHANGE IMPACTS ON EXTREME FLOODS IN THE CHAMKHARCHU SUB-BASIN, BHUTAN

Megnath Neopaney, from Bhutan

The Chamkharchu sub-basin is located in the north-central region of Bhutan. It is highly vulnerable to hydro-meteorological hazards owing to variations in rainfall patterns triggered by climate change and has experienced floods. Socio-economic activities, infrastructure, and settlements are located along the flood plain, and lack of investment in scientifically designed flood protection measures along vulnerable areas could aggravate future flood risk. This study assessed the impact of climate change on extreme floods along the Chamkharchu River using recent advances in science and technology, including general circulation models (GCMs), considering the RCP8.5, scenario and rainfall-runoff-inundation (RRI) model for hydrological simulations. All selected GCMs projected an increase in extreme daily rainfall between 10% and 60%, inundation extent by 30%, and inundation depth by more than double, with an increase in the number of affected houses and population in the near future. This indicates that water resource sectors would be beneficial simultaneously, and there will be increased flood risk in human settlement areas, especially Choekhor Gewog (Chamkhar town).To overcome these effects, inundation maps were prepared for 100-year return period design floods and the number of likely affected houses and population were investigated, and two types of climate change adaptation measures were designed and estimated. Additionally, non-structural measures are recommended for effective flood management and decision-making.



Methodology

Keywords: climate change, rainfall, return period, inundation, flood

Firstly, I would like to express my sincere gratitude to the Royal Government of Bhutan, JICA, ICHARM and GRIPS for nominating and selecting me to pursue this prestigious Master's Degree on "Disaster Management"during this difficult times of COVID-19 pandemic. It was possible to complete this program without any difficulties due to the efforts of the committed professors and staffs of the ICHARM and GRIPS.

During my study in ICHARM, I carried out research titled "Assessment of Climate Change Impacts on Extreme Floods" in Chamkharchu Sub-Basin, Bhutan. The research was carried out to address scientific, engineering and policy challenges for climate change in the basin. The study assessed the climate change impacts by incorporating the recent advancements in science and technology tools and models. DIAS, CMIP5 platform was used to select GCMs and the RRI model to simulate the basin-scale hydrological response under climate change. The climate change impact assessment showed an increased flood risk in the basin in particular Chamkhar area. All GCMs predicted an increase in extreme rainfall, inundation extent, inundation depth, affected houses and population in the near future due to climate change. The outputs of this research will contribute to the evidence-based decision making process for the government in the basin scale. Besides the research works in ICHARM, we got lots of opportunities to visit several river basins in Japan and learnt Japanese experiences in disaster mitigation and various river engineering and management in Japan that are utmost beneficial for me and my department in the future.

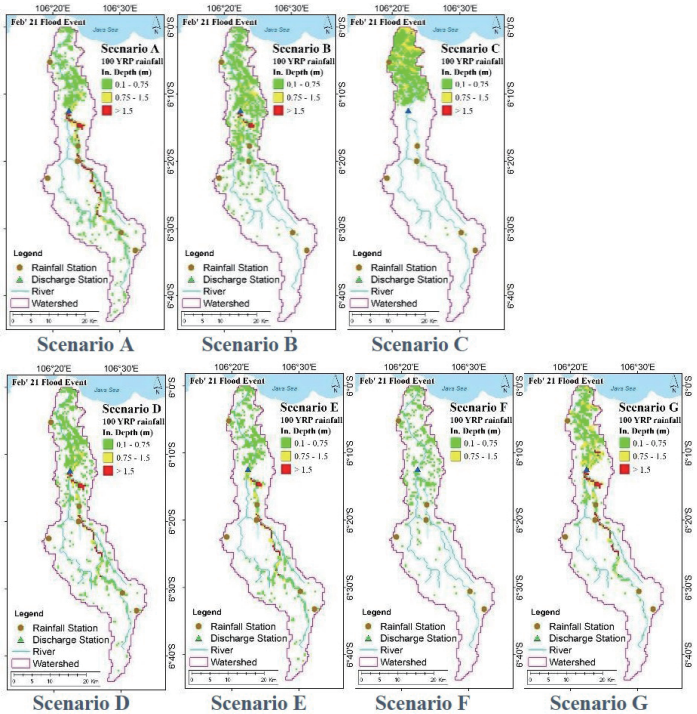
The environment is very conducive for learning with qualified professors and researchers in the ICHARM. I highly recommend government officials to apply for this DMP course. We will be equipped with the theoretical, practical and research works in the ICHARM.

Lastly, I would like to extent my sincere gratitude to my supervisors and professors for their endless efforts for dissemination of their knowledge and skills.

ASSESSMENT OF FLOOD RISK AND IMPACT BASED EARLY WARNING SYSTEM IN THE CIDURIAN RIVER BASIN, INDONESIA

HAFIZH Abdul, from Indonesia

The Cidurian River Basin (CRB) in Indonesia experiences flooding almost every year and it has been a problem since it causes damage and interferes with daily life. Structural countermeasures such as embankment and diversion channels have been planned and implemented since 2016 at several locations for reducing the impact of flooding. However, non-structural countermeasures such as flood early warning systems in the CRB are not established yet. In order to reduce the flood risk, this study thus attempts to propose a framework for establishing early warning systems by combining the hydrological analysis using the rainfall-runoff-inundation (RRI) model and the impact-based forecast (IBF) from Agency for Meteorological, Climatological, and Geophysics (BMKG). Flood simulation for various flood scenarios based on frequency analysis with various rainfall patterns provides an idea of how the spatial-temporal distribution of rainfall influences flood extent and inundation depth. The results of this study show that combining the extent of flood area resulting from RRI modeling and the IBF can provide more specific and reasonable information of flood early warning.



Flood Scenario Based on February 2021 Flood Event (100 Year Return Period)

Keywords: Risk Assessment, Impact Based Forecast, Frequency Analysis, Early Warning Systems

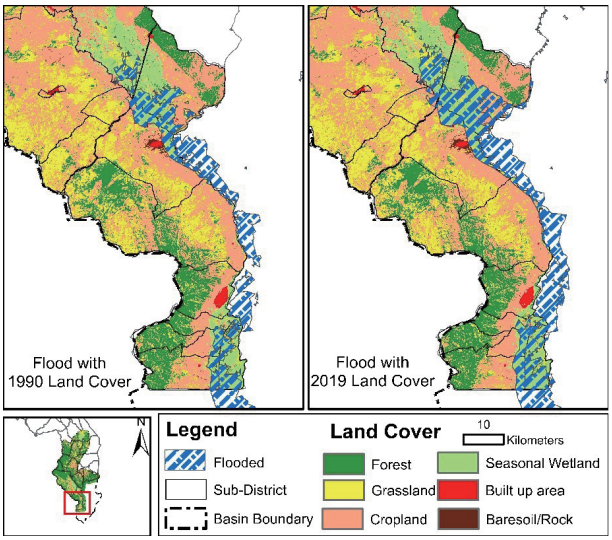
First of all, praise and gratitude I pray to Allah SWT. I feel very lucky to have been selected for this program. Because here I get a research-based education that is supported by the best Sensei in their field and also supported by qualified facilities. We had the opportunity to visit several DAMs in Japan, learn about their history, and also see how they work. This knowledge is very valuable for us to have and apply in our country. Here we also have the opportunity to get to know and learn about Japanese culture. One of them is hard work and on time. I still remember Koike Sensei's first message when we arrived in Japan: "be punctual!"

One year passed very quickly, but we gained a lot of things: knowledge, experience, and friendship. I hope this can be my provision in furthering my career in the future to be able to provide the greatest benefit to our country. Lastly, I want to express my gratitude to GRIPS, ICHARM, and JICA for giving me this precious opportunity. My gratitude to BNPB, who has been entrusted with sending me to Japan. Last, my gratitude to all ICHARM's Sensei and my supervisor, Prof. OHARA Miho, Dr. UMINO Hitoshi, Dr. SHRESTHA Badri , and Prof. TAKEDA Fumio. Because of their help, I was able to finish my research on time. To all my friends, I hope this will not be our last meeting. I hope to see you again at another good opportunity.

MODELING THE IMPACT OF LAND COVER CHANGE ON FLOOD RISK IN THE LOWER SHIRE RIVER BASIN, MALAWI

Hanke Titus Lloyd Ndau, from Malawi

Severe poverty, dependence on rain-fed agriculture, and increasing population size in the Shire River Basin of Malawi have resulted in rapid conversion of forests to settlements and croplands along rivers. We quantify how land cover changes over a 30-year period, between 1990 and 2019, have affected the nature of floods and flood disaster damage in the lower Shire River Basin in Malawi, using the Rainfall-Runoff-Inundation Model. We found that forest depletion from 13,743 km^2 to 6,444 km^2, and cropland expansion from 6,311 km^2 to 13,776 km^2 caused an increase in flood inundation area from 817 km^2 to 1,164 km^2. We conclude that the conversion of land from forest to agricultural land, which was stimulated by agricultural development policies, increased the flood risk to communities in Chikwawa and Nsanje districts in the lower Shire Basin. Our recommendation is that development strategies should include specific measures to either maintain forest cover or offset the equivalent roughness and infiltration provided by forest cover.



Flood inundation simulated with 1990 land cover and simulated with 2019 land cover

Keywords: Risk assessment, Land-cover change, Floods

The masters in Disaster Management Policy is a great course taught by a great team. We started learning online. This approach made an already challenging course more difficult. However, through the efforts of JICA and ICHARM we were allowed to travel to Japan. In this way we experienced Japanese culture in addition to the benefits of learning face to face with most of the professors.

The essential knowledge in floods and sediment disasters that I have gained will be used to improve the wellbeing of poor people, who suffer from regular flood and drought disasters in Malawi. The emphasis on basin-wide and the end to end flood risk management is a relatively new approach for Malawi, where disaster risk management has mostly focused on response and vulnerability reduction in the disaster prone areas. Upon returning to Malawi I will promote the inclusion of disaster risk management in development at all levels (from individuals to national level) while emulating the great example set by Japan.

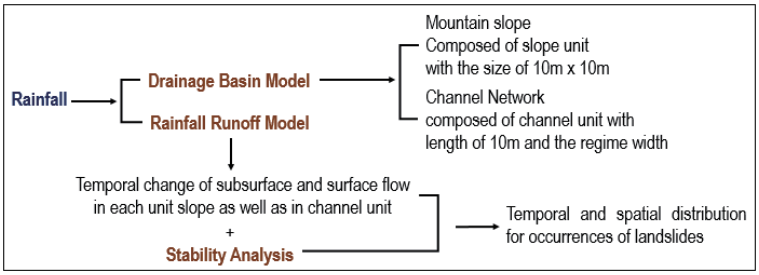
During the course I also experienced Japanese culture. Opportunities for interaction were limited in order to prevent the spread of COVID-19. However, the little interaction I had with the people of Japan taught me the great values of patience and persistence, and supporting others to achieve their goals and aspirations. I even managed to practice a new hobby, photography, despite the busy schedule of the academic work.

Such lessons and enjoyment of Japan was only made possible by the hardworking team from ICHARM, and the kind support from my classmates who became like family. With great and unfathomable appreciation to them, I am now a Master of Disaster Management policy.

CRITICAL RAINFALL CONDITIONS FOR LANDSLIDES OCCURENCES TO DEVELOP WARNING SYSTEM IN CAMERON HIGHLANDS, PAHANG, MALAYSIA

Raja Noraini binti Raja Yusof, from Malaysia

The present study aimed to develop a method for the prediction of the occurrence of sediment-related disasters resulting from landslides in the Cameron Highlands, Pahang. First, the author numerically discusses the correlation between rainfall conditions and the number of landslides using a drainage model, slope stability model, and rainfall runoff model. The rainfall conditions obtained numerically from the models are discussed, with respect to the plane of hourly rainfall and accumulated rainfall and snake lines of past rainfall events. Then, the snake lines that caused the sediment-related disasters have been compared with the simulated threshold curves to specify the critical line useful for the disaster occurrence. This study proposes the critical lines of rainfall conditions for five areas in the Cameron Highlands, Pahang.



Structure of Rainfall-Sediment Runoff Model to evaluate shallow landslides

Keywords: landslide prone area, critical rainfall condition, slope stability, snake lines, early warning

Great memories! Never once in my lifetime that I would have a chance to study abroad.

I refused to apply this course on previous batch, but I can't refuse the offer twice! Instead, my target study is in my own country, I have be lucky enough to be here in Japan, especially in ICHARM.

I learned a lot during my one year stay. From knowledge to good behavior and attitude from the Japanese.

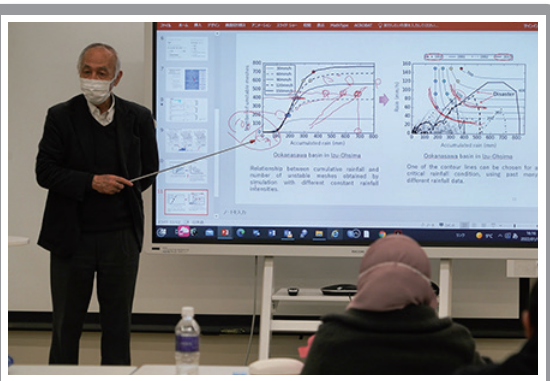
I really appreciate everything that was given to me. It might be nothing for other persons but huge for me. I managed to participate in all JICA events no matter how busy I was. This is the only way for me to express my gratitude to JICA. I participated in calligraphy event, "Thank you around the world campaign" on AEON Mall Tsukuba website, calligraphy event, Japanese flower arrangement (ikebana) , rice planting festival, Japanese cultural event, learning about Tsukuba Science city, understanding the Japanese development experiences and a high school visit. I knew from these events are "once in lifetime and memorable" for me that is why I must grab as much as possible activities and opportunities offered by JICA.

The culture here is the best. I learned a lot. The "arigato gozaimasu" is a simple words but give huge impact on people who received it yet difficult to say for some other people, but the Japanese are really generous to this magic word.

The knowledge! I have be lucky enough to be with the experts in their field. I learned a lot from them. No word can describe how grateful I am to be selected as a participant in this course.

Last but not least, leaving 3 kids was the hardest part, but for sure I'm returning home with proud.

JAPAN! Always like a home for me!



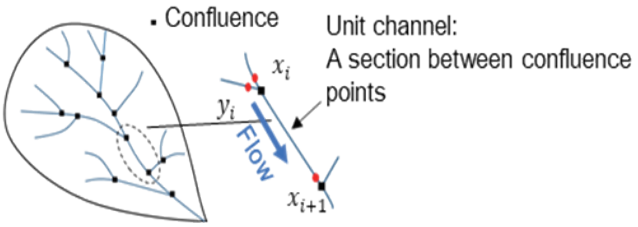
Research and Training Advisor EGASHIRA Shinji
江頭進治研究・研修指導監

Prof. FUKUOKA Shoji of Chuo University
福岡捷二　中央大学教授

PREDICTION OF SEDIMENT TRANSPORT PROCESSES IN THE UPPER KINTA RIVER BASIN, MALAYSIA

Siti Adabiyah binti Sulaiman, from Malaysia

Understanding sediment transport processes and sediment supply from slopes is essential for river basin management. To specify sediment supply conditions from slopes, this study investigated the occurrence of landslides upstream of the Kinta Dam basin using slope stability analysis. The results showed that landslides occur mainly adjacent to river channels and roads, which affects the sediment supply to the river channel. Subsequently, the sediment transport process in the river basin was evaluated to investigate the effect of landslide on reservoir sedimentation. The computation was conducted for two cases: Case 1 was for the current drainage condition with sediment supplied from the landslide, and Case 2 was for the virtual drainage condition without landslides. The results showed that fine sediment generated from landslides was actively transported to the reservoir throughout the year, causing bed degradation where coarse sediment remained in the channel. Fine sediment transported from upstream accumulated in the dam with landslides, and the sediment yielded double in volume.



Concept of unit channel

Keywords: landslide, sediment transport, reservoir sedimentation, basin scale model, Kinta Dam

"Good things never come from COMFORT ZONE". This quote may sum up my one year experiences pursuing Master program in ICHARM and GRIPS. This part of my life journey has strengthen me especially by living away from my family and friends at the same time working hard with classes, exam and research. Nevertheless, there will be a rainbow after the rain. The satisfaction when completing the study is beyond explanation. I am gratitude with the opportunity given to me to study here. I have met with experts in Disaster Management and has broaden my view on this matter. I am hoping that all the knowledge gathered from classes, field trips and discussion will benefit me and my country. I will have a bigger responsibility now to share the knowledge because in Islam we are thought that knowledge without actions is like tree without any fruits. I will forever cherish the ups and downs in this journey because of this, it has certainly upgrade me.

Having the opportunity to study sediment transport using numerical analysis was really special to me. Realising there are not much study using the same methodology was done in my county made me realized that I am very lucky. Many thanks to my supervisor Egashira sensei and Harada sensei with their guidance and supervision. May ICHARM keep on producing very good quality of research that will benefit the entire world.

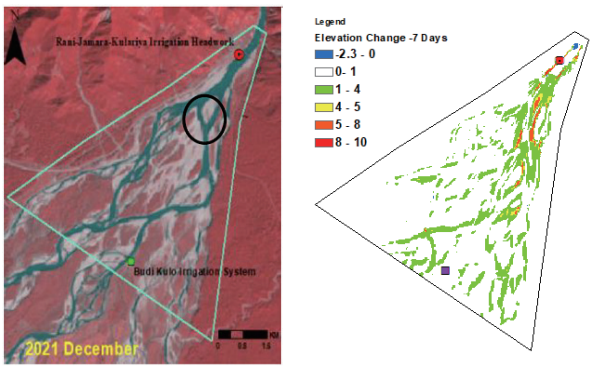
Executive Director KOIKE Toshio
小池俊雄センター長

Mr. WATANABE Masayuki, the President of the Institute for International Social Development & Cooperation
渡辺正幸　国際社会開発協力研究所代表

ANALYSIS OF WATERCOURSE CHANGE DURING ALLUVIAL FAN FORMATION AND COUNTERMEASURE FOR STABILIZATION OF CHANNEL FLOW IN KARNALI RIVER, NEPAL

SURESH Khadka, from Nepal

In this study, we discussed watercourse changes during the alluvial fan formation of the Karnali River and proposed a countermeasure to stabilize the channel to maintain the ideal flow discharge in two branches. First, we observed and analyzed time series satellite images to understand the braided channel area of alluvial fan and major regions in which channel changes were occurring. Second, we conducted a numerical simulation to evaluate the water flow and sediment flow including river bed evolution numerically. The results demonstrated that the sediment deposited in the channels has narrowed the channels and deformed the bed, thereby raising the water level. As a result, the water has spread to adjacent areas, producing unstable channels and discharge instability in the two branches. Finally, we proposed countermeasures considering the major regions of change and those were in terms of discharge distribution, sediment deposition, and channel stability. This understanding of water course changes and the recommended countermeasures are helpful for managing rivers with braided channel alluvial fans.



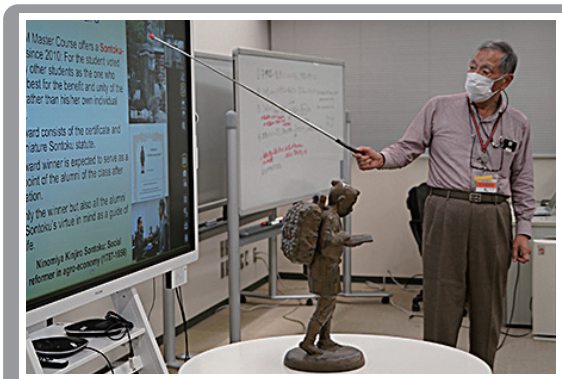
Verification of model

Keywords: Alluvial fan, water course changes, sediment deposition, countermeasure, channel stabilization.

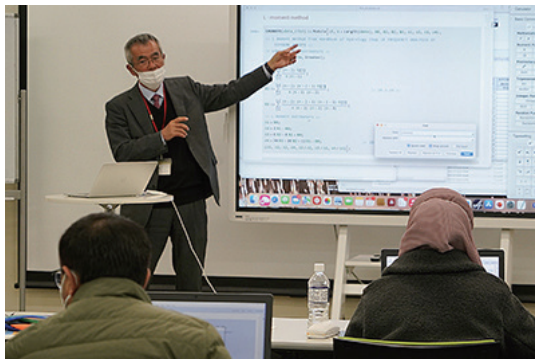
As learning is a continuous process, this one year's course added to me lots of valuable things in my life. This one year has not just only added knowledge to my field, but also added value to my knowledge of the water-related disaster. Japan and Nepal have almost similar topographies and rivers originating from the mountains and flowing to the plains. This course helped me to understand the managed rivers here, along the rivers in Nepal which are currently in the process of management. Management of the river in terms of public awareness, preparedness and mitigation measures. Field visits like Kinu River, Yamanashi River and Shinano River gave me a visualization of river management using traditional knowledge and scientific advancement. Integrated river basin management with the construction of dams and also the sharing of the water from one sub-basin to another could be learned to apply in our country considering local boundary conditions. Traditional knowledge that is used in Midai river management in Yamanashi prefecture is a typical example of how knowledge from tradition is important to managing the rivers. These field visit experiences provided me a deep insight to consider such factors in our country. In total we learnt the overall hydrological processes, fluvial process including geomorphic processes.

Besides education, I enjoyed the Japanese stay a lot and learning the people and culture. Hardworking, efficient time management are exemplary here. Besides, the lifestyle, food and festivals are amazing.

Lastly, I am indebted to all the helping hands during my stay here. Thanks to ICHARM, JICA and GRIPS to providing me such nice opportunity.



Prof. Emeritus TAKEUCHI Kuniyoshi of the University of Yamanashi
竹内邦良　山梨大学名誉教授



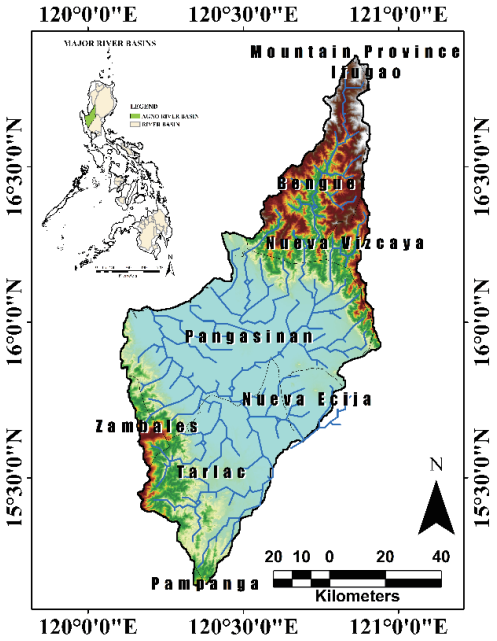
Prof. Emeritus TANAKA Shigenobu of Kyoto University
田中茂信　京都大学名誉教授

IMPROVEMENT OF FLOOD FORECASTING FOR STRENGTHENING FLOOD RESILIENCE IN THE AGNO RIVER BASIN

Ailene R. Abelardo, from the Philippines

The Agno River Basin Flood Forecasting and Warning Center of the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) provides flood advisories and warnings to the basin, including its allied river basins, mainly using real-time monitoring of rainfall and water levels. This study analyzed the impact of climate change in the Agno River Basin (ARB) for the period of 2041-2060 using the Global Climate Model archived in the Data Integration and Analysis System of Japan considering the Representative Concentration Pathway 8.5 scenario. The results revealed an increase of 1m and 151 km^2 in the future flood depth and extent, respectively. To increase the resilience of the community to flood disasters, this study utilized the operational Weather Research and Forecasting (WRF) model, Domain1 (12km) and Domain2 (3km), used by PAGASA to increase the lead time. The results showed that both domains of WRF predicted the discharge at the Carmen Station for Tropical Cyclone (TC) Ompong (2018). WRF Domain2 showed good performance in predicting discharge during TC Jenny (2019), TC Josie (2018) and Southwest Monsoon (August & September 2019), however, WRF Domain1 exhibited a very poor performance in these cases. To warn the people in the ARB of the possible flood in the future, a longer lead time is required to prepare and minimize the risk of such hazards, thus Numerical Weather Prediction, like WRF can be advantageous.

Keywords: RRI Model, NWP, GCM, WRF, flood forecasting

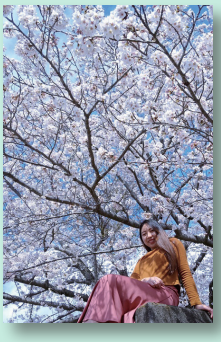


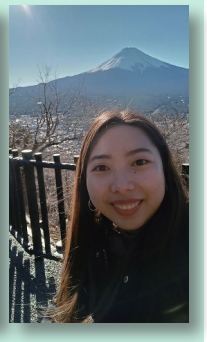
Location and Elevation of the Agno River Basin

I thank the Almighty God for giving this opportunity to come here in Japan.

I am grateful to be part of this course and meet my newfound friends from different parts of the earth with the same experience when it comes to water-related disasters. Also, being a student of these wonderful professors and lecturers from ICHARM was a privilege. They taught us a lot of things and mold us to be a responsible citizen of our country as a public servant.

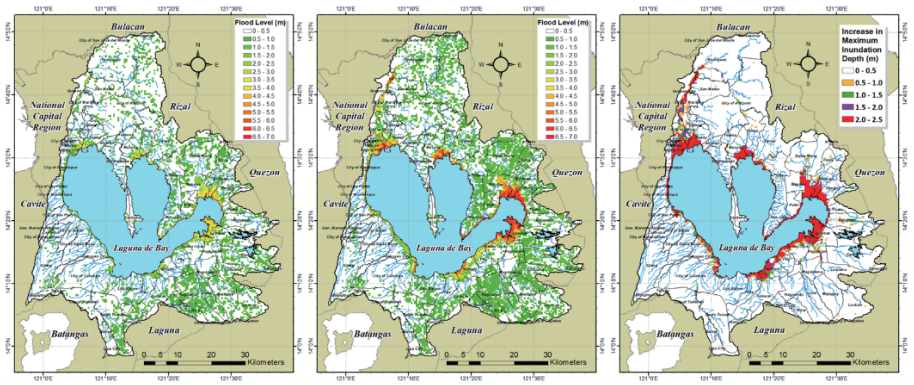
During this course, we had a chance to witness the country's disaster management works, from how they issue the warnings, and formulation of hazard maps, to the different structural countermeasures that gave us more understanding of what have shared with us during our lectures. All knowledge shared will be useful when we go back to our respective county. Learnings from this course help me successfully finish my research paper with the guidance of my generous supervisors. It is indeed a wonderful experience and achievement to finally get my Master's Degree here in Japan with the collaboration of ICHARM, GRIPS, and JICA. Maraming Salamat po.





CLIMATE CHANGE AND URBANIZATION IMPACT ASSESSMENT ON INUNDATION CHARACTERISTICS OF LAGUNA DE BAY BASIN

Erwin Rafael De Ocampo Cabral, from the Philippines



Simulated 2020 Maximum Inundation Level | Simulated Future Inundation Level (200 Years Return Period) | Increase in Inundation Depth in the Future Scenario

Simulated Laguna Lake Shore Inundation

Laguna de Bay is the largest lake in the Philippines located inside the Pasig-Laguna Basin. It acts as a flood retention lake to safeguard Metro Manila from extreme flooding. However, the threat of climate change and rapid urbanization affect the basin, which puts the lives of those residing within its hydrological boundary in danger. This study is a rapid assessment of the impact of climate change and urbanization on the lake level and shore inundation of the Laguna de Bay using the Rainfall-Runoff-Inundation Model. The simulation revealed that the lake level could increase by 2.54 m under future climate in the RCP8.5 scenario compared to the level during Typhoon Ulysses in 2020. Also, compared to the same event, the average highest lake level could be reached 2.8 months earlier in the seasonal cycle. In addition, the lake level could increase by 0.24 m in the 3rd quarter of the year if cropland is urbanized, and a 0.22-m increase in the peak lake level may be observed if forestland will become a built-up area. The simulated results also show that the maximum inundation depth will increase by 2.34 m and the extent will increase by 442.61 km2 owing to climate change, especially in shoreline communities, exposing more barangays (villages) and more people to flood hazards.

Keywords: climate change, urbanization, inundation, RRI model

I am amazed by how Japan maintains its rich history, tradition, and culture, breathtaking nature and sceneries, safe environment, and kind and humble people while the development and advancement in technology continue. I am truly grateful to the Japan International Cooperation Agency (JICA), the International Centre for Water Hazard and Risk Management (ICHARM) under the auspices of UNESCO, the National Graduate Institute for Policy Studies (GRIPS), and the people of Japan for giving me this once-in-a-lifetime opportunity to experience and enjoy Japanese culture and education.

I learned a lot of invaluable knowledge, techniques, and skills about flood disaster risk management from this master's degree program. The professors, researchers, and staff of ICHARM and GRIPS are very knowledgeable, hard-working, competent, and approachable. They guided us all throughout the program and gave us important information about everything that we needed to know. They allowed us to experience Japanese culture and technology, and they prepared educational site visits to places that are vital for disaster prevention, tourism, history, and the culture of Japan.

Through my dear organization, Batangas State University (BatStateU) the Philippines' National Engineering University, I can share the learnings I got through instruction, research, extension activities, and community involvement. These will benefit my country and my fellow Filipino people by becoming more prepared and resilient against natural hazards, especially the water-related ones.

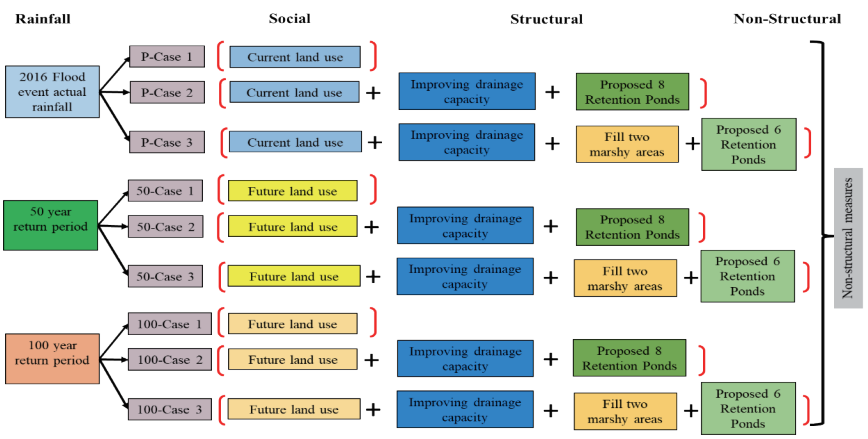
It is an honor and a great privilege that I was given a chance not only to study in Japan but to represent my beloved country, the Philippines, in this program, where I was able to share our experiences, history, traditions, and culture, not only with Japan but with other participating countries.

I will never forget all the good memories I had, the lessons I learned, and the new friends I met. I will be forever thankful to Japan!

CREATING AN EFFECTIVE FLOOD MANAGEMENT PLAN TO IMPROVE THE STANDARD OF LIVING WITHIN THE MUDUN ELA BASIN, SRI LANKA

Ibra Lebbe ZIYAROOUN, from Sri Lanka

Floods have been the most frequently occurring type of natural disaster in Sri Lanka for the past ten years. They account for approximately 37% of all disasters, including 47% of total housing damage and 57% of total affected persons atrributed to all disasters. The government of Sri Lanka has suffered large financial losses due to direct and indirect flood damage. This study aimed to assess the impacts of climate change and social change on extreme floods over time and propose suitable countermeasures to mitigate flood risks.This study is based on the Rainfall–Runoff–Inundation (RRI) model simulation carried out for the Mudun Ela basin. Past and future rainfall, social changes, improvements in drainage capacity, and proposed retention pond scenarios are fed into the RRI model to simulate changes in extreme inundation area and depth. Our results indicate that climate change increases the inundation area and depth, while social changes aggravate flood risks. Proposed countermeasures include flood retention ponds with drainage improvements, which may be effective at reducing the inundation area and depth and associated flood damage. Overall, this study proposes that a flood management plan with structural and non-structural measures can help to create a flood-resilient society and improve the standard of living.



Selected scenarios for analysis

Keywords: flood, rainfall–runoff–inundation model, inundation, flood-resilient, flood management

I have arrived Japan to pursue my master's studies during covid pandemic situation. So we have quarantined for two weeks after arrived Japan. We followed the studies through online. I am working in Sri Lanka Land Development Corporation and many engineers from my organization successfully followed this study in the past. This course and study trips were well organized within a short period of time and well managed by ICHARM, JICA and GRIPS. Experienced gain through this course and field visits will have a big impact after I will rejoin to my organization. I normally not much exposed personally to software related design tools. But I manage people who deals with software programs. Since I join this course, I pretty much become a person who directly deal with software related things and I succeded in that. This is an added advantage for me and will be useful in my future career.

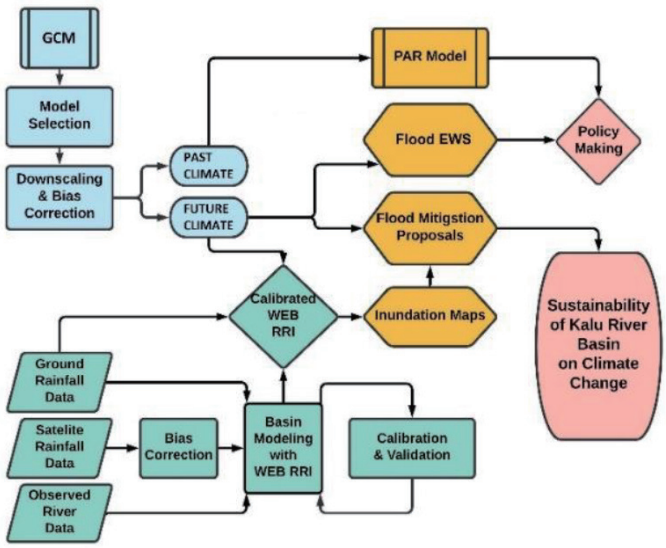
Here, I found where my soul need to be. Japanese people are very disciplined and well manner in everywhere. They never bother or disturb other people. Their attitude is much attracted by me. I have learn so many things by seeing them and by their day to day lifestyle.

I would like to thank my supervisors and every one from ICHARM, JICA and GRIPS to made this study journey a successful one to me. I am really confident to use the knowledge and experience gained throughout this stay in Japan for my entire lifetime.

A STUDY ON CLIMATE CHANGE IMPACTS ON EXTREME RAINFALL AND FLOOD EVENTS IN THE KALU RIVER BASIN, SRI LANKA

ARUNA Samarathunga, from Sri Lanka

Frequent flooding in the Kalu River basin causes numerous damages to lives and properties every year. Though there are several flood mitigation proposals, none of them has been implemented to date. High-intensity and frequent rainfall enhanced by global warming, rapid development, lack of evidence-based information, and absence of disaster mitigation plans are expected to boost the severity of these damages in manifold and additional pressures to sustainable development of the region. This study investigated the climate change impacts on extreme rainfall and flood events using in-situ, selected, and bias-corrected General Circulation Models' (GCM) outputs and rainfall-runoff-inundation model in the Kalu River basin, Sri Lanka. The results showed that the annual (13%–26%) and extreme rainfall intensity (53%–62%) will increase in the mid (2050–2075) and far (2075–2100) futures. The results coincided with the recorded increasing climate signals of extreme rainfall. The well-calibrated and validated hydrological model was used to drive the basin responses to projected rainfall from GCMs. The results showed that the flood discharge may increase by 20%–30% and the flood water levels in the far future may rise by 1.5m, compared to that in the past (1980–2005). The simulation of proposed dry dams as flood mitigation measures showed that they can reduce the flood inundation area by ~16%. The evidence-based information obtained in this study can support the preparation of future flood mitigation measures and decision-making for the sustainable development of the basin.



Flow Chart of Methodology

Keywords: Climate Change, Kalu River, Extreme Rainfall, Flood Mitigation

I chose Japan as my destination for study because it is a friendly country in Asia that has been supporting Sri Lanka. As Japan has a growing economy and is more industrialized with concern for sustainable development, social responsibility, and healthy living concepts, studying and living in Japan added a great experience for me.

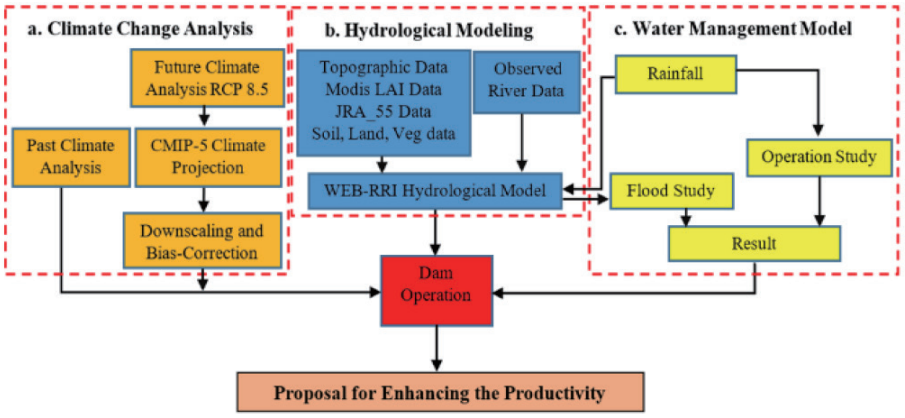
The Great Teacher, the Founder of Buddhism, spread a wave of humanism through South Asia, Sri Lanka, and northward through the Himalayas into Japan, which bound us together for hundreds of years with a common culture and heritage. I believe this shared culture is still alive and well. As I watch dramas like "Oshin" and NHK TV programs, and the 2020 Tokyo Olympics, I can remember the story of "The Courageous Loser Who Won Hearts" at the 1964 Tokyo Olympics. Mr. Karunananda's story reminded me that bilateral relationships are in the genes of our two countries. Because Sri Lankan and Japanese are high-spirited people. In the year 2022, we are celebrating the 70th anniversary of the establishment of diplomatic relations between Sri Lanka and Japan.

The Disaster Management Master course not only outlines the significance of water-related disasters and the Japanese experience in flood fighting but also points out the importance of policy implementation and project cycle management training. Besides, it summarizes research studies followed by modern hydrological

models. To put it simply, disaster management, research studies, and hydrological models seem to play an instrumental role in my professional life.

DEVELOPMENT OF INTEGRATED WATER RESOURCES MANAGEMENT FOR EASTERN DRY ZONE IN SRI LANKA UNDER CHANGING CLIMATE: THE CASE OF MUNDENI, MAGALAWADUWAN, AND ANDELLAOYA RIVER BASINS

Sandrasegaram Nerojan, from Sri Lanka



Methodology

The eastern dry zone of Sri Lanka is susceptible to extreme floods and droughts due to climate variations, high-intensity rainfall, a lack of disaster preparedness, and a lack of a science-informed water resources management increase the vulnerability of the region to floods and droughts. This study has developed an end-to-end approach combining scientific, engineering, and socio-economic analyses to increase the confidence level in decision-making under climate change for sustainable Integrated Water Resources Management (IWRM) in the river basins. It was found that flood and drought conditions increased between 1991 and 2020 and are likely to increase in the future (2035-2060) under RCP8.5. The hydrological model was used to quantify the inflow conditions and to test the ability of dams and river widening to facilitate flood control and drought management for future scenarios, and the feasibility of enhancing the agricultural productivity of the basins. Compared to past observations, the river basins will experience more discharge in the future except in January. The water management model was developed using Dam Operation Model (DOM) and Crop Model (CM) to estimate the water budget during wet and dry seasons. Finally, policy implications are suggested in terms of disaster risk reduction and water management. This study provides evidence-based information regarding past and future climate, water resources, crops and cultivation patterns, and countermeasures for making decisions toward sustainable development.

Keywords: IWRM, DOM, climate change, productivity, sustainable development

It was a golden opportunity to pursue my master's degree in ICHARM which has an extraordinary panel of lecturers and professors with whom I personally experience the in-depth of knowledge in their respective fields.

This fruitful one-year period taught me invaluable lessons not only in my study area but also in personal grooming as an engineer and I gained experience in different areas such as hydrology, hydraulics, numerical models, climate change, and disaster risk management. In addition to the theoretical subjects, I learned numerical software packages and models which improved my analytical ability to understand and solve current hydro-meteorological issues. I worked on a compressive analysis on development of an integrated water resources management for eastern dry zone in Sri Lanka under changing climate which gave me vast knowledge while carrying out my thesis with the guidance of my supervisors Professor Mohamed Rasmy and Professor Toshio Koike. After perusing this study, I am confident that I can find workable solutions for the challenges I face in the future using an end-to-end approach combining scientific, engineering, and socio-economic analyses.

Apart from the studies and thesis, this journey gave me more practical experiences through several field visits in this marvelous country, and also I was able to meet world-renowned professors and experts. I am certain that the results, experiences, and knowledge gained in completing my studies will definitely be applicable to the betterment of my country. This well-structured master's degree program is very useful for young engineers to improve their knowledge, and skills and gain hands-on experience in using modern science and technology in their fields. I am extremely grateful to the panel of academic staff in ICHARM for the valuable lectures they delivered, continuous support, and guidance.

A group from MJIIT visits ICHARM
MJIIT (Malaysia Japan International Institute of Technology) の来訪

Twenty faculty members and students from the Malaysia Japan International Institute of Technology (MJIIT) visited ICHARM on August 25, 2022, to collect information on its current education and research programs and the recent progress of sediment and flood disaster research. Like ICHARM, MJIIT has a one-year master's course on flood disaster prevention, and the students are studying in this course. The meeting was planned to include presentations and discussions by accommodating their requests. It started with the ***welcome address*** by Chief Researcher FUJIKANE Masakazu, which was followed by a series of presentations by ICHARM researchers on: ***flood disaster research and IFI activities at ICHARM*** by Senior Researcher MIYAMOTO Mamoru; ***a mathematical model of sediment hazards*** by Research and Training Advisor EGASHIRA Shinji; ***a sediment runoff model in a watershed*** by Research Specialist QIN Menglu; ***the influence of landslides on sediment runoff*** by Ms. Siti Adabiyah Binti SULAIMAN; and ***rainfall conditions for occurrences of sediment-related disasters*** by Ms. Raja Noraini Binti RAJA YUSOF. Ms. Siti and Ms. Raja, who were master's students at ICHARM then and had just finished their graduation theses, were invited to join the meeting because they were from Malaysia and studied topics related to water-related disasters. The meeting went very well, with the participants enthusiastically discussing various issues and exchanging knowledge, lasting for three hours, an hour longer than initially scheduled.

(Written by EGASHIRA Shinji)

2022 年 8 月 25 日、MJIIT の教員、学生合わせて 20 人が、ICHARM における教育・研究の実態や土砂・洪水災害等に関する研究の現状に関する情報を収集することを目的として来訪しました。MJIIT においては、ICHARM と同様、一年間で修士号を取得できる洪水防災コースを持っており、今回の訪問者は、当該コースの学生でした。一方、ICHARM では、マレーシアからの二人の修士学生がいて、彼女らはタイムリーに修士論文を仕上げたところでした。そのため、先方からの要望もあって、彼女らを含めて次のような話題について意見交換を行うことになりました。

・藤兼雅和上席研究員による***歓迎の挨拶***　・宮本守主任研究員による***ICHARM の洪水災害研究と IFI 活動***

・江頭進治研究・研修指導監による***土砂災害ハザードの数学モデル***

・秦梦露特別研究員による***流域土砂流出モデル***　・Siti Adabiyah Binti SULAIMAN 君（修士学生）による***土砂流出に対する山腹崩壊の影響***

・Raja Noraini Binti RAJA YUSOF 君（修士学生）による***避難予警報のための土砂災害発生降雨条件***。

当初、話題提供と意見交換（討議）、合わせて 2 時間の予定でしたが、一時間ばかり予定を超過するなど、熱心に意見交換が行われました。写真は話題提供の一コマです。

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、ご活躍の様子について寄稿していただくこととしております。本号では2013年（6期）修士課程卒業のNikola Zlatanović氏（セルビア）から寄稿いただきましたので、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. Nikola Zlatanović (Serbia), who graduated from the master's program in 2013, has kindly contributed the following article to this issue.

Nikola Zlatanović

Ph.D student, Faculty of Civil Engineering, the University of Belgrade

In 2012-2013, I had the great opportunity to attend the Water-Related Disaster Management Program, jointly organized by GRIPS and PWRI/ICHARM, through the support of JICA, and graduate with the class of 2013. During the one-year master's course program, I was able to refresh my knowledge of flood-related engineering sciences, as well as learn many new concepts of disaster management and gain new insights and different points of view from ICHARM and GRIPS professors, research staff and my fellow international student colleagues.

Upon returning from Japan to my previous post as Research Engineer at the Institute for the Development of Water Resources in Belgrade, Serbia in 2013, I have continuously applied much of what I have learned at ICHARM in all areas of flood management, including integrated flood risk management (IFRM), sediment transport and debris flow, hazard and risk mapping, hydrological modelling, etc. During my research thesis at ICHARM I had the chance to begin development of techniques for automated calculation of design discharges for ungauged catchments, which has proven to be extremely useful, as I am still (almost ten years later) applying many of these techniques in my everyday engineering practices.

I also had the honor to serve as Deputy Director of the Water for Sustainable Development and Adaptation to Climate Change (WSDAC) UNESCO Category 2 Centre in Belgrade from 2014, focusing on knowledge dissemination activities (conferences, symposiums, workshops etc) and establishing working relationships with key water related UNESCO Category 2 centres worldwide. In this capacity, I had the great opportunity to meet up with both my mentors and classmates from ICHARM as well as with ICHARM alumni on numerous occasions worldwide and discuss current issues.

Currently, I am focusing on my PhD studies at the Faculty of Civil Engineering at the University of Belgrade in Serbia, while working as an independent engineer. My PhD thesis deals with the development of a practical geomorphological unit hydrograph for use in design flood estimation in ungauged catchments, and is in fact a direct continuation of my research that I began during my thesis at the ICHARM Master's course exactly 10 years ago.

Meeting up with Prof. TAKEUCHI from ICHARM and ICHARM alumni Dr. Ali Chavoshian at the UNESCO Science Centres Coordination Meeting in Beijing, 2016

Presenting at the Asia Water Cycle Symposium, University of Tokyo, 2016

Information Networking

ICHARM co-organized a session at the Stockholm World Water Week 2022
ストックホルム世界水週間でセッションを共催

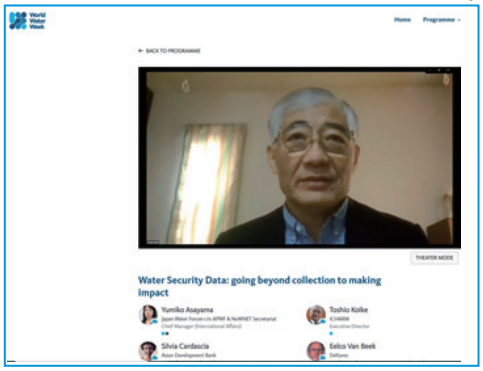
The Stockholm World Water Week (SWWW) 2022 was held from August 23 to September 2, 2022. The SWWW 2022 was redesigned as a hybrid (online and in-person) event composed of more than 300 sessions with over 5400 participants from 160 countries. ICHARM actively contributed to the event by co-organizing sessions with partner organizations and providing the presentations of its activities.

On August 24, Prof. KOIKE Toshio, the executive director of ICHARM, participated as a speaker in "Water Security Data: going beyond collection to making impact," a session that the Asia-Pacific Water Forum (APWF) and the Asian Development Bank (ADB) organized with some other organizations. The session discussed quantitative data for water security and also actions to utilize data for decision making in society while quoting data from the Asia Water Development Outlook (AWDO) 2020, one of the flagship knowledge products of ADB's Water Sector Group. Prof. KOIKE pointed out the importance of establishing a platform with various stakeholders, including line-ministries and academic organizations, and consolidating water consilience. He also mentioned that AWDO should add climate change impact analysis to its next version.

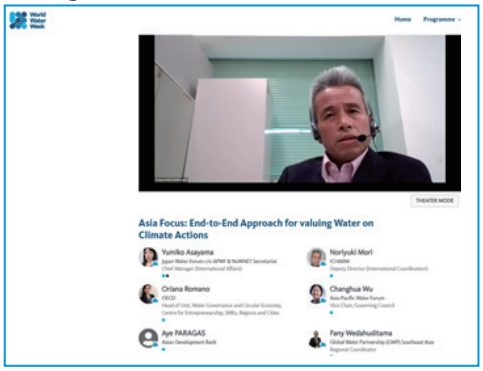
On the 25th, ICHARM co-organized a session, "End-to-End Approach for valuing Water on Climate Actions," with its partners, including APWF and the Global Water Partnership (GWP). This session shared good practices and discussed ways to enhance the understanding of valuing water and better managing water resources through end-to-end approaches with the interactions of science and technology, good governance, and finance. Mr. MORI Noriyuki, the director for Special Research of ICHARM, made a presentation entitled "Research of Science & Technology for Climate Resilient Society" in this session. In the presentation and the panel discussion that followed, he highlighted the importance of interdisciplinary study with end-to-end approaches, which include data collection, the analysis, assessment, and prediction of natural phenomena, and socio-economic impact assessment.

On the same day, Dr. MATSUKI Hirotada, the deputy director of ICHARM, joined a different session, "NBS for Climate Action with Sound Watershed Management," organized by the Northern Water Network (NoWNET) and presented "J-traditional River Engineering as a Nature-based Solution." He introduced Japan's traditional flood management methods, such as masonry groins, and emphasized the importance of taking a participatory approach that incorporates historical and cultural viewpoints. He also stressed the importance of routine repairability by explaining that structures should be built in a sustainable manner utilizing local materials and residing engineers with affordable costs.

As the SWWW is one of the most influential international conferences in the field of water, ICHARM views it as an extremely significant occasion to provide inputs of its activities and discuss issues with other partner organizations.



Executive Director KOIKE
小池センター長



Director for Special Research MORI
森特別研究監

2022 年 8 月 23 ～ 9 月 2 日、ストックホルム世界水週間（SWWW）2022 が開催されました。本年の SWWW は、対面とオンラインのハイブリッド形式により開催され、参加者は 160 か国から 5400 名、セッション数は 300 を超えました。ICHARM はパートナー機関とのセッション共催や活動発表により SWWW に積極的に貢献してきています。

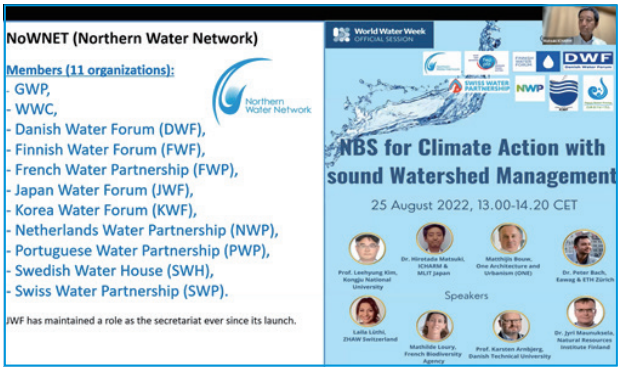
8 月 24 日には「Water Security Data: going beyond collection to making impact（水の安全保障のデータ：データ収集から、実社会への影響波及にむけて）」と題して、アジア太平洋水フォーラム事務局やアジア開発銀行等が主催したセッションにおいて、小池俊雄センター長がパネリストとして登壇しました。セッションでは、アジア開発銀行・水セクターにおける代表的な公表資料・データであるアジア水開発展望（AWDO）2020 年度版をベースとして、水の安全保障にかかる定量的データや、データを実社会での意思決定に活用するための行動について議論が行われました。小池センター長は、関係省庁や学術機関などを含む広範なステークホルダーが参画するプラットフォームの各国での形成や知の統合を図っていくことの重要性や、今後の AWDO における気候変動影響分析の必要性を指摘しました。

8 月 25 日には ICHARM は、アジア太平洋水フォーラム事務局、世界水パートナーシップなどとともに、「End-to-End Approach for valuing Water on Climate Actions（気候変動対応行動における水の価値化に向けた End-to-End Approach）」のセッションを共催しました。本セッションでは、End-to-End Approach を採りつつ科学技術、ガバナンス、ファイナンスの観点からの統合的な取り組みを行うことにより、水の価値化や水資源管理の改善を図るための Good Practices などが共有されました。ICHARM からは森範行特別研究監が、「Research of Science & Technology for Climate Resilient Society（気候変動に対して強靭な社会を実現するための科学技術研究）」と題した発表を行いました。発表やその後のパネルディスカッションを含め、データ収集・取得から自然現象の解明・評価・予測、社会経済への影響評価まで end-to-end で、かつ統合的に研究を行うことの重要性が強調されました。

同じく 8 月 25 日には「NBS for Climate Action with Sound Watershed Management（健全な流域管理による気候変動対応行動のための Nature Based Solution）」と題したセッションが、ノーザン・

ウォーター・ネットワーク（NoWNET; Northern Water Network）により開催されました。ICHARMの松木洋忠グループ長は「J-traditional river engineering as a Nature-based Solution（Nature-based Solutionとしての日本の伝統的河川工学技術）」と題して、我が国の石積水制工などの伝統的な治水工法も紹介しつつ、質の高いインフラの一環として、歴史文化を重視した参加型のアプローチの重要性を主張しました。その際、地元の材料や在住の技術者により安価な費用で、持続可能なかたちで維持・修繕を行うことが不可欠であることも強調しました。

SWWWは水分野において最も影響力ある国際会議の一つであることから、ICHARMとしてもパートナー機関と協働しつつ、その活動についての情報発信を行っていきます。



Session attended by Deputy Director MATSUKI
松木グループ長が参加したセッション

(Written by MORI Noriyuki)

Coming Events

Information on the 9th International Conference on Flood Management (ICFM9)
第９回洪水管理国際会議（ICFM9）に関するお知らせ

これまでのICHARMニュースレターでもご紹介のように、第９回洪水管理国際会議（ICFM9）が主に茨城県つくば市において2023年２月18日から22日まで開催されます。以下、参加を予定される皆様へのお知らせです。皆様の積極的なご参加をお待ちしています。

○重要な締切

・Extended abstract 投稿締切：11月15日（※当初案内の10月31日から延期になりました）

・早期割引締切：11月15日（※当初案内の10月31日から延期になりました）

・各種オンライン登録締切：12月31日（※以降の参加登録は、会議場現地で行えます。ただしクレジットカードのみの受付になります）

○ 現在のプログラム案：図１

・より詳細なセッション情報は https://www.icfm9.jp/sessions/ をご覧ください

○ オンライン登録：【参加登録サイト https://amarys-jtb.jp/icfmp/】

・現在、以下の項目についてオンライン登録を受け付けています。また、表１に各種登録料を示します。

► 会議参加登録
► 弁当予約
► 現地視察登録
► レセプション登録
► ホテル予約

・オンライン登録の締め切りは12月31日までです。なお、早期割引の締め切りは11月15日です。オンライン登録締め切り後は、会議場現地で当日受付を行いますが混雑が予想されますので、できるだけ事前の登録をお願いします。

As announced in the past issues of the ICHARM Newsletter, the 9th International Conference on Flood Management (ICFM9) will be held from February 18 to 22, 2023, mainly in Tsukuba, Ibaraki, Japan. In this issue, we would like to provide you with the following important information to encourage your active participation.

ICFM9
River Basin Disaster Resilience and Sustainability by All
https://www.icfm9.jp/index.html

○ Important dates :

・Deadline for extended abstracts: November 15
※postponed from the original date (October 31)

・Deadline for early bird registration: November 15
※postponed from the original date (October 31)

・Deadline for online registration: December 31
※After the online registration ends, on-site registration at the conference venue is possible, but the payment will be accepted by credit card only.

○ Program (Tentative): See Figure 1

・More information is available at https://www.icfm9.jp/sessions/ .

Floor		1F			2F					4F
Room		Main Hall	Room 101	Room 102	Hall 200	Room 201	Room 202A	Room 202B	Hallway	Room 405
Feb.19 Sun.	9:00	Opening Ceremony							Poster Exhibition	
	10:00	Plenary 1								
	11:00	Poster Indexing 1								
	12:00									
	13:00	Open-to-Public Symposium	Theme-2a	Theme-2e	Theme-3a	Theme-1a	Theme-8+9	Theme-5		Special Session
	14:00									
	15:00		Theme-2b	Theme-2f	Theme-3b	Theme-1b	Theme-6	Theme-4a(+5)		Special Session
	16:00									
Feb.20 Mon.	9:00	Plenary 2							Poster Exhibition	
	10:00	Plenary 3								
	11:00	Poster Indexing 2								
	12:00									
	13:00	Theme-10a	Theme-2c	Theme-2g	Theme-3c	Theme-1c	Theme-6+7	Theme-4b		Special Session
	14:00									
	15:00	Theme-10b	Theme-2d	Theme-2h	Special Session	Special Session	Theme-7	Theme-4c		Special Session
	16:00									
Feb.21 Tues.	9:00	Plenary 4								
	10:00	Closing Ceremony								
	11:00									
	12:00									

Figure1 Draft program schedule
図１　プログラム構成案

○ Online registration:

<Registration at https://amarys-jtb.jp/icfmp/>
Deadline for the early bird registration: November 15
※postponed from original date (31st October)

・We are now accepting your application for the following items on the registration site. See Table 1 for fees for each application.

► Registration for participation
► Lunch box
► Field trip (February 21 and 22)
► Reception
► Hotel

Registration fee	
Regular	¥35,000
Regular: Early bird	¥30,000
Student	¥18,000
Student: Early bird	¥15,000
One day	¥15,000
Student: One day	¥10,000
One-day field trip (Feb. 22)	¥3,000
Lunch box	¥1,000 (Japanese style, Halal food, Vegetarian food, sandwich) or ¥500 (Japanese style)
Reception (Feb. 19)	¥5,000

Table1 Fees
表 1　各種登録料など

・The online registration will be open until December 31, 2022. Please be aware that the early-bird registration fee is available until 23:59, November 15, 2022 (Japanese time). For those wishing to participate in the conference after the online registration ends, on-site registration at the conference venue is possible, but early registration is recommended to avoid a long wait at the reception.

○ Field trip:

・The planned destinations are as follows. More information is available at https://www.icfm9.jp/date_place.html .

February 21 (Mon): Half-day trip to research institutes in Tsukuba

► Dam Hydraulics Laboratory of Public Works Research Institute
► Virtual flood experience using hydraulic simulation and VR devices at Public Works Research Institute
► Tsukuba Space of Japan Aerospace Exploration Agency [TBD Space Dome]

Dam model
ダム水理実験模型

February 22 (Tue): One-day field trip

► Dyke break points along the Kinu River due to the Kanto and Tohoku heavy rain in September 2015
► Metropolitan Area Outer Underground Discharge Channel
► Watarase Yusuichi (retarding basin)
► National Research Institute for Earth Science and Disaster Resilience (NIED)

Pressurization Water Tank
首都圏外郭放水路　調圧水槽

Large-scale Rainfall Simulator
大型降雨実験施設

Other:

・The details about the booth exhibition are currently being discussed and will be announced on the ICFM9 website soon.

(Written by KURIBAYASHI Daisuke)

○ 現地視察：

・視察先は以下を予定しています。より詳細な情報は ICFM9 サイト https://www.icfm9.jp/date_place.html をご覧ください

2 月 21 日（月）つくば市内研究所訪問（半日）

► 土木研究所　ダム水理実験施設見学
► 土木研究所　仮想洪水体験システム体験
► 宇宙航空研究開発機構 (JAXA) 筑波宇宙センター

2 月 22 日（火）関東近郊現地視察（1 日）

► 2015 年関東・東北豪雨による鬼怒川破堤地点
► 首都圏外郭放水路
► 渡良瀬遊水地
► 防災科学技術研究所 (NIED) 大型降雨実験施設での豪雨体験

○ その他：

・企業ブースの設置も予定しており、詳細が決定次第あらためてサイト上などでお知らせします。

Miscellaneous

Comments from internship students
インターン生からのコメント

ICHARMでは、館野真悠さん（福島大学）、林 優斗さん（東京工業大学）、余田奈穂さん（東京大学）の3名をインターン生として2022年8月18日から26日にかけて受け入れました。

ICHARMでの活動を振り返って、3名からコメントをいただきました。

ICHARM accepted three internship students Ms. TATENO Mayu from Fukushima University, Mr. HAYASHI Yuto from Tokyo Institute of Technology, and Ms. YODEN Naho from the University of Tokyo from August 18 to August 26, 2022.

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

TATENO Mayu (Fukushima University) / 館野真悠（福島大学）

ICHARMは国際的な防災問題に熱心に取り組んでおり、魅力的な研究をたくさん紹介していただきました。野外調査にも同行し、私にとって貴重な経験になりました。下の画像はドローンを用いた植生調査での様子です。6日間ありがとうございました。

ICHARM is passionate about international disaster prevention issues, and the staff introduced me to many fascinating research projects. I also accompanied the staff on a field survey, which was a valuable experience for me. The image below shows a vegetation survey using a drone.

Thank you very much for the six days.

A scene from a field observation using a UAV (drone)
ドローンを用いた野外調査の様子

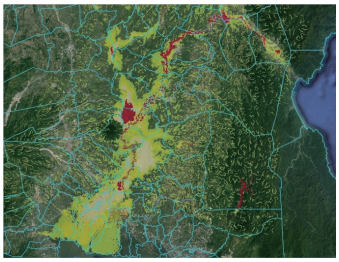
HAYASHI Yuto (Tokyo Institute of Technology) / 林　優斗（東京工業大学）

8月18日から8月26日まで合計7日間、夏季インターンシップでお世話になりました東京工業大学学士三年の林優斗です。研究の紹介や実際にモデルを動かしてみることで水分野への関心が強まり、大学での学習に取り組む際の大きなモチベーションになりました。

皆さん、お忙しい中でも私たち実習生の希望に沿って実習が行えるように調整をしてくださったり、工夫して伝えてくださったりしていただいたおかげでとても有意義な7日間になりました。今回の実習に携わってくださったすべての方々にお礼申し上げます。本当にありがとうございました。

I am Yuto Hayashi, a third-year bachelor's student at the Tokyo Institute of Technology, who spent a total of seven days from 18 August to 26 August on a summer internship. Introducing our research and actually working with the models strengthened my interest in the water field and gave me great motivation for my studies at university.

Thanks to everyone who took time out of their busy schedules to make adjustments to the practical training in line with our wishes and to communicate in creative ways, we were able to have a very meaningful seven days. I would like to thank everyone who was involved in this training. Thank you very much.



Hazard maps produced using QGIS in practical training
実習で QGIS を用いて作製したハザードマップ

YODEN Naho (the University of Tokyo) / 余田奈穂（東京大学）

土木研究所では5日間インターンシップ生としてお世話になりました。このインターンシップの講義を通して、モデルの物理的な意味を理解することの大切さといった考え方の部分も教えていただき、勉強になりました。お忙しい中私たちインターンシップ生を受け入れてくださり、本当にありがとうございました。

I joined an internship at ICHARM for five days. I learned not only individual pieces of knowledge and skills but also the importance of understanding the physical meanings of models through the lectures in this internship. Thank you very much for everyone for taking care of us.

Hydraulic experimental flume that we observed
見学させていただいた水理実験施設

Business trips / 海外出張リスト

* July - September 2022

- *August 29 - September 10, KOIKE Toshio, Stockholm, Sweden, HELP advisory meeting; Delft, Netherlands, Meeting with IHE; Koblenz, Germany, Meeting with ICWRGC; Geneva, Switzerland, WMO Scientific Advisory Panel*
- *Septemner 10 - 18, NAGUMO Naoko, Coimbra, Portugal, 10th IAG International Conference on Geomorphology*
- *September 25 - 29, OHARA Miho, NAITO Kensuke, NAGUMO Naoko, AIDA Kentaro, and Vicente Ballaran Jr. (- October 5), Los Banos, Santa Cruz, Pagsanjan, San Fernando, Candaba, and Manila, the Philippines, Site visit of Pampanga River Basin, Pasig-Marikina River-Laguna Lake Basin and research meeting*

Visitors / 訪問者リスト

* July - September 2022

- *Visited by delegate from Malaysia-Japan International Institute of Technology (MJIIT), August 25, 2022*
  See "A group from MJIIT visits ICHARM**" on page 29.*

  Purpose: As part of course work "MJIIT Master of Disaster Risk Management Japan Attachment", Prof. EGASHIRA Shinji (ICHARM Research and Training Advisor), Dr. MIYAMOTO Mamoru (Senior Researcher), and Dr. Qin Menglu (Research Specialist) gave lectures. Two Master's students from Malaysia also presented their outcomes of their coursework.

Publications / 発表論文リスト

* July - September 2022

1. Journals, etc. / 学術雑誌（論文誌、ジャーナル）

- *Li Zhou, Toshio Koike, Kuniyoshi Takeuchi, Mohamed Rasmy and Katsuhiro Onuma, A Study on Availability of Ground Observations and Its Impacts on Bias Correction of Satellite Precipitation Products and Hydrologic Simulation Efficiency, Journal of Hydrology, July 2022*
- *NAGUMO Naoko and EGASHIRA Shinji,、Multi-decadal Landform Evolution in the Sittaung River Estuary, Myanmar、地学雑誌、東京地学協会、Vol.131、pp.427-445、2022年8月25日*

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

- *遠藤彩夏、木村美瑛子、中尾 毅、大原美保、藤兼雅和、地方自治体での水害対応ヒヤリ・ハット事例の発生傾向に関する分析、土木学会全国大会第77回年次学術講演会、土木学会、2022年9月16日*
- *南雲直子、傳田正利、原田大輔、小池俊雄、江頭進治、新屋孝文、洪水被害軽減に向けた仮想避難体験プログラム提供の試み、日本地理学会2022年秋季学術大会、日本地理学会、2022年09月24日*
- *NAGUMO Naoko and EGASHIRA Shinji, Effect of water level variation on the channel width in the river mouth、10th IAG International Conference on Geomorphology、International Association of Geomorphologists, September 13, 2022*
- *須貝俊彦、山野博哉、南雲直子、長谷川直子、自然地理教育の実践から明らかになった課題とそれをふまえた環境防災教育の展望、日本地理学会2022年秋季学術大会、日本地理学会、2022年09月24日*

3. Poster Presentations / ポスター発表

None / 該当者無し

4. Magazines, Articles / 雑誌、記事（土技資含む）

- *大原美保、アジアにおける水災害リスク評価に基づく流域治水の支援活動 —HyDEPP-SATREPSフィリピンプロジェクト—、土木学会誌、流域治水特集号、Vol.107、No.6、pp.28-31、2022年6月*
- *大原美保、新屋孝文、研究コラム フィリピン共和国との国際共同プロジェクト：HyDEPP-SATREPS、土木技術資料、Vol.64、No.7、pp.49、2022年7月*

5. PWRI Publications / 土研刊行物（土研資料等）

- *宮崎了輔、Report on 2018-2019 M.Sc. Program, "Water-related Disaster Management Course of Disaster Management Policy Program"、第4420号、土木研究所資料、2022年7月1日*

6. Other/ その他

None / 該当者無し

Editor's Note
編集後記

今年７月から始まった国内での新型コロナ第７波は予想を大きく上回る大流行となり、感染者数が20万人を超える日も多くなりました。しかし秋の深まりとともに、全国的にも収束の方向に向かっているようです。今回の第７波の流行では、感染者の療養期間を１０日間から７日間に短縮したり、入国制限を緩和するなど、新型コロナとの共存の方向に舵を切ったように思われます。

そのような状況の中、ICHARMでも海外との往来が徐々に戻りつつあります。もちろん、コロナ禍の中で一気に進んだオンラインの活用も継続していきますが、対面での人的交流や現場への訪問による親近感や空気の共有も、実際の仕事を進めていく上では重要な要素でしょう。例えばICHARMでは９月末に13名の留学生が修士課程を修了して、母国に戻られました。最後のFarewellでは、小池センター長から留学生に対し“ICHARMのAmbassador”として母国で活躍してほしい旨の激励がありました。このような直接の人的交流で得られる絆を、是非、ポストコロナの世界で深めていきたいところです。

ICHARMニュースレター
編集委員会
森　範行

The 7th COVID-19 wave started from July 2022 in Japan and caused a large-scale pandemic with over 200,000 new daily infection cases, which was much more serious than our prediction. However, as fall deepens, the wave fortunately seems to be coming to an end. During the 7th wave, the government steered toward adapting to life with COVID-19, implementing policies such as shortening the isolation period from 10 to 7 days and easing entry restrictions.

In these circumstances, ICHARM is gradually increasing travels to and from overseas. Although we continue to use online meetings, which were widely introduced during the COVID-19 pandemic, face-to-face human interaction and on-site visits are important for our work to share a sense of familiarity and atmosphere. For example, at ICHARM, 13 international students completed the master's program and returned to their home countries at the end of September. At the farewell gathering, ICHARM Executive Director KOIKE Toshio encouraged them to become "ICHARM Ambassadors" in their home countries. In the post-corona world, we hope to deepen ties which can be fostered through such in-person relationships.

ICHARM Newsletter Editorial Committee
MORI Noriyuki

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