

BULETIN SEADPRI

pusat kajian bencana asia tenggara
southeast asia disaster prevention research initiative

WELCOME, NEW HEAD OF SEADPRI-UKM SELAMAT DATANG KETUA PUSAT SEADPRI-UKM

Noor Shafirah Ramli

Since its establishment in 2008, SEADPRI-UKM has become a leader in innovative research and knowledge sharing on holistic disaster prevention, nationally and globally. In 2016, it was bestowed the status of the International Centre of Excellence (ICoE) in Disaster Risk and Climate Extremes in Southeast Asia. Its success is primarily due to the fact that it has been helmed by top researchers with experience and foresight.

At the helm, currently, we welcome Professor Dr. Sharifah Zarina Syed Zakaria, Her area of expertise is in Sustainability Education and Environment. She has been actively engaged in community work and programmes, especially with the indigenous community, for student development programmes.

When it was first established in 2008, SEADPRI-UKM was led by Emeritus Professor Dato' Dr. Ibrahim Komoo, a founder Director and a scholar in the field of Earth Science, specialized in Engineering Geology, Conservation Geology and Sustainability Science. As a renowned scientist in geological hazards in the country, he has also led a research team to the tsunami impacted areas in northern Malaysia, and published a book on "The Tsunami Disaster in Malaysia--an Environmental Socio-economic and Community

Well-being Impact Study.

After that, in 2012, Prof. Dato' Dr. Mazlin Mokhtar, a Senior Professor at the Universiti Kebangsaan Malaysia, with research experience in Sustainability Science and Governance took over. Prof. Dr Lee Yook Heng, who is a specialist in Environmental Pollution and Risk Assessment in Chemical Hazard Management, took over from 2013 to 2016.

SEADPRI-UKM was next led by Associate Prof. Dr. Sarah Aziz Abdul Ghani Aziz, the first woman to be appointed to the Chair. Her expertise in environmental and natural resources law, constitutional law, natural resources governance, the law on hazards and disasters preparedness and response stood her in good stead from 2016 to 2019.

Then from 2019 to 2020, SEADPRI-UKM was headed by Associate Prof. Dr. Goh Choo Ta, who is a known expert in chemical governance and chemical safety, particularly in the area of Globally Harmonised System of Classification and Labelling of Chemicals (GHS) in Malaysia. He has been promoted to Deputy Director of LESTARI in early 2021.

We look forward to more successful years ahead of SEADPRI-UKM under the leadership of Professor Zarina.



JUNE 2021

From top to bottom:

Professor Dr. Sharifah Zarina Syed Zakaria, Emeritus Professor Dato' Dr. Ibrahim Komoo; Professor Dato' Dr. Mazlin Mokhtar; Prof. Dr. Lee Yook Heng, Associate Prof. Dr. Sarah Aziz Abdul Ghani Aziz and Associate Prof. Dr. Goh Choo Ta



Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM)

Buletin SEADPRI

Buletin SEADPRI is published biannually by Universiti Kebangsaan Malaysia's Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM) through Penerbit LESTARI. It contains short communications, case studies and original research on science, technology, innovation, impact, vulnerability and governance related to disaster risk reduction.

About SEADPRI-UKM

Universiti Kebangsaan Malaysia's Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM) has been in operation since June 2008. Based at the Institute for Environment and Development (LESTARI), the Centre addresses crucial challenges on disaster risk reduction in Malaysia and the region. The research focus is on climatic hazards, geological hazards and technological hazards, with emphasis on capacity building, mainly through post-graduate programmes and specialized training. Transdisciplinary research conducted by the Centre is action-oriented, bridges the science-governance interface and provides pathways for disaster prevention.

In 2016, SEADPRI-UKM was acknowledged by the Integrated Research on Disaster Risk Programme (IRDR), jointly sponsored by International Science Council (ISC) and the United Nations Office for Disaster Risk Reduction (UNDRR), as an IRDR International Centre of Excellence (ICoE) for Disaster Risk and Climate Extremes (ICoE-SEADPRI-UKM). Globally, SEADPRI-UKM now sits with a group of 16 institutions with similar recognition, representing various regions. The focus of ICoE-SEADPRI-UKM is to strengthen local input for addressing regional disaster risks in conjunction with national and international partners. A major flagship is the Asian Network on Climate Science and Technology (ANCST), coordinated by SEADPRI-UKM and funded by the Cambridge Malaysian Education and Development Trust, to link disaster risk reduction and climate change for building resilience in the region.

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BELASUNGKAWA

Dalam kenangan
Allahyarham Prof. Madya Dr Tajul Anuar Jamaluddin

Pada 29 Julai 2020, UKM dan dunia geosains khususnya kehilangan seorang sarjana dan pendidik dalam bidang geologi. Allahyarham Prof. Madya Dr. Tajul Anuar Jamaluddin berkelulusan Sarjana Muda Sains Geologi dan Sarjana Sains Geologi Kejuruteraan daripada UKM, dan Doktor Falsafah Geologi Struktur University of Wales Aberystwyth, United Kingdom. Di UKM, beliau adalah Felo Bersekutu di Institut Alam Sekitar dan Pembangunan (LESTARI), pernah menyandang jawatan Ketua Program Bencana Geologi di Pusat Kajian Bencana Asia Tenggara (SEADPRI-UKM), sejak tahun 2008 sehingga 2013, dan pada masa yang sama mengajar di Program Geologi Fakulti Sain dan Teknologi.

Allahyarham Prof. Madya Dr. Tajul Anuar Jamaluddin tidak asing kepada media massa sebagai pakar geologi kejuruteraan dan geologi struktur serta sering tampil sebagai pakar rujuk untuk memberi penerangan mengenai isu-isu geobencana semasa terutamanya tanah runtuh. Pengalaman bersama beliau di SEADPRI-UKM, penyelidikan beliau terserlah bukan sahaja

mengenai tanah runtuh berskala besar yang langka di Malaysia, beliau merupakan penyelidik yang menerajui kajian geobahaya sesar aktif dan gempa bumi dan bencana tsunami peringkat kebangsaan di Malaysia.

Semasa bencana tsunami yang melanda Malaysia pada tahun 2004, beliau adalah antara penyelidik utama yang membuat pemetaan penilaian pantas di tempat kejadian sehingga terbukanya The 26.12.04 Tsunami Disaster in Malaysia: An Environmental, Socio-Economic and Community Well-Being Impact Study yang berjaya merekodkan fenomena dan impak gempa bumi dan tsunami. Dalam bidang dasar bencana, beliau ialah ketua penyelidik kepada kajian Policy and Planning Responses for Earthquake and Tsunami Hazards in Malaysia yang dianjurkan oleh Akademi Sains Malaysia untuk menasihati pihak berkepentingan dalam menghadapi bahaya gempa bumi dan tsunami yang pada masa tersebut bencana ini adalah amat baharu kepada negara Malaysia.

Al-Fatihah.

Research Highlight

Ketersediaan Maklumat Terbuka mengenai Elemen Keterdedahan di Kuala Lumpur, Malaysia (Availability of Open Data on Exposure Elements in Kuala Lumpur, Malaysia)

Siti Hasniza Muhammad Arshad, Nurfashareena Muhamad & Joy Jacqueline Pereira
SEADPRI-Universiti Kebangsaan Malaysia

Abstract: Exposure elements in the open access disaster database synonymous with critical infrastructure and basic services in the Sendai Framework on Disaster Risk Reduction (SFDRR) has been converted into spatial data to study flash floods in Kuala Lumpur, Malaysia. Information on exposure elements and vulnerability is vital for managing disaster risks in line with the goals of SFDRR. A limited number of open access databases are available for users to download information on exposure elements. The information is useful for building urban community resilience to address risks associated with climate change. This article is adapted from the paper titled *Exposure Elements in Disaster Databases and Availability for Local Scale Application: Case Study of Kuala Lumpur, Malaysia* that was published in *Frontiers Earth Science*.

Keywords: exposure elements, Sendai Framework, spatial data, flood hazard, disaster database, open access, disaster risk reduction, Malaysia

Abstrak: Elemen keterdedahan dalam pangkalan data bencana akses terbuka sinonim dengan infrastruktur kritikal dan perkhidmatan asas dalam Sendai Framework on Disaster Risk Reduction (SFDRR) telah diubah ke bentuk data spasial bagi menjalankan kajian berkenaan kesan bahaya banjir kilat di Kuala Lumpur, Malaysia. Maklumat mengenai elemen keterdedahan dan bahaya adalah penting bagi meningkatkan daya tahan masyarakat agar dapat bertindak dari bukan sekadar menangani bencana tetapi dapat menguruskan risiko bencana selaras dengan matlamat SFDRR. Hasil kajian menunjukkan bahawa terdapat beberapa pangkalan data di internet yang mempunyai akses terbuka di mana pengguna dapat mengakses dan memuat turun maklumat mengenai elemen terdedah. Maklumat tersebut dapat membantu proses membuat keputusan untuk membina daya tahan masyarakat bandar terhadap bahaya akibat perubahan iklim. Artikel ini diubahsuai daripada makalah bertajuk *Exposure Elements in Disaster Databases and Availability for Local Scale Application: Case Study of Kuala Lumpur, Malaysia* yang telah diterbitkan dalam jurnal *Frontiers Earth Science*.

Kata kunci: elemen keterdedahan, Sendai Framework, data spasial, bahaya banjir, pangkalan data bencana, akses terbuka, pengurangan risiko bencana, Malaysia

Pengenalan

Sejak beberapa dekad yang lalu, lebih daripada ratusan bencana yang direkodkan telah menyebabkan 11,755 kematian, melibatkan 95 juta orang dan mengakibatkan kerugian AS \$ 103 bilion di sektor ekonomi di seluruh dunia (EM-DAT, 2020). Kerugian dan kerosakan ekonomi meningkat secara global. Bahaya keterdedahan dikenal pasti sebagai pamacu utama peningkatan ini. Pangkalan data bencana berperanan sebagai alat utama untuk analisis ciri dan tren bencana pada skala global dan nasional bagi menyokong pengurangan risiko bencana (DRR) dan penyesuaian perubahan iklim (Huggel et al., 2015). Kebolehpangkalan data bencana berbeza berdasarkan tujuan penubuhannya; ia terbahagi kepada (a) akses terbuka, (b) terhad kepada akses tertentu (untuk sesuatu kumpulan atau organisasi sahaja) atau (c) terhad. Pangkalan data biasanya tersebar secara geografi (benua, wilayah, negara) dan dimiliki oleh pelbagai agensi dan pihak berkepentingan termasuk individu di seluruh dunia (Li et al., 2019). Negara-negara membangun giat mempromosikan inisiatif data terbuka yang digabungkan dengan maklumat yang bersumber dari orang ramai dengan fokus utama pada ketelusan, kebertanggungjawaban dan penyertaan orang ramai. Walau bagaimanapun, terdapat beberapa cabaran yang berkaitan dengan data akses terbuka. Ini termasuk sumber data tidak berstruktur, kehilangan data utama dan kebenaran/keselamatan maklumat (Harvard Humanitarian Initiative, 2011; Smith, 2013; Shah et al., 2015). Sebilangan besar pangkalan data global bencana hanya mengumpulkan maklumat berkenaan kerugian dan kerosakan. Terdapat beberapa pangkalan data global dan nasional yang menyediakan maklumat mengenai bahaya, di mana usaha untuk meningkatkan keseragaman dan pengurusan data masih menjadi satu isu yang berterusan (Wirtz, et al., 2014). Istilah keterdedahan ditakrifkan secara global sebagai keadaan di mana manusia,

satu isu yang berterusan (Wirtz, et al., 2014). Istilah keterdedahan ditakrifkan secara global sebagai keadaan di mana manusia, infrastruktur, perumahan, kapasiti pengeluaran dan aset manusia berada di kawasan yang rentan bahaya (UNDRR Terminology, 2017). Keterdedahan berkaitan dengan kerentanan dan bahaya terkandung di dalam pemodelan risiko. Istilah "elemen keterdedahan" dan "elemen terdedah" terhad dalam literatur yang dikaji oleh para pengkaji. Istilah "elemen berisiko" lebih biasa digunakan (Bell dan Glade, 2004; Papatoma-Kohle et al., 2007, 2016). Persepsi umum di era big data dan kesalinghubungan yang besar adalah bahawa semua kejadian bencana dan elemen keterdedahan di setiap tempat di muka bumi dipetakan secara terperinci. Walau bagaimanapun, sejauh mana data mengenai elemen keterdedahan terdapat atau tidak dalam pangkalan data global belum dikaji secara terperinci. Sifat maklumat yang ada termasuk ketersediaannya di seluruh skala dan sistem masih tidak diketahui. Maklumat mengenai bahaya dan data mengenai elemen keterdedahan sangat penting untuk pengembangan strategi pengurangan risiko bencana bagi meningkatkan daya tahan dari masa ke semasa. Bersandarkan kepada keperluan ini, kajian ini menganalisis liputan maklumat mengenai elemen keterdedahan sejajar dengan SFDRR dan Sendai Framework Monitor (SFM), untuk melaporkan kemajuan, memberikan gambaran keseluruhan mengenai ketersediaan data ini untuk skala tempatan dan mengaplikasikannya dalam pangkalan data bencana yang sedia ada (Muhamad et al., 2021).

Pendekatan

Analisis kandungan digunakan untuk mengumpulkan dan menilai pangkalan data yang berkaitan dengan bencana dari pelbagai sumber seperti tinjauan literatur rakan sebaya, internet, laporan kerajaan dan dokumen lain yang tidak diterbitkan. Pelbagai kata

Kuala Lumpur terletak di pertemuan Sungai Klang dan Gombak di pantai barat Semenanjung Malaysia. Pembangunan di sini lebih pantas berbanding bandar-bandar lain di Malaysia. Pembinaan yang pesat dan pertumbuhan penduduk yang drastik telah meluaskan peluang ekonomi dan meningkatkan pembangunan infrastruktur. Tempo pembinaan yang pantas telah dikenal pasti sebagai pemacu risiko bencana yang penting (UNISDR, 2015; Nisiri et al., 2019). Pihak berkuasa telah mengambil langkah-langkah untuk mengatasi banjir kilat di Kuala Lumpur melalui pelaksanaan Stormwater Management and Road Tunnel (SMART), yang mengalihkan air banjir dari pusat bandar. Maklumat mengenai elemen keterdedahan (iaitu unsur yang berpotensi terdedah) di Kuala Lumpur diperolehi dari pelbagai sumber data terbuka di dalam sistem nasional. Ia diperolehi dari platform akses terbuka bersama atribusi spasial mereka

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sementara yang lain digeokodkan jika perlu, bagi mengembangkan inventori data elemen keterdedahan Kuala Lumpur (Jadual 2). Terdapat 509 elemen keterdedahan di Kuala Lumpur yang meliputi 33 hospital swasta dan kerajaan serta klinik komuniti ; 189 sekolah dan institusi pengajian tinggi awam serta swasta; 261 kemudahan yang menyediakan perkhidmatan asas; dan 26 ciri yang mewakili aspek sosial dan ekonomi (Jadual 3).

Elemen keterdedahan dalam SFDPR	Elemen keterdedahan dalam SFM	Elemen keterdedahan dalam Artikel Jurnal	Elemen keterdedahan di Kuala Lumpur
Fasiliti Kesihatan	Fasiliti Kesihatan	Perkhidmatan kecemasan	Hospital
Fasiliti Pendidikan	Fasiliti Pendidikan	Tiada	Sekolah
Perkhidmatan Asas	Kuasa Elektrik	Sistem kuasa elektrik	Stesen TNB
	Penjanaan / penghantaran & pengedaran tenaga elektrik	Gas & minyak	Tiada
	Perkhidmatan kumbahan	Rangkaian air kumbahan	Loji Rawatan Kumbahan
	Perkhidmatan pengangkutan	Pengangkutan	Jalan
	Pengangkutan udara	Tiada	Tiada
	Jambatan / kereta api / metro	Tiada	Tiada
	Bekalan air	Bekalan air	Tiada
	Pengumpulan / rawatan & bekalan air	Tiada	Loji Rawatan Air
	Perkhidmatan sisa pepejal	Sisa buangan isi rumah	Pusat Pelupusan sisa
			Pepejal
		Tiada	Tapak Pelupusan Sampah
		Tiada	Bekas Tapak Pelupusan Sampah
		Tiada	Stesen Permindahan
	Telekomunikasi	Telekomunikasi	Tiada
	Perkhidmatan Bantuan & Kecemasan	Tiada	Balai Polis
			Balai Bomba
		Tiada	Tiada
	Sistem Teknologi Maklumat & Komunikasi (ITC)	Tiada	
Aspek Sosial	Bangunan kerajaan	Tiada	Bangunan Bersejarah
		Tiada	Tempat Ibadah
		Tiada	Dewan serbaguna
Aspek Ekonomi	Perkhidmatan pentadbiran awam	Perkhidmatan kerajaan	PPA-PPR
		Perbankan dan kewangan	Kondominium Elit

Jadual 3: Elemen terdedah yang merangkumi lima kategori utama Sasaran D dalam SFDPR (Sumber: Muhamad et al., 2021).

Kesimpulan

Hasil dari kajian literatur ilmiah menunjukkan elemen keterdedahan tidak diterangkan dengan jelas dalam domain penyelidikan di mana hanya 10 indikator yang mewakili 4 daripada 5 kategori utama SFDPR. Tiada petunjuk untuk kategori infrastruktur pendidikan, sementara liputannya sangat sedikit bagi data mengenai infrastruktur asas, aspek sosial dan ekonomi. Liputan elemen keterdedahan dalam pangkalan data bencana adalah sangat kurang, di mana hanya lima dari 26 pangkalan data yang dikaji mempunyai rekod maklumat tersebut; dengan atribut spatial yang terdapat dalam satu pangkalan data nasional. Terdapat 509 elemen keterdedahan di Kuala Lumpur; meliputi 33 hospital swasta dan kerajaan serta klinik komuniti; 189 sekolah dan institusi pengajian tinggi awam serta swasta; 261 kemudahan yang menyediakan perkhidmatan asas; dan 26 ciri yang mewakili aspek sosial dan ekonomi. Elemen keterdedahan dalam inventori dapat dikelaskan dengan mudah mengikut SFDPR. Ketersediaan maklumat tempatan dengan akses terbuka akan menyokong usaha untuk membangunkan daya tahan masyarakat yang tidak memiliki akses kepada maklumat mengenai bahaya dan tidak menyedari kesan yang timbul terhadap elemen keterdedahan yang mereka andalkan.

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Research Highlight

Muhamad, N., Arshad, S.H.M., Pereira, J.J. (2021) Exposure Elements in Disaster Databases and Availability for Local Scale Application: Case Study of Kuala Lumpur, Malaysia. *Front Earth Sci Geohazards Georisk* 2021 (9) doi: 10.3389/feart2021.616246

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U-INSPIRE Malaysia@UKM pledges at UNDRR Sendai Framework Voluntary Commitments (SFVC). The SFVC serves as a platform to incentivize stakeholders to inform the public about work, to provide a vehicle for sharing commitments and initiatives and for motivation toward the implementation of the Sendai Framework. U-INSPIRE Malaysia@UKM has organised a series of training to equip youth and young professional groups in Malaysia on knowledge about DRR and climate change. The commitment pledged in the SFVC has started in January 2020 until December 2020 has reached out to educational institutions and various youth-led platforms in Malaysia.

More details about this voluntary commitment are available at the UNDRR website https://sendaicommitments.undrr.org/commitments/20200902_001

Climatic Hazards Programme

Integrating climate and disaster risks in the National Agenda for Water Sector Transformation

Joy Jacqueline Pereira & Go Wen Zi
Academy of Sciences Malaysia



Photo by Akademi Sains Malaysia

The EPU and ASM officially launched the Roadmap for the (WST2040) Study in Putrajaya Marriott Hotel on 6 August 2020. The welcome speech was delivered by ASM Chief Executive Officer, Puan Hazami Taib (top left) and the ceremony was officiated by YBhg. Datuk Azhar bin Noraini, the Deputy Director General's Office (Sectoral) of EPU, Prime Minister's Department (top right).

The Economic Planning Unit (EPU) of the Prime Minister's Department has appointed the Academy of Sciences Malaysia (ASM) as its strategic partner to undertake a study to develop a national agenda to transform the water sector to an economy that is dynamic, contributing significantly to the GDP, enhancing employment opportunities and steering science, technology, and innovation in the country. The National Agenda for Water Sector Transformation 2040 (WST2040) will be implemented over 20 years in four phases, starting with the 12th Malaysia Plan. The WST2040 Roadmap Development Study consists of eight components where the Task Force on Climate Change Impact and Adaptation (CCIA) is led by Professor Dr. Joy Jacqueline Pereira FASc., who also leads a spin-off project on a similar topic in SEADPRI. The Task Force will deliver a strategic advisory report to provide input to the EPU Study and also frame a national strategy for climate change adaptation to enhance adaptive capacity and build resilience, with specific focus on the impacts of 1.5°C global warming in the country.

The specific objectives are as follows:

- Taking stock of the expected impacts of 1.5°C global warming to prioritize key sectors and vulnerable populations as well as its linkages to water resources.
- Identifying key priority actions for strengthening climate change adaptation and enhancing integration with disaster risk reduction in Malaysia, using the best available science.
- Leveraging on IWRM, to identify potential innovation in water technology to integrate climate change adaptation and its co-benefits as well as disaster risk reduction.

Malaysia is actively addressing the challenges of climate change on various platforms. The mainstreaming of climate change is reflected in national development policies, processes and objectives, strategies and budgets. Malaysia is also a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement where the Ministry of Environment and Water (KASA), serves as the National Focal Point. Through the National Disaster Management (NADMA) Malaysia, the country reports progress on the Sendai Framework for Disaster Risk Reduction to the United Nations Office for Disaster Risk Reduction by providing information to the Sendai Monitor.

The process of preparing the National Communications and the Sendai Monitor information has served as a means to bring together policymakers and researchers from research institutes and universities to view climate change mitigation, adaptation and disaster risk reduction in its broad multidisciplinary context. The process is also leveraged by the Economic Planning Unit of the Prime Minister's Department to report the country's progress on Sustainable Development Goals (SDGs) 13 on Climate Action, which encompasses climate change mitigation, climate change adaptation and disaster risk reduction.

The Task Force on CCIA has representation from both KASA and NADMA to ensure that recommendations submitted to the EPU are aligned with the aspirations of the respective institutions and maintain synergy with the WST2040. The report will also recommend a national strategy for climate change adaptation, to enhance adaptive capacity, build resilience and integrate adaptation into policies, plans and strategies in a coherent manner into various sectors and at the relevant scale.

Climatic Hazards Programme

Climate Change and Groundwater: Future Pathways for Malaysia

Go Wen Zi & Joy Jacqueline Pereira
Academy of Sciences Malaysia



The virtual consultation session on Climate Change and Groundwater was attended by 50 participants.

The ASM Strategic Consultation on Climate Change and Groundwater was successfully conducted on 14 December 2020 via Zoom. The consultation was jointly convened by the Academy of Sciences Malaysia (ASM), SEADPRI-UKM, Geological Society of Malaysia (GSM), Institute of Geology Malaysia (IGM) and Department of Minerals and Geoscience Malaysia (JMG). The main objective was to scope the role of the groundwater sector in contributing to the National Agenda for Water Sector Transformation 2040 (WST2040), in the advent of climate change. It was also a platform for groundwater experts to discuss current challenges and potential areas for technology expansion to further develop climate resilient groundwater resources in Malaysia and elsewhere.

The consultation session was moderated by Mr. Nizarul Ikram Bin Abdul Rahim (JMG) and Dr. Nurfashareena Muhamad (SEADPRI-UKM). The session commenced with presentations on “Overview of Climate Change and Groundwater” by Prof. Dr. Joy Jacqueline Pereira; “Resolving water stress through groundwater” by Mr. Alvin Clancey Mickey from JMG; and “Transforming the Groundwater Sector – Pathways Forward” by Mr. Loganathan Ponnambalam FASc. The projected impacts of 1.5°C global warming include extreme weather events and water stress conditions that require careful planning of water resources. The Third National Communication of Malaysia that was submitted to the United Nation’s Framework Convention on Climate Change in 2018 reports that groundwater usage in Malaysia is about 3.4% of the total water consumption in 2010, with the state of Kelantan having the highest use. It is projected that sea-level rise will be a threat to groundwater

in the future for areas such as Kuala Terengganu, Sabah, Sarawak and Kuala Selangor. The JMG has led efforts to provide groundwater supply to resolve water stress conditions for about 220,000 villages in the country. It was reported that the JMG carried out groundwater modelling and detailing in Sungai Muda (Kedah), Sungai Pahang (Pahang), Sungai Selangor (Selangor), Sungai Baram (Sarawak) and Sungai Kedamaian-Tempasuk (Sabah), and mapped 27.9 million m3 of groundwater zones, which could benefit about 6.7 million people in these areas. Groundwater usage in Malaysia is still under-utilized and serves as a potential resource to supplement current surface water supply. The discussion highlighted the need for a comprehensive policy on groundwater and aquifer management.

The need to integrate groundwater and surface water supply as an adaptation measure in water stressed areas was also underscored. It has also been reported that the cost of shifting supplies from groundwater to surface water for the groundwater-dependent community is very high, especially with increased river pollution. In 2018, it was reported that 46% of river monitoring stations had recorded pollution. Hence, groundwater development and management should be an integral part of the Integrated Water Resources Management (IWRM). These are aspects that have to be further studied. A call was made for JMG to play a stronger leading role in facilitating groundwater management, possibly through the establishment of a central national groundwater hub, drawing on the expertise from exiting research institutes and universities, to strengthen its operations. This would facilitate technology expansion and innovation to further develop climate resilient groundwater resources in Malaysia.

Climatic Hazards Programme

Forging partnerships for strengthening disaster risk financing

Joy Jacqueline Pereira, Mohd Khairul Zain Ismail & Go Wen Zi

SEADPRI-Universiti Kebangsaan Malaysia

Academy of Sciences Malaysia



The jointly organized consultation workshop was attended by 45 participants, including professionals in risk management and insurance.

The Academy of Sciences Malaysia (ASM) has successfully convened a strategic consultation on "Climate Change Adaptation and Disaster Risk Management" on 25 February 2021 which was conducted virtually through Zoom. This session was held together with the National Disaster Management Agency (NADMA) Malaysia, the Academy of Risk Management Malaysia and SEADPRI-UKM. The consultation is part of the National Agenda for Water Sector Transformation 2040 (WST2040) Study, where the ASM was appointed as a strategic partner by the Economic Planning Unit (EPU), Prime Minister's Department on 10 April 2020. The purpose of the consultation was to present the current status of climate change and risk management practices and seek input to transform disaster risk management in Malaysia in the advent of climate change.

The workshop was officiated by YBhg. Datuk Dr. Aminuddin bin Hassim, Director General of NADMA who emphasized that access to science, technology and innovation as well as enhanced knowledge-sharing and use of enabling technology is of particular relevance for disaster risk reduction to ensure sustainable development. The promotion of science is an important element to beat disaster resilience and to meet the SDGs. The session featured three speakers: Dato' Ir. Sabri bin Abdul Mulok, the Director of Mitigation, NADMA; Prof. Dr. Joy Jacqueline Pereira FASc, from SEADPRI-UKM and chair of the Task Force on Climate Change Impacts and Adaptation (CCIA); and Assoc. Prof. Dr. Arpah Abu Bakar, from the Universiti Utara Malaysia Institute of Risk Management.

The audience was provided with an overview of disaster risk management in Malaysia, specifically the role of NADMA as the agency that is responsible for disaster management in the country. In December 2014, Malaysia faced its worst monsoon flood affecting several states, with Kelantan being the worst hit. Tragically, 541,896 people were affected and a total of RM2.58 billion was lost due to the extensive damage to infrastructure.

This led to the cabinet's action, and the memorandum of the Prime Minister dated 26th August 2015, for "the establishment of the National Disaster Management Agency (NADMA) under the Prime Minister's Department taking over the responsibility from the National Security Council". NADMA was officially formed on 1st October 2015 with the consolidation of the Disaster Management Division of the National Security Council, Post-Flood Recovery Unit of the Prime Minister's Department and the Special Malaysia Disaster Assistance and Rescue Agency (SMART).

A central concern in the country relates to the projected impacts of 1.5°C global warming. In addition to weather extreme events, water shortages and sea level rise among other effects, tropical Southeast Asia is projected to experience the largest impact on economic growth. In the case of Malaysia, there is a low to medium level of readiness, particularly for extreme rainfall, heat and coastal hazards.

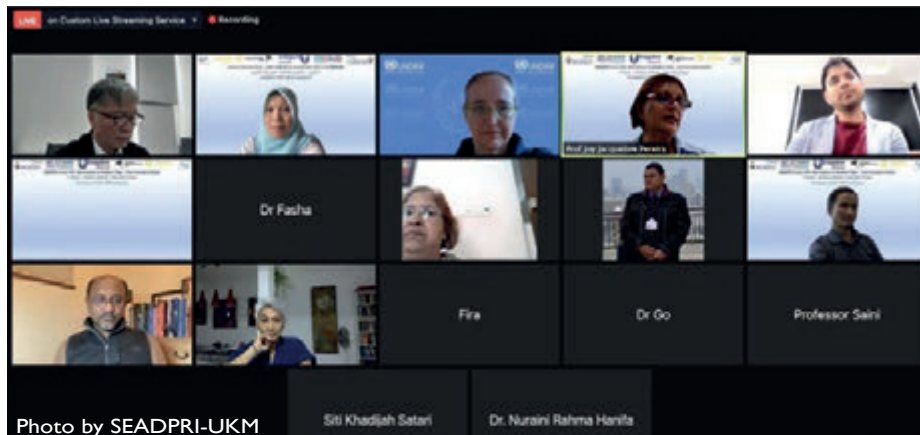
Priority actions have to be identified, particularly with respect to disaster risk reduction. Integrated river water resources management offers a great entry point for bringing together climate change adaptation and its co-benefits as well as disaster risk reduction. Elements of risk financing, as mentioned in the Sendai Framework for Disaster Risk Reduction, Paris Agreement and the World Humanitarian Summit, have to be articulated in the context of the National Policy on Climate Change and linked to disaster risk reduction. As the investment in post-disaster recovery is much higher, the approach should be focusing on pre-disaster mitigation efforts.

The promotion of mechanisms for disaster risk transfer, insurance risk-sharing, retention and financial protection have to be explored. The role of the private sector is very critical and a call was made for NADMA to play a central role in mobilizing the sector in conjunction with all relevant stakeholders.

Climatic Hazards Programme

SEADPRI Forum 2021: Risk Science for Resilient Cities – From Concept to Action

Joy Jacqueline Pereira, Tariqur Rahman Bhuiyan, Nurfashareena Muhamad & Mohd Khairul Zain Ismail
SEADPRI-Universiti Kebangsaan Malaysia



Panelists during SEADPRI Forum 2021.

The SEADPRI Forum is an annual flagship event of SEADPRI-UKM, an IRDR International Centre of Excellence on Disaster Risks and Climate Extremes (ICoE-SEADPRI-UKM). The Forum aims to foster understanding and strengthen linkages between researchers, practitioners and policymakers in the thematic areas of disaster risk reduction.

The Forum this year, titled “Risk Science for Resilient Cities – From Concept to Action”, saw about 80 participants from the region. Held online from 1700-1900 (GMT+8) on 7 May 2021, it served as a pre-session of the IRDR Conference 2021. The purpose was to gather input for the Global Research Agenda for disaster risk reduction and risk-informed development toward 2030 and beyond.

The Forum was convened by the IRDR ICoE-SEADPRI-UKM, UNDRR Asia Pacific Science Technology Academia Advisory Group (AP-STAG) and Asian Network on Climate Science and Technology (ANCST), with support from the UNESCO Youth and Young Professionals Group on Disasters, International Science Council – Regional Office for the Asia Pacific (ISC-ROAP) and the Academy of Sciences Malaysia. The objective was to promote understanding of risk science and the regional risk landscape in a changing climate; identify major challenges and research priorities for risk science of cities in the region; and explore means for implementing actions, including drawing on the energy of youth and young professionals. The Forum comprised two scene-setting keynotes followed by interventions from a Panel of Experts, moderated by Prof. Joy Jacqueline Pereira and Dr. Nurfashareena Muhamad of IRDR ICoE-SEADPRI-UKM. Participants were encouraged to provide written input during the session and up to a week after the event. It was officiated by Dr. Riyanti Djalante, Chair of the IRDR Steering Committee while Prof. Rajib Shaw, Chair of AP-STAG delivered the closing remarks.

The first keynote by Dr. Jenty Kirsch-Wood, Head of Global Risk Management and Reporting at the UNDRR, provided an overview of the “Concept and Practice of Risk Science”. She highlighted the need to manage risk systematically, taking into account interdisciplinary input, practitioners’ knowledge and community engagement. Technological solutions have to be considered in tandem with societal behavior, governance and political will.

As risk cannot be eliminated entirely, aspects such as living with uncertainty, perceiving opportunities in all circumstances and enhancing resilience are important. She also emphasized the importance of engaging young scientists in risk sciences.

The second keynote by Prof. Qunli Han, Executive Director of Integrated Research on Disaster Risk (IRDR) International Programme Office (IPO), focused on “Development of the Global Research Agenda for DRR”. Aspects covered included the need to contextualize the global science and technology road map; promote science and policy dialogue for better data; advance science and technology for DRR and resilience; review of hazard terminology for better communication; and enhance interdisciplinary collaboration. He emphasized that risk-informed sustainable development is one of the key targets of IRDR. He also called for a paradigm shift in disaster risk management by investing in risk prevention, living with uncertainty and managing the uncertainty instead of focusing only on disaster management and disaster response.

A major point of discussion was the potential of youth and young professionals for contributing to risk science in the region. The enthusiastic youth and young scientists of U-INSPIRE collectively pledged to strengthen sub-regional efforts. For example, an intention was expressed to form U-INSPIRE with strong links to ASEAN, and contribute to the changing risk landscape in Southeast Asia. There was also a strong call to make resilient cities a key pillar of the Global Research Agenda to address urban health, risk governance, and the urban-rural partnership. This is to ensure that science-technology advice is channeled to cities and sub-national levels, to meet the aspirations of the Sendai Framework on Disaster Risk Reduction.

Key findings from the Forum will be conveyed to the 2021 Integrated Research on Disaster Risk (IRDR) Conference on 8-10 June 2021, to develop the Global Research Agenda on disaster risk reduction. The Forum ended with a note of appreciation to all the convening partners, keynote speakers, panelists and participants. The excellent technical support provided by the team at ICoE-SEADPRI-UKM coordinated by Mr. Mohd Khairul Zain Ismail was applauded.

Climatic Hazards Programme

Empowering Youths for Climate Action

Nurfashareena Muhamad, Ahmad Sufyan Aslam & Muhammad Daniel Azlan Mahadzir

SEADPRI-Universiti Kebangsaan Malaysia

Global Shapers Kuala Lumpur



Photo by U-INSPIRE Malaysia

The event was convened by SEADPRI-UKM and U-INSPIRE Malaysia@UKM, in collaboration with the Global Shapers Kuala Lumpur with support from Asian Network on Climate Science (ANCST). The event was convened by SEADPRI-UKM and U-INSPIRE Malaysia@UKM, in collaboration with the Global Shapers Kuala Lumpur with support from Asian Network on Climate Science (ANCST).

Putting the world back on a path of sustainable, equitable, and prosperous development will require more than a global recovery led by a few. Instead, it will require a Great Reset that places all citizens, particularly young people, at the heart of economic, social, and environmental systems. The Climate Reset Dialogue is the first intergenerational lab aimed to connect young people with the knowledge, networks, and tools to help drive a Great Reset. The Dialogue aims to advance a mature model of youth activism, focused on self-awareness, systems leadership, and intergenerational allyship. This youth Dialogue was convened virtually on 27 February 2021 by SEADPRI-UKM, U-INSPIRE Malaysia@UKM, The Global Shapers Kuala Lumpur with support from Asian Network on Climate Science (ANCST); it has been broadcasted and shared through all social media platforms. The Dialogue involved youth leaders representatives from organizations in the country that are working directly with stakeholders in addressing issues related to the need for the Climate Reset. The event was conducted in two sessions; a panelist session and a debrief session. In the panelist session, three invited panelists discussed their respective efforts in the academic, NGO, and private sectors. The debrief session was tailored to the invited panels and a selected group of attendees to discuss and deliberate issues related to youth empowerment for climate change. The Dialogue provided an opportunity on the debate about the need for a declaration of youth commitment in climate action to be put forward to highlight the role of youth and increase the visibility of efforts in informing climate change policy at the national and local levels.

Geological Hazards Programme

SEADPRI inks MoU with GSM

Lim Choun Sian

SEADPRI-Universiti Kebangsaan Malaysia



Photo by SEADPRI-UKM

SEADPRI, GSM and partners jointly organised a field excursion and mapping with a terrestrial LiDAR

SEADPRI and the Geological Society of Malaysia (GSM) are continuing their collaboration through the signing of a Memorandum of Understanding (MoU), to strengthen the cooperation between the two parties.

GSM is a scientific society founded in 1967 to promote the earth sciences' advancement in Malaysia and the Southeast Asian region. Currently, it has a membership of more than 600 geoscientists worldwide, of various disciplines and expertise. It publishes scientific journals, books and various communication, organizes field trips, seminars, short courses and technical talks.

The commitment is an upscale to both long-standing collaborations started since SEADPRI's inauguration in the year 2008 through the joint organization of training and knowledge outreach events, as well as a joint research partner in projects pertaining to climate change and disaster risk reduction.

GSM has partnered with SEADPRI-UKM in their Malaysia Window to Cambridge at UKM (MW2C@UKM) initiative, to train young early-career geoscientists from ASEAN countries on new advancements in climate and earth science as well as risk communication. The early-career geoscientists were invited to share their experience at conferences and workshops in Malaysia. Such training programmes were designed to provide opportunities for young geoscientists in ASEAN to establish and strengthen their linkages. In 2017, now almost at its completion, the two institutions formed a consortium of 16 research and business organizations in an international project

namely Disaster Resilient Cities: Forecasting Local Level Climate Extremes and Physical Hazards for Kuala Lumpur, funded by Newton Ungku-Omar Fund (NUOF) under the administration of the Malaysian Industry-Government Group for High Technology (MIGHT) and Innovate-UK. The project aims to customize climate and hazard models from the UK to forecast physical hazards common in Kuala Lumpur i.e. floods, landslides, sinkholes, strong winds, urban heat and local air pollution and to develop a prototype multi-hazard platform for managing and communicating the risks of damaging events to enhance disaster resilience.

Currently, both partners in Malaysia and Cambodia, are embarking on a project "Promotion of Social Entrepreneurship in Disaster Risk Reduction to Build Community Resilience", funded by the International Development Research Centre (IDRC) Canada in 2019. The main objective of the project is to foster long-term community resilience in Malaysia and Cambodia by empowering young female social entrepreneurs to develop disaster resilience plans. The project aims to bring together and train individuals from the youth groups to build community resilience by developing disaster resilience plans that integrate climate change adaptation to support decision-making at the local level. The MoU will further strengthen the collaboration between two institutions in forming a partnership which will lead to many new publications, educational and joint research initiatives to produce new synergies in pursuing knowledge, inclusiveness of graduates, young scientists and communities in climate and disaster risk resiliency.

Technological Hazards Programme

A successful ICGEB grant for rapid COVID19 diagnosis strategy

Tan Ling Ling

SEADPRI-Universiti Kebangsaan Malaysia



Photo by SEADPRI-UKM

CRP-ICGEB Research Grants Programme 2020. (Source: Tan Ling Ling)

A research grant application with the Collaborative Research Programme-International Centre for Genetic Engineering and Biotechnology (CRP-ICGEB) on "Nanomaterials-based Genosensor (Nano-GS) for improved detection method of SARS-CoV-2 RNA as rapid COVID-19 diagnosis strategy" has been positively evaluated and is thus eligible for funding in the context of the CRP-ICGEB Research Grants Programme 2020. The Evaluation Committee proposed that the ICGEB awards a grant of Euro 8,000 for one year from 1 January 2021 to 31 December 2021 (XX-2020-011) to the awardee, Assoc. Prof. Dr. Tan Ling Ling, the Coordinator of Technological Hazards Programme, SEADPRI-UKM. Depending on the progress in this first year, funding for a further period may be considered by ICGEB.

The CRP-ICGEB Research Grants Programme was established in 1988; it aims to stimulate collaborative research in ICGEB Member States, with the ICGEB Component laboratories in order to promote training of young scientists, and to facilitate the creation as well as development of appropriate research facilities. The ICGEB Member States now include 22 countries in Africa, nine in the Middle East, 13 in Europe, five in Central America and the Caribbean, eight in South America and eight in Asia.

Generally, the CRP-ICGEB Research Grant is a dedicated source of funding aimed at financing projects addressing original scientific problems of particular relevance for the host country and of regional interest. The programme provides support for research projects in basic science, human healthcare, industrial and agricultural biotechnology and bioenergy.

Almost 600 applications, and over 100 COVID-related from across 52 Member States have been received under the 2020 call for CRP-ICGEB Research Grants.

A recent scientific report has revealed that there are cases of undetected severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) from asymptomatic carriers, which subsequently leads to a subsequent wave of outbreaks. Thus, there is an urgent need to establish a more rapid strategy to screen and to detect this virus in potential human carriers, and also from the public environment. The current clinical diagnosis of coronavirus disease 2019 (COVID-19) infection based on real-time polymerase chain reaction (real-time PCR) for viral quantification requires high quality assurance laboratory, and assortment of DNA extraction and purification kits for a more detailed quality control to improve overall specificity. Hence, exploitation of novel viable, simple, cost effective, high throughput and non-invasive method for early and fast screening of COVID-19 infection in humans is urgently required.

Our research plan is to develop a biosensor, made of a special matrix that holds G-quadruplex DNA probe targeting a specific site of the SARS-CoV-2 viral RNA. Binding interaction between DNA probe and target sequence site on viral RNA produces colour and electrochemical changes that could be visualized and detected by an electronic reader. This biosensor will be adapted as strip or tube to be used with a hand-held device that is user-friendly and cheaper at manufacturing cost. Prototype units of our biosensor will be tested against an appropriate number of clinical samples for estimation of sensitivity and predictivity performance. As an immediate effort for diagnosis-method of the current COVID-19 outbreak, we aim to establish a detection tool with a faster turnaround time of 30-45 min, starting from RNA extraction step until result interpretation. Later, we plan to integrate virus isolation and RNA extraction steps in the biosensor system through a microfluidic-based platform to upgrade its versatility as a point-of-care testing device in resource-limited settings.

Technological Hazards Programme

Pemasangan dan Penggunaan Instrumen Pembekalan Air Ultrapure

Tan Ling Ling and Mohd Faizol Markom
SEADPRI-Universiti Kebangsaan Malaysia



Photo by SEADPRI-UKM

Sesi pemasangan dan penggunaan instrumen pembekalan air ultrapure pada 7 Januari 2021 di Makmal Bencana Teknologi, SEADPRI-UKM. Encik Mohd. Faizol Markom (pertama dari kanan) sebagai Penolong Pegawai Sains dan Prof. Madya Dr. Tan Ling Ling (pertama dari kiri) sebagai ketua projek DIP-UKM.

Program Bencana Teknologi, Pusat Kajian Bencana Asia Tenggara (SEADPRI-UKM) telah mengadakan sesi pemasangan dan penggunaan instrumen pembekalan air ultrapure pada 7 Januari 2020 bertempat di Makmal Bencana Teknologi, SEADPRI-UKM. Jurutera dari Sartorius Malaysia Sdn. Bhd. telah dijemput untuk memberi ceramah mengenai komponen utama dan konsep operasi asas sistem pembekalan dan rawatan air termasuk teknik pengambilan air terawat dan penyelenggaraan alat.

Instrumen Sartorius Ultrapure Water Purification System, model arium® pro DI yang diperolehi bawah geran penyelidikan Dana Impak Perdana (DIP), Universiti Kebangsaan Malaysia (DIP-2020-013) mampu menghasilkan air ultrapure dengan ketahanan 18.2 MΩ •cm (kekonduksian 0.055 μS cm⁻¹) yang memenuhi standard spesifikasi ASTM D1193-06 untuk reagen air jenis I. Air yang dirawat ini mempunyai kandungan bahan organik yang sangat rendah, jumlah karbon organik (TOC) hanya 1 hingga 3 μg L⁻¹ dan bahan zarah juga disimpan sangat rendah adalah sesuai digunakan dalam penyediaan bahan eksperimen seperti media bahan cecair kimia dan penimbun.

Lawatan Kerjasama Penyelidikan oleh Akademik Universitas Negeri Padang di SEADPRI

Tan Ling Ling and Mohd Faizol Markom
SEADPRI-Universiti Kebangsaan Malaysia



Photo by SEADPRI-UKM

Lawatan kerjasama penyelidikan oleh Dr. Alizar Ulianas (kedua dari kiri) dari Universitas Negeri Padang pada 22 Januari 2020 di Pusat Kajian Bencana Asia Tenggara (SEADPRI), Universiti Kebangsaan Malaysia, Bangi, Selangor.

Program Bencana Teknologi, Pusat Kajian Bencana Asia Tenggara (SEADPRI-UKM) telah menerima lawatan oleh Dr. Alizar Ulianas, seorang akademik dari Universitas Negeri Padang, Sumatera Barat, Indonesia pada 22hb Januari 2020.

Dr. Alizar Ulianas merupakan seorang Pensyarah Universiti dalam bidang Kimia khususnya Kimia Analisis, Elektrokimia dan Biosensor. Tujuan Dr. Alizar Ulianas melawat ke SEADPRI-UKM adalah untuk mengadakan kerjasama penyelidikan dalam Pembangunan Mikro-Optod DNA untuk Mengesan Virus Denggi dan Penggunaannya dalam Pengurusan Bencana Denggi.

Bagi tujuan mencapai penguatan jaringan dan pengantarabangsaan, pelajar dari Universitas Negeri Padang telah diambil untuk menyambung pengajian Di peringkat Sarjana Sains di bawah seliaan Prof. Madya Dr. Tan Ling Ling di Universiti Kebangsaan Malaysia dan bimbingan daripada penyelia lapangan di Universitas Negeri Padang, Indonesia dalam ahli jawatankuasa penyeliaan projek penyelidikan pelajar. Dengan ini jaringan kolaborasi antara UKM dan Universitas Negeri Padang akan tercapai. Selain itu, lawatan penyelidikan oleh Dr. Alizar Ulianas juga mencadangkan kerjasama penyelidikan melalui permohonan geran penyelidikan antrabangsa dalam pembangunan biosensor untuk pengesanan penunjuk kanser dalam manusia.

Sokongan Belia dalam Sambutan Hari Bumi Tahun 2021

Mohd Khairul Zain Ismail & Nurfashareena Muhamad
SEADPRI-Universiti Kebangsaan Malaysia



Setiap tahun pada 22 April, “Hari Bumi” menandakan ulang tahun sambutan sejak pertama kali diadakan pada tahun 1970. Tema pada tahun ini ialah “Pulihkan Bumi Kita” atau “Restore Our Earth”. Ia diadakan bertujuan untuk memberi kesedaran berkaitan pentingnya menjaga keseimbangan bumi bagi tujuan masa hadapan. Webinar sambutan Hari Bumi 2021 secara atas talian telah berjaya dilaksanakan pada 22 April 2021, anjuran SEADPRI-UKM, U-INSPIRE Malaysia@UKM, dengan sokongan Asian Network on Climate Science and Technology (ANCST). Sambutan Hari Bumi 2021 ini menampilkan beberapa pembentang dan ahli panel yang terdiri daripada profesional dan belia muda di Malaysia, iaitu Dr. Ahmad Aldrie Amir (The Malaysian Mangrove Research Alliance and Network, MyMangrove), En. Masbudi Abdul Malek (Inspirasi KAWA), Dr. Jurry Foo (Universiti Malaysia Sabah), dan Pn. Faiizah Arshad (Jabatan Alam Sekitar Perlis). Webinar sambutan peringkat kebangsaan ini menyaksikan penyertaan belia dan professional muda secara atas talian dengan kehadiran

maksima mencecah 215 orang pada suatu masa dan 56 penonton melalui platform media sosial Facebook U-INSPIRE Malaysia@UKM.

Tujuan utama Webinar diadakan adalah untuk memberi penerangan mengenai pengurusan alam sekitar bagi menjaga keseimbangan bumi secara amnya. Selain itu, pelajaran yang boleh didapati turut dikongsi oleh ahli panel terutamanya yang berkaitan dengan beberapa inisiatif pengurusan alam sekitar seperti ekosistem sungai dan ekosistem paya bakau, yang telah berjaya dijalankan dan diadaptasi bagi mengurangkan impak perubahan iklim serta memaksimumkan pembiayaan di sektor awam dan swasta, samada di peringkat tempatan dan antarabangsa. Melalui pelbagai pembentangan hebat dari para profesional dan belia muda yang terlibat, webinar ini berjaya mencetuskan perbincangan dan perkongsian minat serta pengalaman berkenaan inisiatif mereka menghargai bumi kita.

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