IMPACTS OF COASTAL RECLAMATION IN MALAYSIA



Image © Victor Barro

SAHABAT ALAM MALAYSIA

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This is a SAM publication on the environmental and socio-economic impacts of coastal reclamation based on research and field surveys.

The report indicates that coastal communities and the marine ecosystem have been adversely affected by reclamation projects. The proposed development also infringes on fishers rights to livelihood.

Stop Reclaiming Our Seas!

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INTRODUCTION

"Our ocean is in serious trouble and the deterioration is increasingly posing a danger to people's lives, livelihoods and well-being. The carrying capacity of our ocean has reached its limit. The state of our ocean is worrying".

— **Wu Hongbo,** *Under-Secretary-General of UN DESA, 2017*

Healthy oceans are critical for sustaining life, eliminating poverty and promoting prosperity. Oceans and seas are also the largest carbon dioxide sink. But the ocean has its limits too and this will result in damaging consequences globally. Despite their importance, our oceans and seas continue to be negatively affected by human activities.

Coastal development and land reclamation projects have robbed fishers and communities of use and access to coastal and marine resources. This phenomenon of ocean grabbing dispossesses marine resources and spaces that fishers and coastal communities depend on.

Fishers and coastal communities in Malaysia have not been spared from these threats as reclamation projects are abound in Kedah, Penang, Perak, Melaka, Johor, Pahang and Kelantan.

Hundreds of hectares of fishing grounds and marine habitat have disappeared due to the craze for reclamation. For example in Penang, the state government plans to reclaim 4,500 acres south of the island, neglecting the heavy toll on fisher communities and marine resources.

The mining of marine sand and aggregates used for development and reclamation is also increasing and causing significant impacts to seabed flora and fauna. Millions of tonnes of sand has to be mined and rocks quarried to create new land.

Dredging and extraction of aggregates from the benthic (sea bottom) zone destroys organisms, habitats and ecosystems and deeply affects the composition of biodiversity. Research shows that this leads to a net decline in faunal biomass and abundance or a shift in species composition.

Coastal zones and communities are highly vulnerable to the human-induced reclamation projects.

Stop Reclaiming Our Seas! Stop Sea Grabbing!



Reclamation project in Johor has dispossessed marine resources and spaces that fishers and coastal communities depend on. Image © Victor Barro



Coastal communities depend on the use and access to coastal and marine resources for their lives and livelihoods. Image © SAM

CHARACTERISTICS OF COASTAL ZONES IN MALAYSIA

Malaysia has a total land area of 329,750 km^2, comprising of Peninsular Malaysia (131,590 km^2) and the states of Sarawak (124,449 km^2) and Sabah (73,711 km^2).

The corresponding lengths of shoreline for the three regions are 2,031km, 1,035km and 1,743km respectively.

The Malaysian coastline varies from scenic bays flanked by rocky headlands to shallow mud flats lined with mangrove forests.

On the east coast of Peninsular Malaysia, the high sediment yield from river discharges and harsher wave environment create the setting for a coastline of hook-shaped sandy bays.

Whilst on the west coast, the mild wave climate of the Straits of Malacca makes for wide mud shores and coastal forests rich in biodiversity. Similar forms characterised the beaches of Sarawak and Sabah although certain sandy areas are very flat.

Shore materials include a mix of sand, silts, and even shells with some patches of gravels and the occasional rock outcrops (Department of Irrigation and Drainage, Ministry of Natural Resources and Environment 2015)

Malaysia has the following characteristics for coastal zone (Integrated Coastal Management 2005):

I. Contains habitat and ecosystems (such as estuaries, coral reefs, sea grass beds) that provide goods (e.g., fish, oil, minerals) and services (e.g., natural protection from storms and tidal waves, recreation) to coastal communities.

II. Characterised by competition for land and sea resources and space by various stakeholders, often resulting in severe conflicts and destruction of the functional integrity of the resource system. Stakeholders are groups in the communities having a special interest or involvement in the usage of the resources as common property.

III. Serves as the source or backbone of the national economy of coastal states where a substantial proportion of the gross national product depends on activities such as shipping, oil and gas development, coastal tourism; and

IV. Is usually densely populated and is a preferred site for urbanisation.

Coastal zones are ecologically important, as they provide ecosystem services that are crucial for coastal communities. However, the coastal zones are frequently exploited in the recent years to make way for developments. One of the development that is often associated with coastal zone is land reclamation.





Coastal area in Penang Island. Image © SAM

COASTAL RECLAMATION IN MALAYSIA

Land reclamation is defined as the gain of land from the sea, or wetlands, or other water bodies, and restoration of productivity or use to lands that have been degraded by human activities or impaired by natural phenomena (Glossary of Environment Statistics, 1997).

There are basically two types of coastal reclamation. These are the island type and peninsular type. The former is in the form of a reclaimed artificial island detached from the existing shoreline while the latter is a shore connected reclamation. Previous efforts on coastal reclamation in Malaysia have concentrated on the peninsular type of reclamation, but island reclamation is increasing.

Under the Federal Constitution land is a state matter and hence all reclamation projects require the approval of the State Government before they can be implemented. All land, including the foreshore up to 3 nautical miles seaward from the low-water mark, is controlled by the state. The seabed and water beyond this limit, up to the continental shelf boundary, falls under federal jurisdiction.

Generally an application for land reclamation is submitted to the Local Authority or State Government which then seeks the views and comments from the various Government Agencies before submitting to the State EXCO for approval.

Coastal reclamation for housing and industrial uses came into significance in Malaysia after 1970s as a result of accelerated urban development and the rising cost of land in some major coastal cities. Many small scale reclamation projects were implemented in various parts of the country such as Penang, Melaka, Labuan, Langkawi, Kota Kinabalu, either as public sector or private sector projects.

Recently however, several states such as Johor, Melaka, Penang, Negeri Sembilan and Perak have embarked on massive reclamation projects along their coastline to augment their land bank and to be able to carry out large scale development projects.

RECLAMATION GALORE IN PENANG

Many reclamation projects have been previously undertaken in Penang. Prior to 2008, the previous Penang state government reclaimed 1,765 ha of land on the island. The developer IJM had to build the Tun Dr Lim Chong Eu Expressway (formerly known as Jelutong Expressway) in exchange for the rights to reclaim land off the Jelutong seafront in the 1990s. This 17.84 km project facilitated traffic flow from the Inner City of George Town to Batu Maung in the southeastern tip of the island.

A total of 396 ha of land was reclaimed by E&O for Seri Tanjung Pinang Phases 1 (97 ha) and 2 (307 ha) in Tanjong Tokong on the North-eastern side of Penang Island. Land reclamation for Phase 1 started in 1997 but was interrupted by the Asian Financial Crisis in 1998, and Phase 2 started in 2014.

Coastal land was reclaimed for Wellness City of Dreams project along Gurney Drive, near Gurney Plaza, about 1 km south of Tanjong Tokong. A total of 24 ha of land was to be reclaimed by



Penang fishermen protest reclamation projects. Image © SAM

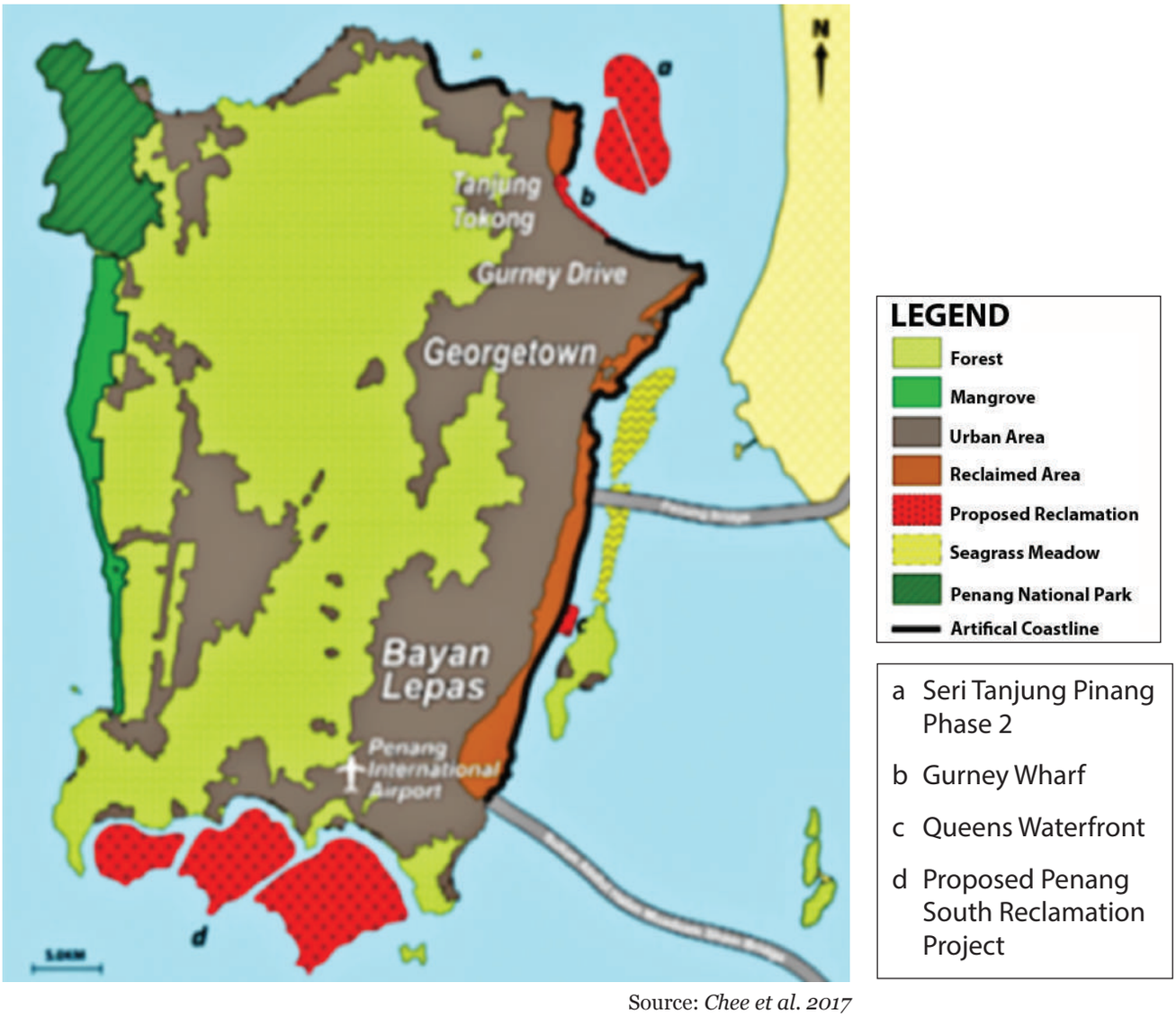
Tropicana Ivory Sdn Bhd for Penang World City project, now sited on an existing 65 acres in Bayan Mutiara on the eastern part of the TunDr Lim Chong Eu Expressway. Land reclamation started in mid-2017.

Queens Waterfront, totalling 14.7 ha of which 10 ha are reclaimed land, will be developed by Ideal Property Group. Permission for land reclamation was given in mid-2015. Fronting Pulau Jerejak, it is about 1.5km away from Penang World City.

In late 2015, two years after the idea of the Penang Transport Master Plan (PTMP) was mooted, the state government announced the RM27bil PTMP which "might be funded" by auctioning two pieces of reclaimed land in the form of islands (930ha and 445 ha respectively). The islands lie in a swath stretching from south of the Penang International Airport and eastwards to the vicinity of Permatang Damar Laut. A third island of 323 ha had also been planned but kept in view for future demand for land activities. If these materialise, they would total 1,698 ha (4,500 acres).

All proposed land reclamation and islands will be protected with hard artificial structures such as seawalls and rock armouring. Thus it would involve quarrying of millions of tonnes of rock and millions of cubic metres of sand to create new land bank.

MAP OF PENANG SHOWING DISTRIBUTION OF NATURAL HABITATS, RECLAIMED LAND AND ARTIFICIAL SHORELINE



Source: *Chee et al. 2017*

Table 1 **A real and linear extent measurements of Penang Island from 1960 to 2015 and proportional change between years.**

	YEAR					PROPORTIONAL CHANGE BETWEEN YEARS					
	1960	1980	2000	2015	After proposed reclamation	1960 - 1980	1980 - 2000	2000 - 2015	2015 - After	1960 - 2015	1960 - After
Total area (km^2)	290.6	290.9	296.9	299.1	321.8	1	1.02	1.01	1.08	1.03	1.11
Urban area (km^2)	29.5	37.8	79.3	112	*	1.28	2.1	1.41	*	3.8	*
Reclaimed area (km^2)	0.4	0.9	6.9	9.5	32.3	2.25	7.67	1.38	3.4	23.75	80.68
Mangrove forest (km^2)	6.9	5.4	6	6.8	6.7	0.78	1.11	1.13	0.99	0.98	0.97
Total shoreline (km)	103.5	114.7	117.2	106.5	*	1.11	1.02	0.91	*	1.03	*
Artificial shoreline (km)	2.4	2.7	11	31.8	*	1.13	4.07	2.89	*	13.25	*
Urban area (%)	10.2	13	26.7	37.4	*						
Reclaimed area (%)	< 0.1	0.3	2.3	3.2	10						
Mangrove forest (%)	2.4	1.9	2	2.3	2.1						
Artificial shoreline (%)	2.3	2.4	9.4	29.9	*						

** cannot be determined*

Source: *Chee et. al 2017*

THE PENANG SOUTH RECLAMATION PROJECT

The Penang State government (the project proponent) intends to undertake land reclamation activities of three man-made islands measuring 4,500 acres (1,821.1ha) at the south coast of Penang island. The reclamation project spanning 50 years is to create land bank to fund the state government's highly-ambitious multi-billion ringgit Penang Transport Master Plan (PTMP).

Fishing activities are conducted extensively within the proposed reclamation area as well as in the surrounding sea. The proposed reclamation project will have an impact on the ocean food chain and the fishing industry due to total loss of mudflats. Loss of coastal habitat due to this proposed project is a major environmental blow.

Although the proposed project will have negative effects on the environment, and also affect the livelihood of fishing communities, the state government chose to ignore the numerous appeals to cancel the project.

The Environmental Impact Assessment report of the project states that in 2015 there was a total of 2,757 licensed fishermen operating within the impact zone. The wholesale value of fish landed at the study area was estimated at RM42.09 million, which amounted to 12.4% of the total wholesale value of fish landings in Penang Island in 2015.

We should also take into account the fact that upstream and downstream activities across the fishing industry enhance socio-economic benefits in adding value and generating jobs. Hence the impacts on the fisheries sector should not be limited to the Project area but beyond.



Penang fishermen protest reclamation projects. Image © Leerang Bato

RECLAMATION IN OTHER STATES

For artificial islands projects it is indicated in brackets whether they are at the proposal stage, underway or completed and how many islands are involved. All other land reclamation activities listed are either underway or complete and have been approved by the DOE. Source: Chee et al. 2017

Table 2 **List of EIA-approved coastal reclamation projects in Malaysia (1988 to 2016).**

State	Completed Project Locations	Artificial islands projects (stage of project x number of islands)
Kedah	Entire coast Pulau Bunting, Daerah Yan	
Penang	Tanjung Tokong Bayan Lepas	Tanjung Tokong (underway x 2) Permatang DamarLaut (proposed x 3)
Perak	Lekir Coastal Development, Pulau Pangkor, Daerah Manjung Perak Heavy Industries Park (PHIP), Bagan Datoh Teluk Muroh Bagan Datoh	Teluk Muroh (completed x 1) Marina Island, Pangkor (completed x 1) Lukut (proposed x 1)
Selangor	Port expansion at Westport, Pulau Indah Kelang	
Negeri Sembilan	Entire coast	
Melaka	Pantai Kundur Malacca City Pulau Panjang, Daerah Melaka Tengah	Malacca City (completed x 2) Off Melaka (proposed x 3)
Johor	Southern International Gateway Project and Tanjung Puteri Lido Boulevard, Johor Bahru Independent Deepwater Petroleum Terminal, Pengerang Mersing Laguna Phase III dredging and reclamation works at Pelabuhan Tanjung Pelepas Marine and Riverine Facilities on Lot PTD 504 and Lot 1668, Sungai Batu Pahat Integrated Hub and Maritime Industrial Park, Tg Piai R&F Tanjung Puteri Lot PTD 220207 and Par of Lots PTD 194792, PTD 194794 - PTD 194797, Mukim Plentong, Johor Bahru	Forest City Island Reclamation and Mixed Development (underway x 4)
Kelantan	Jetty and industrial zone construction, Tumpat	
Sabah	Kudat	Kudat (completed x 1)
Federal Territory of Labuan	Integrated Port, Ranca-Ranca Oil and gas industrial base, Kg Ranca-Ranca	

Source: *Department of Environment (DOE), Malaysia.*



PERAK reclaimed 8,094 ha of land in 1997 in the coastal area of Lekir District, Setiawan, Perak. The Bagan Datuk Heavy Industrial Park was planned to be sited on another 1,375.9ha of reclaimed land (scheduled to start before end of 2017) in Bagan Datuk District.

MELAKA's coastal reclamation development projects include Pantai Klebang, Pekan Klebang, Taman Kota Laksamana, Pulau Melaka, Permatang Pasir Permai and Telok Mas. Perhaps the most ambitious of these projects is the 1,504.9 ha Melaka Gateway, started in 2009, is a mixed development over four artificial islands. Built on Pulau Melaka, the RM43 billion (€9.03 billion) project will feature a deep-sea port, a cruise terminal, a waterfront district, and a giant observation wheel.

JOHOR has its fair share of the controversial RM388 billion 'iconic' Forest City luxury real estate development located in Tanjung Kupang launched in 2014. Four artificial islands covering a total surface area of 1,400 ha will be created with land reclamation in the Tebrau Strait.

A reclamation project off Lukut in Port Dickson District, **NEGERI SEMBILAN**, was announced



Fishermen from Telok Muroh, Perak protesting against a reclamation project here. Image shared by community.

in November 2017 which will involve 3,237 ha of the sea which is in line with the long-term development plan of Port Dickson under the Malaysian Vision Valley project (MVV) by 2045. Previous studies show that beaches in Port Dickson have been having severe erosion problem. It is estimated that the shoreline is retreating up to 0.5m annually.

The east coast state of the peninsular, **KELANTAN**, has land reclamation for integrated resort development in Tumpat, and a RM2billion 202 ha property project on reclaimed land at Kota Baru Waterfront.

THE IMPACTS OF RECLAMATION

The impacts of land reclamation are discussed in 4 aspects;

I. Biological impacts

II. Socio-economic impacts

III. Physical impacts

IV. Other impacts

I. BIOLOGICAL IMPACTS

The process of coastal land reclamation starts off with sand mining and dredging operation carried out offshore, followed by backfilling. The activities carried out during reclamation have direct impacts towards the coastal ecosystem. The impacts include:



Mud and dirt trapped in fish net. Image © SAM

(A) Loss of marine benthic ecosystem

Reclamation activities affect the composition of biodiversity through the destruction of ecosystems such as coral reefs, sea grass meadows and mudflats. This will lead to a net decline in faunal biomass and abundance or a shift in species composition. Once the ecosystem is disturbed, it will take some time for it to recover to its original state, depending on the ecosystem's resilience.

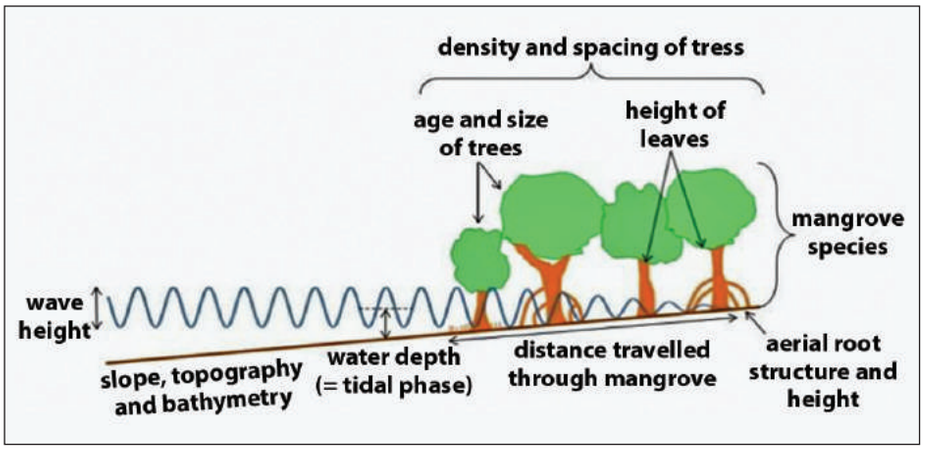
Benthic animals are more abundant in shallower waters especially coastal zone and ocean floor. Modification of the ocean floor by reclamation works causes destruction to habitat of the benthic organisms. The disturbance to bottom sediment from dredging works and placement of fill materials will bury and smother bottom dwellers and cause permanent loss of habitat of benthos. Marine sediment extraction causes disturbance and removal of benthic in fauna and epifauna (Yasser, 2011).

Alteration of sediment composition caused by dredging and backfilling is another contributing factor to loss of marine benthic ecosystem. Sediment composition is a key factor in determining benthos distribution. Long-term recovery of benthic ecosystem can occur only where original sediment composition is being restored.

(B) Destruction of buffer zone

Coastal reclamation is often associated with the loss of coastal ecosystems such as mangroves, seagrasses and mudflats. These ecosystem acts as natural buffers against wave energy and minimising the impacts of wave on coastal areas, thus protecting the coastal area from being flooded and eroded due to wave action.

Removal of the ecosystems will leave the coastal communities vulnerable to flooding



Wave height can be reduced 13-66% over 100m of mangroves. Source: http://www.naturalcoastalprotection.org/documents/reduction-of-windand-swell-waves-by-man

and natural disaster such as tsunami. As widely reported since 2004 when the worst tsunami in record hit South East Asia, extensive areas of mangroves can reduce the loss of life and damage caused by tsunamis by taking the first brunt of the impact and by dissipating the energy of the wave as it passes through the mangrove area.

The survival of the fisherfolks at Pulau Betong, south-west of Penang Island, was attributed to the mangroves growing there. The mangrove forests had helped to buffer the impact of the tsunami heading inland as compared to other places that received a direct hit (Penang Economic Report, Jan. 2005, Vol. 7, Issue 1).



(C) Disruption of food chain

Coastal developments directly disturb the substrates and microenvironments that benthic macro invertebrates depend on to survive. Evidently, it was studied that species richness and diversity was the lowest in Gurney Drive which is situated just 0.5 km from reclaimed land towards its north.

Mangroves also serve to reduce coastal erosion and is a habitat for many species of marine life. They serve as a transit place for more than 30 species of migratory birds, and house mudskippers, fish, crustaceans, and a whole ecosystem of its own. They are a home to all kinds of fish, snails, cockles, shrimps and crabs, reptiles like snakes and monitor lizards, migratory and local birds, insects and mammals such as monkeys, wild boars and otters. Birds seek these places as their sanctuary and feeding place during their migratory season from October to March.

It is proven that land reclamation does cause disjunctions in the consistency of suitable habitats for these organisms which we predict will affect organisms higher in the food chain (Chee & Sim, 2016; Chee et al., 2017). The stress tolerant species will become dominant and replace other species as they are able to stand the changes.

Collapsed ecosystems cannot sustain marine organisms that are dependent on it for survival. Shoreline modification and reclamation works will affect the existing biotic and abiotic factors that are linked in food chains. Any changes or disruption to the close relations between certain species will affect the ecosystem's balance. Removal of primary producers such as mangrove and seagrasses will affect the rest of the food chain as they serve as a base where every other organism depends on directly or indirectly for survival.

(D) Coastal water pollution

Pollution can be controlled to some extent, but ecological and environmental impacts of reclamation cannot be restored. Suspension of organics, heavy metals and other pollutants into sea through dredging activities will cause disturbance to bottom sediments. Land filling with dredged materials may release contaminants which will have impacts on marine life. Eventually, low water quality will affect the sea biotas around the area, and negatively affect the lives of the fishes and coral reef (Priyandes & Majid, 2009).

Corals that are stressed by siltation, mechanical damage, or pollution have a greater likelihood of being subjected to diseases (Clark 1996). As coral reefs are well known as spawning ground, feeding ground and nursery ground for enormous number of marine life, its destruction will cause breakdown in the ecosystem.



Reclamation in Johor. Image © Victor Barro

Other than that, sea grass leaves improve water quality by absorbing nutrients in runoff from the land and slowing the velocity of water, capturing sand, dirt and silt particles. When the bottom sediments are disturbed during reclamation projects, it causes the release of toxic chemicals including heavy metals and polychlorinated biphenyls (PCB) into water column which was trapped by sea grass earlier. The release of toxic compounds will degrade the water quality and affect the aquatic life.

(E) Increase in siltation and turbidity

Dredging and extraction of aggregates from the benthic zone or the seabed is a form of disturbance that leads to increase of suspended particles in the water column. Dredged material may cause suspended solids during dredging as a result of substratum disturbance and during transport to the surface, overflow from barges or leakage from pipelines during transport between dredged and disposal sites (Yasser, 2011).

Aggregate particles that are too fine to be used are rejected by dredging boats, releasing vast dust plumes and change the water turbidity, resulting in major changes to aquatic habitats over a large area. The ecosystems that will be greatly affected by siltation are the coral reefs and sea grasses. Siltation kills corals by shading and smothering them and reduces recruitment of juvenile corals (DENR 2001).

Smothered sea grasses will not be able to take up the sunlight efficiently to carry out photosynthesis. In addition, increased turbidity will increase the scattering of light penetrating the water, causing difficulties to photosynthetic benthic organism to absorb the sunlight.

It was reported in 2010 that a marine study conducted by the National Hydraulic Research Institute of Malaysia commissioned by Penang indicated that reclamation work had brought about significant siltation to disrupt the natural hydro-flow of Penang's coastal waters (The Sun, 2 Feb. 2010). The study indicated that "sea currents had to change direction, pushing mud to be deposited along the island's north-eastern coast and the Penang Channel", pointing to the Gurney Drive coastline and mud deposits after large-scale reclamation nearby (The Sun, 2 Feb. 2010).

Massive deposits of silt was observed in Gurney Drive area after the Tanjung Tokong Land Reclamation Project which started in 2004 and completed two years later, reclaiming 97 ha of land in this first phase (Ramly S., 2008). The second phase of reclamation started in 2016 and slated to be completed in mid-2018.

It was soon after the first phase that the entire Gurney Drive seafront was turned from a sandy beach into a continuous mudflat.

II. SOCIO-ECONOMIC IMPACTS

(A) Livelihood and fisheries

Coastline changes in the coastal areas due to reclamation will impact the local community in that area. Local fishers whose livelihood and source of income depended on the fishing industry are adversely impacted due to land reclamation.

It was stated in the Detailed Environmental Impact Assessment (DEIA) Study for the Proposed Reclamation of Seri Tanjung



Tanjong Tokong fishing village made way for land reclamation for Seri Tanjung Pinang project. Photograph taken in 2003.
Image © Yong Check Yoon

Pinang Development in Penang that the potential impact on local fishing industry is reduction or loss of the size of local fishing ground caused by the project footprint.

Inshore fishermen cannot venture further beyond 8 nautical miles out to the sea to fish hence they might lose their normal fishing ground if there is any proposed reclamation project. Hence, reclamation may either lead to temporary disruption of fishing activities or total loss and thus affecting local fishermen's livelihood. The value of compensation given by developers is incompatible with the fishermen's loss.

In the case of the proposed Penang South Reclamation project to fund the Penang Transport Master Plan, the Danish Hydraulic Institute stated that the coast was "most suitable for reclamation due to its natural bay area with weak tidal currents, shallow water and natural shelter from the effects of tsunami" (The Star, 28 Nov 2015). It overlooked the socio-economic impacts of this project which would inadvertently impact on the livelihood of about 3,000 fishermen from 14 fishermen units living along the Southeast District coastline from Sungai Pinang in Jelutong to Kuala Sungai Pinang in Balik Pulau.

Such projects often force fishermen either to invest more on equipment to fish in deeper waters or force a career change. Malaysia is experiencing fish shortage for local needs and this is worsened by the destruction of inshore fishing areas through consequences of land reclamations.

Coastal zone ecosystems are the most productive ecosystem, which serves as nursery, breeding and shelter grounds for various aquatic organisms. Reclamation works may deplete fisheries stock due to pollution, siltation and habitat loss. Reviews of the literature identified the loss of mangrove and coral reefs together with pollutants generated during the reclamation activities during site filling affect the fisheries activities (Nadzhirah & Mansor, 2014).

Commercial value species may migrate or replaced by non-commercial species caused by reclamation works. Arshad Omar, who is head of 3000 fishermen in Southwest District Penang said that the proposed land reclamation projects off Permatang Damar Laut, Teluk Kumbar, and Gertak Sanggul would affect fish and shrimp hatcheries, as well as disturb marine life habitats in that area.

Besides, the restriction on local fishermen due to reclamation works, they have to take longer routes instead of direct or shorter routes to their normal fishing area. Thus, it extended the distance and period of travel for fishermen to catch fish and it will cost them more due to additional fuel.

Other adverse impact includes the reduction of daily fish catch by the fishermen, forcing them to either double their efforts in catching fish or totally abandon their age-old profession to try other jobs (Priyandes & Majid, 2009). However, without experience and knowledge, it will be difficult for them to adjust to their new way of life.

Among the common reasons given for the need of land reclamation are land scarcity and rapid development, having to meet

the needs for physical space, especially on an island like land-strapped Penang. In the case of Johor, the land reclaimed was for the RM392 billion Forest City, a property development that is selling its two-room 774 sq ft apartment for about RM666,230 each which is considered exorbitant by local standards. It does not address the more urgent need for affordable housing.

Land reclamation at the Forest City replaced the fishermen's enclaves and jetties that nestled among mangrove forests, resulting in an immediate impact on Tanjung Kupang intertidal seagrass meadow, touted as the "largest of its kind" in the country. It is because seagrass meadows are a habitat to a diverse marine wildlife and are also very fragile ecosystem.

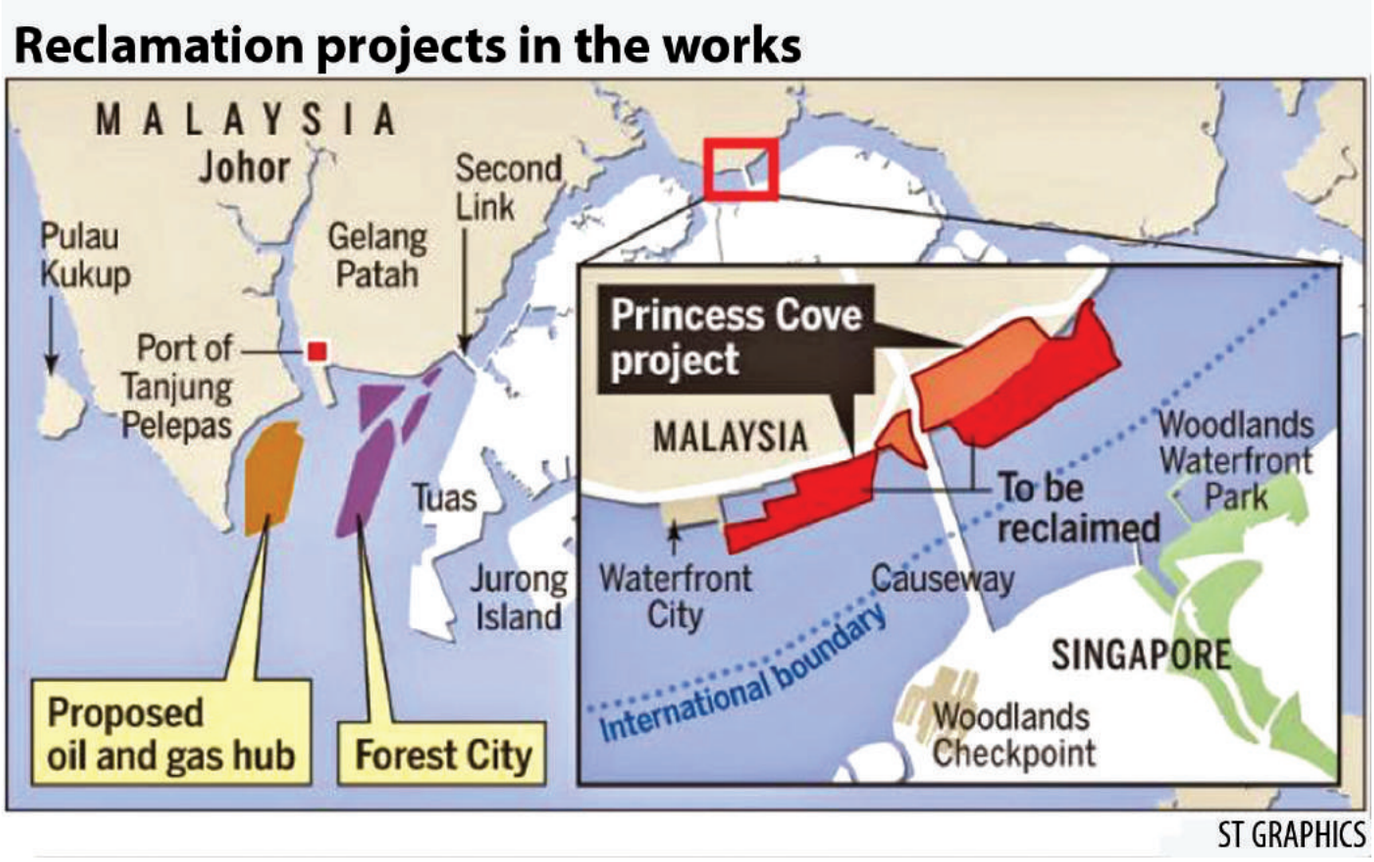
With the construction of a causeway for the project, cutting across the seagrass meadow, it is potentially altering the currents and thereby threatening the ecosystem existing there. Fishermen are already complaining of reduced catches and they have to venture farther to fish in deeper waters (The Diplomat, 30 August 2017).

Although the developer of this project, Country Garden Pacific View Sdn Bhd (CGPV), subsequently tried to engage with grassroot organisations, distributing compensation financially to the affected families, and pledge to protect the environment. While in reality some villagers had to be resettled as their villages were affected by the project just as their livelihood did. As for the compensation, it was claimed that it "rarely reach those who are directly affected" (The Diplomat, 30 August 2017).

Another issue was that there was a need for large quantities of sand to construct these islands and there are villagers who are selling sand without an Approved Permit (AP) from their own village to contractors, thereby scarring their village landscape (The Diplomat, 30 August 2017).

(B) Sociocultural Impacts

Clash of cultures, values and tolerance level between locals and foreign workers may occur during the reclamation project. Malaysia is known to rely on foreign workers as manpower in any construction projects. Different ethnicity or nationality of the

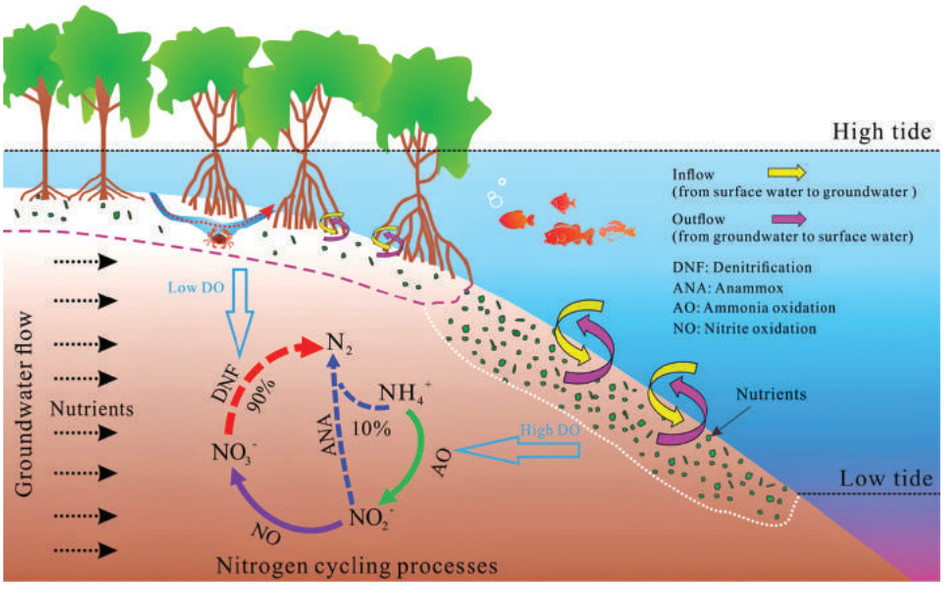


construction workers is the main reason of socio-cultural conflict.

It is mentioned in the Detailed Environmental Impact Assessment (DEIA) Study for the Proposed Reclamation of Seri Tanjung Pinang Development, in Penang, that the presence of a large number of foreign workers alongside the locals could disrupt the cultural and racial balance of the area, thus transforming the social makeup of the area into a more cosmopolitan entity.

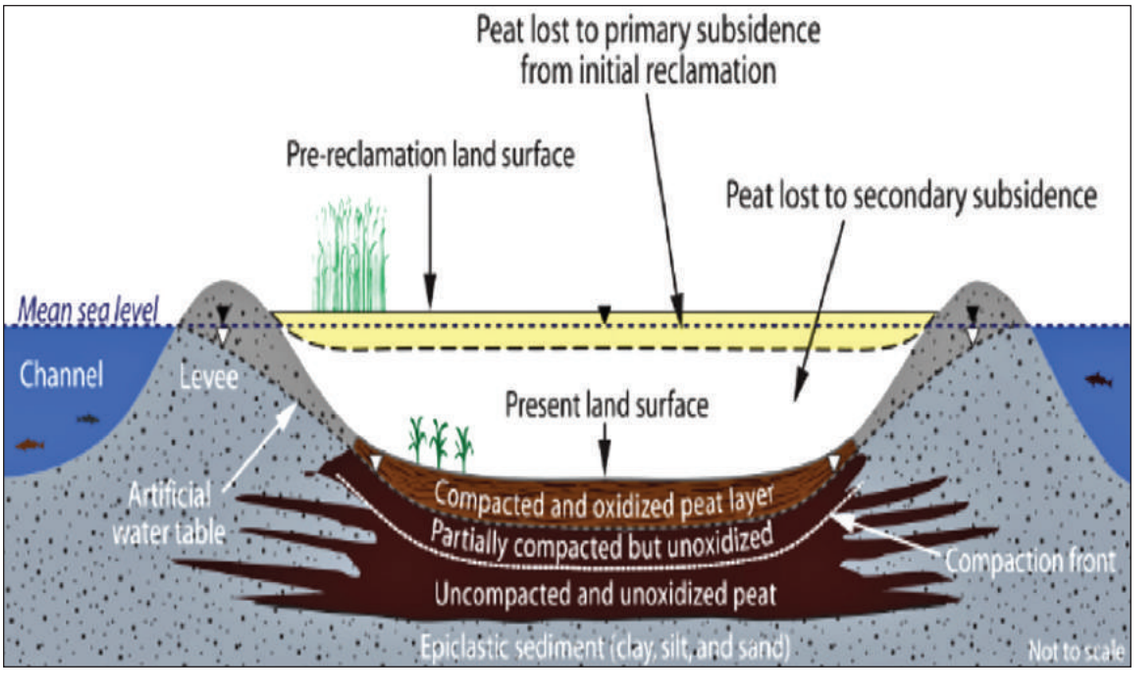
III. PHYSICAL IMPACTS

(A) Saltwater intrusion and alteration of groundwater system



Land reclamation activities in coastal areas causes changes on local groundwater systems (Guo & Jiao, 2007). This is because the removal of crucial ecosystems such as mangrove and mudflats maximises the impacts of wave on coastal areas, causing seawater intrusion into groundwater. This will affect nearby agriculture land as the pH of the soil is altered thus making it unsuitable for plant growth, especially species that are sensitive to salinity changes.

Another situation that is likely to occur is the newly reclaimed land that blocks natural agricultural drain will lead to rise of water tables, causing seawater intrusion and increased salinity in soil and groundwater. However, some believed that reclamation process increases water level in the original aquifer and the saltwater-freshwater interface moves seawards. The fresh groundwater resources are increased after reclamation because both recharge and the size of aquifer are increased.



IV. OTHER IMPACTS

(A) Affects the quality of life of nearby residents

Temporary increase in noise pollution and air quality is likely to occur at the site, caused by construction and reclamation processes. Dust and particulate generation due to movement into and off the site like scrappers, bulldozers, and loaders and due to excavated soil is the negative impact of temporary workforce (Yasser, 2011). This gives a negative psychological and physical impact to the people around the area.

If the project spans over a prolonged period of development, it may cause adverse effects to public's health due to long term exposure to dust and debris. Respiratory problem is the main concern, especially among children and senior citizens.

The stress level of the residents might increase due to traffic congestion as many routes will be inaccessible for reclamation development. Therefore, the residents were left with no choice but to take alternative routes, causing inconveniences due to the restrictive access.

(B) Loss of Heritage

The Melaka Gateway Project, besides causing the sea in front of the Portuguese settlement's pier to become muddy, is also threatening the heritage of the Portuguese which, as the saying goes, "Where there are Portuguese around the world, there is sea. There is no separating the Portuguese from the sea". The project is part of the Beijing's One Belt, One Road initiative and when the reclamation is complete, the Portuguese sea-going community will be far from the coast. (Free Malaysia Today, 7 Sept 2017)

It was proposed that canals be built, leading to the settlement's shores but this is definitely against the very grain of heritage conservation. The character-defining elements of the settlement merits its protection. The local government's duty is to protect the integrity of the area and the character defining elements it contains. Apparently this is not the case as the fishing community is in a limbo over the future of the settlement and relying on the hope that either the fishing settlement be moved to a location within the massive project or otherwise have canals built for them to get connected to the sea.



In Perak, the fishermen of Telok Muroh have not only lost their livelihood to reclamation, they have also lost their age old undisturbed fishing heritage. Image shared by community.

CONCLUSION

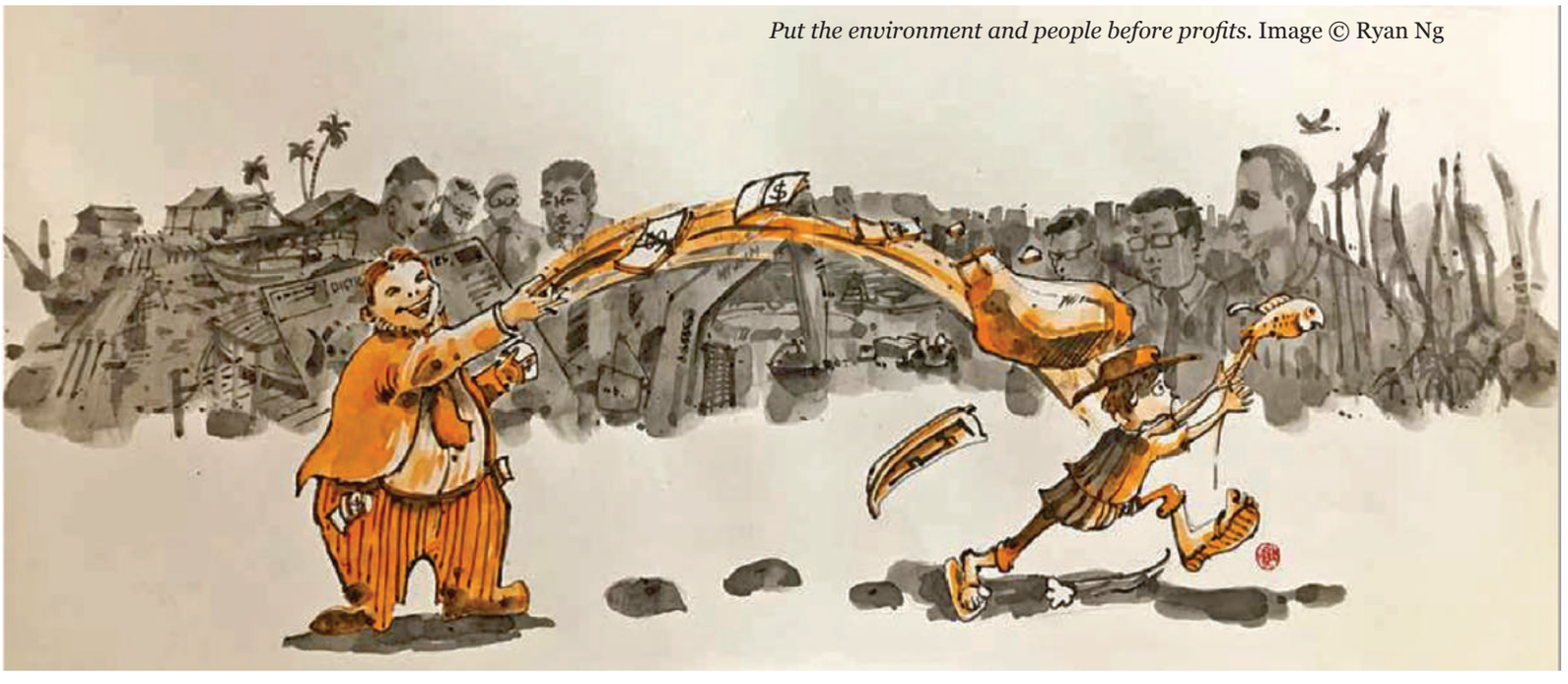
Sahabat Alam Malaysia calls upon the Malaysian government to cancel all proposed reclamation projects in the country. The massive reclamation project proposed in the south of Penang Island i.e. the Penang South Reclamation Project clearly will cause environmental destruction, disrupt the fisheries sector and the livelihood of people depending on this sector. This multi-million ringgit fisheries sector of which thousands depend on, and not forgetting our food security is being traded-off for development which is not justified.





Lives and livelihoods of fishing communities in Southern Johor were dependent on a relatively healthy marine ecosystem before the reclamation projects began. Image © Victor Barro

Put the environment and people before profits. Image © Ryan Ng



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