

INOS

Designing Multiuse Zone via Marine Spatial Planning Approach for Marine Park Sustainability



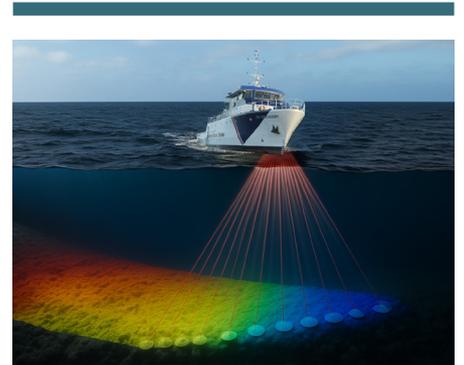
MARU International Research and Training Program: Scientific Sampling and Hands-On Fish Specimen Workshop in Malaysia

... MARU supported the implementation of the international workshop at the Biodiversity & Biological Oceanography Laboratory (OBB), INOS, which brought together participants from Malaysia and Indonesia.



Introducing CHARMS: Engineering the Smart Sea Turtle Sanctuary from the Ground Up

... the Chagar Hutang Resource Management System (CHARMS) mobile application is developed as an integrated digital platform to modernize sea turtle conservation management and automate SEATRU operations.



Multibeam Backscatter Data Analysis & Interpretation Training Workshop

... the workshop successfully enhanced participants' technical skills while strengthening collaboration between government agencies, universities and research institutions.

From the Editor's Desk

INOS Newsletter Editorial Team



Welcome to the second edition of the INOS Newsletter. Over the past year, INOS has further strengthened strategic collaborations, advanced marine and oceanographic research that addresses pressing regional and global challenges, and expanded outreach initiatives to share knowledge with the wider community. Our research efforts continue to drive advancements in marine and oceanographic science, reflecting the expertise, leadership, and dynamic spirit of INOS. We hope this edition offers readers meaningful insights into our ongoing progress and reinforces our shared aspiration of nurturing a healthy ocean for future generations.

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MARU International Research and Training Program: Scientific Sampling and Hands-On Fish Specimen Workshop in Malaysia



Written by: **Siti Tafzilmeriam Sheikh Abdul Kadir,**
Behara Satyanarayana (INOS)

The Mangrove Research Unit (MARU) plays a key role in supporting and strengthening the implementation of an international research and training program with a strong emphasis on mangrove-associated marine ecosystems as key components of coastal and marine biodiversity. “This program highlights MARU’s commitment to advancing mangrove and coastal marine research, enhancing regional scientific collaboration and building technical capacity among young researchers,” said Prof. Zainudin Bachok, Director of INOS, during a recent discussion.

The program focuses on scientific sampling activities and technical capacity building in marine and mangrove biodiversity studies through the project Scientific Sampling of Population Structure and Phylogeography of Marine Fishes and Marine Leeches in Malaysia, as well as the organization of the International Hands-On Workshop on Fish Specimen Procedure. Under a strategic collaboration between INOS and AKUATROP, Universiti Malaysia Terengganu (UMT) and Universiti Brunei Darussalam (UBD) from 10 to 14 November 2025, young researchers, with assistance from INOS staff, conducted intensive fieldwork at several LKIM landing sites along the east coast of Peninsular Malaysia, covering areas from Terengganu to Tok Bali, Kelantan, to collect fish and marine leech specimens for genetic and phylogeographic analysis. The research activities included specimen collection and preservation, morphological identification and DNA analysis to assess fish population structure, genetic diversity, historical dispersal patterns, and host-parasite relationships between mangrove fishes and marine leeches.



Concurrently, MARU supported the implementation of the international workshop at the Biodiversity & Biological Oceanography Laboratory (OBB), INOS, which brought together participants from Malaysia and Indonesia. The workshop was held on 13 November 2025, included participants from the Program Sangkutan Antarabangsa Inbound Pelajar, Universitas Airlangga, Indonesia, under the supervision of Assoc. Prof. Dr. Nurul Ulfah Karim (Akuatrop, UMT). The workshop featured expert lectures by Prof. Takaomi Arai (UBD, Brunei), who presented on “Tropical Marine Biodiversity in Southeast Asia” and by Ts. Dr. Siti Tafzilmeriam Sheikh Abdul Kadir (INOS), who provided academic and technical perspectives on fish specimen handling and preservation. Intensive practical sessions were conducted by Mr. Sharol Ali (FPSM, UMT), training participants in specimen preparation.

Overall, the program not only expanded academic collaboration networks between regional institutions but also enhanced the scientific and technical skills of participants, provided fundamental molecular and ecological marine data, and reinforced MARU’s role in advancing mangrove-focused scientific research, ecosystem-based fisheries management, coastal aquaculture health monitoring, and the conservation of marine and mangrove biodiversity in Malaysia.



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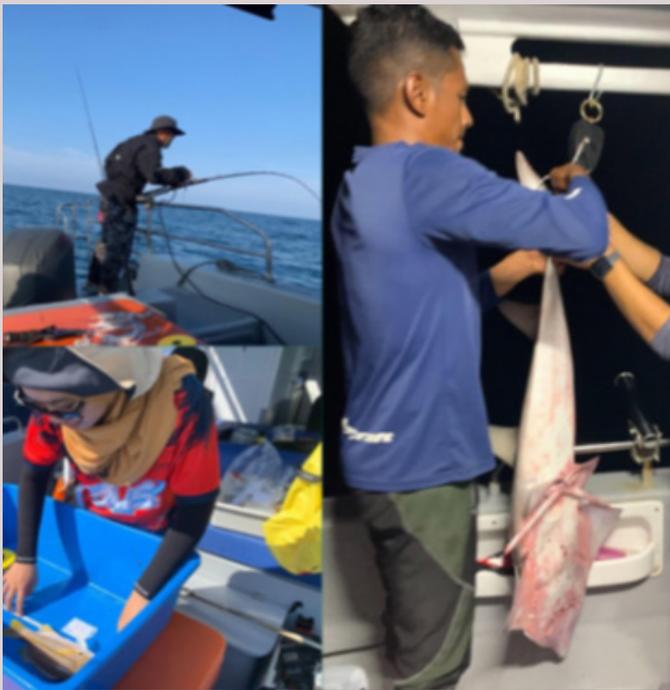
Written by: **Mohd Safuan Che Din (INOS)**

Under the Convention of Biological Diversity (CBD), Malaysia is one of the signatories in the convention that obligate to protect marine biodiversity and ecological integrity and the sustainable use of marine resources (UNEP 1994). Due to high diversity of marine organisms which support human and other marine life, Malaysia has taken an initiative to protect the marine ecosystem via establishment of Marine Protected Area (MPA) or known as Marine Parks (MPs) established under Part 41 of the Fisheries Act, 1985. The main goals are to protect, conserve, and manage [HA1.1]in perpetuity representative marine ecosystems of significance, particularly coral reefs and their associated flora and fauna, so that they remain undamaged for future generations.



Among the MPs, Pulau Tioman Marine Park is an archipelago that consist of nine islands including the Pulau Tioman, the largest island in east coast of Peninsular Malaysia. The island hosts a wide range of critical marine ecosystems, including fringing coral reefs, rocky shores, sandy beaches, seagrass beds, mangrove forests, and open coastal environments. These diverse and highly productive ecosystems are of significant biodiversity, social, and economic importance to Malaysia. An economic valuation conducted by researchers at Universiti Utara Malaysia (UUM) estimated that the 14.5 km² reef area within the Tioman Island Marine Park contributes approximately RM3.4 billion annually to the economy. Given the ecological and economic value of these marine ecosystems, sustainable management is essential to ensure their long-term viability and continued benefits. This requires careful planning and the implementation of strategies aimed at preserving biodiversity while translating these ecological assets into sustainable economic gains. Future development initiatives on Pulau Tioman must prioritise[HA2.1] environmental sustainability, integrating insights from diverse experts to achieve a balance between ecological conservation, community well-being, and tourism development. This approach will safeguard the island's natural heritage and ensure its sustained contribution to both local and national prosperity.

Although the establishment of MPAs has covered a vast marine area, less than 2% of the world's oceans are fully protected (Halpern, 2010). Depending on the political and economic context of each region, different countries use different approaches to design their MPAs. For example, the Australian government enacted the Great Barrier Reef Marine Park Act, 1975 (the Act) for the long-term conservation and protection of reefs (Hassan and Alam, 2019) by adopting marine spatial planning (MSP) via zoning strategies to minimise multiple conflicts and effectively manage 344,400 km² of a large marine ecosystem (Kenchington and Day, 2011). In Malaysia, MSP has gained traction in environmental policy debates and government practise as an effective tool for adaptive and cross-scale management, providing mechanisms for resolving jurisdictional conflicts among stakeholders in the marine environment.



In line to the situation discussed, Universiti Malaysia Terengganu (UMT) and International Islamic University Malaysia (IIUM) in collaboration with Reef Check Malaysia, conducted a research entitled “Designing A Proposed Multi-Use Zones for Taman Laut Pulau Tioman: A Marine Spatial Planning Approach for Sustainable Marine Park Management” under the support from Department of Fisheries Malaysia. The purpose of this research is to design and propose a multi-use zone for the Pulau Tioman Marine Park via MSP approach for the sustainability of the marine ecosystem and development on the island. The project comprises of three major components: biodiversity, social and governance. Incorporating these findings into the MSP process will enhance the effective management of the marine park, strengthening its ability to protect and conserve biodiversity while promoting the sustainable use of marine resources. This approach also aligns with the National Policy on Biological Diversity (NPBD) and global agenda of Sustainable Development Goals (SGC) and United Nation Ocean Decade.

Expanding the Radius of International Collaboration in Europe

Written by: **Behara Satyanarayana (INOS)**

Universiti Malaysia Terengganu (UMT) holds one of the most active MOUs with the University Libre Brussels (ULB) in Brussels, Belgium since 2011. Since the beginning, the Laboratory of Systems Ecology and Resources Management (SERM), led by Prof. Dr. Farid Dahdouh-Guebas, is upholding a very strong collaboration with the Mangrove Research Unit (MARU) at the Institute of Oceanography and Environment (INOS). Together, they have been carrying out numerous academic and research activities, including the Erasmus Mundus excellence labeled TROPIMUNDO program, scientific projects, students' exchange, joint research supervision, and publications. In fact, the MARU, established in 1997, is known widely for its holistic contributions to mangrove education and research in Malaysia. The accomplishments of MARU have already been recognized nationally and internationally. Supported by a strong team of experts specialized in hydrodynamics, mangrove flora and fauna, pollution, remote sensing, carbon sequestration, and socioecology, the MARU remains dedicated to promoting sustainable conservation and management of the mangrove ecosystems through innovative research. Both past and present international projects, in particularly from Belgium, have explored several key scientific topics in mangrove ecology, ranging from vegetation dynamics to natural/anthropogenic impacts on forest cover/biodiversity, habitat restoration, carbon sequestration, and long-term conservation and management. [HA3.1][FA3.2]While building on a remarkable progress achieved through the partnership of UMT and ULB, the MARU is now stepping ahead with the plans of expanding the radius of academic collaborations in Europe with the University of Florence (UNIFI) in Italy. The UNIFI is one of the largest research and higher education institutions and popular in Italy. As part of this initiative, Prof. Stefano Cannicci and Prof. Sara Fratini visited INOS on 13 July 2025 and held productive discussions with Prof. Dr. Zainudin bin Bachok, Director of INOS, and Assoc. Prof. Dr. Effi Helmy bin Ariffin, Deputy Director of INOS. In this context, Prof. Dr. Farid Dahdouh-Guebas also joined the meeting and contributed to the development of future collaborative plans. To support and strengthen the emerging collaboration between UMT and UNIFI, the INOS organized a four-day seminar series featuring all three visiting delegates. Prof. Dr. Farid Dahdouh-Guebas held two sessions on the theme of "Scientific Presentation Skills and Career Planning" benefiting both students and staff (14-15 July 2025), followed by Prof. Stefano Cannicci and Prof. Sara Fratini who talked about "The Role of Resident Macroenthos in Mangrove Ecosystem Functioning" and "New Monitoring Techniques of Mangrove Fauna: The e-DNA based Approaches", by targeting the early-career researchers and faculty members (16-17 July 2025). As a next step, the formalities to sign an MoU between the UMT and the UNIFI has begun and is expected to be finalized by mid-2026. This agreement will serve as another gateway for enhancing the capacity of UMT to excel the mangrove macroenthos studies, particularly on brachyuran crab species, and for generating a comprehensive checklist of mangrove crabs in Peninsular Malaysia. The scientific insights of this collaboration will also support the local management authorities to take appropriate decisions and policy improvisation. Meanwhile, the efforts to secure Erasmus Mundus+ funding are underway to facilitate the exchange of both students and staff between the UMT and the UNIFI.



UMT INSTITUTE OF OCEANOGRAPHY AND ENVIRONMENT

INOS Seminar Series 2025

“SCIENTIFIC PRESENTATION SKILLS AND CAREER PLANNING”

Learn from the mistakes in data showcasing (Part 1)
14 July 2025 | 10.00 am

How to succeed & sustain in the academia (Part 2)
15 July 2025 | 2.00 pm

Prof. Dr. Farid Dahdouh-Guebas
UNIVERSITY LIBRE BRUSSELS (ULB), BELGIUM

All students and staff are invited. INOS Creative Hub

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UMT INSTITUTE OF OCEANOGRAPHY AND ENVIRONMENT

INOS Seminar Series 2025

“THE ROLE OF RESIDENT MACROBENTHOS IN MANGROVE ECOSYSTEM FUNCTIONING: WHAT WE KNOW SO FAR”

16 July 2025 | 10.00 am

Prof. Dr. Stefano Cannicci
UNIVERSITY OF FLORENCE (UNIFI), ITALY

All students and staff are invited. INOS Creative Hub

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UMT INSTITUTE OF OCEANOGRAPHY AND ENVIRONMENT

INOS Seminar Series 2025

“NEW MONITORING TECHNIQUES OF MANGROVE FAUNA: THE ENVIRONMENTAL DNA-BASED APPROACHES”

17 July 2025 | 10.00 am

Prof. Dr. Sara Fratini
UNIVERSITY OF FLORENCE (UNIFI), ITALY

All students and staff are invited. INOS Creative Hub

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Empowering Ocean and Biodiversity Literacy through the Curatorial Volunteer Club (CVC): Kuala Nerus Hosts Its First UNESCO Blue School Malaysia Programme (2025)



Written by: **Repository and Reference Centre (RRC, INOS)**

Universiti Malaysia Terengganu (UMT), through the Institute of Oceanography and Environment (INOS), achieved a major milestone in ocean education and community engagement with the successful implementation of the first UNESCO Blue School Malaysia programme in Kuala Nerus, Terengganu held in conjunction with World Ocean Week @ UMT (WOW@UMT) 2025.

The initiative comprised three key components:

1. CVC From Sea to Gallery @RRC-UMT: A Junior Curator's Journey Workshop, conducted on 23–24 May 2025,
2. Marine Life Exhibition Competition held on 15 June 2025 at each school participated and
3. The Marine Life Exhibition Awards Ceremony & The Blue School Global Network Recognition, held on 22 June 2025 at the INOS Auditorium, UMT.

The programme was jointly organised by the Repository and Reference Centre of the South China Sea (RRC-INOS), INOS UMT, and the Faculty of Marine Science and Environment (FSSM), UMT, in collaboration with Sustainable Ocean Alliance (SOA Malaysia). The initiative was supported by The Habitat Foundation, YUFE, and UMT internal partners including HEPA, PIJIM, and PKK (PNC).

A total of 100 primary school students and 20 teachers from five participated schools in Kuala Nerus namely; SK Tok Jembal, SK Tanjung Gelam, SK Mengabang Telipot, SK Gong Badak, and SK Kompleks Gong Badak, were involved in the programme including 50 undergraduate students of Marine Biology from UMT.

CVC From Sea to Gallery @RRC-UMT: A Junior Curator's Journey

The two-day workshop (23–24 May 2025) introduced students to marine science through an experiential, curator-based learning approach, transforming them into junior curators.

On the first day, students explored marine ecosystems through a “living classroom” field experience, guided by 50 Marine Biology students from UMT. This peer-learning model encouraged knowledge exchange while fostering early appreciation of coastal and marine biodiversity.

The workshop continued with Module 1: Introduction to marine habitats and coastal biodiversity and in Module 2: Hands-on training in wet and dry specimen processing and preservation at RRC-INOS laboratories. Students were introduced to the role of scientific collections as vital tools for research, education, conservation, and national biodiversity heritage.

On the second day, participants transitioned from science to communication through Module 3: Digital gallery development using MAQIVE – Malaysia Aqua Archive, a national aquatic biodiversity platform developed by RRC-INOS and in Module 4: Collaborative construction of marine habitat exhibitions, involving school students and UMT undergraduates. The exhibitions were subsequently displayed at the participating schools, allowing students to act as ambassadors of ocean knowledge within their own communities.

Marine Life Exhibition Awards & Blue School Global Network Recognition

The programme culminated on 22 June 2025 with the Marine Life Exhibition Awards Ceremony and the Blue School Global Network Recognition, held at the INOS Auditorium, UMT.

During this event, outstanding school exhibitions [HA1.1] were recognised for their creativity, scientific accuracy, and conservation messaging. All five participating schools were officially appointed as Blue School Malaysia Ambassadors and the schools were formally inducted into The Blue School Malaysia-Global Network, endorsed by the UNESCO Intergovernmental Oceanographic Commission (UNESCO-IOC).

This recognition signifies the schools' long-term commitment to advancing ocean literacy, marine conservation awareness, and sustainability education, aligned with SDG 4: Quality Education and SDG 14: Life Below Water.

Curatorial Volunteer Club (CVC): Empowering Future Ocean Stewards

The CVC From Sea to Gallery workshop forms part of the broader Curatorial Volunteer Club (CVC) framework led by RRC-INOS throughout 2025. The programme positions university collections as active learning platforms, integrating citizen science, curatorial practice, and public engagement. By connecting scientific specimens, digital archives, and school-based exhibitions, CVC and Blue School Malaysia UNESCO programmes nurture a generation that is scientifically informed, environmentally responsible, and capable of communicating ocean knowledge effectively.

The successful implementation of WOW@UMT 2025, together with the CVC From Sea to Gallery Workshop and the Marine Life Exhibition Awards & Blue School Global Network Recognition, demonstrates UMT's leadership in advancing ocean literacy and community-based education. INOS and RRC-UMT remain committed to expanding similar initiatives in the future, reinforcing UMT's role as a marine-focused, sustainability-driven university, while contributing meaningfully to national and global efforts in ocean education and biodiversity conservation.



Introducing CHARMS:

Engineering the Smart Sea Turtle Sanctuary from the Ground Up

Written by: **Faizah Aplop (INOS)**

The Sea Turtle Research Unit (SEATRU) established its flagship volunteer program in 1998 to sustain long-term sea turtle conservation at the Chagar Hutang Turtle Sanctuary on Redang Island. Through volunteer participation, SEATRU supports vital monitoring, tagging, in-situ egg incubation, and research efforts for endangered green and hawksbill turtles. This annual program, which runs from April to October each year, invites members of the public from Malaysia and across the globe to experience these ancient marine reptiles up close in their natural habitat. While immersed in a pristine tropical environment, volunteers actively contribute to conservation led by SEATRU’s scientific team. Over the years, the program has helped foster a deep sense of national heritage and environmental stewardship among Malaysians. It has also gained international recognition, drawing participants from around the world for a once-in-a-lifetime opportunity to aid in the protection of endangered sea turtles nesting along a remote, conservation-focused beach.

As a research center actively involved in diverse, multidisciplinary studies while simultaneously advancing on-the-ground conservation, Chagar Hutang Turtle Sanctuary (CHTS) depends heavily on robust human and financial support. These resources are crucial for maintaining the sanctuary’s operations, enhancing research activities, and providing training and education for students, emerging researchers, and the general public. SEATRU has been proactive in ensuring CHTS can develop and sustain itself financially over the long term, without neglecting its social responsibilities to local communities and nature. Through innovative adoption and outreach programs, SEATRU has cultivated vital partnerships and public engagement.

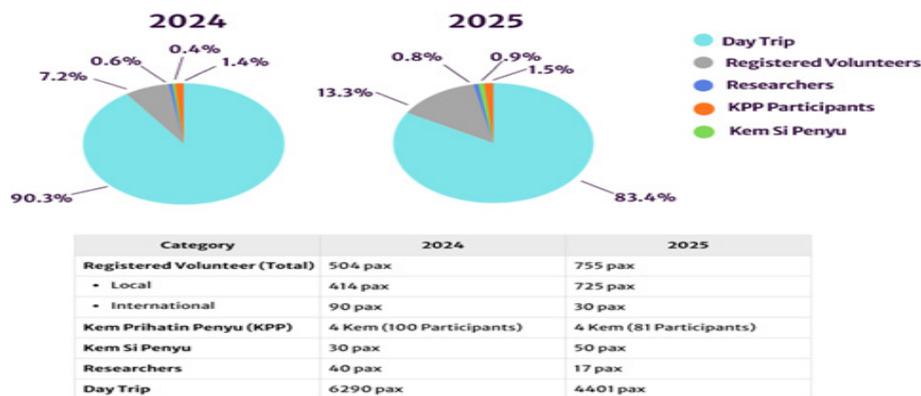


Figure 1: The number of visitors and outreach programs at CHTS for 2024 and 2025

With the rise of social media, interest in SEATRU’s programs has surged among the global public and scientific community. This growing visibility that coupled with the participant growth illustrated in Figure 1, making the case for digitalization more urgent than ever. Furthermore, the pressures of ecological challenges from coastal development to climate change increasingly strain conventional conservation practices. As these pressures intensify, the limitations of passion-driven, manual, and paper-based conservation systems become evident. The conservation activities of sea turtles have therefore reached a critical turning point, demanding a systematic and technology-enabled upgrade in conservation management. As illustrated in figure 2, SEATRU has conducted a SWOT analysis to critically evaluate internal operational capacities and external pressures in managing CHTS, thereby informing strategic planning and justifying the adoption of integrated digital solutions to enhance long-term sea turtle conservation effectiveness.



Figure 2: SWOT Analysis on SEATRU's sea turtle conservation management at Chagar Hutang

In response to this need, the Chagar Hutang Resource Management System (CHARMS) mobile application is developed as an integrated digital platform to modernize sea turtle conservation management and automate SEATRU operations. CHARMS moves beyond fragmented, paper-based workflows by centralizing data management, resource allocation, volunteer and internship coordination, safety monitoring, maintenance scheduling, and regulatory compliance within a single, cohesive system as shown in figure 3. By combining structured databases, real-time reporting, and decision-support tools, CHARMS enables conservation teams to manage complex field operations more efficiently, transparently, and sustainably. This system represents a shift from reactive, labor-intensive conservation practices toward a proactive, data-driven model capable of supporting long-term sea turtle protection under escalating environmental and operational pressures.

At its core, CHARMS is structured around four integrated modules, which are Program Reservation, Safety and Maintenance, Internship Program, and Human Resource Scheduling that collectively form the foundational digital infrastructure of a smart sea turtle sanctuary. Designed from the ground up, these modules mirror the essential day-to-day operations of conservation sites and translate them into structured, interconnected workflows. The Program Reservation module (figure 4) coordinates volunteers and outreach program participants, task assignments, and participation tracking for conservation activities. The Safety and Maintenance module (figure 5) ensures systematic monitoring and upkeep of critical facilities and equipment, supporting a safe and functional field environment. The Internship Program module (figure 6) manages internship applications, training, supervision, and performance documentation for student researchers and interns, strengthening capacity building and knowledge transfer. Meanwhile, the Human Resource Scheduling module (figure 7) optimizes shift planning to ensure adequate manpower coverage for staff deployment, daily patrols, nesting monitoring, and emergency response. Together, these interconnected modules replace fragmented, paper-based practices with a centralized, data-driven system, laying the operational foundation for a smart sanctuary that is efficient, accountable, and resilient to the growing challenges of sea turtle conservation. This modular architecture also provides a scalable foundation for integrating sensor networks, real-time monitoring, and AI-enabled analytics in future smart sanctuary deployments.

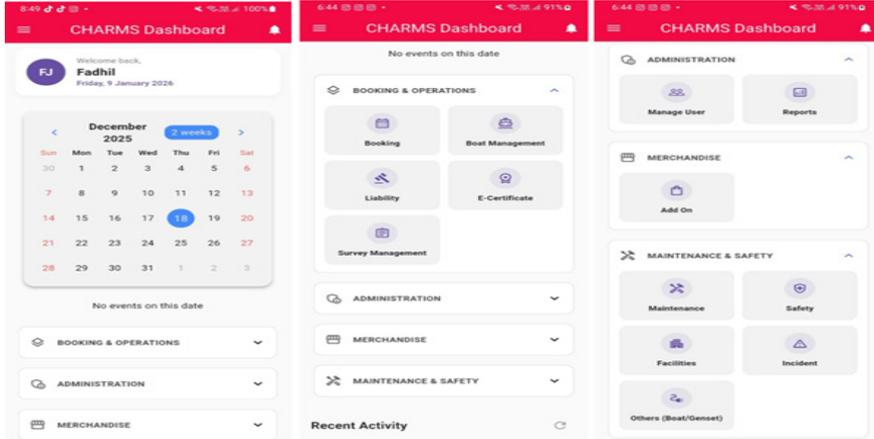


Figure 3: CHARMS dashboard (SEATRU internal administration)

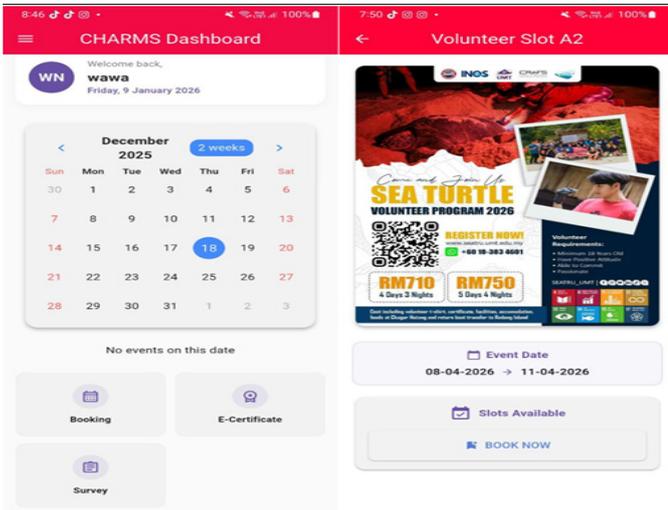


Figure 4: Program Reservation module

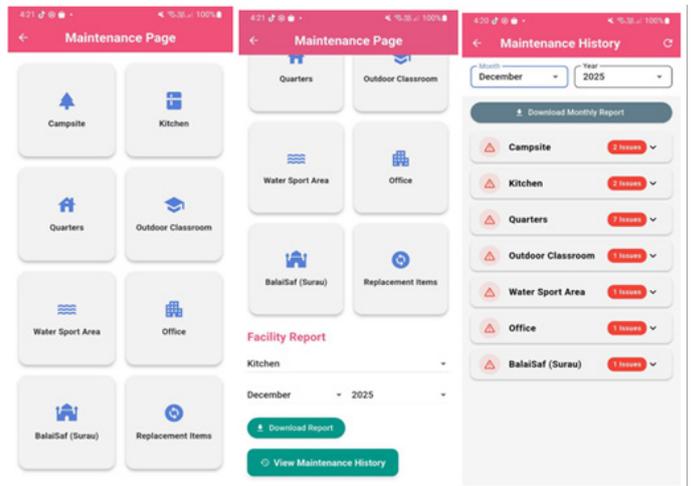


Figure 5: Safety and Maintenance module (SEATRU internal administration)

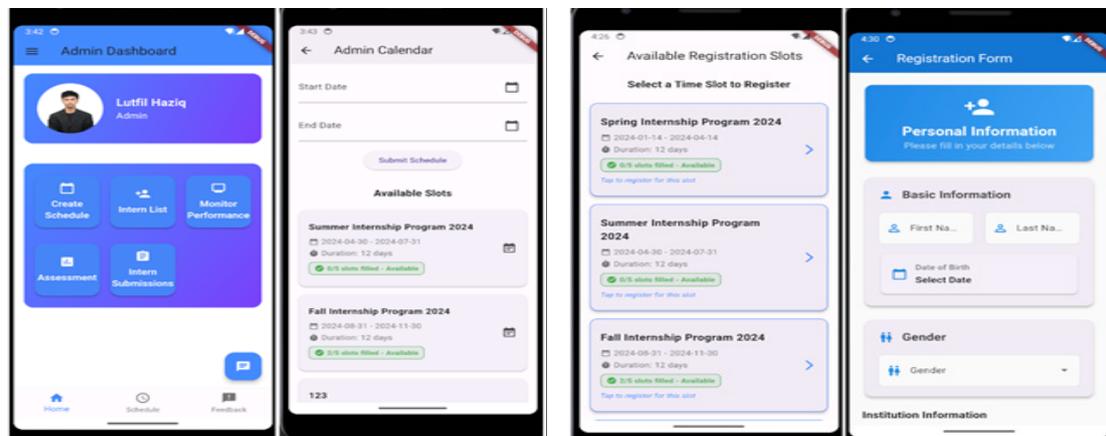


Figure 6: Internship Program module

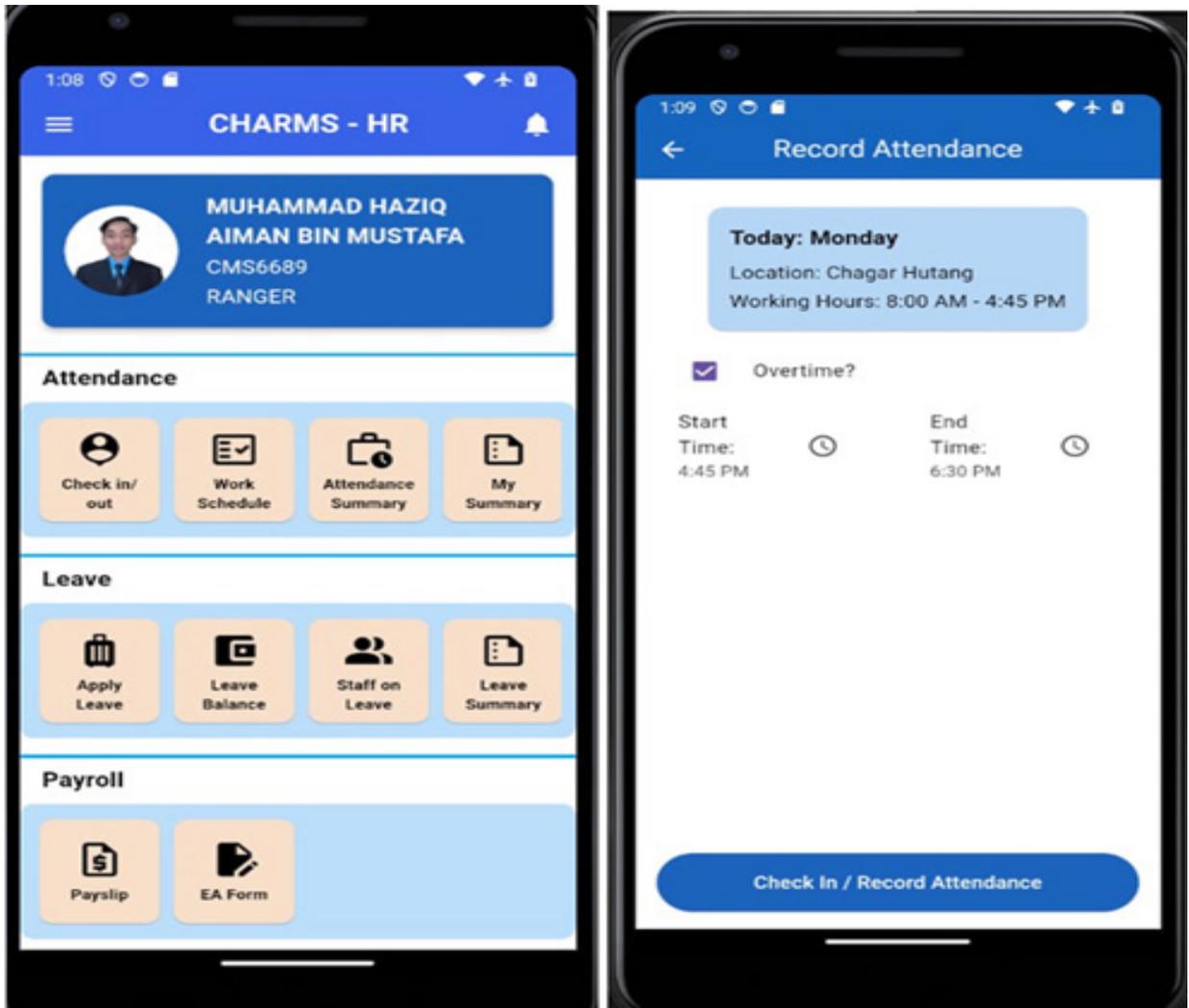


Figure 7: Human Resource module

CHARMS received its official copyright registration in 2025. Concurrently, recent updates to the Institute of Oceanography and Environment (INOS) organizational structure have placed SEATRU under the newly formed Conservation Management Centre (CMC), alongside affiliated units including the Mangrove Research Unit (MARU), Coral Ecology Unit (CORE), and the Marine Endangered Species Unit (MES). This realignment creates a strategic opportunity. The vision of a "smart sanctuary" system and specifically the CHARMS framework can now serve as a foundational blueprint for digital transformation across these related conservation units. By leveraging the modular design already proven at Chagar Hutang, the system offers a scalable model for advancing data-driven management throughout the CMC.sanctuary deployments.

Multibeam Backscatter Data Analysis & Interpretation

Training Workshop

Written by: **Azizi Ali (INOS)**

The Institute of Oceanography and Environment (INOS), Universiti Malaysia Terengganu (UMT) successfully organised a five-day Multibeam Backscatter Data Analysis & Interpretation Training Workshop (23th – 27th of November 2025), involving 22 participants from various government agencies and academic institutions.

The workshop was funded by the Department of Minerals and Geoscience Malaysia (JMG) and jointly supported by the National Hydrographic Centre (PHN), Department of National Heritage (Jabatan Warisan Negara – JWN), Universiti Teknologi Malaysia (UTM), with INOS, UMT serving as the main organiser.

Sharing Knowledge and Practical Experience- Learning from Experts

The training sessions were delivered by a team of experienced lecturers and researchers:

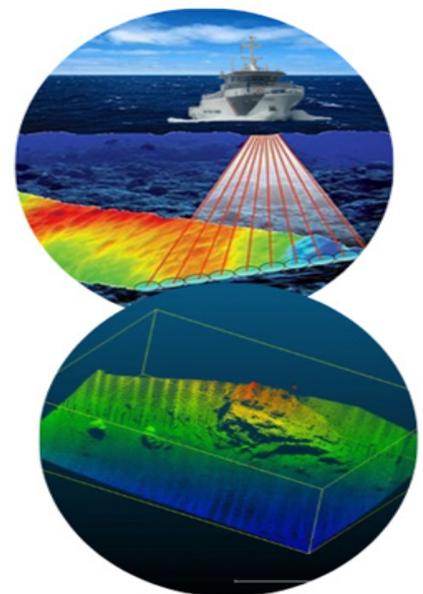
Ts. Dr. Azizi Ali, Dr. Khaira Ismail, Dr. Rozaimi Che Hasan, Assoc. Prof. Dr. Fatin Izzati Minha, and Gs. Dr. Muhammad Hafeez Jefry. Their combined expertise provided participants with both strong theoretical understanding and valuable hands-on experience.

What Did the Participants Learn

The workshop content was carefully structured to guide participants from basic concepts to practical applications. Key topics included:

- Introduction to acoustic surveys and marine data
- Datums, map projections and coordinate systems
- Backscatter theory in multibeam surveys
- Hands-on backscatter data processing
- Introduction to Angular Range Analysis (ARA)
- Practical ARA exercises
- Ground-truthing and sediment data interpolation
- Practical sessions using ArcGIS, including exporting backscatter, ARA and ground-truth data

Participants were also introduced to industry-standard software such as QPS FMGT and SonarWiz, widely used in hydrographic and seabed mapping studies.

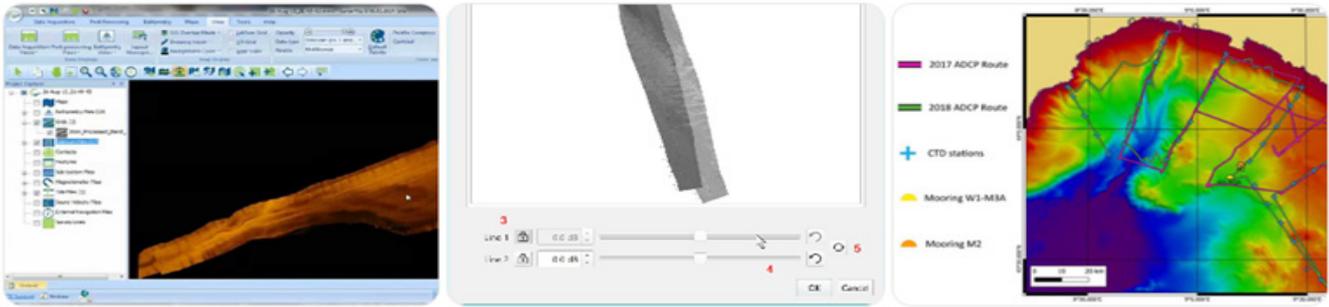


Workshop Objectives

The main objectives of the training were to:

1. Introduce participants to the fundamentals of multibeam echosounder (MBES) and backscatter technology
2. Provide hands-on experience in processing and interpreting multibeam backscatter data
3. Demonstrate the integration of backscatter and bathymetric data for seabed characterisation
4. Familiarise participants with commonly used industry software for backscatter analysis

Overall, the workshop successfully enhanced participants' technical skills while strengthening collaboration between government agencies, universities and research institutions. This training reflects INOS, UMT's continued commitment to capacity building and knowledge sharing in marine mapping and hydrographic sciences.



From Theory to Practice

The workshop was designed to be practical and hands-on. Participants learned step by step, starting from basic concepts and moving towards real data analysis. Topics included:

- Introduction to acoustic surveys and marine data
- Datums, map projections, and coordinate systems
- Basics of multibeam backscatter theory
- Hands-on backscatter data processing
- Introduction to Angular Range Analysis (ARA)
- Practical ARA exercises
- Ground-truthing and sediment data interpolation
- Using ArcGIS to integrate backscatter, ARA, and ground-truth data
- Industry-standard software such as QPS FMGT and SonarWiz was used throughout the training.



The workshop successfully provided participants with new skills, practical experience, and confidence in handling multibeam backscatter data. It also strengthened collaboration between government agencies, universities, and research institutions.

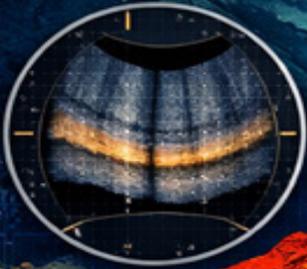
This training reflects INOS, UMT's commitment to capacity building and knowledge sharing in marine mapping, hydrography, and seabed characterisation.

NEWSLETTER

Multibeam Backscatter

Data Analysis & Interpretation

TRAINING WORKSHOP



Exploring the Seafloor Through Sound

Racing Against Time

Written by: **Mohd Uzair Rusli (CMC, INOS)**

Marine conservation today is no longer constrained by scientific uncertainty. It is constrained by institutional hesitation, fragmented responsibility and the reluctance to act decisively in the face of overwhelming evidence. The persistent gap between scientific knowledge, policy formulation and on-the-ground action is not merely a technical failure. It is a governance and leadership failure.

Across the world, marine ecosystems are changing faster than our institutions, policies, and implementation mechanisms can adapt. Coral reefs, seagrass meadows, mangroves and threatened marine species do not wait for governance structures to be perfectly aligned. They respond immediately to pressure, and often irreversibly.

Malaysia has not been idle. The country has produced numerous policies, blueprints and strategic frameworks related to oceans, biodiversity and sustainability. These documents reflect serious intent, intellectual effort and long-term vision. Yet, it would be intellectually dishonest not to acknowledge a persistent and uncomfortable reality: the gap between scientific knowledge, policy formulation and on-the-ground action remains wide.

Marine governance in Malaysia is highly fragmented. Fisheries, conservation, coastal development, tourism, energy and enforcement operate largely within their own institutional boundaries. Mandate-based thinking, while administratively convenient, often becomes ecologically destructive. Marine ecosystems do not recognise institutional jurisdictions, yet management responses remain rigidly compartmentalised.

Paradoxically, this very fragmentation also presents an opportunity. A multi-sectoral landscape brings diverse perspectives, expertise, and ideas. Scientists, practitioners, policymakers, and communities view the marine environment through different lenses, enriching the collective understanding of problems and solutions. The real deficit, therefore, is not a lack of ideas or data, but a lack of ownership when it comes to translating knowledge into action.

Too often, responsibility is deferred with statements such as “this falls under another agency” or “that is not within our mandate.” These phrases sound administratively correct, yet they often function as convenient stopping points. In the end, institutional boundaries are respected, but ecosystems continue to degrade.

This is where the academic and scientific community must reflect seriously on its role. The role of scientists must evolve from knowledge producers to ethical actors within socio-ecological systems. The responsibility of knowledge does not end with accuracy, rigour or ethical publication. It also includes the moral obligation to ensure that knowledge informs decisions, shapes practices and leads to tangible outcomes.

This reflection has driven recent initiatives at the Institute of Oceanography and Environment (INOS), particularly the consolidation of marine conservation-related entities under a unified platform: the Centre for Marine Conservation (CMC). This move is grounded in a simple but critical realisation that marine conservation has long been approached in silos, often organised by species or habitat. Sea turtles are managed separately from coral reefs, mangroves from estuaries, and biodiversity from human activities.

Nature, however, does not operate this way. Species move across habitats. Human pressures accumulate across space and time. Climate change transcends ecological and administrative boundaries. Conservation efforts, therefore, must evolve from fragmented interventions towards integrated, system-based approaches.



CMC represents an institutional experiment in breaking the science-policy-action divide by design, not by aspiration. It aims to amplify impact not by replacing existing expertise, but by connecting it. From isolated projects to coordinated efforts. From species-centric thinking to seascape-level strategies. From short-term interventions to sustained, adaptive action.

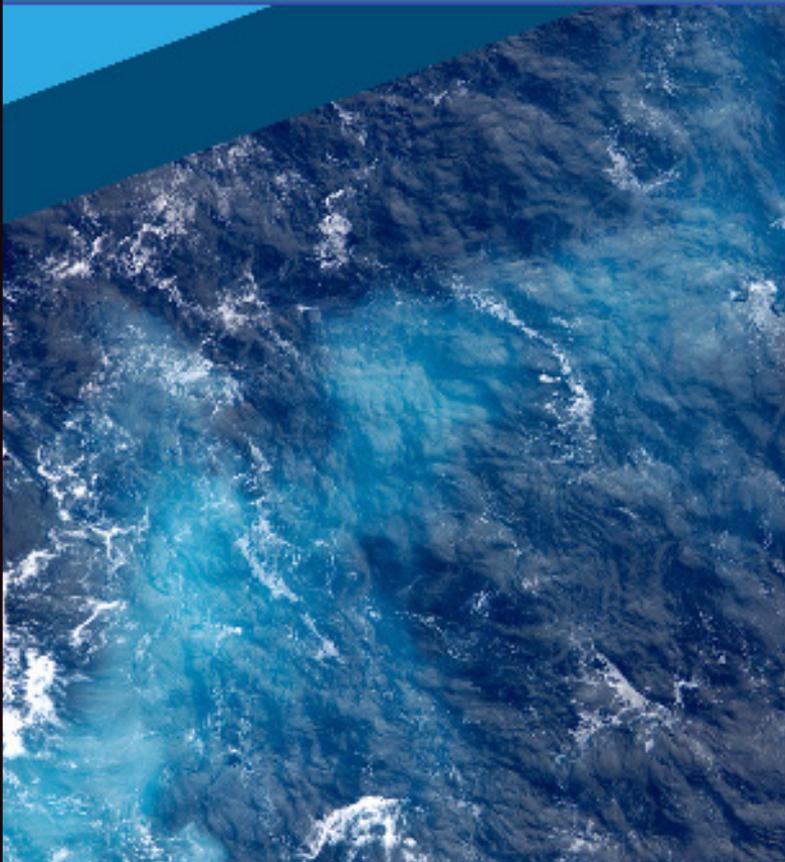
Yet, structure alone will not deliver change if courage is absent.

This brings us to a question every researcher should honestly ask: Where does the impact of our research truly go? Is it sufficient for years of work, often funded by public resources, to culminate solely in academic papers? Or should we expect our science to influence how environments are managed, protected and governed?

This question is not an accusation, but an invitation to reflect. If we genuinely believe that our research carries the potential to make a difference, then it is our responsibility to stand at the forefront of that change.

Marine conservation today demands more than technical correctness. It requires ethical leadership, humility, collaboration, and the courage to move first. In a race against time, ecosystems do not respond to explanations; they respond to action.





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