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The rise of Iskandar Malaysia: Implications for Singapore's marine and coastal environment

Iskandar Malaysia, a major economic zone in the southern part of Malaysia, is experiencing meteoric growth. Given that the zone lies along the Straits of Johor, how will the increasing industrialisation and urbanisation seen in the area affect the marine and coastal environment? Also, what are the implications of this growth for Singapore, whose northern coast lies on the other side of the Straits? This NTS Insight investigates these questions and suggests ways to mitigate the potential impacts of developments in Iskandar Malaysia on Singapore's marine and coastal environment.

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Model of Iskandar Malaysia (in green). Iskandar Malaysia, at 2,217 sq km, is touted as the 'the largest single development project ever to be undertaken in the region'.

Credit: Pau Khan Khup Hangzo.

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Introduction

The importance of marine and coastal ecosystems – coastal floodplains, mangroves, marshes, beaches, dunes and coral reefs – should not be underestimated. Coastal areas host a diverse

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range of organisms, providing them with food, shelter, breeding areas and nursery grounds; and coastal ecosystems help prevent erosion and filter pollution.¹ Coastal areas also contribute to a country's economy, providing water and space for shipping and ports and serving as a source of raw materials such as salt and sand.² Coastal areas are also popular as locales for various recreational activities.

Singapore, as one of the world's smallest countries with a coastline of just 268 km,³ has long recognised the importance of its coastal and marine ecosystems, and there are national efforts to preserve them through nature reserves and designated 'nature areas'. Within this context, the massive projects in the Iskandar Malaysia economic zone in Johor, just across the border from Singapore, could have important implications. This NTS Insight suggests that, while it is easy to overlook the potential spillover impacts from the activities in Iskandar Malaysia, it is important that the issue be addressed.

Drawing insights from both primary and secondary sources, this NTS Insight first provides an overview of the Straits of Johor and Singapore's marine and coastal ecosystem. It then discusses the developments in Iskandar Malaysia, identifying potential sources of pollution, both land- and sea-based, and their potential impacts on Singapore's marine and coastal environment. The NTS Insight argues that it is in the interest of both Malaysia and Singapore to protect their shared marine and coastal ecosystems in and around the Straits of Johor, and that joint efforts should be stepped up.

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Singapore's marine and coastal ecosystem

Despite its small size and its largely urban character, Singapore continues to have high biodiversity, both terrestrial and marine. It has four nature reserves that collectively cover 33.26 sq km, or about 4.7 per cent, of the country's total land area. There are also 18 nature areas – terrestrial, marine and coastal – that have been recognised for their significant biodiversity.

In all, Singapore's waters are home to 31 of about 56 species of 'true' mangrove plants in Asia (those that are found exclusively in the mangrove habitat), about 255 out of a total of 800 species of hard corals in the world, and 12 out of the 23 seagrass species in the Indo-Pacific region.⁴ There are also over 450 marine and freshwater species of crustaceans, 580 species of molluscs, 856 species of marine fishes and about 500 species of seaweeds (see also Table 1). Singapore's largest marine biodiversity expedition, conducted in October 2012, uncovered about 1,000 specimens, including new species such as Subtidal Lantern Shells and Plate Crabs.⁵

Table 1: Marine biodiversity in Singapore.

Taxonomic group	No. of species
Seagrass	12
Sea anemone	16
Marine mite	40
Marine worm	74
Echinoderm	90
Reef fish	>100
Goby	149
Sponge	>200
Hard corals	255

Source: National Parks Board of Singapore (NParks), *Singapore: 4th national report to the Convention on Biological Diversity* (September 2010), <http://www.cbd.int/doc/world/sg/sg-nr-04-en.pdf>

Some of the most biodiverse terrestrial and coastal areas in Singapore are found in the northern part of the country along the Straits of Johor. The Straits of Johor, which marks the border between Singapore and Malaysia, is just 1 km wide, and approximately 50 km from end to end. It is also a crossing point between Singapore and Malaysia. The first cross-country bridge, the Johor-Singapore Causeway, was

opened on 28 June 1924. A second bridge, the Malaysia-Singapore Second Link, was opened on 2 January 1998. These two bridges are symbolic of the close relationship between the two countries.

Singapore's northern coastline contains some of the country's most significant mangroves. A 2010 study estimates that mangrove forests cover about 0.95 per cent of Singapore's total area.⁶ The largest fragment, measuring 1.17 sq km, is found at the Sungei Buloh Wetland Reserve, located along the northern coastline (see Figure 1). Mangroves serve as a buffer against storm surges, reduce shoreline erosion and turbidity, absorb and transform nutrients, and are home to many types of organisms. Indeed, replanted mangrove trees in Southeast Asia are getting credit for providing protection against deadly tsunamis and typhoons and for cutting greenhouse gas emissions.

Beyond its ecosystem functions, a healthy mangrove population is essential to realising Singapore's vision of a City in a Garden. This plan emphasises conserving the natural environment so as to mitigate the harsh concrete urban environment, improve the quality of life and enhance Singapore's attractiveness to businesses and talents. Although the concept is primarily concerned with terrestrial biodiversity, there have been calls to expand its scope to include marine biodiversity.⁷

Over the years, the damming of rivers and land reclamation have affected Singapore's coastal and marine environment. As a result of such activities, Singapore's mangrove forest area has declined from 75 sq km in 1819 to just 6.59 sq km today,⁸ and the possibility of losing more to other national priorities remains a concern. For instance, Singapore's population is projected to increase to between 6.5 and 6.9 million by 2030, with some experts even suggesting that Singapore could accommodate 8 million or more by then.⁹ Supporting this larger population entails reclaiming additional land and developing some reserve land.

Singapore has thus far managed to balance growth and environmental conservation through strict environmental guidelines and an environmental strategy based on prevention, enforcement, monitoring and education. Potential pollution problems are addressed through land-use planning, judicious siting of industries, control over development and building plans, and provision of waste collection and treatment facilities. However, the developments in Iskandar Malaysia and the attendant socioeconomic changes pose an altogether different set of challenges to the well-being of Singapore's coastal and marine environments.

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Iskandar Malaysia and its potential impacts on marine and coastal ecosystems

Launched in 2006, Iskandar Malaysia is, in terms of land area, 'the largest single development project ever to be undertaken in the region'.¹⁰ Already, the economic zone has recorded total cumulative committed investments of RM129.42 billion.¹¹ Of this, RM56.32 billion has been realised.¹² By 2025, total cumulative committed investments are expected to reach RM383 billion.¹³

Of the amount committed thus far, RM45.68 billion has gone to the manufacturing, petrochemical, oleo-chemical and food and agro-processing sectors.¹⁴ This is followed by logistics (RM4.81 billion), tourism (RM2.50 billion), healthcare (RM2.59 billion), education (RM1.56 billion), financial services (RM0.6 billion) and the creative industries (RM0.4 billion).¹⁵

Singapore has a keen interest in Iskandar Malaysia for pragmatic and strategic reasons. Domestic push factors such as scarce land supply, rising land and property prices, and foreign labour restrictions have led Singapore-based companies to see Iskandar Malaysia, with its cost competitiveness and proximity to Singapore, as a natural solution.¹⁶ Not surprisingly, Singapore is the largest investor, accounting for 16 per cent of total foreign investment as of June 2013,¹⁷ and Singaporean companies have set up over 300 manufacturing projects there.¹⁸

However, that very same proximity also raises flags. Four of the five zones that make up Iskandar Malaysia – Johor Bahru City Centre, Nusajaya, Western Gate Development and Eastern Gate Development – are located along the Straits of Johor.¹⁹ The potential impacts of these developments on the Straits and on Singapore's marine and coastal environment warrant greater attention, and are explored next.



The Management Development Institute of Singapore's RM300 million project in Iskandar Malaysia (Nusajaya). Singapore is the largest investor in Iskandar Malaysia, accounting for 16 per cent of total foreign investment as of June 2013.

Credit: Pau Khan Khup Hangzo.



Source: Adapted from map by Queix / Wikimedia Commons.

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Pollution

Marine pollution is 'the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities'.²⁰ Marine pollution recognises no boundaries and any waste discharged into coastal waters from one country will quickly find their way into the waters and beaches of neighbouring countries.

Land-based pollution

Land-based pollution accounts for as much as 80 per cent of all marine pollution worldwide.²¹ It is no different for the Straits of Johor. Land-based pollution can come from point as well as non-point sources. Point source pollution refers to pollution originating from a fixed point such as a sewage treatment plant and a factory.²² In the case of non-point source pollution, a pollutant can come from many places, and reach coastal areas 'via groundwater, streams and rivers, the atmosphere, combined sewage overflows, storm drains and flood control channels, as discharges from boats, and as the release of toxic chemicals from contaminated sediments, among other pathways'.²³ Due to the dispersed nature of non-point source pollution, it can at times seem less significant than point source pollution; however, when added together, non-point source pollution can turn out to be highly salient.²⁴

Changes in land use linked to rapid industrialisation and urbanisation in Iskandar Malaysia can increase pollution transported through runoff. What is of concern in terms of cross-border impacts on Singapore is that the Iskandar region's four major river systems – Sungai Tebrau, Sungai Skudai, Sungai Plentong and Sungai Pulai – all empty into the Straits of Johor.²⁵ Pollution in these and other river systems is already a major problem. Massive funds have been injected by both the federal and state governments to deal with river pollution, but no real improvements have been seen. Urban effluents continue to be discharged into them; and 11 tonnes of rubbish from residents who live along the river are collected each month from Sungai Skudai alone.²⁶

Such shifts in land use, and the consequent increase in waste discharge, have an impact on fishing and aquaculture activities. For instance, a recent study noted that those factors have 'severely impaired the water condition and threatened the profitable green mussel aquaculture activity'.²⁷ Changes in water quality as a result of shifts in land use also endanger the seagrass meadows that support large tracts of riverine mangroves and endangered species such as the seahorse, pipefish, dugong and sea turtle. Commercially important fishes, crabs and prawns, and invertebrates such as sea stars, sea cucumbers, anemone, etc., that thrive in the seagrass beds could be affected as well.

Another effect of changes in land use could be increased marine debris in the coastal areas on both sides of the Straits of Johor. Marine debris includes 'any form of manufactured or processed material discarded, disposed of or abandoned in the marine environment'²⁸ whether deliberately or unintentionally. The debris may enter the sea through rivers, drainage, sewage systems or the wind, posing ecological, economic, health and aesthetic problems. Ocean Conservancy's International Coastal Cleanup in 2013 revealed the full extent of marine debris in Singapore's coastal waters when a total of 14,448 kg of litter comprising 153,147 items was collected.²⁹ Unlike other parts of the world where cigarettes make up the bulk of the litter collected on beaches, in Singapore, it is styrofoam. Styrofoam is potentially much more damaging because it can fragment badly, whereas cigarette butts stay whole. Most of the debris on Singapore's shores originates from within the country. However, given Singapore's proximity to the rising urban and industrial centres of Johor, it is not beyond the realm of possibility that debris from those locations could become an increasingly significant issue.

Table 2: Sources of land-based pollution in Johor.

- Earthworks.
- Wet markets.
- Abattoirs / slaughterhouses.
- Chicken processing stalls.
- Landfills near rivers.
- Squatters on river reserves.
- Shared accommodation for workers at construction sites.
- Plastic bags.
- Individual septic tanks in old housing areas.
- Old sewage treatment plants.
- Restaurants and food stalls.
- Sand mines in and upstream of rivers.
- Pig farming areas.
- Aquaculture in tidal flats.
- Logging of permanent forest reserves.

Source: Zelina Z. Ibrahim et al., 'Coastal pollution loading and water quality criteria' (Bay of Bengal Large Marine Ecosystem (BOBLME) Country Report on Pollution, Universiti Putra Malaysia, 2011), <http://www.boblme.org/documentRepository/BOBLME-2011-Ecology-11.pdf>

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Sea-based pollution

Some 20 per cent of sea pollution can be attributed to the dumping of oil and other wastes from ships, accidental spills and offshore oil drilling. Thus, any increase in maritime traffic in the Straits of Johor could be damaging to Singapore's marine and coastal environment. Already, maritime traffic has been blamed for the coastal erosion seen on Singapore's Pulau Tekong, which is located at the eastern end of the Straits of Johor. Such erosion could threaten the island's 0.92 sq km of mangroves, 'one of the largest remaining mangrove areas in Singapore with a mature and undisturbed habitat'.³⁰ Of urgent concern is the development of the Pengerang Integrated Petroleum Complex just across from Pulau Tekong. Malaysia envisions that the complex will become the Rotterdam of Asia within the next 20 years, with a storage capacity of up to 1.3 million cubic metres of crude oil.³¹ This could accelerate growth of maritime traffic, greatly increasing the risks of coastal erosion and oil spills around the waters off northeastern Singapore.

Oil spills in Singapore's waters are not a new phenomenon. The most recent occurred in July 2013 when two bulk carriers, the South Korea-registered *Oriental Pioneer* and the Bahamas-registered *Atlantic Hero*, collided off the coast of Singapore, causing spillage of some 100 tonnes of fuel oil.³² The largest spill occurred in October 1997 when more than 28,000 tonnes leaked following a collision between the Cyprus-registered tanker *Evoikos* and the Thai-registered crude-oil tanker *Orapin Global* in the southern part of Singapore, seriously affecting mangrove forests and coral reefs (see also Table 3).³³

Table 3: Major oil spills in Singapore history.

Year	Name of ship	Amount spilled (tonnes)
1975	<i>Showa Maru</i> tanker.	3,300

1987	<i>Elhami</i> tanker.	2,300
1995	<i>Saybolt</i> barge.	100
1997	<i>Orapin Global</i> tanker.	28,463
2000	<i>Natuna Sea</i> vessel.	7,000
2002	<i>MV Hermion</i> freighter, collision with <i>Neptank VII</i> tanker	450
2002	<i>Agate</i> tanker, collision with <i>Tian Yu</i> cargo ship.	350
2003	<i>MV APL Emerald</i> container ship.	150
2010	<i>MT Bunga Kelana 3</i> tanker, collision with <i>MV Waily</i> bulk carrier.	2,500
2013	Collision between <i>Oriental Pioneer</i> and <i>Atlantic Hero</i> .	100

Source: 'Major oil spills in Singapore history', *Today*, 2 July 2013, <http://wildsingaporenews.blogspot.sg/2013/07/oil-spill-due-to-collision-near-tanah.html#.Uo24tRX2OUm>

Although there have been relatively few cases of oil spills in the Straits of Johor, the idea of opening up the narrow waterway to larger vessels must be cause for concern. In July 1996, then Malaysian Prime Minister Dr Mahathir Mohamad had proposed replacing the Causeway between Johor and Singapore with a new bridge that would allow for the passage of large ships.³⁴ While negotiations between Malaysia and Singapore on the project were not successful, and it was subsequently cancelled, interest has not died altogether. In December 2011, the Johor branch of the United Malays National Organisation (UMNO), the largest party in Malaysia's ruling coalition, asked Prime Minister Najib Razak to revive the project. While the prime minister was not keen at that point in time due to the concern that it could affect bilateral ties with Singapore, this situation could change as maritime traffic increases in tandem with economic growth in Iskandar Malaysia and Johor. With the Straits of Singapore already congested, opening up the Straits of Johor to larger ships may become the most attractive solution, particularly given that that would also increase connectivity between Johor's two main ports, namely, the Port of Tanjung Pelepas and Johor Port.³⁵

Land reclamation

Increased land reclamation as part of the Iskandar Malaysia project poses yet another challenge. Land reclamation in the Straits of Johor has long been a major irritant in relations between Malaysia and Singapore. Malaysia had in the past blamed Singapore's land reclamation around Pulau Tekong and Tuas for causing floods in Johor. Such activities, it reasoned, narrowed the mouth of the Johor River, causing the river to burst its banks when excess rainwater could not flow out to the sea fast enough.³⁶ Also, it was argued that land reclamation by Singapore would obstruct ships headed for ports in Johor, and that that would affect Johor's economy. However, Malaysia is itself now actively reclaiming land – to build waterfront residences at Danga Bay (opposite Singapore's Sungei Buloh Wetland Reserve) and for the Pengerang Integrated Petroleum Complex at the southeastern tip of Johor.

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Obstacles to realising an environmentally friendly Iskandar Malaysia



The coastal region of Iskandar Malaysia has witnessed increasing urbanisation. Developments such as Puteri Harbour (above) and Danga Bay often involve land reclamation.

Credit: Pau Khan Khup Hangzo.

Iskandar Malaysia is touted as an alternative model to the congested and polluted urban centres that characterise many transitioning countries. The plan is to incorporate the latest in environmentally friendly technology in order to realise the vision of developing Iskandar Malaysia into a 'strong and sustainable metropolis of international standing'.³⁷ According to Prime Minister Najib Razak, Iskandar Malaysia is based on 'a smart city template – protecting the environment, promoting equitable development and addressing urban development challenges [through] the creation of smart, liveable urban communities that will yield an improved quality of life for thousands of citizens, with safer, cleaner, healthier, more affordable and more vibrant neighbourhoods, serviced by more efficient and accessible transportation systems – great destinations for businesses'.³⁸

The development plans for Iskandar Malaysia encompass most of the southern Johor coast. The coastal zone stretches for 64 km along the Straits of Johor and also includes a 3 km inland zone.³⁹ The overall development plan is geared towards green growth with an emphasis on reducing the zone's carbon footprint. In December 2012, Iskandar Malaysia adopted the Low Carbon Society (LCS) blueprint, with the target of reducing the zone's carbon intensity (emissions) by 50 per cent by 2025 (based on 2005 levels).⁴⁰ The LCS blueprint focuses on three areas, namely, Green Community, Green Economy and Green Environment, and these are fused into various application areas such as land-use planning, waste management, energy system, air quality, transport, and consensus building and education.

Successful implementation of the LCS blueprint would invariably have positive impacts on the Straits of Johor. What is still at question, however, is whether the grandiose pronouncements will be matched by implementation. Already, critics have suggested that talk about green development remains nothing but a gimmick to attract investments. There are several challenges to translating the various blueprints into action, including the lack of a single authority with overall responsibility, transparency issues, as well as uncertainties in the political climate. These are discussed further below.

Fragmented and overlapping agency responsibilities and legislation

Currently, there is no comprehensive, national framework governing environmental management, and no single authority with overall mandate. Instead, the responsibility falls to multiple agencies at both federal and state levels (see table 4). This results in unnecessary overlap and duplication of functions, and chequered enforcement of regulations.

The management of water resources is a case in point. Domestic, industrial and agricultural effluents are a major contributor of pollutants to the Straits of Johor. However, it has not been easy to tackle this issue. River cleaning, for example, involves a number of parties, among them the Department of Environment, the Drainage and Irrigation Department and local councils.⁴¹ A complicating factor is that the management of river basins is governed by laws passed separately by the relevant states.⁴² Consequently, as a scholar on water issues in Malaysia noted in an interview, 'When a problem occurs, they are often confused as to who is responsible'.⁴³ Further adding to this confusion is the fact that there is an overall lack of environmental awareness in Malaysia. One environmentalist observed that 'environment' was considered 'a dirty word', especially among bureaucrats and corporations in the 1970s and the situation has not changed much.⁴⁴

Table 4: Water resources management in Malaysia – Relevant laws and agencies.

	Statute	Agencies
Water and river protection	<ul style="list-style-type: none"> ● Water Act 1920. ● Drainage Water Act 1954. ● Street, Drainage and Building Act 1974. ● Environmental Quality Act 1974. ● Local Government Act 1976. ● National Forestry Act 1984. 	<ul style="list-style-type: none"> ● Water Supply Department. ● Department of Irrigation and Drainage. ● Town and Country Planning Department. ● Department of Environment. ● Local government. ● Forestry Department.

Land and soil	<ul style="list-style-type: none"> • Land Conservation Act 1960. • National Land Code 1965. • Town and Country Planning Act 1976. 	<ul style="list-style-type: none"> • Local Authority. • Land Office. • Ministry of Land Development.
Water services	<ul style="list-style-type: none"> • Water Services Industry Act 2007. • National Water Services Industry Commission Act 2007. 	<ul style="list-style-type: none"> • National Water Services Industry Commission (SPAN). • Ministry of Energy, Green Technology and Water.

Source: Compiled by authors.

Lack of transparency

The Iskandar Malaysia development is perceived as being driven by a small group of elites, and appears to be lacking in participation and overall transparency in decision-making. In the haste to court investments, large projects have been fast-tracked without adequate public consultation over potential environmental impacts. Perhaps the most high-profile example of this is the debacle over plans by a Taiwanese corporation to build a petrochemical plant in Pengerang.

In 2012, Malaysia signed an agreement with Taiwan's state-owned oil and gas company, CPC Corporation, for the construction of a RM35 billion petrochemical plant in Pengerang, located at the eastern end of the Straits of Johor.⁴⁵ The project included the construction of a petroleum refinery capable of handling a load of up to 150,000 barrels a day and a naphtha cracker with an annual capacity of 800,000 tonnes by Kuokuang Petrochemical Technology Company (KPTC), part-owned by CPC Corporation.

As it turned out, the plant was initially intended for construction on the coastal wetlands of Changhua County in Taiwan. However, that plan encountered opposition over the possible impacts on the coastal and marine environment and people's health, and had to be scrapped. KPTC then scoured overseas for suitable locations, and Pengerang was seen as an ideal choice given Malaysia's eagerness to attract investments.⁴⁶ Learning of this, members of the Pengerang NGO Alliance and three Johor State legislative assembly members travelled to Taipei in July 2013 to protest against the project.⁴⁷ The project was subsequently shelved on 5 December 2013 by KPTC because it was deemed to be uncompetitive in light of the emergence of shale gas as an alternative energy source.⁴⁸ Such protests have not gone down well with the authorities. According to reports, the Sultan of Johor 'reminded his subjects not to oppose any form of development if they do not want to be isolated or neglected',⁴⁹ and 'described those opportunists who were against the project as anti-development instigators'.⁵⁰

Uncertain political climate

Iskandar Malaysia, initiated in 2006 under the auspices of the ruling coalition party, the Barisan Nasional (BN), is considered a prestige project, and is seen by BN as key to its continued electoral dominance in Johor (UMNO was founded in Johor in 1946; and the state was for a long time considered a BN and UMNO 'fortress'). Although the likelihood of opposition parties upstaging BN in Johor was slim, the ruling coalition was keen from the beginning to protect Iskandar Malaysia from petty party politics. Consequently, the project was established under a Federal Act of Parliament, namely, the Iskandar Regional Development Authority (IRDA) Act 2007 (Act 664), which guarantees the continuance of Iskandar Malaysia regardless of which party is in power at the federal or state level.⁵¹

The fear that Iskandar Malaysia would fall victim to party politics was however rekindled recently during the Malaysian General Election held in early 2013. Although BN retained Johor, opposition parties for the first time gained significant ground, leading some to raise fears about potential impacts on Iskandar Malaysia. Opposition parties have dismissed such concerns. For example, opposition leader Anwar Ibrahim has said that he would not cancel Iskandar and would ensure that the project is carried out in a transparent manner.⁵²

Some election observers credit the recent success enjoyed by opposition parties in Johor to the growing discontent among some in southern Johor who have been left out of the development project; and opposition parties have criticised BN for allowing foreigners to drive up property prices in Iskandar Malaysia and Johor.⁵³ A continued rise in prices of homes and cost of living without a concomitant increase in wages could trigger a backlash against Iskandar Malaysia, which could in turn derail development plans, including those aimed at transforming Iskandar Malaysia into an eco-friendly metropolis.

In sum then, while there is a clear environmental component built into the Iskandar Malaysia plans, there remain several uncertainties in terms of implementation. In addition, there is also as yet no provision specifically targeted at the marine environment.

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Way forward: A higher level of cooperation

Singapore's goal of realising a City in a Garden (so as to mitigate the effects of dense urban living) hinges in no small part on the well-being of its marine and coastal ecosystem. As such, it cannot ignore the potential impact of the developments in Iskandar Malaysia on the Straits of Johor. Likewise, Malaysia's stated objective of transforming Iskandar Malaysia into a 'strong and sustainable metropolis of international standing' also depends on how successfully it balances development with biodiversity conservation. These goals could serve as common ground for the deepening of cooperation and collaboration between the two sides on environmental issues in and around the Straits of Johor.

Singapore and Malaysia have in fact had a working relationship with each other for some time. They have held Annual Exchange of Visits (AEVs) since 1979. Singapore's Ministry of the Environment and Water Resources (MEWR) and Malaysia's Ministry of Natural Resources and Environment (MNRE) have taken turns to host the visits with the aim of cultivating rapport and enhancing cooperation on issues of mutual concern.

At the 26th Malaysia-Singapore AEV held in November 2013, the environment ministers of the two countries resolved to continue to collaborate on, among others, efforts to improve the overall water quality of the Straits of Johor and to prevent chemical and oil spills.⁵⁴ In the area of biodiversity resources, they agreed to continue exchanging data on the status of the ecology and morphology in and around the Straits of Johor.

In addition to the ministerial-level AEV, senior officials from the MEWR and MNRE and their respective agencies also meet regularly through the Malaysia-Singapore Joint Committee on the Environment (MSJCE). Founded in 1991, the MSJCE serves as a forum for common environmental challenges. The environment agencies of both countries subsequently developed an Emergency Response Plan (ERP) under the MSJCE's auspices to deal with accidents arising from the transportation of hazardous chemicals across the Second Link, and bilateral training exercises in connection with this have been conducted regularly since 2000. The ninth such exercise, conducted on 20 October 2013, involved 24 agencies and companies from both countries.⁵⁵

Whether or not the aforementioned collaborative efforts can address the full spectrum of threats to the coastal and marine biodiversity of the Straits of Johor remain uncertain as they are largely reactive measures designed to be deployed after a crisis has occurred. To effectively manage marine pollution in the Straits of Johor, more extensive and proactive measures are required. A good start would be for Malaysia and Singapore to initiate a joint study to determine the current state of pollution in the Straits of Johor and to identify sources of pollutants. The last major joint assessment was done in 1993 when Malaysia and Singapore under the auspices of the MSJCE jointly commissioned an independent surveyor, Murray-North (SEA) Pte Ltd, to undertake a hydraulic and water quality study of the Straits of Johor. The report identified certain rivers and areas in Johor as major sources of pollutants and also named treated effluents from water reclamation plants in Singapore as a further source of pollutants.⁵⁶

Malaysia and Singapore should also strive to develop a common methodology for assessing impacts. This could include baseline surveys, and assessments of resources, risks and damage at pre- and post-project development stages. Such investigations could be planned and coordinated internationally but implemented on a national basis.

A more complex, but important, undertaking would be for the two countries to harmonise their respective strategies or regulations for marine environmental protection and preservation. Harmonisation of pollution control practices and regulations would entail re-examining the rationale for their respective laws and might necessitate developing new ones or modernising and streamlining those that are outdated and dissonant. Ultimately, though, these measures must be backed by greater political will, and this can only come from a greater recognition of the urgency of addressing the potential impacts of development and urbanisation on the marine and coastal environment.

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