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BULETIN SEADPRI
Pusat Kajian Bencana Asia Tenggara
Southeast Asia Disaster Prevention Research Initiative

A DECADE OF EXCELLENCE: SEADPRI MAINTAINS ITS STANDING AS (ICOE-SEADPRI-UKM)

Nurfashareena Muhamad & Joy Jacqueline Pereira
SEADPRI-Universiti Kebangsaan Malaysia

On 30th November 2016, SEADPRI-UKM was officially recognised as an International Centre of Excellence (ICoE) for Disaster Risk and Climate Extremes under the Integrated Research on Disaster Risk (IRDR) programme. The designation was conferred during the IRDR Scientific Committee meeting held at the Institute of Remote Sensing and Digital Earth (RADI), Chinese Academy of Sciences (CAS), at its Sanya Campus in China. With this recognition, UKM has continued to strengthen and expand its global partnerships over the years. The ICoE designation has further enhanced the university's ability to build meaningful linkages with renowned institutions worldwide. Through university-to-university collaborations led by UKM's centres of excellence, international engagement has deepened, elevating the university's visibility and impact across diverse fields, including the social sciences, humanities, science, and engineering.

With the conclusion of the first phase of the IRDR ICoEs programme, ICoE-SEADPRI-UKM has successfully maintained its status and renewed its commitment as the International Centre of Excellence for Disaster Risk and Climate Extremes. The renewal evaluation, conducted in 2025 and formally confirmed on 9 July 2025, affirmed that ICoE-SEADPRI-UKM met the criteria for renewal due to its strong contributions to outreach, knowledge sharing, and regional engagement. This achievement reflects the centre's sustained dedication to advancing disaster risk science and strengthening capacities across Southeast Asia. Moving forward, the renewed commitment of ICoE-SEADPRI-UKM will be aligned with the IRDR Action Plan 2025–2027. Strengthening contributions to IRDR publications, coordinating international research dialogues, and actively engaging in IRDR's capacity-building initiatives such as online training, policy briefs, and young scientist programmes will form essential components of this next phase of collaboration.

Maintaining the ICoE status not only reaffirms SEADPRI's standing within the global disaster risk reduction community, but also strengthens its institutional credibility as a leading research centre in Malaysia and the region. The renewal underscores SEADPRI's capacity to consistently deliver high-quality research, meaningful outreach, and strategic collaborations at international levels. This status serves as a benchmark for excellence, reinforcing confidence among government agencies, development partners, academic institutions, and local communities in SEADPRI's leadership and scientific contributions. It also enhances the centre's visibility in global networks, positioning SEADPRI as a trusted partner in advancing science-based disaster risk and climate resilience solutions.

The continuation of this status aligns closely with the SEADPRI Action Plan, which emphasizes strengthening national and regional resilience through integrated research, capacity development, and policy engagement. The renewed ICoE commitment creates additional opportunities for SEADPRI to harmonise its research priorities with global agendas, including risk-informed development, climate adaptation, early warning systems, and DRR education. By aligning its activities with both the IRDR Action Plan 2025–2027 and SEADPRI's institutional roadmap, the centre is well-positioned to scale up its contributions through new pilot studies, multi-stakeholder partnerships, technical advisory roles, and youth empowerment programmes. This synergy ensures that SEADPRI not only continues to uphold its mandate but also amplifies its impact in shaping evidence-based resilience policies and practices at the national, regional, and international levels.

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Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM)

Buletin SEADPRI

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About SEADPRI-UKM

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

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

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Climatic Hazards Programme

The Kuala Lumpur Multi-Hazard Platform Featured at Global Platform for Disaster Risk Reduction 2025 (GPDRR 2025)

Nurfashareena Muhamad & Joy Jacqueline Pereira
SEADPRI-Universiti Kebangsaan Malaysia

SEADPRI showcases its innovation at the GPDRR 2025 Ignite Stage.

The eighth session of the Global Platform for Disaster Risk Reduction (GPDRR 2025) was held from 2 to 6 June 2025 in Geneva, Switzerland. Organized and convened by the United Nations Office for Disaster Risk Reduction (UNDRR) and hosted by the Government of Switzerland, the conference was co-chaired by both parties. GP2025 was conducted under the theme "Every Day Counts, Act for Resilience Today," emphasising the urgency of strengthening global resilience as countries approach the 2030 deadline of the Sendai Framework. The conference placed strong focus on enhancing risk governance, scaling up financing for resilience, advancing multi-hazard early warning systems, and accelerating disaster risk reduction (DRR) action worldwide.

Malaysia's delegation to GPDRR 2025 comprised representatives from the National Disaster Managemeny Agency (NADMA) Malaysia as well as several state and local-level DRR officers. Academic and research institutions including SEADPRI-Universiti Kebangsaan Malaysia, Universiti Malaysia Sabah (UMS), Universiti Tun Hussein Onn Malaysia (UTHM), and Universiti Malaysia Kelantan (UMK) also formed part of the delegation.

The Malaysian team was led by the Honourable Deputy Prime Minister of Malaysia, YAB Datuk Seri Dr. Ahmad Zahid Hamidi, reflecting Malaysia's continued commitment to elevating resilience, strengthening risk governance, and deepening multi-stakeholder collaboration at the global level.

In this session, SEADPRI participated in the Ignite Stage 2025 to present key findings from a pilot project on forecasting climate extremes at the local scale. The presentation highlighted the Kuala Lumpur Multi-Hazard Platform (KL-MHP), an emerging early warning and decision-support system designed to strengthen risk-informed urban planning. Demonstrating how localized climate forecasting supported by high-resolution data, hazard modelling, and real-time monitoring can enhance proactive measures for urban resilience, this session underscored the scientific importance of integrating climate intelligence into city governance. SEADPRI's showcase played a key role in communicating the value of local-level innovations for resilient cities, aligning with global DRR priorities. The significance of this initiative was also shared with the Honourable Deputy Prime Minister of Malaysia during the delegation exchanges, reaffirming national support for the advancement of science-based resilience tools.

Malaysia's delegation led by the Honourable Deputy Prime Minister

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Lawatan Kerjasama Penyelidikan Antarabangsa oleh Pasukan Erasmus+ UIA ke SEADPRI, UKM

Mohd Fairus Awang, Nurfashareena Muhamad, Siti Khadijah Satari & Mohd Faizol Markom
SEADPRI-Universiti Kebangsaan Malaysia

Pada 27 Ogos 2025 Pusat Kajian Bencana Asia Tenggara (SEADPRI-UKM) telah menerima kunjungan rasmi daripada pasukan penyelidik Erasmus+ Transnational Meeting, Universiti Islam Antarabangsa Malaysia (UIAM). Lawatan ini diketuai oleh Prof. Madya Dr. Fatmir Shehu, selaku Pengerusi Erasmus+ Transnational Meeting, bersama Prof. Madya Dr. Ainul Azmin Md. Zamin selaku Pengurus Program.

Delegasi Erasmus+ terdiri daripada para akademik antarabangsa dari Jerman, Sepanyol, Austria, Albania dan juga Malaysia, yang terlibat dalam projek bertajuk Facing Global Challenges: Environmental and Peace Education in Interreligious Cooperation for Teacher Training. Projek ini bertujuan memperkukuh pemahaman rentas agama dalam pendidikan serta menangani cabaran global termasuk perubahan iklim dan kelestarian alam sekitar.

Lawatan ini disambut oleh Gs. Dr. Nurfashareena Muhamad, Ketua SEADPRI-UKM, bersama beberapa penyelidik dan pegawai pusat.

Program dimulakan dengan Bengkel Kerjasama Penyelidikan yang diadakan di Bilik Kuliah Utama, Aras 1, LESTARI. Dalam sesi ini, kedua-dua pihak membincangkan potensi kolaborasi dalam bidang pendidikan bencana, perubahan iklim, dan pembinaan kapasiti masyarakat.

Melalui sesi perkongsian ini, wakil Erasmus+ dan SEADPRI-UKM telah bertukar pandangan mengenai pendekatan penyelidikan antara disiplin serta peranan institusi akademik dalam memperkukuh ketahanan komuniti menghadapi risiko bencana. Lawatan ini diakhiri dengan sesi ramah mesra serta lawatan sekitar fasiliti SEADPRI.

Kunjungan ini diharap dapat membuka peluang kepada kerjasama strategik antara SEADPRI-UKM dan institusi antarabangsa, khususnya dalam usaha memperkukuh pendidikan alam sekitar dan keamanan global berasaskan nilai sejagat.

Photo by SEADPRI-UKM

Gs. Dr. Nurfashareena Muhamad (lima dari kanan) bersama sebahagian delegasi Erasmus+ UIA yang diketuai oleh Prof. Madya Dr. Fatmir Shehu (enam dari kanan) semasa lawatan ke SEADPRI pada 27 Ogos 2025.

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Memperkasa Pelajar UKM melalui Modul Pengiraan Jejak Karbon: Bengkel Pembangunan Modul 2025

Mohd Fairus Awang[1], Nurfashareena Muhamad[1], Aida Soraya Shamsuddin[1] & Muhammad Amirulamri Mohd Akhairi[2]
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Pusat Kajian Bencana Asia Tenggara (SEADPRI), Institut Alam Sekitar dan Pembangunan (LESTARI), Universiti Kebangsaan Malaysia (UKM) telah menganjurkan Bengkel Pembangunan Modul Pengiraan Jejak Karbon Pelajar UKM pada 24 Julai 2025 bertempat di Pulse Grande Hotel, Putrajaya. Bengkel ini merupakan sebahagian daripada pelaksanaan Projek Penyelidikan Kelestarian UKM Tahun 2024, yang menyokong usaha mendidik dan meningkatkan kesedaran pelajar universiti terhadap isu perubahan iklim melalui pendekatan saintifik, praktikal dan berasaskan bukti.

Bengkel ini telah melibatkan enam orang penyelidik dan pelaksana projek yang diketuai oleh Gs. Dr. Nurfashareena Muhamad. Turut serta ialah Gs. Dr. Aida Soraya Shamsuddin, ChM. Mohd Fairus Awang, Encik Muhammad Amirulamri Mohd Akhairi, Muhammad Rifqi Amsyar Khalid Ibni Walid, dan Muhammad Faaris Mohd Zamri. Dengan bilangan peserta yang terhad, bengkel ini berlangsung dalam suasana kondusif dan berfokus, membolehkan perbincangan berjalan secara mendalam dan produktif.

Sepanjang sesi bengkel, perbincangan memberi tumpuan kepada pembangunan rangka awal modul pengiraan jejak karbon yang disesuaikan dengan konteks kehidupan pelajar UKM, khususnya dalam aspek penggunaan tenaga, pengangkutan, dan pemakanan. Bengkel ini turut menekankan penetapan garis masa pelaksanaan, penanda aras projek, serta semakan terhadap dapatan awal kaji selidik berkaitan kesedaran karbon, dalam kalangan pelajar. Selain itu, perbincangan merangkumi pelaporan kepada Jawatankuasa Etika Penyelidikan UKM dan Pusat Idea UKM, perancangan format penerbitan hasil projek serta penyusunan tindakan susulan bagi memastikan kelancaran dan kesinambungan pembangunan modul.

Modul yang sedang dibangunkan ini dijangka menjadi instrumen pembelajaran yang interaktif, relevan dan mudah digubakan bagi membantu pelajar memahami impak jejak karbon individu serta kepentingan tindakan adaptasi terhadap perubahan iklim.

Inisiatif ini merupakan sebagai langkah proaktif dalam menyokong aspirasi UKM ke arah kampus rendah karbon dan pembangunan lestari selaras dengan Matlamat Pembangunan Mampan (SDG) dan Dasar Perubahan Iklim Negara.

Photo by SEADPRI-UKM

Peserta bengkel yang terlibat. Dari kiri Muhammad Faaris Mohd Zamri, Encik Muhammad Amirulamri Mohd Akhairi, ChM. Mohd Fairus Awang, Gs. Dr. Nurfashareena Muhamad, Gs. Dr. Aida Soraya Shamsuddin dan Muhammad Rifqi Amsyar Khalid Ibni Walid

Photo by SEADPRI-UKM

Gs. Dr. Nurfashareena Muhamad sedang menberi taklimat berkaitan dengan perjalanan dan agenda bengkel.

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Kerjasama Strategik SEADPRI bersama Kementerian Pendidikan Malaysia dalam Pembangunan Modul Pendidikan Pengurangan Risiko Bencana

Nurfashareena Muhamad
SEADPRI-Universiti Kebangsaan Malaysia

Pelancaran Modul Pendidikan Pengurangan Risiko Bencana oleh Kementerian Pendidikan Malaysia (KPM) pada 27 Oktober 2025 menandakan satu langkah penting dalam usaha memperkukuh budaya kesiapsiagaan bencana dalam kalangan murid dan warga sekolah. Majlis pelancaran yang disempurnakan oleh YBhg.

Dato' Ts. Dr. Haji Aminuddin bin Hassim, Ketua Setiausaha KPM, turut menzahirkan komitmen kementerian untuk memperkukuh pendidikan keselamatan dan ketahanan komuniti melalui pendekatan sistematik serta berasaskan bukti.

Pembangunan modul ini merupakan antara pencapaian utama hasil kolaborasi yang diketuai oleh Pusat Kajian Bencana Asia Tenggara (SEADPRI), Universiti Kebangsaan Malaysia bersama KPM, Agensi Pengurusan Bencana Negara (NADMA), U-INSPIRE Malaysia@UKM dan lain-lain di bawah projek yang dibiayai oleh UNICEF, yang memberi tumpuan kepada mengarusperdanakan pengurangan risiko bencana dalam sektor pendidikan.

Modul yang dibangunkan bukan sahaja menyediakan panduan kepada guru selaku jurulatih utama, tetapi juga memperkenalkan aktiviti pembelajaran melalui pengalaman yang relevan bagi membantu murid memahami risiko bencana, mengenal pasti bahaya di persekitaran mereka, dan mengamalkan langkah keselamatan yang betul.

Keberhasilan ini membuka ruang baharu untuk SEADPRI memainkan peranan sebagai rakan strategik KPM dalam usaha berterusan untuk mengembangkan dan menambah baik modul pendidikan pengurangan risiko bencana. Dengan kepakaran dalam penyelidikan bencana, analisis risiko dan pendidikan komuniti, SEADPRI berpotensi memberikan sokongan teknikal serta khidmat nasihat dalam menyokong inisiatif lanjut KPM. Perkembangan ini sekali gus memperkukuh kerjasama antara institusi akademik, agensi kerajaan, dan rakan pembangunan antarabangsa ke arah mempertingkat ketahanan bencana di sekolah di seluruh Malaysia.

YBhg Dato' Ts. Dr. Haji Aminuddin bin Hassim, Ketua Setiausaha KPM meneliti Modul Pendidikan Pengurangan Risiko Bencana Kementerian Pendidikan Malaysia (KPM)

Pelancaran Modul Pendidikan Pengurangan Risiko Bencana Kementerian Pendidikan Malaysia (KPM) telah dilancarkan pada 27 Oktober 2025 oleh YBhg Dato' Ts. Dr. Haji Aminuddin bin Hassim, Ketua Setiausaha KPM

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Building a Resilient Coastline: The Inspiring Ideas Behind the COFAR Challenge 2025

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Malaysia's coastal regions are facing growing threats from climate change, and the Coastal Flooding Adaptation & Resilience (COFAR) Challenge 2025 is taking proactive steps to address this critical issue. Organised by the Securities Commission Malaysia (SC) and ICAEW Malaysia in partnership with SD Guthrie Berhad and SEADPRI-UKM, the challenge brings together university students from various disciplines to design innovative, scalable, and financially sustainable solutions for coastal flooding. With over 4,675 kilometres of coastline, Malaysia continues to battle sea-level rise, storm surges, and saltwater intrusion that endanger both livelihoods and infrastructure. The floods of 2021, which displaced over 400,000 people and caused damages worth RM6.1 billion, stand as a stark reminder of the urgency to strengthen coastal resilience through innovation and collaboration.

The COFAR Challenge centres on Carey Island in Selangor, a low-lying coastal area known for its oil palm plantations and vulnerability to tidal surges and erosion. Much of the island sits six to eight feet below sea level, making it highly susceptible to flooding. Students were tasked with reimagining flood protection strategies for the West Estate Jetty, a critical site for logistics and emergency access. Their challenge was to design sustainable and modular flood mitigation systems that could withstand sea-level rise while also generating economic value through mechanisms such as eco-tourism and renewable energy initiatives. Each proposal had to ensure financial feasibility by achieving at least 10% cost recovery, ensuring that the solutions were both environmentally and economically sound.

From the pool of submissions, six teams were shortlisted for their innovative and practical ideas. Anti-Banjir Co. presented a hybrid solution that integrates mangrove growth with eco-concrete tetrapods, coupled with an eco-tourism walkway that promotes public awareness and environmental education. This dual-purpose design not only strengthens Carey Island's shoreline but also generates steady income through tourism and corporate partnerships. Team Bahr from the International Islamic University Malaysia introduced a hybrid barrier system made from biodegradable bamboo and hexagonal concrete blocks that dissipate wave energy while encouraging mangrove and marine life growth. Their design empowers the local Mah Meri community to produce bamboo materials, turning resilience into a source of livelihood. UTP TerraX from Universiti Teknologi PETRONAS developed an innovative bamboo I-head groyne system that combines hard engineering and soft ecological restoration. Through computational modelling, the team optimized the groyne's performance to reduce erosion and encourage sediment buildup for mangrove regrowth. They also proposed glamping-based eco-tourism, carbon credit trading, and CSR partnerships to ensure financial sustainability, with a projected two-year payback period.

SD Guthrie Berhad hosted the site visit in Carey Island, Banting on 11 September 2025 to show students about coastal adaptation and resilience strategies

Other shortlisted teams also impressed with their creative approaches. Banjirassic Park transformed the idea of flood mitigation into an interactive experience by designing a "Flood Resilience Park," a living demonstration site for climate education and green infrastructure. The Greens Bond team proposed a financial model called "Greens Bond: Financing Resilient Futures," focusing on mobilising green investment instruments and public-private partnerships to fund nature-based adaptation projects. Meanwhile, Fantastic Six's "Project Tiram" combined oyster reef cultivation with mangrove restoration to strengthen coastal ecosystems while supporting local aquaculture and community-based income generation.

After months of research, design, and evaluation, Fantastic Six emerged as the Champion of the COFAR Challenge 2025, impressing judges with their innovative integration of ecological science, community empowerment, and sustainable financing. Their Project Tiram not only demonstrated technical excellence but also embodied the spirit of nature-based adaptation and long-term resilience. The First Runner-Up was awarded to Greens Bond, whose financial innovation model stood out for its potential to mobilise green capital and scale climate-resilient projects across Malaysia. Meanwhile, Banjirassic Park secured the position of Second Runner-Up for transforming flood adaptation into an engaging, educational experience that bridges public awareness and resilience building.

Through their creativity and passion, these teams have proven that resilience is not only about surviving nature's challenges but also about thriving alongside it, shaping a sustainable and adaptable future for generations to come.

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SEADPRI as Malaysia's Leading Institution in the DBAR Working Group

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SEADPRI has been formally engaged as one of Malaysia's key partners in the Digital Belt and Road (DBAR) Working Group on Disaster Risk Reduction (DBAR-DISASTER), a global science initiative under the DBAR Programme that leverages Big Earth Data to support risk reduction across the Belt and Road region.

As documented, Prof. Joy Jacqueline Pereira previously served as SEADPRI's representative in the DBAR WG-DRR and this role is now carried forward by Dr. Nurfashareena Muhamad, who brings essential expertise in climate hazards, spatial modelling, and risk governance.

Through this collaboration, SEADPRI continues to contribute to the integration of satellite-based Earth observation, high-resolution hazard mapping, and vulnerability data to inform science-policy decision-making aligned with the Sendai Framework for Disaster Risk Reduction.

Key partners of the DBAR-DISASTER Working Group from renowned research institutions.

In the recent DBAR meeting attended by SEADPRI this year in Beijing, the team also participated in the 5th International Forum on Big Data for Sustainable Development Goals 2025 (FBAS 2025) youth session, specifically during Session on Big Earth Data and AI for Disaster Risk Reduction.

This session brought together emerging scientists and young practitioners to explore how artificial intelligence, combined with multi-dimensional earth observation datasets, can enhance early warning capabilities and improve risk assessment at multiple scales.

SEADPRI highlighted Malaysia's broader efforts in integrating Big Earth Data and AI to support disaster risk reduction, including initiatives to enhance forecasting capacity, strengthen multi-hazard monitoring, and improve data-driven decision-making for resilient development.

The presentation underscored how science-informed approaches can empower Malaysian agencies and local communities to proactively anticipate risks and build long-term national resilience.

SEADPRI featured as a panel speaker at FBAS 2025.

SEADPRI's active participation in DBAR-DISASTER and its engagement in other global platforms demonstrate the centre's growing visibility and leadership in advancing disaster risk reduction research in Malaysia. These involvements not only position SEADPRI as a trusted scientific contributor in international DRR networks, but also open new avenues for collaboration, innovation, and capacity building

By continuously engaging with high-level scientific communities and multilateral initiatives, SEADPRI strengthens Malaysia's role in shaping evidence-based resilience strategies and expands opportunities to broaden its partnerships, research impact, and regional influence in the years ahead.

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Geological Hazards Programme

Slow-Onset Hazards: What You Need to Know

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When we think of climate change, sudden events such as floods, landslides, or storms are often the first images that come to mind. These events, dramatic and destructive, capture public attention quickly. However, set of hazards unfolds more quietly and gradually. Known as slow-onset hazards, these phenomena develop over long periods of time but carry equally serious, and often more enduring, consequences.

What are slow-onset hazards?

Slow-onset hazards are climate-related processes that do not have a sudden beginning or end. Instead, they accumulate steadily, making their impacts less visible in the short term yet profound over time. According to the Intergovernmental Panel on Climate Change (IPCC), examples include sea-level rise, ocean acidification, glacial retreat, salinization, land degradation, desertification, and biodiversity loss (IPCC, 2019). Because they develop incrementally, these hazards are frequently underestimated, even though they can disrupt societies in lasting and sometimes irreversible ways.

One of the most widely recognised slow-onset hazards is sea-level rise. The IPCC Special Report on the Ocean and Cryosphere in a Changing Climate project that global mean sea level could rise by as much as 1.1 metres by 2100 under high-emission scenarios (IPCC, 2019). For low-lying countries, this gradual change threatens to inundate coastal zones, accelerate saltwater intrusion, and result in permanent land loss. Similarly, glacial retreat and permafrost thaw are unfolding processes that not only affect water availability and destabilise landscapes but also release greenhouse gases, compounding long-term climate risks (IPCC, 2019).

In Malaysia, these risks are already evident. Coastal erosion and rising seas in Kelantan and Terengganu have destroyed agricultural land and forced some communities to relocate. In Sabah, recurrent droughts associated with El Niño have strained water supplies, affecting both households and farming activities. Across Southeast Asia, the Mekong Delta in Vietnam is facing saltwater intrusion, reducing rice yields and threatening the livelihoods of millions (World Bank Group, 2021). Collectively, these cases highlight that slow-onset hazards are not distant possibilities but unfolding realities with significant implications for development and human security.

Other critical hazards include land degradation and desertification, which reduce soil fertility and undermine agricultural productivity, particularly for rural communities reliant on natural resources. Meanwhile, ocean acidification, driven by the absorption of carbon dioxide into seawater, is weakening coral reef ecosystems and threatening fisheries that sustain coastal populations. These hazards rarely dominate headlines, but their impacts accumulate to reshape economies, societies, and ecosystems.

Implications for communities and policy

The implications of slow-onset hazards extend beyond environmental changes; they directly affect societies and economies. For communities, rising seas may trigger displacement, disrupt traditional livelihoods, and erode cultural heritage in coastal areas. For farmers, prolonged droughts and land degradation reduce crop yields, increase food insecurity, and deepen rural poverty. Health systems are also at risk, as slow-onset hazards contribute to water scarcity, malnutrition, and the spread of vector-borne diseases. Importantly, these impacts often fall disproportionately on vulnerable groups, including low-income households, women, and Indigenous peoples, who have fewer resources to adapt (SEI, 2020).

From a policy perspective, addressing slow-onset hazards requires sustained, long-term investment. Short-term disaster relief is insufficient for challenges that evolve over decades. In Malaysia, strategies such as strengthening coastal defences in erosion-prone areas, diversifying crops in drought-affected regions, enhancing water resource management, and protecting marine ecosystems are crucial. Equally important is the integration of indigenous and local knowledge with scientific research, ensuring that adaptation strategies are both culturally relevant and scientifically robust. Strengthening risk communication and public awareness is also important, so that communities recognise the gradual nature of these hazards and adopt preventive measures before impacts become irreversible.

Conclusion

Slow-onset hazards may not command daily headlines, but they are steadily shaping Malaysia's future. The erosion of coastlines in Kelantan, the recurring droughts in Sabah, and the regional threats to food security are clear warnings that climate change is not only about sudden disasters but also persistent pressures. For Malaysia, this underscores the need to mainstream slow-onset hazards into national climate policy, development planning, and community resilience programmes. By recognising these silent but powerful forces today, Malaysia can take decisive steps to safeguard its ecosystems, strengthen social resilience, and protect future generations from long-term climate risks.

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Cont.- Slow-Onset Hazards: What You Need to Know

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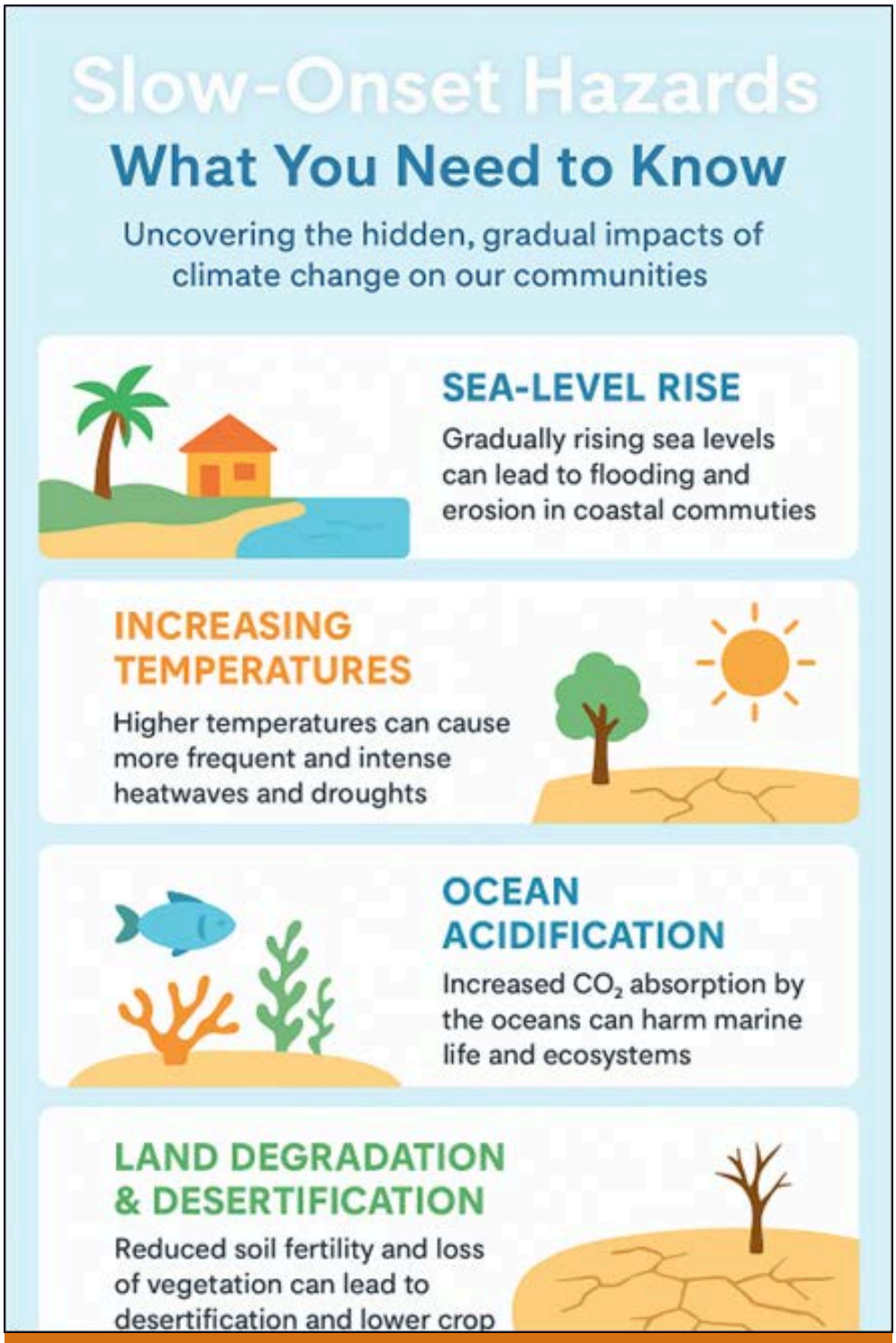

Impacts of slow-onset hazards

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Strengthening Regional Geoscience Cooperation: Highlights from the 61st CCOP Annual Session 2025 in Vientiane, Lao PDR

Lim Choun Sian
SEADPRI-Universiti Kebangsaan Malaysia

Advisory Group Meeting on 2 November 2025, which discussed the CCOP Strategic Plan 2026–2030 and the management of CCOP expert groups to enhance scientific support for member countries.

The Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP) is a unique organization founded in 1966 under UN-ECAFE (now UN-ESCAP) and became an intergovernmental organization in 1987. Today, CCOP comprises 16 member countries, 14 cooperating countries, and 17 cooperating organizations worldwide.

For more than 55 years, CCOP has provided a strong foundation for bilateral and multilateral cooperation among its member countries, cooperating countries, and organizations.

CCOP serves as a platform for various geoscientific programs and activities organized through international partnerships that have spanned over five decades in the region. Since its inception, CCOP has undertaken work in geological surveys, exploration, and technological cooperation related to offshore petroleum and mineral resource extraction.

Over time, in response to the evolving needs of its member countries, CCOP projects have diversified significantly, particularly in areas such as groundwater resources, geohazards, global climate change, and urban geology.

In the face of the Fourth Industrial Revolution, CCOP compiles, manages, and utilizes vast amounts of data collected by its member countries, with an increasing focus on data sharing, education, and capacity building.

This year, the 61st CCOP Annual Session was hosted by the CCOP Technical Secretariat in cooperation with the Department of Geology and Mines, Ministry of Industry and Commerce, Lao PDR. The session took place in Vientiane, Lao PDR, from 2–6 November 2025, bringing together over 150 delegates from 11 member countries (Brunei Darussalam, Cambodia, China, Indonesia, Japan, Republic of Korea, Lao PDR, Malaysia, Myanmar, Philippines, and Thailand), 5 cooperating countries (Canada, Denmark, Finland, France, and Germany), and 3 cooperating organizations (IUGS, JICA, and UKM), along with CCOP Honorary Advisers.

SEADPRI-UKM, as one of the cooperating organizations, was represented at the Advisory Group meeting by Dr. Lim Choun Sian, Senior Researcher at SEADPRI, and Dato' Yunus Abdul Razak, Associate Fellow at SEADPRI and Vice Chair of the CCOP Advisory Group.

The Advisory Group, comprising representatives from cooperating countries, cooperating organizations, and honorary advisers, meets annually to review the technical, scientific, and research aspects of CCOP's work program.

Over the past decade, UKM and CCOP have jointly undertaken numerous activities under the auspices of the Department of Mineral and Geoscience Malaysia (JMG). These initiatives aim to strengthen regional cooperation, build capacity, and facilitate the exchange of geoscientists across East and Southeast Asia to address issues related to sustainable development, including geohazards, climate change adaptation, disaster-resilient cities, geoheritage, and the development of young geoscientists.

During this annual session, SEADPRI presented past and ongoing collaborative work with cooperating and member countries, including the British Geological Survey (BGS) and the JMG. In the previous year, SEADPRI-UKM, together with JMG and the CCOP Technical Secretariat, co-hosted the Thematic Session of the CCOP Annual Session 2024 in Langkawi, Malaysia.

A total of 67 papers were presented, with 19 full papers compiled to showcase the latest geoscience research from the region. Additionally, three papers were submitted for publication in the Geological Society of Malaysia's Scopus-indexed journal, the Bulletin of the Geological Society of Malaysia.

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Geological Hazards Programme

The Silent Surge: Sea Level Rise and Its Impacts

Aida Soraya Shamsuddin
SEADPRI-Universiti Kebangsaan Malaysia

The participants of ASEAN Sea Level Rise Workshop on 11–12 June 2025, in Kuala Terengganu
Source: https://www.umt.edu.my/umt-at-the-forefront-of-regional-action-against-sea-level-rise/

Climate change remains one of the most pressing global challenges, with sea level rise emerging as an increasingly urgent threat. Driven by global warming, accelerated glacial melt, and the thermal expansion of seawater, rising sea levels jeopardise coastal communities, ecosystems, and economic stability. In Southeast Asia, home to millions living in low-lying coastal zones, the consequences are particularly severe. These include heightened flooding, shoreline erosion, saltwater intrusion, loss of livelihoods, and the displacement of vulnerable communities. Addressing sea level rise is therefore not only an environmental imperative but also a critical issue of human security, disaster resilience, and sustainable development.

Recognising the magnitude of this challenge, Malaysia demonstrated strong regional leadership by convening the ASEAN Sea Level Rise Workshop on 11–12 June 2025, under its ASEAN Chairmanship. Held at the Raia Hotel & Convention Centre in Kuala Terengganu, the workshop brought together more than 100 participants, including policymakers, scientists, environmental specialists, and climate practitioners from across ASEAN. The event was organised by the Ministry of Natural Resources and Environmental Sustainability (NRES), in collaboration with the Yayasan Penyelidikan Antartika Sultan Mizan (YPASM), the Ministry of Energy Transition and Water Transformation (PETRA) through the National Water Research Institute of Malaysia (NAHRIM), Universiti Malaysia Terengganu (UMT), and the National Antarctic Research Centre (NARC). The workshop also received support from GIZ under the ASEAN EU German Climate Action Programme and the ASEAN Secretariat.

SEADPRI was invited to participate in the regional dialogue, reflecting the centre's recognised expertise in climate risks and disaster resilience and Gs. Dr Aida Soraya Shamsuddin attended the workshop as the official representative of SEADPRI.

The keynote speaker Datuk Nor Yahati Binti Awang, Deputy Secretary General (Environmental Sustainability) of NRES, underscored the urgency of coordinated regional action. She emphasised that sea level rise is a shared regional threat that transcends national boundaries and demands collective solutions. By mobilising shared expertise, scientific capacity, and policy commitment, ASEAN member states can build stronger resilience against the multifaceted risks associated with rising seas, ensuring that vulnerable communities are not left behind.

Throughout the workshop, participants highlighted the need for deeper cooperation in three critical areas. First is strengthening scientific research, monitoring, and data sharing to improve regional understanding of sea level trends and vulnerabilities. Secondly is developing integrated coastal management policies, including early warning systems and climate informed urban planning.

The last is enhancing community based adaptation measures supported by ecosystem based approaches such as mangrove conservation and restoration.

These discussions reflect a growing regional recognition that effective adaptation requires both robust scientific evidence and meaningful engagement with local communities who experience the impacts firsthand.

The outcomes of the Kuala Terengganu workshop reaffirmed the shared responsibility of ASEAN member states and strengthened momentum for deeper collaboration in addressing sea level rise. By acknowledging and acting on the silent but powerful surge of rising seas, ASEAN is taking an important step toward protecting its people, economies, and natural heritage for generations to come.

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Technological Hazards Programme

Bengkel Pemurnian dan Pengemaskinian Laman Sesawang SEADPRI

Mohd Fairus Awang, Nurfashareena Muhamad, Lim Choun Sian, Siti Khadijah Satari & Mohd Faizol Markom
SEADPRI-Universiti Kebangsaan Malaysia

Pada 31 Julai 2025, Pusat Penyelidikan Bencana Asia Tenggara (SEADPRI), Institut Alam Sekitar dan Pembangunan, Universiti Kebangsaan Malaysia telah menganjurkan Bengkel Pemurnian dan Pengemaskinian Laman Sesawang SEADPRI bertempat di Bilik Mesyuarat SEADPRI. Bengkel ini melibatkan pegawai penyelidik, pegawai sains dan penolong pegawai sains yang berperanan dalam pengurusan data, komunikasi penyelidikan serta pembangunan platform digital pusat.

Tujuan utama bengkel adalah memperkukuh fungsi laman sesawang Pusat SEADPRI sebagai medium penyebaran ilmu yang lebih sistematik, mesra pengguna dan berimpak tinggi. Perbincangan memberi tumpuan kepada penambahbaikan struktur laman, pengemaskinian profil penyelidik dan projek, serta integrasi bahan penerbitan dan aktiviti pusat.

Penekanan turut diberikan kepada elemen penjenamaan visual dan keselarasan dengan imej profesional UKM, di samping cadangan penambahan ciri interaktif dan penyediaan sokongan dwibahasa bagi memperluas capaian di peringkat antarabangsa.

Sesi bengkel berlangsung secara interaktif melalui perkongsian idea dan latihan praktikal bagi memperkukuh kefahaman peserta terhadap aspek teknikal pengurusan laman sesawang.

Pendekatan kolaboratif ini, membolehkan pelan tindakan dirangka secara teratur, merangkumi mekanisme pengemaskinian berkala, penyelarasan tanggungjawab antara kakitangan, serta pemantapan strategi komunikasi digital pusat.

Penganjuran bengkel ini menegaskan komitmen Pusat SEADPRI untuk meningkatkan keterlihatan dan keberhasilan penyelidikan pusat di peringkat kebangsaan dan antaravangsa melalui platform digital yang lebih dinamik dan responsif.

Laman sesawang bukan sahaja berfungsi sebagai saluran maklumat rasmi, tetapi juga sebagai medium strategik dalam menyokong misi Pusat SEADPRI sebagai peneraju penyelidikan bencana di rantau Asia Tenggara.

Peserta Bengkel Pemurnian dan Pengemaskinian Laman Sesawang SEADPRI pada 31 Julai 2025 di Bilik Mesyuarat SEADPRI-LESTARI, UKM.

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Technological Hazards Programme

Voltammetric Genosensor from Silica Nanocomposites for Transgenic Soybean Analysis

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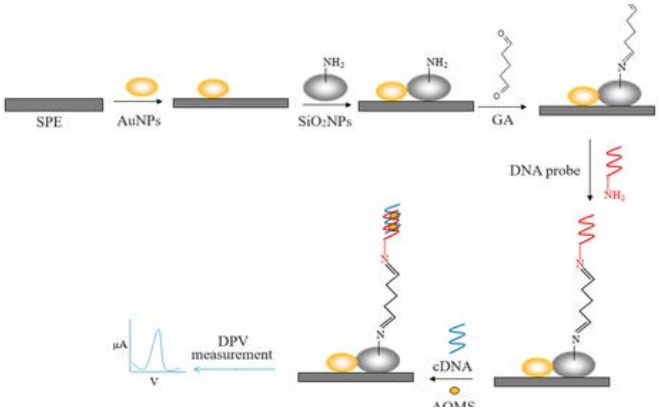
Modern biotechnology, which is also referred to as recombinant DNA technology, has improved the nutritional value of domesticated plants and animals by enriching genetically modified organisms (GMOs) with vitamins and minerals. With modern biotechnology, the gene encoding for certain toxins can be transferred to plants, creating living modified organisms that are resistant to viruses, antibiotics, and insects, thereby leading to high crop yields as a result of reduced losses to pests and diseases. However, this technology might potentially be unsafe for consumers. Therefore, the detection of food derived from genetically modified material is very important for the safety of consumers.



Schematic illustration of the stepwise GMO DNA biosensor fabrication process by using aminated DNA probes. It begins with the deposition of AuNPs onto SPE, followed by drop coating of SiO_2 nanospheres onto AuNPs-modified SPE. Covalent attachment of the aminated DNA probe to the SiO_2-Au-SPE is done via GA crosslinking reaction, followed by DNA hybridization with cDNA and AQMS intercalation reactions on the DNA electrode.

With the advancement in nanoscience and nanotechnology, various advanced nanomaterials have been applied to enhance DNA biosensing performance, such as gold nanoparticles (AuNPs), silver nanoparticles, ferrum-Au nanoparticles, Fe_3O_4 nanoparticles, nickel oxide nanoparticles, copper oxide nanocomposites, etc. Among those mentioned nanomaterials, AuNPs have been popularly used to design DNA biosensors based on electrochemical transduction, due to their superb physical and chemical properties e.g. highly conductive, tunable optical, and electronic properties, large surface area, and biocompatibility, which prevents DNA activation. Additionally, the combination of AuNPs with semiconductor nanoparticles or microspheres, such as carbon nanotubes, reduced graphene oxide nanoribbon, polypyrrole nanoparticles, nanoporous polycarbonate, silica nanospheres, etc. have also been widely utilized to increase the electrochemical DNA biosensor performance with regard to broad dynamic range, low detection limit (pM-fM levels), rapid response time, and good reproducibility (<5% RSD).

Silica nanoparticles (SiO_2NPs)-based bioconjugates are widely exploited to detect DNA hybridization reactions by electrochemical or optical biosensors. Aminated-modified SiO_2NPs, for instance, have been applied to develop an aptasensor based on insulin-binding DNA aptamer (IGA3). A nickel-salphen type complex with a piperidine side chain [Ni(II)-SP] was used as an optical label upon aptamer binding with insulin with high specificity.

The insulin aptasensor demonstrated a low detection limit of 3.71 μIU mL^{-1} with good selectivity. On the other hand, a DNA biosensor based on methylene blue-modified SiO_2NPs has been synthesized and coupled to an impedimetric transducer for the detection of hepatitis C virus DNA.

The DNA biosensor employing tris(bipyridine) ruthenium(II) ($Ru(bpy)_3^{2+}$) DNA hybridization indicator was capable of determining low DNA concentration down to the pM level with a wide linear response range.

Another amine-modified SiO_2NPs has been proposed to develop a solid-state DNA optode sensor for dengue virus DNA detection. The dengue virus DNA biosensor was fabricated by employing glutaraldehyde-activated aminated SiO_2NPs as the DNA carrier matrix for covalent crosslinking of the DNA probe.

The SiO_2NPs-based HBV DNA biosensor was highly sensitive, stable, and reproducible, and could be used to determine dengue serotype 2 DNA at zM concentrations with a large improvement in the linear detection range.

Our research team attempted to investigate a voltammetric DNA biosensor design based on silica-gold nanocomposite (SiO_2-Au)-modified screen-printed electrode (SPE) for GMO determination. The aminated DNA probe was immobilized onto 3-aminopropyl-triethoxysilane (APTS) modified SiO_2 nanospheres via glutaric dialdehyde crosslinking agent.

The small size of SiO_2 nanospheres provides a large surface area for the high loading capacity of DNA probe immobilized at the surface to promote hybridization reaction with target DNA and to increase DNA biosensor sensitivity.

A layer of AuNPs was deposited onto the SPE surface to mediate fast electron-transfer kinetics via long-range electron transfer during the intercalation of anthraquinone-2-sulfonic acid monohydrate sodium salt (AQMS) into immobilized double-stranded DNA (dsDNA).

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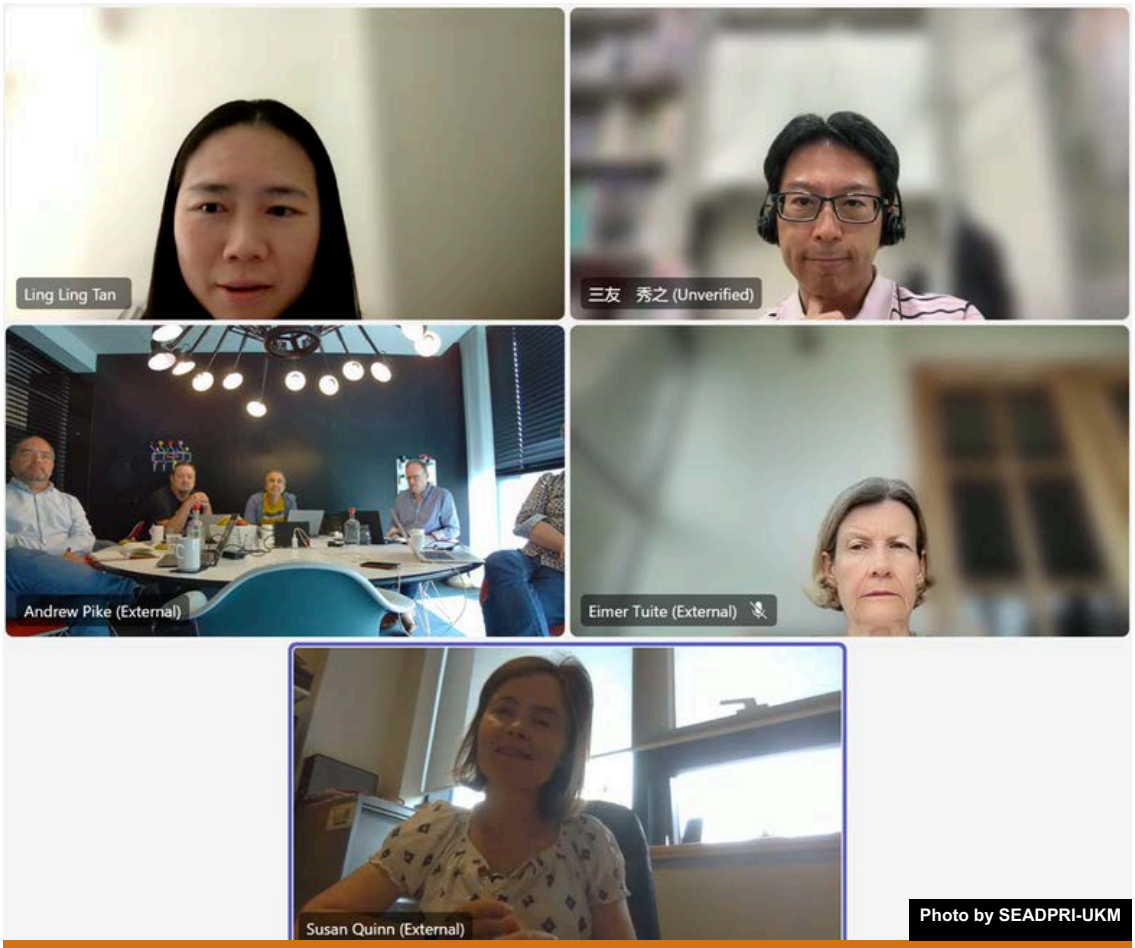
Technological Hazards Programme

Invitation to be an Asian International Partner for the EU Horizon Funding programme on Integrated DNA Sensors

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



The first meeting invitation from the EU consortium partners to meet potential Asian international partners as part of DNA Surf II on the 6th of August 2025.

The Technological Hazard Programme of SEADPRI, coordinated by Assoc. Prof. ChM. Dr. Tan Ling Ling, based on her expertise in DNA biosensor research, is very honored to have received an invitation from the EU consortium partners for the EU Horizon Funding programme application in 2025. In the EU, there will be partner universities in Newcastle, Northumbria, the Basque Country in Spain, the Netherlands, and Ireland. And non-EU partners in the USA, Japan, China, and Malaysia. The theme of the consortium would be in the general area of integrated DNA sensors. The funding would enable EU academics or students to travel to non-EU partner universities for research purposes.

The SEADPRI Research Center is expected to host some visitors from the EU in the laboratory. The first kick-off meeting between EU consortium partners and potential Asian international partners, as part of DNA Surt II, was held on August 6, 2025. The aim is to develop sustainable collaborative projects between different academic organisations.

The exchange of staff or student will benefit from new knowledge, skills, and career development perspectives, while participating organisations increase their research and innovation capacities.

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IPCC Expert Review Briefings on the Special Report on Climate Change and Cities for Asia Pacific and Malaysia

Puteri Amirah Nabilah Azman & Joy Jacqueline Pereira
SEADPRI-Universiti Kebangsaan Malaysia

Posters and programme highlight from the IPCC Expert Review Briefings held on 23 October and 7 November 2025, showcasing regional efforts led by Prof. Dr. Joy Jacqueline Pereira and partners to mobilize Asia-Pacific and Malaysian experts for the Special Report on Climate Change and Cities.

Two online briefings were held on 23 October and 7 November 2025 to encourage participation in the IPCC Special Report on Climate Change and Cities (SR Cities) review process. Led by Professor Joy Jacqueline Pereira, Co-Chair of Intergovernmental Panel on Climate Change (IPCC) Working Group III and hosted by SEADPRI-UKM in collaboration with partners including Asia-Pacific Network for Global Change Research (APN), the Pacific Climate Change Centre (PCCC-SPREP), the Asian Network on Climate Science and Technology (ANCST), and the Geological Society of Malaysia (GSM), the sessions aimed to mobilize experts from Malaysia and across the Asia-Pacific region to serve as Expert Reviewers for the First-Order Draft (FOD).

The briefings introduced the IPCC's Seventh Assessment Cycle (AR7), its reporting timeline, and the structure of SR Cities, which focuses on urban risks, solutions, and enabling conditions for climate-resilient development. Participants were guided on how to register as reviewers, access the draft, and submit evidence-based, constructive comments by 12 December 2025.

Prof. Dr. Joy Pereira highlighted the importance of Asia-Pacific representation, noting that regional expertise especially in geology, urban hazards, and adaptation can enrich the global assessment. Reviewers' names will be included in the annex of the final report acknowledging their contribution to this voluntary scientific process. Both briefings highlighted that broad and inclusive participation helps ensure the report reflects diverse regional realities, concluding with Prof. Joy's message: "Your voice matters in shaping the future of climate science and policy."

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