



**INOS GRADUATED
THE 7 YEARS HICOE
PROGRAMME**

**RISING SEA-LEVEL IN
MALAYSIA: A HISTORY**

**A TALE OF THE
MONSOON RIDERS**



INOS HAS OFFICIALLY GRADUATED AS A NATIONAL HIGHER INSTITUTION CENTRE OF EXCELLENCE

by **Prof. ChM. Dr. Suhaimi Suratman**

INOS is a pioneer centre of excellence (COE) in UMT. Established in May 2001, our main focus is conducting multi-disciplinary research in oceanography. The major objective behind the establishment of INOS is to achieve better understanding on the key scientific questions about the marine environment and its interaction with the earth systems through scientific research, oceanographic observations, data modelling and satellite studies.

Moving towards gearing up research, development, and innovation (R&D&I) in Malaysia, the Ministry of Higher Education (MOHE) found the need to recognise exceptional CoEs in universities as Higher Institution Centres of Excellence (HICoE) to advance them towards internationalisation in becoming a global leader in their niche areas. HICoEs are supported and facilitated by MOHE to become the focused vehicles in driving the R&D&I agenda particularly in fundamental research, as well as contributing to human capital development.

In November 2011, INOS was awarded the status of Potential HICoE by MoHE under the R&I Thrust, and subsequently became the 7th full-fledged HICoE programme in July 2012 under the “Sustainability of Marine Ecology” niche area. INOS was designated as the focal point and leader in marine science, focussing on the South China Sea area. Although our core focus has always been in the broad area of oceanography, realignment took place under this HICoE programme with the aim to bolster three main research areas; marine processes and marine ecology that have always been our strength, and an emerging field of ocean governance that provides the science policy nexus to achieve the Sustainable Development Goals.





The HICoE status has elevated our visibility and attracted research collaborations from across the country and around the world. Key performance indicators (KPIs) have been put in place throughout the implementation of HICoE. Among the KPIs set are increased research grants from the industries and international agencies, high-impact publications through research collaborations, postgraduate students, innovation, and income generations from courses and trainings. After a stringent series of audit during Phase One and Phase Two by HICoE panels, INOS has now officially graduated as a national HICoE with outstanding achievement, as announced by the Minister of Higher Education, Datuk Seri Dr Noraini Ahmad, during her working visit to UMT on 3 October 2021.

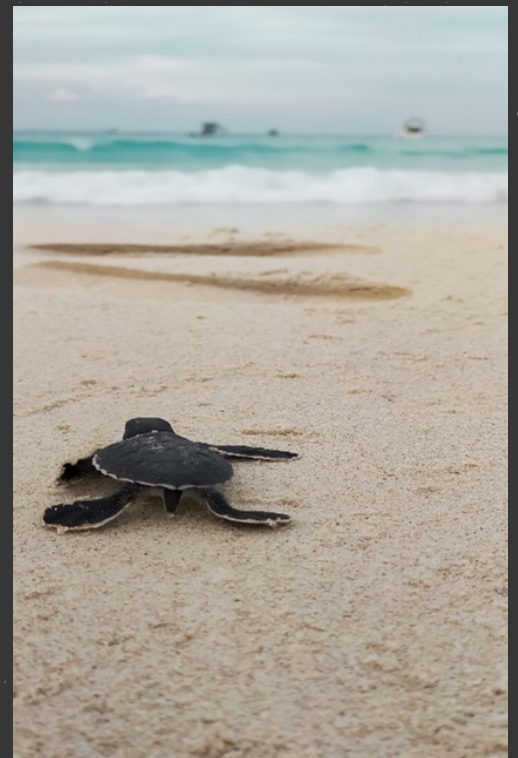
A TALE OF THE MONSOON RIDERS FROM TERENGGANU

by **Dr. Uzair Rusli**
Sea Turtle Research Unit, INOS

The monsoon system helps our sea turtle to establish different populations in the South China Sea (SCS) for their survival. How baby turtle benefits from the monsoon?

The SCS exhibit two types of monsoon; the Northeast and Southwest monsoon. Sea turtle hatchlings dispersal in the ocean are highly influenced by the monsoon season. The simulated hatchlings are distributed north into the Gulf of Thailand during the Southwest monsoon, while during the Northeast monsoon, the simulated hatchlings travel south into the Java Sea. A classic theory in sea turtles' life cycle is the 'lost years' of baby turtles once they get into the water and swim away from the shore. It is almost impossible to track a half palm-sized baby turtle in a vast ocean as they normally exhibit swimming frenzy behaviour to leave the shore. The lost years will last between 15-25 years, until the sea turtle reach their maturity and return to their natal beach to reproduce.

However, the findings in 2016 by UMT on baby turtles' energy spends when they come out of the nest has paved the way to unravel these lost years theory. We learnt from most recent research that baby turtles hatch during different monsoon seasons will form different subpopulations in the SCS. We predicted a single hatchling to swim for 7 days non-stop and go as far as 116 km through ocean modelling techniques. We now understand the role of this monsoon wind in guaranteeing this species' survival. Although they come from the same mother, their dispersion in the ocean is determined by different currents according to the Southwest or Northeast monsoon season. This is the reason why a mother turtle can nest between 8-12 times annually - some hatchlings are set to go to the Gulf of Thailand, while the others will go to the Natuna Islands. Therefore, the sea turtle hatchling benefits from these different monsoons by building up distinct subpopulation in our big ocean.

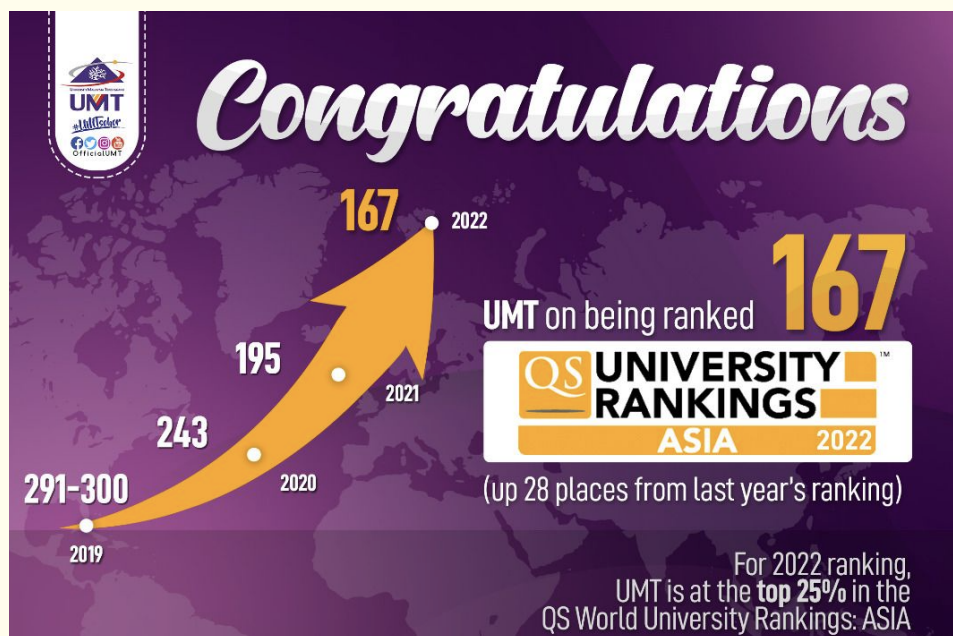


Our research findings may be able to bring us back to the grace of Allah SWT through His amazing creation. If we continue to consume turtle eggs while this species is on the verge of extinction, we are indeed ignorant and thoughtless.

MONSOON RIDERS

"Great news to all who involve
directly or indirectly to make this
university progress further and
contributes more to the nation
and the world"

OCEAN OF DISCOVERIES FOR
GLOBAL SUSTAINABILITIES



WHY SHOULD WE TRUST THE NEW CLIMATE REPORT?



by Prof. Ts. Dr. Mohd Fadzil Mohd Akhir

It is devastating to see another extreme flash flooding water gushing down slopes around Gunung Jerai catchment area affecting thousands of people in Kedah. Many started to blame deforestation as the leading cause, and some reserved their blame towards climate change. Twitter feeds start pouring comments, but several threads begin to attract attention. For example, some internet users use Google Earth snapshots, freely comparing available high-end satellites images with different time frames, trying to prove the cause of the flash floods.

During this information age, people requires explanation substantiated with evidence, not just theories. Their efforts to explore into every accessible information to back their views is very impressive. It is a great progress for Malaysia when the people are shifting their trust from theory to empirical data, and when science is being at the focal point of discussion.

Although interest in science is relatively low in Malaysia, the recent trend has shown that trust in evidence-based decision is at the pinnacle. The vaccination program is a straightforward example. Swift action in thumping vaccine sceptics was founded based on scientific explanation. It is time for scientists to increase science advocacy to translate essential information into impactful actions. A recent IPCC report published in early August will be the best tool - this 3,000-pages report altogether describes itself as a "code red for humanity." If scientists were to properly use this output, it might accomplish two things; creating fear of an impending danger posed by the changing climate, or instil awareness that we can still do something about it. Both elements will effectively carry a sense of urgency and climate literacy.

The report took almost 8 years to prepare, by 234 leading scientists from more than 60 countries, who are among the best in their respective fields. It requires them to digest nearly 15,000 scientific papers and derive the interconnectivity therein, which carry loads of information on what will change our physical earth. 195 representatives from UN member countries subsequently reviewed those reports in several stages. It took longer than expected because the first draft of the current report had more than 23,000 review comments from experts while the second draft had more than 50,000 review comments, which were taken into consideration in producing the final draft. It is by far the most comprehensive and sophisticated report ever made on earth. Its lengthy and systematic examination process by fellow scientists makes it almost impossible to deny the findings.

So what does the report found? The IPCC emphasizes the global temperature has increased more than 1.1%, the highest since 125,000 years ago. The ice melting is at a tipping point, and it will speed up the sea level rise, which tells us that coastal erosion will worsen and few coastal cities will be underwater in the next few decades. Most importantly, for us in Malaysia, this is the first time the report underlines the increase of extreme weather events such as rainfall, drought, storm, and flooding.

To trust the report is one thing, to act upon it is another – and the education sector is trying its best to do both. For several decades, there has been a widespread and organized campaign aimed to generate scepticism in science. Some were funded by big industries threatened by the findings of modern science, which might cause trouble to their establishment. Take, for example, the flat-earth theory. Even, a standard 6 school children can testify how ridiculous it is. However, ideas flow swiftly in this internet age where social media influencers or celebrities can easily gain traction of these silly ideas through their millions of so-called followers.

Our climate is changing, so must our approach. The changes we need to make are complex, particularly when we lack the skills of communicating our findings and increase public literacy on climate-related actions. This effort demands large-scale, collective action: to build and create interests, change mind-sets, revolutionize public advocacy, and perhaps rebuilding our education system. Modern society relies on experts. We must therefore grab this opportunity with the most extensive data and information available. Now is the best time to communicate climate change action to the public.

Like the Covid-19 vaccination program, we want to translate information into action. Just knowing and agreeing about vaccines is not enough without taking the jab. So do climate change, it is happening, and we can feel it. Many of the direst effects of climate change can still be avoided by taking immediate action.

*This article first appeared in the New Straits Times .



SOLID WASTE MANAGEMENT STAKEHOLDER ENGAGEMENT ON ISSUES AND SOLUTIONS IN TERENGGANU



by Dr. Nazli Aziz

Coordinator, Centre for Ocean Governance, INOS

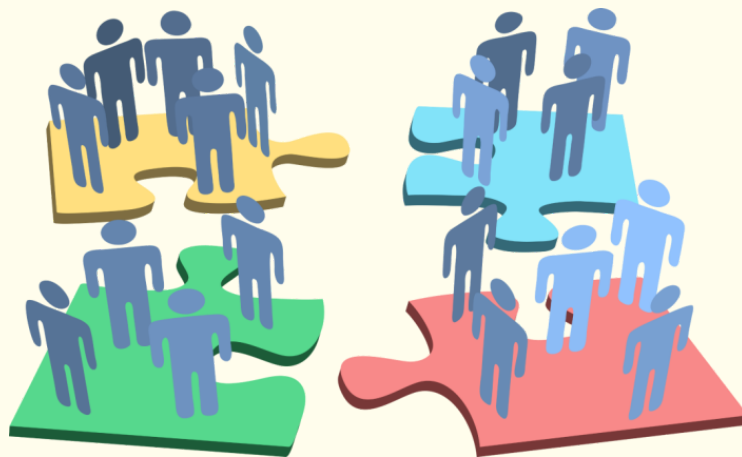
Solid waste management has become one of the most important issues, both in academia and non-academic domains for decades. Various dialogues have been organised on how best to solve the issues holistically using sustainable methods and technology.

The first UMT – Kuala Terengganu City Council (MBKT) engagement on issues and solutions in solid waste management was held on 13-14 October 2021 at its Pulau Bidong Natural Marine Research Station. The engagement was jointly organised by INOS and MBKT. This session was part of Kuala Terengganu-Kuala Nerus Marine Spatial Planning Project, a joint pilot project between INOS and Fujian Institute for Sustainable Ocean (FISO), Xiamen University, China. This engagement session was also partially supported by the UK Global Research Translation Award, as part of microplastics project with University of East Anglia.

This engagement gathered 22 participants from UMT, MBKT and PLANMalaysia Terengganu. The session focused on the potentials of Kuala Terengganu and Kuala Nerus to better institutionalise and nurture sustainable development, using combination of bottom-up and top-down approaches. In addition, the engagement also was used as a platform to (re)introduce UMT experts to MBKT and their possible contributions to the engagement objectives.

Over two days, this platform was used by the participants, including the Kuala Terengganu Mayor, to brainstorm in a very laidback setting. They re-energised the existing thinking on the modalities of sustainable methods and development as well as encouraged MBKT to shape new inter-agency cooperation initiatives. Among the most important concrete initiatives discussed were mechanisms on solid waste management and policy development. In addition, the engagement assessed the need for regular meetings of MBKT-UMT. Some of these notions were also picked up at the engagement's closing session by YB Ahmad Shah Muhamed, Deputy Chairman of the Local Government, Housing, Health and Environmental of Terengganu of practical ways that UMT and the State Government of Terengganu could foster sustainability as a key objective in policy-making.

A resolution was presented before YB Ust. Ahmad Shah Muhamed, Mayor Tn. Hj. Rozali Salleh, and Vice Chancellor UMT, Prof. Dr. Mazlan Abd Ghaffar during the closing ceremony. The suggestions and resolutions detailed out are generally not new and grandeur. But, they are promising - practical, achievable, sustainable and future-oriented. The hope is that the resolution could eventually make significant contribution to the current and future sustainable development strategies adopted by MBKT. The holistic approach to transform the city now begins.



PENGURUSAN MAMPAN SISA PLASTIK PERLU KERJASAMA SERANTAU DAN ANTARABANGSA

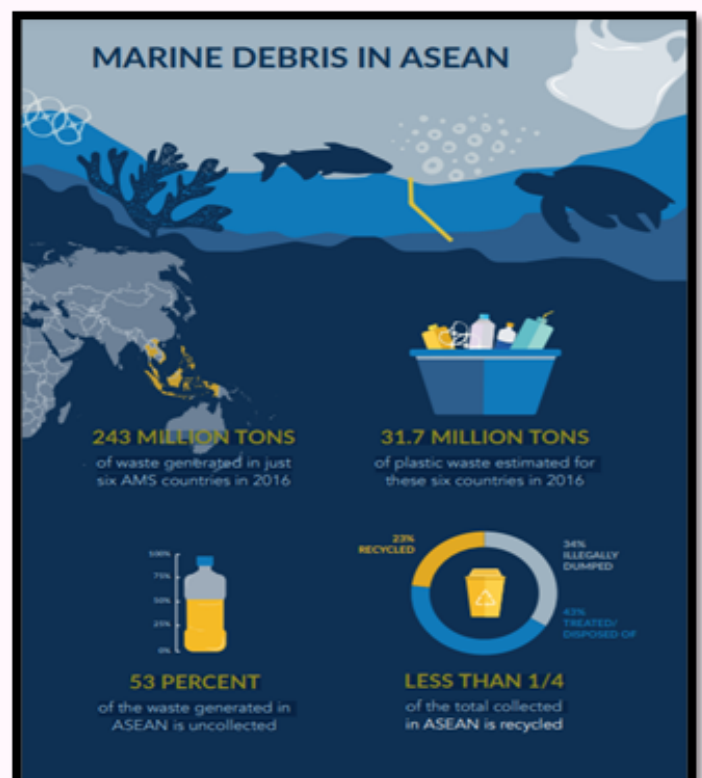
by **Prof. Dr. Wan Izatul Asma Wan Talaat**

Ketua Pusat Tadbir Urus Lautan, INOS

Pandemik COVID-19 telah menyebabkan peningkatan penggunaan peralatan pakai buang terutamanya plastik sekali pakai (single use plastics – SUPs). Kian banyak sisa plastik mencemar lautan, garis pantai, dan sungai di samping mempengaruhi kehidupan masyarakat pesisir pantai. Kebanyakan pencemaran plastik di laut bermula di darat. Ketumpatan rendah plastik memudahkan pergerakannya dari tempat asal sehingga terkumpul di dalam putaran sistem arus laut yang besar. Memandangkan lautan tiada bersempadan fizikal, dianggarkan antara 15 ke 51 trillion kepingan plastik di dalam lautan-lautan dunia dari Kutub Utara ke Kutub Selatan, dari permukaan bumi sehinggalah ke dasar lautan.

Plastik merupakan bahan yang tidak boleh terurai secara biologi dan boleh menjadi toksik dan berbahaya kepada alam sekitar dan juga manusia jika tidak diuruskan dengan baik. Konvensyen Basel 1989 mengenai Kawalan Pergerakan Merentasi Sempadan dan Pembuangan Sisa Berbahaya adalah undang-undang antarabangsa yang terpakai bagi mengatasi masalah sampah plastik. Pindaan baru-baru ini yang berkuatkuasa pada 1 Januari 2021 dan terpakai terhadap kesemua 188 negara anggota telahpun memperkemas kawalan pergerakan sisa plastik termasuk import an eksport, serta menyenaraikan jenis-jenis plastik yang berbahaya dan perlu diasing dan dilupuskan secara mampan.

Masalah pengurusan sisa plastik di ASEAN turut berada di tahap yang membimbangkan. Pada tahun 2016, 243 juta ton sampah telah dihasilkan oleh 6 buah negara ASEAN termasuk Malaysia. Pelan Tindakan Serantau ASEAN bagi Memerangi Serpihan Laut 2021-2025 telah dilancarkan baru-baru ini untuk memandu tindakan serantau dalam menangani pencemaran plastik terutamanya untuk mengatasi masalah sisa SUPs, dan menangani punca yang membawa kepada kebiasaan dan amalan peralatan pakai buang.



Sumber: Pelan Tindakan Serantau ASEAN 2021-2025

Memandangkan 80% pencemaran laut berpunca dari darat, penyelesaian dan koordinasi bersepadu telah dikenalpasti untuk mengatasi serpihan plastik laut pada tiga peringkat utama rantai nilai:-

- **Mengurangkan Input**

Merancang produk agar dapat diguna atau dikitar semula, meningkatkan kesedaran perniagaan dan pengguna mengenai jejak sisa plastik mereka, menjelaskan piawai mengenai kebolehgunaan secara biologi, serta mengurangkan penggunaan SUPs.

- **Meningkatkan pengumpulan dan meminimumkan kebocoran**

Menambahbaik infrastruktur utama pengurusan sisa pepejal, mempromosi langkah pengasingan yang sesuai, memperketat mekanisme penguatkuasaan untuk mengelakkan pembuangan sampah, serta memperjelaskan perlabelan pembungkusan sama ada untuk perlupusan/kitar semula.

- **Mengwujudkan nilai bagi sisa yang diguna semula**

Menjamin jumlah bahan baku, membangunkan pasaran lepas, meningkatkan pengasingan sampah pengguna, meningkatkan pengetahuan tentang teknologi yang sesuai serta meminimumkan risiko pelaburan ke atas langkah-langkah penyelesaian utama.

Komitmen negara ASEAN diperlukan untuk memastikan pendekatan bersepadu melalui 14 Tindakan Serantau untuk mengatasi pelbagai masalah plastik di sepanjang rantai nilai mengikut 4 komponen kerangka di bawah.



Sumber: Pelan Tindakan Serantau ASEAN bagi Memerangi Serpihan Laut 2021-2025

Peranan dan Tindakan Malaysia

Malaysia sedang melaksanakan projek SEA Circular bersama tujuh negara ASEAN lain untuk mengurangkan sampah plastik melalui pengurusan rantai nilai plastik di Asia Tenggara. Di samping itu, Kementerian Alam Sekitar dan Air (KASA) turut telah mengambil langkah pantas merangka polisi dan pelan tindakan kebangsaan bagi menanganimasalah sampah dan serpihan plastik laut yang bakal dilancarkan pada 16 November 2021.

Memandangkan pencemaran plastik di lautan mengancam hidupan dan ekosistem marin yang akhirnya akan memberi impak negatif ke atas manusia, dan kos pemulihan ternyata amat besar, masyarakat juga perlu segera diberi kesedaran untuk mengambil pelbagai langkah proaktif bersama-sama dengan kerajaan untuk memastikan punca masalah pencemaran ini dikawal dan diselia rapi. Perlaksanaan Konsep 4R (Reduce, Reuse, Recycle + Refuse,) yang telah diperkenalkan di Malaysia wajib dipandang serius.

Kerajaan Negeri, terutamanya kerajaan tempatan, perlu memperluas dan memperketatkan penguatkuasaan larangan penggunaan beg plastik secara sepenuhnya. Pengurusan sisa pepejal perlu dimantapkan di semua peringkat bagi memastikan Konsep 4R betul-betul dilaksanakan tanpa sebarang pengecualian. Teknologi dan inovasi terutamanya yang dihasilkan oleh universiti tempatan untuk mengubah sisa plastik kepada tenaga, bahan binaan, dan lain-lain kegunaan patut dimanfaatkan secara lebih agresif dan meluas dengan kerjasama industri.

Komitmen bersama dan tindakan bersepadu oleh ketiga-tiga peringkat kerajaan persekutuan, negeri dan tempatan, dan pelbagai pemegang taruh ini boleh memastikan keberkesanan langkah-langkah mengatasi masalah pencemaran plastik yang diambil di peringkat kebangsaan, serantau dan antarabangsa.

**An earlier version of this article first appeared in Berita Harian, 13 Julai 2021*



RISING SEA-LEVEL IN MALAYSIA: A GLIMPSE OF HISTORY



by **Dr. Rokiah Suriadi**

Post Doctoral Candidate, INOS

Rising sea-level is no doubt an international threat to coastal cities including in Malaysia. Giving the fact that our neighbour, Indonesia will be relocating its capital city from Java to Kalimantan soon due to sinking, Malaysia must also be prepared with good and proactive action plans. Kuala Terengganu, or known as 'Waterfront Heritage City' is among coastal cities in Malaysia, blessed with fascinating and breathtakingly beautiful beaches. With the current rate on sea-level rise, this beautiful city is not exempted from being inundated one day. But do you know, that Kuala Terengganu, or certain parts of this city to be exact, has been underwater for some period of time? And way before that, our coastline was further offshore before it transgressed inland? That is the history of our sea.

Last Glacial Maximum

The Last Glacial Maximum (LGM) refers to the time (ca. 18,000 years ago) when most of the parts of the world was covered in vast ice sheets. During LGM, Borneo, Java, Southeast Asia, and Sumatra were connected to form the Sundaland with a land area of ca. 180 million km². During the period of lowered sea level (~120 m lower than present day) associated with the LGM, the Sunda Shelf area was subaerially exposed. This expansive (800 km wide) coastal plain linked Peninsular Malaysia to Borneo and was crossed by rivers that discharged their sediment load onto the present-day outer shelf and adjacent continental slope. Meaning that, it was easier for human to migrate from one place to another back then.

Holocene Transgression

Contrary to the LGM, the Holocene Transgression refers to the warmer period (ca. 9,000 to 5,000 years ago), with a thermal maximum around 8,000 years ago. This was the time when the ice melts, and sea-level was at its maximum position, at about 4 m above present mean sea-level. The discovery of well-preserved fossil coral reef, mollusks, and bivalves, located 6-13 km inland from the modern coastline and occur up to 50 cm above mean sea level, southwest of Merang, Terengganu confirms this theory. Subsequently, relative sea-level retreated generally to its present position and in Malaysian seas, the altimeter sea-level time series revealed that since 1993, the mean sea-level has been rising again, at a rate of between 1.42-4.08 mm/year.

Present day

The Sunda Shelf at present forms the submerged connection between the South China Sea and the Indian Ocean through three shallow straits, namely Malacca, Karimata and Gaspar. The water depth over the shelf area rarely exceeds 50 m, and a complex bottom topography (numerous elongated depression and paleo-channels) characterized the modern sea floor.

It is clear and can no longer be denied that the rising of sea-level due to the climate change can have devastating effects on coastal communities. If global warming is not handled wisely, it is not a surprise that history will repeat itself again.

*This article is an excerpt from a proceedings and journal article in preparation by the author.

·New evidence for early Holocene transgression on the Sunda shelf, offshore eastern Peninsular Malaysia. Proceedings of XIX INQUA Congress, Nagoya, Japan. 2015.

·Evidence of early Holocene transgression and paleoenvironmental interpretation inferred from benthic foraminifera on the Sunda Shelf, offshore eastern Peninsular Malaysia. *In preparation*



KAPAS TURTLES JOINS WITH UMT MARINE BIOLOGISTS AND SEAKEEPERS ASIA TO PROTECT SEA TURTLES ON KAPAS ISLAND



Suzanne Goodfellow

Kuala Terengganu, Malaysia.

Kapas Island has been involved in turtle conservation for many years. However, for 20 of those years, it has been local Malaysians who have led the cause to save the millennia-old giants of the sea, the green turtles of Terengganu. In Malaysian culture, there is usually one person who stands out, as the go-to person, for information on any subject. In this case, the rescuer of Kapas Island, Terengganu's green turtles is an athletic, energetic, local Malay man with a ready smile. Rani, or Turtleman, as everyone knows him, is the champion of the green turtles on Kapas Island.

Even while turtle egg poachers are wary of Rani bin Awang, he is lauded by the resort owners of Kapas Island. For the past 20 years, he has been saving the turtle eggs on Kapas by collecting them for hatching and releasing the baby turtles back into the South China Sea. He has not done this alone, because while we have been in lockdown during the Covid - 19 Pandemic, Rani has enlisted help from several of the resort owners and the community on Kapas Island to save the turtles.

Kapas Turtles has set up an area for a hatchery as well as scheduled night watches for female turtles landing to "nest" and lay their eggs. Current data shows more than 80% of the relocated eggs were hatched which is above average in the area and a great accomplishment. They also patrolled the beaches, to ward off poachers. The poachers sell the eggs for a nice profit in the local markets as a local delicacy. Everyone is aware that eating turtle eggs has been a local custom, and there is a need for others to make a living, but since the turtles are endangered, the hope is to create other job opportunities through conservation efforts.

Meanwhile Rani looks out for male breeding turtles. These males are now thought to stay in the area and have recently made the marine habitat around Kapas their territory. This is big news since this is a true sign their efforts are starting to be rewarded.

The Collaboration

Since their success has grown, Kapas Turtles formed a partnership with the International Seakeepers Society Asia which, in turn, reached out for project support to the Universiti Malaysia Terengganu (UMT), famed for its expertise in Marine Biology. A Scientific Advisory Team has been formed by Research and Education on the Environment for Future Sustainability (REEFS) Research Interest Group, Faculty Science and Marine Environment (FSSM). The Scientific Advisory Team is led by Assoc. Prof. Dr. Poh Seng Chee with REEFS researchers Assoc. Prof. Dr. James Tan Chun Hong, Dr. Siti NurTahirah Jaafar, Dr. Muhammad Hafiz Borkhanuddin, and Dr. Mohd Uzair Rusli from Sea Turtle Research Unit (SEATRU).

Meanwhile, the International SeaKeepers Society, Asia, a non-profit marine conservation organisation, is actively involved in projects that promote education, research, protection, and restoration of our oceans and marine life. The groups are collaborating with the aim to gather data for UMT Sea Turtle Research Unit's (SEATRU) turtle database. This database was created at UMT to hold, assimilate, and share information on all sea turtles in the area as well as prevent repetitive research among scientists. The University hopes to gather data from all of the other Terengganu turtle sanctuaries. Their goal is to give the Department of Fishery (DOF) Malaysia direct access to data from both scientists and conservation efforts so the Department can monitor turtle populations in the entire Terengganu area. Eventually, the plan is to tag each turtle so a treasure trove of information can be kept on each individual animal for turtle sustainability.

Dr. Rusli explained, "The standardization of the data recordings enables sharing of the data so that others, who (for example) might be concerned with the behavior or gender of the turtles, will have the data there in the dataset. "Citizen science programs like Kapas Turtles Project play an important role in providing data needed to monitor progress towards the sustainable development goals", according to Dr Poh.

Green Turtle Facts

Green turtles are the largest species of hard-shelled turtles and second largest sea turtle. These turtles are in danger from human poachers who take their precious eggs and human pollution, in the form of plastics, fishing nets, and marine traffic.

- Green sea turtles are classified as an Endangered species
- They are typically 91 to 122 cm long and weigh 136 to 159 kilos.
- Turtles are critical to maintaining healthy coral ecosystems.
- The turtles bring needed nutrients to maintain healthy beaches.
- The green sea turtle population seems to be growing on Kapas, but more data is needed.
- Male green sea turtles have been spotted in the area year-round leaving some to speculate that they are establishing habitat.

