

BULETIN SEADPRI

Pusat Kajian Bencana Asia Tenggara
Southeast Asia Disaster Prevention Research Initiative

OVERTURNING INEQUALITY

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The 3rd International Workshop & Training on Youth and Young Professionals in Science, Engineering, Technology and Innovation (SETI) for Disaster and Climate Resilience (DCR) was held in Jakarta, Indonesia from 4-8 December 2023. This workshop was co-organized by UNESCO Office Jakarta, National Research and Innovation Agency (BRIN), and U-INSPIRE Alliance. The theme was 'Empowering the Powerful Overturn Inequality by Building Resiliency'. The purpose of this workshop was to create an energetic platform where YYPs could acquire knowledge, network and spot chances for collaboration; all while fostering the growth and sustainability of the YYPs network.

U-INSPIRE Malaysia was represented by Mr. Ahmad Sufyan Mohamed Aslam of UNICEF Malaysia, Dr. Iffah Farhana Abu Talib of Universiti Teknologi Mara (UiTM), Dr. Alyaa Afifah Abu Talib of Management and Science University (MSU), Dr. Muhammad Daniel Azlan Mahadzir of Nanyang Technological University (NTU), Mr. Navakanesh M. Batmanathan, and Ms. Nur Zahidah Mohamad of UKM's Southeast Asia Disaster Prevention Research Initiatives (SEADPRI-UKM).

Keynote and plenary remarks by esteemed leaders and experts marked the inaugural day of the workshop, emphasizing the pivotal role of youth and young professionals (YYPs) in driving global change, particularly in achieving Sustainable Development Goals (SDGs). This set the scene for the workshop throughout, highlighting the need for an inclusive environment that acknowledges and empowers YYPs, recognizing their potential as catalyst for positive transformation.

This was followed by the World Café discussion which delved into inequalities faced by youth in terms of opportunities, resources and access to information. Participants highlighted challenges including geographical disparities, exclusivity, and gender bias. Proposed solutions centered on raising awareness, capacity building, providing platforms for YYPs, advocating for open science, and exploring nature-based solutions.

The second day commenced with Futures Literacy Lab (FLL) which introduced a way of forward-thinking that requires collective intelligence to understand and engage the future in a meaningful way. In the 2045 envisioning exercise, participants were encouraged to imagine the potential futures of youth inequalities and disaster risk reduction (DRR). The exercise which unfolded in phases, initially focused on anticipating future developments, and later witnessed a shift towards prioritizing individualism, reframing 'leave no one behind' to recognize practical limitations in saving everyone. Concluding phases introduced new questions and next steps, emphasizing the creation of regulations for inclusivity in DRR. Recognizing the crucial role of inclusiveness in building resilient communities and eliminating inequality, the responsibility for developing inclusive regulations was identified across government, NGOs, academia, private sector, and the vulnerable communities alike.

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Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM)

Buletin SEADPRI

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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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Research Highlight

The third day continued with a stakeholder panel discussion featuring government and private sector representatives, focusing on the strategic pathway to a sustainable future. The discussion covered diverse topics, including the concept of sustainable resilience, the role of artificial intelligence in national security, early warnings, and the role of the private sector in building resiliency.

This was followed by the U-INSPIRE national chapter sharing session involving seven country chapters (Indonesia, Maldives, Central Asia, India, Nepal, Malaysia and Philippines) where they showcased their organization, activities, challenges and future goals. The day also witnessed the signing of Memorandum of Understanding (MoU) between Integrated Research on Disaster Risk (IRDR) and U-INSPIRE Alliance.

The fourth day was scheduled for a field trip to the Jakarta Disaster Management Office Jakarta. Participants visited the Literasi Room, an interactive multimedia space promoting

public education in disaster preparedness through virtual reality (VR) disaster simulations. There were also visits to the Emergency Operation Center (EOC) showcasing its role as a central hub for efficient emergency response and the Psychological and Trauma Mitigation Facility, providing both mobile and psychosocial support and serving as a donation platform for toys and dolls. At Taman Wisata Alam Angke Kapuk, participants engaged in mangrove planting, kayaking, and wildlife and bird watching; highlighting the potential of nature-based solutions in addressing coastal challenges and showcasing the resilience of mangroves.

The final day featured a plenary session discussing journalism in disasters and science communication. This was followed by the development and presentation of action plans by the participants. The closing ceremony included remarks from the new Secretary General and Chair of U-INSPIRE Alliance, Hanif Sulaiman and Sufyan Aslam, respectively, along with representatives from UNESCO and BRIN.



Mr. Navakanesh M. Batmanathan (on the left) representing U-INSPIRE Malaysia during the U-INSPIRE National Chapter Sharing Session.

Climatic Hazards Programme

Perspectives on Advancing Effective Flood Management and Responses in Cities

Navakanesh M Batmanathan¹, Nurfashareena Muhamad¹, Elanni Md Affandi², Siva Prakash³, Poorani Krishnan³ & Joy Jacqueline Pereira¹

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Photo by SEADPRI-UKM

The Roundtable on Management and Responses in Cities was launched by YB Tuan Nga Kor Ming (left), after H.E. Ailsa Terry (right) delivered the opening remarks.

INTRODUCTION

The escalating financial impact of floods in cities underscore the urgency of addressing this challenge. Climate-related disasters pose significant risks and sharing of experiences to delineate pathways for improving flood management is key to building resilience in cities. This was the context for convening the Roundtable on "Effective Flood Management and Responses in Cities" in Kuala Lumpur on 25th and 26th March 2024. The British High Commission Kuala Lumpur organized the event with technical support from Universiti Kebangsaan Malaysia's Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM). A diverse group of about 70 stakeholders from various backgrounds came together to exchange insights and explore future strategies for enhancing flood management in cities.

The event commenced with an overview of the programme by Ms. Poorani Krishnan, Science and Innovation Advisor of the British High Commission Kuala Lumpur. This was followed by welcoming remarks by H.E. Ailsa Terry High Commissioner British High Commission Kuala Lumpur. The opening remarks were delivered by YB Tuan Nga Kor Ming, Minister of Housing and Local Government. The event comprised four main

segments. The first segment centered on UK Investment in Flood Research, offering an overview of the UK's National Flood Forecasting Framework and showcasing three major initiatives funded by the UK Government in Malaysia. The second segment featured Malaysian Flood Responses, highlighted by a keynote presentation from the National Disaster Management Agency (NADMA) Malaysia, providing an overview of the country's flood management status. This was followed by two panel sessions focusing on enhancing community responses and early warning systems. The third segment addressed financial aspects, while the fourth segment delved into sustainable infrastructure, including planning and nature-based solutions. The key themes of the event revolved around science and technology, governance, finance, capacity building, and stakeholder engagement.

SCIENCE AND TECHNOLOGY

Science and technology has clearly advanced but scaling-up is required to support effective flood management and responses in cities. Current rainfall trends are different from historical projections, and early warning systems need to cover both the temporal and spatial dimensions, with more detailed information required for the city-scale. It was noted that the expertise in

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projecting pluvial flooding caused by direct rainfall in urban areas significantly lags behind the existing knowledge and experience in forecasting fluvial or river flooding, particularly in relatively large river basins in the country, especially during the monsoon season.

A different approach is required for early warning in cities. This is demonstrated by the Kuala Lumpur Multi Hazard Platform (KL-MHP), a local level forecasting system developed for Kuala Lumpur, with support from the Newton Ungku Omar Fund. The KL-MHP is now anchored by the Meteorology Department of Malaysia for the City Hall of Kuala Lumpur. The scaling-up of such a system to other cities in the country would help Local Authorities to manage increasing hazards due to climate change such as increased intensity and frequency of rainfall and intense heatwaves. The KL-MHP is a robust and effective tool for local-level decision-making and disaster response.

Nature-based solutions and blue-green infrastructure require context-specific and area-based approaches, including assessing the severity of flooding. A range of blue-green infrastructure solutions are available for flood management, focusing along rivers and in catchment areas. Natural flood management requires state intervention to provide a hybrid approach to hard engineering solutions, allocate funding, and scaling up successful pilots. In the UK, practical guidance is provided to effectively plan, implement, and sustain such assets in a cost-effective manner, leveraging the comprehensive societal advantages of nature-based solutions. Tools that evaluate flood, environmental, and carbon benefits could further enhance the effectiveness of nature-based solutions, creating avenues to incorporate both climate change mitigation (emission reduction) and climate change adaptation (physical risk reduction) strategies.

GOVERNANCE

Governance is fundamental for effective flood management and responses in cities. Local Authorities in Malaysia need to take a holistic approach to understand the connectivity of issues. An example is the use of integrated river basin management via land-use planning and development control, as advocated in the Water Sector Transformation Plan 2040. This calls for strengthening administrative bodies within catchment areas and taking into account river boundaries when planning land-use within administrative boundaries. Institutional arrangements and legislative measures that mainstream and accelerate nature-based solutions for flood management need to be identified and implemented.

The mandate of the Drainage and Irrigation Department of Malaysia seems to focus primarily on major rivers, leaving Local Authorities responsible for small river channels and drainage systems within urban areas. Pluvial flooding resulting from direct rainfall over cities is anticipated to worsen due to climate change, heightened exposure, and vulnerability of



Dr. Charlie Pilling, Chief Hydrometeorologist National Flood Forecasting Centre, UK, shared successful flood initiatives in the UK. He highlighted the alarming number of properties at risk of surface water flooding in England, emphasizing the urgent need for updated national risk registers and enhanced emergency alert systems to improve flood preparedness and response capabilities.

infrastructure, assets, and communities. Effective early warning systems for pluvial flooding rely on detailed, downscaled rainfall projections. This calls for closer institutional arrangements between Local Authorities and the Meteorology Department of Malaysia, to facilitate the transmission of scale-appropriate weather forecasts for cities to strengthen early warning and disaster response. Early warning systems, blue-green infrastructure and nature-based solutions represent the building blocks of an adaptation industry in Malaysia, as mentioned in the National Industrial Plan.

FINANCE

Finance is fundamental for effective flood management and responses in cities. Overall, the financial infrastructure for floods needs to be strengthened. It appears that that large multinationals have better financial protection from floods compared to smaller companies. There is a need to enhance the penetration of flood risk insurance among small and medium enterprises in the country. The disclosure and

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reporting of flood risks also need improvement. This calls for more granular scale information to be accessible in the country. In addition, the financial feasibility of technology implementation is an important aspect that requires evidence-based information. Funding mechanisms to support nature-based solutions and ensure their multiple benefits are realized were identified as a priority.

In the UK, fostering innovation is a priority in enhancing flood and coastal resilience, with substantial investments in innovation programs aimed at developing new technologies, strategies, and adaptation measures. Decarbonizing efforts, including initiatives to reduce carbon emissions from infrastructure, demonstrate a commitment to building climate-proof assets that mitigate the impacts of climate change while promoting sustainability and environmental stewardship. Through these integrated approaches, countries such as the UK can build resilient and sustainable infrastructure that withstands the challenges of a changing climate while fostering economic and social prosperity.



Photo by SEADPRI-JKM

Mr. Zamakhshari bin Hanipah, Deputy Director General (Policy), National Disaster Management Agency (NADMA), provided statistics that painted a concerning picture of Malaysia's vulnerability to various climate induced disasters including floods, and highlighted ongoing efforts to address these challenges.

CAPACITY BUILDING

Capacity building is critical to enhance evidence-based decision-making for effective flood management and responses in cities. It was noted that the capacity for flood management is higher among practitioners in Federal agencies and researchers in universities, compared to Local Authorities. Capacity has to be strengthened risk-informed decision-making in Local Authorities, as well as among other local stakeholders including the private sector and communities, to build resilience to floods and other disasters, which are expected to worsen in cities due to climate change. There is also need to develop metrics to assess the effectiveness of flood-management schemes, which could then be compared to nature-based solutions. In the UK, there is a platform for practitioners to learn about sustainable drainage systems, specifically natural flood management. A similar platform could be considered in Malaysia to accelerate capacity building at the local level in Malaysia.

MOVING FORWARD

A significant issue arises from the lack of readiness within communities, where many residents lack the awareness needed to respond efficiently to floods. Low capacity among local authorities and outdated infrastructure exacerbates the level of devastation. Access to data regarding flood risks poses a major challenge, impeding efforts to generate accurate forecasts and execute preventive measures. Financial constraints associated with flood management were also discussed. Limited resources make it challenging to invest in resilient infrastructure and proactive risk mitigation strategies.

There is a beacon of hope for advancing flood management in cities. The scaling-up of early warning systems is one avenue. Forecasting at a more detailed city-scale for effective early warning can provide crucial lead time for evacuations, resource allocation, and preventative measures, potentially saving lives and minimizing property damage. A range of blue-green infrastructure solutions are also available for flood management, focusing along rivers and in catchment areas. These are context-specific and area based. Examples include restoring wetlands and planting trees in strategic locations to effectively manage floodwater naturally. State intervention is required to provide a hybrid approach to hard engineering solutions, allocate funding, and scaling up successful pilots. Sustainable infrastructure was recognized as a critical long-term strategy.

Local Authorities in Malaysia need to take a holistic approach to understand the connectivity of issues and implement appropriate institutional arrangements to overcome mandate limitations, and conduct land-use planning that takes into account both natural and administrative boundaries. They should leverage the potential for an adaptation industry mentioned in the National Industrial Plan of Malaysia, in the form of early warning systems, blue-green infrastructure and nature-based solutions. Innovative financing mechanisms, such

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as public-private partnerships and risk transfer mechanisms should also be explored to address resource limitations. A spirit of collaboration and openness is a crucial element in the fight against floods. Commitment to ongoing open data

sharing, capacity building and stakeholder engagement is vital for improving transparency, innovation and community action for effective flood management to build resilience in cities.



Photo by SEADPRI-UKM

Mr. Muru Loganathan, Deputy Head - Climate Change, Energy and Environment, British High Commission Kuala Lumpur (far right) moderated a panel session involving from the left, Mr. Hafiz Amirrol (Deputy Executive Director, Mercy Malaysia), Mr. Jonathan Moxon (Executive Manager, Flood Risk & Climate Resilience, UK), Ms. Rose Afrina Mansor (Senior Associate, Climate Resilience, Think City), and Ms. Jagadeswari Mariappan (Senior River Care Programme Officer, Global Environment Centre, GEC), provided perspectives on the challenges and opportunities surrounding community understanding and response to climate change.

Pembentangan Kertas Cadangan Penyelidikan

<p>PEMBENTANGAN KERTAS CADANGAN PENYELIDIKAN BIL. 6/2024</p>	<p>PEMBENTANGAN KERTAS CADANGAN PENYELIDIKAN BIL. 9/2024</p>
<p>Tarikh : 5 April 2024 (Jumaat) Masa : 10.00pagi - 11.00pagi Aplikasi: Ms. team (http://sur.li/ouhwa) Pengerusi : PROF. MADYA DR. SAIFUL ARIF ABDULLAH Penilai : PROF. TS. DR. LEE KHAI ERN PROF. MADYA DR. SHARINA ABDUL HALIM</p>	<p>Tarikh : 23 Mei 2024 (Khamis) Masa : 3.30ptg-4.30ptg Aplikasi: Ms. team (http://sur.li/ouhwa) Pengerusi : DR. NOR AZIEMAH ZULKIFLI Penilai : PROF. DR. JOY JACQUELINE PEREIRA</p>
<p>Nama: SURENTHARAN A/L RAMADAS (PI17248) Program : Doktor Falsafah TAJUK: ACCELERATING CITY LEVEL CLIMATE ACTION-CASE STUDY IN PENANG NAMA PENYELIA: PROF. DR. JOY JACQUELINE PEREIRA GS. DR. NURFASHAREENA MUHAMMAD</p>	<p>Nama: MOHAMAD FAIZAL BIN MANSOR (PI32213) Program : Sarjana Sains TAJUK: KRITERIA * LANGKAH BERJAGA- JAGA PERSENDIRIAN * DALAM KESAPSAPSIAGAAN BANJIR DI MUKIM DENGKIL, SELANGOR MALAYSIA. NAMA PENYELIA: GS. DR. NURFASHAREENA MUHAMMAD PROF. MADYA DR. SHARINA ABD HALIM</p>
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Tahniah diucapkan kepada dua pelajar Pusat SEADPRI iaitu Saudara Surentharan A/L Ramadas dan Saudara Mohamad Faizal Mansor kerana dengan jayanya telah selesai membentangkan kertas cadangan penyelidikan pada bulan April dan Mei 2024.

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Kemuncak Program Jejak Karbon di Sekolah: Menuju Masa Depan Lestari

Aida Soraya Shamsuddin¹, Sharifah Zarina Syed Zakaria², Muhammad Rizal Razman², Nurfashareena Muhamad¹, Mohd Fairus Awang¹, Bisharuzi Omar², Mohd Faizol Markom¹, Noor Shafirah Ramli¹

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a) Simbol tangan yang membawa maksud ecological handprint, b) Pelajar membentangkan aktiviti pengurangan jejak karbon yang telah dijalankan

Tanggal 14 November 2023, satu majlis pembentangan akhir bagi Program Jejak Karbon di Sekolah telah diadakan di Auditorium Teknologi Multimedia Fusion, Akademia Siber Teknopolis, Universiti Kebangsaan Malaysia (UKM). Majlis ini merupakan penutup bagi Program Jejak Karbon di Sekolah yang telah bermula pada Julai 2023 sehingga November 2023. Majlis ini telah dihadiri oleh lebih kurang 120 pelajar beserta guru-guru daripada Sekolah Berasrama Penuh Integrasi Gombak (INTEGOMB) dan Sekolah Menengah Agama Persekutuan Kajang (SMAPK) yang telah menyertai program ini. Majlis ini juga turut dihadiri oleh pengetua SMAPK dan wakil pengetua INTEGOMB.

Majlis pembentangan ini telah dirasmikan oleh Pengarah Institut Perubahan Iklim (IPI), UKM, Profesor Madya Dr. Zaini Sakawi. Manakala barisan juri terdiri daripada Dr. Radin Zulhazmi Radin Abdul Halim (Ketua Penolong Setiausaha Bahagian Perkhidmatan Air dan Pembetulan, Kementerian Sumber Asli dan Kelestarian Alam), Puan Marhaini Mat (Ketua Penolong Setiausaha, Unit Perubahan Iklim, Seksyen Dasar Perubahan Iklim, Kementerian Sumber Asli dan Kelestarian Alam), Profesor Madya Dr. Wan Hanna Melini Wan Mohtar (Ketua Pusat Pengurusan Alam Sekitar, Institut Perubahan Iklim (IPI), UKM) dan Cik Su-Jin Lim (Koordinator Youth Environment Living Labs (YELL), The United Nations Children's Fund (UNICEF).

Dalam pembentangan tersebut, kumpulan-kumpulan daripada kedua-dua sekolah ini telah berkongsi aktiviti-aktiviti yang telah mereka jalankan antaranya ialah taman gantung menggunakan bahan-bahan kitar semula seperti botol-botol plastik, penghasilan baja kompos menggunakan sisa-sisa makanan dari kantin dan dewan makan asrama, pengumpulan

minyak masak terpakai dan penghasilan sabun daripada minyak masak terpakai tersebut dan lain-lain. Mereka telah menyampaikan strategi dan kaedah yang telah digunakan serta pencapaian sepanjang tempoh program ini dijalankan.

Penglibatan pelajar dan guru-guru sekolah dalam program ini menunjukkan kesedaran yang tinggi terhadap isu-isu alam sekitar, khususnya dalam usaha mengurangkan kesan negatif terhadap alam sekitar. Dengan adanya kerjasama antara pelajar dan guru-guru, diharap usaha ini dapat memberikan impak yang positif dalam mengurangkan jejak karbon serta memupuk kesedaran alam sekitar dalam kalangan generasi muda.



Bersama kumpulan Terra Firma yang telah memenangi bagi kategori INTEGOMB

Climatic Hazards Programme

Research Collaboration with Universiti Sains Malaysia

Nurfashareena Muhamad¹ & Tan Mou Leong²

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The 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC COP-27) was hosted by the Government of the Arab Republic of Egypt in November 2022. Its aim was to build upon the commitments made in COP26, with the mission of addressing the challenges of global climate change more effectively through various actions and strategic steps on climate change issues. Within the framework of the Paris Agreement, the Intergovernmental Panel on Climate Change (IPCC) has underscored the significance of constraining global warming to levels "well below 2°C", and preferably to 1.5°C compared to pre-industrial levels, as a collective endeavor to alleviate climate change.

Solar Radiation Modification (SRM) is a controversial proposal to reduce some impacts of climate change by reflecting a small portion of incoming sunlight. In brief, most SRM research has been conducted in the Global North, and most SRM modeling research has focused on its potential effects on global climate. Studies on the regional impacts of SRM have been limited, especially in the Global South. How SRM will impact the most critical climate variables for life and human well-being, such as extreme temperatures or rainfall, droughts, sea level rise, or impacts on agriculture, biodiversity, or health, remains uncertain.

This research collaboration with Universiti Sains Malaysia investigates the effects of SRM on hydro-climatic extremes in Southeast Asia, with a specific focus on floods. The work is still on-going and was presented in a seminar hosted by SEADPRI-UKM in the Lecturer Hall at the Institute for Environment and Development on 26 February 2024.

This seminar provided feedback on the SRM effects on hydro-climatic extremes in Southeast Asia and focused on the best practices of climate-related modeling, which was shared by several invited panel including from the Malaysia Meteorological Department (METMalaysia) and National Water Research Institute of Malaysia (NAHRIM).



Photo by SEADPRI-UKM

Associate Professor Dr. Tan Mou Leong provided information on SRM and shared updates on the ongoing work related to SRM.



Photo by SEADPRI-UKM

Undergraduate and postgraduate students from UKM and USM were also present.

Geological Hazards Programme

Geological Hazards and Water Pollution

Aida Soraya Shamsuddin¹, Aziemah Zulkifli², Lim Choun Sian¹
¹SEADPRI, Universiti Kebangsaan Malaysia
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Geological hazards and water pollution are closely linked, frequently impacting, and worsening each other in complex ways. Geological hazards, such as earthquakes, volcanic eruptions, landslides, and tsunamis, can directly impact water sources and ecosystems, leading to water pollution (Nakić et al., 2017). Additionally, the processes involved in these hazards can indirectly contribute to water pollution through various mechanisms.

One of the primary ways that geological hazards lead to water pollution is through the disturbance of natural land formations and ecosystems. For example, landslides triggered by heavy rainfall or seismic activity can transport large amounts of soil, debris, and pollutants into rivers, lakes, and groundwater reservoirs. This influx of sediment can degrade water quality by introducing contaminants such as heavy metals, pesticides, and organic matter into aquatic environments. These pollutants can persist in water bodies, posing risks to both human health and ecosystem integrity.

In April 2024 and still continuing into May 2024, the Ruang volcano in Sulawesi, Indonesia erupted in several episodes, and caused disruptions to air transportation due to erupted ash could posing a threat to flight engines and low visibility. Volcanic eruption represents another significant geological hazard that can also have profound impacts on water quality. While Malaysia has no active volcano, there are many active volcanoes in neighbouring countries namely Indonesia, the Philippines, and Papua New Guinea. Volcanic ash and gases emitted during eruptions can contaminate surface water sources and infiltrate groundwater systems, leading to acidification and chemical alteration of water chemistry. The release of sulphur dioxide, other toxic gases, and chemicals in the ash such as metal elements can react with water vapor in the atmosphere to form acid rain and toxic metallic and non-metallic chemicals, which further exacerbates water pollution by increasing acidity levels in aquatic environments. High concentration of sulphate, nitrate, phosphate, iron, copper, plumbum, zinc and other potentially toxic elements were generally found in the post-volcanic eruption areas, in some instances resulting in acidic and toxic water which were not viable to aquatic life. Acid rain can leach metals and other pollutants from soils and rock formations, introducing them into surface water bodies such as lakes and river, and groundwater reservoirs.

Moreover, geological hazards can disrupt infrastructure systems designed to manage and treat water resources, leading to increased vulnerability to pollution. For instance, earthquakes can damage wastewater treatment plants,

sewage systems, and storage facilities, causing leaks, spills, and overflows of untreated sewage into nearby waterways. This influx of untreated wastewater can introduce pathogens, nutrients, and other contaminants into aquatic ecosystems, posing risks to public health and exacerbating water pollution issues (Baba & Gündüz, 2017).

Furthermore, the impacts of geological hazards on water pollution can be compounded by anthropogenic activities such as urbanization, deforestation, and industrialization. Human interventions in natural landscapes can alter hydrological cycles, increase surface runoff, and exacerbate soil erosion, thereby amplifying the transport of pollutants into water bodies during geological events. Additionally, the expansion of urban areas and industrial facilities often results in the discharge of hazardous chemicals, heavy metals, and pollutants into surface water and groundwater systems, which can interact with geological processes and exacerbate water pollution issues during hazard events.

The relationship between geological hazards and water pollution is multifaceted and dynamic, characterized by complex interactions between natural processes and human activities. Addressing these interconnected challenges requires a comprehensive approach that integrates hazard mitigation, water resource management, and pollution control strategies to safeguard both human health and environmental integrity.



Mud slide in Weiziping Village of Luanzhen Township, China's Shaanxi Province (Xinhua News)

References

1. Baba, A., & Gündüz, O. (2017). Effect of Geogenic Factors on Water Quality and Its Relation to Human Health around Mount Ida, Turkey. *Water*, 9(1), 66. <https://doi.org/10.3390/w9010066>
2. Nakić, Z., Mileusnić, M., Pavlič, K., & Kovač, Z. (2017). Environmental geology and hydrology. *Physical Sciences Reviews*, 2(10). <https://doi.org/10.1515/psr-2016-011>.

Geological Hazards Programs

Rainfall-induced Landslide Forecasting

Lim Choun Sian

SEADPRI-Universiti Kebangsaan Malaysia



The Secretary General and delegates at the launch of the GeoSlide.

Rainfall-induced landslides including debris flows have been among the most frequent landslide disasters in the country. The climate drivers, intense and prolonged rainfall, are common to tropical countries like Malaysia, especially during the monsoon seasons. According to the studies published by the Intergovernmental Panel on Climate Change (IPCC), more extreme rainfalls or rainstorms are expected with the increasing global temperature and climate change.

In Malaysia, there are indications that the impact of climate-driven disasters are already realizing. Incidentally, since the last three decades, there are trends of landslides increasing in frequency and magnitude. This can be seen from a few major debris flows in Gunung Jerai, Yan (2021) and Sungai Kupang, Baling (2022) in Kedah; Batang Kali in Selangor (2022); Kenyir Dam in Terengganu (2022); and also numerous other landslide events after rainstorms in many parts of the country.

Since rainfall is the main trigger factor for landslides, disaster preparedness against landslide hazards would require anticipating the rainfall that will induce slope failures. A timely rainfall forecast would assist in the disaster management by giving out early warning to the landslide prone areas and allocating resources for disaster assistance.

The Ministry of Natural Resources and Environmental Sustainability of Malaysia (NRES) and the Department of

Mineral and Geoscience Malaysia under their Integrated National Geological Disaster Management for Landslide, or code-named GeoSlide, has developed a landslide forecasting system leveraging on Big Data Analytics technology. The system uses multi-source data, e.g. nowcast and forecast from Numerical weather prediction (NWP) models by the Malaysian Meteorological Department, the national landslide susceptibility model and National Geospatial Terrain and Slope Information System (NATSIS) by the Department of Mineral and Geoscience, and various other agencies.

This system will be able to forecast rainfall-induced landslide hazards based on thresholds of predicted rainfall for the following 3 hours up to 7 days, corresponding to the landslide susceptibility of slopes. It is also capable of estimating possible losses in the event of a mishap and visualizing routing to nearest emergency responders or relocation to shelters in emergency disaster response.

Initiated one year ago and completed in March 2024, the GeoSlide system was officially launched by the Secretary General for Ministry of Natural Resources and Environmental Sustainability YBhg. Datuk Dr. Ching Thoo a/l Kim on 9 May 2024 for implementation by agencies involved in disaster management. SEADPRI collaborated in the rainfall threshold and system development.

Geological Hazards Programs

Kursus Dalaman: Asas Sistem Maklumat Data Bencana DesInventar

*Mohd Fairus Awang, Lim Choun Sian, Aida Soraya Shamsuddin, Noor Shafirah Ramli
SEADPRI-Universiti Kebangsaan Malaysia*

DesInventar merupakan Sistem Maklumat Data Bencana yang menjadi alat konseptual dan metodologi penting dalam pengurusan data berkaitan bencana secara efektif. Sistem komprehensif ini memudahkan pengumpulan, dokumentasi, dan analisis sistematik maklumat yang berkaitan dengan kerugian yang disebabkan oleh bencana. Terdiri daripada dua modul penting, ia membolehkan pengguna memasukkan data peristiwa ke dalam pangkalan data yang terstruktur dan seterusnya melakukan analisis terperinci berdasarkan pelbagai kriteria termasuk kesan, jenis peristiwa, punca, lokasi, dan faktor temporal. Hasil analisis ini kemudiannya disajikan secara visual melalui jadual, graf, dan peta tematik, memberikan pandangan holistik tentang kesan bencana. Dengan mengambil pendekatan pengelasan yang sejajar dengan kategori Data Kerugian Bencana (DATA), DesInventar mengelaskan kesan bencana kepada empat kumpulan utama: yang bilangan manusia terkesan, kediaman, infrastruktur, dan sektor ekonomi. Pendekatan bersepadu ini tidak hanya meningkatkan amalan pengurusan data tetapi juga memberi maklumat kepada pihak berkepentingan untuk membuat keputusan yang termaklum, akhirnya memperkuat ketahanan dan usaha tindak balas bencana pada peringkat tempatan dan global.



Praktikal kemasukan data bencana dalam Sistem DesInventar oleh Navakanesh M Batmanathan

Dalam era yang mencabar dengan kepelbagaian iklim yang semakin tidak menentu dan dinamik sosioekonomi yang rumit, kekerapan dan keparahan bencana telah meningkat, memberikan cabaran yang besar kepada masyarakat di seluruh dunia. Dari ribut taufan hingga kemalangan industri, kesan peristiwa-peristiwa ini menekankan keperluan yang kritikal untuk strategi pengurusan bencana yang efektif. Sehubungan dengan itu pihak Pusat Bencana Asia Tenggara (SEADPRI) telah melaksanakan kursus dalaman mengenai sistem ini kepada kakitangan pada 23 April 2024 yang lalu. Kursus ini bertujuan untuk melengkapi peserta dengan kemahiran dan pengetahuan yang diperlukan untuk mengendalikan DesInventar, alat khusus yang direka untuk pengurusan data bencana. Dengan memupuk pemahaman menyeluruh tentang pendekatan yang berdasarkan data, kursus ini bertujuan untuk memberdayakan individu untuk menyumbang secara proaktif kepada usaha pengurangan risiko bencana dan meningkatkan ketahanan komuniti di dalam menghadapi cabaran.

Technological Hazards Programme

Early Diagnosis of Septicemia and Pyemia Disease

Tan Ling Ling

SEADPRI-Universiti Kebangsaan Malaysia

Procalcitonin (PCT), as a medium of inflammation, has become a new marker in recent years for the identification of severe bacterial infections. It has received high attention due to its most ideal diagnostic indicators of specificity with major types of organism systemic inflammation of bacterial infection in the early stages.

In general, PCT is a normal precursor of the active hormone calcitonin with a molecular weight of 13 kDa. Various studies have shown that rapidly increasing levels of procalcitonin were closely correlated with severe systemic bacterial infections. Serum PCT concentration in healthy individuals is typically <0.1 $\mu\text{g/L}$. In the presence of bacterial infection, PCT increases, and the degree of rise correlates with the severity of the infection. Patients with localized infection have smaller increases of PCT in comparison to those with generalized sepsis, severe sepsis, and septic shock. A declining PCT concentration usually reflects the resolution of the disease. PCT is detectable 3 to 4 hours after an infection following the release, and it peaks at 6 to 12 hours and has a half-life of about 24 hours. The favorable kinetic profile, and its specificity and sensitivity for bacterial infection make it suitable for diagnosis and disease progression monitoring.

There are many uses for monitoring the PCT concentration. It can be used to provide useful information for the differential diagnosis of infectious and non-infectious diseases so as to avoid the abuse of broad-spectrum antibiotics, and also to reduce the occurrence of drug resistance. It can be used in the follow-up of patients with infections and a systemic inflammatory response to improve the rescue success rate of critical patients. It is useful to assess the prognosis of the disease, and to improve the efficacy of therapeutic measures.

Therefore, the detection of PCT in serum is crucial for effective early diagnosis and very helpful for further treatments.

Extensive efforts and a variety of analytical techniques have been widely employed in the determination of PCT. However, despite considerable efforts launched in this area, improving the selectivity and sensitivity of detecting PCT is still a challenge. Typical methods for quantitative detection of PCT are fluorescence immunoassay (IFA), chemiluminescence immunoassay (CLIA), and enzyme-linked immunosorbent assay (ELISA). However, these methods are expensive, complicated and time-consuming owing to both the equipment and detection process. Exploring new strategies and techniques for simple, sensitive, rapid, and reliable detection of PCT is strongly desirable.

There are a few reports about the application of electrochemical immunoassays for procalcitonin biomarker. Electrochemical immunoassays, as a promising approach for selective and sensitive analyses, with simple instrumentation, easy signal quantification, low cost, low power requirements, rapidness, high compatibility, and high repeatability, have become important analytical tools in different fields, such as environmental protection, food safety, and clinical diagnosis. As for the construction of an electrochemical immunosensor, it is based on the antigen-antibody interactions that are coupled to electrochemical transducers. The key step is the efficient immobilization of biomolecules onto the electrode surface. Biosensor possesses good prospects for the analysis and detection of disease markers but developing a highly sensitive, viable, simple, cost-effective, and high-throughput detection method for detecting PCT remains a daunting task.



The image on the left shows skin blotching and inflammation due to sepsis that is potentially life-threatening when the body's response to infection causes injury to its own tissues and organs. The image on the right shows gangrene after sepsis and adrenaline. (Google image)

Technological Hazards Programme**Lawatan Rakan Penyelidik dari Newcastle University ke SEADPRI**

*Tan Ling Ling & Mohd Faizol Markom
SEADPRI-Universiti Kebangsaan Malaysia*



Photo by SEADPRI-UKM

Lawatan rakan Penyelidik, Dr. Andrew Pike (kedua dari kiri) dari Newcastle University pada 13 November 2023 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. Andrew Pike, seorang akademik dari Newcastle University, Newcastle upon Tyne, United Kingdom pada 13hb November 2023. Beliau merupakan rakan penyelidik kepada Prof Madya Dr. Tan Ling Ling dalam beberapa projek penyelidikan, antaranya adalah seperti pembangunan aptasensor impedimetrik berasaskan polianilina untuk pengesanan aflatoxin B1 dalam makanan ayam ternakan untuk keselamatan makanan dan pembangunan biosensor DNA sebagai sistem amaran awal untuk pengesanan ledakan

alga bloom berbahaya. Beliau juga merupakan penyelia bersama kepada dua pelajar Sarjana Sains di SEADPRI, Institut Alam Sekitar dan Pembangunan iaitu Ong Jing Yi (P98955) yang telah pun tamat pengajian pada tahun ini dan Jeremy Jason Chin Chwan Chuong (P118359) yang masih aktif pengajian. Kunjungan Dr. Andrew Pike juga disambut baik oleh dua orang penyelidik bersama Dr. Tan iaitu Dr. Nurul Yuziana Mohd Yusof, seorang Ahli Molekul Biologi dari Jabatan Sains Bumi dan Alam Sekitar, Fakulti Sains dan Teknologi, UKM dan Dr. Lee Loong Chuen yang merupakan seorang Saintis Forensik dari Fakulti Sains Kesihatan, UKM.

Bengkel Pra-Iktizal Pusat Kajian Bencana Asia Tenggara

Mohd Fairus Awang, Nurfashareena Muhamad, Noor Shafirah Ramli & Mohd Faizol Markom
SEADPRI-Universiti Kebangsaan Malaysia



Perbincangan diantara ahli Pusat SEADPRI-UKM semasa Bengkel Pra-Iktizal SEADPRI

Pada 14 Mei 2024, bertempat di Hotel Bangi Resort, Selangor, telah berlangsungnya satu bengkel Pra-Iktizal Pusat Kajian Bencana Asia Tenggara (SEADPRI) – UKM. Bengkel telah dihadiri oleh sembilan peserta yang terdiri daripada empat orang Felo, dua orang Ketua Pegawai Penyelidik (RO), seorang Pegawai Sains Kanan (PS), seorang Penolong Pegawai Sains (PPS) dan seorang Pembantu Tadbir (PTO). Bengkel ini diadakan bertujuan bagi mengumpul idea-idea baharu serta cadangan-cadangan daripada setiap ahli Pusat SEADPRI. Percambahan idea dari ahli SEADPRI ini dapat digunakan untuk perancangan pelan strategik pusat di samping mencapai KPI dari masa ke semasa. Cadangan-cadangan dan idea-idea ini akan dibawa dan dibentangkan semasa Bengkel Iktizal LESTARI yang akan diadakan pada bulan Julai 2024.

Di antara objektif perlaksanaan bengkel ini adalah seperti berikut:

- Percambahan idea-idea terkini dan dinamik bagi pemantapan halatuju penyelidikan, program pengajian, pentadbiran & sumber manusia dan penjenamaan LESTARI.
- Membolehkan kakitangan berinteraksi, membina hubungan baik dan bekerja secara efektif dengan rakan sekerja untuk mencapai objektif yang sama.
- Mewujudkan interaksi positif dalam kalangan kakitangan bagi membentuk semangat kerja secara kolaborasi.
- Mewujudkan perasaan bertanggungjawab kakitangan terhadap keputusan kumpulan.

Bengkel telah dimulai dengan kata alu-aluan oleh Ketua Pusat SEADPRI iaitu Dr. Nurfashareena Muhamad.

Kemudian diteruskan dengan perbincangan Halatuju Pusat SEADPRI. Bengkel diteruskan dengan agenda ke-3 iaitu perbincangan Iktizal LESTARI, yang terdiri daripada empat topik utama: halatuju penyelidikan, program pengajian, pentadbiran dan sumber manusia, serta penjenamaan LESTARI. Agenda ke-3 ini merupakan fokus utama bengkel, di mana hasil perbincangan akan dibentangkan semasa Bengkel Iktizal LESTARI. Bengkel berlanjutan dengan agenda ke-4 (Pelataan KPI Pusat SEADPRI) dan agenda ke-5 (hal-hal lain). Penutupan bengkel disempurnakan dengan ucapan terima kasih daripada Ketua Pusat.

Kesimpulannya, bengkel Pra-Iktizal SEADPRI – UKM ini merupakan sebuah platform yang membolehkan ahli Pusat SEADPRI berinteraksi, berkongsi idea, dan menyumbangkan cadangan untuk pembangunan dan penambahbaikan pusat. Dengan kerjasama dan semangat kolaborasi di antara kakitangan, diharapkan Pusat SEADPRI dapat terus berkembang dan memberi impak positif dalam bidang kaji selidik dan pengurusan bencana di rantau Asia Tenggara.

BENGKEL PRA-IKTIZAL SEADPRI 2024

Tarikh : 14 Mei 2024 (Selasa)
Masa : 8.00 pagi hingga 5.00 petang
Tempat : Bangi Resort Hotel

Akses Folder :
https://drive.google.com/drive/folders/10RoMu3K3FP5i7woc0Jyzfime5gzh0Ky?usp=share_link

TAHNIAH DAN SYABAS

Pihak Pusat SEADPRI-UKM mengucapkan tahniah kepada **PUAN SITI KHADIJAH SATARI** di atas pelantikan beliau sebagai Project Administrator untuk *Working Group III on Mitigation of Climate Change, Intergovernmental Panel on Climate Change (IPCC)* dan kenaikan pangkat ke jawatan Ketua Pegawai Penyelidik di Gred Q48.

Pihak Pusat SEADPRI-UKM amat berbangga dengan kejayaan yang diperolehi dan berharap dengan pelantikan dapat menyumbangkan perkhidmatan dengan lebih cemerlang lagi di dalam bidang kepakaran untuk Pusat SEADPRI khususnya dan UKM amnya.

Semoga dengan pelantikan dan kenaikan pangkat ini akan memberi aspirasi kepada semua staf Pusat SEADPRI untuk terus berusaha dengan gigih dalam melaksanakan tugas dan amanah yang dipertanggungjawabkan.



Puan Siti Khadijah Satari

Dr. Lim Choun Sian



Puan Noor Shafirah Ramli

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Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM)

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