

## Life Below Water

Conserve and sustainably use the oceans, seas and marine resources for sustainable development.



### *Seperti Ikan Pulang ke Lubuk*

SDG 14, which focuses on the protection and restoration of aquatic ecosystems, is embodied in the Malay proverb “*seperti ikan pulang ke lubuk*”—“like a fish returning to its spawning ground.” This saying reflects the idea that life flourishes when it returns to its natural habitat, just as healthy aquatic ecosystems sustain biodiversity and ensure the resilience of our planet. At Universiti Malaya (UM), this principle is put into action through educational programmes that emphasise sustainable water management, conservation of marine and

freshwater environments, and outreach initiatives on responsible fishing and water usage. Efforts at UM also extend to direct actions aimed at protecting aquatic life, from campus-based initiatives to community involvement in safeguarding local wetlands and waterways. Through research, events, and collaboration with local communities, UM plays an active role in restoring aquatic ecosystems, raising awareness, and ensuring that life below water continues to thrive for future generations.

## Community Outreach on Fresh-water Ecosystems

Universiti Malaya carried out a range of initiatives in 2024 for community outreach on freshwater ecosystems. At Tasik Varsiti, the campus lake, programmes combined fish population studies with the release of native species, supported by educational activities on invasive species, responsible fishing, and ecosystem conservation.

The yearly Sungai Pantai clean-up further strengthens local stewardship of the river and encourages sustained volunteer participation (see page 127). Beyond the campus, activities such as Guarding Our Water Together at Tasik Taman Aman (pages 128–129) expand community engagement by empowering residents to take collective action in caring for shared water bodies.

### Fish Inventory Study and Native Fish Release Programme at Tasik Varsiti

On 20–21 May 2024, the UM Water Warriors, under the UM Sustainable Development Centre (UMSDC), with the support of the UM Sports Centre and the Estates Department (JHB), and in collaboration with the Department of Fisheries (DoF), Federal Territories of Kuala Lumpur and Putrajaya, conducted a Fish Inventory Study Programme at Tasik Varsiti (Varsity Lake), Universiti Malaya (UM). The objective of the study was to identify the fish species present and assess their population in Tasik Varsiti. This programme forms part of a long-term strategic initiative aimed at conserving and maintaining the biodiversity of the campus lake's ecosystem.

Findings from the 2024 study indicated that Tasik Varsiti is currently dominated by non-native fish species, particularly Tilapia and Cichlid, while only a few native species were recorded. The study also documented the presence of *Hypostomus* spp., and the presence of *Cichla* spp. (Peacock Bass) was previously recorded in 2023. Both species are invasive alien species and are considered harmful to Malaysia's aquatic ecosystems.



**Right:** Fish inventory study at Tasik Varsiti

UM, in collaboration with the Department of Fisheries (DoF) Malaysia, organised a half-day event — the Juvenile Fish Release Program — on Thursday, 18 July 2024, focused on the release of juvenile and adult fish into the urban lake. This initiative marked DoF's first official programme of its kind on a university campus in Malaysia. Held at Tasik Varsiti, UM, the event was attended by distinguished guests including Tuan Haji Wan Muhammad Aznan Abdullah, Deputy Director-General of Fisheries (Management), DoF; Prof. Ir. Dr. Kaharudin Dimiyati, Deputy Vice-Chancellor (Research and Innovation), UM; Prof. Ir. Dr. Ramesh Singh a/I Kuldip Singh, Deputy Vice-Chancellor (Development), UM; Prof. Dr. Yahaya Bin Ahmad, Associate Vice-Chancellor (Corporate Strategy), UM; and Dr. Muhammad Azzam Ismail, Director of the Eco Campus, UMSDC, along with staff from both UM and DoF.

The event was part of a strategic collaboration established through a Memorandum of Understanding (MoU) signed between UM and DoF in 2022.

A total of approximately 36,600 native fish were released into the lake, including species such as Terbul (*Osteochilus hasseltii*), Kelah (*Tor tambroides*) at both juvenile and adult stages, Baung (*Hemibagrus bleekeri*), and Lampam Sungai (*Barbonymus schwanenfeldii*), among others. The estimated value of the released fish was RM24,400, reflecting the significance and scale of this conservation effort. This initiative aims to enhance local aquatic biodiversity, promote freshwater ecosystem conservation, and support long-term sustainable resource management, in line with national environmental goals.

**Right:** Native fish release programme at Tasik Varsiti, in collaboration with the Department of Fisheries (DoF) Malaysia



As part of the event, educational booths and public engagement sessions were held by the DoF and UM Water Warriors, highlighting the impacts of overfishing, the importance of sustainable catch limits, and the dangers of illegal, unreported and unregulated (IUU) fishing. Visitors were shown examples of prohibited fishing gear, introduced to regulations for legal fishing practices, and informed about destructive fishing techniques that damage aquatic habitats. The outreach also emphasised the ecological risks of introducing alien species, which can outcompete native fish and disrupt food chains.

During the ceremony, the findings of the Fish Inventory Study were shared with attendees. It was also shared with the UM community via UMLInfo (Universiti Malaya emailing list), and the public via social media. As part of this outreach, the community was reminded: *“To ensure the biodiversity ecosystem of Tasik Varsiti is preserved, members of the Universiti Malaya community are advised not to release any fish or aquatic organisms into Tasik Varsiti without the permission and approval of the management. If this occurs, the lake’s biodiversity ecosystem will be disrupted, and the use of the lake will also be affected.”*

**Right:** Booth by the Department of Fisheries (DoF) during the native fish release programme at Tasik Varsiti, UM, highlighting issues of overfishing, prohibited equipment, and fish species permitted or prohibited in public waters (Photo credit: Department of Fisheries Malaysia)

**Below:** Notice on ‘Suspension of All Fishing Activities at Tasik Varsiti, Universiti Malaya’ issued on 7 August 2024 by Prof. Dr. Yahaya Ahmad, Associate Vice-Chancellor (Corporate Strategy)

An official advisory was also issued stating that all fishing activities in Tasik Varsiti are suspended for one (1) year — until 18 July 2025 — to allow the newly released fish to grow and reproduce as intended. Research, inventory studies, and educational activities may continue with written permission from the Director of UMSDC, and the Security Office will assist in monitoring to ensure no fishing activities take place without authorisation. In addition, to maintain ecosystem balance, the campus community is requested not to release alien fish species such as Tilapia, suckermouth catfish (*Hypostomus* spp.), African catfish, Peacock Bass, or pets such as turtles into the lake, as such releases will affect the fish population and disrupt the biodiversity of Tasik Varsiti.

This advisory forms part of UM’s ongoing educational and outreach efforts under sustainable fisheries management, aimed at fostering responsible stewardship of aquatic biodiversity and preventing the introduction of invasive species.



#### PEMAKLUMAN PENANGGUHAN SEBARANG AKTIVITI PENANGKAPAN IKAN DI TASIK VARSITI UNIVERSITI MALAYA

Dengan hormatnya saya merujuk kepada perkara di atas.

2. Sukacita dimaklumkan bahawa pada 18 Julai 2024 yang lalu, Universiti Malaya melalui Pusat Pembangunan Lestari Universiti Malaya (UMSDC), Pusat Sukan, dan Jabatan Harta Benda (JHB) dengan kerjasama Jabatan Perikanan telah menganjurkan Program Pelepasan Benih Ikan di Tasik Varsiti. Sebanyak 36,000 benih ikan bersama induk daripada pelbagai spesies air tawar telah dilepaskan. Tujuan pelepasan ini bagi memastikan kelangsungan spesies ikan tempatan serta menjadikan Tasik Varsiti sebagai bank ikan tempatan bagi Kuala Lumpur.

3. Oleh yang demikian, segala aktiviti penangkapan ikan di Tasik Varsiti ditangguhkan selama **satu (1) tahun (sehingga 18 Julai 2025)** untuk memberi masa bagi ikan tersebut membesar dan membiak dengan baik sebagaimana dihasratkan. Walau bagaimanapun, bagi aktiviti penyelidikan, kajian inventori dan pembelajaran masih boleh diteruskan dengan mendapatkan kebenaran bertulis kepada Pengarah Pusat Pembangunan Lestari Universiti Malaya (UMSDC). Pusat Keselamatan juga akan membantu memantau bagi memastikan tiada aktiviti penangkapan dilakukan tanpa kebenaran.

4. Sementara itu, bagi memastikan keseimbangan ekosistem, komuniti kampus dimohon agar tidak melepaskan spesies ikan asing seperti tilapia, bandaraya, keli afrika, peacock bass dan lain-lain ikan beserta haiwan peliharaan seperti kura-kura di Tasik Varsiti. Pelepasan ini akan menjayakan populasi ikan di Tasik Varsiti malah mengganggu kepelbagaian biodiversiti.

## Raising Awareness on Overfishing and Sustainable Fisheries

Universiti Malaya (UM) carried out a range of initiatives in 2024 to raise awareness and share knowledge on the sustainable management of fisheries, aquaculture, and related ecosystems. These efforts reflect UM's commitment to addressing issues of overfishing and destructive fishing practices through research, education, and community engagement.

Assoc. Prof. Dr. Amy Then, from the Institute of Biological Sciences, contributed scientific data that supported the nomination of two Important Shark and Ray Areas (ISRAs) in Malaysia, with Mukah in Sarawak successfully recognised.

At the community level, programmes at Tasik Varsiti combined fish inventory studies, fish release initiatives, and educational activities to highlight concerns such as illegal, unreported and unregulated (IUU) fishing, invasive species risks, and the importance of sustainable resource management. This initiative has been featured earlier in this SDG 14 report (see pages 258–260).

Beyond the campus, UM's research seminars and outreach events explored the sustainability of seaweed aquaculture under climate change, while also highlighting the vital role of seagrass in supporting fisheries and coastal communities through both scientific and artistic approaches.

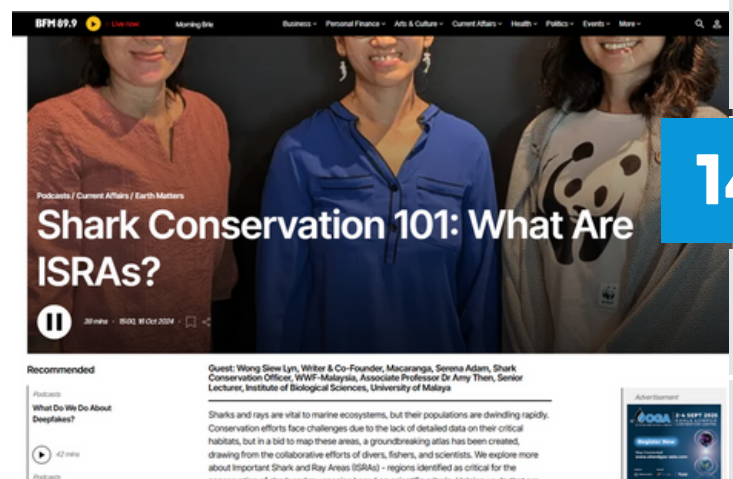
### Important Shark and Ray Areas (ISRAs) in Sarawak, Malaysia

Universiti Malaya, under the lead of Assoc. Prof. Dr Amy Then, Institute of Biological Sciences, contributed to the nomination of two Important Shark and Ray Areas (ISRAs) in Malaysia, based on UM's data. One of these, the Mukah ISRA in Sarawak, was successfully accepted. In Mukah, Dr Then combined research on shark and ray landings with interviews of local fishers, who shared decades of catch history and pinpointed where they set their nets. This valuable local ecological knowledge revealed Mukah as a critical breeding site for Scalloped Hammerheads. The new atlas of ISRAs offers a scientific foundation for sustainable fisheries management while strengthening the case against overfishing, by guiding where regulations, enforcement, and awareness should focus.

On 16 October 2024, Dr Then further highlighted these issues on BFM, a Malaysian independent business and current affairs-oriented radio station. Joining Serena Adam (Marine Conservation Officer, WWF-Malaysia, IUCN member) and environmental journalist Wong Siew Lyn, she discussed the urgent need to protect sharks and rays, whose populations are rapidly declining.

Their conversation underscored how ISRAs—developed through collaboration between divers, fishers, and scientists—can safeguard biodiversity, inform conservation strategies, and support sustainable fisheries. Dr Then emphasised the importance of bridging scientific research and practical conservation to ensure that critical marine habitats receive the protection they urgently need.

*Below: BFM webpage on “Shark Conservation 101: What Are ISRAs?”*



## Sustaining Seaweed Aquaculture in a Changing Climate

The IOES Scientific Seminar Series on “Sustaining Seaweed Aquaculture” was organised by the Institute of Ocean and Earth Sciences (IOES), Universiti Malaya, in conjunction with the celebration of World Oceans Day. The seminar featured expert presentations including “Sustaining Eucheumatoids Aquaculture Amid Global Climate Change” by Prof. Dr. Lim Phaik Eem (IOES, Universiti Malaya); “Seaweed Biosecurity and the Progressive Management Pathway” by Prof. Elizabeth Cottier-Cook (Scottish Association for Marine Science, United Kingdom); and “Conserving Wild Seaweeds for the Future of the Global Seaweed Industry” by Prof. Juliet Brodie and Dr. Sophie Corrigan (Natural History Museum, London). The seminar highlighted critical discussions on the sustainability, resilience, and future directions of seaweed aquaculture under the pressures of climate change and global industry demand.



**Above:** Event poster for “Sustaining Seaweed Aquaculture”

## Seruan Setu: The Secret Gardens of the Sea through Science and the Arts

On 1 March and 20 March 2024, UM was represented by Dr. Jillian Ooi in two international engagements highlighting Seruan Setu, a programme that bridges science and the performing arts to promote seagrass conservation.

The first was an online talk organised by iConserve China in conjunction with World Seagrass Day, titled “Seruan Setu: Illuminating Seagrass Conservation through the Performing Arts.” The second, part of the ALAM-ADFIM Merubah Minda Talk 2024, carried the theme “Harmonizing and Integrating Science with the Arts – Seruan Setu: The Secret Gardens of the Sea.” Delivered to an audience comprising representatives from banking and finance agencies affiliated with the Association of Development Finance Institutions of Malaysia (ADFIM), the presentation underscored the importance of seagrass to society, particularly its role in fisheries and tourism.



**Right:** Event poster for the talk organised by iConserve China (top) and Dr Jillian as one of the speakers during the Merubah Alam Minda Talk 2024 (bottom)

## Conservation for the Future: Events on Oceans, Lakes, and Rivers

In 2024, a wide range of events were organised and supported to promote the conservation and sustainable utilisation of oceans, seas, lakes, rivers, and marine resources. These included student-focused programmes such as the Science Camp & Research Gallery: Polar and Marine Science Exploration, educational visits to the Bachok Marine Research Station, and the service-learning initiative XPLORESEAS in Terengganu.

The Institute of Ocean and Earth Sciences (IOES) hosted seminars on topics ranging from marine biodiversity to jellyfish taxonomy, while collaborations with partners extended outreach through public talks, exhibitions, and international workshops. From engaging secondary school students to sharing expertise with policymakers and the finance sector, these efforts highlighted the role of marine science in raising awareness and promoting stewardship of aquatic ecosystems. Related events on lakes and rivers are reported under both SDG 6 and SDG 14 report (see page 127 - 129, 134 and 258 - 260).

### Science Camp & Research Gallery: Polar and Marine Science Exploration Programme

Life Education Academy Malaysia (LEAM), the Institute of Ocean and Earth Sciences (IOES), the National Antarctic Research Centre (NARC), and Yayasan Penyelidikan Antartika Sultan Mizan (YPASM) hosted the Science Camp & Research Gallery: Polar and Marine Science Exploration Programme on 29 May 2024. This event aimed to immerse students in the wonders of world-class marine science research and to inspire a passion for STEAM fields (Science, Technology, Engineering, Arts, and Mathematics). The day was filled with enriching experiences for 40 secondary school students aged 13 to 19. Participants had the unique opportunity to attend marine science lectures delivered by scholars from Universiti Malaya, engage in interactive discussions, and gain insights into cutting-edge research.

The programme also featured a variety of engaging activities designed to spark curiosity and deepen understanding. These included a Polar & Marine Science Exploration podcast session led by IOES researchers Dr Poong Sze Wan and En Affendi Yang Amri, an exhibition of selected research findings in the fields of polar and marine science, a guided tour of the HICoE IOES research laboratories, and a visit to the Research Gallery. Throughout the day, students witnessed first-hand the intricacies of scientific investigation and the real-world application of theoretical knowledge. One of the programme's highlights was the marine research exhibition, which showcased the diversity of marine life and underscored the importance of marine conservation.

**Below:** Talk on polar and marine sciences by IOES researchers (left) and participants engaging with the exhibition (right)



## IOES Seminar Series on Marine Science and Conservation

The Institute of Ocean and Earth Sciences (IOES) organised and contributed to several talks and lectures in 2024, highlighting diverse aspects of marine science and conservation:

- 29 February 2024 – *AI and Systems Design for Marine Challenges* by Assoc. Prof. Dr. Sai-Kit Yeung (Hong Kong University of Science and Technology), focusing on the transformative role of artificial intelligence—particularly computer vision and graphics—in addressing complex and dynamic marine issues.
- 12 March 2024 – IOES Marine Biodiversity Seminar Series: *Challenges of APMBON (Asia-Pacific Marine Biodiversity Observation Network)* by Prof. Dr. Masahiro Nakaoka (Hokkaido University), discussing efforts to fill gaps in marine biodiversity data and promote better conservation and ecosystem management.
- 20 May 2024 – *The Role of Viruses in Marine Polar Environments and Their Response to Change* by Prof. Andrew McMinn (University of Tasmania), exploring the ecological significance of marine viruses in polar ecosystems and their responses to climate-driven environmental change.
- 27 May 2024 – Lecture on harmful algal blooms delivered by Assoc. Prof. Dr. PoTeen Lim, invited by the Ministry of Health (MOH) to share insights with ministry staff.
- 17 October 2024 – *Beautiful Jellyfish: Taxonomy and Husbandry* by Prof. Hiroshi Miyake (Kitasato University), covering techniques for identifying jellyfish species and approaches to maintaining and displaying them in aquaria and museums, with emphasis on their care in both research and public exhibition contexts.



**Right:** Photos from the Institute of Ocean and Earth Sciences (IOES) Seminar Series

## UniSA Students Explore Marine Science at BMRS

On 11 January 2024 and 17 November 2024, the Bachok Marine Research Station (BMRS) of the Institute of Ocean and Earth Sciences (IOES), Universiti Malaya (UM) had the privilege of hosting educational visits for 53 first-year Aquatic Science students from Universiti Sultan Zainal Abidin (UniSA). During both visits, the BMRS team organised a range of engaging and hands-on activities. These included insightful lectures—on 11 January, a session on harmful algal blooms by Dr Monaliza Mohd Din, and on 17 November, a lecture on harmful algae, toxins, and harmful algal bloom (HAB) research by Dr Hii Kieng Soon.

Students also participated in microscope-based sessions to examine microorganisms, observed demonstrations of various scientific sampling instruments, and enjoyed an introductory scuba diving experience. The visits provided an inspiring and enriching experience for all involved. They offered students a valuable opportunity to apply classroom learning in a real-world research setting, deepening their understanding of marine science while creating lasting memories and fostering a greater appreciation for aquatic ecosystems.



**Above:** UniSA students observing microorganisms and a demonstration on sampling equipment

**Below:** A lecture on harmful algal blooms and an introduction to scuba diving equipment



## XPLORESEAS

XPLORESEAS was a one-day Service-Learning Malaysia-University for Society (SULAM) initiative carried out by first-year students from the Southeast Asian Studies programme (AIX1005) on 25 May 2024, in collaboration with the Turtle Conservation and Information Centre (PKPP) in Rantau Abang, Terengganu. The project was designed to address the declining awareness and concern for marine life, particularly endangered sea turtles. Despite being a valuable part of Malaysia's biodiversity, sea turtles continue to face serious threats such as ocean pollution, illegal poaching, and the unregulated trade of their eggs.

XPLORESEAS aimed to reintroduce these marine creatures into public consciousness and inspire a renewed commitment to marine conservation through active community engagement and education. Held over a single day from 8:00 a.m. to 7:00 p.m., the programme included a talk on local turtle species, a community service effort to clean turtle ponds, mural painting at the conservation centre, and a symbolic release of baby turtles at Rantau Abang Beach. A total of 28 Universiti Malaya students participated in these meaningful activities. Through XPLORESEAS, students not only contributed to the preservation of a national treasure but also cultivated a deeper sense of environmental responsibility within themselves and the wider community.



**Above:** Group photo of UM students at Rantau Abang Beach and hatchlings of the green sea turtle (*Chelonia mydas*)



## Educational Talk on Sustainable Seas

The Educational Talk on Sustainable Seas: Investing in Malaysia's Coastal Ecosystems and Charismatic Fauna featured UM's Dr. Jillian Ooi, Mr. Affendi Yang Amri, and Dr. Nur Adilla Mohamad Fauzi as guest speakers. Organised by EXIM Bank on 23rd July 2024, the session brought together staff from the banking and finance sector to explore the links between ocean sustainability and financial practices.

**Right:** Mr. Affendi Yang Amri, a Research Officer from UM, as the guest speaker (top) and group photo with UM researchers and participants from EXIM Bank (bottom)



## Fishy February

On 23–24 February 2024, the Rimba Ilmu Botanic Garden, UM, organised "Fishy February", a series of talks featuring three young explorers in the aquatic field as they shared their journeys exploring freshwater and marine ecosystems. An exhibition on seagrass by Team Sea Habitats was also featured in Rimba Ilmu's exhibition hall. The first talk, "Fish & Fishermen: A Naive Perspective," explored the speaker's experience entering the scientific world and the lessons learnt from the Jakun fishermen on sustainable living. Next was "What Do 'Yu' Know About Sharks in Malaysia?", which highlighted local shark and ray diversity and their relationship with fisheries in Malaysia. The speaker shared insights from fieldwork and captivating footage from the field. Lastly, "Of Seagrass Meadows & Friends – An Analog Diary" showcased the beauty and importance of seagrass meadows through a conservation lens. The speaker focused on the ecological and cultural significance of seagrass, particularly in relation to coastal communities.



**Above:** Event poster for Fishy February, co-organised by Rimba Ilmu and The Habitat Foundation

## Workshop on Advancing Holistic Marine Ecosystem Restoration

Two speakers from UM, Dr. Jillian Ooi and Mr. Affendi Yang Amri, participated as international panelists in the Workshop on Advancing Holistic Marine Ecosystem Restoration, held at Universitas Hasanuddin, Makassar, Indonesia, on 21st December 2024. They provided insights into seagrass and coral reef restoration approaches in Malaysia and in particular, restoration techniques developed at Universiti Malaya. The workshop was organised by Universitas Hasanuddin in collaboration with the Pew Fellows Programme in Marine Conservation (USA).



**Right:** Event poster for the Workshop on Advancing Holistic Marine Ecosystem Restoration

## Guardians of the Blue: Protecting Biodiversity for the Ocean

From 24–26 June 2024, the Association of Pacific Rim Universities (APRU) convened its 28th Annual Presidents' Meeting in Auckland, New Zealand. The event, themed “Oceans – The World’s Challenges Divide Us, the Ocean Currents Connect Us,” brought together representatives from APRU’s 60 member institutions to discuss critical issues facing the world’s oceans.

Professor Dr Yatimah Alias, Deputy Vice-Chancellor (Academic & International) of Universiti Malaya, participated as a panellist in the session titled “Guardians of the Blue: Protecting Biodiversity for the Ocean.” She highlighted Universiti Malaya’s significant contributions to marine conservation, demonstrating the institution's strong commitment to safeguarding ocean biodiversity.



**Above:** APRU’s event titled “Oceans – The World’s Challenges Divide Us, the Ocean Currents Connect Us” featuring Professor Dr. Yatimah Alias as one of the panellists

## Maintaining Ecosystems and Biodiversity: Research, Industry, and Community Efforts

In 2024, Universiti Malaya (UM) engaged in direct research, partnerships, and community initiatives to help maintain ecosystems and their biodiversity, particularly in areas under environmental stress. A preliminary survey in Pahang, commissioned by the Department of Fisheries and the Regent of Pahang, documented extensive seagrass meadows and dugong feeding trails—providing the first scientific evidence of dugongs in the state. Research collaborations such as Risks and Solutions: Marine Plastics in Southeast Asia (RaSP-SEA), supported by UK Research & Innovation, combined scientific investigation with community engagement through initiatives like TrashBlitz@Pantai Jeram.

UM researchers also contributed to biodiversity assessments in mangrove ecosystems at Sungai Melayu, seahorse use studies with Save Our Seahorses Malaysia, and eDNA-based monitoring of fish in mud-volcano-impacted rivers. Freshwater studies addressed microbial dynamics, including *E. coli* persistence in urban lakes. Coral reef restoration and invasive species management were advanced through cross-sector collaborations, including the RHB Ocean Harmoni programme with industry partners and the Pleco Pupus Project, which involved community groups and local government. Socio-ecological research, such as studies on seagrass gleaning livelihoods, further highlighted the link between biodiversity and community well-being. Collectively, these initiatives demonstrate UM's role in producing scientific evidence, sharing expertise with industry and government, and engaging communities to support the stewardship of aquatic ecosystems.



## Scientific Report on Dugong Presence and Seagrass Distribution at Pulau Seri Buat-Sembilang, Pahang, for the Department of Fisheries, Pahang

UM research team, led by Dr. Jillian Ooi and Mr. Affendi Yang Amri, was commissioned by the Department of Fisheries Malaysia and the Regent of Pahang to conduct a preliminary survey on seagrass distribution and the presence of dugongs around Pulau Seribuat and Pulau Sembilang. Tourist access to these islands had previously been restricted following anecdotal reports of dugong sightings, and UM's expertise was sought to provide scientific confirmation. Dugongs (*Dugong dugon*), often called "sea cows," are gentle marine mammals that rely almost entirely on seagrass meadows for food. Classified as Vulnerable on the IUCN Red List, they are under threat globally due to habitat loss, boat strikes, entanglement in fishing gear, and declining seagrass ecosystems.

Through detailed field surveys, the UM team identified extensive subtidal seagrass meadows at both sites and documented clear dugong feeding trails, including signs of juvenile presence. This work, compiled as a formal report for the Department of Fisheries Pahang, represents the first scientific record of dugongs in Pahang waters and suggests possible herd migration between Johor and Pahang. The findings not only provide rare evidence of this elusive species in the region but also highlight the vital role of UM's marine research expertise in informing conservation strategies and strengthening protection measures for dugongs and their fragile seagrass habitats.

### FINAL REPORT

#### PRELIMINARY SURVEY OF SEAGRASS DISTRIBUTION AND DETECTION OF DUGONG PRESENCE AT PULAU SERI BUAT-SEMBILANG, PAHANG



Jillian Ooi Lean Sim  
Affendi Yang Amri  
Siti Nabila binti Mohd Sharif  
Muhaffiz bin Hamid  
Muhammad Aminul Siddiq bin Abd Rashid

Submitted to the Department of Fisheries, Pahang  
21<sup>st</sup> October 2024

Citation: Ooi, J. L. S., Affendi, Y. A., Siti Nabila, M. S., Muhaffiz, H., & Muhammad Aminul Siddiq, A. R. (2024). Preliminary survey of seagrass distribution and detection of dugong presence at Pulau Seri Buat-Sembilang, Pahang. Report prepared for the Department of Fisheries Pahang, Malaysia.

**Above:** Ooi, J. L. S., Affendi, Y. A., Siti Nabila, M. S., Muhaffiz, H., & Muhammad Amirul Siddiq, A. R. (2024). Preliminary survey of seagrass distribution and detection of dugong presence at Pulau Seri Buat-Sembilang, Pahang. Report prepared for the Department of Fisheries Pahang, Malaysia



## Risks and Solutions: Marine Plastics in Southeast Asia

In 2024, researchers from UM continued to collaborate with the University of Exeter on investigating and mitigating the impact of plastic pollution on marine ecosystems in Southeast Asia through the research project titled “Risks and Solutions: Marine Plastics in Southeast Asia” (RaSP-SEA), funded by UK Research & Innovation (UKRI). As part of the research activities, Universiti Malaya Sustainable Development Centre (UMSDC) together with the Department of Science and Technology Studies (STS) and Institute of Biological Sciences (ISB) - Faculty of Science successfully hosted the TrashBlitz@Pantai Jeram programme on 21 January 2024. The programme, which engaged over 30 postgraduate students and staff from the Universiti Malaya, aimed to investigate the impact of plastic pollution in the oceans surrounding Southeast Asia. This Citizen Science and Action Research approach called TrashBlitz@Pantai Jeram initiative demonstrated a collective commitment to environmental conservation with both theory and on-site practical application.

Participants actively contributed to beach cleanup and trash auditing activities, diligently identifying and cataloging various types of litter found along the shoreline of Pantai Jeram, Kuala Selangor. On 6 December 2024, another TrashBlitz@Pantai Jeram programme was held with a different group of STS students, along with staff and researchers from UM and the University of Exeter, who participated in the citizen science fieldwork.

The Centre for Research in Waste Management and the Institute of Biological Sciences, Faculty of Science, Universiti Malaya, organised a seminar on Risks and Solutions to Plastic Pollution (RASP-SEA), featuring collaborators from the University of Exeter. Prof. Dr. Brendan Godley delivered a talk titled "Plastics and Sea Turtles: A Forward Look with the Benefit of Hindsight", while Dr. Daniel Wilson presented on "Plastic in the Ocean: From North to South and Micro to Macro."



**Above:** UM students conducting a beach cleanup and trash audit as part of the TrashBlitz@Pantai Jeram programme

**Below:** Event poster for a seminar on plastic pollution featuring speakers from the University of Exeter



**SEMINAR**  
**RISKS AND SOLUTIONS**  
**TO PLASTIC POLLUTION**  
**(RASP-SEA)**

Venue  
**i-Cube, Faculty of Science, Universiti Malaya**

**2 December 2024**  
**2:00 - 4:30 PM**

**SPEAKERS**



**Prof. Dr. Brendan Godley**  
DIRECTOR, GRADUATE SCHOOL OF ENVIRONMENT AND SUSTAINABILITY, UNIVERSITY OF EXETER

**Plastics and sea turtles: a forward look with the benefit of hindsight**

**Biography**  
Brendan Godley is a Scottish conservation scientist with wide ranging interests in biodiversity conservation. He is the Marine Strategy Lead for the University of Exeter (UK). His research has largely focussed on the study of marine vertebrates (turtles, mammals, birds) and he has always been an early adopter of novel technology such as satellite tracking to understand animal movements. In the last few years, he has spent ever more efforts on interdisciplinary approaches to conservation research, including focussing on the impact of plastics in our oceans, methods to mitigate bycatch in fisheries, and the design of marine protected areas. This work is undertaken in a highly collaborative way with academic, government and non-governmental organisations and industrial partners in the UK and overseas. He takes these approaches into his educational work focussing particularly on fostering employability skills and opportunities for undergraduates and masters students to interact with a wide range of stakeholders whilst working on real world problems and solutions.



**Dr. Daniel Wilson**  
POSTDOCTORAL RESEARCH ASSOCIATE, UNIVERSITY OF EXETER

**Plastic in the ocean: from north to south and micro to macro**

**Biography**  
Daniel Wilson is a Physical Oceanographer with a particular interest in understanding how plastic pollution is transported around the global oceans. He is currently a Postdoctoral Research Associate at the University of Exeter. Here he works closely with Professor Brendan Godley and our partners in Southeast Asia on a pioneering project that uses GPS tagged plastic bottles to improve our understanding of the ocean transport of plastic bottles. Previously he completed a PhD at the University of Exeter, where his research developed a computer model to simulate the transport of microplastic pollution around the Southern Ocean and Antarctica. He has also spent time sampling microplastics on beaches in England and has run an at sea microplastic sampling campaign onboard a research ship.



Kindly scan the QR code to confirm the attendance

## Assessing Fish Biodiversity through a Mini Expedition at Sungai Melayu, Johor

Associate Professor Dr. Amy Then, a marine fisheries expert from Universiti Malaya, joined Kelab Belia Prihatin—a youth organization dedicated to environmental awareness and community development—in the Mangrove Forest Mini Expedition and Assessment at Kampung Sungai Melayu, Iskandar Puteri, from 6 to 10 May 2024. This expedition forms part of Kelab Belia Prihatin Malaysia's Mangrove Restoration & Conservation Initiative, which unites leading experts to evaluate and safeguard the rich biodiversity of Kampung Sungai Melayu's mangrove ecosystem.

The programme was led by Dr. Aldrie Amir (UKM LESTARI) and supported by a panel of distinguished experts: Dr. Alison Wee (University of Nottingham Malaysia), Dr. Amy Then (Universiti Malaya), Dr. Ng Wei Lun (Xiamen University), Dr. Nada Badruddin (FRIM), and Shahfiz Azman (FRIM). Their efforts focused on assessing the ecological health of mangroves and highlighting their vital role in climate resilience. Through scientific assessments, bio diversity documentation, and on-ground conservation activities, this initiative underscores the importance of protecting and restoring Malaysia's mangrove forests for future generations



**Left:** Mangrove forest mini expedition and assessment at Kampung Sungai Melayu, Iskandar Puteri. Video credit: Kelab Belia Prihatin

## Socio-Cultural Influences on Seahorse Use in Malaysia

Researchers from Universiti Malaya and Save Our Seahorses (SOS) Malaysia—Reana Ng, Associate Prof. Dr. Amy Then, and Dr. Adam Lim Chee Ooi—conducted a study published in *Oryx* (2024) titled “Cultural and Socio-Demographic Drivers Shape Seahorse Uses in Malaysia: Implications for Conservation.”

**Reference:** Ng, R.M.Y., Then, A.Y.H., Lim, A.C.O. (2024). Cultural and socio-demographic drivers shape seahorse uses in Malaysia – way forward for conservation. *Oryx*. doi: [10.1017/S0030605324000425](https://doi.org/10.1017/S0030605324000425)

The research explores how cultural practices and socio-demographic factors shape the use of seahorses in Malaysia, whether for traditional medicine, cultural rituals, or other purposes, and analyses the resulting conservation challenges. It also proposes strategies to harmonize cultural sensitivities with conservation goals, ensuring the sustainable protection of seahorse populations for the future.

## Exploring Fish Communities in the Mud Volcano Polluted River

Researchers at UM (Dewi et al., 2024) conducted the study “Exploring Fish Communities in the Mud Volcano Polluted River Using Environmental DNA Metabarcoding”, which applies eDNA technology to assess fish biodiversity in a river severely impacted by mud volcano pollution—a highly stressed and vulnerable aquatic ecosystem.

By identifying species presence in such degraded conditions, the research provides crucial insights into community structure and species resilience, supporting strategies for ecosystem recovery and conservation. It enables science-based decision-making and targeted interventions to maintain biodiversity in ecosystems under significant environmental pressure.

**Reference:** Dewi, F.R.P., Kim, H-W, Kim, A.R., Lee, S.R., Then, A.Y.H., Zamroni, M., Palimirmo, F.S., Wahyuni, H.T., Fu'adil Amin, M.H. (2024). *Exploring fish communities in the mud volcano polluted river using environmental DNA metabarcoding. Environmental Advances* 16. [doi:10.1016/j.envadv.2024.100534](https://doi.org/10.1016/j.envadv.2024.100534)

## Environmental Drivers of Vibrio Bacteria in Tropical Marine Waters

Wong et al. (2024) investigated the environmental factors regulating the abundance and community structure of *Vibrio* spp. in tropical marine waters around Peninsular Malaysia, covering estuarine, coastal, and offshore habitats. The study found that more than 85% of *Vibrio* spp. in nearshore waters were attached to suspended particles, with strong correlations to total suspended solids (TSS) and chlorophyll A concentration. Growth dynamics were influenced by dissolved organic carbon (DOC) and shaped by competition with other bacteria, while high-throughput sequencing revealed six dominant *Vibrio* taxa and their relative contributions to the bacterioplankton community.

By identifying the key roles of suspended solids and dissolved nutrients in shaping *Vibrio* populations, the research provides essential insights into microbial biodiversity and ecosystem functioning in tropical marine waters. Such understanding is critical for monitoring water quality, anticipating ecological shifts, and guiding conservation strategies.

**Reference:** Wong YY, Lee CW, Bong CW, Lim JH, Ng CC, Narayanan K, Sim EUH, Wang AJ (2024) *Environmental factors that regulate Vibrio spp. abundance and community structure in tropical waters. Anthropocene Coasts* 7: 21



## Understanding E. coli Persistence in Tropical Freshwater Systems

Liu et al. (2024) investigated the role of sediments as reservoirs of *Escherichia coli* in five urban lakes in Kuala Lumpur and Petaling Jaya, Selangor. Using a newly developed method, the study quantified habitat transition rates of *E. coli* from sediment to the water column and compared these to bacterial decay rates in water. Results showed that sediment contained significantly higher concentrations of *E. coli* than the water column, with transition rates ( $0.03\text{--}0.41\text{ h}^{-1}$ ) often exceeding decay rates ( $0.02\text{--}0.16\text{ h}^{-1}$ ). This indicates that sediment release can replenish *E. coli* populations in the water, contributing to their persistence in tropical freshwater ecosystems.

By providing the first quantitative evidence of *E. coli* habitat transition in tropical lakes, this study advances understanding of microbial dynamics in urban aquatic ecosystems. Such insights are essential for accurate water quality assessment, ecosystem health monitoring, and the management of biodiversity in freshwater habitats under pressure from urbanisation and pollution.

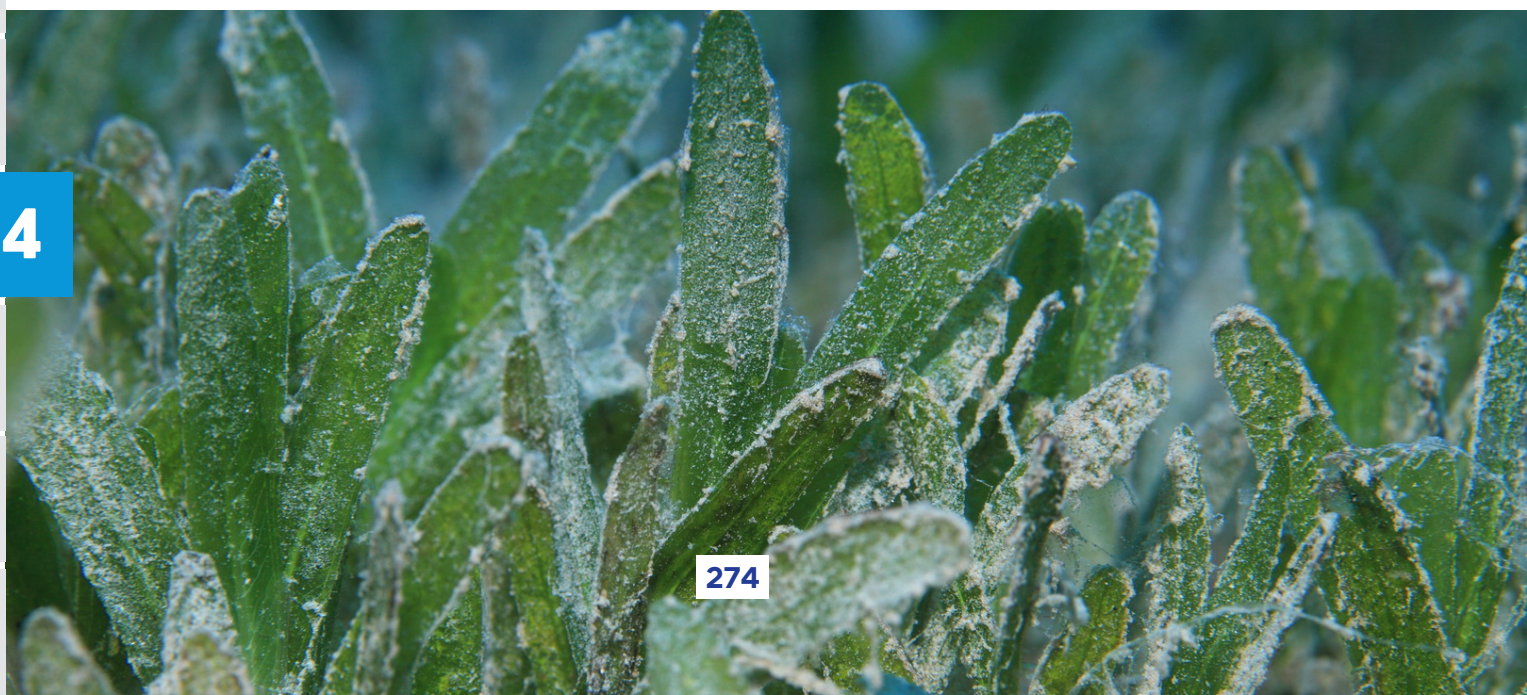
**Reference:** Liu B, Lee CW, Bong CW, Wang A-J (2024) *Investigating Escherichia coli habitat transition from sediments to water in tropical urban lakes*. *PeerJ* 12:e16556

## Seagrass Gleaning and Livelihoods in the Sungai Johor Estuary

David et al. (2024) explored the socio-ecological significance of seagrass-gleaning fisheries in Kampung Perigi Acheh, within the Sungai Johor estuary. Using ethnographic methods such as participatory mapping and focus group discussions, the study documented six main gleaning sites and the wide variety of marine resources harvested there. The research emphasised the central role of women in gleaning, not only in providing food and supplemental income but also in strengthening community cohesion, sustaining cultural identity, and supporting recreational practices.

By highlighting the intertwined ecological, social, and cultural values of seagrass ecosystems, the study shows how these habitats contribute to both biodiversity conservation and community well-being. It draws attention to informal coastal resource use that often goes unnoticed in official records but remains critical for livelihoods.

**Reference:** David, A. D., Fadzil, K. S., Amri, A. Y., & Ooi, J. L. S. (2024). *Gleaners, gleaning activities, and livelihoods in Peninsular Malaysia*. *JATI—Journal of Southeast Asian Studies*, 29(2), 99–142. <https://doi.org/10.22452/jati.vol29no2.5>



## UMMC Joins RHB Ocean Harmoni for Coral Reef Conservation

Universiti Malaya Medical Centre (UMMC) collaborated as a strategic partner with RHB Islamic Bank Berhad in the RHB Ocean Harmoni Programme: Crown of Thorns (COT) Balancing Dive. Held at the B&J PADI 5-Star CDC Dive Centre in Pulau Tioman, Pahang, from 11–13 October 2024, the programme also involved Diveheart Malaysia and the Department of Fisheries Malaysia. The programme was joined by YBr. Prof. Dr. Nazirah Binti Hasnan, Director of UMMC, along with a team of volunteer scuba divers from the Department of Rehabilitation Medicine, UMMC.

The initiative focused on underwater diving activities aimed at the conservation and restoration of coral reefs, specifically through the control of the Crown of Thorns starfish (COT) population in the waters of Pulau Tioman. This effort aims to stabilise the marine ecosystem in the area, aligning with Sustainable Development Goal (SDG) 14: Life Below Water. Two adaptive Diveheart divers, Nooraishah binti Arshad and Nur Nabilah binti Mohd Azahar, carried the mission of supporting the Persons with Disabilities (OKU) community through the promotion of Water Therapy.

**Right and below:** Participants of the RHB Ocean Harmoni Programme: Crown of Thorns (COT) Balancing Dive, together with UM, Dive Heart Malaysia, and the Department of Fisheries Malaysia



## Pleco Pupus 2024: Managing Alien Fish Species through Community Empowerment

The influx of alien fish species in Malaysian waters is a deeply concerning situation. The uncontrolled and widespread breeding of these non-native species has led to ecological damage, imbalance in aquatic biodiversity, and a decline in native fish populations. Alien fish species, being more resilient and aggressive than local species, have begun to dominate freshwater ecosystems across the country. One such species that currently dominates major waterways in the Klang Valley is *Hypostomus plecostomus*, more commonly known as the “Bandaraya” or Suckermouth catfish.

Universiti Malaya (UM), through UM Sustainable Development Centre (UMSDC), in collaboration with Universiti Selangor (UNISEL), Universiti Tun Hussein Onn Malaysia (UTHM), and the Komuniti Pemburu Ikan Bandaraya (KPIB), organised a fishing competition targeting this invasive species through the Pleco Pupus Project 2024: Nurturing Rivers, Empowering Communities. The competition was jointly sponsored by Menteri Besar Selangor Incorporated (MBI) and Landasan Lumayan Sdn. Bhd.

Held on 25 August 2024 along the Damansara River in Shah Alam, the event attracted 32 public participants. Remarkably, in just two hours, more than one tonne of ikan bandaraya was successfully removed from the river. However, this substantial amount is not a source of pride—it serves instead as a stark reminder that the alien fish invasion has reached a critical and alarming stage.

Following this, a community knowledge transfer programme led by UNISEL began in September 2024, focusing on the production of fish feed using ikan bandaraya. This initiative not only supports sustainable waste management by turning invasive biomass into a useful product, but also enhances community engagement in protecting and restoring freshwater ecosystems through practical, circular solutions.



**Above and below:** Participants capturing suckermouth catfish at the Damansara River



## Coral Reef Restoration at Pulau Rubiah

In May 2024, UM joined Universitas Syiah Kuala (USK), Universiti Sains Malaysia (USM), and Universiti Teknologi MARA (UiTM) in supporting a community-based coral transplantation initiative at Pulau Rubiah, Sabang, Aceh. This effort, organised in conjunction with National Coral Reef Day and Biodiversity Month, was led by USK's Master of Environmental Management (MPL) programme in collaboration with Serangkai Community Center and Yayasan Coral Oasis.

UM's participation was represented by Prof. Gs. Dr. Rosmadi Fauzi, a Geographic Information Systems (GIS) expert from the Faculty of Arts and Social Sciences, together with UM students. They took part directly in the transplantation activities and contributed to the academic exchange under USK's visiting lecture and summer school programme. The coral transplantation involved the deployment of three spider-web modules carrying 60 coral fragments, designed to restore reef habitats and support marine biodiversity in the Pulau Rubiah area.

By sharing GIS expertise, Prof. Rosmadi provided valuable insights into spatial mapping and monitoring approaches that can strengthen coral reef restoration efforts. Through this initiative, UM contributed both scientific knowledge and student involvement to enhance academic partnerships and community engagement in marine conservation.



**Above:** Participants with the three spider-web modules for coral transplantation. Photo credit: ANTARA News Aceh, 2024



## Technologies Towards Aquatic Ecosystem Damage Prevention

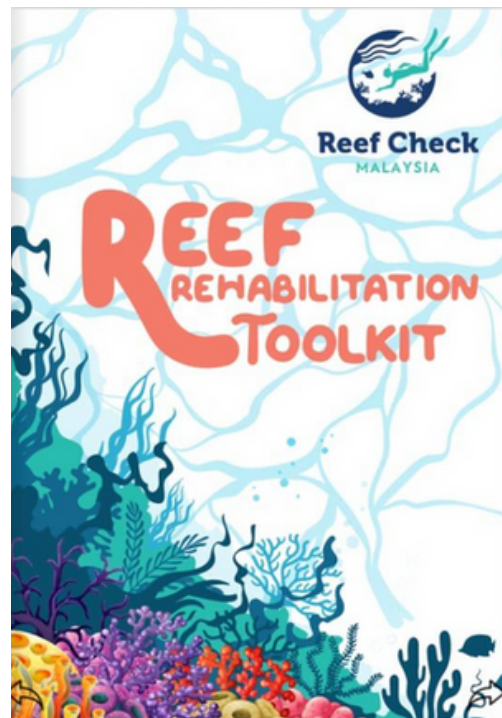
Universiti Malaya (UM) engages directly with industries and partners to advance technologies and practices that help minimise and prevent damage to aquatic ecosystems. These efforts range from advanced atmospheric monitoring at the Bachok Marine Research Station, which informs marine and coastal management, to molecular tools for early-warning of harmful algal blooms that safeguard aquaculture and fisheries.

Projects such as the National Community-based Coral Rehabilitation Toolkit, low-impact seaweed farming using deep seawater, coral damage-mitigation techniques, and novel disease management approaches in freshwater aquaculture reflect UM's applied research focus. By working alongside government agencies, NGOs, and marine operators, these initiatives not only contribute to ecosystem resilience but also strengthen the sustainability of industries that depend on healthy aquatic environments.

### National Community-based Coral Rehabilitation Toolkit

UM, through Affendi Yang Amri, supported Reef Check Malaysia and Coralku in developing the National Community-based Coral Rehabilitation Toolkit, a resource to strengthen local reef restoration and marine management. Drawing on UM's research in marine ecology and community engagement, the toolkit provides science-based guidance on site selection, rehabilitation, monitoring, and maintenance. Funded by the National Conservation Trust Fund under the Ministry of Natural Resources and Environmental Sustainability, the initiative shows UM's commitment to turning research into practical solutions for protecting aquatic ecosystems.

This collaboration bridges science and community action, enabling groups like the Redang Marine Conservation Group (RMCG) to carry out coral rescue and rehabilitation. The toolkit also promotes ecotourism-linked livelihoods, reinforcing conservation as a shared responsibility. By equipping communities and marine operators with reliable practices, UM supports both coral reef resilience and the sustainable future of Malaysia's marine industries.



**Above:** The Reef Rehabilitation Toolkit developed by Reef Check Malaysia with the support of a UM researcher

## Atmospheric Monitoring Technologies Supporting Aquatic Ecosystem Protection at Bachok Marine Research Station

At the Universiti Malaya Bachok Marine Research Station (BMRS), advanced atmospheric monitoring is conducted through the Global Atmospheric Watch (GAW) station and an Automatic Weather Station (AWS). These technologies provide continuous, high-quality measurements of meteorological and atmospheric parameters, including wind, rainfall, aerosols, greenhouse gases, and reactive gases. The resulting datasets are crucial for understanding climate-ocean interactions and assessing pressures on marine ecosystems. By supporting predictive modelling, improving assessments of acid deposition, and informing sustainable practices in marine and coastal management, the monitoring system contributes to broader efforts aimed at preventing damage to aquatic ecosystems.

In 2024, BMRS welcomed key collaborators whose visits reinforced the station's technological advancement and its role in environmental stewardship. From 20 to 22 November, the First Institute of Oceanography (FIO), Ministry of Natural Resources, China, conducted maintenance of the AWS and installed new sensors to enhance observation capacity. This visit also included IOES researcher Dr. Wee Cheah and his collaborator, Prof. Dr. Liew Chee Sun from the Faculty of Computer Science and Information Technology, Universiti Malaya, who worked on a data integration system unifying all GAW sensor outputs, including those from FIO's AWS, into a single platform. By consolidating atmospheric data streams, this system strengthens the ability to detect early signals of atmospheric and oceanic stressors that can harm marine ecosystems.

Earlier that year, on 22 April, the Malaysian Meteorological Department (MetMalaysia) visited the BMRS GAW facility, further aligning national efforts with international monitoring standards. Together, these initiatives demonstrate UM's commitment to applying atmospheric technologies and collaborative research towards minimising and preventing damage to aquatic ecosystems.

**Below:** Visits by the First Institute of Oceanography (FIO), Ministry of Natural Resources of China, and the Malaysian Meteorological Department to Universiti Malaya Bachok Marine Research Station (BMRS)



## Early-Warning for HAB Risk to Aquaculture & Fisheries

Harmful Algal Blooms (HABs) occur when certain algae multiply rapidly, producing toxins or causing environmental changes that can kill fish, contaminate shellfish, and damage marine ecosystems. In aquaculture and fisheries, HAB outbreaks can lead to mass stock mortality, economic losses, and public health risks. Because HABs often develop quickly and unpredictably, early-warning systems and monitoring technologies are essential to protect livelihoods and ecosystems.

In 2024, researchers at UM's Bachok Marine Research Station published a study in *Marine Environmental Research* that compared qPCR and metabarcoding approaches for eDNA detection of the toxic dinoflagellate *Alexandrium tamiyavanichii*.

This species is a well-known HAB former in tropical waters. Their research demonstrates that eDNA-based molecular tools can provide rapid and sensitive detection of harmful species before blooms become visible. Such molecular monitoring represents a deployable early-warning technology that directly supports aquaculture and fisheries by allowing operators to anticipate HAB risks, reduce stock losses, and prevent wider ecosystem harm. The study reflects UM's role in developing practical technologies that safeguard both marine ecosystems and the industries that depend on them.

**Reference:** Hii KS, Abdul Manaff AHN, Gu H, Lim PT, Leaw CP. A comparative analysis of real-time quantitative PCR and metabarcoding methods for eDNA-based detection of the toxic dinophyte *Alexandrium tamiyavanichii* (Dinophyceae). *Mar Environ Res.* 2024 Jul;199:106593. doi: [10.1016/j.marenvres.2024.106593](https://doi.org/10.1016/j.marenvres.2024.106593). Epub 2024 Jun 6. PMID: 38852495

## Lower-Impact Seaweed Aquaculture Practice Using Deep Seawater (DSW)

Seaweed aquaculture is one of the fastest-growing sectors in marine farming, but conventional near-shore cultivation often faces environmental challenges such as eutrophication, coastal pollution, and competition for space with fisheries and tourism. These pressures can lead to lower-quality biomass and increased ecological stress on coastal ecosystems.

In 2024, UM researchers from the Institute of Ocean and Earth Sciences (IOES), Nur Fatin Solehah Husin, Emeritus Prof. Dr. Phang Siew Moi, Dr. Yeong Hui-Yin and Fiona She-Lin Keng, together with collaborators, published a study in *Aquaculture International* entitled "Sustainable high-quality seaweed production from deep seawater." The research explored the use of deep seawater (DSW)—naturally rich in stable nutrients and free from surface-level contaminants—for cultivating seaweed.

The study demonstrated that DSW-supported cultivation produces higher-quality seaweed biomass while simultaneously reducing the reliance on nutrient-enriched near-shore waters, which are more vulnerable to pollution and overuse.

This approach provides a lower-impact alternative for the marine aquaculture industry, as it lessens nutrient loading in coastal waters, minimizes disease risks, and reduces conflicts with other near-shore activities. By shifting some cultivation offshore and tapping into DSW, the practice not only improves the sustainability of seaweed farming but also supports the long-term resilience of marine ecosystems.

**Reference:** Husin, N.S., Yeong, H.Y., Keng, F.S.L. et al. Sustainable high-quality seaweed production from deep seawater. *Aquacult Int* 32, 7319–7353 (2024). <https://doi.org/10.1007/s10499-024-01517-0>

## Coral Damage-Mitigation Technique for Restoration Programmes

In 2024, UM researchers Kok Lynn Chew (Institute of Biological Sciences, Faculty of Science) and Affendi Yang Amri (Institute of Ocean and Earth Sciences) co-authored a paper in *Regional Studies in Marine Science* titled “In situ lesion recovery of scleractinian branching coral wild colonies from asexual coral propagation.” The study details a practical restoration technique for accelerating the recovery of lesions in branching corals, which are highly susceptible to damage from storms, anchoring, and physical contact. By applying asexual propagation methods—attaching healthy coral fragments to injured colonies—the approach supports faster tissue regeneration and colony survival.

The methodology is field-deployable and designed to be taken up by NGOs, reef restoration practitioners, and reef-dependent tourism operators seeking to minimize damage and restore coral health after disturbances. By providing actionable know-how, this work helps safeguard reef ecosystems from long-term degradation, ensuring they continue to provide critical ecological and livelihood functions.

**Reference:** Kok Lynn Chew, Choon Weng Lee, Yang Amri Affendi, *In situ lesion recovery of Scleractinian branching coral wild colonies from asexual coral propagation*, *Regional Studies in Marine Science*, Volume 77, 2024, 103615, ISSN 2352-4855, <https://doi.org/10.1016/j.rsma.2024.103615>

## Disease Management in Freshwater Aquaculture

Dr. Tang Swee Seong, Senior Lecturer at the Institute of Biological Sciences and Associate Member of the Centre for Research in Biotechnology for Agriculture (CEBAR), Universiti Malaya, addresses the pressing challenges confronting the freshwater fish farming community, particularly in Temerloh, Pahang. His research focuses on understanding and mitigating the devastating impacts of disease outbreaks that have increasingly threatened the viability of aquaculture farms. Recent investigations have taken Dr. Tang and his team to the epicentre of these crises, where they have conducted site visits and engaged directly with local farmers to identify the root causes of recurring fish mortality events. These incidents, particularly those affecting key aquaculture species such as Patin (*Pangasius* spp.) and Tilapia (*Oreochromis* spp.), have resulted in significant economic losses and exposed the vulnerabilities within this vital sector.

One of the most promising avenues currently under exploration is the application of bacteriophage therapy as a treatment for bacterial infections in freshwater fish. Bacteriophages—viruses that specifically target and eliminate bacteria—represent a novel and sustainable approach to disease management in aquaculture. This method, commonly referred to as phage therapy, offers a targeted alternative to conventional antibiotic treatments, thereby reducing the environmental and ecological risks associated with antibiotic overuse. Dr. Tang’s work contributes meaningfully to the development of innovative, science-based solutions that aim to strengthen the resilience and sustainability of Malaysia’s aquaculture industry.

**Below:** Photos from Dr. Tang Swee Seong’s site visit to several aquaculture farms



## Monitoring the Health of Aquatic Ecosystems

Universiti Malaya (UM) conducts regular monitoring to track the ecological condition of its freshwater ecosystems, ensuring alignment with national standards and supporting conservation planning. Parameters such as dissolved oxygen, nutrient levels, suspended solids, and *E. coli* were measured against the Department of Environment's Water Quality Index Classification.

Beyond water chemistry, UM also carries out fish population surveys (see SDG 14 report, page 258), which provide biological indicators of ecosystem health. Together, these efforts provide essential data for identifying pollution risks and maintaining the health of campus lakes and rivers.

### Freshwater Ecosystem Monitoring at Universiti Malaya: Tasik Varsiti, Sungai Anak Air Batu, and Sungai Mustafa

In 2024, the UM Estates Department (JHB) engaged Eurofins NM Laboratory Sdn Bhd to carry out water quality analysis from July to December. The purpose was to assess and monitor the health of selected water bodies within the campus, ensuring that they meet environmental and safety standards. Three locations were identified for sampling — Tasik Varsiti, Sungai Anak Air Batu, and Sungai Mustafa — representing key freshwater ecosystems in Universiti Malaya.

The analysis covered a comprehensive range of parameters, including ammoniacal nitrogen, biochemical oxygen demand, chemical oxygen demand, dissolved oxygen, pH (power of hydrogen), total suspended solids and the presence of *Escherichia coli* (*E. coli*). These indicators provide vital insights into the ecological condition of the water bodies, highlighting potential sources of pollution and informing targeted conservation measures. The Department of Environment (DOE) Water Quality Index Classification was used as the benchmark to determine the overall water quality class, ensuring alignment with national environmental assessment standards.



**Right:** The three site locations for water quality monitoring in Universiti Malaya (top) and water samples collected from Tasik Varsiti for further analysis (bottom)