

BULETIN SEADPRI

pusat kajian bencana asia tenggara
southeast asia disaster prevention research initiative

SELAMAT BERSARA MANTAN PENGARAH DAN SELAMAT BERTUGAS PENGARAH DAN TIMBALAN PENGARAH LESTARI YANG BAHARU

Sharifah Zarina Syed Zakaria

Terlebih dahulu SEADPRI ingin mengambil kesempatan untuk merakamkan jutaan terima kasih kepada Prof. Dato' Dr. Mazlin bin Mokhtar di atas segala jasa, bakti dan sumbangan yang telah diberikan kepada Pusat SEADPRI dan Insitut Alam Sekitar dan Pembangunan (LESTARI) sepanjang memegang jawatan sebagai Pengarah, yang telah berakhir pada Febuari 2022. Semoga Allah S.W.T. memberkati usaha murni yang telah beliau laksanakan. Pihak SEADPRI mendoakan agar beliau dapat terus menyumbangkan pendapat dan buah fikiran agar dapat mengukuhkan lagi struktur akademik di UKM dan negara.

SEADPRI juga mengambil kesempatan ini, mengucapkan tahniah kepada Prof. Madya Dr. Goh Choo Ta and Dr. Sharina Abdul Halim atas lantikan sebagai Pengarah dan Timbalan Pengarah, LESTARI. SEADPRI berharap dengan pelantikan ini akan mendorong PM Dr Goh dan Dr. Sharina, untuk terus memberikan perkhidmatan yang bermutu tinggi seterusnya dapat menyumbang bakti kepada UKM. Pusat SEADPRI akan sentiasa memberi sokongan padu kepada PM Dr. Goh dan Dr. Sharina dalam melaksanakan tugas sebagai Pengarah dan Timbalan Pengarah LESTARI.

SEADPRI congratulates Associate Professor Dr. Goh Choo Ta and Dr. Sharina Abdul Halim on their appointment as the Director and Deputy Director of the Institute for Environment and Development (LESTARI). We wish you both every success in your duties. May both of you be blessed with the strength, wisdom and perseverance to lead and continue to contribute towards achieving our mission and vision. We are with you in the march towards the pinnacle of academic excellence!

JUNE 2022

Tahniah dan Selamat Bertugas



Sekalung Penghargaan



From left to right:

Associate Prof. Dr. Goh Choo Ta, Dr. Sharina Abdul Halim and Prof. Dato' Dr. Mazlin Mokhtar





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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Climatic Hazards Programme

Bengkel Dasar Pengurangan Risiko Bencana Negara dan Perbincangan Rang Undang-Undang Pengurusan Bencana

Siti Khadijah Satari & Go Wen Ze
 SEADPRI-Universiti Kebangsaan Malaysia



Photo by SEADPRI-UKM



SEADPRI-UKM is providing technical support to NADMA Malaysia in formulating the National Policy on Disaster Risk Reduction. A workshop was held with senior officials of NADMA on 8-10 February 2022 to take stock of the inputs received from the extensive stakeholder consultation that was conducted prior to this event.


Bengkel Dasar Pengurangan Risiko Bencana (DRR) Negara dan Perbincangan Rang Undang-undang Pengurusan Bencana telah diadakan selama tiga hari bermula 8 hingga 10 Februari 2022, bertempat di Dewan Wawasan, Markas Pasukan Mencari dan Menyelamat Khas Malaysia (SMART), Pulau Meranti. Bengkel ini dianjurkan oleh Agensi Pengurusan Bencana Negara (NADMA) bersama Pusat Kajian Bencana Asia Tenggara (SEADPRI-UKM), Universiti Kebangsaan Malaysia sebagai rakan strategik bagi penggubalan Dasar Pengurangan Risiko Bencana Negara. Bengkel telah dirasmikan oleh YBrs. Tuan Jamil Derus bin Ahmad, Timbalan Ketua Pengarah, Bahagian Perancangan dan Persediaan Bencana NADMA. Pembentangan Deraf Dasar DRR Negara telah disampaikan oleh Puan Che Siti Noor binti Koh Poh Lee@ Che Mamat, Ketua Penolong Pengarah, Seksyen Mitigasi NADMA dan pembentangan Deraf Pelan Tindakan DRR telah disampaikan oleh Prof. Dr. Joy Jacqueline Pereira, Felo Utama, SEADPRI-UKM.

Objektif bengkel ini untuk memperincikan tindakan-tindakan yang digariskan dalam setiap strategi DRR yang telah ditetapkan dan penambahbaikan kandungan serta penggunaan istilah dalam deraf Dasar yang sedang dibangunkan. Bengkel ini dihadiri oleh 36 orang pegawai NADMA dari pelbagai seksyen seperti Seksyen Dasar dan Perancangan, Seksyen Pembangunan Komuniti dan

Sosial, Seksyen Pelaksanaan Operasi, Seksyen Mitigasi, Pusat Kawalan Bencana Negara (NDCC) dan Pasukan Mencari dan Menyelamat Khas Malaysia (SMART) serta turut dihadiri oleh beberapa penyelidik daripada SEADPRI-UKM. Sesi perbincangan berkumpul telah dijalankan bagi mendapatkan pandangan dan input dari semua wakil bahagian dan seksyen di NADMA bagi memastikan dasar yang dihasilkan adalah menyeluruh dan boleh dilaksanakan. Perbincangan bertumpu untuk memastikan Dasar DRR Negara dan Pelan Tindakan adalah selaras dengan struktur semasa NADMA dan elemen utama dalam Rang Undang-undang.

Sesi perbincangan yang diadakan pada hari pertama dan kedua telah berjaya menambah baik kandungan dan penggunaan istilah di dalam deraf Dasar DRR yang merangkumi tajuk, mukadimah, rasional, pernyataan dasar, matlamat, prinsip, teras strategik dan tindakan utama. Perbincangan Rang Undang-undang pengurusan bencana pada hari yang ketiga melibatkan satu sesi umum yang dikendalikan oleh Pengarah Dasar NADMA bagi memastikan deraf Dasar Pengurangan Risiko Bencana Negara yang digubal selaras dengan kerangka Rang Undang-undang yang dirancang. Lanjutan daripada bengkel yang diadakan, satu survei Mentimeter telah dijalankan untuk mendapatkan maklum balas awam bagi deraf penggubalan Dasar DRR Negara yang disediakan.

Bengkel Anjuran SEADPRI-UKM Bulan Julai



Pusat SEADPRI telah mengadakan bengkel Geological Disasters Knowledge and Awareness Training of Trainers pada 7 Julai 2022 melalui atas talian. Matlamat bengkel ini adalah untuk mendidik dan menggalakkan golongan belia dan professional muda (YYP) untuk memahami risiko bencana geologi di Malaysia dan kawasan sekitarnya.

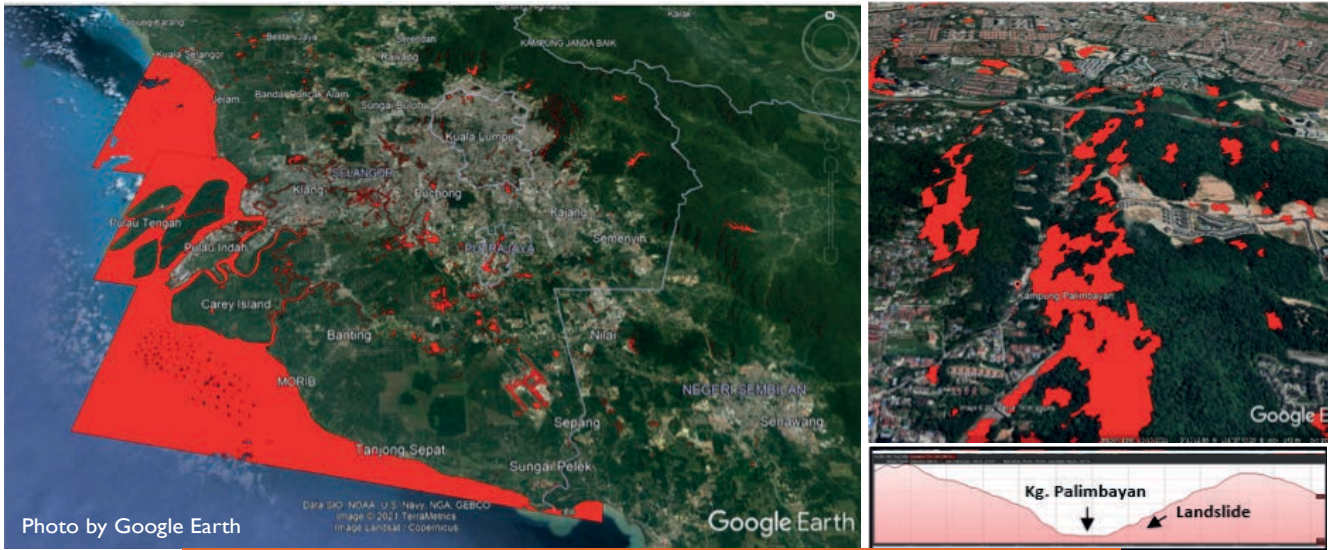
Photo by SEADPRI-UKM

Bengkel Geological Disasters Knowledge and Awareness Training of Trainers

Climatic Hazards Programme

The December 2021 / January 2022 Disasters in Selangor

*Nurul Syazwani Yahaya, Navakanesh M. Batmanathan & Joy Jacqueline Pereira
SEADPRI-Universiti Kebangsaan Malaysia*



Wet zones were delineated using open-access data. Snapshot from 19 December 2021 above shows the areas affected by the storm event. The storm event also led to landslides that had compounded the flood events in various areas of Selangor and Kuala Lumpur.

Extended landfall from a tropical depression 29W across the South China Sea in mid-December 2021 had caused severe floods in several states of Peninsula Malaysia and Sabah until mid-January 2022. Various struggles ensued and resulted in 54 deaths, RM5.3-6.5 billion worth of property damage and a total of 125,4890 people displaced. Selangor, especially, had experienced record-high precipitation during the storm event with several days of continuous heavy rains; it was among the worst-hit states, along with Kuala Lumpur. A quick probe of disaster-hit areas in Selangor was carried out by the Project's graduate researcher at SEADPRI (Mr. Navakanesh Batmanathan, Ph.D. candidate) using Open-Access data, including satellite imagery from Sentinel-1, Google Earth, etc. The Sentinel-1 satellite data was used as a tool to identify wet areas, giving an estimation of the extent of inundated areas (on low-lying areas) and moisture-induced landslide-prone areas (on highland/slope areas). Based on the analysis, evidence of river swelling was found, such as along the Langat River. Wet slopes were also identified, including areas surrounding Kampung Palimbayan, Kuala Lumpur, which was affected by landslides on 19 December 2021 following the continuous rain. High-risk slope areas need to be identified and monitored to better prepare for similar phenomena. For low-lying areas, including floodplains and coastal plains in Selangor, flood hazards may worsen, so areas already exposed

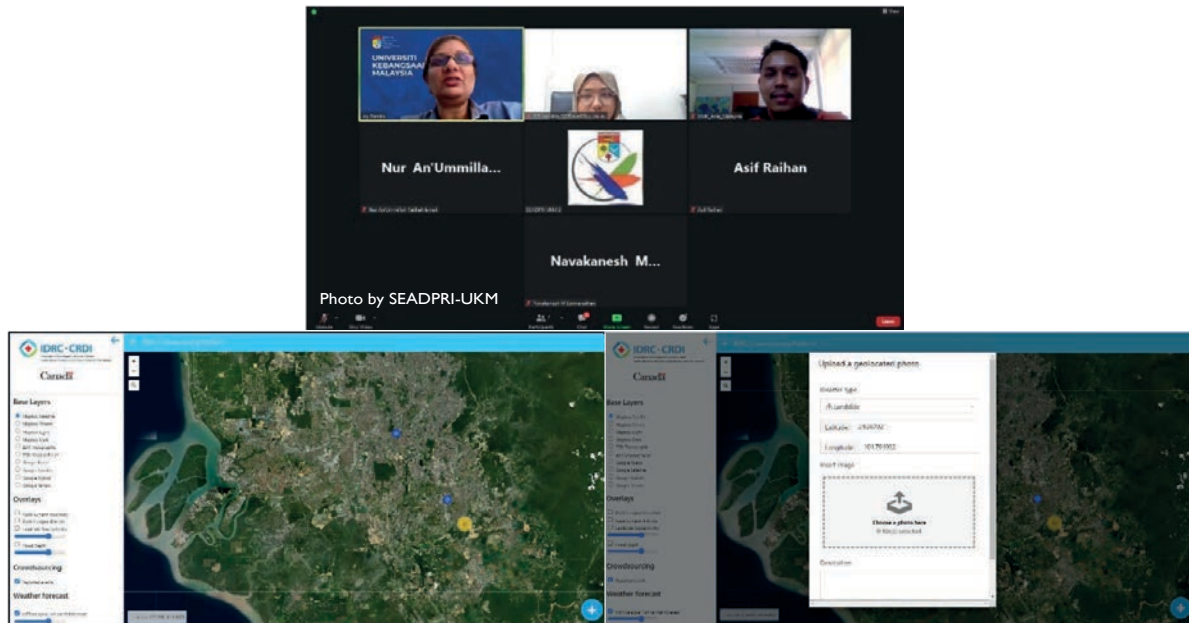
need to prepare for more severe and frequent floods. New areas that will be susceptible to flooding must be identified using new approaches, considering the impacts of climate change. In Selangor, other factors were also found to compound the impacts of extreme weather events. These include high tide in the coastal areas and shutdown of water treatment plants resulting in water cuts in many areas.

The extreme floods that occurred rapidly and simultaneously at many places in Selangor had left the local authorities struggling to manage the crisis. Following the event, the Selangor State Secretary Office invited Professor Dr Joy Pereira to provide input on the risks of climate change and its long term implications for development. The findings were presented to the Chief Minister and Members of the Selangor State Executive Council at their annual planning retreat held in Langkawi on 24 February 2022. The need for a more enhanced DRR approach and the implementation of evidence-based decision-making was emphasized. Subsequently on 12 April 2022, SEADPRI participated in the meeting on the flood post-mortem focusing on operational aspects. The meeting provided insights on the barriers and challenges faced by the operational agencies at the state and federal levels during the disasters and how to improve the situation for future events.

Climatic Hazards Programme

Community GIS System for Building Disaster Resilience

Nurul Syazwani Yahaya & Joy Jacqueline Pereira
SEADPRI-Universiti Kebangsaan Malaysia



The crowdsourcing data input window is designed for simple reporting of hazard events by laymen (citizen scientists). The users will need to upload a geolocated photo which will be used for the validation processes. Photos uploaded by the users will be displayed by placing the cursor at the reported events (blue dots). The interns hired to assist in the development of the system are Siti Hanna Sofea, Mohd Aniq Ikhwan and Nur An'Ummillah Fatimah, all of whom are geology undergraduates from Universiti Malaysia Kelantan (UMK).

The advancement of long-term disaster resilience is facilitated by access to scientific information and awareness of susceptibility to hazards, so that communities can self-organize to take appropriate actions to reduce their risks. An open-source digital platform with relevant data for disaster risk reduction is essential for building disaster resilience at the community level. The development of such a system is underway in the project on 'Promotion of Social Entrepreneurship in Disaster Risk Reduction', funded by the International Development Research Centre (IDRC) Canada. SEADPRI is collaborating with the Meteorology Department of Malaysia and other parties in a pilot study, to develop a system to inform communities of the susceptibility of their neighbourhoods and their exposure to hazards. The system also serves as a medium for users to partake actively by contributing data on hazards through a crowdsourcing platform. The crowdsourcing platform enables communities to become citizen scientists, who record data on hazards such as floods and landslides. To ensure better usability and attract a wider range of users, the project has developed a mobile-friendly application by which reporting of events can be made in a simple manner. Automatic location discovery and photo upload via the mobile application will facilitate data input by users and verification of reported incidents by the data manager. Further improvements are necessary during the incubation period to ensure its efficacy and reliability. Currently, the system is being updated for quality control based on feedback gathered from

several pilot tests conducted. The IDRC Project is also supporting three interns from Universiti Malaysia Kelantan to assist with the development of the hazards database, which will be a component of the Community GIS System. The interns are collating information on hazards and disasters, and conducting initial screening for removal of spurious data. The capacity of the interns is being strengthened on mapping using the OpenStreetMap (OSM) platform, facilitated by the Asian Network on Climate Science and Technology (ANCST), a key collaborator of the project, and other parties.

The interns have also been equipped with a series of hands-on training of GIS applications, led by Ms. Siti Hasniza Md. Arshad, a Ph.D candidate and graduate researcher at SEADPRI. The training modules include plotting and mapping of hazard locations and elements at risk. Moving forward, the focus will be on field training to familiarize the interns with field assessment of high-risk areas. Understanding of conditions in the field will be crucial towards the identification of potentially high-risk areas based on satellite imageries and verification of reported events that they need to filter for, based on crowdsourced photos. These technical skills serve as the foundation for building social entrepreneurs in DRR, who will then move on to further develop the open-source digital platform for building disaster resilience, in service of more communities and stakeholders from other neighbourhoods.

Climatic Hazards Programme

Dialogue on Climate Change 2022: Risks, Adaptation and Mitigation - Implications and Way Forward

Go Wen Ze, Nurfashareena Muhamad & Joy Jacqueline Pereira
SEADPRI-Universiti Kebangsaan Malaysia

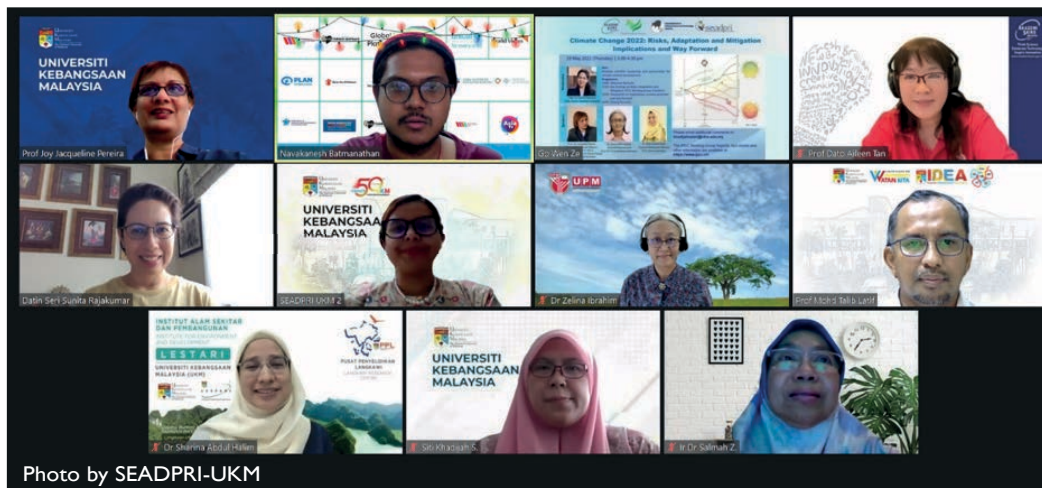


Photo by SEADPRI-UKM

The event was moderated by YBhg. Datin Seri Sunita Rajakumar, (second row, first left) and key findings of the IPCC were presented by three IPCC authors from Malaysia, namely Professor Dr. Joy Jacqueline Pereira (top row, first left), Associate Professor Dr. Zelina Zaiton Ibrahim (second row, second right); and Dr. Sharina Abdul Halim (bottom row, first left).

The Intergovernmental Panel on Climate Change (IPCC) has confirmed that humans have contributed to global warming of about 1.1°C since pre-industrial times. This has caused widespread changes to the atmosphere, natural ecosystems and the oceans. Human-induced climate change is already affecting many weather and climate extremes in every region across the globe. In the worst case scenario should climate actions fail, global warming of 1.5°C will be exceeded in the next two decades. Malaysia can anticipate increased frequency and intensity of heavy rainfall and hazards associated with rainfall such as floods, flash floods, mudflows, landslides, of which all have already occurred in our country.

In conjunction with the most recent report produced by IPCC, a dialogue of key findings on “Climate Change 2022: Risks, Adaptation and Mitigation - Implications and Way Forward” was jointly convened by the Committee on Climate Change and Disaster Risk Reduction of the Academy of Sciences Malaysia; Climate Governance Malaysia (CGM); the Asian Network on Climate Science and Technology (ANSCT) and Southeast Asia Disaster Prevention Research Initiative-Universiti Kebangsaan Malaysia (SEADPRI-UKM); this event took place on 19 May 2022 at 3.00-4.30pm via Zoom platform. It was aimed to mobilize scientific leadership and partnerships for climate resilient development and enable the local scientists, corporate leaders and policy makers to be abreast of the IPCC’s latest findings. The discourse received great support from more than 90 participants who were representing the public and private universities, corporate sectors, private sectors, and non-government organizations.

The event began with the presentation of the most recent key findings of the IPCC reports, by three IPCC authors from Malaysia, Professor Dr. Joy Jacqueline Pereira of SEADPRI-UKM, as the Vice Chair, IPCC Working Group II Chair and ASM Committee on Climate Change and Disaster Risk Reduction; Associate Professor Dr. Zelina Zaiton Ibrahim from Universiti Putra Malaysia as the IPCC WG II Coordinating Lead Author; and Dr. Sharina Abdul Halim from Universiti Kebangsaan Malaysia, as the IPCC WG II Lead Author. The event was moderated by YBhg. Datin Seri Sunita Rajakumar, Chair of CGM.

Professor Joy first briefly spoke about the IPCC, the 6th Assessment Cycle and the report preparation process. This was followed by Dr. Zelina’s presentation on some of the global findings on warming projections, observed impacts, future risks including those that are irreversible, adaptation feasibility, and the new concept of climate resilient development; the process of integrating adaptation and mitigation. Dr. Sharina then spotlighted some observed and projected impacts, key risks and adaptation measures, as well as enabling conditions in multiple sectors relevant to Asia. New findings from WG I on reducing short-lived climate forcers (SLCFs) in cities that bring about direct health benefits to the urban population whilst contributing to reduction in greenhouse gas emissions (GHG) was highlighted by Professor Joy.

The findings of WG II which indicate that there are options for reducing GHG emissions in every sector was also underscored. The scientific evidence is clear; we are missing a narrowing window of opportunity to limit global warming to 1.5 °C.

Climatic Hazards Programme

There were five panelists from the Academy of Sciences Malaysia (ASM) invited to share their views on the implications and issues of priority for the country, as well as the way forward. Prof. Dr. Fredolin Tanggang made an intervention on downscaling of global climate projections. In his view, policies and laws need to be formulated to steer the country towards climate-resilient pathways that can be applied at all levels, including state and local levels. Prof. Dr. Mohd Talib Latif shared his views on SLCFs and air pollution. According to him, Malaysia has the capacity to contribute data and support the methodology and guideline development of IPCC for reporting on SLCFs at the global level. Ir. Dr. Salmah Zakaria shared her views on water resources. She opined that target objectives need to be prioritized according to the country's needs and situation as the IPCC report targets global and regional levels. She also pointed out that the impacts of sea level rise need to be properly evaluated for adaptation planning of coastal areas of Malaysia. Datuk Dr. Abdul Rahim Nik shared his thoughts on biodiversity and forests. According to him, the understanding of the interconnection is vital in formulating the strategies to achieve the co-benefits of mitigation and adaptation and achieve positive outcomes. Prof. Dato' Dr. Aileen Tan Shau Hwai provided her perspective on oceans and marine biodiversity. She lamented the slow pace and minimum focus of climate change research on marine ecosystems that is hindering progress on understanding of the processes and changes at the local level.

These changes have not only devastated the environment, but also impacted the food security. Climate education is essential in this context. The discussion session that was moderated by YBhg. Datin Seri Sunita Rajakumar pointed out the importance of climate governance. It was stressed that the directors in the corporate sectors have to take the lead in contributing and demonstrating their climate ambitions to steer the social systems towards achieving the SDG 13. It was also emphasized that carbon trading schemes have to be carefully structured and monitored to ensure that it contributes to absolute emission reduction at the global level. The use of groundwater as a safe and alternate source of water resource is context and area specific; local scale information is required to support the decision-making process. It was proposed that ASM play a greater role in encouraging people to publish their research findings in peer reviewed and indexed journals. This is a way to get local innovation, practices and technology highlighted at the global level. The issue of data accessibility, particularly science information that is restricted by data sharing regulations or rules was also highlighted. The event has served as a stepping stone for the ASM and the conveners to mobilize scientific leadership and partnership, and building of trust between the different disciplines to accelerate action for climate resilient development. It is hoped that the key findings of the IPCC will serve as an impetus for policy makers to recalibrate our country with more effective action for climate resilient development and sustainable development.



Climate Change 2022: Risks, Adaptation and Mitigation Implications and Way Forward

19 May 2022 (Thursday) | 3.00-4.30 pm

Moderator:
Datin Seri Sunita Rajakumar
Chair, Climate Governance Malaysia

Aim:
Mobilise scientific leadership and partnerships for climate resilient development

Programme:
1500: Welcome Remarks
1510: Key findings on Risks, Adaptation and Mitigation: IPCC Working Group II Authors
1550: Viewpoints on implications, country priorities and way forward
1630: Closing Remarks

Speakers:
Prof. Joy Jacqueline Pereira
Universiti Kebangsaan Malaysia
Vice Chair, IPCC WG II
Chair, ASM Committee on Climate Change and Disaster Risk Reduction

Dr. Zelina Zaitun Ibrahim
Universiti Putra Malaysia
IPCC WG II Coordinating Lead Author

Dr. Shanna Abdul Halim
Universiti Kebangsaan Malaysia
IPCC WG II Lead Author

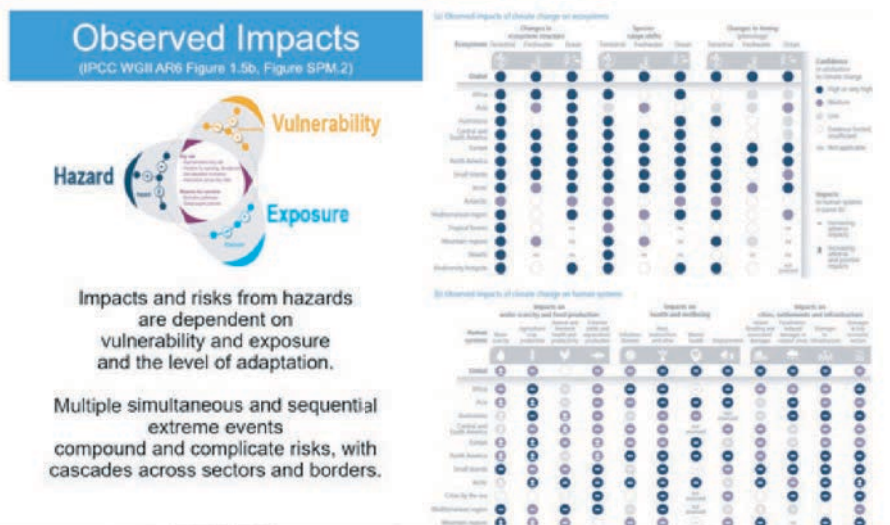
Please email additional comments to:
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The IPCC Working Group Reports, fact sheets and other information are available at:
<https://www.ipcc.ch/>

Photo by SEADPRI-UKM

The Committee on Climate Change and Disaster Risk Reduction of the Academy of Sciences Malaysia; Climate Governance Malaysia (CGM); the Asian Network on Climate Science and Technology (ANSCT) and Southeast Asia Disaster Prevention Research Initiative-Universiti Kebangsaan Malaysia (SEADPRI-UKM) have jointly convened a discourse on Climate Change 2022 on 19 May 2022, via Zoom platform with the highlights on IPCC's latest findings.

Climatic Hazards Programme



Kesan yang diperhatikan memberi gambaran tentang risiko iklim global masa hadapan terhadap ekosistem dan sistem manusia. (Sumber: IPCC, 2022)

Perubahan iklim telah memberi impak terhadap ekosistem daratan, air tawar dan lautan sama ada di peringkat global, serantau mahupun tempatan. Antara kesan yang ketara adalah pada struktur ekosistem, julat geografi spesies dan masa kitaran hidup bermusim (fenologi). Di rantau Asia, adalah nyata bahawa perubahan iklim mendatangkan kesan pada struktur ekosistem daratan (keyakinan tinggi), air tawar (keyakinan sederhana) dan lautan (keyakinan tinggi). Penilaian juga menunjukkan bahawa terdapat anjakan julat spesies di kawasan air tawar di rantau Asia dengan tahap keyakinan sederhana, diikuti oleh kawasan daratan dengan tahap keyakinan rendah; manakala bukti adalah terhad bagi ekosistem lautan. Namun demikian, ekosistem lautan dipercayai terjejas dari segi fenologinya dengan tahap keyakinan sederhana. Manakala, ekosistem daratan dan air tawar mencatatkan tahap keyakinan yang rendah.

Dari segi sistem manusia, keselamatan air dan pengeluaran makanan; kesihatan dan kesejahteraan; serta bandar, penempatan dan infrastruktur juga terkesan akibat dari perubahan iklim. Di rantau Asia, kesan buruk perubahan iklim telah diperhatikan terhadap kekurangan air (keyakinan sederhana) dan pertanian atau pengeluaran tanaman (keyakinan tinggi). Sementara itu, sektor perikanan, haiwan dan ternakan akan mengalami peningkatan kesan buruk terhadap produktiviti dengan keyakinan sederhana hingga rendah akibat daripada perubahan iklim. Kesan buruk yang semakin meningkat terhadap kesihatan dan kesejahteraan juga diperhatikan terutamanya disebabkan oleh haba, kekurangan zat makanan, kesihatan mental dan perpindahan (keyakinan tinggi) serta penyakit berjangkit (keyakinan sederhana).

Tambahan pula, penduduk di rantau Asia juga akan mengalami kesan buruk yang semakin meningkat ke atas bandar, penempatan dan infrastruktur akibat daripada kerosakan yang disebabkan oleh banjir/ribut di kawasan pantai seperti kenaikan paras laut dan lonjakan ribut (keyakinan tinggi), kerosakan kepada infrastruktur dan sektor ekonomi utama (tahap sederhana) dan banjir pedalaman dan kerosakan yang berkaitan seperti limpahan sungai, hujan lebat dan banjir bandar (keyakinan rendah). Secara keseluruhan, bahaya kesan dan risiko adalah bergantung kepada kelemahan dan pendedahan serta tahap adaptasi. Pelbagai kejadian serentak yang melampau dan berurutan menghasilkan serta merumitkan risiko, dengan merentasi sektor dan sempadan.



Risiko utama dan pilihan adaptasi di bandar terpilih di seluruh Asia. (Sumber: IPCC, 2022)

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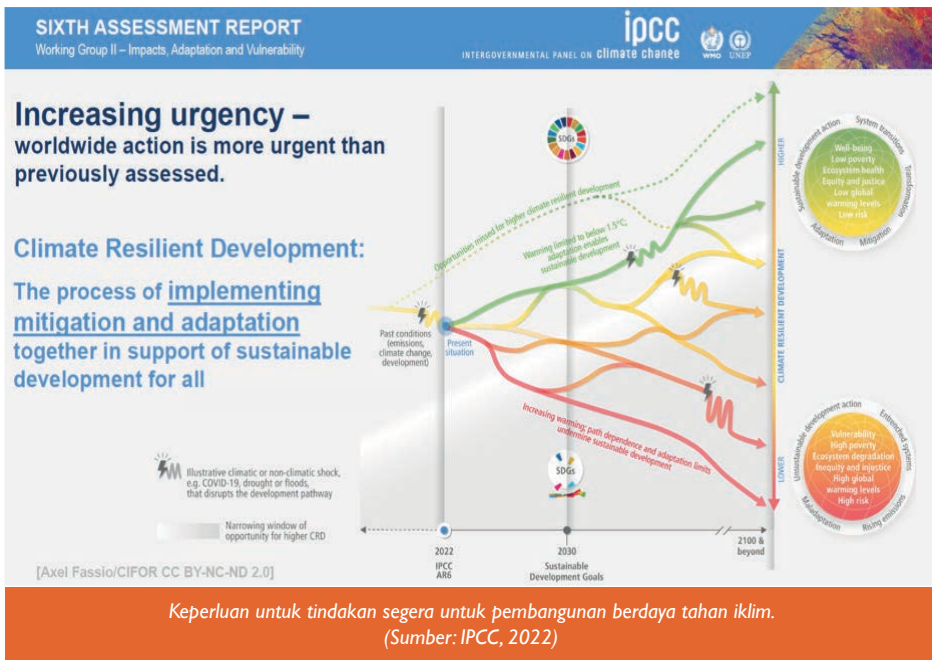
Di rantau Asia Tenggara, banjir dan kenaikan paras laut adalah antara risiko utama yang dikenalpasti. Namun demikian, kenaikan paras laut tidak berkaitan di Kuala Lumpur. Bandaraya Kuala Lumpur, Jakarta dan Ho Chi Minh mengalami tahap risiko sederhana untuk kejadian panas dan hujan yang melampau; kecuali kesan haba/ fenomena pulau haba bandar ke atas Ho Chi Minh adalah tidak ketara. Kuala Lumpur mempunyai kejadian hujan yang tinggi dan risiko rendah dalam menghadapi kemarau dan kekurangan air. Sebaliknya, tahap risiko kemarau dan kekurangan air di Jakarta adalah sederhana. Risiko utama khususnya taufan tidak dititikberatkan bagi bandar-bandar di Asia Tenggara kerana kajian dan penerbitan saintifik yang tidak mencukupi.

Kuala Lumpur dan Jakarta mempunyai tahap kemajuan sederhana dalam institusi dan infrastruktur dari segi adaptasi. Manakala bandar Ho Chi Minh adalah agak ketinggalan dalam dua aspek ini. Kuala Lumpur juga mencatatkan tahap kemajuan yang lebih tinggi dari segi adaptasi berasaskan ekosistem. Walau bagaimanapun, tiada kajian saintifik dilaporkan mengenai adaptasi dari segi tingkah laku di bandar Kuala Lumpur. Tahap perkembangan adaptasi berasaskan ekosistem juga diperhatikan adalah lebih perlahan di Ho Chi Minh dan Jakarta. Seterusnya, tahap kemajuan untuk adaptasi dari segi tingkah laku di Jakarta dan Bandaraya Ho Chi Minh adalah sederhana hingga rendah. Pembangunan berdaya tahan iklim merupakan proses melaksanakan mitigasi dan adaptasi secara bersama dalam menyokong pembangunan mampan untuk semua. Menurut laporan terbaharu IPCC, tindakan seluruh dunia untuk mencapai pembangunan berdaya tahan iklim adalah lebih mendesak daripada yang dinilai sebelum ini. Setiap tindakan, pilihan dan keputusan yang dibuat adalah penting kerana setiap daripadanya akan membawa kita jauh dari, atau ke arah dunia mampan yang berdaya tahan terhadap perubahan iklim.

Justeru itu, rangka kerja penyelesaian untuk pembangunan berdaya tahan iklim perlu dipertimbangkan oleh pihak kerajaan dan semua lapisan masyarakat. Ia juga harus melibatkan semua orang dalam membentuk perkongsian (partnership) dan menggunakan pengetahuan yang luas sama ada saintifik, pengetahuan asli, tempatan atau praktikal. Selain itu, usaha memelihara dan memulihara ekosistem juga harus dipertingkatkan dan keterlibatan kumpulan terpinggir harus diperkukuhkan. Antara aspek lain bagi rangka kerja penyelesaian untuk pembangunan berdaya tahan iklim adalah seperti mengutamakan kesaksamaan dan keadilan; menyelaraskan minat, nilai dan pandangan dunia yang berbeza; dan meningkatkan pelaburan serta kerjasama antarabangsa. Prospek untuk pembangunan berdaya tahan iklim akan menjadi lebih terhad jika pemanasan melebihi 1.5°C dan ia mungkin tidak tercapai jika tahap pemanasan melebihi 2°C.



Rangka kerja penyelesaian untuk pembangunan berdaya tahan iklim. (Sumber: IPCC, 2022)



Keperluan untuk tindakan segera untuk pembangunan berdaya tahan iklim. (Sumber: IPCC, 2022)

Climatic Hazards Programme

Bengkel Memuktamadkan Penggubalan Dasar DRR Negara

Siti Khadijah Satari & Go Wen Ze

SEADPRI-Universiti Kebangsaan Malaysia



Photo by SEADPRI-UKM

Bengkel bersama pegawai kanan NADMA bagi memuktamadkan penggubalan Dasar DRR Negara bertempat di Shangri-La Golden Sands, Pulau Pinang, 21-23 Mac 2022

Bengkel Memuktamadkan Penggubalan Dasar Pengurangan Risiko Bencana (DRR) Negara dan Perbincangan Deraf Penggubalan Rang Undang-undang Agensi Pengurusan Bencana Negara telah diadakan selama tiga hari bermula 21-23 Mac 2022, bertempat di Shangri-La Golden Sands, Pulau Pinang merupakan lanjutan daripada bengkel Dasar Pengurangan Risiko Bencana Negara yang telah diadakan pada bulan Februari 2022. Bengkel ini yang dianjurkan secara bersama oleh Agensi Pengurusan Bencana Negara (NADMA) dan rakan strategiknya Pusat Kajian Bencana Asia Tenggara, Universiti Kebangsaan Malaysia (SEADPRI-UKM), telah dirasmikan oleh YBrs. Tuan Jamil Derus bin Ahmad, Timbalan Ketua Pengarah, Bahagian Perancangan dan Persediaan Bencana NADMA dan dihadiri oleh 35 orang peserta terdiri daripada pegawai NADMA dari pelbagai seksyen seperti Seksyen Dasar dan Perancangan, Seksyen Pembangunan Komuniti dan Sosial, Seksyen Pelaksanaan Operasi, Seksyen Mitigasi dan Pusat Kawalan Bencana Negara (NDCC) serta beberapa penyelidik SEADPRI-UKM.

Pembentangan deraf survei Mentimeter maklumbalas awam mengenai deraf Dasar DRR Negara yang dalam proses penggubalan telah disampaikan oleh Dr. Nurfashareena Muhamah, Felo Penyelidik, SEADPRI-UKM. Manakala, pembentangan deraf terkini Dasar Pengurangan Risiko Bencana Negara telah disampaikan oleh Prof. Dr. Joy Jacqueline Pereira, Felo Utama, SEADPRI-UKM. Sesi perbincangan telah dijalankan bagi mendapatkan pandangan dan input daripada semua wakil bahagian dan seksyen di NADMA mengenai konsep pelaksanaan survei Mentimeter Dasar DRR yang akan dibuka kepada orang

awam serta memastikan dasar yang dihasilkan adalah menyeluruh dan boleh dilaksanakan. Perbincangan juga bertumpu untuk memastikan bahawa Dasar DRR Negara dan aktiviti-aktiviti yang terpilih dalam setiap tindakan utama adalah selaras dengan struktur semasa NADMA dan elemen utama dalam Rang Undang-undang.

Hasil perbincangan dalam bengkel yang dijalankan, satu deraf Dasar DRR Negara yang meliputi kenyataan dasar, mukadimah, rasional, matlamat, prinsip, teras strategik, tindakan utama serta aktiviti-aktiviti terpilih bagi setiap tindakan utama berjaya dimuktamadkan dan telah dibentangkan oleh Pengarah Seksyen Mitigasi NADMA, YBrs. Tuan Wan Marhafidz Shah Bin Wan Mohd Omar kepada Ketua Pengarah NADMA, YBhg. Datuk Dr. Aminuddin Bin Hassim.



Photo by SEADPRI-UKM

Climatic Hazards Programme

U-INSPIRE Malaysia@UKM Celebrates Earth Day 2022

Nurfashareena Muhamad & Mohd Fairus Awang
 SEADPRI-Universiti Kebangsaan Malaysia

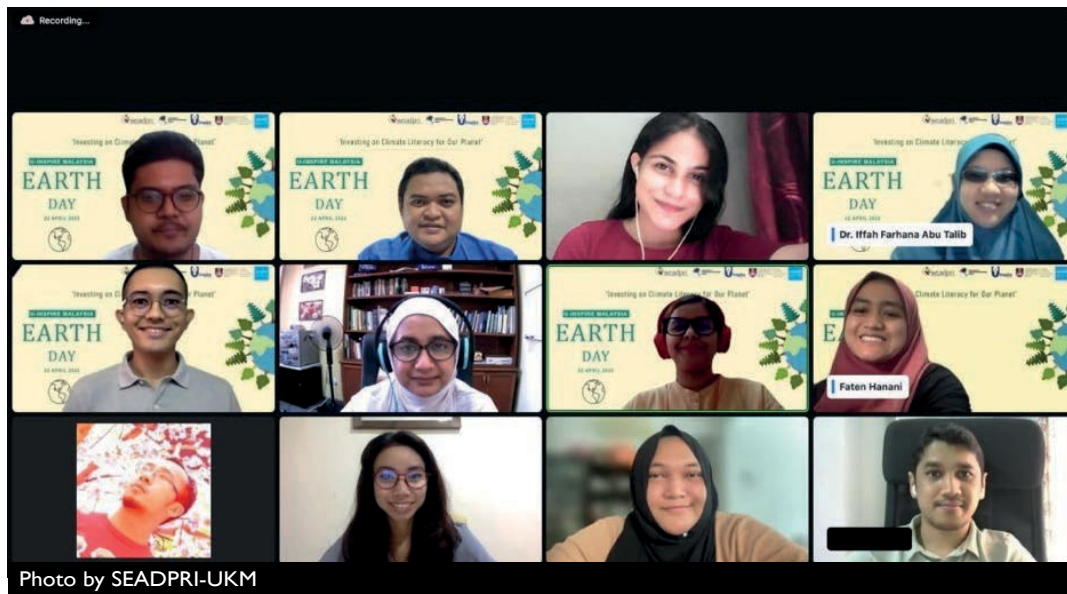


Photo by SEADPRI-UKM

Celebration of Earth Day 2022 led by U-INSPIRE Malaysia@UKM with presence from other youth and young professionals' major group in Malaysia.

Every year on April 22, Earth Day marks the anniversary of the birth of the modern environmental movement which was initiated in 1970. Earth Day celebrations emerged from an environmental and educational revolution to save the planet. It was initially started to combine grassroots support and ground efforts by students, educators, and non-profit organizations with national level commitments, to ensure that students across the world benefit from high-quality education to develop into informed and engaged environmental stewards. In addressing the climate crisis these days, coupling climate and environmental literacy with strong civic education is indeed a way to combat our greatest threat: climate change. The aim for Earth Day 2022 is to reframe the conversation, accelerate action and to work collectively among the community - individuals, governments, NGOs and businesses - to do our part.

U-INSPIRE Malaysia@UKM, Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM), and the Asian Network on Climate Science and Technology (ANCST) with support from UNICEF Malaysia and Universiti Teknologi MARA (UiTM) successfully conducted a webinar celebration on 22 April 2022. The aim of this webinar was in line with the Earth Day 2022 global theme to enhance and promote climate literacy initiatives among youth and young professionals in Malaysia. It can be seen as an effort to nurture knowledge and better understanding of their potentials, roles, and opportunities to utilize their background in combating the real threat of climate change. During the webinar, our first speaker, Prof. Sharifah Zarina Syed Zakaria of SEADPRI-UKM set the stage for what it is like to be climate literate when she elaborated that one should be able to make informed and responsible decisions with regard to actions

that may affect climate. Besides focusing on youth and young professionals, a child's right should never be left out. Ms. Jasmin Irisha Jim Ilham of UNICEF Malaysia shared in her presentation, the UNICEF perspective on children's lives being threatened due to the impact of climate change, how it will affect their abilities and what UNICEF has been doing through inclusive measures in tackling the climate and environmental crisis, which risks undoing decades of progress fighting for children's basic rights.

The next speaker, Ms. Mastura M. Rashid from IMPACT Malaysia, in her presentation shared observations on environment and climate issues that are usually discussed in urban echo chambers, and found out that youth are more triggered by waste management, disasters and political issues, among others; and shared calls for action, for instance, like having more capacity building in the local language to local people, orang asal, and more investment to empower youth towards meaningful climate actions. Our last speaker, Ms. Alka Kaur from the Malaysian Youth Climate Action Pact concluded the webinar with her presentation on youth perspective on strengthening national climate narrative matters and what type of policies could help promote investment in climate literacy; how we hold governing institutions to enforce and enact climate-related policies; how we can amplify a multitude of diverse youth voice, among others.

About 35 participants were present in the webinar and joined the question-and-answer session, reflecting this webinar was a success. Effective youth participation is about creating opportunities for other young people to be involved in influencing, shaping, designing, and contributing to policy and the development of services and programmes.

Geological Hazards Programme

The December 2021 Floods: The Role of Geospatial & Remote Sensing in Disaster Preparedness and Prevention

Lim Choun Sian

SEADPRI-Universiti Kebangsaan Malaysia



Flood incident in Taman Sri Muda, Shah Alam in December 2021 (Source: malaymail)

The December 2021 floods in Malaysia caused tremendous losses to the country. Due to continuous heavy rain and high tides, many states in Malaysia especially in the Klang Valley, Southern and East Coast Peninsular Malaysia, Sabah and Sarawak were hit by riverine and flash floods, as well as debris floods in the highland valleys. The Department of Statistics Malaysia (DOSM) reported RM6.1 billion in losses for the December to January 2022 period, with Selangor suffering the highest damages (RM3.1 billion) mainly in the districts in Klang and Petaling followed by Hulu Langat.

Responding to this catastrophic event, SEADPRI, Institution of Geospatial and Remote Sensing Malaysia (IGRSM), IEEE Geoscience and Remote Sensing Society Malaysia (GRSS Malaysia), UPM and Science and Technology Research Institute for Defence (STRIDE), Ministry of Defence Malaysia, jointly initiated and organized a series of technical forums as a post-mortem of the recent flood incidents. The focus was to discuss how geospatial and remote sensing technologies can help to support disaster preparedness and prevention. To date, two forums were carried out.

The first was held on 22 March 2022, led by paper presentations from technical agencies relevant to disaster risk management, namely:

- *Predictability of Extreme Rainfall Events During the Northeast Monsoon Season: A Recent Case during 16 - 18 December 2021.* Speaker: Muhammad Firdaus Ammar bin Abdullah, Malaysian Meteorological Department (METMalaysia)

- *Geospatial Support for Mapping of Disaster Incidents.* Speaker: Sr. Yeap Wei Chien, Department of Survey and Mapping Malaysia (JUPEM)

The second forum was held on 12 April 2022, with presentations on:

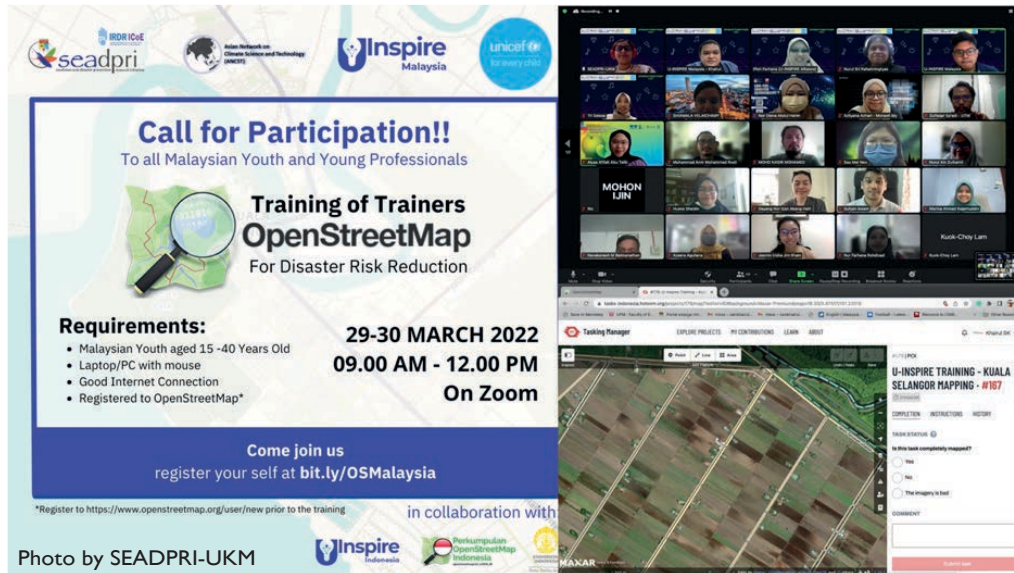
- *Flood Hazard Mapping in Support of Engineering Design for Infrastructure Development.* Speaker: Mr. Wan Hazdy Azad bin Wan Abdul Majid, Drainage & Irrigation Department (DID) Malaysia
- *"Aplikasi Data Geospasial dan Penderiaan Jauh dalam Kajian Kejadian Bencana Geologi Tanah Runtuh dan Aliran Debris di Gunung Jerai, Kedah".* Speaker: P.Geol. Wan Salmi bin Wan Harun, Department of Mineral and Geoscience Malaysia (JMG)
- *Usage of UAS for Flood Management.* Speaker: Captain Illyaquila Fateen bt Ismail, Unit, Civil Aviation Authority of Malaysia (CAAM)

The presentations from technical agencies served as discussion starters and enabled the audience to relate to the agencies' roles and functions. The case studies on natural hazard phenomena and review of climate-weather conditions during the December 2021 events were also very useful. The findings of the forum will be documented to recommend steps that can be taken by relevant authorities to prepare for future natural hazard events. The forums were useful for understanding the gaps and needs in disaster risk reduction, including how geospatial and remote sensing technologies can contribute to its advancement.

Geological Hazards Programme

Young Professionals as Community Mappers for Disaster Resilience

Nurfashareena Muhamad & Faten Hanani Hakimi
 SEADPRI-Universiti Kebangsaan Malaysia



The cohort of Malaysian Young Professionals trained as OSM Community Mappers in March 2022

OpenStreetMap (OSM) is an open-source digital world map that is built through volunteered geographic information (VGI). OSM is supported by non-profit organizations and the data is available free of charge for visualization, query, download and modification under an open license. In disaster risk reduction (DRR), OSM is used in various aspects to support informed decision making. Mapping through the OSM platform emphasizes local knowledge of a disaster or hazard situation. OSM is very useful when the data is complete (including all buildings, road network and other points of interest) and detailed (building height, materials, structural information). This is where using youth as community mappers for disaster resilience becomes useful. OSM training will develop the capacity of youths as open-access mappers to train other youth groups in Malaysia to support informed decision making on disaster. An OpenStreetMap Training of Trainers (ToT) was successfully organized on 29-30 March 2022 by the Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM) and U-INSPIRE Malaysia. The event was supported by the Asian Network on Climate Science and Technology (ANGST) and UNICEF Malaysia in collaboration with the U-INSPIRE Indonesia, Perkumpulan OpenStreetMap Indonesia and Universitas Indonesia. This type of capacity-building training helps the youth gather local knowledge to develop an open access database. This exercise is expected to

promote a community of mappers who can contribute and maintain data on road networks and physical infrastructures for the purpose of assessing aspects of disasters in a selected area.

The two-day ToT involved 55 participants covering early career scientists, young professionals, undergraduates and postgraduates from various universities in Malaysia. On Day One the theory of OSM data development was elaborated on; this covered everything from registering the OSM account to digitising. Day Two provided hands-on training to all participants for the Kuala Selangor mapping area. During the exit survey of training, a majority of the participants expressed their interest in joining our next OSM experiential-mapping mission in selected areas of Selangor, Malaysia. The interest of participants for future events reflects our success in conducting this ToT; it also reflects the commitment of youth and young professionals (YYPs) in the country on issues of disaster risk, climate change and disaster management.

The ToT goal is to nurture YYPs to contribute in the detailed mapping of information in selected risk areas. With good information and proper understanding, youth as individuals and community, will be better able to improve their lives and make good decisions about the future.

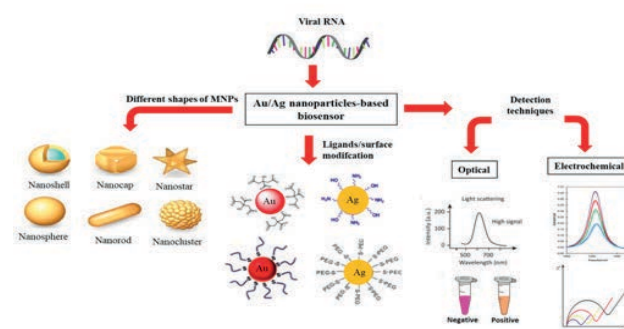
Nanoparticles-based Biosensor as a Detection Strategy for Emerging and Pathogenic RNA Virus

Tan Ling Ling & Nadiah Ibrahim
SEADPRI-Universiti Kebangsaan Malaysia

The emergence of highly pathogenic and deadly human coronaviruses, namely SARS-CoV and MERS-CoV within the past two decades, and currently SARS-CoV-2, have resulted in millions of human deaths across the world. Not to forget other human viral diseases, such as mosquito borne-viral diseases and blood-borne viruses which also contribute to a higher risk of death in severe cases. To date, there is no specific drug or medicine available to cure these human viral diseases. Therefore, the early and rapid detection without compromising the test accuracy is required in order to provide a suitable treatment for the containment of the diseases. Recently, nanomaterials-based biosensors have gained enormous interest due to their biological activities and unique sensing properties, which enable the detection of analytes, such as nucleic acid (DNA or RNA), aptamers and proteins in clinical samples. In addition, the advances of nanotechnologies is also enabling the development of miniaturized detection systems for point-of-care (POC) biosensors, which could be a new strategy for detecting human viral diseases. The detection of virus-specific genes by using single-stranded DNA (ssDNA) probes have become a particular interest due to their higher sensitivity and specificity compared to immunological methods based on antibody or antigen for early diagnosis of viral infection.

The use of nanotechnology in the development of biosensor has enhanced its performance and sensitivity due to the characteristics of nanoparticles in terms of good biocompatibility, broad structure variety and notable biomimetic characteristics, which can offer numerous biosensing functions and applications. Nanoparticles are tiny chemical substances or materials that are manufactured and used at a very small scale ranging from 1 nm to 100 nm. Several novel characteristics of nanoparticles, such as good chemical reactivity and high strength conductivity have attracted much attention for usage in the development of electrochemical biosensors. Various kinds of nanoparticles have been studied in the context of biological detection, including carbon nanotubes, silica nanoparticles, quantum dots, polymeric nanoparticles and metal nanoparticles (MNPs). Among these nanoparticles, MNPs such as gold nanoparticles (AuNPs) and silver nanoparticles (AgNPs) have been widely used due to their unique physicochemical features, such as the morphological and structural characterization at the nanoscale. These properties enabled the MNPs to be synthesized and modified with various chemical functional groups for conjugation with DNA probes, antibodies and ligands, which are crucial in the development of biosensor. The application of nanotechnology in the biosensor has contributed to the increase of sensitivity and specificity of the viral nucleic acid detection. As is well known, the sensitivity of biosensor is dependent on the capability of the biosensor to detect the minimum amount of analyte or known as the limit of

detection (LOD). This is to avoid the false negative results during the early or later stage of viral infection in which the viral load is too low. The AuNPs and AgNPs are excellent candidates as signal amplifiers or enhancers in the optical biosensors due to their distinctive sensing properties. In addition, the evolution of the optical absorptive effects exhibited by plasmonic nanoparticles enable the improvement in the biological sensing. Nonetheless, the electrochemical DNA biosensors have gained much attention recently due to their fast response time, user-friendly nature, high specificity and sensitivity. Besides, the incorporation of AuNPs and AgNPs in the electrochemical biosensing design can provide a promising novel approach for the construction of biosensors due to their powerful characteristics such as, highly promoting electron transfer reactions, large surface area, electrical conductivity, good chemical stability and mechanical robustness. In brief, the electrochemical sensors have been proven to be very simple, cost-effective devices which can be designed into a hand-held device and still retain their high sensitivity in the detection of analyte.



The schematic figure that represents the different shapes of MNPs (AuNPs or AgNPs) and the use of ligands to stabilize the MNPs. The optical and electrochemical properties of the MNPs have been validated by using the optical and electrochemical sensing techniques. (Graphic by Nadiah Ibrahim)

The intelligent use of nanomaterials is anticipated to enhance the analytical performance of biomolecular electronic devices with high sensitivities and detection limits especially in the molecular diagnosis of viral infections and currently focusing on SARS-CoV-2. By manipulating the aggregation and dispersion behaviour of cysteamine cation-stabilized AuNPs (cysAuNPs) based on nucleic acid loading, Technological Hazard Programme of SEADPRI-UKM through International Centre for Genetic Engineering and Biotechnology (ICGEB) research grant (XX-2022-002) have demonstrated a colorimetric biosensor that is able to semi-quantify COVID-19 RNA at low levels with a visual change in colour as well as reflectance spectra intensities.

Technological Hazards Programme

Kalibrasi dan Latihan Penggunaan Alat Penimbang Analisis Ohaus® PX224

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



Photo by SEADPRI-UKM

Kalibrasi dan latihan penggunaan alat penimbang analisis pada 24 Mac 2022 di Makmal Bencana Teknologi, SEADPRI-UKM.

Program Bencana Teknologi, Pusat Kajian Bencana Asia Tenggara (SEADPRI-UKM) telah mengadakan satu sesi kalibrasi dan latihan penggunaan alat penimbang analisis berjenama Ohaus® pada 24 Mac 2022 bertempat di Makmal Bencana Teknologi, SEADPRI-UKM. Jurulatih dari Labchem Sdn. Bhd. telah dijemput untuk memberi ceramah dan latihan mengenai kaedah melakukan kalibrasi terhadap alat penimbang seri PX224, konsep operasi asas dan teknik pengukuran berat atau jisim bahan spesimen.

Alat penimbang analisis Ohaus® PX224 telah diperolehi dengan menggunakan dana daripada Tabung Agihan Penyelidikan (TAP-K020205) yang diketuai Prof. Madya Dr. Tan Ling Ling. Alat penimbang analisis Ohaus® PX224 menawarkan ketepatan penimbangan dan kebolehulangan yang tinggi dengan kapasiti maksimum sebanyak 220 g dan kebolehbacaan 0.1 mg (0.0001 g) untuk aplikasi dalam tetapan makmal, industri dan pendidikan. Alat penimbang seri PX ini berharga berpatutan, dan direka bentuk secara intuitif untuk operasi pintar dengan paparan baris kedua untuk maklumat tambahan, dan sambungan USB dan RS232 untuk komunikasi yang mudah.

Pelajar Latihan Industri dari Universiti Malaysia Kelantan di SEADPRI



Photo by SEADPRI-UKM

Program Lawatan Penyelia Latihan Industri dari FSB, UMK dan Perbentangan Laporan Kemajuan.



Pusat SEADPRI telah menerima tiga orang pelajar daripada Fakulti Sains Bumi (FSB), Universiti Malaysia Kelantan (UMK) untuk menjalani latihan Industri bermula pada 21 Mac 2022 sehingga 7 Julai 2022 dibawah seliaan Prof. Dr. Joy Jacqueline Pereira bawah geran penyelidikan International Development Research Centre (IDRC), Kanada. Pelajar tersebut iaitu Siti Hanna Sofia binti Abdul Jalal, Nur An'ummilah Fatimah binti Ismail dan Muhammad Aniq Ikhwan bin Rosdy telah membenteng laporan kemajuan mereka dalam Program Lawatan Penyelia dan Bengkel Latihan Industri yang diadakan pada 1 Jun 2022, bertempat di Bilik Mesyuarat SEADPRI. Dr. Nursafiah binti Sulaiman, Pensyarah FSB, UKM telah hadir dalam program lawatan tersebut. Beliau telah dibawa melawat makmal-makmal SEADPRI selepas bengkel berakhir.

Jaringan Kerjasama SEADPRI dan NADMA

Siti Khadijah Satari, Go Wen Ze & Siti Mariam Abu
SEADPRI-Universiti Kebangsaan Malaysia



Malaysia kini berdepan dengan cabaran bencana alam seperti banjir, tanah runtuh, ribut dan lain-lain yang disebabkan oleh kesan perubahan iklim serta pandemik Covid-19 yang tidak dapat dielakkan. Perubahan iklim merupakan fenomena yang nyata dan secara saintifiknya ia menjejaskan kesejahteraan masyarakat dan memberi kesan negatif seperti kerugian ekonomi negara, kemusnahan infrastruktur, kerosakan harta benda, mengancam keselamatan dan kesihatan manusia, kemusnahan flora dan fauna serta menyebabkan pencemaran alam sekitar. Menyedari impak bencana ini, terdapat keperluan segera untuk kerajaan mewujudkan dasar yang dapat memberikan tindakan komprehensif dan tadbir urus yang cekap dalam pengurusan risiko bencana. Kerajaan melalui Agensi Pengurusan Bencana Negara (NADMA) dengan sokongan SEADPRI-UKM sebagai rakan strategik telah mengambil inisiatif melalui penggubalan Dasar Pengurangan Risiko Bencana (DRR) Negara. Kerjasama tersebut adalah seiring dengan perjanjian persefahaman yang telah dimeterai antara NADMA dan SEADPRI-UKM pada tahun 2020.

Penyediaan Dasar DRR Negara telah melibatkan tiga peringkat, iaitu penyediaan kerangka Dasar DRR, penyediaan program dan aktiviti, dan pemurnian Dasar DRR. Proses ini bermula dengan penyediaan kerangka Dasar DRR oleh pihak SEADPRI-UKM dan telah dibentangkan kepada ahli Science and Technology Expert Panel for Disaster Risk Reduction (STEP for DRR) untuk penambahbaikan. Kerangka Dasar DRR ini seterusnya telah dibincangkan bersama pegawai-pegawai NADMA dalam Bengkel Penyediaan Dasar Pengurangan Risiko Bencana Negara setelah mendapat input daripada pelbagai agensi di peringkat

persekutuan dan pihak yang berkepentingan lain termasuk wakil di peringkat negeri dalam bengkel sumbangsaran (brainstorming). Sebanyak dua bengkel sumbangsaran telah dianjurkan di bawah agenda Transformasi Sektor Air Negara (WST2040) yang diterajui oleh Unit Perancang Ekonomi (EPU), Jabatan Perdana Menteri dengan Akademi Sains Malaysia (ASM) sebagai rakan strategik. Satu Pelan Tindakan (2021-2040) untuk Dasar DRR yang merangkumi cadangan program, aktiviti dan bajet untuk jangka masa dekat dan jangka panjang daripada RMK-12 hingga RMK-15 telah disediakan oleh pihak NADMA. Pelan Tindakan tersebut merupakan suatu dokumen hidup (living document) dalam bentuk Excel yang boleh dirujuk dan diperbaiki oleh pihak NADMA dari masa ke semasa.

Deraf Dasar DRR kemudian dimurnikan dalam Bengkel Dasar Pengurangan Risiko Bencana Negara dan Perbincangan Rang Undang-undang Pengurusan Bencana pada bulan Februari 2022 dan Bengkel Memuktamadkan Dasar Pengurangan Risiko Bencana Negara dan Perbincangan Deraf Penggubalan Rang Undang-undang Agensi Pengurusan Bencana Negara pada bulan Mac 2022. Kedua-dua bengkel tersebut dan pelaksanaan survei Mentimeter Dasar DRR yang dibuka kepada orang awam pada bulan April 2022 dapat memastikan dasar yang dihasilkan adalah menyeluruh dan boleh dilaksanakan. Penyediaan Dasar DRR Negara ini dilihat dapat memperkasa pengurusan dan memperhebat kesiapsiagaan risiko bencana negara khususnya dalam menangani bencana iklim dan berkasked akibat daripada perubahan iklim.

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