

BULETIN SEADPRI

Pusat Kajian Bencana Asia Tenggara
Southeast Asia Disaster Prevention Research Initiative

DASAR PENGURANGAN RISIKO BENCANA NEGARA 2030

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SEADPRI-Universiti Kebangsaan Malaysia

Hampir sedekad kerjasama antara Pusat Kajian Bencana Asia Tenggara (SEADPRI), Institut Alam Sekitar dan Pembangunan, Universiti Kebangsaan Malaysia dengan Agensi Pengurusan Bencana Negara, Jabatan Perdana Menteri (NADMA, JPM) dalam pelbagai inisiatif membina Malaysia sebagai negara yang berdaya tahan bencana yang bersedia menghadapi cabaran masa depan.

Kerjasama strategik yang berterusan ini telah menyokong NADMA dalam menyediakan pelbagai dokumen dan platform berkaitan pengurangan risiko bencana (DRR), termasuk penggubalan terkini Dasar Pengurangan Risiko Bencana Negara (Dasar DRR) 2030. Dasar ini, yang telah dilancarkan pada 3 Oktober 2024 oleh Yang Amat Berhormat Timbalan Perdana Menteri Malaysia, merupakan dokumen holistik yang akan menjadi rujukan utama serta panduan kepada pihak berkepentingan dalam pengurusan risiko bencana di semua peringkat.



Konsep DRR di peringkat global telah disesuaikan dan diadaptasi mengikut konteks negara dan keadaan tempatan berdasarkan faktor geografi, demografi, bahaya, risiko serta budaya bagi memastikan kebolehgunaan dan keberkesanan dalam pelaksanaan Dasar ini. Secara ringkas, Dasar DRR menerangkan tujuan dan rasional inisiatif DRR yang perlu dilaksanakan secara sistematik, disokong oleh mekanisme tadbir urus dan kewangan yang berkesan untuk peningkatan kesejahteraan rakyat dan kelestarian alam sekitar. Dokumen ini menggariskan empat (4) Prinsip iaitu: perkongsian tanggungjawab, keterangkuman, penyertaan dan penyemtepatan; diikuti dengan lima (5) Teras Strategik (TS) yang menjadi pamacu bagi tindakan yang bersifat saling melengkapi dasar dan mekanisme sedia ada iaitu: menambah baik pemahaman risiko, mengukuhkan tadbir urus, melabur dalam pengurangan risiko bencana, meningkatkan kesiapsiagaan untuk tindak balas bencana yang efektif dan pemulihan selepas bencana serta membangunkan keupayaan dan penglibatan komuniti. Empat (4) Prinsip dan lima (5) TS boleh diterjemahkan melalui pelaksanaan enam (6) Sasaran Utama yang telah digariskan.

Dasar DRR telah merencanakan hala tuju strategik negara dalam mengurangkan risiko bencana ke arah membentuk negara Malaysia yang selamat dan berdaya tahan. Kerjasama semua pemegang taruh merentasi pelbagai peringkat dan sektor penting dalam pelaksanaan inisiatif dasar ini melalui Pelan Tindakan Pengurangan Risiko Bencana peringkat masing-masing. SEADPRI akan terus menyokong dan berkolaborasi dengan NADMA dalam mengarusperdanakan DRR yang komprehensif dan inklusif ke arah kesejahteraan rakyat dan pembangunan yang mampan.



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

Webinars on IPCC AR7 Author Nominations in Asia and the Southwest Pacific

*Navakanesh Batmanathan, Siti Khadijah Satari & Joy Jacqueline Pereira
SEADPRI-Universiti Kebangsaan Malaysia*



The Intergovernmental Panel on Climate Change (IPCC) called for nominations for experts to contribute to its Seventh Assessment Report (AR7) in April 2025. The AR7 aims to assess the latest scientific understanding of climate change, its impacts, adaptation strategies, and mitigation efforts. Experts who are selected as authors have the Opportunity to contribute in global climate policies and scientific discourse. As part of the AR7 process, the IPCC sought Coordinating Lead Authors, Lead Authors and Review Editors from various disciplines to help develop the report. These authors work collaboratively within and across three working groups focused on physical science, impacts and adaptation, and climate change mitigation.

A series of webinars were convened to assist experts from the Southwest Pacific Islands, Asia, and Malaysia in navigating the nomination process, as follows:

- **Webinar for the Southwest Pacific Islands held on April 4, 2025, from 11:00 am to 12:30 pm (Nadi, Fiji time).** Hosted by the Pacific Climate Change Centre (PCCC) and the Asia Pacific Network for Global Change Research (APN), it featured keynotes from IPCC Co-Chairs, including Professor Xiaoye Zhang, Professor Winston Chow, and Professor Joy Jacqueline Pereira. This webinar had 21 researchers from Pacific Island nations.
- **Webinar for Asia held on April 10, 2025, from 2:00 pm to 3:30 pm (Kuala Lumpur time)** was convened by the Asia Pacific Network for Global Change Research (APN), Singapore Management University (SMU) and Universiti Kebangsaan Malaysia (UKM). Experts such as Dr. Malak Al-Nory, Dr. Sharina Abdul Halim, and Ms. Jennifer Lew

Schneider shared their experiences and provided detailed information on the author nomination process. The webinar had 69 participants from various countries in Asia.

- **Webinar for Malaysian researchers held on April 10, 2025, from 4:00 pm to 5:30 pm (Kuala Lumpur time),** provided an in-depth look at the AR7 outlines and practical advice for local researchers who wish to contribute. The webinar was convened by the Malaysian Research Network for Climate, Environment and Development (MyCLIMATE), under the auspices of IDEA UKM and other partners. A total of 45 local researchers joined the session to better understand the responsibilities involved in being an IPCC author. Guidance was also provided on continuous engagement with the IPCC beyond the author selection process.

The nomination process for becoming an IPCC author is straightforward but requires careful attention to detail. Experts are required to reach out to their National Focal Points or IPCC Observer Organizations to submit their application forms. The deadline for submitting nominations to the IPCC was set for 17 April 2025. Experts are required to ensure that they meet the required qualifications and are prepared to dedicate time to one of the most prestigious scientific initiatives in climate change. The time commitment is significant, with periods of peak workload and ongoing collaboration with other authors globally. Participants are expected to attend meetings, adhere to strict deadlines, and maintain exacting standards of integrity, as outlined by the IPCC's Conflict of Interest policy.

Climatic Hazards Programme

SEADPRI Expands Global Research Ties Through British Academy Project

Nurfashareena Muhamad

SEADPRI-Universiti Kebangsaan Malaysia



Photo by SEADPRI-UKM

The project members, comprising partners from Malaysia, the UK, and Hong Kong, conducted the first phase of data collection at the Tasik Chini Research Centre, Universiti Kebangsaan Malaysia.

The Sendai Framework of Action 2015-2030 recognises culture as an important dimension of disaster resilience and highlights the need to protect and draw on heritage as an asset for strengthening community resilience. It also underlines the importance of addressing both the needs of Indigenous Peoples and the role that their knowledge can play in tackling disaster risk. SEADPRI and the Tasik Chini Research Centre, Universiti Kebangsaan Malaysia[FHH1], in collaboration with the University of Greenwich (United Kingdom), Lingnan University (Hong Kong), and Universiti Teknologi MARA, have initiated the British Academy Project with the first phase of data collection conducted from 5 to 9 May 2025 at the Tasik Chini Biosphere Reserve.

The overall aim of this project is to develop approaches and tools that foster equitable and meaningful collaboration between Indigenous and non-Indigenous research partnerships. These efforts are intended to support Indigenous Peoples in reviving and strengthening their worldviews, knowledge systems, and practices, and in applying them to disaster risk reduction (DRR). As part of this initiative, SEADPRI's role is to assess climate-related hazard risks within

the Tasik Chini Biosphere Reserve. This includes conducting a vulnerability assessment using advanced geospatial participatory mapping techniques in collaboration with the local Jakun Indigenous community.



Photo by SEADPRI-UKM

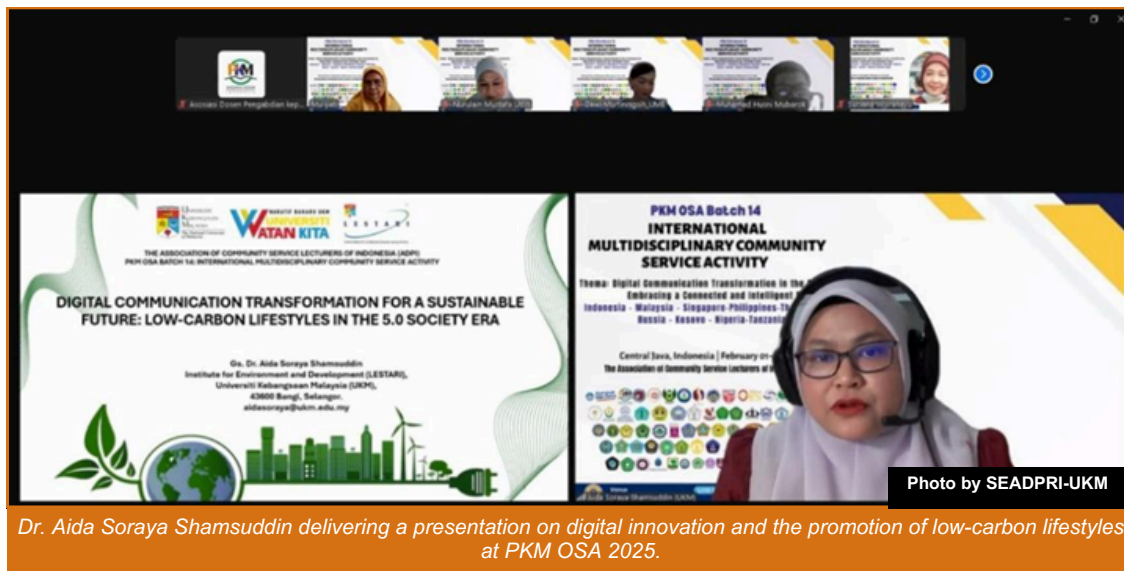
The debriefing meeting, hosted by SEADPRI-UKM and co-chaired by the Head of SEADPRI-UKM (a project member) and the Director of ALAF-UKM (far right), welcomed partners from the University of Greenwich (UK), Lingnan University (Hong Kong), and Universiti Teknologi MARA.

Climatic Hazards Programme

Harnessing Digital Innovation for Climate Action Through Low Carbon Lifestyles in the 5.0 Society Era

Aida Soraya Shamsuddin

SEADPRI-Universiti Kebangsaan Malaysia



Dr. Aida Soraya Shamsuddin delivering a presentation on digital innovation and the promotion of low-carbon lifestyles at PKM OSA 2025.

In a world increasingly driven by digital technology, the need to adapt to more sustainable lifestyles have become ever more crucial. At PKM OSA Batch 14, 2025, which stands for "International Multidisciplinary Community Service Activity," Dr. Aida Soraya Shamsuddin presented the topic "Digital Communication Transformation for a Sustainable Future: Low Carbon Lifestyles in the 5.0 Society Era," highlighting how digital communication transformation can help promote low-carbon lifestyles as a way to address climate change.

Climate change is a global challenge caused by increasing greenhouse gas emissions from human activities, particularly in the industrial, energy, and transport sectors. Adopting a low-carbon lifestyle is a proactive step towards reducing carbon emissions that contribute to global warming. This involves efficient energy use, choosing environmentally friendly transportation, waste reduction, and practicing recycling and reuse. In the 5.0 society era, technological advancements such as artificial intelligence (AI), the Internet of Things (IoT), and big data enable communities to manage resources more efficiently.

Digital transformation plays a crucial role in supporting low-

carbon lifestyles in several ways. Firstly, the use of smart technology in buildings and urban areas enables more efficient energy consumption, with IoT-based energy monitoring systems allowing users to track and control their electricity consumption more effectively. Secondly, the shift towards digital meetings and conferences has significantly reduced the need for air and land travel, decreasing carbon emissions. Thirdly, digital platforms are essential for disseminating information on sustainable practices. Online awareness campaigns help improve public understanding of climate change impacts and how individuals can adopt low-carbon lifestyles. Furthermore, the development of the digital economy allows transactions and business operations to be conducted virtually, reducing the need for physical materials such as paper and printing supplies.

In conclusion, digital communication transformation not only enhances daily convenience but also plays a significant role in the transition towards low-carbon lifestyles. Through technological approaches in the 5.0 society era, communities can collectively reduce carbon footprints, contributing to climate change mitigation efforts.

Geological Hazards Programme

Penerokaan Bahaya Geologi di Kampus UKM: Risiko dan Kesan Tanah Runtuh

Aida Soraya Shamsuddin, Lim Choun Sian, Mohd Fairus Awang, Mohd Faizol Markom
SEADPRI-Universiti Kebangsaan Malaysia



Photo by SEADPRI-UKM

Pelajar kursus LMJS1512 bersedia sebelum kerja lapangan berkaitan bahaya geologi dijalankan di Kampus UKM Bangi.

Usaha meningkatkan kesedaran dan daya tahan komuniti kampus terhadap risiko bencana, pelajar kursus LMJS1512: Pengurangan Risiko Bencana ke Arah Membina Daya Ketahanan Komuniti telah mengadakan satu sesi kerja lapangan bertemakan bahaya geologi khususnya fenomena tanah runtuh yang dijalankan di sekitar kawasan kampus UKM Bangi. Kerja lapangan yang dijalankan setiap semester ini bertujuan untuk memberikan pendedahan secara langsung kepada pelajar tentang risiko dan kesan bahaya geologi, khususnya tanah runtuh, dalam persekitaran kampus.

Fenomena tanah runtuh merupakan antara bencana geologi yang sering berlaku di kawasan berbukit dan berlereng. Tambahan pula, pembangunan infrastruktur dan ubah suai cerun semula jadi yang tidak terkawal boleh meningkatkan kerentanan kawasan terhadap pergerakan tanah. Dalam kerja lapangan ini, pelajar menjalankan pemerhatian tanda-tanda awal ketidakstabilan cerun seperti retakan tanah, pokok condong dan sebagainya. Hasil pemerhatian mendapati beberapa kawasan yang menunjukkan petunjuk awal tanah runtuh. Hal ini menunjukkan pentingnya aspek pengurusan cerun secara lestari, termasuk penyelenggaraan berkala dan perancangan pembangunan yang teliti, bagi mengelakkan kejadian tanah runtuh yang boleh mengancam keselamatan warga kampus.

Kerja lapangan ini telah berjaya memberikan pendedahan yang bermakna kepada pelajar tentang bahaya geologi tanah runtuh serta memperkukuh kefahaman mereka terhadap strategi pengurangan risiko bencana. Aktiviti ini mencerminkan komitmen SEADPRI dalam melahirkan generasi pelapis yang peka, berpengetahuan dan bersedia untuk menghadapi cabaran risiko bencana, selari dengan prinsip pembangunan mampan dan keselamatan komuniti.



Photo by SEADPRI-UKM

Gs. Dr. Aida Soraya memberi taklimat keselamatan kepada pelajar sebelum aktiviti kerja lapangan dijalankan.

Geological Hazards Programme

Pengenalan Asas Penderiaan Jauh: Potensi NDVI, NDWI dan LST dalam Pemantauan Alam Sekitar

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Penderiaan jauh merupakan satu kaedah pemerolehan maklumat tentang permukaan bumi tanpa memerlukan sentuhan fizikal secara langsung. Kaedah ini biasanya menggunakan satelit atau sistem penderiaan dari udara yang merekodkan isyarat tenaga elektromagnetik. Teknologi ini membolehkan pemantauan alam sekitar dijalankan dengan kos rendah, liputan luas dan akses berterusan, sekali gus menjadi alat yang sangat berguna dalam era perubahan iklim dan pembangunan pesat.

Salah satu sumber data utama dalam penderiaan jauh ialah satelit Landsat, yang dioperasikan oleh National Aeronautics and Space Administration (NASA) dan United States Geological Survey (USGS). Landsat telah mengumpulkan data sejak tahun 1972 dan menawarkan imej dengan resolusi spasial sekitar 30 meter. Data ini boleh diakses secara percuma melalui laman web rasmi seperti *USGS Earth Explore*.

Setiap imej Landsat mengandungi maklumat dalam pelbagai jalur spektrum (band) yang merekodkan pantulan cahaya yang berbeza termasuk cahaya nampak, inframerah dekat (NIR), dan inframerah gelombang pendek (SWIR). Jalur-jalur ini digunakan untuk mengira pelbagai indeks bagi menilai keadaan alam sekitar.

Tiga indeks satelit yang lazim digunakan dalam pemantauan alam sekitar ialah:

Indeks	Tujuan	Kegunaan
NDVI (Indeks Kehijauan Normalisasi Perbezaan)	Menilai kehijauan dan kesihatan tumbuhan	Pemantauan pertanian, hutan dan landskap bandar
NDWI (Indeks Air Normalisasi Perbezaan)	Mengesan kandungan air dan kelembapan permukaan	Pengesanan banjir, tanah lembap dan kolam
LST (Suhu Permukaan Bumi)	Mengukur suhu permukaan bumi	Kajian pulau haba bandar, kesan perubahan guna tanah

NDVI dikira berdasarkan perbezaan pantulan antara jalur merah dan inframerah dekat (NIR). Nilai indeks berada antara -1 hingga +1. Nilai hampir kepada +1 menandakan kawasan yang mempunyai tumbuhan yang sihat dan padat. Sebaliknya, nilai rendah menunjukkan kawasan yang gersang, dibina atau tidak mempunyai tumbuhan.

NDWI menggunakan jalur hijau dan inframerah gelombang pendek (SWIR) untuk mengenal pasti kawasan berair. Ia digunakan untuk mengenal pasti zon banjir, tanah lembap, kolam atau kawasan yang mempunyai kelembapan tinggi.

LST diukur melalui jalur terma (thermal band) dan merujuk kepada suhu sebenar permukaan tanah, bukan suhu udara. Kajian LST digunakan secara meluas untuk mengesan fenomena pulau haba bandar (urban heat island) yang berpunca daripada permukaan berturap dan kekurangan kehijauan di kawasan bandar.

Dalam era teknologi digital, penderiaan jauh menjadi salah satu alat penting dalam kajian dan pemantauan alam sekitar. Ia membolehkan pemerolehan data dari angkasa secara sistematik tanpa kehadiran fizikal di lokasi tertentu. Beberapa kelebihan utama kaedah ini termasuk:

- Percuma dan mudah diakses.
- Liputan luas dan berkala
- Tidak memerlukan kehadiran di lapangan
- Pelbagai aplikasi
- Menyokong dasar dan perancangan

Penderiaan jauh memainkan peranan penting dalam usaha memelihara dan mengurus alam sekitar secara mampan. Antara kepentingannya termasuk:

- Mengesan perubahan guna tanah dan kehilangan kawasan hijau
- Menilai kesan perubahan iklim dan suhu permukaan
- Memantau sumber air dan vegetasi
- Menyokong perancangan guna tanah dan pengurusan bencana
- Menyediakan data saintifik untuk dasar alam sekitar



Technological Hazards Programme

Amplification-free Biosensing of Hypermethylated SFRP1 Gene for Early Diagnosis of Colorectal Cancer via Electrochemical Sandwich-like Sorbent Assay

Ling Ling Tan

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According to the World Health Organization (WHO), colon cancer or colorectal carcinoma is the third leading cause of cancer-related deaths worldwide. The mechanism of colorectal cancer (CRC) begins with a noncancerous polyp that develops inside the colon and rectum, eventually leading to cancer. CRC is characterized by relatively rapid progression of the disease and late clinical presentation, which is primarily the underlying reason for increased mortality and morbidity in patients suffering from this malignancy. By implementing early-stage screening, CRC can be significantly controlled through timely medical interventions such as chemotherapy and epigenetic-modifying drugs.

Current clinical diagnoses of CRC are based on barium enema, fecal occult blood test (FOBT), sigmoidoscopy, colonoscopy, periodic computed tomography (CT), biopsy, and serum carcinoembryonic antigen (CEA). Some of these methods require invasive procedures, laborious instrumentation, high maintenance, and trained medical professionals. Although FOBT is a non-invasive and inexpensive method, its sensitivity is limited. Even though colonoscopy is the gold standard for CRC screening, it requires time-consuming operation steps and sometimes causes serious complications. In the case of CT scans, it has limited sensitivity, especially for small lesions, and could cause a high rate of false positivity. As for the CEA testing of another biomarker, the sensitivity and specificity are not optimal. Although advanced imaging techniques are increasingly used for the diagnosis of CRC, there is a significant amount of interest in developing inexpensive, highly sensitive and specific, and non-invasive biomarkers that could potentially be useful in developing novel diagnosis, prognosis, and treatment methods.

Epigenetic modifications such as aberrant DNA methylation, are revealed to be promising diagnostic biomarkers for early cancer diagnosis in humans, as it is involved in tumor initiation and progression leading to inappropriate gene silencing among tumor suppressor genes. Hypermethylation in a promoter region or tumor suppressor gene could lead to the inactivation of that gene. The effects of such epigenetic changes may precede genetic changes, such as mutations and deletions in various tumor suppressors or oncogenes, hence leading to the changes in cellular activity that pave the way for cancer development. Therefore, the presence of DNA methylation may be a more ideal representation and reflection of early molecular alterations that take place in human cancers.

Hypermethylation of SFRP1 is accompanied by downregulation of SFRP1 gene expression, which is correlated with CRC development. Measurement of specific CRC biomarker SFRP1 methylation in human plasma may be of great assistance in early detection of CRC. An amplification-free nanostructured DNA biosensing platform is proposed for detecting DNA methylation of the SFRP1 site-specific region. The method is based on an electrochemical sandwich-like sorbent assay of PCR-free DNA from human plasma. Specific ferrocene (Fc)-modified DNA probe will be designed to hybridize with SFRP1 fragments at methylation levels, while 5-methylcytosine antibody (5-mCAB), serving as a methylation probe, will be bioconjugated to a gold nanoparticles electrode. This configuration enables the determination of methylation percentage and differentiation between methylated and unmethylated DNA fragments. The immobilized 5-mCAB on the surface of the gold nanoparticle (AuNP) electrode and the free Fc-modified DNA probe interact with the hypermethylated SFRP1 (mSFRP1) to form a sandwich-like complex, AuNPs–5-mCAB–mSFRP1–Fc-DNA probe, on the electrode surface. This complex will be analyzed using electrochemical techniques such as cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS), and differential pulse voltammetry (DPV). Quantitative biosensing of hypermethylation of the tumor suppressor, SFRP1, may serve as a noninvasive early diagnostic and even screening for CRC. Diagnosis at an earlier stage of cancer development is associated with improved outcomes, increased chances of survival, and reduced cost of medical treatment.



Prevent colorectal cancer with early detection and screening.
(Google image)

Technological Hazards Programme

Kesan Alam Sekitar dan Kesihatan Awam daripada Pemprosesan Sisa Import di Kuala Langat, Selangor

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Dalam beberapa tahun kebelakangan ini, Malaysia telah menjadi antara destinasi utama pengimport sisa plastik global, terutama selepas China mengharamkan import sisa plastik pada tahun 2018. Keadaan ini menyebabkan peningkatan jumlah sisa plastik yang dihantar ke Malaysia untuk tujuan kitar semula, namun tidak semua sisa tersebut dapat diproses dengan cara yang lestari. Sebahagian besar sisa yang tidak dapat dikitar semula dibuang secara haram atau dibakar secara terbuka, menyebabkan pencemaran udara, tanah, dan air yang serius. Kuala Langat, Selangor, merupakan salah satu kawasan yang terkesan akibat operasi pemprosesan sisa plastik import yang tidak terkawal, dengan kesan langsung terhadap alam sekitar dan kesihatan awam.

Pada 16 Januari 2025, satu sesi perbincangan kumpulan berfokus (Focus Group Discussion, FGD) telah diadakan bagi membincangkan kesan industri pemprosesan sisa import terhadap alam sekitar dan kesihatan awam di Kuala Langat, Selangor. Sesi ini dianjurkan dengan objektif utama untuk meneliti hasil kajian berkaitan serta membincangkan langkah-langkah kawalan yang boleh diambil bagi menangani isu pencemaran dan kesihatan awam di kawasan yang terlibat. Sesi perbincangan ini telah dihadiri oleh pelbagai agensi kerajaan antaranya Kementerian Sumber Asli dan Kelestarian Alam (NRES), Jabatan Alam Sekitar (JAS), Majlis Perbandaran Kuala Langat (MPKL), Kementerian Pelaburan, Perdagangan dan Industri (MITI), serta Jabatan Kastam Diraja Malaysia; badan bukan kerajaan (NGO) seperti Greenpeace, Sahabat Alam Malaysia (SAM), dan Basel Action Network; serta institusi pengajian tinggi seperti UPM, UKM, UiTM dan UniSZA.



Photo by SEADPRI-UKM

Sesi Perbincangan Fokus (FGD) mengenai Kesan Industri Pemprosesan Sisa Import terhadap Alam Sekitar dan Kesihatan Awam di Kuala Langat, Selangor, yang melibatkan penyertaan daripada pelbagai agensi kerajaan, pertubuhan bukan kerajaan (NGO), dan institusi pengajian tinggi.

Semasa sesi perbincangan, para peserta telah dibahagikan kepada lima kumpulan utama, masing-masing membincangkan tema khusus berikut:

1 Dasar, Tadbir Urus dan Kesedaran Awam mengenai Import Sisa Plastik

Perbincangan tertumpu kepada dasar sedia ada, keberkesanannya dalam menangani isu import sisa plastik, dan cadangan penambahbaikan dalam rangka kerja polisi untuk mengurangkan risiko alam sekitar dan kesihatan.

2 Impak Ekonomi dan Sosial Import Sisa Plastik

Kesan import sisa plastik terhadap ekonomi tempatan, termasuk peluang pekerjaan, kos pengurusan sisa, dan kesan terhadap komuniti berdekatan.

3 Kesan Alam Sekitar Akibat Pengimportan Sisa Plastik

Isu pencemaran tanah, air, dan udara serta kesan terhadap ekosistem dan biodiversiti akibat pembuangan serta pemprosesan sisa plastik.

4 Implikasi Kesihatan Akibat Import Sisa Plastik

Risiko kesihatan kepada komuniti yang terdedah kepada pencemaran plastik, termasuk kesan bahan kimia berbahaya dan mikroplastik terhadap kesihatan manusia.

5 Cabaran dalam Pengurusan Sisa dan Sistem Kitar Semula

Keupayaan infrastruktur sedia ada dalam menguruskan sisa plastik import serta cabaran dalam mengawal aktiviti kitar semula haram dan pembuangan sisa secara tidak terkawal.

Hasil perbincangan ini menunjukkan terdapat keperluan mendesak untuk penambahbaikan dasar, peningkatan penguatkuasaan undang-undang, serta pelaksanaan langkah-langkah mitigasi yang lebih berkesan. Beberapa cadangan utama yang dikemukakan termasuk:

- Pengetatan peraturan terhadap import sisa plastik dan kawalan ketat terhadap aktiviti pemprosesan sisa.
- Peningkatan kesedaran awam melalui program pendidikan dan advokasi bagi mengurangkan pergantungan kepada plastik.
- Pengukuhan kerjasama antara agensi kerajaan, industri, NGO, dan komuniti dalam menangani cabaran pengurusan sisa.
- Pembangunan teknologi dan infrastruktur yang lebih mampan untuk pengurusan sisa dan kitar semula.

Cadangan-cadangan yang diketengahkan dalam sesi ini diharapkan dapat menyumbang kepada pengurangan impak negatif industri pemprosesan sisa import dalam mengurangkan impak negatif industri pemprosesan sisa import terhadap alam sekitar dan kesihatan awam di Malaysia, khususnya di Kuala Langat, Selangor.

Technological Hazards Programme

Strategi Adaptasi dan Mitigasi Sindrom Bangunan Sakit dalam Konteks Perubahan Iklim

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Perubahan iklim bukan sahaja memberi implikasi terhadap persekitaran luaran seperti peningkatan suhu global, kejadian cuaca ekstrem dan pencemaran udara. Ia juga turut menjejaskan kualiti udara dalaman melalui perubahan dalam suhu, kelembapan relatif, kadar pengudaraan, serta peningkatan kepekatan bahan pencemar dalaman. Perubahan ini boleh mengganggu persekitaran mikro dalam bangunan, serta meningkatkan risiko berlakunya Sindrom Bangunan Sakit (SBS) di kalangan penghuni bangunan. SBS dikaitkan dengan pelbagai simptom kesihatan seperti sakit kepala, keletihan, iritasi mata dan saluran pernafasan yang berpunca daripada pendedahan kepada persekitaran dalaman yang tidak sihat. Oleh itu, pelaksanaan langkah-langkah mitigasi dan adaptasi menjadi keutamaan dalam usaha memastikan ruang dalaman kekal sihat dan selesa untuk didiami. Strategi yang bersesuaian perlu dikenal pasti, dirancang, dan dilaksanakan secara menyeluruh bagi mengurangkan kesan perubahan iklim terhadap kualiti udara dalaman serta menurunkan prevalens SBS dalam kalangan penghuni bangunan.

Pendekatan Mitigasi untuk Mengurangkan Risiko SBS

1. Penggunaan Bahan Binaan Mesra Alam.

Penggunaan bahan binaan yang rendah pelepasan sebatian organik meruap (VOCs) boleh mengurangkan pencemaran udara dalaman. Ini termasuk pemilihan cat, pelekat, dan perabot yang diperakui selamat dan tidak mudah meruap.

2. Sistem Pengudaraan Pintar

Peningkatan sistem pengudaraan seperti pemasangan penapis udara berkualiti tinggi dan sistem ventilasi mekanikal dapat membantu menyingkirkan pencemar udara dan mengekalkan keseimbangan oksigen serta karbon dioksida dalam bangunan.

3. Teknologi Penapisan Udara Berasaskan Inovasi

Penggunaan teknologi seperti penapis *High-Efficiency Particulate Air* (HEPA), sistem ionisasi udara, dan penyerap karbon aktif yang dapat mengurangkan kepekatan pencemaran dalaman. Selain itu, pembangunan sistem pemantauan kualiti udara secara automatik juga boleh membantu dalam mengesan tahap pencemaran dengan lebih efektif.

4. Reka Bentuk Bangunan yang Berdaya Tahan

Bangunan yang direka bentuk dengan ciri mesra alam seperti penggunaan bahan penambat haba yang baik dan tingkap boleh laras untuk meningkatkan pengudaraan semula jadi dapat membantu mengurangkan ketergantungan terhadap penghawa dingin.

Strategi Adaptasi untuk Menangani Perubahan Iklim dan SBS

- Penggunaan Teknologi Hijau dalam Reka Bentuk Bangunan**
Integrasi teknologi hijau seperti bumbung hijau, dinding hijau, dan sistem penyejukan semula jadi dapat membantu mengekalkan suhu dalaman yang lebih stabil dan mengurangkan kesan haba bandar.
- Peningkatan Kesedaran dan Pendidikan**
Pendidikan kepada pemilik bangunan, penghuni, dan pengurus fasiliti mengenai kepentingan kualiti udara dalaman dan cara-cara untuk mengurangkan pencemaran dalaman adalah langkah penting dalam usaha mitigasi SBS.
- Polisi dan Perundangan yang Lebih Ketat**
Kerajaan dan pihak berkuasa berkaitan perlu menggubal undang-undang dan garis panduan yang lebih ketat terhadap standard kualiti udara dalaman serta menggalakkan pembangunan lestari yang selaras dengan perubahan iklim.
- Pemantauan dan Penyelidikan Berterusan**
Kajian lanjut mengenai kesan perubahan iklim terhadap kualiti udara dalaman dan SBS perlu dipergiatkan. Penggunaan data dan analisis saintifik boleh membantu dalam pembangunan dasar yang lebih berkesan.

Perubahan iklim memberi impak yang signifikan terhadap kualiti udara dalaman, yang seterusnya meningkatkan risiko SBS. Oleh itu, strategi mitigasi dan adaptasi yang efektif perlu dilaksanakan bagi memastikan bangunan yang lebih sihat dan lestari. Kerjasama antara kerajaan, institusi penyelidikan, sektor pembinaan, dan masyarakat umum amat penting dalam usaha ini bagi menjamin kesejahteraan generasi akan datang.



Research Notes

Assessing Community Resilience to Flooding in Mukim Hulu Langat, Selangor

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Disasters have been occurring with increasing frequency in recent years. Between 2000 and 2019, the number of recorded disasters rose by 74.4%, largely due to climate change and environmental shifts. Malaysia is no exception, having experienced various types of disasters, including floods, droughts, haze, landslides, and tsunamis. Flooding remains a persistent challenge in Malaysia, particularly in low-lying areas such as Hulu Langat, Selangor. This study aims to: (1) identify vulnerable communities in Mukim Hulu Langat based on factors such as age, health condition, employment status and income, access to healthcare, and disaster education; (2) determine key social vulnerability factors; and (3) examine the level of community resilience in flood-prone areas, with a focus on community connectedness, risk and vulnerability, planning and procedures, and available resources. Vulnerable communities will be identified using ArcGIS software and spatial analysis techniques. A mixed-methods approach will be employed, combining a cross-sectional survey and semi-structured interviews. The survey will target residents of Kampung Batu 18, Kampung Batu 20, and Kampung Batu 21, using a structured questionnaire developed using the Torrens Resilience Scorecard. Descriptive and inferential statistical analyses will be conducted to interpret the quantitative data. Qualitative insights will be gathered through interviews with three village heads, one officer from the Hulu Langat District and Land Office (Pejabat Tanah dan Daerah Hulu Langat), and the Penghulu of Mukim Hulu Langat. Thematic analysis will be used to analyze the qualitative data. The expected outcomes of this study include the development of a vulnerability map of communities in Mukim Hulu Langat, the identification of key social vulnerability factors influence resilience, and an assessment of the overall level of community resilience to support informed decision-making and strategic planning by local authorities. The study also aims to provide valuable insights for local authorities and stakeholders in formulating more effective strategies to enhance flood resilience in vulnerable areas. Furthermore, it seeks to empower communities through disaster education and community-based disaster resilience programs, in alignment with the Malaysian government's commitment to the Sendai Framework for Disaster Risk Reduction 2015–2030.

Keywords: Community Resilience, Flooding, Vulnerability Factors, Healthcare Access, Disaster Education

Impedimetric Polyaniline-based Aptasensor for Aflatoxin B₁ Determination in Agricultural Products

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Mycotoxin is a toxin commonly present in agricultural products that are contaminated by *Aspergillus* and *Fusarium* species. Herein, an impedimetric aptasensor based on polyaniline (PANI) support matrix is developed through the surface modification of screen-printed carbon electrode (SPE) for aflatoxin B₁ (AFB₁) detection in foodstuffs and feedstuffs for food safety. The PANI is synthesized with the chemical oxidation method and characterized with potentiostat/galvanostat, FTIR, and UV-vis spectroscopy techniques. The stepwise fabrication procedure of the PANI-based aptasensor is characterized by means of cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS) electrochemical methods. The impedimetric aptasensor is optimized using the EIS technique and its ability to detect AFB₁ in real sample matrices is evaluated via recovery study in spiked foodstuffs and feedstuffs, such as pistachio nuts, cinnamons, cloves, corn, and soybeans with a good recovery percentage ranging from 87.9% to 94.7%. The charge transfer resistance (R_{CT}) of the aptasensor increases linearly with the AFB₁ concentration in the range of 3×10^{-2} nM to 8×10^{-2} nM with a regression coefficient (R^2) value of 0.9991 and detection limit of 0.01 nM. The proposed aptasensor is highly selective towards AFB₁ and partially selective to AFB₂ and Ochratoxin A (OTA) due to their similar structures that differ only on the carbon-carbon double bond located at C₈ and C₉ and the large molecule size of OTA. The aptasensor is stable up to 5 days of storage period at -4 °C and exhibits an optimized response time of 30 minutes. The repeatability of the aptasensor for four AFB₁ detection cycles is good with an RSD value lower than 5% (n=4).

Keywords: Aflatoxin B, Aptasensor, Polyaniline, Impedimetric, Food safety

Kunjungan SCAC ke SEADPRI-UKM: Sinergi Dasar dan Penyelidikan Perubahan Iklim

Siti Khadijah Satari & Joy Jacqueline Pereira
SEADPRI-Universiti Kebangsaan Malaysia



Photo by SEADPRI-UKM

Kunjungan hormat pihak Adaptasi Perubahan Iklim Negeri Selangor (SCAC) ke SEADPRI-UKM diketuai oleh En. Danial Lee, Pengarah Eksekutif SCAC

Pusat Kajian Bencana Asia Tenggara (SEADPRI) telah menerima kunjungan hormat daripada Pusat Adaptasi Perubahan Iklim Negeri Selangor (SCAC) pada 7 Mei 2025, bertempat di Bilik Mesyuarat SEADPRI. Kunjungan hormat yang diadakan bertujuan untuk membincangkan kerjasama dalam perkongsian data dan penyelidikan mengenai isu-isu perubahan iklim. Melalui perbincangan yang diadakan, kerjasama di antara pihak SCAC dan SEADPRI-UKM akan diteruskan dalam usaha berterusan melaksanakan Dasar Perubahan Iklim Negeri Selangor, meneroka peluang penggunaan Sistem MyBahaya dan KL-MHP, serta kemungkinan memeterai Memorandum Persefahaman (MoU) bagi memperkukuh kerjasama dalam penyelidikan, pembangunan kapasiti dan

perkongsian data. Tiga orang pegawai yang diketuai oleh En. Danial Lee, Pengarah Eksekutif SCAC, telah hadir dalam kunjungan hormat tersebut. Manakala pihak SEADPRI telah disertai oleh lima orang penyelidik yang diketuai oleh Prof. Dr. Joy Jacqueline Pereira.

SCAC telah ditubuhkan pada akhir November 2024 selari dengan pelancaran Dasar Perubahan Iklim Negeri Selangor. Pusat tersebut telah dilancarkan secara rasmi pada 19 Mei 2025 oleh Raja Muda Selangor, Tengku Amir Shah Sultan Sharafuddin Idris Shah bertempat di Concorde Hotel, Shah Alam. Dua orang wakil daripada SEADPRI-UKM turut hadir dalam majlis pelancaran tersebut bagi memberikan sokongan kepada pihak SCAC, yang merupakan pusat pertama seumpamanya di Malaysia dan berfungsi sebagai pelaksana dasar perubahan iklim negeri melalui kerjasama dengan pelbagai pihak untuk membangunkan penyelesaian bagi menghadapi cabaran perubahan iklim. Ia turut menjadi pusat rujukan dan penyelaras dasar perubahan iklim di peringkat negeri Selangor.

Kunjungan pihak SCAC ke SEADPRI-UKM merupakan perintis kerjasama antara kedua-dua pihak dalam bidang penyelidikan iklim. Kerjasama strategik yang terjalin dapat membuka ruang kepada perkongsian kepakaran dan data ilmiah, pembangunan kapasiti melalui penganjuran bengkel, penyelidikan bersama merangkumi topik penyesuaian iklim dan mitigasi perubahan iklim, pemindahan teknologi dan inovasi termasuk penggunaan sistem amaran awal, sokongan kepada dasar awam dengan hasil penyelidikan yang dijadikan rujukan dalam membentuk polisi dan penglibatan komuniti dalam memperkasakan masyarakat melalui pendidikan iklim.

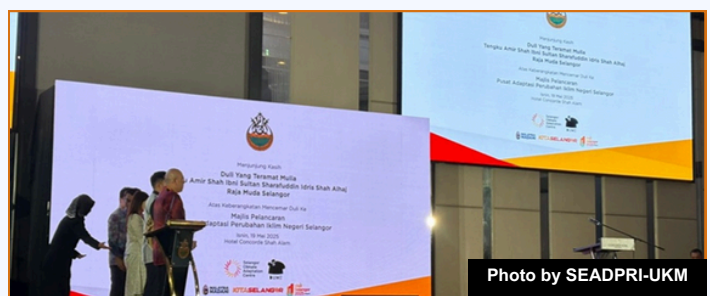


Photo by SEADPRI-UKM

Majlis Pelancaran Pusat Adaptasi Perubahan Iklim Negeri Selangor oleh Raja Muda Selangor, Tengku Amir Shah Sultan Sharafuddin Idris Shah

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