

Corals of Pulau Perak: After 46 years of Scientific Solitude

Affendi Yang Amri^{1*}, Badrul Huzaimi Tajuddin¹, Yong Ai Lin¹ and Kee Alfian Abdul Adzis²

¹ Institute of Biological Sciences, Faculty of Science, Universiti Malaya, 50603 Kuala Lumpur, Malaysia.

² Marine Ecosystem Research Centre (EKOMAR), Faculty of Science & Technology, National University of Malaysia.

* affendi@um.edu.my (corresponding author)

Abstract Underwater surveys were done at Pulau Perak in 2004 and 2006 to investigate whether corals were present after the last scientific expedition in 1958. Using a modified Reef Check method at two study stations at 5 m and 15 m depths, it was documented that corals were not only present but had a high cover of up to 58%. Abundant fish life and high numbers of the banded coral shrimp were observed. A very distinct Crown-of-Thorns Sea Star population unlike the ones found in other Malaysian waters was also documented. The island and its surrounding water should be declared a marine park as it harbours a rich diversity of pristine corals and other marine life.

Abstrak Tinjauan bawah air Pulau Perak telah dijalankan pada tahun 2004 dan 2006 untuk mengetahui jika batu karang masih wujud seperti yang dilaporkan oleh ekspedisi saintifik sebelum ini yang telah dilakukan pada tahun 1958. Dengan menggunakan kaedah Reef Check yang telah ubahsuai untuk digunakan di kawasan 'reef wall', tinjauan telah dilakukan di dua stesyen pada kedalaman 5 m dan 15 m. Bukan sahaja batu karang masih didapati di sana tetapi ianya mempunyai litupan yang tinggi sehingga 58%. Ikan dan udang 'banded coral shrimp' juga didapati dengan banyak disana. Populasi tapak sulaiman 'Crown of Thorns' di Pulau Perak didapati amat berbeza jika dibandingkan dengan populasi di kawasan lain di perairan Malaysia. Oleh kerana perairannya mempunyai banyak batu karang yang amat baik serta diversiti hidupan laut yang tinggi adalah dicadangkan supaya kawasan ini digazetkan sebagai sebuah Taman Laut.

(scleractinian coral, reef wall, Reef Check, Pulau Perak)

INTRODUCTION

Munshi Abdullah (1795-1854), a revered Malay writer, was one of the first Malay scholars who visited and wrote about Pulau Perak in 1854. He documented it in his final travel journal 'Kisah pelayaran Abdullah dari Singapura ke Mekah' which unfortunately could not be completed. Abdullah died at the end of his journey in Mekah while performing his Hajj, from cholera. It was on his 9th day sailing towards Mekah that he reached the island at about 4 pm on 6 of February 1854. He described the island aptly, "There was not a single blade of grass nor shrubs of any kind on this island, only mounds of stones, which appeared whitish and silvery from a distance", which is why people have named it Pulau Perak. It is also a place where birds of various kinds gather to sleep [1]. Apparently,

Munshi did not know that it was the bird droppings that made the island appear 'silver' (= perak).

Pulau Perak (5°41'3.27" N, 98°56'19.86" E) is situated in the northern part of Selat Melaka about 120 km south-west of Pulau Langkawi and 140 km north-west of Pulau Pinang (Figure 1). It is approximately 550 m in length, 400 m wide and 125 m in height. Munshi Abdullah had described Pulau Perak as being barren, but today, the island is covered in green shrubs (Figures 2 - 4). The birds, though, are still there in large numbers.

The island marine life has been lying dormant with regards to scientific knowledge for nearly 46 years. The last known scientific data was taken on the 22 September 1958 when Georg Scheer from the Hessian State Museum, Darmstadt,

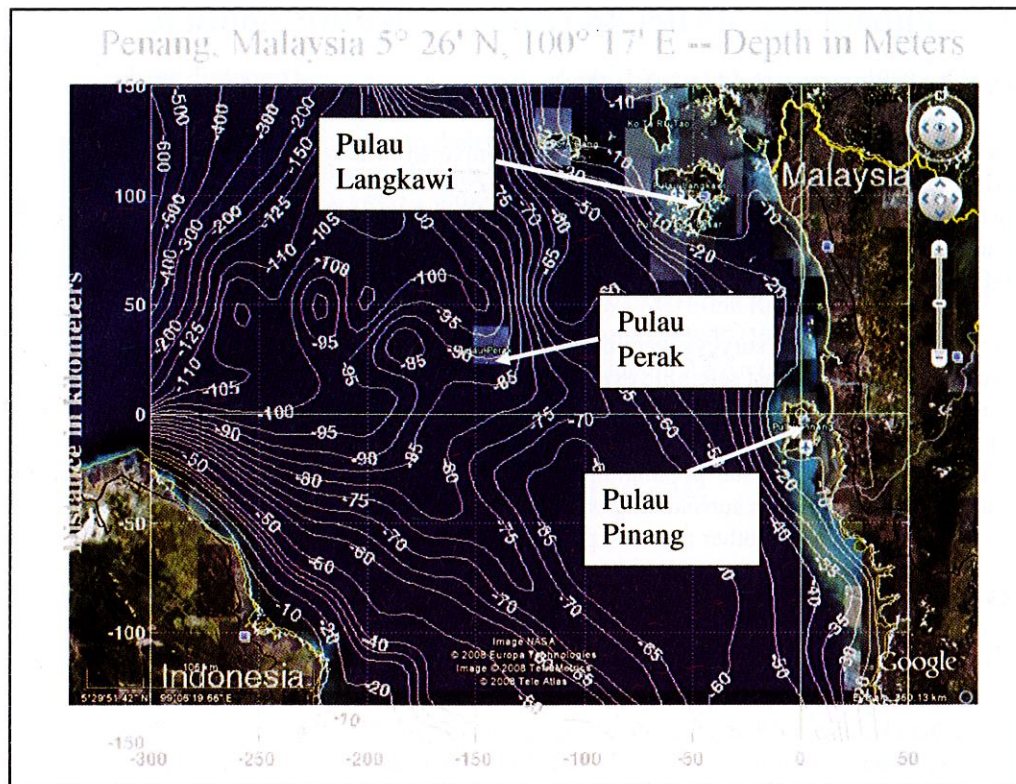


Figure 1. A combination of a satellite picture (taken from Google Earth on 20th October 2008) and a bathymetry map of the area (taken from Lipa et al. [2]) showing Pulau Perak in Selat Melaka. Pulau Langkawi and Pulau Pinang is also shown.

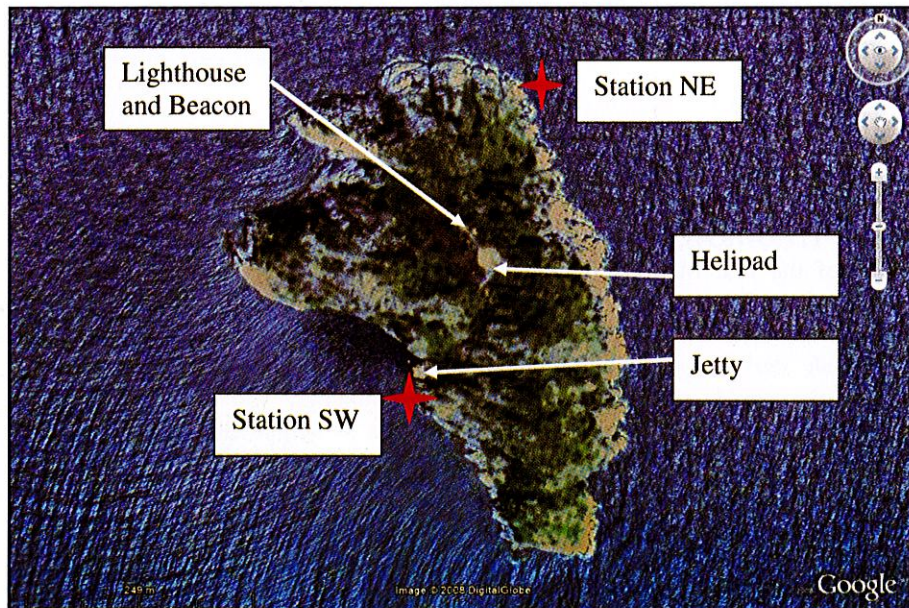


Figure 2. Picture taken by satellite (taken from Google Earth on 20th October 2008) of Pulau Perak. The locations of the two stations surveyed are marked as red stars. The helipad, jetty and lighthouse are also shown.



Figure 3. Undated picture from the air of Pulau Perak western side. Photo taken from www.benalec.group.com website in May 2004.



Figure 4. Picture of Pulau Perak from a boat from the south in 2006. The lighthouse can be seen at the top of the island. Note the green vegetation on the island. A bird is seen flying back to its nest on the island. Photo by Affendi Yang Amri.

No	Family	Genus	Species
1	Pocilloporidae	<i>Pocillopora</i>	<i>damicornis</i>
2			<i>brevicornis</i>
3			<i>solida</i>
4			<i>eydouxii</i>
5	Acroporidae	<i>Montipora</i>	<i>foliosa</i>
6	Agariciidae	<i>Pavona</i>	<i>duerdeni</i>
7			<i>varians</i>
8	Fungiidae	<i>Fungia</i>	<i>fungites</i>
9	Poritidae	<i>Goniopora</i>	<i>tenella</i>
10		<i>Porites</i>	<i>eridani</i>
11	Merulinidae	<i>Merulina</i>	<i>Ampliata</i>
12	Caryophyllidae	<i>Plerogyra</i>	<i>sinuosa</i>
13	Dendrophylliidae	<i>Dendrophyllia</i>	<i>arbuscula</i>
14		<i>Tubastrea</i>	<i>aurea</i>

Table 1. A list of coral species of Pulau Perak documented by Pillai and Scheer [3]. The collection is presumably now kept in the Hessian State Museum, Darmstadt, Germany. There were 14 species from 10 genera collected from only one station.

West Germany made a representative collection of corals during the 2nd 'Xarifa' expedition [3]. This was considered to be the first collection of corals made from Pulau Perak. The total coral diversity collected was only 14 species from 10 genera (Table 1). The low diversity is understandable as the collection was made from only one station (5°41'40" N, 98°56'26" E), presumably on the northern side of the island, and was assumed to be done using only 'skin diving' and cumbersome diving equipment such as 'hard hat diving'. In addition they had some difficulty in sampling in which they stated, "... bottomless' abyss, strong currents and presence of dangerous sharks restricted diving operations..."

Pillai and Scheer [3] briefly described the underwater environment as having steep slopes that continued underwater to about a 50 m depth where a less steep rubble slope began. 'Head sized' anemones were in abundance with the red coloured coral *Tubastrea aurea*, mixed with gorgonians and bivalves. Corals were observed to be in dense patches on the steep rocks but there was no consolidated reef framework. They highlighted that *Acropora* sp. was not present whereas it was found in all their other sampling sites in Selat Melaka during their expedition. They concluded that the island had poor coral fauna as it is an isolated island. Whether they had considered this with regards to coral larvae dispersal from other locations is unknown.

Since the 2nd 'Xarifa' expedition in 1958, Selat Melaka has gone through a lot of changes where

developments on its adjacent shorelines and shipping activities have dramatically increased. With all this development and other present anthropogenic factors, the water quality in Selat Melaka has significantly decreased [4].

With reference to the poor coral fauna reported in 1958 and the ever decreasing water quality of Selat Melaka, the presence of corals at Pulau Perak was uncertain.

In early June 2004, after nearly 46 years of having no scientific data on the island corals we did surveys at Pulau Perak under the flag of the Scientific Expedition to the Seas of Malaysia (SESMA). Our objectives were to document the presence of corals and determine their current status.

MATERIALS AND METHODS

On 9 of June 2004 we conducted surveys at two stations which were on the South West (SW) side (5°40'58.92" N, 98°56'14.66" E) and North East (NE) side (5°41'10.74" N, 98°56'21.67" E) of the island (Figure 2). We surveyed the stations again in January 2006 and the data presented in this report is a compilation of both surveys. All surveys were done using a Reef Check method [5] modified to suit reef-wall surveying where transects of 100 m in length were deployed at 5 m and 15 m depths at both stations. The surveys were done whilst using SCUBA (Self Contained Underwater Breathing Apparatus).

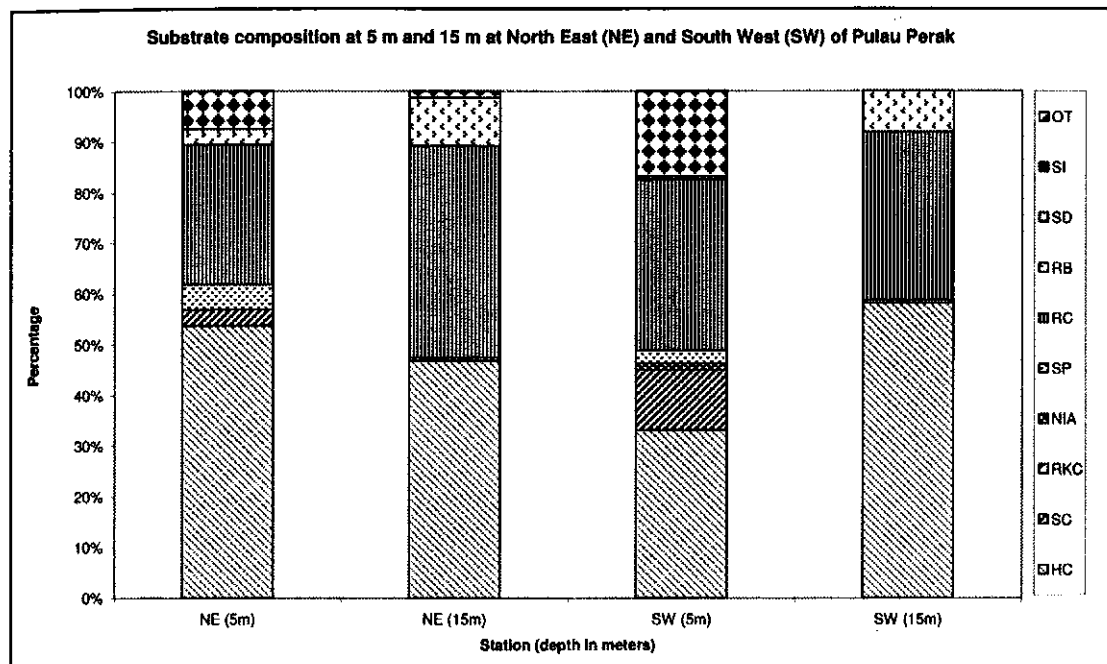


Figure 5. Showing the substrate cover (%) of the two stations (North East and South West) at two depths of 5 m and 15 m. Refer to Table 2 for the definition of the substrate categories.

Table 2. The definition of the substrate categories with their percentages and SD for each station and depth surveyed. SD are in parentheses.

Substrate Category	NE (5m)	NE (15m)	SW (5m)	SW (15m)
Hard Coral (HC)	53.8 (5.20)	46.3 (7.77)	33.1 (7.47)	58.1 (7.74)
Soft Coral (SC)	3.1 (2.39)	0.0	11.9 (10.68)	0.0
Recently Killed Coral (RKC)	0.0	0.0	0.0	0.0
Nutrient Indicator Algae (NIA)	0.0	0.0	1.3 (1.44)	0.0
Sponge (SP)	5.0 (8.42)	0.6 (1.25)	2.5 (0.00)	0.6 (1.25)
Rock (RC)	27.5 (5.40)	41.3 (14.36)	33.8 (8.29)	33.1 (10.68)
Rubble (RB)	3.1 (4.73)	9.4 (5.54)	0.6 (1.25)	8.1 (6.57)
Sand (SD)	0.0	0.0	0.0	0.0
Silt (SI)	0.0	0.0	0.0	0.0
Other (OT)	7.5 (4.56)	1.3 (1.44)	16.9 (4.27)	0.0

RESULTS AND DISCUSSION

We were elated to find that corals were still present at Pulau Perak. This coral community is unique compared to other coral communities in Peninsular Malaysia, which are commonly fringing reefs. The corals of Pulau Perak are actually growing on walls of rock.

Both survey stations had a sheer wall (up to 90 degrees) dropping to about 34 m deep, where it levels off approximately 10 m before dropping off again to about 90 m. The water clarity of the island was phenomenal with underwater horizontal visibility about 50 m and approximately 35 m vertically. Amazingly, it was found that the corals extended down until 45 m as sunlight was still available at this deep depth. It was estimated through visual

observations that the coral cover was up to 60% on the walls and was dominated by the encrusting and foliaceous coral (*Pavona* sp. and *Echinopora* sp.) growth types. This finding differs from [3] report in which they documented dominant *Tubastrea aurea*. It seems that there has been a change in the coral community structure after 46 years. It is known that *Tubastrea aurea* are azooxanthellate corals which have no zooxanthellae symbiont living within them for photosynthesis and therefore are more low-light tolerant than *Pavona* sp. and *Echinopora* sp. corals. This indicates that there might have been a change of underwater quality of light in the area. The other coral species documented by Pillai and Scheer [3] were observed in our own surveys such as the thick branching coral *Pocillopora eydouxi* and the branching coral *Pocillopora damicornis* that were only to be found in the shallower parts of Pulau Perak.

The data from the transect surveys (Figure 5 and Table 2) showed that our initial visual estimates of 60% cover were similar to the transect data where the coral cover was highest at the SW (15 m) station with 58%. Nevertheless, the lowest coral cover was at the same station but at a shallower depth where SW (5 m) was at 33%. When compared to the NE (5 m) station which had 54% we speculate that some form of damage might have been inflicted on the corals at SW (5 m) when the island was developed to accommodate a helipad and a jetty. The SW station was close to the jetty. Soft corals were only found in the shallower part (5 m) and were not found at the deeper transects (15 m). Nutrient Indicator Algae (NIA) were found only at station SW (5 m) but at a low percentage of 1% and this could be due to anthropogenic activities on the nearby jetty. Rock (RC) was a dominant substrate at all stations ranging from 28% to 41% cover as not many marine organisms can actually settle and grow on rock walls. Rubble (RB) was higher in the deeper transects (15 m) at NE with 9% and SW with 8% compared to the shallower transects (5 m) at NE with 3% and SW with 1%. This might be due to the fact that the stations surveyed were rock walls and deeper parts would accumulate more rubble that tumble down the rock face. Others (OT) were dominantly the bivalve *Lopha cristagalli*. Neither Silt (SI), Sand (SD) nor Recently Killed Corals (RKC) were observed on the transects. The absence of silt and sand might be due to the surveyed area being rock walls where it is very difficult for particles

to settle but they can easily fall into the abyss.

It is difficult to assess whether Pulau Perak corals are faring better than other sites in Selat Melaka as other coral reef sites are mainly fringing reefs, whereas Pulau Perak is a reef wall. Nevertheless Affendi [6] had documented that the North East of Pulau Langkawi had a range of 27-58% of live coral cover, whereas this study had a range of 33-58% live coral cover. In the future, a better comparison would be to compare the results from Pulau Perak against reef walls in Pulau LayangLayang or Pulau Sipadan in Sabah.

Fish life on the reef was found to be both high in abundance and diversity. Schools of barracudas, manta rays, dolphins and even whales were seen in the area. In addition important commercial fishes were also observed which suggests that this island is fortunately not heavily exploited by commercial fisheries.

One interesting finding was that there are a number of Crown-of-Thorns Sea Stars (COTS) *Acanthaster planci* at Pulau Perak. Prior to this, it was widely believed that they do not occur on the West Coast of Peninsular Malaysia. Furthermore, the COTS at Pulau Perak had a distinct colouration and pattern compared to the ones found on the East Coast of Peninsular Malaysia. We speculate that the COTS in Pulau Perak is a different clade from the ones on the East Coast as reported by [7] where they documented two distinct clades of COTS between the West Indian Ocean and the Pacific Ocean.

The Banded Coral Shrimp (*Stenopus hispidus*) which is now rarely found in other parts of Peninsular Malaysia was found to be abundant at Pulau Perak. They are intensively collected for the aquarium trade in other areas. Their strong presence in the island waters is very encouraging due to the fact that it is one of the positive indicator species for reef health [7]. Even a rare nudibranch was recorded (*Phyllidiopsis phippiensis*) where it was previously thought that this species was only to be found in Phi Phi Island, Thailand.

With all the attributes of its underwater biological uniqueness, we would like to suggest that Pulau Perak be gazetted as a Marine Park for conservation purposes. It has already been given protection in 1980 under the Fisheries (Maritime) Regulations

(1967) which only allow fishing using traditional appliances in the waters of 5 nm around it. Any form of fishing using commercial gear such as trawls or purse seine nets is deemed illegal [8]. This is seen as a step towards establishing the island as a Marine Park in the future by the Department of Fisheries Malaysia to protect and enhance fisheries activities in the surrounding areas.

Munshi Abdullah in 1854 while at Pulau Perak wrote, "Around Maghrib (= dusk), four birds flew by and started to circle the ship. Night had already fallen and they were flying over to the island to sleep. They then perched on the ship's yards; whereupon a sailor slowly crept up and managed to catch them. The birds had blue feathers, their beaks had a tinge of yellow upon them and their feet were like those of a duck. We caught four birds, which we then slaughtered and fried" [1]. Resource utilisation of Pulau Perak must be well managed so as we do not over exploit it.

CONCLUSION

Corals are still present in Pulau Perak and are in abundance. The coral cover for the stations surveyed was up to 58%. COTS of a distinct colour and pattern from other locations in Malaysia was documented. Fish life was abundant and the presence of the Banded Coral Shrimp in high numbers indicated that Pulau Perak has a healthy underwater environment.

ACKNOWLEDGEMENTS

The authors would like to thank the parties for their support: Universiti Malaya Maritime Research Centre (now known as Institute of Ocean and Earth Sciences), Prof. Dato' Dr Hashim Yaacob (previous UM Vice Chancellor), Tan Sri Halim Mazmin, The Reef Challenger ship captain and crew, SEABUDS, The Royal Malaysian Navy and The Malaysian Marine Police.

REFERENCES

1. Che-Ross, R. (2000). "Munshi Abdullah's Voyage to Mecca: A preliminary introduction and annotated translation." *Indonesia and the Malay World* 28: 173-213.
2. Lipa, B., Bourg, J., Isaacson, J., Barrick, D. and Pederson, L. (2005). Seasonal detection of tsunami waves. Taken from http://www.codaros.com/images/about2005Lipa_Tsunami.pdf on 20 October 2008. Document posted 25 January 2005.
3. Pillai, C.S.G. and Scheer, G. (1974). On the collection of scleractinia from the Straits of Malacca. *Proceedings of the 2nd ICRS*, Brisbane, Australia, October 1974 pp. 445-464.
4. Chua, T.E., Gorre, I. R. L., Adrian Ross, S., Bernad, S. R., Gervacio, B. and Corazon Ebarvia, M. (2000). "The Malacca Straits." *Marine Pollution Bulletin* 41(1-6): 160-178.
5. Hodgson, G. and Liebler, J. (2002). The global coral reef crisis: trends and solutions. *The Reef Check Foundation*. pp. 80
6. Affendi Y. A. (2005). Coral reefs of North East Pulau Langkawi. *Malaysian Journal of Science* 24:145-158.
7. Gérard, K., Roby, C., Chevalier, N., Thomassin, B., Chenuil, A. and Féral, J.P. (2008). "Assessment of three mitochondrial loci variability for the crown-of-thorns starfish: A first insight into *Acanthaster* phylogeography." *Comptes Rendus Biologies* 331(2): 137-143.
8. Najib R., Azahari A. and Khalil K. (2002). Marine Parks Malaysia: Current status and prospect of marine protected areas in Peninsular Malaysia. *Proceedings of IUCN/WCPA-EA-4 Taipei Conference March 18-23, 2002*, Taipei, Taiwan pp. 85-94.