Newsletter

United Nations ucational, Scientific and Cultural Organization

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

Public Works Research Institute National Research and Development Agency, Japan

Volume 15 No. 3
Issue No. 58
October 2020

ICHARM

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

Message from Executive Director

Disaster resilience and sustainable development

The number of water-related disasters has been increasing very rapidly, by more than three times, since 1980. What is also striking is that more than three-quarters of the economic losses are reported from high or upper-middle-income countries, whereas more than 80% of the human losses have occurred in lower-middle or low-income countries. Disasters inhibit growth while growth amplifies disaster damage. To solve these problems, it is essential for nations to strengthen disaster resilience and achieve sustainable development.

Speech at the Graduation Lunch Party at ICHARM on September 10, 2020
修了祝賀昼食会でのスピーチ
（ICHARM にて、2020 年 9 月 10 日）

International discussions on disaster resilience and sustainable development have been conducted under separate tracks. The former depends on the principle that national governments have the primary responsibility for disaster risk reduction. Starting with the designation of the 1990s as the International Decade for Natural Disaster Reduction (IDNDR), the UN organized three world conferences in Yokohama, Kobe and Sendai in Japan. On the other hand, the latter was initially promoted to challenge the world to eliminate the barriers between the North and the South and has eventually come to fruition as SDGs of 17 goals and 169 targets through discussions held in the three UN Earth Summits at Rio de Janeiro, Johannesburg and again Rio de Janeiro.

Hazards cause direct damage to livelihoods and production activities in urban and rural areas, including disrupting and decreasing the supply of water, energy and food. Due to these physical and material harms, educational opportunities and labor markets are lost and degraded. Then, these societal instabilities exacerbate poverty and enormously disturb social justice and peace. In this way, disaster resilience and sustainable development are closely and structurally interlinked through risk. Considering that various issues arise on site, inclusive and proactive approaches should be taken by on-site stakeholders.

In general, however, it is a real challenge for on-site stakeholders to have a broad perspective to look at both their own and other localities around the world and have expert knowledge outside their fields. Accordingly, they often face difficulties in making well-informed decisions and taking appropriate actions to solve on-site issues that require multilateral analyses. This is exactly where the science community comes in. It is in this area that the science community should support on-site stakeholders. Concrete contributions are strongly needed.

October 30, 2020
KOIKE Toshio
Executive Director of ICHARM

災害レジリエンスと持続可能な開発

水災害の報告件数は全世界で急増しており、1980 年以降 3 倍以上にも達しています。特徴的なことは、経済被害の 4 分の 3 以上が高所得・上位中所得国で発生していることに対し、人的被害の 8 割以上が下位中所得・低所得国に偏っていることです。災害は成長を阻害し、成長は被害を増幅する側面を有しています。これらを克服するには、気候の変化によって増大する災害の外力に対するレジリエンスを高め、持続的に成長できる社会の構築が望まれます。

災害レジリエンスと持続可能な開発に関する国際的な議論は、もともと異なる枠組みで進められてきました。前者の議論は、防災・減災の第一義的責任は国家にあるということに依拠しており、1990 年代を「国際防災の 10 年 (IDNDR)」としたことに始まり、3 回の国連防災世界会議（横浜、神戸、仙台）で議論されてきました。一方後者は、環境と開発に関する南北の対立構造の解消を目指して打ち出され、3 回の国連地球サミット（リオデジャネイロ、ヨハネスブルグ、リオデジャネイロ）での議論を経て、17 の目標と 169 のターゲットからなる持続可能な開発目標（SDGs）として集約されたのです。

災害外力は都市や農村の生活や生産活動に直接の被害を与えるだけでなく、水、エネルギー、食糧の供給能力を低下させます。これらによって、教育や労働の機会が失われ、貧困を助長し、社会の公正や平和が損なわれます。このように、災害レジリエンスと持続可能な開発とは、リスクを通して密接で構造的な関係を有しています。しかもこれらの問題は「現場」で発生しており、現場の関係当事者による包摂的で積極的な取り組みが必要となります。

ただし一般には、現場の関係当事者が自身の地域のみならず広く世界を俯瞰し、また専門分野以外の情報にも精通することは難しく、多様な情報をもとに現地での問題の解決に向けて意思決定し、実行することには困難を伴います。この支援こそが、科学者コミュニティの責務であり、その具体的な貢献が求められています。

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Special Topics

Field survey of the July 2020 torrential rain disaster
令和２年７月豪雨災害に関する現地調査

From July 3 to 8, 2020, an active seasonal rain front remained over a wide area from the southern to eastern parts of Japan, causing heavy rain across much of the country. Especially, Kyushu, the largest southern island, was hit by record heavy rain from July 4 to 7.

Linear rain bands formed and stayed over the Kuma River basin, located in Kumamoto Prefecture in Kyushu, causing rainfall of over 30 mm per hour for about 8 hours. As a result, the four rain-gauge stations along the Kuma River and the Kawabe River, the Kuma River's largest tributary, recorded 6-, 12- and 24-hour rainfalls larger than those that triggered the floods in July 1965 and 1982, both of which caused the worst flood damage in the postwar period. This torrential rain triggered record flooding, whose water level exceeded the maximum water level observed at the Hitoyoshi station by 2.2 m, inducing inundation damage to a wide area of the basin, including downtown Hitoyoshi City.

ICHARM has been conducting research on floods with a massive transport of sediment, which have been frequently occurring throughout Japan in recent years, to clarify their mechanism and phenomena and study effective methods for sharing information in the event of such a disaster. In response to the Kuma River flood disaster, ICHARM sent a team of researchers to conduct a field investigation.

On July 16-18, the team, led by Research and Training Advisor EGASHIRA Shinji and consisting of Senior Researcher YOROZUYA Atsuhiro, Researcher MOROOKA Yoshimasa, and Research Specialists NAGUMO Naoko and HARADA Daisuke, stayed in Hitoyoshi City in the Kuma River basin to investigate the disaster due to the heavy rain. The investigation was conducted, focusing on the characteristics of the inundation, the process of sediment supply from the Kuma River and its tributaries, the particle size of transported sediment, and the damage at the confluence of the main river and the tributaries.

Photos 1 and 2 show the researchers measuring the inundation depth. Around the Aoi Aso Shrine, a national treasure, located in downtown Hitoyoshi City (Photo 1), the inundation marks of the 2020 flood were about 2.5 m higher than those left by the July 1982 flood. In the area around Hitoyoshi Station, about 400 m from the Kuma River, the maximum inundation depth was estimated to have been about 1.2 m (Photo 2).

Photo 1. Inundation marks at the Aoi Aso Shrine
写真 1. 青井阿蘇神社における洪水痕跡

Photo 2. Inundation marks around Hitoyoshi Station
写真 2. 人吉駅周辺における洪水痕跡

2020年７月３日から８日にかけて、九州から東日本にのびて停滞した活発な梅雨前線の影響で西日本や東日本で大雨となり、特に九州では７月４日から７日に記録的な大雨がもたらされました。

熊本県を流れる球磨川流域では、線状降水帯が形成・維持され、時間雨量 30mm を超える雨が約８時間降り続いた結果、球磨川本川および最大支川の川辺川の４カ所の雨量観測所における降雨量が６・12・24 時間雨量について、戦後最大の洪水被害がもたらされた昭和 40 年 (1965 年)7 月洪水や昭和 57 年 (1982 年)7 月洪水を上回る降雨を記録しました。本豪雨では、基準地点の人吉観測所における既往最大観測水位を 2.2m 上回る記録的な洪水となり※、人吉市の市街地を始めとした流域内の広範囲で浸水被害が発生しました。

ICHARM では、近年頻発化している大量の土砂輸送を伴う洪水氾濫について、その発生メカニズムや現象の解明、さらには災害時の効果的な情報共有方法の検討等を目的とした研究を継続的に実施しています。

本豪雨についても、その災害発生状況等を把握するため７月 16 ～ 18 日に球磨川流域において、江頭進治研究・研修指導監、萬矢敦啓主任研究員、諸岡良優研究員、南雲直子専門研究員、原田大輔専門研究員が現地調査を行いました。この調査では、熊本県人吉市を中心に、浸水状況の実態と球磨川本川・支川からの土砂の供給条件、氾濫土砂の粒径および本川と支川合流部の被害状況に着目した調査を実施しました。

人吉市市街地に位置する国宝青井阿蘇神社付近では、写真１に示すように、1982 年７月洪水の痕跡を示す標識と比較して、約 2.5m 高い位置に今回の浸水痕跡があることを確認しました。また、球磨川から約 400m 離れた人吉駅周辺では、写真２に示すように最大浸水深が約 1.2m 程度であったと推測されます。

写真３は、支川の川辺川からの土砂の供給条件を調査している様子を示しています。また、写真４は人吉市市街地の氾濫土砂を採取している様子を示しています。これらの現地調査で得た情報を数値シミュレーションへ入力し、さらには検証材料とすることで本豪雨災害時の氾濫状況を再現し、結果を分析することで、今後の川づくり・地域づくりに貢献できるような研究を実施しています。

被災されました皆様に心よりのお見舞いと、一日も早い復旧・復興のお祈りを申し上げるとともに、よりレジリエントな社会構築に向けて、ICHARM では今後も本豪雨災害に関する調査・研究を進めていくことを予定しています。

※国土交通省九州地方整備局「令和2年7月豪雨における出水について（第2報）」（http://www.qsr.mlit.go.jp/site_files/file/bousai20071005%282%29.pdf）より

Photo 3 shows the investigation of sediment supply conditions in the Kawabe River and Photo 4 shows the researchers collecting transported sediment at a parking lot in downtown Hitoyoshi City. Data and information collected in this investigation will be used for numerical simulations to reproduce the flood event caused by the heavy rain. Simulation results will be verified using the collected data and information and analyzed to better understand the mechanism of the event. All of this will contribute to river management and community development.

Photo 3. Investigation of the sediment supply conditions at the Kawabe River
写真 3. 川辺川の土砂供給条件の調査

Photo 4. Investigation of the transported sediment in downtown Hitoyoshi City
写真 4. 人吉市市街地における氾濫土砂の調査

With the deepest sympathy for those affected by the disaster and hope for the earliest restoration possible, ICHARM will continue research on this torrential rainfall disaster to learn new findings and lessons for building a more disaster-resilient society.

The record of water levels cited in this article is quoted from a disaster report on the July 2020 flood issued by the Kyushu Regional Development Bureau of the Ministry of Land, Infrastructure, Transport and Tourism.

(Written by MOROOKA Yoshimasa)

Briefing session on a trial experiment of the "Support System on Countermeasures for Severe Flood Damage under the Risk of COVID-19"

「新型コロナウイルス感染症のリスク下にあって激甚化する水害への対策支援システム」試行実験説明会の開催

Flood damage is becoming more severe and widespread every year, and it is becoming more difficult to prevent and respond to flood damage, especially in the middle of the COVID-19 crisis. Under these circumstances, it is necessary to open and operate evacuation shelters and emergency management headquarters while avoiding so-called "Three Cs situations (closed spaces, crowded places, close-contact settings)." It is also essential to establish a system based on a consensus between municipalities, which are responsible for issuing evacuation orders, and residents, who act upon receiving such information.

Therefore, ICHARM is working on the development of a system that allows each local government to check the status of their preparation for effective disaster response by combining the "Collection of Critical Situations during Flood Emergency Response (Appendix: local government response under COVID-19)" and the BOSS-SHIFT disaster response support system, which were introduced in the previous edition (No.57) of the ICHARM newsletter.

In order to reflect the opinions and needs of municipalities in this system development, ICHARM invited municipalities to participate in a trial experiment of this new system with support from the Cabinet Office. As a result, seven municipalities showed interest in the system and decided to participate in the experiment: they are Annaka City, Gunma Prefecture; Sodegaura City, Chiba Prefecture; Kawasaki City and Chigasaki City, Kanagawa Prefecture; Anpachi Town, Gifu Prefecture; Yakage Town, Okayama Prefecture; and Takehara City, Hiroshima Prefecture. On August 25 and 27, online briefing sessions were held, after which they decided to try out the prototype (presently using an excel file) of the new system.

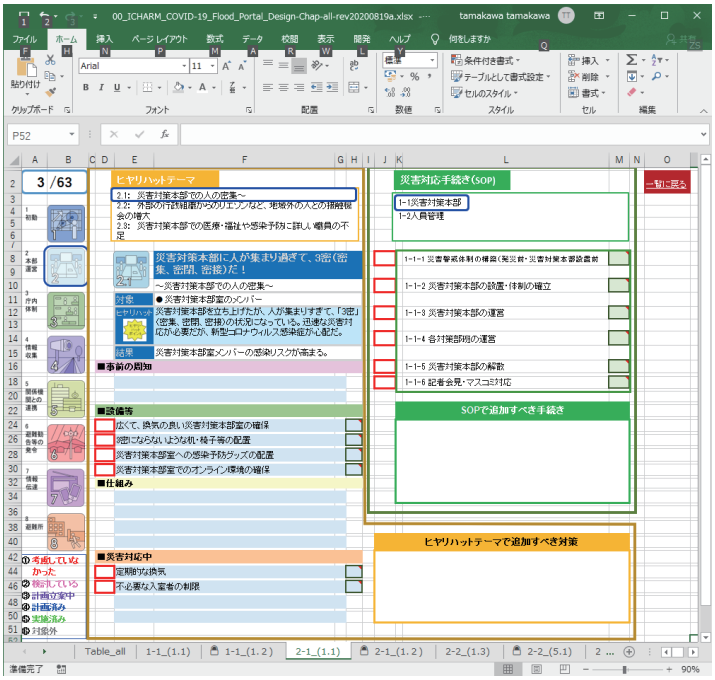
ICHARM is planning to improve the system based on the feedback from the participating municipalities, hoping that it will be widely used by municipalities throughout Japan in the future.

豪雨災害が年々激甚化・広域化している状況下において、2020 年初頭から蔓延した新型コロナウイルス感染症の災禍（以下、コロナ禍）が、水害への対応を一層困難にしています。避難所や対策本部の開設・運営においては、いわゆる「三密」の防止が必要であり、避難情報の発令を担う市町村と、情報を受けて行動する住民の両者が納得、合意できる体制づくりが不可欠です。

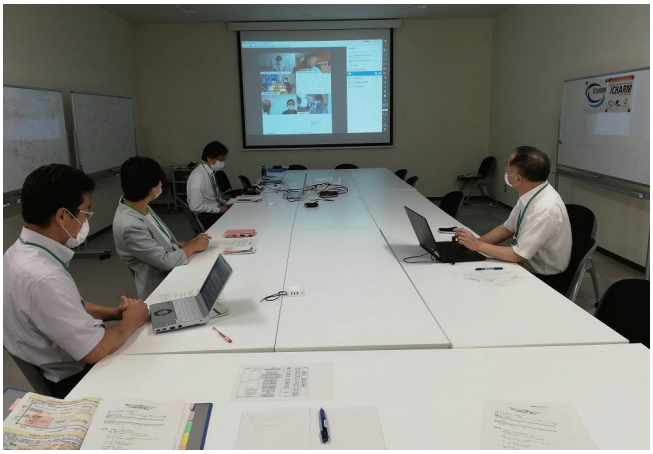
そこで、ICHARM ではニュースレターの前号（No.57 号）で紹介した、水害対応ヒヤリ・ハット事例集の別冊：新型コロナウイルス感染症への対応編と、東京大学目黒教授等が開発した災害対応支援システム BOSS・SHIFT とを結びつけ、コロナ禍での災害対応を支援するシステムの開発に取り組んでいます。

今回その開発に際し、現場の市町村の意見やニーズ等を反映するため、内閣府にも協力をいただき、本研究に関心のある市町村を募集したところ、群馬県安中市、千葉県袖ケ浦市、神奈川県川崎市、茅ヶ崎市、岐阜県安八町、岡山県矢掛町、広島県竹原市の７市町に参加いただきました。８月２５日と２７日の２回に分けて WEB 上で説明会を行い、本システムのプロトタイプ（現時点ではエクセルファイル）を試行し、システムの有効性等を評価していただきました。

今後は、上記自治体よりいただいたご意見を踏まえシステムを改良したうえで、全国の市町村に適用可能なシステムの開発を行っていく予定です。



An example of Excel files of the trial experiment
試行版のエクセルファイルの一例



A scene of the online briefing session on August 25
Web での説明会の様子（8 月 25 日）

(Written by FUJIKANE Masakazu)

Research

Seeing is believing - A practice task for a Ph.D. student has developed into global-scale research on sediment transport -

百聞は一見に如かず ー演習問題のつもりが PhD 研究へ、流砂研究の国際展開へー

ICHARM では、国内外における研究・研修活動はもとより IFI をはじめとする国際的な研究ネットワークづくりを行っています。このような活動を通じて、我々はミャンマーのシッタン川河口における河岸侵食の問題に出会いました。これは、シッタン川河口域において年間 1km にも及ぶ河岸侵食が生じ、集落や農地が流亡するといった事象でありますが、この問題に関する相談を受けた当初、衛星画像等を用いた地形変化の実態が把握できて、河口域の洪水流や潮汐流の挙動を評価できれば、何らかの手立てができるものと考えていました。同じ頃、バングラデシュから PhD 学生の Ahmed Tanjir Saif 氏を受け入れていて、同国メグナ川下流域の流砂問題について研究計画を詰めているところでした。

・潮汐流のシミュレーション

潮汐流のシミュレーションは、Tanjir 氏がメグナ川の流砂・流路変動に関する研究を進める上でタイムリーな演習問題の一つであり、「1 ～ 2 か月程度で・・」というのがこの問題への取っ掛かりでした。とはいうものの、年間 1km にも及ぶような河岸侵食の経験がなく、雲をつかむようなこともあったことから、実態を理解する手始めとして、2017 年 11 月に侵食域の踏査や河岸材料の調査を主目的とする第一回目の現地調査を行いました。時を同じくして、幸運にも東京大学大学院工学系研究科社会基盤学専攻海岸・沿岸環境研究室の田島芳満教授および下園武範准教授のグループの会合に参加して当該問題についての情報交換ができる機会があり、潮汐流のシミュレーションの結果等に対する先生方からの助言により、河口問題に関する経験の乏しい我々は大いに勇気づけられました。

・河口域河岸へのボア（海嘯）の衝突

河岸侵食の実態を把握するため、第二回目の調査はボアが確実に観察できる 2018 年 2 月に計画されました。現地調査を前にして、ボアに関するいくつかの動画を見る機会があり、それによれば、河岸に対してボアが激しく衝突し、水しぶきが跳ね上がる状況が確認されました。そのため、河岸侵食の主因は「河岸に対するボアの衝突」であると考えて、河岸に対するボアの衝突モデルを作成し、衝突現象と侵食現象をいかにモデル化するかを模索していました。年間 1km にも及ぶ河岸侵食をボアの衝突モデルによっていかに説明するのか？

ICHARM not only conducts research and training activities in Japan and overseas, but also creates international research networks such as the International Flood Initiative (IFI). It was through this networking activity that we first came to know about bank erosion in the estuary of the Sittaung River in Myanmar. We learned that the erosion there is very active, continuing at a rate of 1 km per year at some locations, where even settlements and farmland disappear. When we were first asked for some advice, we thought that we should be able to come up with some control measures after analyzing topographical changes through satellite images and understanding the behavior of the flood flow and the tidal current in the estuary. At that time, Mr. Ahmed Tanjir Saif from Bangladesh was studying in our doctoral program under my supervision, finalizing his research plan on sediment transport in the lower Meghna River basin of his country.

Simulation of the tidal current

To address the erosion problem in Myanmar, the simulation of the tidal current was necessary. I thought that it would be a good case for Mr. Tanjir to practice this type of simulation so that he will be able to apply the experience to his research project on the Meghna River to understand sediment transport and channel changes. My first plan was that he should be able to finish the simulation assignment in a month or two. However, since we had never studied this scale of erosion causing a riverbank retreat of 1 km per year, we had few clear clues about how it was really happening and where to start the research. Thus, we decided to conduct a field investigation with some fellow researchers in November 2017 to observe erosion-active areas and sample river materials. Around the same time, we had a great opportunity to join a meeting organized by Professor TAJIMA Yoshimitsu and Associate Professor SHIMOZONO Takenori of the Coastal Engineering Laboratory of the Department of Civil Engineering, School of Engineering, the University of Tokyo. We shared our simulation results of the tidal current with them and were provided with expert opinions. Since we had little experience in addressing issues in this field, they were of great help for us to continue our project.

Impact of the tidal bore on estuarine riverbanks

To better understand the bank erosion in the Sittaung River, we planned a second field investigation in Myanmar in February 2018, because we needed to observe tidal bores, which usually take place around that time of the year. Before going to Myanmar for the investigation, we watched video clips of tidal bores, which showed the bore crashing into a riverbank and causing a big splash. Then, we hypothesized that the main cause of the bank erosion would be the bore crashing into the riverbank and developed a simulation model. As a next step, we were trying to create a model to link the bore-crashing phenomenon with the large-scale erosion. Our question was: How is it possible to explain the erosion at a rate of 1 km per year using the bore crashing model?

Bank erosion and strong tidal currents caused by tidal bores

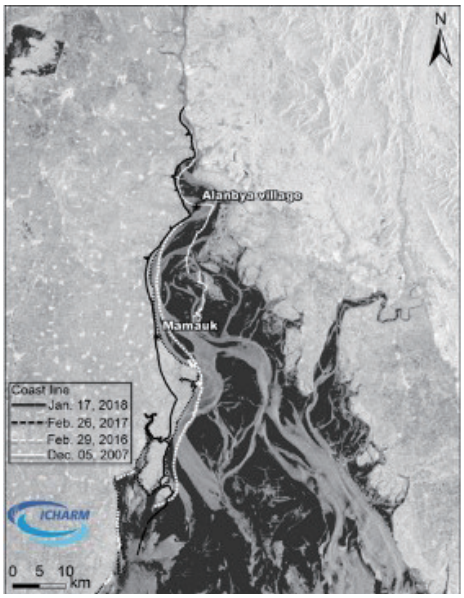
The bank erosion we saw at Mamauk, a riverside settlement, was rather shocking. As we imagined, the bore front rushed in from offshore with thundering sound, ran upstream in the river, and crashed into the riverbank with a big splash. However, the phenomenon after that was rather different from what we imagined. As soon as the bore front passed our observation site, the water level started to rise. As it continued to rise, the water surface formed a longitudinal slope.

In this process, strong currents were generated and eroded the bank foot. As the erosion at the bank foot continued, the bank slope started to show an overhang shape. The overhanging part became increasingly unstable and finally broke off the bank and rolled down the slope to the river. As soon as the strong currents washed away the fallen chunk, the erosion started again at the bank foot. The observation at Mamauk led us to an understanding of the bank erosion process in the Sittaung River, though we also realized that the process is rather usual just like the common erosion pattern.

New development from a Ph.D. research assignment to full-scale sediment transport study

Our initial plan was to simulate the phenomenon of tidal currents and, based on simulation results, discuss bank erosion control measures. However, as we proceeded with the research, collecting data on sand bars in the estuary and bank material, analyzing channel changes and satellite images, and simulating tidal currents numerically, we started to realize that the initial plan had been missing some crucial parts needed to understand the bank erosion in the Sittaung River. In particular, we learned that the research would require analyzing the transport of silt-dominant sediment, for which little research has been done, and also analyzing river channel changes. We also realized from the collected data that the bank line may move back and forth in a cyclic pattern.

Tidal bore observed in the Sittaung River estuary
シッタン川河口域におけるボアの一例



Historical bank retreat in the Sittaung River estuary
シッタン川河口域における河岸部の後退

All of these considered, we decided to study topographical changes in the last 100 years and the transport of silt-dominant sediment. We also decided that, as the core part of his Ph.D. research, Mr. Tanjir undertake numerical simulation of tidal currents and topographical changes that are observable at present. Some wonder whether it is possible to conduct such simulation without a clear understanding of silt-dominant sediment transport. Our answer is yes. The sedimentation velocity of silt particles is so small that they show a strong non-equilibrium tendency. Because of that, as long as the simulation model is designed to evaluate the non-equilibrium of the subject, it can incorporate the outcomes of sediment transport research in the system as soon as they are out. Mr. Tanjir proceeded with his research in this principle under my supervision.

EGASHIRA Shinji
Research and Training Advisor,
Adjunct Professor, National Graduate Institute for Policy Studies

・ボアに伴う強い潮汐流と河岸侵食

河岸域に形成された Mamauk という集落において目の当たりにした河岸侵食現象は衝撃的でした。ボアのフロント（段波）が轟音とともに沖から押し寄せ、岸に衝突して水しぶきを上げるところまでは予想通りでした。ところが、フロントが通過すると目の前の水位が上昇し続け、水面の縦断勾配が形成され、これに対応して強い流れが形成され、この流れによって河岸脚部が侵食されます。河岸脚部の侵食によってオーバーハングが生じ、不安定になったブロックは倒壊し滑動しながら水面下に消え、水面下に没したブロックが強い流れによって輸送されると、再び脚部の侵食が始まります。実際には、このようなプロセスによって河岸侵食が起こっていることが推察されました。このような侵食のプロセスは、冷静に見ると至極当然のことでした。

・PhD 研究から流砂研究の新たな展開

当初の目論見は、潮汐流のシミュレーションを行い、その結果に基づいて河岸侵食対策について検討することでした。ところが、河口域における砂州や河岸材料に関するデータ収集、流路変動現象に関する解析や衛星画像データの解析、潮汐流に関する数値解析が進むに伴い、当初の目論見は的外れであることが分かってきました。特に、シッタン川河口域においては、研究の蓄積のないシルト粒子を中心とする流砂・流路変動現象の評価を避けては通れないことや、河岸線は前進と後退を繰り返しており、周期性がありそうなことも分かってきました。

このようなことから、当面、当該課題については、近年 100 年程度の地形変動解析、シルト粒子の流砂過程、Tanjir 氏には現時点における潮汐流と地形変動に関する数値シミュレーションを担当していただき、これを PhD 研究の中心に据えることになりました。シルト粒子の流砂過程をあいまいなまま残してシミュレーションができるのか？との疑問を抱く方もおられるでしょう。シルト粒子は、沈降速度が小さいので強い非平衡性が現れます。したがって、流砂過程において、非平衡性が評価できる枠組みでシミュレーションモデルを作成しておけば、流砂過程に関する研究成果が出た段階でこれを導入することができます。このようなスタンスで Tanjir 氏の指導にあたってきました。

研究・研修指導監、
GRIPS 連携教授
江頭進治

Numerical study on tidal currents and bed morphology in Sittaung river estuary, Myanmar

AHMED Tanjir Saif
Ph.D. in Disaster Management, GRIPS and Research Assistant, ICHARM

The Sittaung river stretches northward from the mouth and it drains the area of about 36000 km^2 at the Sittaung bridge. The estuary is 220 km long southwards, 270 km wide and it opens to the Gulf of Martaban. Due to its funnel shape, tidal bores and associated strong currents take place during spring tides on new moon and full moon resulting in movement of sand bars and bank line retreat. Figure 1 shows such morphological change. In addition, more than 10 km bank line retreat occurred near Mamauk in recent years.

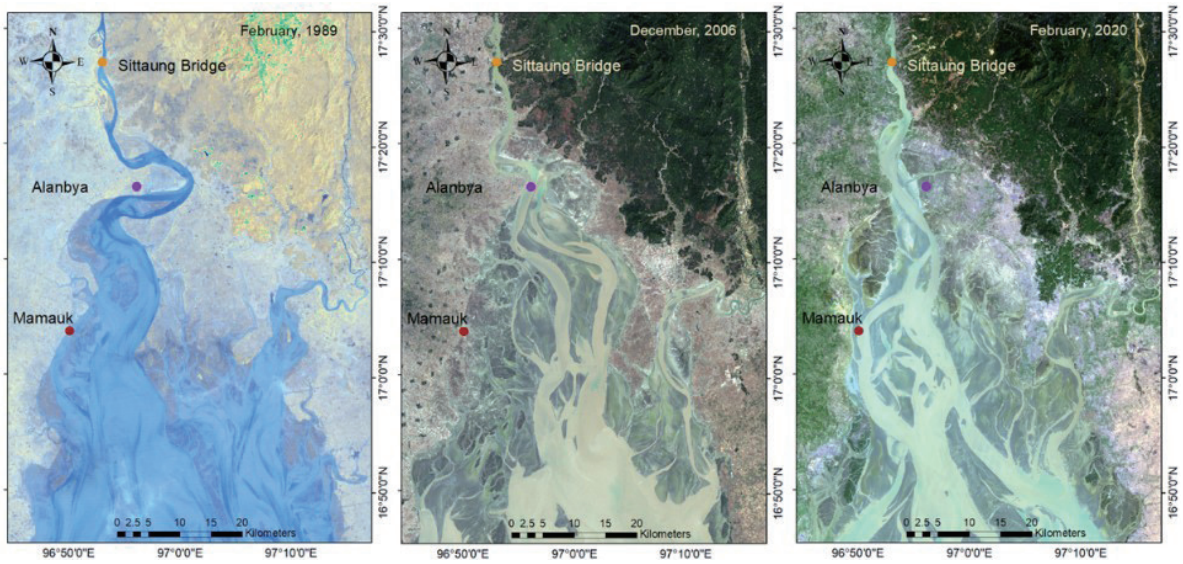


Figure 1 Landsat 8 satellite images on February, 1989, December, 2006 and February, 2020

Analysis of particle sizes suggest that the bed sediment in the downstream reach of the river, the bed sediment in the estuary, the bank sediment of the river reach and the estuary bank have almost the same sizes ranging 0.02 to 0.04 mm in median size d_{50}. Due to existence of such very fine particles, the flow field exhibits high sediment erodibility and transportability, resulting in rigorous changes in stream channel pattern and movement of sand bars. Historical discharge along Sittaung river shows that from January to May, discharge remains around or less than 500 m^3/s, whereas during monsoon it remains around 3000 m^3/s. Tidal range reaches up to 4.4 m at Mawlamyine area in the Gulf of Martaban.

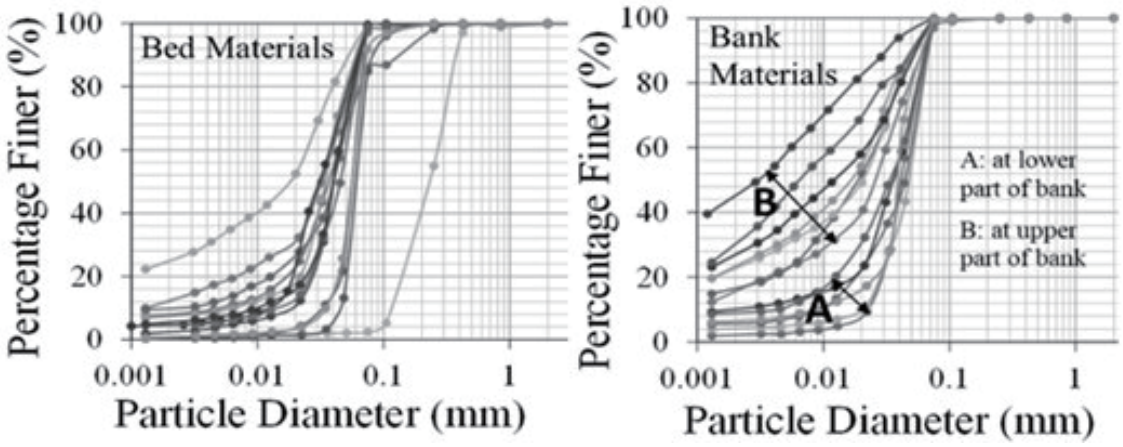


Figure 2 Particle sizes of bed and bank materials in the estuary

Numerical simulations are conducted using a two dimensional depth averaged Reynolds' equation and a sediment transport model. Most of existing formulas evaluate the suspended sediment loads as well as the erosion rates where the sediment sizes are much coarser than those of the present material. So, a new method to evaluate the entrainment of very fine material is introduced into the sediment transport model. In present treatment, it is assumed that the bed-load layer is constituted mainly by loosely deposited silt material. Fine sediment is entrained

from a loose bed into flow body and also the bed surface layer is shearing parallel to the water flow. Figure 3 shows schematic diagram of a quasi-Bingham flow. We introduce entrainment velocity or entrainment co-efficient, which is commonly employed to evaluate the mixing processes in density stratified flows, to formulate erosion rate of bed material and the entrainment phenomenon from the bed-load layer is evaluated using the overall Richardson number. Using the proposed treatment, tidal currents, sediment transportation, sand bar deformation and over-all morphology are reproduced in the study area.

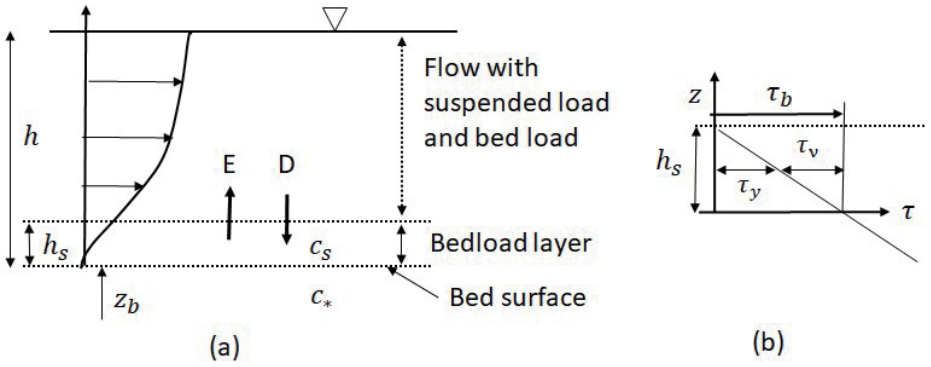


Figure 3 Schematic diagram showing (a) definition of flow field and (b) constitutive relation in bed load layer

Tidal bore and associated tidal currents are investigated by numerical computations. Figure 4 shows the temporal changes of water surface elevation computed at different sites where site-B is near Mamauk and the temporal change of water surface elevation was observed there during the passage of the tidal bore. The results illustrated in this figure show that the computed profile agrees very well with the observed shown as red colored plots.

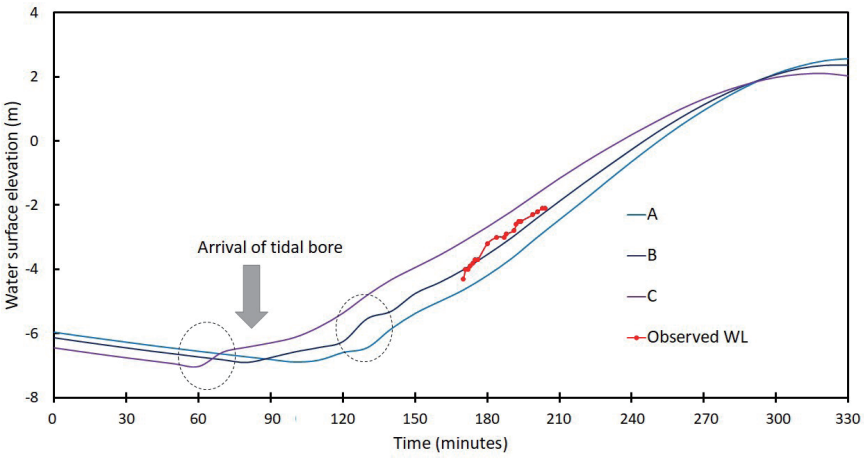


Figure 4 Temporal change of computed water surface elevations at sites near Mamauk and comparison with observed data

Sediment transportation, corresponding channel changes, sand bar evolution and over-all morphology are investigated by numerical simulation. We can see that high velocity areas appear in the deep zones of main channels, and this distribution of velocity is reflected by channel patterns. Tide and ebb dominated sand bars are formed near Mamauk. Such tendency of bar formation process identifies deposition prone areas very clearly. Proposed method can be employed to reproduce and predict morphological changes in estuaries composed of such fine sediment.

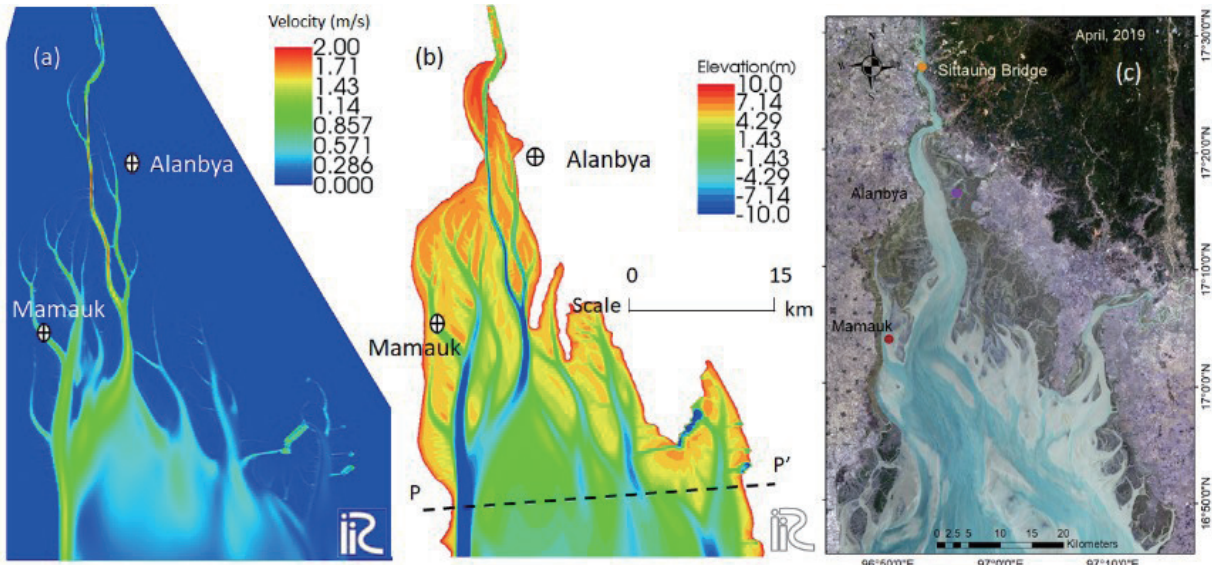


Figure 5 (a) Computed spatial distribution of velocity during ebb tide, (b) computed bed evolution and (c) comparison of results with Landsat 8 satellite image on April, 2019

On the 13th graduation of the ICHARM master's program students
第 13 回修士修了生に思うこと

去る 9 月 15 日に 11 名の洪水防災学修士が巣立ちました。国別内訳はパキスタン（1 名）、ネパール（2 名）、ミャンマー（2 名）、ブラジル（2 名）、ブータン（2 名）、バングラデシュ（2 名）でした。この修士課程プログラムは、大学卒業後、各国の行政機関等において河川計画や河川行政等の経験を有する者を対象として、JICA の支援のもと GRIPS と ICHARM が共同して運営しており、今回は第 13 回の修了式にあたります。当該研修員は、10 月に入学して翌年の 9 月に終了する一年修士であるものの、上述のように応募要件に経験年数が問われていることから、研究テーマに対する問題意識は極めて高く、昨年 10 月に ICHARM で開催された Inception Report 発表会において、多くの研修員が自国における河岸侵食の原因を解明したい、水災害に関する社会的・経済的影響を評価したい等と頼もしい発言をしていました。

今回の研修員全員、COVID-19 による影響を強く受けました。通常の研究指導は、主として face to face の形を基本として行ってきましたが、対策として 3 密を避けることが有効な手立てと考えられ、研究指導の現場もそれらに則った対策のもと行われました。そのため、今年の 4 月から 5 月中旬頃まではどんな成果が得られるか心配でしたが、5 月後半になるとそのような心配は見事に払拭されました。これは、研修員の取り組む姿勢と主指導及び副指導の先生方の研究指導の賜物であります。彼らはこれから元の職場に戻り、これまで以上の活躍が期待されます。また、アブストラクトから推察されるように、彼らのほとんどは実務的な研究を推進しており、数年後にはそれらの実用化のためのリーダーになっていることが期待されます。

なお、本研修員は全員と言っていいほど優秀であり、できることなら全員を表彰したかったのですが、各表彰は次のように授与されました。

Dean's Award:
SILVA ARAUJO Rafael, from Brazil

Best Research Awards:
RAHMAN Md Shahinur, from Bangladesh
PHUNTSHO Tashi, from Bhutan

SONTOKU Award:
ISLAM Md Masbahul, from Bangladesh

研究・研修指導監、
GRIPS 連携教授
江頭進治

On September 15, 2020, the 13th graduation was held for 11 students, one from Pakistan and two each from Nepal, Myanmar, Brazil, Bhutan and Bangladesh, who were graduating from ICHARM master's program, "Water-related Disaster Management Course of Disaster Management Policy Program."

This program is operated by ICHARM and GRIPS with support from JICA and primarily designed for those who hold bachelor's degrees and have work experience related to river planning and management at government organizations in their own countries. It is a one-year program to complete starting in October and ending in September. Since they join the program with work experience, students generally have a specific research theme and are able to clearly express their goals to achieve through the program. At the Inception Report meeting held at ICHARM last October, the students of the 2019-2020 class were also articulate about their purposes of joining the program; one student was planning to explore the causes of bank erosion, and another to evaluate the socio-economic impact of water-related disasters, for example.

COVID-19 had a significant impact on the class of 2019-2020. Students usually receive face-to-face supervision from ICHARM's teaching staff. However, they were forced to have online meetings and take other preventive measures that were thought effective not to create a highly infectious environment, specifically, by avoiding closed spaces, crowded places and close-contact settings. Practicing unusual, unfamiliar approaches in teaching and learning, the staff were worried, from April through mid-May, whether such conditions would affect the students' achievement. By late May, it turned out that those worries were unnecessary, thanks to the hard work on the learning side and the enthusiasm on the teaching side.

Now that they have returned to their previous workplace back home, we hope that they will make more contributions than before to whatever assignment they will work on. When looking at the following abstracts, one can tell that their research was focused on practical issues. In this sense, we are also hoping that, in several years, they will be implementing their research outputs in their countries as project leaders.

At the time of graduation in each year, ICHARM, GRIPS and JICA present awards to some selected students for their outstanding work and performance. Whereas the class of 2019-2020 were all excellent students and good candidates for them, this year's awards went to the following students:

Dean's Award:
SILVA ARAUJO Rafael, from Brazil

Best Research Awards:
RAHMAN Md Shahinur, from Bangladesh
PHUNTSHO Tashi, from Bhutan

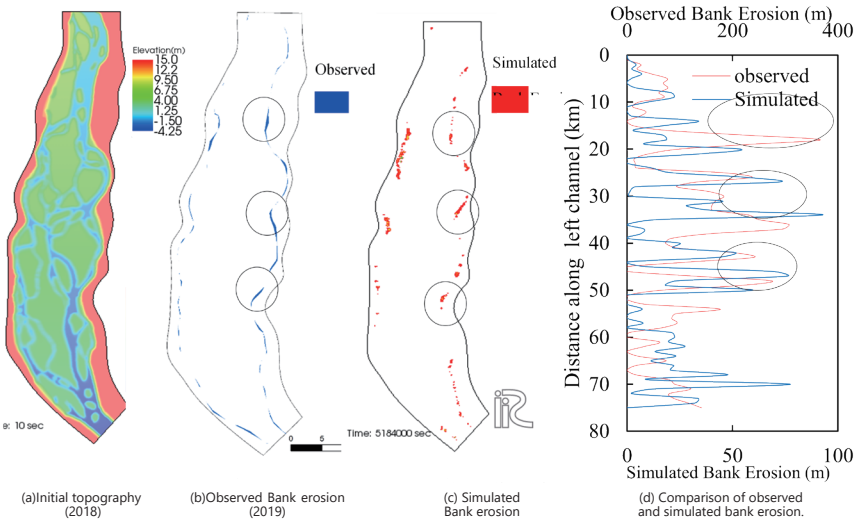
SONTOKU Award:
ISLAM Md Masbahul, from Bangladesh

EGASHIRA Shinji
Research and Training Advisor,
Adjunct Professor, National Graduate Institute for Policy Studies

A NUMERICAL STUDY ON BANK EROSION OF A BRAIDED CHANNEL: CASE STUDY OF THE "TANGAIL AND MANIKGANJ DISTRICTS ALONG THE BRAHMAPUTRA RIVER"

ISLAM Md Masbahul, from Bangladesh
Sub-Divisional Engineer/Design Circle-2/Bangladesh Water Development Board

This study aims to predict the vulnerable location of bank erosion along the braided river, which is composed of many different channels. For this study, the authors paid attention to two aspects. The first point is changing of flow discharge along the channel, which belongs to the area of interest as a large-scale phenomenon. The second point is changing the geometry by the sand bar and the changing of the flow associated with it as a small-scale phenomenon.



(a)Initial topography (2018) (b)Observed Bank erosion (2019) (c) Simulated Bank erosion (d) Comparison of observed and simulated bank erosion.

Figure: Bank erosion result comparison

The large-scale phenomenon is important since increasing discharge indicates increasing not only bank erosion but all the vulnerabilities associated with it. To consider the two different scales, the authors determine the domain as an entire channel. By using numerical simulation and satellite data analysis the two-scale phenomena were described. Regarding the large-scale phenomenon, the morphology and the channel change pattern were evaluated and regarding the small-scale phenomenon, the vulnerable location of bank erosion was predicted.

Finally, the author proposed the fixing of existing countermeasures by adding future predictions.

Keywords: Braided Channel, Bank erosion, Numerical simulation, Bed deformation, Channel bifurcation.

STUDY ON FLOW PATTERN AND ASSOCIATED BED DEFORMATION IN THE OFF-TAKE REGION OF GORAI RIVER, BANGLADESH

RAHMAN Md Shahinur, from Bangladesh
Sub-Divisional Engineer/Office of the Director Planning-II/Bangladesh Water Development Board

The flow pattern and morphological characteristics of the Ganges River are the main factors controlling the flow diversion into the Gorai River. The present study discusses the morphological behavior and its control in the Ganges reach to obtain suitable flow diversion towards the Gorai River, using a depth averaged two dimensional numerical model. Two separate domains (grid system) have been used for numerical simulation: one analyzes the flow patterns and morphological change solely in the Ganges reach, and the other discusses the morphology and flow diversion into the Gorai River, combining both the Ganges and the Gorai reaches. The effects of the different sets of countermeasures by means of the spur dikes on the morphological changes in the off-take area were investigated numerically with attention focused on the flow pattern and flow diversion reproduced near the Gorai off-take area. The results show that the present method can evaluate the flow pattern and morphological change exhibited by each countermeasure; thus, it can assess the effect of countermeasures on the sandbar formation and flow diversion process on the Gorai River.

Keywords: Flow diversion, Channel morphology, Sedimentation, Gorai off-take, Countermeasures.

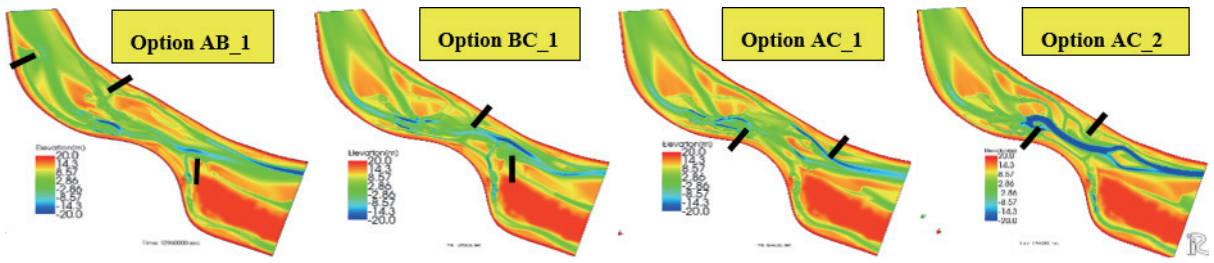


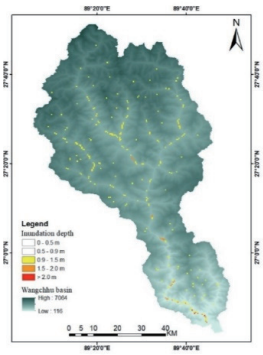
Figure: Computed results for the different series of countermeasures at around the Gorai river off-take area. The color contour shows the elevation.

COMPREHENSIVE EVALUATION OF FLOOD MITIGATION MEASURES BASED ON CLIMATE CHANGE IMPACT ASSESSMENT IN THE WANGCHU BASIN

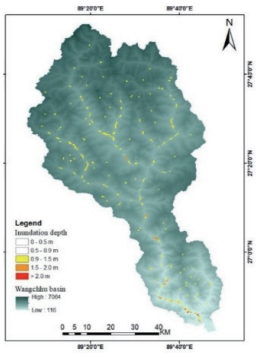
PHUNTOSHO Tashi, from Bhutan

Executive Engineer/Flood Engineering and management Division/Department of Engineering Services, Ministry of Works and Human Settlement

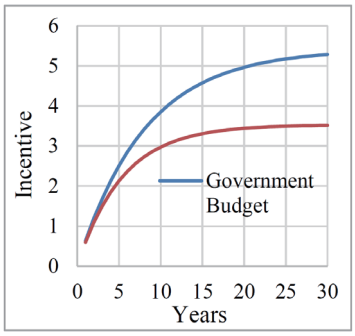
The Wangchu basin in western Bhutan has almost 30% of the country's population, mostly settled along the rivers and streams in its sub-basins. The 2009 flood event and the unexpected increase in river discharge during the rainy season in recent times have illustrated the people of their vulnerability in the basin. This study assessed the impacts of climate change on rainfall intensity and flooding in the basin using general circulation models (GCMs). The rainfall-runoff-inundation model was employed in the study area to simulate past and future flooding as per the GCM rainfall outputs. The selected GCMs showed an increase in extreme rainfall, discharge, inundation area, affected population, and infrastructural damage cost in the future. Fewer inundation days but with increase in inundation area are predicted to occur in the future, indicating the high intensity of rainfall that could cause severe flash floods in the basin. Further, as huge recovery costs are incurred after a disaster, a method to evaluate the incentive for prior investment in flood preventive measures was developed. The evaluation will help to convince and explicate the decision-makers of the benefits of such early disaster preparedness works. The method is beneficial for the implementation of embankment works along the Haa sub-basin when considering future flooding.



Inundation map of the CMCC-CMS model (Past)



Inundation map of the CMCC-CMS model (future)



Incentive for flood preventive measures

Key words: rainfall, discharge, damage, incentive, investment

ASSESSMENT OF WATER RESOURCES UNDER CHANGING CLIMATE FOR EFFECTIVE HYDROPOWER AND AGRICULTURE PRODUCTIONS IN PUNA TSANGCHHU BASIN, BHUTAN

DORJI Nima, from Bhutan

Executive Engineer/Agriculture engineering Division, Department of Agriculture/Ministry of Agriculture and Forests

The hydropower and agriculture are the backbones of Bhutan's socio-economic development due its abundance water resources in the forms of snow and glacier deposits, which are the most vulnerable to global warming but its impacts are overlooked in Bhutan. To obtain climate change impact on the water resources and to support policy makers in Puna Tsangchhu basin, this study assessed the effect of climate change utilizing past and future meteorological data of General Circulation Models (GCM). The GCMs projected increase of precipitation and temperature, however, the assessment of availability of water resources was very essential. The WEB-DHM-S was employed to simulate and estimate the future hydrological processes and water availability. The simulation indicated the increase of flow and snow cover area despite increase of temperature, which is good for Bhutan's hydropower and agriculture production.

Keywords: hydropower, water resources, climate change, WEB-DHM-S, snow cover area

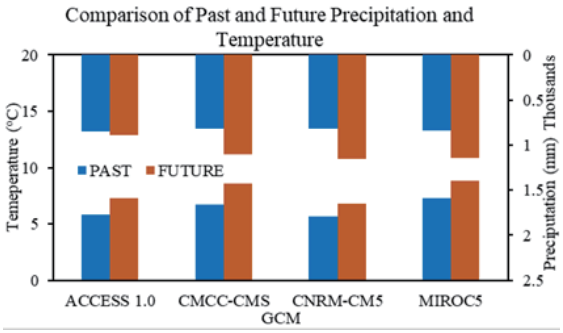


Figure 1. Variation of future temperature and precipitation (projected)

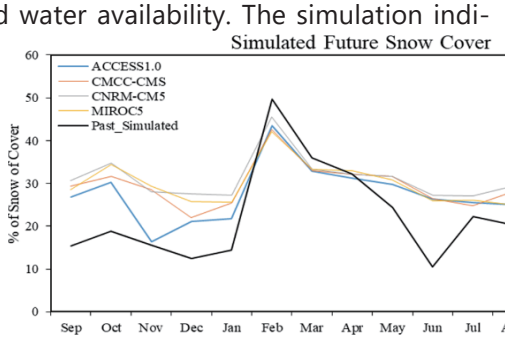


Figure2. Projected snow cover

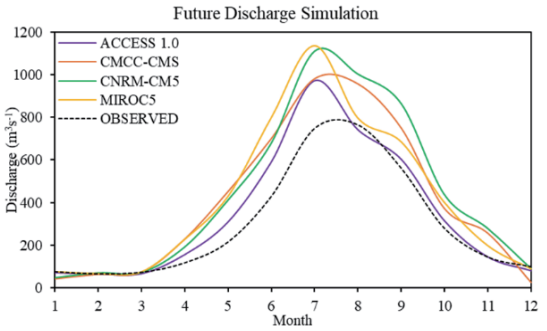


Figure 3. Model-wise projected streamflow

FLOOD IMPACT ASSESSMENT IN THE ITAPOCU RIVER BASIN, BRAZIL

SILVA ARAUJO Rafael, from Brazil,
Researcher in Geosciences/Department of Territorial Management/Companhia de Pesquisa de Recursos Minerais

Brazil is a country with high inequality rates and an extensive disaster risk profile. Disasters tend to affect the poorest inhabitants and increase inequality. Therefore, this study aims to propose a method to assess whether households are unequally affected by floods based on their income, apply it to the Itapocu River basin located in Santa Catarina State, Brazil, and propose adaptive measures. Flooding was assessed through rainfall analysis and hydrological simulations. Household income information was obtained from the 2010 census and downscaled. Both flooding and income information were then combined to assess the distribution of affected households by income level and flood return period. The results indicated that flooding events in the Itapocu River basin affect the lowest-income households more frequently with events of greater magnitude. Therefore, investing in disaster management can be useful not only for protecting lives and assets, but also for reducing inequality.

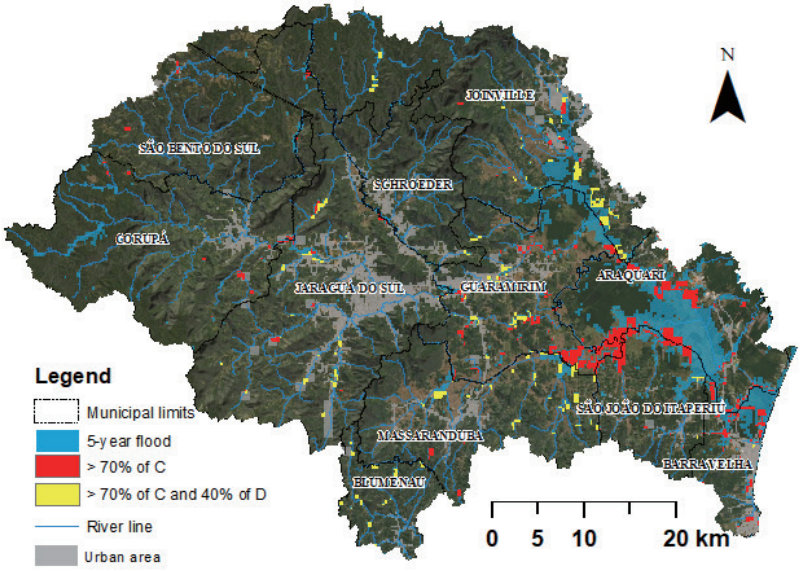


Figure: Location of the two lowest income levels in the Itapocu basin (red and yellow)

Keywords: inequality, flood, household income, Itapocu

HAZARDOUS AREA RESULTING FROM TAILINGS DAM FAILURE

MARTINS AMENO Herman Ziyang, from Brazil
Press Communication Officer/Press Communication Section/Military Fire Brigade of Minas Gerais

Mining is an important economic activity for the state of Minas Gerais, Brazil. Millions of cubic meters of tailings from mining are stored in artificial retention barriers called tailings dams. However, these structures represent a significant risk, as the materials employed (mining waste, tailings, or compacted soil) raise uncertainties regarding their mechanical behavior, either due to their low shear strength or their variable permeability. In the last 20 years, at least five tailings dams collapsed in Minas Gerais, causing both death and damage. Currently, 221 tailings dams in the state could fail, and have potential to cause damage, as it is the case for the Casa de Pedra tailings dam. In the study area, numerical simulations employing depth-integrated 2-D governing equations for mudflow shows that approximately 500 houses could be affected in two adjacent neighborhoods. The simulated mud wave could reach some houses in less than 30 seconds. Slope monitoring, early warning systems, hazard maps, buffer zone, and retaining walls were proposed as countermeasures.

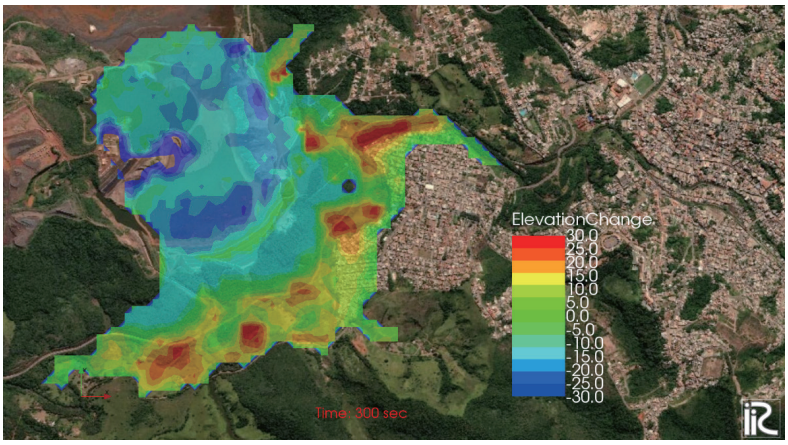


Figure: Distribution of flow pattern

Keywords: Mudflow, tailings dam, numerical simulation, hazard map, early warning system

DEVELOPING AN INTEGRATED WATER RESOURCES MANAGEMENT PLAN FOR CHINDWIN RIVER BASIN UNDER CHANGING CLIMATE

Khin Si Si Hlaing, from Myanmar
Staff Officer/Irrigation and Water Utilization Management Department/Ministry of Agriculture, Livestock and Irrigation

Agriculture is the mainstay of the economy in Myanmar, and the Chindwin River Basin (CRB) plays a vital role in both agricultural production and food exportation. However, inadequate water resource management policies together with water-related disasters that are exacerbated by climate change (i.e., floods and droughts) are major threats to the country's economy. This research has been carried out to address scientific, engineering, and policy challenges by utilizing advanced models and technologies to obtain evidence-based information to implement an Integrated Water Resources Management (IWRM) plan for this basin. The results indicate that rainfall in the basin is set to increase during the wet season and decrease in the dry season as a result of the future climate. The number of extreme rainfall events and intensities are also expected to increase in the future. To address the impact of climate change, a Water and Energy Budget of Rainfall-Runoff Inundation model (WEB-RRI) was developed for this basin, and its performance in simulating low flow, high flood peak, and inundation extents was verified. The model-simulated output for the future climate showed that monthly mean flow, extreme peak flow, and inundation extents will increase, whereas low flow will be slightly reduced. These results indicate more frequent and intensified floods in the future. To mitigate these identified water-related disasters under a changing climate and to introduce IWRM practices, several implementation strategies were examined for policy recommendation and proposed for use by decision makers.

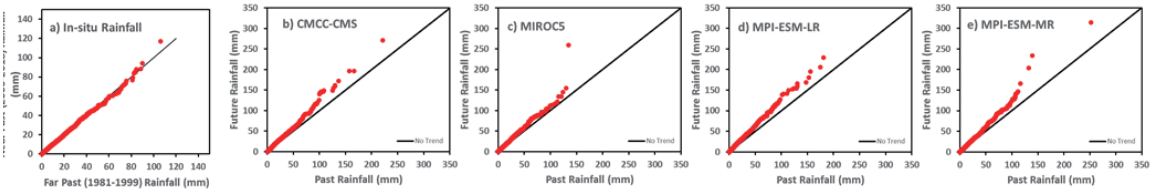


Figure 1. Trend Analysis for the daily past and future climate rainfall events

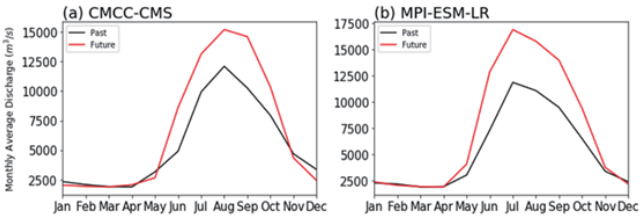


Figure 2. Monthly Average Discharge

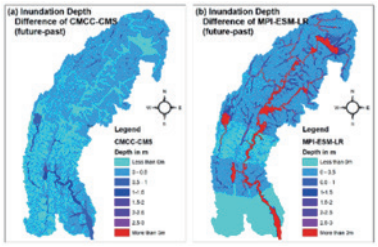


Figure 3. Inundation depth difference (Future-past)

Keywords: Chindwin River Basin (CRB), IWRM, Flood, Drought, GCMs, Rainfall

ANALYZING RIVER MORPHOLOGICAL CHANGES AND FORMULATING NO REGRET STRUCTURAL MEASURES IN CHINDWIN RIVER

Tin Aung Win, from Myanmar
Sub-Assistant Engineer-1/River Engineering Section/Directorate of Water Resources and Improvement of River System

This study focused on navigation improvement in Chindwin River between Alon and Monywa, Myanmar. Numerical analysis of two-dimensional depth-integrated flow and bed deformation was carried out to support decision-making for river improvement works. Using a flood hydrograph, computations equivalent to 103 d were conducted with different allocations of spur dikes to define the desired flow velocity, flow direction, sandbar movement, and discharge proportion. The results showed that while blocking the smaller channel can divert 50 to 80% of the flow to the main channel, the velocity in the latter increases from 1 to 1.3 m/s. On the other hand, constructing a series of dikes in the main channel can improve the navigable depth and protect the bank from erosion, but doing so will raise the water surface elevation. Efficient navigation improvement works can be implemented to maintain bank stability and avoid other impacts after gaining an understanding of sandbar movements and the effects of different countermeasures.

Key words: river navigation channel, numerical simulation, bed deformation, sandbar

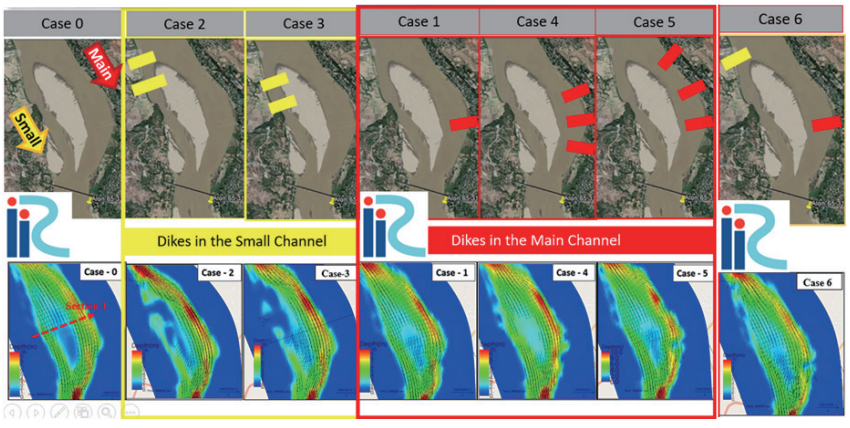


Figure: Comparison of the simulated results for 6 cases.

NUMERICAL STUDY FOR INFLUENCES OF FLOW DIVERSION ON CHANNEL MORPHOLOGY CASE STUDY OF BAGMATI RIVER, CENTRAL NEPAL

MAHARJAN Kapil, from Nepal
Hydro-geologist/Integrated Energy & Irrigation Special Program/Department of Water Resources and Irrigation

The study area is located in a transition zone between Mountain and the Terai Plain, where bank erosion due to the changing course of the Bagmati River is a major problem. To reduce bank erosion, this study proposed countermeasures to control flow patterns by means of levee embankments and investigated their effects using numerical simulations. The flow pattern and bed deformations were analyzed for different cases of bed load and suspended load to find an effective countermeasure. The numerical predictions suggested that the bed shear stress in the upstream reach increased spatially and temporarily compared to downstream, and that the increasing velocity in the left channel was a major factor enhancing bank erosion. The numerical results showed that one of the best countermeasures involved shifting the stream from the left to the right by means of an embankment.

Keywords: Flow diversion, Flow pattern, Morphological change, Bed deformation, Sediment transportation

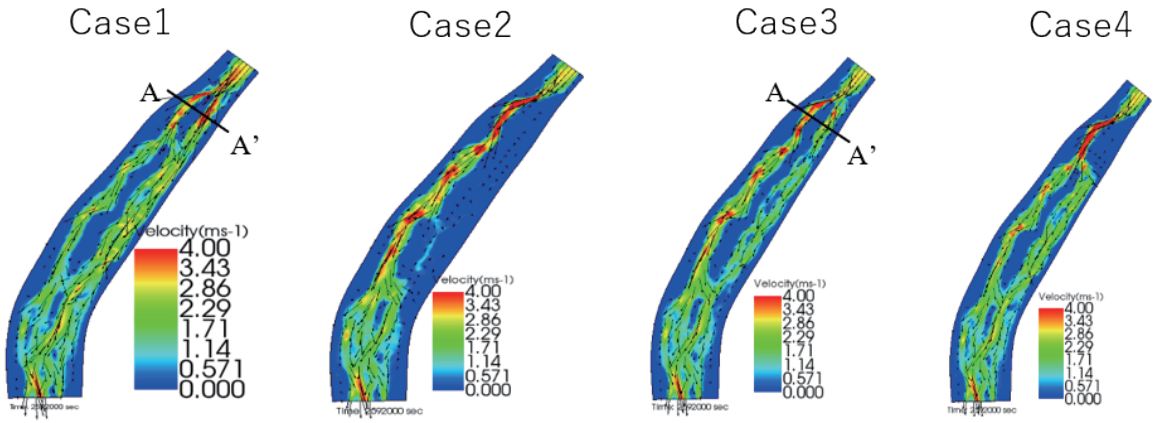


Figure: Computed results for the different series of countermeasures. The color contour shows the velocity distributions.

MORPHOLOGICAL STUDY OF KOSHI RIVER AT CHATARA AND ITS INFLUENCE ON INTAKE OF SUNSARI MORANG IRRIGATION PROJECT, NEPAL

MAHARJAN Mahesh, from Nepal
Civil Engineer/Integrated Energy & Irrigation Special Program/Department of Water Resources & Irrigation

The study aimed to understand the formation of bars and their behaviors, which can change the morphology of the Koshi River at Chatara, where the Sunsari Morang Irrigation Project (SMIP) was constructed to withdraw water from the river to feed the irrigation canal. Every year, substantial amounts of sediment are deposited near the intake area, interrupting sufficient water flow towards the intake during the dry season. The depth-integrated two-dimensional (2D) numerical model was used for the analysis. The study indicated the formation of a mid-channel bar, which could not be eliminated by constricting the river width downstream, whereas the location of the mid-channel bar changed when adding a spur upstream. These forced bars were formed due to the river bend upstream of the channel. In the presence of a mid-channel bar, there is not sufficient flow of water towards the intake in the dry season, whereas enough water could be diverted towards the intake with the addition of the spur.

Keywords: river morphology, 2D flow simulation, bed deformation, flow pattern, sediment transport rate

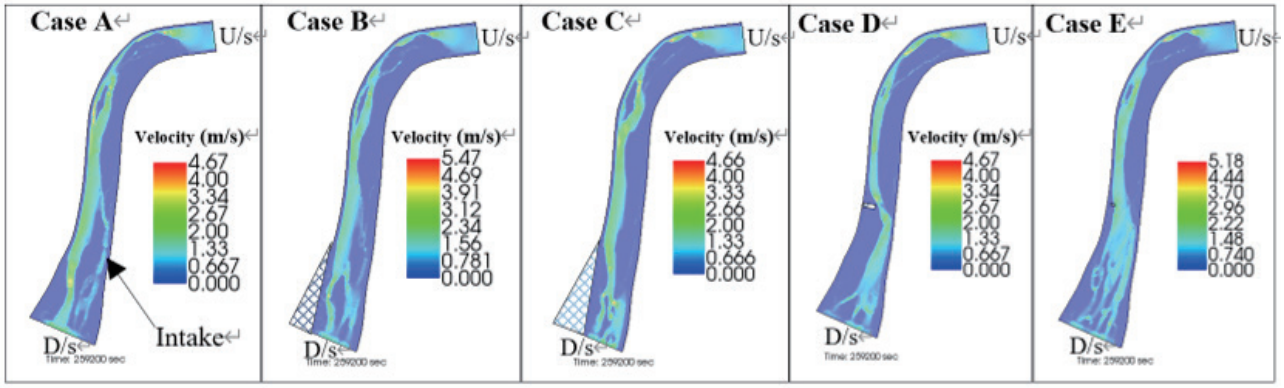


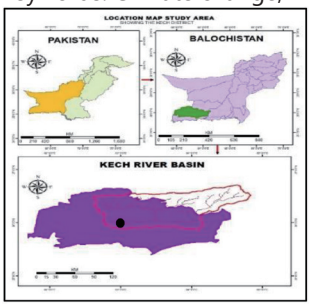
Figure: Distribution of flow pattern

CLIMATE CHANGE IMPACT ASSESSMENT ON THE FLOOD RISK CHANGE IN KECH RIVER, TURBAT BALOCHISTAN, PAKISTAN

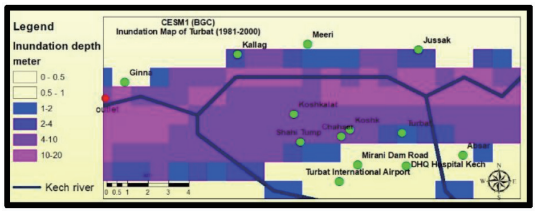
FARIAL Khawar, from Pakistan
Meteorologist/Pakistan Meteorological Department

According to the high risk of flood and drought conditions of Kech River, Balochistan, a research has been conducted to perceive the future scenario. A hydrological simulation based on the APHRODITE data showed inundation distribution comparable to MODIS data analysis, which validated the model. An assessment of the climate change effects on the flood and drought risk has been achieved through General Circulation Models (GCMs). Six GCMs whose historical climate reproduced better for the target area were chosen from the Coupled Model Intercomparison Project Phase 5 (CMIP5), and their bias were corrected on the APHRODITE data. The Representative Concentration Pathways 8.5 (RCP 8.5) scenario was selected for future scenario. The discharge and inundation in the projected climate were obtained through the simulation of the Rainfall-Runoff-Inundation (RRI) model. The increasing trend of inundation by global warming are used to assess upcoming conditions of the basin. Some of the GCMs showed large increase of rainfall in future suggested needs of more countermeasures for flood risk. The appropriate use of the information helps to mitigate the flood hazard.

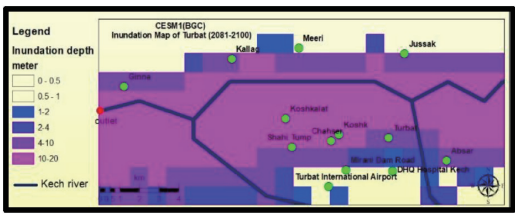
Keywords: Climate change, RRI Model, MODIS, CMIP5, Inundation



Location of Kech River basin



CESM1(BGC) Past Inundation Map



CESM1(BGC) Future Inundation Map
(Location is the center dot of the left map)

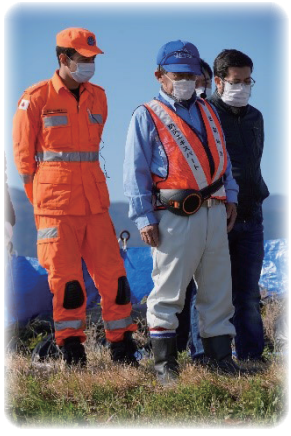
Comments from ICHARM master's program students
ICHARM 修士学生からのコメント

The research was carried out to address scientific, engineering and policy challenges for inadequate water resources management plans and impact of climate change in Myanmar. It could be supported for implementing an Integrated Water Resources Management (IWRM) plan based on evidence information. Decision makers might follow policies identified water-related disasters under changing climate by introducing IWRM practices.

(Khin Si Si Hlaing, from Myanmar)

The study discussed countermeasures to decrease bank erosion by means of numerical simulation. The results will help the decision makers to make river management planning in my country. I would like to express my sincere gratitude to my supervisors and the Professors for teaching river management knowledge.

(MAHARJAN Kapil, from Nepal)



The research I developed in Japan will be useful for my institution to plan buffer zones and other countermeasures for tailings dams. Also, in case of a collapse of a tailings dam, the research can shed light on the depth, area, and velocity the mudflow reached to help the rescue teams plan their operations.

Best regards.

(MARTINS AMENO Herman Ziyang, from Brazil)

My thesis tries to reveal the characteristics of the sand bar behavior formed along the channel, and the response of the channel associated with spur dike constructions by means of 2-D depth-integrated numerical computations. The results of this thesis will contribute to the decision making process for the decision makers. And also the knowledge of river engineering that I learned in Japan is very useful for me and my department's future works.

With regards,

(Tin Aung Win, from Myanmar)

Introduction of ICHARM research projects / 研究紹介

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) Water-related disaster data archiving, sharing and statistics
(2) Risk assessment on water-related disasters
(3) Monitoring and forecasting water-related disaster risk changes
(4) Support through proposal, evaluation and application of policies for water disaster risk reduction
(5) Support for improving the capacity to practice disaster prevention and mitigation

This issue introduces a researcher as listed below:

Ralph Allen Acierto, Research Specialist

Dynamic downscaling of climate change projections for basin-scale impact assessment

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、Ralph Allen Acierto 専門研究員の行っている「Dynamic downscaling of climate change projections for basin-scale impact assessment」を紹介します。

Dynamic downscaling of climate change projections for basin-scale impact assessment

Ralph Allen Acierto, Research Specialist
ラルフ　アレン　アチエルト　専門研究員

Developing countries are highly vulnerable to flood and drought disasters that lead to substantial socio-economic damages and loss of human lives. More significant damages in developing countries are expected due to the combination of rapidly increasing urbanization and projected increases in frequency and intensity of flood and drought disasters due to climate change. So, localized adaptation strategies to climate change impacts on flood and drought disasters are key in addressing these potential significant damages. In ICHARM, science-based end-to-end approach to produce localized adaptation measures for future floods and droughts under climate change is done by utilizing dynamic downscaling to produce localized (basin-scale) data, impact models (hydrological and inundation models), and risk assessment methodologies.

To develop basin-scale hazard assessment and adaptation measures, dynamic downscaling and bias-correction is necessary to produce localized climate change projections. This study contributes to ICHARMS's research on study on climate change impact assessment and formulation of adaptation measures, which is a part of the Integrated Hazard Prediction (Theme D) of the Integrated Research Program for Advancing Climate Models (TOUGOU Program) funded by the Ministry of Education, Culture, Sports, Science and Technology of Japan. As part of the TOUGOU program, one of the selected study areas is the Solo River located in the Java Island in Indonesia.

The basin-scale climate projections in Solo River were dynamically downscaled using the Weather and Research Forecast (WRF) model by using climate projections from global circulation model (GCMs) as shown in left picture in Figure 1. The GCMs used in this study were MRI 3.2H (60km) and MRI 3.2S (20km) as input to the WRF model. The WRF model's output are 5km downscaled (DS) data of localized climate projections from multiple scenarios (RCP 2.6 and RCP 8.5 for MRI 3.2H, and RCP 8.5 for MRI 3.2S). The downscaled 5km data were bias-corrected using quantile mapping method with raingauge dataset as reference. The WRF model was configured to capture monthly climatology and annual extreme rainfall in the river basin by comparing the output to rain gauge observation dataset. As shown in right picture in Figure 1, the downscaled 5km rainfall data reproduced the monthly climatology in the river basin better than the original GCM rainfall.

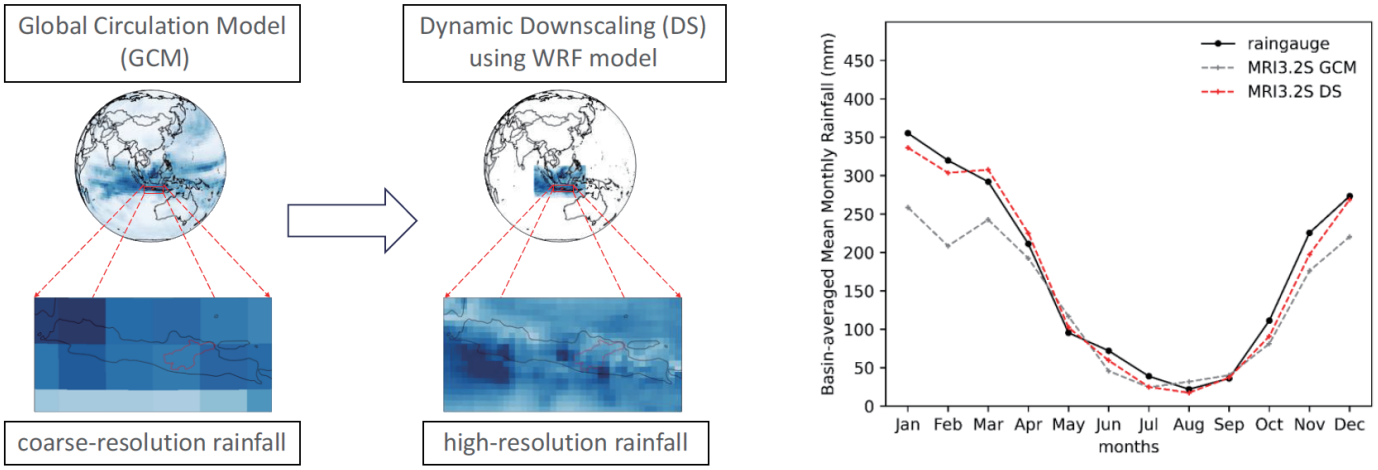


Figure 1. Diagram of dynamic downscaling of 5km climate projections from GCMs and Monthly climatology comparison plot of basin-averaged rainfall from raingauge, original MRI 3.2S GCM rainfall, and 5km MRI 3.2S DS rainfall in Solo River

Figure 2 shows the downscaled 5km spatial distribution of seasonal rainfall in the Solo River for the present climate and RCP 8.5 future climate from MRI 3.2 GCM. The RCP 8.5 future scenario shows an increase in rainfall in the river basin for all seasons with significant increase during wet seasons (DJF, MAM) located on the mountainous area in the upper part of the basin (river flows from south towards the equator).

These downscaled scenarios are being used as input to the hydrological models that quantify the future changes in flood and drought hazards for developing river basin flood and drought risk mitigation plans. By comparing results using different scenarios, we can also quantify the uncertainties in projected future hazard changes in developing river basin flood and drought risk mitigation plans. This study contributes to the development of science-based flood and drought management in the Solo River for climate change adaptation. Similar methodology is also applied to multiple river basins in the Philippines (Davao River, Pampanga River, and Pasig-Marikina-Laguna-Lake basin).

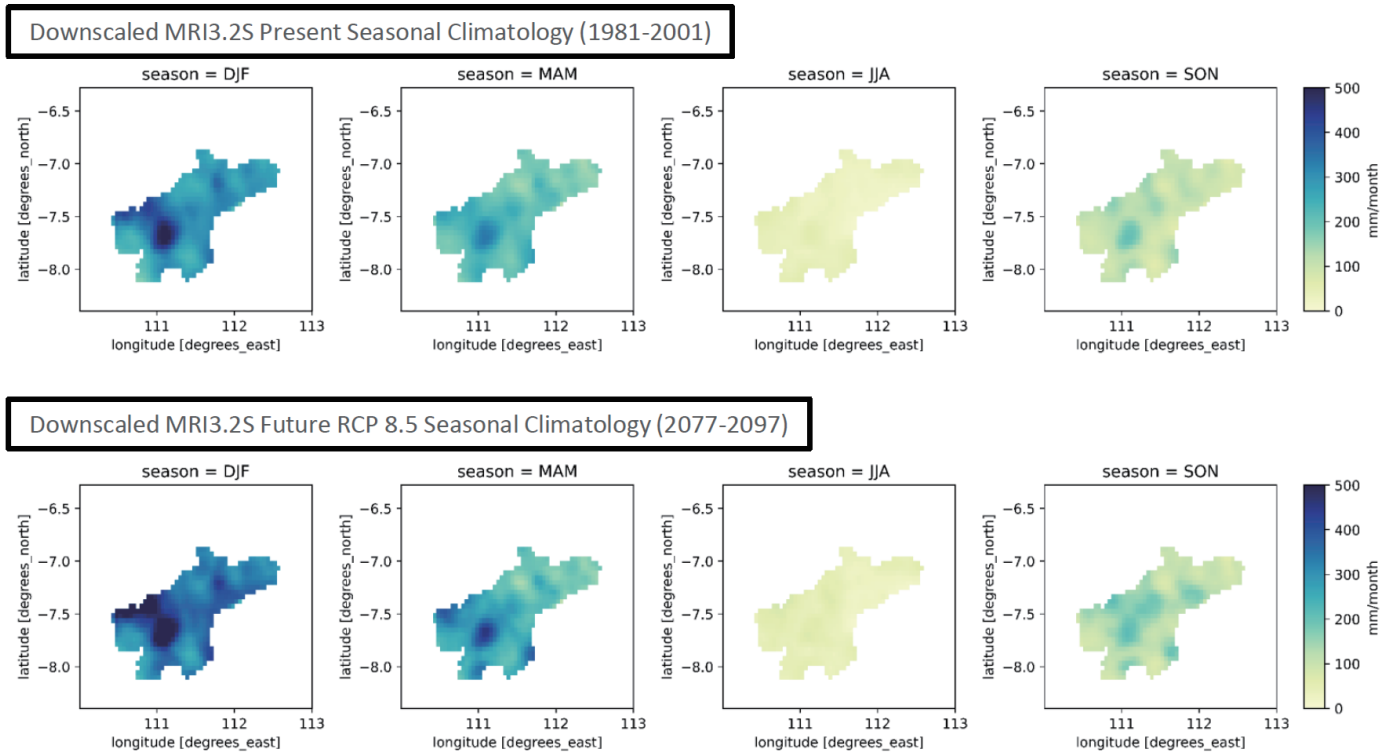


Figure 2. Dynamically downscaled 5km rainfall data in Solo River from the MRI 3.2S GCM.

Training & Education

Educational program updates
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」活動報告

ICHARM offers a master's degree program, "Water-related Disaster Management Course of Disaster Management Policy Program (JICA Knowledge Co-Creation Program on "Flood Disaster Risk Reduction"), in collaboration with JICA and the National Graduate Institute for Policy Studies (GRIPS). As of September 2020, 11 students are enrolled in this 13-year-old program and studying various issues related to the management of water-related disasters.

● Study Trip of M.Sc. students to Niigata

They recently took a study trip to the Shinano River basin as part of the program curriculum. The trip was originally scheduled in April but forced to be postponed due to the global pandemic of COVID-19.

Early in September, the students visited the Shinano River basin in Niigata Prefecture, one of the best rice-producing basins in Japan. The river basin has experienced many severe flood events, including the ones in 2004 and 2011, due to heavy rainfall.

On the first day, accompanied with the staff of the Shinanogawa Karyu River Office, the Hokuriku Regional Development Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), the students went to see the Yasuragi Levee, which has helped bring more people and businesses to the waterside area and thus boosted its economy. They also visited the Irifune Port Tower and the Sekibun Memorial Park to see the control measures against coastal erosion.

After that, they paid a visit to the office for a lecture on the heavy rain events in 2004 and 2011 and the effect of the preventive measures implemented after the 2004 event. The lecturer made a presentation on the successful implementation of the measures after the 2004 heavy rain, explaining that the number of flooded houses in 2011 was reduced by 90% compared with that in 2004 despite the rainfall in 2011 being 1.6 times that in 2004.

The office has been recently implementing additional countermeasures to enhance the local disaster management in collaboration with the national, prefectural and municipal governments.

In the afternoon, the students visited the Ohkozu Museum to learn about the Ohkozu Diversion Channel, which was built in 1922 and then called "Oriental Panama Canal" due to its large-scale construction. The staff of the Shinanogawa River Office outlined the construction at the time. After that, they moved to the Nitoko Mie-ru Museum, which was renewed last June as a base to provide civil engineering information for the general public. The students listened to an explanation about a current river improvement project to widen the river channel by excavating hill slopes. They also tried out augmented and virtual reality technology, which enabled them to have a virtual but very real experience of the ongoing construction while being in the observation space on the museum's second floor.

On the second day, the student visited the Shinano River Park in Ojiya City, where they practiced discharge measurement in the Shinano River, following instructions from PWRI researchers. Despite extremely hot weather, they worked on the practice diligently, which was the first outdoor training they had in a very long time.

In the afternoon, they visited Sagurigawa Dam, where an officer of the Sagurigawa Dam Management Office explained the history and structure of the rockfill dam and took them to the inside of the dam body, which was a rare opportunity.

On the final day, before going back to Tsukuba, the students stopped at Yamba

ICHARM では、（独）国際協力機構（JICA）及び政策研究大学院大学（GRIPS）と連携して、本年で 13 年目となる修士課程「防災政策プログラム水災害リスクマネジメントコース」（JICA 研修「洪水防災」）を実施しています。2019-20 年の 11 名の研修員に対して ICHARM 内での講義に加えて、日本の洪水対策についてよりよく理解するための現地見学を実施しました。

● 修士課程研修　現地見学

以下、9 月に実施した現地見学の概要を報告します。なお、当該見学は本来 4 月に実施する予定でしたが、新型コロナウイルス感染症拡大防止の観点から延期しておりました。

信濃川流域は豊かな穀倉地帯である一方、2004 年及び 2011 年に代表される豪雨災害が発生した地域です。

現地見学初日は、信濃川下流河川事務所の職員に同行していただき、水辺の賑わいや経済効果を創出している「やすらぎ堤」を訪れた後、海岸浸食に対する取り組みを見学するため、「入船みなとタワー」や「関分記念公園」を訪れました。

続いて、同事務所を訪問し、上記過去 2 回の豪雨とその対策事業の効果について講義を受けました。2004 年豪雨後の対策事業の効果として、2011 年の降水量は 2004 年の 1.6 倍であったにもかかわらず、浸水家屋戸数は 2004 年よりも 90% 減らすことが出来たとの説明を受けました。近年は国・県・市町村が連携し、地域の防災力を向上させる取組を行っています。

その後、1922 年に完成し、当時「東洋のパナマ運河」と呼ばれるほどの大工事と言われた大河津分水路を見学しました。初めに「大河津資料館」にて、信濃川河川事務所の職員から当時の工事の概要について説明を受けた後、今年 6 月にリニューアルされた情報発信基地「にとこみえ～る館」を訪れました。そこでは洪水処理能力向上のため、山地部を掘削し川幅を広げる現在の改修事業について説明を受け、拡張現実（AR）及び仮想現実 (VR) を体験出来る最新機器を用いながら現場の状況を身近に感じることが出来ました。

2 日目は、まず小千谷市に移動し、信濃川河川公園にて土木研究所職員より流量観測の実習を受けました。その日は気温が高く研修員の体調が心配されましたが、久しぶりの屋外実習で皆真摯に取り組んでいました。その後、三国川

ダムを訪問し、ロックフィルダムの説明を受けた後、堤体内を見学しました。

最終日は、群馬県の八ッ場ダムと世界遺産である富岡製糸場に立ち寄り、それぞれ現地のガイドより歴史的・文化的観点から説明を受けました。

今回の現地見学は、心配されていた台風の影響も無く、またコースインストラクターである小池センター長も初めて同行しました。何よりも新型コロナウイルスの影響により半年間様々な制限を強いられていた中で修士論文を書き上げた学生にとって、帰国前に日本の治水対策の実例を直接学ぶことが出来たことは、非常に良い経験となりました。

最後に、ご多用のなか、ご対応いただきました国土交通省北陸地方整備局信濃川下流河川事務所、同信濃川河川事務所、同三国川ダム管理所の職員及び道の駅八ッ場ふるさと館、富岡製糸場のガイドの皆様には現地訪問に大変お世話になりました。ここにお礼申し上げます。

● JICA 第 13 期研修 閉講式

2020 年 9 月 14 日には、ICHARM にて第 13 期研修の閉講式が行われました。

JICA 筑波から小田亜紀子次長、ICHARM から小池俊雄センター長、GRIPS からオンラインで菅原賢教授による祝辞が贈られ、研修員の代表として Phuntsho Tashi 氏（ブータン）が答辞を述べました。

優れた研究成果を残した学生に贈られる「Best Research Award」は、8 月 6 日に実施された最終プレゼンテーションの結果と論文を総合的に判断し、Rahman Md Shahinur 氏（バングラデシュ）、Phuntsho Tashi 氏（ブータン）の 2 名に授与されました。また、研修員同士の他薦により、研修中最も参加者全体のために貢献したと思われる研修員に対して、ICHARM から「Sontoku Award」が Islam Md Masbahul 氏（バングラディシュ）に贈られました。

● GRIPS 学位記授与式

今年度は新型コロナウイルスの影響により、事前に GRIPS にてガウンを着用した記念撮影を行い、9 月 15 日の授与式当日は、ICHARM にてオンラインで聴講する形式となりました。修士課程の研修員 11 名に「修士（防災政策）」の学位が、博士課程の Saif Ahmed Tanjir 氏に「博士（防災学）」の学位が授与されました。また、GRIPS から成績優秀者表彰として、Silva Araujo Rafael 氏（ブラジル）に Dean's Award が贈られ、Rafael 氏が修了生代表挨拶を述べました。

● JICA 第 14 期研修 開講式

10 月からは、14 期目の修士課程が開始され、1 日に ICHARM においてオンラインによる開講式を行いました。JICA 筑波からは渡邊健所長及び事務担当者、GRIPS からはオンラインにて菅原賢教授、土木研究所

Dam and the Tomioka Silk Mill, a world heritage, in Gunma Prefecture. At each location, local guides showed them around the main spots and explained their historical and cultural backgrounds.

The study trip was blessed with good weather, hardly affected by a typhoon hitting southern Japan at that time. Moreover, Executive Director KOIKE Toshio accompanied them on the trip for the first time. The students successfully completed the training scheduled and had rare opportunities to take a close look at Japan's flood control measures in operation. The trip may have been particularly special to the students, because it took place soon after they completed their theses and also because they had been forced to live a highly restricted, stressful life for the past six months due to the COVID-19.

Finally, ICHARM would like to express its deepest appreciation to all the offices for their excellent support for the study trip.

At the Ohkozu Museum
大河津資料館にて

Discharge measurement workshop in the Shinano River
信濃川流量観測実習

At Yamba Dam
八ッ場ダムにて

● 13th closing ceremony hosted by JICA

On September 14, 2020, the closing ceremony of the 13-year-old master's program was held at ICHARM. JICA Tsukuba Deputy Director General ODA Akiko, ICHARM Executive Director KOIKE Toshio, and GRIPS Professor SUGAWARA Masaru, who attended the ceremony online, made a congratulatory speech. Mr. Phuntsho Tashi of Bhutan spoke in return on behalf of the students.

In the ceremony, the Best Research Award was presented to Mr. Rahman Md Shahinur of Bangladesh and Mr. Phuntsho Tashi of Bhutan this year. The award was given those two by ICHARM and GRIPS to laud them for excellent work based on their master's theses and final presentations they delivered on August 6. The Sontoku Award, selected by their fellow trainees, was presented to Mr. Islam Md Masbahul of Bangladesh. This award is given every year by ICHARM to the student who made an outstanding contribution to the class throughout the program.

The 13th Closing Ceremony for JICA Knowledge Co-Creation Program on "Flood Disaster Risk Reduction" at ICHARM
ICHARM にて「防災政策プログラム水災害リスクマネジメントコース」第 13 期閉講式

● Graduation ceremony hosted by GRIPS

On September 15, 2020, the graduation ceremony was held by GRIPS for graduate students who studied in various programs there. This year, the ceremony was held online due to the COVID-19 pandemic. Eleven master's students and one doctoral student who completed the programs at ICHARM also participated online from ICHARM. Several days before the ceremony, they took memorial photos at GRIPS with a graduation gown on.

In the ceremony, all the students were finally awarded a hard-earned master's or doctoral degree in disaster management.

In addition, GRIPS presented Mr. Silva Araujo Rafael of Brazil with the Dean's Award for his excellent academic achievement. He also gave a speech on behalf of all graduating students.

Memorial photo of students in a graduation gown at GRIPS
GRIPS にてガウンを着て記念撮影

●14th opening ceremony hosted by JICA

Meanwhile, seven new students have started the 14th year of the master's program. On October 1, the opening ceremony was held at ICHARM in the presence of JICA Tsukuba Director General WATANABE Takeshi, GRIPS Professor Sugawara, via an online system, and PWRI President NISHIKAWA Kazuhiro along with other JICA officials and PWRI executives. Although the new students attended the starting event online, ICHARM really hopes that the COVID-19 situation will soon settle down so that they will be able to come to Japan and engage in the training as it has been practiced for over a decade.

Opening ceremony at ICHARM
ICHARM での開講式

(Written by MIYAZAKI Ryosuke)

から西川和廣理事長及び幹部職員が参加しました。本年度は７名が新たに１年間の研修を受けます。新型コロナウイルスが沈静化し、研修員達の一日も早い来日が待たれます。

Comments from visiting researchers
招聘研究員からのコメント

ICHARM では、ブルキナファソから Salifou Dene 氏を受け入れました。
Dene氏からの、ICHARMでの研究活動を振り返ったコメントを紹介いたします。

ICHARM accepted a visiting researcher Mr. Salifou Dene from Volta Basin Authority (VBA), Burkina Faso from March to August.

He contributed a short message as below while looking back at his research at ICHARM.

Africa trains its experts at ICHARM

Mr. Salifou Dene, from Burkina Faso (Volta Basin Authority, VBA) Stay period: March 4 - August 5, 2020

In this year 2020, I had a new opportunity to strengthen my capacities at the International Centre for Water Hazard and Risk Management (ICHARM) in Japan as part of the Water related disaster reduction platform to enhance resilience to climate change in West Africa (WADiRE-Africa) by UNESCO.

Executive Director KOIKE Toshio and Mr. Salifou Dene (Right)

The project will set up a regional flood early warning system focusing on the Niger and Volta basins. The project will contribute to enhancing the capacity of countries and river basin organizations on the management of flood disasters through integrated flood management approaches.

During this scientific stay, which was very rich in teaching based on the Water Energy Budget Rainfall-Runoff-Inundation (WEB-RRI), rainfall and discharges data management and contingency plan implementation, implementing VBA data for statistical bias-correction of GSMaP data on DIAS, testing the FEWS prototype of the Volta basin, applying national scale WEB-RRI model to obtain flood inundation depth, developing specific contingency plans for the hot spots in the Volta basin, and participating in e-learning material preparation for the training of trainers and national workshops.

With these tools, I am ready to serve and share my skills so that we can overcome the natural disasters that cause floods in the Volta Basin.

To all my supervisors, who, during my stay, gave me lectures and technical support so that I can use these tools, I send them my sincere thanks: Professor Emeritus Toshio KOIKE, director of ICHARM, who agreed to receive me at ICHARM, Mr. Hiroyuki ITO, the professors and associate researchers Miho OHARA and Rasmy Abdul Wahid, the researchers Katsunori TAMAKAWA, Kentaro AIDA, Yoshimasa MOROOKA, and the professors of Tokyo University Eiji IKOMA, Masaki YASUKAWA, without forgetting Asuka SATO who helped me anytime, Maksym GUSYEV, whom I thank for his advice, Mikiko NAKAMURA for relaxation in badminton during lunch breaks.

Mr. Salifou Dene (center) with ICHARM members

Information Networking

ICHARM's contribution to the international network activities under the COVID-19 pandemic
新型コロナウイルス感染症大流行下における国際ネットワーク活動へのICHARMの貢献

Despite the severe restrictions on business trips abroad and participation in face-to-face meetings due to the prevention of the COVID-19 pandemic, ICHARM has been active in contributing to the international network activities mainly through the Internet.

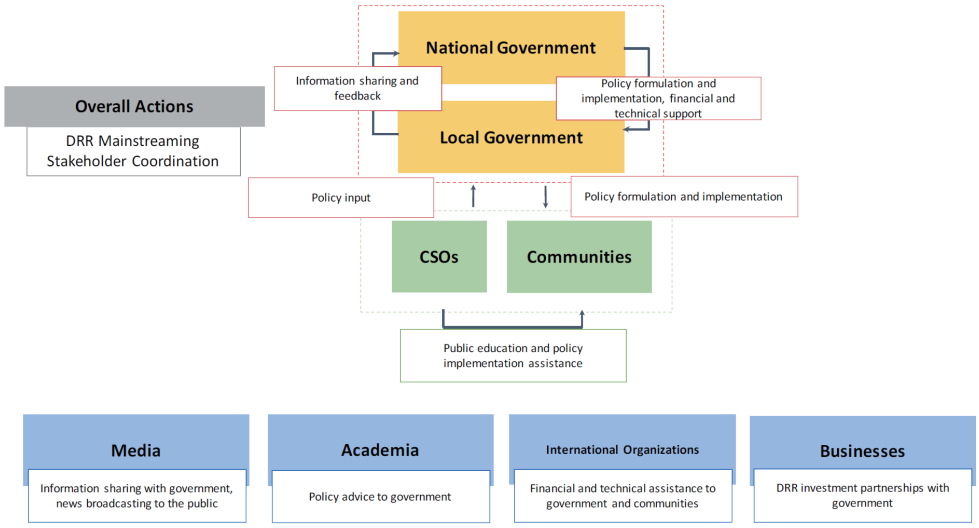
1. Joint development of a policy brief of ADBI

Water-related disasters, referring to climatological and hydro-meteorological events, derail sustainable development, therefore making it paramount to embed water-related disaster resilience into the SDGs. The COVID-19 pandemic of recent date has made disaster risk reduction even more challenging.

Jointly organized by the Asian Development Bank Institute (ADBI) and ICHARM, the Policy Dialogue on Water-related Disaster Resilience under Climate Change was held on January 27-28, 2020. It focused on exploring and discussing initiatives and efforts for strengthening governance and investment for water-related disaster resilience under climate change in Asia through transdisciplinary dialogue and collaborative work between the science and technology community and other stakeholders, including senior government officials and experts from international development organizations.

Based on their experience, ADBI and ICHARM co-published a policy brief, "Frontiers of Water-Related Disaster Management and the Way Forward," this August, which emphasizes that: "Effective governance is one of the most essential elements of an overall disaster risk management strategy" among others. It also highlights case studies from the Philippines (Activities in Davao City), Japan (Challenges to adapt to climate change), and India (Learning from previous disasters).

https://www.adb.org/publications/frontiers-water-related-disaster-management-way-forward



Disaster Risk Reduction Governance Framework (Source: Policy Brief)
災害リスク軽減に関するガバナンスの枠組み（出展：Policy Brief）

2. Presentation at the ICFM webinar

The International Conference on Flood Management (ICFM) is held every three years to discuss a wider range of flood-related issues. ICHARM has long been participating in ICFMs and worked as a secretariat for ICFM5, held on September 27-29, 2011, in Tokyo, with others. ICFM8 will be held on August 9-11, 2021, in Iowa, USA, after the decision of its postponement from August 2020, and ICHARM

COVID-19の感染症拡大を防止すべく、海外出張や対面での会議への参加に対して厳しい制約がある中においても、ICHARMでは主にオンラインを通じて国際ネットワーク活動に積極的に貢献することとしています。

1．ADBI Policy Briefの共同作成

気候・気象水文現象などに起因する水関連災害は持続可能な成長を遅らせ、それゆえに水関連災害に対するレジリエンスを持続可能な開発目標（SDGs）に埋め込むことが最重要となっています。また、近年のCOVID-19感染症拡大により、災害リスク軽減への取り組みは一層重要な課題となってきています。

2020年1月27～28日、「気候変動下における水関連災害へのレジリエンスに関する政策対話（Policy Dialogue on Water-related Disaster Resilience under Climate Change）」がアジア開発銀行研究所（ADBI）とICHARMとで共催されました。本政策対話は、科学技術コミュニティと政府高官や開発に関わる国際機関の専門家等のステークホルダーとの間で、セクターを超えた対話及び協働を通じて、アジア地域を対象に気候変動下における水関連災害レジリエンス向上に必要なガバナンスや投資を強化する取り組みについて議論することに焦点が置かれました。

そうした経緯を踏まえ、この8月、政策提言集（Policy Brief）「水関連災害対策の最先端と今後の取り組み（Frontiers of Water-Related Disaster Management and the Way Forward）」をADBIとICHARMとで共同出版しました。ここでは「効果的なガバナンスは全体的な災害リスク管理戦略にとって必須要素の一つである。」ことが特に強調され、フィリピン（Davao市での活動）や日本（気候変動適応への課題）、そしてインド（過去の災害からの教訓）におけるケース・スタディが盛り込まれています。

https://www.adb.org/publications/frontiers-water-related-disaster-management-way-forward

2．ICFMウェビナーでの発表

洪水管理国際会議（ICFM）は洪水に関して広範に議論する機会として3年ごとに開催されています。ICHARMはICFMに長く参加してきており、特に2011年9月27～29日に東京で開催されたICFM5では事務局を務めました。ICFM8は当初、2020年8月に開催される予定でしたが、2021年8月9～11日に延期されて米国アイオワで開催されることとなりました。ICHARMではテーマ・セッションの開催や研究

論文の発表等を通じて参画する予定です。

それに先立ち、COVID-19 による洪水対策への影響に関連する議論を行うために ICFM ウェビナーが開催されています。ICFM ウェビナー 2.0 は「洪水に関するレジリエンスへの課題（The Flood Challenge to Resilience）」として 2020 年 8 月 27 日にライブ配信されました。本ウェビナーでは、小池俊雄センター長から今年 7 月に九州で発生した洪水災害について発表するとともに、ICHARM が最近出版した「水害対応ヒヤリ・ハット事例集」の紹介が行われました。また「気候モデルに連動させた洪水計画」や「流域治水」といった日本の新たな政策について発表が行われました。ウェビナーでは中国における過去数十年で最悪と言われる洪水災害や、ダムの崩壊によって数千名が避難したものの死者が生じなかった米国ミシガン州の事例が報告されました。
http://www.icfm.world/Webinars/webinars-no-2.html

3．WWF9 への貢献

2021 年 3 月の開催が予定されている第 9 回世界水フォーラム（WWF9）では具体的な反応や活動を特定し、推進し、そして実行させることを目指しています。ここでは水の安全保障、地域の発展、協力、そして手段・手法といった 4 つの優先テーマに焦点を当てています。これらのテーマは 45 のパイロット・グループによって調整され、それぞれの優先テーマに対してより目的志向で取り組むためにアクション・グループが設置され、200 もの機関が参画しています。ICHARM はアクション・グループ 3C「ODA を含めた国際協力の拡張と平和を育む能力開発（Expand international cooperation, including ODA, and capacity building to foster peace）」に参画し、他の機関とともに議論を進めています。

https://www.worldwatercouncil.org/en/dakar-2021

https://www.worldwatercouncil.org/sites/default/files/World_Water_Forum_09/9th_Forum_List_PG_and_AG_publish_.pdf

will be involved, organizing thematic sessions and presenting research theses.

Since the postponement, ICFM webinars have been held for discussions on the impact of COVID-19 on flood management. ICFM webinar 2.0 was livestreamed on August 27, 2020, focusing on "The Flood Challenge to Resilience." In this webinar, ICHARM Executive Director KOIKE Toshio explained the July 2020 flood disaster in Kyushu and introduced "Collection of Critical Situations during Flood Emergency Response", which ICHARM has recently published. In addition, he presented the policy development of the government of Japan on "Flood design by coupling with climate models" and "Basin-wide Flood Management." This webinar also highlighted the worst flooding in the last decades in China and the evacuation of thousands of people with no loss of lives after dam failures in Michigan, USA.

http://www.icfm.world/Webinars/webinars-no-2.html

Speakers in the webinar (Source: ICFM website)
ウェビナーの様子（出典：ICFM ウェブサイト）

3. Contribution to WWF9

Scheduled in March 2021, the 9th World Water Forum (WWF9) will seek to identify, promote and implement concrete responses and actions. It will focus on four priorities: Water Security; Rural Development; Cooperation; and Means and Tools, which will be coordinated by the Pilot Groups composed of 45 organizations. Formed by 200 organizations, the Action Groups have been established at a more focused objective level under each of these priority areas. ICHARM has been assigned to the Action Group 3C for "Expand international cooperation, including ODA, and capacity building to foster peace" under the theme of "Cooperation" and already promoting discussions together with other participating organizations.

https://www.worldwatercouncil.org/en/dakar-2021

https://www.worldwatercouncil.org/sites/default/files/World_Water_Forum_09/9th_Forum_List_PG_and_AG_publish_.pdf

Interactive breakout session at the WWF9 Kick-Off meeting (in Dakar, Senegal, on June 20, 2019)
WWF9 キックオフミーティングでの対話型セッション（セネガル・ダカール、2019 年 6 月 20 日）

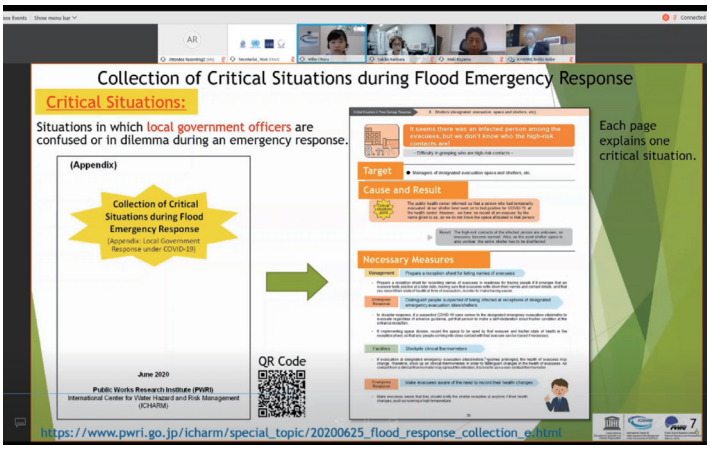
(Written by IKEDA Tetsuya)

Contribution to the International Online Conference to Address Water-related Disaster Risk Reduction (DRR) under the COVID-19 Pandemic
新型コロナウイルス感染症大流行下の水防災に関する国際オンライン会議への貢献

The International Online Conference to Address Water-related Disaster Risk Reduction (DRR) under the COVID-19 Pandemic was held on August 20, 2020. It was jointly organized by the High-Level Experts and Leaders Panel on Water and Disasters (HELP), the United Nations Department of Economic and Social Affairs (UNDESA)/United Nations Centre for Regional Development (UNCRD), the Asian Development Bank (ADB), the National Graduate Institute for Policy Studies (GRIPS), and others.

HELP created "Principles to Address Water-related Disaster Risk Reduction (DRR) under the COVID-19 Pandemic" to help political leaders, DRR and COVID-19 managers, and all stakeholders cope with these challenges by the co-occuring disasters. (https://www.wateranddisaster.org/covid-19/). In this conference, a wide range of participants, including leaders, government officials, representatives of international, UN and civil society organizations, and experts on DRR, water and health, discussed effective ways to address water-related DRR under the COVID-19 pandemic. Their Majesties the Emperor and Empress of Japan, together with approximately 300 participants from 40 countries, attended and viewed the conference virtually.

Chaired by Dr. Han Seung-soo, the HELP chair and former prime minister of the Republic of Korea, the keynote speeches were delivered by Mr. Angel Gurría, the secretary-general of the Organization of Economic Co-operation and Development (OECD), and H.E. Dr. Danilo Türk, the former president of the Republic of Slovenia, the chair of the Global High-Level Panel on Water and Peace, and the lead political advisor of the Geneva Water Hub. A scientific omnibus presentation, "Role of Science and Technology to Cope with Challenges on Water, Disaster, and COVID-19," followed, coordinated by Prof. Gretchen Kalonji, the dean of the Institute for Disaster Management and Reconstruction, Sichuan University, China, and ICHARM Executive Director KOIKE Toshio. In this session, Senior Researcher OHARA Miho gave a presentation on "Coping with Flood Disasters during the COVID-19 Pandemic" jointly with Dr. KOYAMA Maki, an associate professor of Gifu University, and Dr. KANBARA Sakiko, a professor of University of Kochi. In the presentation, OHARA introduced a booklet entitled "Collection of Critical Situations during Flood Emergency Response," which was published by ICHARM to support local government officers in learning about possible critical situations they may face during flood emergency response under COVID-19 and also to assist local governments in improving emergency response capabilities. ICHARM will continue the effort to contribute to the capacity development of local governments by using the booklet.



Presentation by Senior Researcher OHARA Miho at the scientific omnibus presentation
科学技術セッションでの大原美保主任研究員の発表

The detail of the international online conference is available on the website of HELP.

https://www.wateranddisaster.org/the-international-online-conference-to-address-water-related-disaster-risk-reduction-drr-under-the-covid-19-pandemic/

(Written by OHARA Miho)

2020 年 8 月 20 日に、水と災害に関するハイレベルパネル（HELP）、国連経済社会局（UNDESA）/ 国連地域開発センター（UNCRD）、アジア開発銀行（ADB）、政策研究大学院大学（GRIPS）等の共催により、「新型コロナウイルス感染症大流行下の水防災に関する国際オンライン会議」が開催されました。HELP は、政治指導者、防災対応及び新型コロナウイルス感染症対応責任者、さらに全ての利害関係者が新型コロナウイルス感染症大流行下で災害が起こった場合に同時発生する様々な課題に対処するため「新型コロナウイルス感染症大流行下で水関連災害に対処するための原則」を作成・公表しています (https://www.wateranddisaster.org/covid-19/)。このような状況を踏まえて、本会議には、水災害・水問題・健康分野のリーダー、行政職員、国際機関・国連機関・市民社会の代表者、専門家等が参加し、新型コロナウイルス感染症大流行下の水災害への効果的な対処方法について議論を行いました。日本国天皇皇后両陛下をはじめ、40 ヵ国から約 300 名が本会議に参加・視聴しました。

HELP 議長・元韓国国務総理のハン・スンス氏の司会のもと、経済協力開発機構（OECD）事務総長のアンヘル・グリア氏および元スロベニア大統領・水と平和に関する世界ハイレベルパネル議長・ジュネーブウォーターハブリード政治アドバイザーのダニロ・テュルク氏が基調講演を行いました。続いて、四川大学災害危機管理学部長・教授のグレチェン・カロンジ氏および ICHARM 小池俊雄センター長のコーディネートのもと、科学技術セッション「水、災害、新型コロナウイルス感染症の問題に対処する科学技術の役割」が開催されました。本セッションでは、大原美保主任研究員が、岐阜大学の小山真紀准教授・高知県立大学の神原咲子教授とともに、「新型コロナウイルス感染症の懸念がある水災害への対処」についての共同発表を行いました。大原主任研究員からは、地方自治体の職員が水害に際して起こりうる危機的事態を予測するのを助け、その災害対応力を向上させることを目指して ICHARM が作成・公表した「水害対応ヒヤリ・ハット事例集」の紹介を行いました。ICHARM では引き続き、「水害対応ヒヤリ・ハット事例集」を活用した地方自治体職員の災害対応力の向上に向けた活動を続けていく予定です。

本オンライン会議の詳細は、HELP のウェブサイトに掲載されています。
https://www.wateranddisaster.org/the-international-online-conference-to-address-water-related-disaster-risk-reduction-drr-under-the-covid-19-pandemic/

Miscellaneous

Personnel change announcements
人事異動のお知らせ

New ICHARM Members

Two new members joined ICHARM.
They would like to say brief hello to the readers around the world.

KOBAYASHI Hajime / 小林　肇
Chief Researcher / 上席研究員 — *Japan*

Until this past September, I was in charge of disseminating advanced technologies developed by PWRI, such as holding the 'PWRI New Technology Showcases'. Before that, until eight years ago, I worked as a JICA flood management expert in Kenya. I have just started working at ICHARM this October in charge of its educational and training programs. I am looking forward to teaching trainees about Japanese water hazard and risk management technologies.

Qin Menglu / 秦　梦露
Research Specialist / 専門研究員 — *China*

I am so excited to join ICHARM, where I can work with many researchers from different disciplines. I have been investigating how the river basin's geological and topographical conditions affect the morphodynamics of rivers. At ICHARM, I would like to focus all my attention to improving the fundamental theory of nonuniform sediment transportation to enhance the understanding of the behavior of the riverbed and channel variation among rivers, thus contributing to the prediction of water-related disasters.

Leaving ICHARM

- **OKADA Tomoyuki:** Chief Researcher
  United Nations

○**岡田　智幸**　上席研究員
国土交通省大臣官房付
派遣：国際連合

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

ICHARM accepted an internship student Ms. Tha Pisey from Cambodia from April to September 2020.

She contributed a short message as below while looking back at her studying at ICHARM.

ICHARMでは、インターン生として、Tha Pisey氏を受け入れました。

ICHARMでの研究活動を振り返って、Pisey氏からコメントをいただきました。

Ms. Tha Pisey, from Cambodia

Stay period: April 1 - September 28, 2020

My name is Tha Pisey from Cambodia. After graduating from Kyoto University, I began an internship as a Visiting Foreign Researcher at the International Center for Water Hazard and Risk Management (ICHARM). I came here to join the training programs on practical knowledge and technologies useful to reduce water-related risks. During my stay at ICHARM, I have been learning about Rainfall Runoff Inundation (RRI) model and how to use Data Integration and Analysis System (DIAS) for climate change impact assessment. Then, I applied the RRI model to advance my research about Flood Damage Assessment on Rice Crop in the Lower Mekong River Basin, under the supervision of Dr. Mohamed Rasmy Abdul Wahid and Dr. TAMAKAWA Katsunori. Flood damage assessment is an essential information needed to plan effective flood mitigation as well as for climate change adaptation and mitigation.

Executive Director KOIKE Toshio, Ms. Tha Pisey and Dr. Mohamed Rasmy Abdul (from left)

I also spent time on learning how to extract and interpret gridded precipitation using Python. I admit that I really learn a lot during my 6-months internship at ICHARM. Therefore, I would like to express my deepest gratitude to all ICHARM staffs for being so helpful and friendly to me since the very beginning until the completion of my internship period. I hope to use all the knowledge the I have learned from ICHARM contributing to disaster management in my home country, Cambodia.

Awards / 受賞リスト

* July - September 2020

- *Research Specialist Robin Kumar Biswas, Research and Training Advisor EGASHIRA Shinji and Research Specialist HARADA Daisuke were presented with the Best Paper Award for their paper at Asia and Pacific Regional Division of International Association for Hydro-Environment Engineering and Research (IAHR-APD), presented in the 22nd IAHR-APD Congress in Sapporo, Japan, September 15-16, 2020 (online).*

Award winning paper:
Robin K. Biswas, S. Egashira, D. Harada; Variability in Stage-Discharge Relationships in River Reach with Bed Evolutions, 22nd IAHR-APD Congress in Sapporo, Japan, September 15-16, 2020 (online).

Robin Kumar Biswas専門研究員、江頭信治研究・研修指導監および原田大輔専門研究員がAsia and Pacific Regional Division of International Association for Hydro-Environment Engineering and Research (IAHR-APD)にて優秀論文賞を受賞しました。

受賞論文：
Robin K. Biswas, S. Egashira, D. Harada; Variability in Stage-Discharge Relationships in River Reach with Bed Evolutions, 22nd IAHR-APD Congress in Sapporo, Japan, September 15-16, 2020 (online).

Publications / 発表論文リスト

* July - September 2020

1. Journals, etc. / 学術雑誌（論文誌、ジャーナル）

None / 該当者無し

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

- *傳田正利、諸岡良優、藤兼雅和、国土数値情報等と氾濫シミュレーションを用いた仮想洪水体験システムの開発、安全工学シンポジウム2020講演予稿集、pp.96～97、安全工学シンポジウム2020、2020年7月1日～2日*
- *HARADA Daisuke, EGASHIRA Shinji and ITO Hiroyuki, Characteristics of active sediment transport processes in extreme flood hazards, Proceedings of River Flow 2020, River Flow 2020 (Online), July 6-10, 2020*
- *Robin K. Biswas, EGASHIRA Shinji, HARADA Daisuke and ITO Hiroyuki, Evaluation of geomorphological characteristics in a quasi-equilibrium river channel, Proceedings of River Flow 2020, Proceedings of River Flow 2020, River Flow 2020 (Online), July 6-10, 2020*
- *傳田正利、諸岡良優、藤兼雅和、気象庁55年長期再解析・降雨流出氾濫モデル及び地理情報システムを用いた過去の洪水状況の再現と水災害史研究への活用可能性に関する研究、土木史研究講演集、pp.9～15、土木史研究講演会、2020年7月11日～12日*
- *KOIKE Toshio, Strengthening governance and investment for water-related disaster resilience under climate change in Asia, JpGU-AGU Joint Meeting 2020 (Online), July 12-16, 2020*
- *KOIKE Toshio, Satellite-based Data Assimilation Systems by Using Microwave Radiometers, JpGU-AGU Joint Meeting 2020 (Online), July 12-16, 2020*
- *Gusyev M., AKATA N., YAMANAKA T., HIRABAYASHI K. and Morgenstern U., Comparing tritium concentrations and water transit times in the Chikuma and Fujikawa River basins, Japan, JpGU-AGU Joint Meeting 2020 (Online), July 12-16, 2020*
- *HARADA Daisuke and EGASHIRA Shinji, Erosion rate of bed sediment in terms of entrainment concept, 22nd IAHR-APD CONGRESS 2020 IN SAPPORO, IAHR=APD (Online), Septemner 14-15, 2020*

3. Poster Presentations / ポスター発表

- *NAGUMO Naoko, HARADA Daisuke, Tanjir Saif Ahmed, EGASHIRA Shinji, Bank erosion owing to tidal currents and its impact on village distribution in the Sittaung River estuary, Myanmar, JpGU-AGU Joint Meeting 2020 (Online), July 12-16, 2020*

4. Magazines, Articles / 雑誌、記事（土技資含む）

None / 該当者無し

5. PWRI Publications / 土研刊行物（土研資料等）

None / 該当者無し

6. Other/ その他

None / 該当者無し

Editor's Note
編集後記

関東地方では 8 月 1 日ごろと発表された梅雨明け以降、35 度を超える猛暑日が続いた今年の夏も終わり、朝晩は冷え込むようになってきました。

COVID-19 の影響で海外への渡航が制限される中、ICHARM の活動も昨年度までの海外出張を伴うものから、オンラインでの会議など、New Normal の生活様式に沿った形に変わってきています。

本号でも紹介していますが、COVID-19 等の感染症が拡大している中での避難については今までの災害対応とは異なる行動が求められることもあります。ICHARM では防災に関する最新の情勢に目を配りながらこれからもニュースレターで情報発信を行ってまいります。

ICHARM ニュースレター
編集委員会
冨澤 洋介

In Japan, hot summer started around August 1, as soon as a very wet July ended. Many days were extremely steamy, with temperatures rising over 35 degrees Celsius. Finally, it started cooling down day by day around mid-September and now rather cold in the morning and evening.

Just like everybody else in the world, we at ICHARM are forced to adopt changes in our way of working while practicing a "new normal" lifestyle because of COVID-19. For one, under overseas travel restrictions, ICHARM's activities accompanying overseas business trips have been mostly conducted through WEB-based meetings.

As in this newsletter, evacuation activities under infectious diseases like COVID-19 require different considerations rarely thought of in existing disaster responses. ICHARM will continue to work in the frontline of disaster risk reduction activities and keep the readers posted with the latest information through newsletters.

ICHARM Newsletter Editorial Committee
TOMIZAWA Yosuke

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