

Life Below Water

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



Universiti Malaya's Commitment to Life Below Water

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Universiti Malaya (UM) is deeply committed to the conservation of marine and freshwater ecosystems, aligning its efforts with Sustainable Development Goal 14 (SDG 14), "Life Below Water". In 2023, UM furthered its commitment through a series of targeted initiatives aimed at preserving aquatic biodiversity, reducing marine pollution, and promoting sustainable practices in fisheries and aquaculture. These efforts are part of UM's broader sustainability strategy, which is outlined in the UM Transformation Plan 2030 and the UM Master Plan 2050. This report will explore the various initiatives undertaken by UM in 2023, highlighting how these efforts align with global trends in marine conservation and contribute to achieving SDG 14 by 2030.

Collaborative River Stewardship Initiative

In August 2023, the UM Water Warriors teamed up with the Global Environment Centre to conduct free River Ranger 2.0 training, supported by Fujitsu Systems Global Solutions Management Sdn Bhd, at a stream near Tasik Varsiti. This training is part of a broader initiative to implement the "Sungai Pantai Monitoring Project" using citizen science methods, which commenced in July 2023 and is set to continue until May 2024. The project involves 33 participants, including Fujitsu employees, local community members, and UM students.

The initiative focuses on monitoring the entire stretch of Sungai Pantai, including Sungai Anak Air Batu, in Kuala Lumpur. Its goal is to enhance the health and sustainability of these water bodies through a range of activities, including water quality assessments, river health monitoring, and River Ranger 2.0 training. Additionally, the project will include river maintenance activities and knowledge-sharing sessions.

Local communities and Fujitsu staff will play a crucial role in the river health monitoring activities, acting as the eyes and ears for the river, especially in identifying and reporting any pollution incidents. This collaborative effort is designed to engage the community in proactive river stewardship and ensure the effective management and preservation of the river ecosystem. For more information, please visit: <u>River Ranger 2.0</u>



Right: Training for River Ranger 2.0 conducted by the Global Environment Centre at UM's Tasik Varsiti





Above: UM staff and student volunteers, along with Fujitsu staff volunteers, during the River Ranger 2.0 training

Fostering River Conservation Dialogue

The UM Water Warriors (WW) were invited as keynote speakers at the ESH Campaign's "Rivolution: The River Life Program". This event gathered a diverse audience, including representatives from Sime Darby Property City of Elmina (Property Developer), Mentari Design (Landscape Architects), KTA Tenaga Sdn. Bhd. (Civil and Structural Consultants), and Forest House Sdn. Bhd. (Landscape Designer). During the keynote address, WW delivered an insightful presentation on water quality and biodiversity, highlighting key issues and advancements in river conservation. The speech provided a comprehensive overview of the current challenges facing river ecosystems and emphasised the importance of maintaining high water quality to support diverse aquatic life. The event served as a valuable platform for fostering dialogue among stakeholders and advancing collective understanding of river conservation issues. By contributing their perspectives and sharing their knowledge, the UM Water Warriors played a crucial role in promoting awareness and inspiring action toward the preservation and enhancement of river ecosystems.



Above: "Rivolution: The River Life Program" talk by a member of UM Water Warriors

UM Student Highlights River and Freshwater Ecosystem Issues on It's About YOUth

The Kita Jaga Air Challenge, hosted by the UM Sustainable Development Centre (UMSDC) with Pengurusan Air Selangor Sdn. Bhd., was a 7-week competition. Participants completed weekly water conservation activities to raise awareness of sustainable water usage. The second-place winner of the Kita Jaga Air Challenge represented UM during an episode of Astro Awani's series It's About YOUth. The programme seeks to empower youth by involving them in discussions on current affairs and critical issues, offering them balanced perspectives to share on a national platform. In this episode, the student representative brought critical attention to aquatic ecosystem issues from a youth perspective. The discussion focused on the protection and preservation of river and freshwater ecosystems, emphasising the importance of governance and sustainable management practices. The student also highlighted the significant role that educational institutions play in fostering environmental stewardship and stressed the urgency of ensuring equitable access to clean water supplies, particularly in the face of growing environmental challenges.



Above: Astro Awani's promotional poster for the "It's About Youth" talk show, featuring a UM student in the session on protecting our waterways (Source: Astro Awani)
 Below: The speakers and host during the show's recording. Watch the <u>full video here.</u>



Community Outreach on Sustainable Fisheries and Aquaculture

UM's commitment to sustainable fisheries and aquaculture extends beyond academia to encompass a broad range of community outreach initiatives. These efforts are vital in fostering collaboration among academia, industry, and local communities to develop sustainable solutions. Emphasising a global trend toward community-based conservation, UM's outreach highlights the importance of involving local stakeholders in marine resource management. By partnering with international experts, UM further enhances these initiatives, bringing global expertise to address local challenges effectively.

Institute of Ocean and Earth Sciences (IOES) Blue Carbon Series

In 2023, the Institute of Ocean and Earth Sciences (IOES), Universiti Malaya (UM) led efforts to promote sustainable practices within the fishing and aquaculture industries. Through free seminars and workshops, IOES addressed pressing issues such as below:

In September 2023, Ms. Liyana Yamin from the Institute of Marine Affairs and Resource Management at National Taiwan Ocean University, Taiwan collaborated with IOES UM to deliver a free seminar titled "Climate Change Perceptions and Adaptation of Fishing Communities in Kuala Terengganu, Malaysia". Her presentation focused on how small-scale fisheries in Kuala Terengganu perceive and adapt to climate change, with an emphasis on the roles of policy, religion, and non-governmental organisation interventions in shaping their responses to environmental challenges. IOES UM organised a free public talk titled "The Power of Citizen Science: **Developing a Program for Seaweed** Aquaculture and Conservation", featuring Prof. Dr. Juliet Brodie from the Natural History Museum, UK. She delivered an insightful presentation on using citizen science to advance seaweed aquaculture and conservation. Held at the Auditorium, Complex of Advanced Studies, and streamed online via Zoom, the event attracted over 80 participants from domestic and international institutions. Prof. Dr. Brodie highlighted innovative ways to involve communities in seaweed aquaculture, emphasising citizen science's role in conservation and sustainable marine ecosystems. The interactive session fostered discussions on collaborative strategies and cutting-edge research.



Above (left): "Climate Change Perceptions and Adaptation of Fishing Communities in Kuala Terengganu, Malaysia" talk, in collaboration with National Taiwan Ocean University, as part of UM IOES's public seminar
 Above (right): "The Power of Citizen Science: Developing a Program for Seaweed Aquaculture and Conservation" talk, as part of UM IOES's public seminar

UrbanAqua@UM

<u>UrbanAqua@UM</u> is an initiative within Ladang Mini ISB, a research center spanning 2 acres located at Universiti Malaya. Managed by the Institute of Biological Sciences, Faculty of Science, the mini farm focuses on advancing knowledge in aquaculture and aquaponics for urban farming. The primary goal of UrbanAqua@UM is to educate and empower individuals to grow their own food - especially seafood - in urban environments. The initiative emphasises sustainability, health, nutrition, and year-round freshness.

The UrbanAqua physical workshop, titled "Unlock the Secrets to the Future of **Aquaculture**", covered a range of topics including "Fish Feed Making & Black Soldier Fly Culture Training", "Introduction to Aquaculture Systems & Design", and "Maintenance of Fish Health & Biosecurity in Aquaculture." The workshop featured presentations from researchers at the Faculty of Science, Universiti Malaya (UM), the Centre for Research in Biotechnology for Agriculture (CEBAR) at UM, and Hellas Technology Farm. Held on 22 August 2023, at the UM Estates Department lecture hall and Ladang Mini ISB, this event marked the first physical workshop following a series of webinars. Participants included UM students, staff, and farmers from various backgrounds. The workshop was led by postgraduate students specialising in agua nutrition, Black Soldier Fly (BSF) culture, biosafety, and biosecurity. Demonstrations included practical aspects of aqua nutrition, fish dissection, and environmental DNA (E-DNA) analysis, providing attendees with hands-on experience in these key areas of aquaculture.











Right (top to bottom): Snapshots from the UM UrbanAqua physical workshop titled "Unlock the Secrets to the Future of Aquaculture" Throughout the year, UrbanAqua hosted a series of online webinars to promote networking between industry professionals and Universiti Malaya, focusing on urban farming, aquaculture, and aquaponics. These webinars aimed to enhance education and skills for students, staff, and practitioners by bridging academia and industry, enriching knowledge in urban agriculture.

UrbanAqua's Free Webinar Series:

February 2023:

- Smart Aquafarming Business Modules for Malaysia
- Smart Aquaponics: Aqua Business Modules in Malaysia

March 2023:

- Importance of Live Feed Culture in Urban Farming
- Urban Aquaponics Farming for Food Sustainability in Malaysia

April 2023:

- The Future of Farming: Benefits of Controlled Environment Agriculture
- High-Density Smart Aquaculture

May 2023:

• Fish Nutrition for Beginners: Essentials of Sustainable Fish Farming

June 2023:

- Aquaculture Systems: A Basic Overview
- Citizen Science Approach Using eDNA to Address Biosafety in the Environment



Above: The collection of UrbanAqua's webinar series, as listed above (Source: UrbanAqua, Universiti Malaya)

Seruan Setu: Secret Gardens of the Sea

Seruan Setu takes audiences on a mesmerising musical journey, bringing Malaysia's endangered seagrass ecosystems into the spotlight through the powerful medium of the performing arts. At the core of this production is the creative vision of Dr. Jillian Ooi Lean Sim, a marine ecologist and senior lecturer from the Department of Geography at UM. Serving as both the Artistic and Music Director, Dr. Ooi skillfully integrates her expertise in marine ecology with her passion for the arts. In 2022, she was awarded the prestigious Pew Marine Fellowship for her pioneering work in seagrass restoration and advocacy for seagrass conservation in Malaysia. Her innovative approach led to the creation of Seruan Setu in 2023 - a groundbreaking gamelan concert that fuses science and performance to raise awareness about the importance of these vital, yet often overlooked, ecosystems.

Seagrasses play a crucial role in supporting marine biodiversity and sustaining coastal communities, yet their alarming decline remains largely unnoticed. Seruan Setu, produced in collaboration with Rhythm in Bronze, continues their tradition of blending environmental advocacy with artistic expression. The concert features original gamelan compositions, interwoven with moving stories about seagrasses and the communities they nourish. Adding to the depth of the production, the Seruan Setu team hosted a public roundtable following the performance, featuring panel discussions that highlighted the challenges facing seagrass ecosystems and explored the innovative intersection of performing arts and marine conservation.



Diving deep into the magical world of Seruan Setu - The Secret Gardens of the Sea 🕻 🕼

Above: Watch the full video of Seruan Setu here: <u>https://www.youtube.com/watch?v=o-DeW1XZZjU</u>

Below: During the Seruan Setu gamelan concert in 2023



Seruan Setu's Symposium: Harmonising Marine Conservation and Performing Arts – Revealing the Charisma of Seagrass

In addition to the concert, the Seruan Setu team organised a symposium titled "Harmonising Marine Conservation and Performing Arts - Revealing the Charisma of Seagrass" in August 2023 at IPPP, UM. The symposium aimed to unite diverse stakeholders to share key insights and lessons from the concert, exploring how conservation narratives can be effectively conveyed through music and theatre. Participants were invited to delve into the role of the performing arts in environmental protection, engage in discussions on leveraging artistic expression for science communication, and use seagrass - an underappreciated and often overlooked ecosystem - as a model for this innovative approach. The event also aimed to inspire future arts-science collaborations by providing attendees with practical ideas for integrating these fields in their own work.

This initiative sought to foster stronger collaboration between performing artists and scientists in the realm of environmental conservation. Participants had the opportunity to learn from renowned figures such as Dato' Zahim Albakri (actor, stage and film director), Datin Marion D'Cruz (dancer, choreographer, arts educator), Khairi Anwar (film director and producer), and Mark Teh (performance maker, researcher, playwright, and curator). On the scientific side, speakers included Dr. Neo Mei Lin (marine biologist, National University of Singapore), Dr. Serina Rahman (environmental anthropologist, Kelab Alami), and Professor Dr. Sithi Muniandy (physicist, Universiti Malaya), among others. This diverse lineup created a dynamic platform for dialogue and partnership, enriching marine conservation efforts through the creative power of the performing arts.



Seruan Setu: Seagrass Conservation Through the Performing Arts

Above: Watch the full video of the Seruan Setu symposium: <u>https://www.youtube.com/watch?v=R4IN5JYuyk0</u>

Seruan Setu at the Malaysian Pavilion during the COP28 UN Climate Change Conference

The Seruan Setu team also took part in the COP28 UN Climate Change Conference in Dubai. At the Malaysian Pavilion, they delivered a presentation titled

"Harmonising and Integrating Science with the Performing Arts for Conservation: A Presentation on Seruan Setu Gamelan Music Theatre". This session highlighted the innovative use of the ArtScience approach to convey environmental messages, including climate action, through the fusion of scientific research and performing arts.



Above: "Harmonising and Integrating Science with the Performing Arts for Conservation: A Presentation on Seruan Setu Gamelan Music Theatre" at COP28 (Source: Malaysia Pavilion, COP28)

Responsible Fishing Practices Highlighted During UM Varsity Lake Free Fishing Activity

During a free fishing activity at UM Tasik Varsiti (Varsity Lake), participating hobbyist fishermen were provided with a detailed briefing on sustainable fishing practices. They were advised to avoid destructive techniques, such as using nets, and were encouraged to fish exclusively with rods to minimise harm to the lake's ecosystem. The briefing also emphasised the importance of the "catch and release" method to help maintain fish populations, alongside guidelines permitting fishing only during designated periods to prevent overfishing. These measures are part of a broader effort to ensure the long-term sustainability of the lake's aquatic environment while allowing the community to enjoy recreational fishing responsibly.



Above: Fishing activity announcement at Tasik Varsiti, UM, highlighting sustainable fishing practices (Source: UM Estates Department) Below: Tasik Varsiti at UM



Water and Biodiversity at COP28

Dr. Jillian Ooi, a marine ecologist and senior lecturer at UM, represented Malaysia at the COP28 UN Climate Change Conference in Dubai, speaking on the country's marine biodiversity and the importance of multistakeholder action. Her presentation, held during the "Water and Biodiversity Day" at the Malaysian Pavilion, was titled "Protecting Our Nature and Biodiversity Treasures: Multi-Stakeholder Actions to Halt Biodiversity Loss". The session brought together key stakeholders, including representatives from Yayasan Hasanah, the Sabah Forestry Department, and the Tropical Forest Alliance, to discuss collaborative strategies for safeguarding biodiversity and addressing the urgent need to protect Malaysia's natural ecosystems.



Above: Talk on "Protecting Our Nature and Biodiversity Treasures: Multi-Stakeholder Actions to Halt Biodiversity Loss" during COP28 (Source: Malaysia Pavilion, COP28)

Addressing Harmful Algal Blooms: From Research to Action

On August 16, 2023, a symposium was held at the Bachok Marine Research Station, Institute of Ocean and Earth Sciences (IOES) at Universiti Malaya, Kelantan. This significant event united experts from the Institute of Oceanology, Chinese Academy of Sciences (IOCAS) in China, and IOES, UM to address the pressing environmental issue of Harmful Algal Blooms (HABs). The symposium provided a platform for distinguished representatives from both institutions to present their latest research findings and showcase pioneering technological advancements in the field. The event also saw participation from members of the Department of Fisheries and academics from universities such as UIA, UMT, and UNIMAS, enriching the discourse and expanding collaborative opportunities to combat this critical environmental challenge.

IOES shared comprehensive insights into the current state of HABs research in Malaysia. Their presentations focused on the detection and dynamics of HABs, underscoring the vital role of early detection technologies in mitigating the detrimental impacts on marine farming and broader ecological systems. In parallel, representatives from IOCAS provided an indepth overview of HABs research in China, including the introduction of the "HAB Extinguisher". This innovative technology is designed to control and mitigate the effects of HABs, aiming to reduce their ecological footprint significantly.

The symposium was a pivotal forum for knowledge exchange, bringing together experts from IOCAS, IOES, and institutions like the Department of Fisheries, UMT, UIA, and UNIMAS. This collaboration facilitated the sharing of cutting-edge research and strategies for addressing HABs while fostering networking opportunities and partnerships. The event highlighted the importance of public awareness and education on HABs and emphasised the need for sustainable practices to manage these environmental issues effectively.

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In addition to the physical event, the research team, in collaboration with The American Chemical Society UM International Student Chapter (ACSUM), organised a webinar titled **"Unveiling the Hidden Dangers of Algae: Harmful Algal Blooms, Toxins, and Food Safety Security**". The webinar explored algae from a chemistry perspective, focusing on the risks associated with harmful algal blooms and their implications for food safety and security.







Top, middle: UM IOES's physical event on Harmful Algal Blooms (HABs) at UM's Bachok Marine Research Station **Bottom:** An IOES researcher delivered a talk titled "Unveiling the Hidden Dangers of Algae: Harmful Algal Blooms, Toxins, and Food Safety Security" (Source: ACS UM Student Chapter)

IOES Free Webinars on Ocean Conservation

The Institute of Ocean and Earth Sciences (IOES) has organised a series of insightful webinars focused on ocean conservation and the sustainable use of marine resources:

- June 2023: A webinar titled "Blue Carbon Restoration: Opportunities and Barriers" was held in collaboration with Deakin University, Australia. The session explored the concept of "blue carbon", emphasising the potential of coastal vegetated ecosystems, such as mangroves and seagrasses, to sequester carbon and mitigate climate change.
- July 2023: In partnership with the Faculty of Law, UM, and Lancaster University, United Kingdom, IOES co-hosted a seminar titled "The Plastic Treaty and Ocean Governance: Opportunities and Challenges", discussing the emerging global efforts to regulate plastic pollution and its impact on ocean governance.
- July 2023: IOES, in collaboration with the Forest Research Institute Malaysia (FRIM) and Japan International Research Center for Agricultural Sciences (JIRCAS), organised a webinar titled "Mangrove Ecosystem Management Under Climate Change", addressing strategies and challenges in safeguarding mangroves in the face of climate change.
- September 2023: A speaker from the Leibniz Center for Tropical Marine Research, University of Bremen, presented a talk titled "Blue Carbon Dynamics in Coastal Vegetated Ecosystems: Naturebased Solutions for Climate Change Mitigation," focusing on the role of coastal ecosystems in combating climate change through nature-based solutions.

These webinars reflect IOES's commitment to advancing knowledge on marine sustainability and promoting interdisciplinary collaboration to address critical ocean-related challenges.



Above: Posters for UM IOES's Blue Carbon Series webinars on ocean conservation (Source: IOES)

IOES Highlights Marine Research and Innovation at RMIC Exhibition

The Institute of Ocean and Farth Sciences (IOES) took part in an exhibition at the Research Management & Innovation Complex (RMIC) at Universiti Malaya (UM), aimed at showcasing scientific research to the public and promoting research collaboration. The IOES exhibit featured a diverse range of materials, including jellyfish and fish specimens, dugong bones, bioplastic samples, and seaweed-based products. Additionally, posters highlighted the activities and outcomes of the Higher Institution Centre of Excellence (HICoE) research, as well as the work of each research unit within IOES. The exhibition served as a platform to engage visitors in marine science and encourage partnerships between researchers and the broader community.

Right: UM IOES participated in an exhibition during the UM Research Carnival 2023 to highlight marine research





COASTAR: Coastal Ocean Actionable & Sustainable Teaching and Research

Focusing on coastal sustainability and blue carbon research, the Coastal Ocean Actionable & Sustainable Teaching and Research (COASTAR) program - a collaboration between Universiti Malaya and Edinburgh Napier University - makes a significant impact by equipping early-career researchers and aspiring university student leaders with interdisciplinary communication and leadership skills. Through a series of virtual and in-person workshops, working meetings, and a mini symposium, participants engage in hands-on learning while building organic mentoring relationships. COASTAR fellows also gain practical experience in creating science communication videos, learning how to effectively present their research through visual media. To watch the 9 featured videos, click here: Video Assignments.

From 2022 to 2023, the COASTAR Expert Seminar Series (both virtual and in-person) promoted knowledge sharing of best practices in research and teaching, with a focus on coastal sustainability and blue carbon research.

One notable 2023 seminar, led by the Sea and Society Research Group at Plymouth Marine Laboratory, explored "Blue Carbon: Benefits, Feasibility, and Financing for Climate Change Mitigation". As global interest in blue carbon credits and schemes grows - driven by efforts to achieve netzero targets, meet Nationally Determined Contributions, and restore habitats for biodiversity - there remains an urgent need for research to clarify the value and cobenefits of blue carbon. This includes understanding the feasibility of blue carbon development and sustainable financing across various contexts. By enhancing the understanding of blue carbon's multiple values and accounting for different beneficiaries, investors, and potential finance mechanisms, researchers aim to strengthen its role in climate change mitigation and broader global goals.



Above: Knowledge-sharing webinar held under the Coastal Ocean Actionable & Sustainable Teaching and Research (COASTAR) program in 2023 (Source: COASTAR)

Community Action for Coastal Preservation

On 14 May 2023, Universiti Malaya (UM) students from the 12th Residential College, organised by the Royal Cares and Royal Wekasih clubs, undertook a beach cleanup initiative at Sepang Gold Coast (Pantai Bagan Lalang). Over 50 dedicated UM volunteers gathered to contribute to this important environmental effort, focusing on removing litter and debris from the beach. The cleanup aimed not only to restore the beach's natural beauty but also to raise awareness about the importance of conserving coastal and marine environments. The event was part of a broader commitment to promoting sustainable practices and protecting oceanic ecosystems. By organising and participating in such activities, the students demonstrated their dedication to environmental stewardship and their role in fostering community engagement in conservation efforts. The successful completion of this cleanup reflects the collective effort to maintain the ecological health of our beaches and to encourage responsible interaction with our natural surroundings.



Above: Volunteers from UM's 12th Residential College participated in a beach cleanup event

Fostering Sustainable Aquatic Sourcing: UM's Commitment to Ethical Food Procurement

Ensuring that campus food from aquatic ecosystems is sustainably harvested aligns with the UM Sustainability Policy 2021-2030 (page 19). Under the "Environment" pillar, specifically in the "Green Procurement" section, the policy encourages the purchase of supplies, services, and works that follow ethical standards, prioritise recycled content, and are produced sustainably. Moreover, the **UM Green Events Guideline** reinforces these principles in the "Refreshment and Dining" section (Page 9). It specifically requires caterers to design menus that are healthy and sustainable by excluding products like shark fin or endangered species. Additionally, the guideline encourages the engagement of local food vendors who are recognised for their commitment to sustainability. Together, these policies create a comprehensive framework to ensure that food coming from aquatic ecosystems is sourced in a manner that supports the long-term health of marine environments, while promoting ethical and responsible consumption on campus.



Above: An excerpt from the UM Sustainability Policy 2021–2030, highlighting the university's commitment to green procurement (Source: UM Sustainable Development Centre)



Project PULIH: Advancing Coral Reef Restoration

Coral reef rehabilitation research at Universiti Malaya (UM) is spearheaded by Project PULIH, an innovative research team dedicated to restoring coral reefs from physical damage through a comprehensive interdisciplinary approach. By integrating expertise from fields such as ecology, geography, physiology, and molecular biology, Project PULIH seeks to develop localised strategies for the recovery and revitalisation of Malaysia's marine ecosystems. The term "PULIH", meaning "to heal" or "to restore" in Malay, aptly reflects the project's mission to rejuvenate and sustain coral reefs.

Project PULIH employs innovative techniques such as artificial structures and coral transplantation to rehabilitate essential marine ecosystems. In 2023, the project made significant strides, thanks to the invaluable support of various collaborators:

- **RHB Islamic Bank:** Provided crucial financial backing and supported sustainability programs. Their contribution was instrumental in funding the project's activities and ensuring its long-term viability.
- Rawa Island Resort: Played a key role by offering logistical support and resources. Their partnership facilitated on-site operations, including access to necessary facilities and coordination for fieldwork activities.
- Orca Nation Dive Centre: Contributed expertise and manpower for the underwater aspects of the project. Their professional divers and marine biologists assisted with coral collection, nursery maintenance, and overall fieldwork operations.
- **Department of Fisheries:** Provided essential permits and regulatory support. Their collaboration ensured that all activities were conducted in compliance with national marine conservation regulations and standards.







Top: Project PULIH at RHB KL's exhibition Middle: Project PULIH during the 5th Asia-Pacific Coral Reef Symposium Bottom: Researchers establishing "Christmas tree" coral rehabilitation nurseries at Pulau Rawa, Johor



Above: A Project PULIH researcher collecting healthy coral fragments for transplanting into "Christmas tree" coral rehabilitation nurseries

This collaboration enabled several key activities:

- Outreach and Education: In August 2023, Project PULIH hosted an informative booth at the RHB KL Centre. Team members presented the project's objectives and achievements, significantly enhancing public awareness and engagement.
- Research Dissemination: Project PULIH also shared their findings and advancements at the 5th Asia Pacific Coral Reef Symposium. This platform enabled the team to present their research and discoveries to a wider audience, fostering greater collaboration and knowledge exchange within the coral conservation community.
- Fieldwork and Coral Nursery Enhancement: In May 2023, the team traveled to Pulau Rawa, Johor, to establish "Christmas tree" coral rehabilitation nurseries. Coral fragments from healthy colonies were selected and transplanted into these nurseries. Unlike the typical practice of using a single species, this project included several species to promote biodiversity. The juvenile corals will be monitored over the next few years before being transplanted to damaged reef areas. The nurseries' design allows them to be relocated to cooler areas if needed, protecting the corals from heat stress during high sea temperatures.

Through these activities, Project PULIH continues to make substantial strides in coral reef rehabilitation, demonstrating the effectiveness of interdisciplinary approaches and industry partnerships in addressing environmental challenges.

Community-based Seagrass Monitoring Work with Reef Check Malaysia

Seagrass is vital to coastal ecosystems, providing habitats for marine life and serving as a nursery for commercially important species like snapper, grouper, and shrimp, supporting local fisheries. It also reduces coastal erosion by trapping sediments and buffering waves. However, communities along Sungai Johor are concerned about the rapid loss of seagrass due to pollution. A major issue is the lack of detailed information on seagrass ecosystems in Malaysia, including the absence of a nationwide map documenting its distribution.

In response, Dr. Jillian Ooi (Department of Geography) and Affendi Yang Amri (Institute of Ocean and Earth Sciences) from UM, in collaboration with Reef Check Malaysia, are training volunteers from DIALOG Group Berhad, the MyKasih Foundation, and the local community in seagrass monitoring and conservation at Tanjung Langsat, Johor. DIALOG Group Berhad, a technical service provider for the oil, gas, and petrochemical industries, operates an industrial complex at Tanjung Langsat and a deep-water port at Pengerang, both near Sungai Johor. Concerns about the seagrass ecosystem's degradation due to large-scale coastal development prompted DIALOG to approach Dr. Ooi to create a communitybased citizen science program, leading to the Dialog Seagrass-Watch Program.

The program's goal is to create a network of volunteer citizen scientists from DIALOG staff and local villagers who will use the Seagrass-Watch Monitoring Protocol—a globally recognized, scientifically rigorous methodology—to collect long-term data on the health of the Tanjung Kopok seagrass meadow. Over the next five years, volunteers trained by UM researchers will conduct monthly sampling of the seagrass meadow. The collected data will form the basis of an environmental conservation plan for the Sungai Johor estuary.

The program is expanding to include community members, including students from nearby schools supported by DIALOG, engaging them in the study and protection of seagrass ecosystems. Now in its second year (2023), the project empowers citizen scientists to learn about seagrass meadows and their importance to marine life. By monitoring these ecosystems, volunteers are directly contributing to the conservation efforts that benefit their own communities. Dr. Ooi and Affendi will also collaborate with local communities to integrate traditional ecological knowledge into the project, helping to strengthen local capacity for natural resource management and conservation.





Top and bottom: Researchers from UM and Reef Check Malaysia, along with volunteers from DIALOG staff and local villagers, monitored seagrass areas to collect data on their health

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Saving the Pink Dolphins in Kuala Sepetang

The research, titled the Marine Endangered Species (MES) study, is a collaboration between Universiti Malaya (UM) and Universiti Malaysia Terengganu (UMT) that focuses on marine mammals. Due to a growing tourism industry, there was a noticeable decline in dolphin sightings, raising concerns about the population. The aim of the study was to investigate two primary dolphin species: the Indo-Pacific Humpback, commonly known as the pink dolphin, and the Irrawaddy dolphin. The UMT team conducted transect surveys, while the UM researchers focused on molecular genetics, collecting skin biopsy samples for DNA analysis without harming the dolphins. Additionally, the UM team utilised environmental DNA (eDNA) techniques, filtering water samples to extract and analyse the DNA of various marine organisms present in the environment. This research was conducted from 2021 to 2024.

The study covered approximately 40 kilometers with 22 sample locations. Using eDNA, the researchers aimed to identify the species in the area through DNA sequencing, which served as an alternative to traditional monitoring methods. In areas like the Bay of Brunei and Kuala Sepetang, the study revealed low genetic variation in the dolphin population, a potentially concerning sign. This reduced variation could pose a threat to the dolphins' survival, as a diverse gene pool was essential for resilience against diseases. Moreover, most of the samples collected were from females, raising concerns about a possible gender imbalance. If males were either not present or more cautious, this could have had significant implications for the population's health, underscoring the need for swift conservation efforts.



Above: Watch the full video on UM's efforts to save the pink dolphins: <u>https://www.youtube.com/watch?</u> <u>v=JcHMdc94104</u> Below (left): UM researchers utilised environmental DNA (eDNA) techniques Below (right): The Indo-Pacific Humpback, or pink dolphin, can be found at Kuala Sepetang



Seahorses Under Threat: Exploring Trade, Tradition, and Ecosystem Conservation in Malaysia

Associate Prof. Dr. Amy Then Yee Hui from the Institute of Biological Sciences, UM, and her student, Reana May Yen Ng, conducted research titled **"Seahorses: Traditional Medicine, Cultural Values, and Trade in Malaysia**" from 2021 to 2023. The study was funded by a small grant from the Rufford Foundation.

This research is of critical importance as it seeks to fill gaps in the understanding of the diversity and volume of seahorses traded for traditional medicine, a trade that poses a serious threat to seahorse populations. By documenting the trade's scale and cultural perceptions surrounding seahorses in Malaysia, the study helps shine a light on how these vulnerable species are being impacted by human activity. Seahorses, being important members of marine ecosystems, play a crucial role in maintaining ecological balance. Their decline could have ripple effects, threatening the health of coral reefs, seagrass beds, and other ecosystems where they act as both predator and prey.

With ecosystems like coral reefs already under threat due to overfishing, pollution, and climate change, understanding and managing the factors that impact seahorse populations is essential for conserving marine biodiversity. Protecting these species not only helps sustain the existing ecosystems but also contributes to the resilience of habitats that support other marine life. Seahorses are also often indicators of ecosystem health, making their study critical for broader conservation efforts.

At the 3rd Biodiversity Research Presentation Series, held on June 16, 2023, Ms. Reana May Yen Ng presented her findings in a talk titled "Seahorses: Traditional Medicine, Cultural Values, and Trade in Sabah". Her presentation highlighted the urgent need for sustainable management practices and raised awareness of how unchecked trade could exacerbate the threats to Malaysia's already fragile marine ecosystems.



Top: UM postgraduate researcher Reana May Yen Ng found seahorses being traded as traditional medicine at a local shop

Right: A talk titled "Seahorses: Traditional Medicine, Cultural Values, and Trade in Sabah" was given by a UM researcher (Source: Sabah Biodiversity Centre)

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SABAH BIODIVERSITY CENTRE PRESENTS BIODIVERSITY RESEARCH PRESENTATION SERIES 2023

Seahorses: traditional medicine, cultural values and trade in Sabah Gataktien Reana May Yen Ng.Universiti Malaya

Scale coll Arotation Muhammad Ali bin Syed Hussein, BMRI-UMS Seahorses (*Hippocampus* spp.) are well known for their importance ecologically, medicinally, economically, and culturally among many communities. Athough seahorses are heavily traded for traditional medicine (1M), as curios, and aquarium fishes in Southeast Asia, there has been a lack of information on the current evtent of seahorse fisheries, trade and cultural use in Malaysia. Besides Peninsular Malaysia, seahorses in Sabah are commonity exported to Hong Kong and imported from other courties such as the Philippines through illicit and rarely discussed trade routes. Seahorses are also apenly sold and highly valued in Sabah. Targesola traviers, the main source of seahorse by cottach also aperate in the state. There have been also informal reports of targeted seahorses arongo certain coastal indigenous communities in Sabah. Therefore, this project aimed to address the gaps in local knowledge of seahorse trade diversity and volume in the TM trade and to document the cultural beliefs and perceptions towards seahorses among Malaysians in Sabah.

PLEASE REGISTER

 16 JUNE 2023 (FRIDAY)

 10:00 am - 11:00 am | ONLINE

 To register please email

 sabc.researchpresentation@gmail.com or WhatsApp

 088 369 081

Contact us

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Enhancing Seaweed Quality and Sustainability

Prof. Dr. Lim Phaik Eem from the Institute of Ocean and Earth Sciences (IOES) at UM has secured a grant for the project titled "A **Global Taxonomic Framework for the** Carrageenan Industry" (GATEWAY). Funded by the Safe Seaweed Coalition, this project aims to advance research capabilities at IOES and is a collaborative effort with esteemed experts from France and the UK: Prof. Dr. Claire Gachon of the National Museum of Natural History in Paris and Prof. Juliet Brodie of the Natural History Museum in London. The GATEWAY project addresses the challenge of accurately identifying the diverse types of seaweed used in the carrageenan industry.

Seaweeds are critical components of marine ecosystems, providing habitat for a wide range of species, offering essential ecosystem services, and acting as major carbon sinks that help mitigate climate change. Carrageenans, extracted from red seaweed primarily cultivated in Southeast Asia, are valuable but face issues with precise identification, complicating efforts to cultivate high-quality seaweed and develop new strains. The GATEWAY project aims to establish a comprehensive taxonomic framework to improve seaweed classification and identification. As part of this effort, the team published a pictorial guide to eucheumatoid seaweed cultivar development from wild populations in 2023.

The seaweed industry faces significant challenges, including increasing pests and diseases due to climate change, loss of genetic diversity, and biosecurity concerns. There is an urgent need for temperatureresilient cultivars derived from indigenous wild seaweed stocks to enhance the climate resilience of cultivated seaweed. In collaboration with indigenous seaweed farming communities in Malaysia, the project will collect wild seaweed populations for potential domestication at a research farm. Additionally, some of these wild seaweeds will be studied in the laboratory to identify temperature-resilient strains that could be developed into new farm cultivars.



Above: The cover page for "A Pictorial Guide to Eucheumatoid Seaweed Cultivar Development from Wild Populations," published in March 2023 and co-developed by UM researchers. (Source: IOES). The pictorial quide can be downloaded here: https://ioes.um.edu.my/Publication/Book/Pictorial%20Guide%20Book%20__ %2021%20March%202023.pdf Below: Seaweed aquaculture in Malaysia





Plastic Pollution in Southeast Asia: Impact and Solutions for Preserving Marine Ecosystems

In 2023, a project focused on investigating and mitigating the impact of plastic pollution on marine ecosystems in Southeast Asia was initiated. Participants actively engaged in beach cleanups and trash audits, playing a crucial role in identifying and cataloging various types of litter along the shoreline. This effort is a key component of the "Risks and Solutions: Marine Plastics in Southeast Asia" (RaSP-SEA) research project, funded by UK Research & Innovation (UKRI). The project brings together researchers from Universiti Malaya, the University of Exeter, Sunway University, Chulalongkorn University, and the National University of Singapore. The team conducted fieldwork at various beaches in Malaysia, including Negeri Sembilan, Pahang, Terengganu, and Selangor, to gather critical data and further their research objectives.



Top: UM researchers conducting trash separation for the audit Bottom: Litter collected from the beach, arranged and photographed for the audit

Plastic pollution represents a monumental system failure that threatens marine ecosystems and causes physical and chemical contamination on a global scale. It is estimated that 12 million tonnes of plastic enter the oceans each year, making this a pressing global concern. The project's trash auditing efforts provide valuable insights into pollution sources and patterns, enabling targeted interventions and policies to reduce plastic waste. Cleaner environments enhance the overall health and resilience of marine ecosystems, allowing them to thrive and adapt to environmental changes.

Plastic pollution severely impacts marine life, affecting everything from microscopic plankton to large marine mammals. By removing plastic debris from beaches and marine environments, the project helps prevent ingestion and entanglement hazards for various marine organisms, thereby supporting the health and survival of diverse species. Marine ecosystems, including coral reefs, mangroves, and seagrass meadows, are vital for sustaining both plant and animal biodiversity. Plastics can smother coral reefs, degrade seagrass beds, and pollute mangrove forests. Addressing plastic pollution not only preserves these critical habitats but also supports the myriad species that depend on them.

Among the locations where the trash audit was conducted are:

- INOCEM Research Station, Kuantan (Pahang)
- Pantai Batu Hitam, Kuantan (Pahang)
- Pantai Teluk Gadung, Dungun (Terengganu)
- Pantai Tanjung Jara, Dungun (Terengganu)
- Pantai Batu Buruk, Kuala Terengganu (Terengganu)
- Pantai UMT, Kuala Terengganu (Terengganu)
- Pantai Teluk Katapang, Kuala Terengganu (Terengganu)

Joint Efforts in Mangrove Conservation

The Institute of Ocean and Earth Sciences (IOES) at Universiti Malaya (UM) and The Japan International Research Centre for Agricultural Sciences (JIRCAS) have embarked on an international research collaboration as part of the Blue Carbon Initiative Project. This partnership involves hosting Japanese researchers from JIRCAS, JAMSTEC, Hokkaido University, and MERI of Japan at IOES from 27 February to 24 March 2023. The collaboration centers around a joint expedition focused on mangrove ecosystems in Peninsular Malaysia, specifically in the states of Kedah, Perak, Selangor, and Melaka.

This research, funded under the joint JIRCAS-IOES project **"Status of Restored Mangrove Forest Across Different Environmental Settings in Malaysia**", aims to assess and enhance the health of mangrove forests, which are crucial for maintaining coastal biodiversity and ecosystem services. Led by Dr. Mohammed Rizman Idid (IOES) and Dr. Rempei Suwa (JIRCAS), and supported by team members including Assoc. Prof. Dr. Siti Asiah Hj Alias, Dr. Cheah Wee, and Dr. Kishneth Palaniveloo, the project conducts detailed surveys and assessments of mangrove ecosystems. The expedition involves rigorous fieldwork, including wading through waist-high muddy shores, measuring mangrove tree trunks, and sampling soils and various mangrove leaves. These activities are essential for understanding the current status of mangrove forests and evaluating the effectiveness of restoration efforts. The challenging fieldwork is financially supported by the FRGS grant on mangrove research awarded to Dr. Kishneth Palaniveloo (IOES).

By examining the condition of restored mangrove forests across different environmental settings, the project provides valuable insights into how these critical ecosystems can be maintained and enhanced. Mangroves are vital for maintaining biodiversity as they support a wide range of plant and animal species, act as nurseries for marine life, and provide coastal protection against erosion and storm surges. The project's findings will help inform best practices for mangrove restoration and conservation, ensuring these ecosystems can continue to support their rich biodiversity and the communities that depend on them.



Above: UM and JIRCAS researchers collaborated on a joint expedition to assess and enhance the health of restored mangrove forests in Malaysia

Malaysia Coral Reef Bleaching Alert

The Institute of Ocean and Earth Sciences (IOES) operates a real-time regional monitoring station for Sea Surface Temperature (SST) at the UM Bachok Marine Research Station. SST is a critical parameter in marine science, as it directly influences coral reef health and marine ecosystem dynamics. By monitoring SST, researchers can assess the thermal conditions of sea water, which is essential for predicting and managing coral reef bleaching events.

Coral reefs are highly sensitive to temperature changes, and prolonged periods of elevated SST can lead to coral bleaching, where corals lose their symbiotic algae and their vibrant colors, potentially leading to reef degradation. The real-time SST data collected helps provide early warnings for such bleaching events, enabling timely interventions and conservation efforts. This monitoring initiative is conducted in collaboration with the South China Sea Marine Forecast and Hazard Mitigation Center, a division of the Ministry of Natural Resources. For example, in June 2023, the thermal stress level for coral reefs at Perhentian Island was categorised as a Bleaching Watch, indicating that conditions were approaching a threshold that could lead to bleaching if not addressed.

Malaysia Coral Reef Bleaching Alert Report

No: 2023-02 Institute of Ocean and Earth Science, University of Malaya Bachok Marine Research Station, 16310 Bachok Kelantan, Malaysia & South China Sea Marine Forecast and Hazard Mitigation Center, Ministry of Natural Resource Third Institute of Oceanography, Ministry of Natural Resources Mail:yb@hyyb.org

> Updated on 9 June, 2023 Issued by 13,74,06

Based on *in-suit* and re-analysis SST at the Perhentian Island, Malaysia. Result shows that SST in the past 5 weeks (1 May-6 June, 2023) was in the ranges 30.0–31.4°C. SST this week was greater than the maximum monthly mean SST. The coral reefs bleaching thermal stress level in Perhentian Island is categorized as *Bleaching Watch*. The predicted SST around reef region may decrease slightly in the next 2 weeks (9 June-22 June) and the thermal stress level maintains *Bleaching Watch*.

Table 1. Regional SST monitoring at the Perhentian Island	, Malavsia
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Reef Location	Current Stress Level	SST in the last 4 weeks (°C)	Predicted SST change in next 2 weeks (°C)
Perhentian Island, Malaysia	Bleaching Watch	30.0~31.4	Decrease slightly

Note: Only 10 days (01 May- 10 May) observed SST are used due to the instrument repair. In addition to *in-suit* SST, the daily-mean NOAA *CoralTemp* SST product which shows good agreement with our observation is used in our report. No Stress: No Thermal Stress, No Bleaching Risk

Bleaching Watch: Slight Thermal Stress, Attention SST Change

Bleaching Warning: Thermal Stress Accumulation, Carefully Attention SST Change

Bleaching Alert Level 1: Strong Bleaching, Significant Bleaching Likely Bleaching Alert Level 2: Severe Bleaching, Significant Mortality Likely



Figure 2. Week 1-2 Thermal Stress Level around the Perhentian Island, Malaysia (Data from the NOAA Coral Reef Watch program)



Figure 3. SST evolution at Perhentian Island, Malaysia

Above: An example of the Malaysia Coral Reef Bleaching Alert Report, indicating slight thermal stress at Perhentian Island, Malaysia on June 2023 (Source: Institute of Ocean and Earth Science, UM)

Team Malaysia's JellyGo: Winning Innovation for Predicting Jellyfish Blooms and Protecting Marine Biodiversity

Bioinformatics students from the Faculty of Science at Universiti Malaya (UM), as part of Team Malaysia, won the Grand Prize of the 7th Ocean Hackathon Grand Finale in Brest, France, in Febaruary 2023. The team, which included students from Universiti Kebangsaan Malaysia (UKM) and Universiti Sains Malaysia (USM), developed JellyGo, an innovative mobile application. Their project, titled "Development of the First Prediction Model for Jellyfish Distribution and Appearance in Penang Island", utilised citizen science data and long-term monitoring from the Centre for Marine and Coastal Studies (CEMACS) at USM to predict jellyfish blooms. This prediction capability helps maintain local marine ecosystems by managing jellyfish populations and mitigating their impact on biodiversity.

JellyGo features a smart image detection system for identifying jellyfish and provides crucial information on first aid and emergency measures for jellyfish stings. The app supports monitoring, reporting, and predicting jellyfish sightings and related incidents, which is vital for preserving the balance of marine ecosystems and protecting diverse aquatic species. For their exceptional achievement, Team Malaysia received a subsidy of 5,000.00 Euros (approximately RM23,000.00) to further develop their project. The Ocean Hackathon[®] is an international competition launched in 2016, focusing on creating digital data-driven prototypes to address complex oceanic challenges globally.



Above: Team Malaysia during the award ceremony of the Ocean Hackathon

Data Advisors for Ocean Hackathon Kuala Lumpur 2023

Academics from the Institute of Ocean and Earth Sciences (IOES) played key roles in the Ocean Hackathon Kuala Lumpur 2023. Dr. Wee Cheah was appointed as Principal Data Adviser, Dr. Mohammed Rizman Idid and Dr. Kishneth Palaniveloo as Deputy Data Advisors. This 48-hour non-stop event allows teams to create innovative prototypes tackling ocean-related challenges using a broad range of marine data.

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The Ocean Hackathon Kuala Lumpur, held in November 2023, was organised by the Embassy of France in Malaysia to raise environmental awareness and promote ocean preservation. It attracted innovators from various fields to address themes such as marine science, ocean conservation, pollution, climate change, sustainable fishing, aquaculture, coastal protection, ecotourism, marine safety, spatial planning, and the circular economy.

Campus Plastic Waste Reduction Action Plan

As outlined in the UM Sustainability Policy 2021-2030, particularly under Pillar 3: Environment, the university has significantly intensified its waste management efforts to focus on reducing single-use plastics and disposable items across the entire campus. This expanded initiative aims to address the environmental impact of waste more holistically.

Central to this initiative is the promotion of a "paperless" environment and the adoption of responsible consumption practices throughout the university's supply chain. This approach encompasses not only internal operations but also interactions with external services and suppliers. By reducing paper use and encouraging sustainable alternatives, UM is committed to minimising its overall waste footprint.

The strategy for implementation involves several key components, as outline in the <u>Universiti Malaya Action Plan on Single-Use</u> <u>Plastics and Disposable Items Reduction</u>:

1. Assessment and Planning: The university is conducting thorough assessments to identify key waste categories and prioritise them for action in phases. This planning will help set measurable goals that align with UM's broader sustainability objectives.

2. Awareness and Promoting: UM is

launching comprehensive awareness campaigns to engage the campus community - students, faculty, and staff - in waste reduction activities. The university is also promoting the UM Green Event Guidelines to encourage more sustainable and responsible event practices.

3. Manifesting and Implementing: The university is working to integrate these practices into all areas of campus operations. This includes establishing designated plastic-free zones in phases, enhancing waste sorting and recycling facilities, installing water refill stations, and introducing compostable containers as eco-friendly alternatives.

4. Collaboration and Partnership: UM plans to develop guidelines for vendors and suppliers, emphasising the elimination of single-use plastics and disposable items. The university will prioritise partnerships with suppliers who offer biodegradable, compostable, or reusable alternatives.

5. Enforcement and Monitoring: The university will enforce these initiatives through policies and circulars and will closely monitor adherence to ensure that all stakeholders comply with the new standards. UM's long-term sustainability plan is to integrate these principles into the university's vision, mission, and core values, ensuring a commitment to environmental stewardship is embedded in all aspects of university life.



Left: <u>Universiti Malaya Action Plan</u> on <u>Single-Use Plastics and</u> <u>Disposable Items Reduction</u>

Marine Pollution Reduction Policy: Addressing Land-Based Sources

Several documents highlight the need to control pollution from land-based activities to protect urban rivers on campus and, ultimately, reduce marine pollution. Among these are:

- UM's Sustainability Policy 2021-2030: This policy outlines the university's commitment (page 6) to enhancing the conservation and sustainable use of oceans and their resources, while significantly preventing and reducing marine pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution. It also emphasises minimising physical, chemical, and biological alterations of aquatic ecosystems by increasing scientific knowledge, developing research capacity, and transferring marine technology through academic and research platforms.
- Scheduled Waste Management: The Waste Card for scheduled waste management, developed by the UM Estates Department, specifically states (page 1) that in the event of any accidental spill or release of scheduled waste, the immediate action is to block the water flow from the spill area to prevent it from entering the river. <u>https://jpphb.um.edu.my/img/portal/ad</u> <u>min/Seventh%20Schedule_Waste%20Ca</u> <u>rd.docx</u>

• The university's strategic approach to preventing marine pollution is further reinforced by the **UM Development Checklist**, which includes Environmental Impact Assessment (EIA) criteria. This checklist ensures that all campus projects are evaluated for their potential impact on aquatic ecosystems (page 5), and includes plans for pollution control (page 6) and waste management, such as integrating wastewater treatment, sewage systems, wetlands, oil and grease traps, as well as preventing direct discharge (page 10). These measures promote responsible development practices. https://jpphb.um.edu.my/img/portal/ark/

<u>UM%20Development%20Checklist_Rev0</u> <u>1%20(February%202018).pdf</u>

Globally, there is an increasing recognition of the need for integrated policies that address the environmental, social, and economic dimensions of sustainability. The United Nations Environment Programme (UNEP) has highlighted the importance of comprehensive policies in achieving SDG 14, particularly in marine pollution control and biodiversity conservation. UM's Sustainability Policy is well-aligned with these global trends, providing a strong foundation for the university's marine conservation efforts.

> **Below:** An urban river on campus, named Sungai Pantai



Safeguarding Tasik Varsiti's Ecosystem: Preventing Overfishing and Controlling Invasive Species

At the University lake, Tasik Varsiti, a comprehensive plan to minimise biological alteration has been carefully outlined in the "Fishing Activity Guidelines for Tasik Varsiti, Universiti Malaya" (<u>Garis Panduan Aktiviti</u> <u>Memancing Tasik Varsiti, Universiti Malaya</u>) in page 1 and 2. This guideline was developed by the UM Sustainable Development Centre (UMSDC), the UM Estates Department (JHB), and the UM Sports Centre in 2023.

To prevent overfishing, fishing is only permitted on specific dates and times with prior approval from the university's management. Overfishing can severely deplete fish populations and disrupt aquatic ecosystems. By limiting fishing, the university ensures fish populations can recover and thrive, maintaining biodiversity and ecosystem health in the lake. The guidelines also reinforce the "catch and release" practice, where native and indigenous fish species caught must be released back into Tasik Varsiti. These species include Hampala macrolepidota, Leptobarbus hoevenii, Oxyeleotris marmorata, Barbonymus schwanefeldii, Labeo chrysophekadion, and Pangasius pangasius. This helps sustain natural fish populations and support the lake's ecological balance.

In contrast, invasive species threaten the ecosystem by outcompeting native species, disrupting food chains, and degrading habitats. The guidelines require the removal of any invasive species caught, preventing their release into public waters. This helps preserve the biodiversity of Tasik Varsiti, ensuring native species thrive. Additionally, anglers must avoid damaging trees and plants in the fishing area to protect the habitat. These measures aim to safeguard the ecological integrity of Tasik Varsiti while promoting sustainable recreation. GARIS PANDUAN AKTIVITI MEMANCING TASIK VARSITI, UNIVERSITI MALAYA

- Aktiviti memancing hanyalah dibenarkan pada tarikh dan masa yang ditetapkan dengan kelulusan pihak pengurusan universiti.
- Peserta perlu menjaga pokok dan tanaman di kawasan memancing daripada kerosakan.
 Peserta boleh menogunakan umpan seperti dedak / cacing / cendkerik / roli / pellet / ikan
- Peserta boleh menggunakan umpan seperti dedak / cacing / cengkenk / roli / pellet / ikan hidup / lipas / lipan / ulat gendon / jenis-jenis ulat hidup / bahan-bahan daripada buahan buahan seperti pisang / betik / buah kelapa sawit / mardmallow / telur kerengga.
 Peserta ADM AM DI ARAMG menonundaka umpan tilura (Ranala) (conservational conservation)
- Peserta ADALAH DILARANG menggunakan umpan tinuan (Rapala) / organ dalaman hakwan / umpan tapa / katak / anak itik / anak ayam / umpan yang menggunakan organ hakwan yang berbau hanyir dan meloyakan / cicak / kuning telur.
- Pemancing hendaklah memastikan keadaan persekitaran bersih dan kemas selepas memancing.
- Bagi mengekalkan konsep tangkap dan lepas, maka spesies ikan yang berjaya dinaikkan perlu dilepaskan semula ke Tasik Varsiti sebagaimana jadual berikut:



UMSDC, JPPHB, Pusat Sukan (2023) 11 September 2023



Bagi mengurangkan populasi spesies ikan invasif, maka spesies ikan yang berjaya dinaikkan perlu dibawa balik dan tidak dilepaskan di mana-mana perairan umum sebagaimana jadual berikut:



UMSDC, JPPHB, Pusat Sukan (2023)

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Above: "Fishing Activity Guidelines for Tasik Varsiti, Universiti Malaya", published in September 2023. Link to download the guideline: <u>https://drive.google.com/file/d/13e3_rrZlzaHlbN</u> <u>7rfwtIETYIX1TX7bDL/view</u>

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UM's Development Checklist and Sustainability Policy for Protecting Campus Aquatic Ecosystems

The University Malaya (UM) safeguards its aquatic ecosystems through the implementation of the UM Development Checklist and the UM Sustainability Policy 2021-2030.

- The UM Development Checklist incorporates Environmental Impact Assessment (EIA) requirements. Developers are required to consult the Urban Stormwater Management Manual for Malaysia (MSMA) (page 5) and address key environmental considerations (page 5), such as the impact on water sources, potential slope clearing, and whether the project may cause water or soil pollution to the campus and surrounding communities. Additionally (page 6), developers must incorporate water features, propose pollution control measures, and aim for water quality standards of Class I or II for all water bodies on campus.
- Under the <u>UM Sustainability Policy</u> <u>2021-2030</u>, part of the Environment Pillar, there is a dedicated policy to protect and conserve water bodies on campus (page 16). The key implementation mechanism is maintaining high water quality, which includes introducing water discharge guidelines to ensure the protection of ecosystems, wildlife, and the health and welfare of the campus community.

These frameworks help protect the physical and chemical integrity of water bodies associated with the campus.

Continuous Monitoring of UM's Tasik Varsiti's Water Quality

The Cleaning Section of the UM Estates Department is committed to the rigorous and ongoing monitoring of Tasik Varsiti (Varsity Lake) at Universiti Malaya (UM). Assessments are conducted at least six times a year using certified laboratory procedures. This monitoring ensures that the lake consistently meets the Class IIB water quality standards established by the Department of Environment, Malaysia, which are necessary for safe body contact. From 2021 to 2023, Tasik Varsiti consistently met the Class IIB water quality standard based on the sampling of parameters such as pH, Dissolved Oxygen (DO), Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), and Nitrogen (N).

The importance of this monitoring extends beyond regulatory compliance. Tasik Varsiti serves as a central recreational area for the university community and is a critical habitat for a variety of aquatic species. Ensuring the lake's water quality supports not only the health and safety of individuals engaging in activities such as swimming and boating but also the ecological balance of the aquatic environment.

Maintaining these high standards is integral to UM's commitment to environmental stewardship and sustainability. It serves as a key performance indicator for the university's top management, highlighting the institution's dedication to preserving natural resources and enhancing the quality of life for its students, staff, and visitors. This proactive approach underscores the university's broader goals of fostering a healthy and sustainable campus environment.



Above: Water quality report for UM's Tasik Varsiti, indicating the water quality is suitable for body contact (Source: UM Estates Department)
 Below: Water quality assessment conducted onsite, with water samples analysed in the certified laboratory



Citizen Science Monitoring of Urban Rivers

Citizen science monitoring of urban rivers at Sungai Pantai was carried out by UM undergraduate students in Ecology & Biodiversity, under the guidance of the Biodiversity & Ecological Research Network (BEN). These students received River Ranger 2.0 training from the non-profit organisation Global Environment Centre (GEC).

The monitoring was conducted quarterly. Three types of citizen science monitoring were employed: physical, chemical, and biological. These assessments were used to calculate the River Ranger Index (RRI), which reflects the health of the stream or river. Physical monitoring assessed various characteristics of the river, including land use, litter, odor, water conditions, vegetation, and vertebrate animal life. Chemical monitoring utilised a low-cost water quality kit to provide baseline data and early indicators for reporting to relevant authorities. Parameters measured included pH, dissolved oxygen, phosphate, nitrate, turbidity, and temperature. Biological monitoring focused on the river's aquatic life, specifically macroinvertebrates and fish. The presence of aquatic macroinvertebrates serves as an indicator of water quality, showing short-term pollution effects, while fish are used for long-term monitoring.



Above: UM undergraduate students participated in the Sungai Pantai citizen science water quality monitoring program based on the River Ranger 2.0 training.

PEMANTAUAN	BULAN	TAHUN	TARIKH
	SEPTEMBER	2023	09/09/2023 @ 10/09/2023
KEDUA	NOVEMBER	2023	11/11/2023 @ 12/11/2023
KETIGA ★	FEBRUARI	2024	10/02/2024 @ 11/02/2024
KEEMPAT	MEI	2024	11/05/2024 @ 12/05/2024

<mark>TEMPOH MASA</mark> PEMANTAUAN KUALITI AIR SUNGAI PANTAI

Above: The timetable for the Sungai Pantai water quality monitoring at UM from 2023 to 2024 (Source: Global Environment Centre)

Hands-On Conservation: Sungai Pantai Cleanup with UM Students

Ongoing river cleanup events were organised throughout the year at Sungai Pantai, involving student volunteers from the Conservation and Development class of the Faculty of Arts & Social Sciences, Chemical Engineering students participating in their Social Engagement project, students from the Department of Geography, and exchange scholarship students from Indonesia conducting community service at UM. Sungai Pantai, an urban river that often resembled a drainage ditch and was frequently overlooked, provided a significant focus for the effort. The event offered students a hands-on opportunity to engage with a real-world environmental challenge, enhancing their understanding and appreciation of urban waterways. Through their involvement in the cleanup, students gained practical experience in aquatic stewardship, which is essential for fostering a deeper respect for and commitment to environmental conservation. Additionally, by focusing on this underappreciated urban river, the project aimed to raise awareness about the environmental impact of urbanisation on local water bodies and encourage more sustainable practices within the community.



Above: Students waded into the urban river at UM to conduct a cleanup Below: Trash collected from the river was brought ashore, weighed, and sent for recycling or disposal in a landfill



Mini Trash Barriers Making a Big Difference: The Sampah Snagger Approach

Sampah Snagger, a mini trash barrier, was installed in a stream at Universiti Malaya (UM). This stream is part of the Klang River urban watershed area, which encompasses other highly urbanised and industrialised regions in Kuala Lumpur and the neighboring state of Selangor. The first prototype was installed in collaboration with 12 students from UM's Faculty of Science, marking the launch of this groundbreaking initiative aimed at tackling water pollution at its source.

The name "Sampah Snagger" combines the Malay word for garbage with the act of snagging, which refers to guickly removing something. These mini trash barriers, constructed from locally available materials, can be easily installed in small rivers, streams, lakes, and ponds, empowering communities to build and maintain them. This approach fosters a sense of ownership and responsibility among community members toward their waterways. Maintenance is conducted regularly, at least twice a month, depending on the intensity of garbage flow. Captured litter can be removed using landing nets or pickers, and is subsequently cleaned and sent for recycling.



Above: UM students assembled the mini trash barrier on site **Below:** The Sampah Snagger 1.0 effectively prevents trash from flowing downstream at UM. Read the Sampah Snagger Impact Report here: https://drive.google.com/drive/folders/1zoUGeiR6ZEs6qHVAwNPsp-KGXoJTIV9S



Ecological Restoration at Rimba Ilmu

The Biodiversity & Ecological Research Network (BEN) at Universiti Malaya (UM) has been awarded the National River Care Fund, with guidance from the Global Environment Centre (GEC). This fund supports river conservation initiatives led by local communities, organisations, and educational institutions. In this program, BEN collaborated with UM Water Warriors and the Centre for Alumni Relations and Institutional Advancement (CARIA) to conduct a river clean-up at the Rimba Ilmu Botanic Garden. The initiative involved deepening the pond and stream and removing excessive wetland plants to enhance the health of the aquatic ecosystem. Furthermore, ongoing river and pond clean-up activities at Rimba Ilmu are supported by various UM volunteers who also participate in other events.



Above: UM volunteers carried out a river cleanup at the Rimba Ilmu Botanic Garden in UM

Rediscovering UM's Waters: Greenbelt Reintroduction and Eco-Heart Insights

Dr. Fathiah Mohamed Zuki from the UM Department of Chemical Engineering, along with the UM Engineering River Team and UM Water Warriors, organised the UM Greenbelt Reintroduction Seminar on May 2023. The free program aims to reintroduce the sustainable aquatic system surrounding the UM Greenbelt area while promoting environmental protection and knowledgesharing.

Activities included a UM Greenbelt Treasure Hunt, allowing participants to explore and rediscover the area's water bodies and ecosystem. The event also featured a presentation on the water quality results of the university's stream, using the Eco-Heart Index - a novel water quality indicator that visually represents the health of the water by drawing a heart shape based on six key water quality parameters. Additionally, the seminar included a photography exhibition focused on water bodies, as well as an aquatic macroinvertebrates booth, where participants could learn about the various forms of life found in the stream.



Above: UM researchers and participants alongside exhibitions at the UM Greenbelt Reintroduction Seminar

From Waste to Wildlife: PASUM's DIY Sustainable Pond Initiative

A dedicated team of eight support staff from Pusat Asasi Sains Universiti Malaya (PASUM) embarked on an innovative project to create a do-it-yourself (DIY) sustainable pond on the PASUM campus, exemplifying best practices in aquatic stewardship. Completed between May and June 2023, the project highlights eco-friendly design and effective water management. The team creatively repurposed waste materials found on the UM campus, such as discarded printer and PC boxes, unused pipes, and timber from fallen trees. They also relocated various plant species, including *Dieffenbachia* (dumb cane), Xanthosoma violaceum (black elephant's ear), taro, water lettuce, Syngoniums (arrowhead), and Alocasia (giant taro), to establish a vibrant and selfsustaining aquatic habitat.

Beyond its aesthetic and ecological value, the pond serves as a crucial educational resource for over 500 PASUM students in the Life Sciences Program, who use it for biology experiments. Mosses like Spirogyra algae and Oscillatoria, collected from the pond, support students' studies on cellular structures and membrane characteristics. The pond requires no ongoing maintenance and hosts guppies and catfish that naturally control mosquito larvae. This project not only enhances the connection with aquatic ecosystems but also sets a notable example of sustainable environmental stewardship.



Right: Support staff from PASUM constructed a do-ityourself (DIY) sustainable pond on the PASUM campus **Below (left and right):** The thriving habitat at the DIY pond, now also serving as an educational site



Friends of Elmina Lake: UM Water Warriors and EGRA Partner for Community Conservation

The UM Water Warriors partnered with the Elmina Gardens Residents' Association (EGRA) to establish the "Friends of Elmina Lake", a collaborative initiative dedicated to the ongoing preservation of the local water body. This partnership was formalised during the Elmina Lake Open Day in July 2023, a free event designed to engage the community and foster a sense of stewardship for their natural surroundings.

The activities of the Open Day included a diverse range of events aimed at enhancing public awareness and involvement. The day began with a meet-and-greet session, allowing residents to connect with one another and with representatives from the UM Water Warriors and EGRA. This was followed by a comprehensive lake clean-up, where volunteers worked together to remove debris and litter, improving the lake's condition and overall aesthetics. Educational activities were also a key component of the event. Attendees participated in interactive exhibits and learning exercises focused on water quality monitoring, the importance of maintaining healthy aquatic ecosystems and water savings. Highlights included an exhibition on aquatic invertebrates, which showcased the diverse life forms that inhabit the lake, and a place-based learning exercise designed to deepen participants' understanding of local environmental issues and conservation practices.

The Friends of Elmina Lake initiative and the Elmina Lake Open Day collectively emphasised the importance of community involvement in environmental conservation. By bringing together residents, educational resources, and hands-on activities, the event successfully promoted long-term engagement and a shared commitment to preserving the health and vitality of Elmina Lake.



Above: The local community participated in educational programs during Elmina Lake Open Day Below: A lake cleanup was conducted with the help of UM and local volunteers



12 Sacks of Trash Cleared: UM Water Warriors Partner with Core Outdoor and Tactical for Mosque Cleanup

The UM Water Warriors collaborated with Core Outdoor and Tactical, a prominent outdoor sports store, to conduct a successful cleanup event at Masjid As-Salam in Tasik Puchong Perdana. An open call was issued to invite the local community to participate in the cleanup effort. This initiative aimed to address environmental concerns and promote community involvement in local conservation efforts. During the event, dedicated volunteers worked diligently to clear litter from the area, resulting in the collection of 12 gunny sacks of trash. The cleanup not only improved the cleanliness and aesthetic appeal of the mosque's surroundings but also contributed to the overall health of the local environment.



Left: UM and local volunteers conducted a cleanup at a lake in the Klang Valley near UM Below: Volunteers with the 12 gunny sacks of garbage collected during the cleanup



Universiti Malaya Watershed Management Strategy

The Universiti Malaya's (UM) Watershed Management Strategy includes several key components outlined in the following documents:

1. UM Master Plan (page 78):

The strategy focuses on rehabilitating existing water bodies to restore river ecosystems and mitigate flash floods on campus. This includes the treatment of river water to benefit wildlife in Rimba Ilmu and reduce pollution levels. <u>Read more about the Master Plan here.</u>

2. UM Sustainability Policy 2021-2030

(pages 4, 6, 16):

 Page 4 outlines UM's commitment to improving water quality by reducing pollution in all forms. It emphasises integrated water resources management at all levels and aims to protect and restore water-related ecosystems including hills, forests, wetlands, rivers, lakes, and seas - through local and international cooperation and capacitybuilding programs to enhance community participation.

- Page 6 focuses on UM's commitment to reducing pollution, particularly from landbased activities. The policy aims to minimise physical, chemical, and biological alterations of aquatic ecosystems by advancing scientific knowledge, developing research capacity, and transferring technology through academic and research platforms.
- Page 16 details the water management policy's goal to protect and conserve campus water bodies. This includes maintaining water quality to safeguard ecosystems, wildlife, and human health and welfare.

These documents collectively guide UM's efforts in sustainable water management and ecosystem conservation on campus.

UM's Role in Advancing SDG 14 (Life Below Water)

Conserving and sustainably using oceans, seas, and marine resources are critical components of global sustainability efforts. As climate change, pollution, and overfishing continue to threaten marine ecosystems, universities and research institutions worldwide play a key role in addressing these challenges.

UM's initiatives in 2023 are closely aligned with global trends in marine conservation, including the growing emphasis on interdisciplinary research, community-based conservation, and using technology in environmental monitoring. By integrating these approaches into its strategic planning, UM is not only advancing its sustainability goals but also contributing to the global effort to achieve SDG 14 by 2030.

UM's focus on education, research, and community outreach positions it as a leader in marine conservation in Malaysia and the region. The university's commitment to sustainability is further reflected in its alignment with the UM Transformation Plan 2030 and the UM Master Plan 2050, both of which emphasise environmental stewardship and responsible resource management.