

A SHORT HISTORY OF TMSI@ST JOHN'S ISLAND

The idea to establish a marine science research institute in Singapore was conceived over 20 years ago by an audacious group of local scientists. At that time, marine related research was carried out autonomously in individual laboratories deep inside universities and national research agencies. Given the exceptional marine biodiversity in the coastal zones of the Indian and Pacific Oceans and the huge socio-economic value of these marine resources combined with the pivotal geographical location of Singapore, TMSI's founders recognized that superior competency in tropical marine science would be a strategic asset for Singapore given our very limited land mass. In most developed nations, marine laboratories formed a critical part in the scientific infrastructure, to enable countries to compete to gain knowledge and access to limited and rare resources from the ocean. We also realized that the focus of marine research has been in the temperate zone and that Singapore, being only 80 nautical miles north of the equator, could offer a very different perspective. The multi-disciplinary nature of marine science dictated the need to draw researchers of different disciplines to an integrated programme. In the context of these contemplations, TMSI was formed.

A strong case was made for TMSI, and this resulted in generous funding from the then National Science and Technology Board (NSTB), now the Agency for Science, Technology and Research (A*STAR) to support an integrated Marine Biology & Biotechnology Programme and Marine Aquaculture Programme. In 1996 TMSI was born as the Tropical Marine Science Initiative. Four staff led by Professor Chou Loke Ming and Dr Elizabeth Taylor worked out of a bungalow at the farthest end of the Hog's Back (now Kent Ridge Road), which was for a time the former residence of the Vice-Chancellor in the early days of NUS. The living room became an administrative office, and the garage was used first as an office and later, a laboratory. Everyone who worked at TMSI has been won over by the easy camaraderie and the sea view: a constant reminder of our larger mission. As projects took off and staff strength grew, the garden was quickly populated with container units that served as temporary laboratories and offices. The multidisciplinary composition of researchers servicing multiple projects and operating in different locations across campus bears testimony to the growing relevance of marine science in Singapore today.

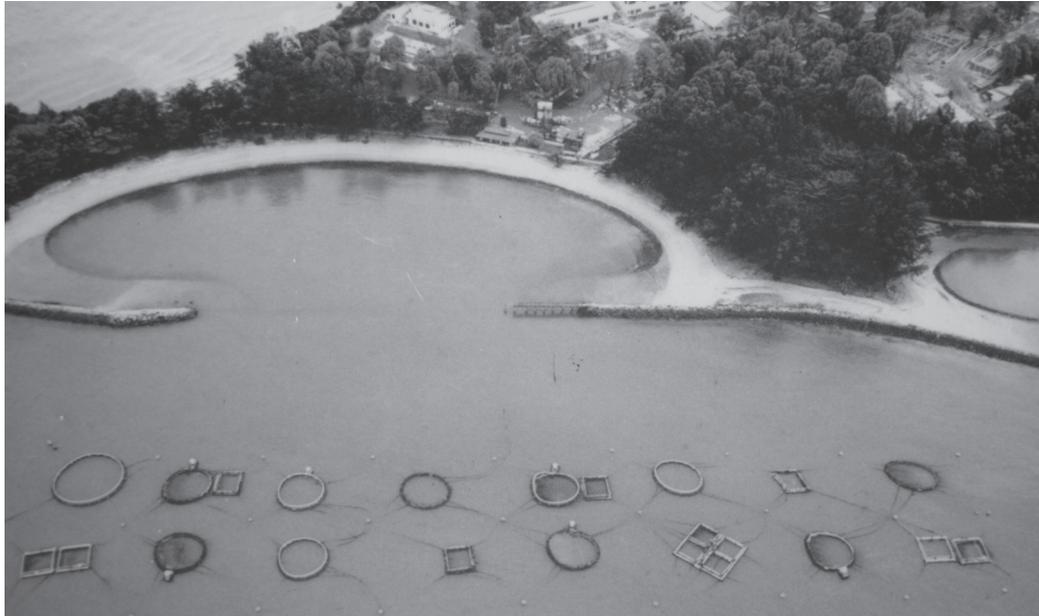
However, marine science research would not be conducted optimally from a land-locked location. Historically, marine exploration and supporting laboratories have been the major drivers for fundamental research in environment and ocean science. They have always formed an essential service for marine scientists by providing access to sites of natural interest supported by necessary living and research facilities to extend their studies. They invariably also operate as education centres, providing unique opportunities for students to receive practical scientific training and for international groups of scientists to meet.

Since the early days of the University, there were numerous attempts to establish marine facilities in Singapore. In the early 1950s, the Zoology Department (then University of Malaya in Singapore) led by Professor Richard Purchon set up a simple facility at Raffles Lighthouse to serve as a field station. This facility was later closed down for security reasons in 1965. At about the same time, the Fisheries Biology Unit (FBU) was established in the Zoology Department led by Professor Tham Ah Kow. A great deal of pioneering research, as evidenced by the many student theses and research papers produced, was carried out at the FBU, but the unit was closed in 1973. However in 1968, the UNESCO program for the cooperative study of the Kuroshio and adjacent regions (CSK) established the Regional Marine Biological Centre (RMBC) in the University of Singapore Bukit Timah campus (also headed by Prof Tham) for sorting and analyzing marine plankton in the South China Sea. RMBC closed after ten years in 1978.

Another attempt was made in the early 1990s to set up an offshore marine laboratory, led by Professors Chou Loke Ming and Lam Toong Jin (then Head of the Zoology Department at NUS). These initial plans were abandoned, but no sooner they were set aside when Dr Elizabeth Taylor approached Professor Lam with a marine project and a proposal to set up a marine institute in the Southern Islands. A meeting of potential stakeholders was organized to discuss the proposal. All supported the proposal and a planning committee chaired by Prof Lam was formed. The committee met with Mrs Pamela Lee at the Singapore Tourism Board (STB), who was then Head of the Southern Islands Development at STB. Mrs Lee proposed St John's Island for the purpose.

Together with the Marine Aquaculture Centre of the Agri-food and Veterinary Authority of Singapore next door to us, we formed a veritable research cluster. The idea to accommodate scientific research on St John's Island was strongly supported by Mrs Lee at STB. However, the project was waylaid by many difficulties from the onset. In 1998, due to civil unrest in Indonesia, original plans for the marine lab at the seafront on St John's Island were shelved to make way for a holding area for illegal immigrants. An area further inland was designated, but this meant that seawater had now to be drawn and pumped up to the aquaria from the sea. Through this turmoil, the project's architects turned over a few times. Mr Kent Williams, a

young Australian architect joined the project in 1998 and designed the excellent buildings we have now. Under his stewardship, the buildings were completed in less than three years, in July 2001, and by December 2001, our pioneer colony consisting of five biologists and one administrator had taken root on the premises.



An aerial view of the southeastern section of St John's Island in June 2000, showing construction of the Tropical Marine Science Institute (top right) and Marine Aquaculture Centre (MAC), Agri-food and Veterinary Authority of Singapore (AVA; top centre). AVA MAC experimental fish net cages can be seen in the channel (foreground) between St John's Island and Lazarus Island (not visible). Photo courtesy of Prof Lui Pao Chuen and the Straits Times.

By mid-2002, then TMSI Director Professor Chan Eng Soon had assembled a motley crew of one facility technician, a caretaker couple, two security guards, and 20 researchers, to begin marine science research on St John's Island. With youthful enthusiasm and vigor, the staff took it upon themselves to refurbish the research labs at the marine station. Everyone was on a steep learning curve, having never actually constructed a marine laboratory - but eventually seawater ran through the pumps, sand filters and aquaria. Furniture was installed in laboratories, whilst fiberglass tanks purchased from Australia were moved into the aquaria. The award of a research grant simply entitled 'The Marine Environment Programme' came from A*STAR just in time for TMSI in late 2001, providing the much needed funding for starting up projects on St John's Island. New equipment was brought in. Augmented with many generous donations of second-hand equipment and furniture, the labs and offices became functional. The TMSI premises on St John's Island were officially declared open by the Minister of Trade and Industry BG George Yeo on 3 October 2002.



The premises of the Tropical Marine Science Institute at St John's Island were declared open by the then Minister for Trade and Industry BG George Yeo on 3 October 2002.

Ten years on, we now have some 50 regular staff working on St John's Island. Despite our relatively modest existence, the repertoire of research and outreach activities carried out so far is impressive. With clean seawater from the Sisters' Fairway pumping through our aquaria, we have successfully reared a myriad of marine plants and animals, from microalgae, sea-grass to sponges, corals, giant clams, and sea horses to support research in the diversity of projects at the lab. The aquarium system also made possible microcosm experiments, which would be difficult to achieve on mainland Singapore. Example projects include research in marine biofouling, which is of great interest to the shipping community in Singapore and across the world because of the high cost to keep ship hulls clean to save fuel and prevent transfer of alien organisms. Collaborative research with the United States Office of Naval Research has helped to establish TMSI as the leading laboratory in the world for the research of marine fouling in tropical waters.

In the past ten years, the marine lab has hosted visits from eminent marine biologists from all over the world. The 14th International Marine Biology Workshop, which is part of a series of international workshops earlier held in Hong Kong and Australia, was hosted at the marine lab in 2006. The study resulted in the publication of a book volume consisting of 19 scientific papers focusing on the biology and ecology of the marine flora and fauna of Singapore. Since 2010, the lab has conducted annual training workshops in the taxonomy of tropical marine fauna, and this workshop series have attracted scientists from Southeast Asia, Australia and across the Pacific Ocean.

In terms of education over the last five years, some 15 local and international postgraduate students have carried out projects at the marine lab on St John's Island, and more than 30 undergraduate students completed their final year projects there. Over the last 10 years, through the Ministry of Education Science Research Programme, 26 junior college students spent several weeks each working on their research projects based on animals or plants found on St John's Island. Through our Outreach Programmes, school children of all ages and public have visited the marine lab, with some staying for overnight camps at the institute to learn more about marine science from physical oceanography and acoustics to the marine flora and fauna on and around the island.

Marine science in Singapore is very much still in its infancy. As an island nation, the reality is that our businesses and lives are very much entwined with the health of the marine environment. While Southeast Asia lies at the centre of the Asian Economic Growth Triangle, the region also has the highest marine biodiversity in the world. Even more complex and challenging is that the region has the greatest number of marine protected areas overlying major shipping lanes, transgressing a complex grid of international borders. The resulting environmental and social conflicts are tremendous. In the face of events such as climate change, the future of the region is uncertain. It has been predicted that fisheries in the South China Sea will collapse in 10-20 years. Such events pose serious threats to both food security and political stability and action to prevent a multi-factorial environmental melt-down must be taken based on careful scientific studies, to secure a future for our children.

TMSI has matured and is now strategically well placed, affirming Singapore's position as a focal point for marine science research and education in Southeast Asia. We have developed an extensive worldwide network of academic colleagues and partners in industry. The St John's Island Marine Laboratory is nestled in the Singapore Southern Islands, within reach of a diversity of rich marine habitats. The diverse biotopes surrounding the island support a large variety of plant and animal species, many of which have yet to be identified and studied. Despite this natural setting, St John's Island is only 15 minutes travel from mainland – just a stone's throw from the massive science and technology research infrastructure on mainland Singapore. Such a scenario is rare anywhere but even more so in the tropics, and the opportunities for novel research are immeasurable.

We consider ourselves exceedingly fortunate to have been part of TMSI's journey from its humble beginnings on Kent Ridge, through an exhilarating decade of fellowship and scientific discovery on St John's Island. Now, with hindsight tempered by experience, we look forward with renewed optimism to new challenges in the years ahead.

Dr Tan Koh Siang
Prof Chan Eng Soon
Dr Serena Teo
Prof Chou Loke Ming
Prof Lam Toong Jin
Dr Elizabeth Taylor