

Navigational Hazards in International Maritime Chokepoints: A Study of the Straits of Malacca and Singapore

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Abstract

The Straits of Malacca and Singapore are two of the world's most significant international maritime chokepoints. The number of ships transiting the Straits of Malacca and Singapore has increased gradually and significantly over the period of 10 years since 2000. This scenario has enhanced the likelihood of the occurrence of maritime accidents in these Straits. This is further aggravated by the fact that the Straits themselves have many navigational hazards which may make navigation difficult. The navigational hazards in the Straits of Malacca and Singapore that could potentially endanger mariners and the adverse environmental impacts arising from a maritime accident are discussed in this paper. The remedies available to the littoral States of Malaysia, Indonesia and Singapore under the International law are identified for enhancing safe navigation. As an important shipping way for oil transportation, the Straits of Malacca and Singapore have to remain open for international shipping as the closure of the Straits would be detrimental to the global economy.

Keywords: *Law of the Sea, Straits of Malacca and Singapore, co-operative mechanism, navigational hazards, shipping.*

Introduction

Managing narrow straits which cater to large international maritime traffic is a serious problem. The consequences of a maritime accident are grave and will have severe economic and environmental problems. The objective of this study is to examine the situation in the Straits of Malacca and Singapore. The options available under the International Maritime Law to the littoral states for avoiding maritime accidents are examined in this study.

A strait has never been legally defined in an international convention or instrument. The ordinary meaning of strait in geographic terms is 'a natural passage or arm of water connecting two larger bodies of water' (Roberts, 2006, pp. 93–112). The Straits of Malacca and Singapore are narrow waterways that connect the Indian Ocean to the West and the Pacific Ocean to the East. The entrance to the Straits is located between Ujung Baka, the northernmost tip of Sumatra, Indonesia to Lem Voalan in Phuket Island in Thailand (Maritime Institute of Malaysia, 2008, p. xiii).

The Strait of Malacca is quite wide at its opening to the Andaman Sea, which is about 200 nautical miles in breadth (Emran, 2007, p. 9). The Strait of Malacca separates mainland Malay Peninsula and the Indonesian island of Sumatra, forming a funnel-shaped waterway as it narrows to the south. It has many tributary waterways along its length, namely Strait of Bengkali, Strait of Rupert and Strait of Johor (George, 2008, pp. 5–6). As it goes south, it ends in areas between Malaysia's Tanjung Piai and Indonesia's Pulau Karimun Kecil and subsequently joins the Strait of Singapore, which is located between the island Republic of Singapore, the south coast of Eastern Johor and the islands of Riau in Indonesia (Ibrahim, Husin & Sivaguru, 2008, pp. 32–33). The Strait of Singapore, which is about 60 miles long, is a gateway to the larger South China Sea that acts as a link to the Pacific Ocean. Its narrowest width is off the southern tip of Singapore where it is slightly more than a kilometer (Oei, 2003, p. 141). The Strait of Malacca is bordered by three countries, briefly by Thailand and mainly by Indonesia and Malaysia. The Strait of Singapore is bordered by Singapore, Indonesia and Malaysia.

The Straits of Malacca and Singapore: Important Maritime Route

In the eyes of the international shipping community, the Straits of Malacca and Singapore are seen as strategic sea lines of communication that facilitate global trade as they form the shortest route connecting both the Middle-Eastern oil suppliers with the Far Eastern economic giants of China, Japan and South Korea.¹ In 1987, the number of transiting traffic stood at 30, 377 per annum (Abdullah et al., 1999, p. 232), and it increased gradually up to approximately 74,000 vessel movements in 2010.²

According to statistics for 2000, a daily average of 399 vessels passed through the Straits of Malacca and Singapore which translates to one every 3.6 minutes (Sakamoto, 2008, p. 2). In 2004, it was reported that more than 900 ships sail the Strait of Singapore everyday, which means that one ship would pass the Strait of Singapore in every 1.6 minutes (International Court of Justice, 2004, pp. 10–11). The British Broadcasting Corporation News reported in 2010 that yearly, the Straits of Malacca and Singapore accommodate almost six times the volume of navigational traffic that goes through the Suez Canal (*BBC News*, 2010). In terms of navigational traffic, the Straits of Malacca and Singapore came second only to the Dover Strait, a crucial European chokepoint bordered by the United Kingdom, France and Belgium (Graham, 2006, pp. 26–27). An estimated 11 million barrels of oil pass the Straits of Malacca and Singapore daily (International Institute for Strategic Studies, 2006, p. 46). Tankers and bulk carriers ferry vast quantities of oil, coal, iron ore and minerals to the economic centres of Southeast and Northeast Asia while on the other direction, millions of containers flow to feed consumer markets from all over the globe (Ho, 2009, pp. 233–234).

Table 1 shows that oil tankers form an average of 21.9% of all shipping transits, making up the second biggest fraction of the types of vessel plying the Straits of Malacca and Singapore. Table 1 also indicates that container vessels formed the biggest group of vessels plying the Straits over the 5-year period of 2005–2010 amounting to an average of 33.42%

of total transits. The data is derived from Port Klang VTS. Port Klang VTS is a ship reporting system available to vessels sailing the Straits of Malacca.

Table 1

Traffic Scenario in the Straits of Malacca

Type	2005	2006	2007	2008	2009	2010
VLCC/Deep Draft CR	3788	3851	3753	4040	4221	4329
Tanker Vessel	14759	14784	14391	15894	16398	16250
LNG/ LPG Carrier	3099	3297	3413	3726	3330	3581
Cargo Vessel	6340	6477	8467	8794	8560	8444
Container Vessel	20818	22615	23736	26359	22310	24805
Bulk Carrier	7394	8129	9684	10256	11186	11639
Others	6423	6496	6734	7312	5354	5085
Total	62621	65649	70718	76381	71359	74133

(Source. VTS Port Klang & MIMA)

With an increase in shipping movements from 40,000 in 1982 (Naidu, 1997), to almost 80,000 in 2007, it has been predicted that traffic will continue to increase up to 140,000 annual ship movements by the year 2020 (Sakhuja, 2007). Traffic in the Straits is reported to have grown at an average rate of 9 per cent annually (Ahmad, 1997, p. 187). The East Asian economies of Japan, China and South Korea rely heavily on the Straits of Malacca and Singapore to transport their oil needs from their Middle Eastern suppliers (Hamauzu, 2005, pp. 50–52). According to an international study, by 2020, nearly 20 million barrels of oil are expected to pass through the Straits of Malacca and Singapore (Ramesh, 2007). Statistical data have shown that most of the world's busiest ports are located in East Asian countries including China and South Korea, with Singapore ranked as the second busiest, as shown in the following Table 2.

Table 2

World's Busiest Ports 2009³

Container Traffic (TEU- Twenty-Foot Equivalent Units) 2009			
Rank	Port	Country	TEUs
1.	Singapore	Singapore	25, 866, 600
2.	Shanghai	China	25, 002, 000

(continued)

Container Traffic (TEU- Twenty-Foot Equivalent Units) 2009			
Rank	Port	Country	TEUs
3.	Hong Kong	China	21, 040, 096
4.	Shenzhen	China	18, 250, 100
5.	Busan	South Korea	11, 954, 861
6.	Guangzhou	China	11, 190, 000
7.	Dubai Ports	United Arab Emirates	11, 124, 082
8.	Ningbo	China	10, 502, 800
9.	Qingdao	China	10, 280, 000
10.	Rotterdam	Netherlands	9, 743, 290
11.	Tianjin	China	8, 700, 000
12.	Kaohsiung	Taiwan	8, 581, 273
13.	Port Kelang	Malaysia	7, 309, 779
14.	Antwerp	Belgium	7, 309, 639
15.	Hamburg	Germany	7, 007, 704
16.	Los Angeles	U.S.	6, 748, 994
17.	Tanjung Pelepas	Malaysia	5, 835, 085
18.	Long Beach	U.S.	5, 067, 597
19.	Xiamen	China	4, 680, 355
20.	Bremen/ Bremerhaven	Germany	4, 578, 642

(Source. American Association of Port Authorities)

These waterways have been important in the strategic calculations of countries in Southeast Asia and the surrounding sub-regions, based on their dominant role as the main sea lines of communication in this part of the world (Sarsito, 2005, pp. 55–57). Due to the maritime geographical features of Southeast Asia, shipping provides the most convenient way to establish trade across the vast expanse of the region (Khalid, 2008, p. 23).

If these Straits are closed for navigation, ships will be forced to traverse the longer Lombok and Makassar routes through Indonesian archipelagic waters, inevitably adding to shipping costs (Sondakh, 2004, pp. 79–80). As a result, the navigational distance for ships would be extended by 1000 nautical miles (Song, 2009, p. 84). After the recent spikes in crude oil prices, this would mean an extra shipping cost of US\$500, 000.00 per ship per transit for a large vessel such as a Very Large Crude Carrier (VLCC) (Sakamoto, 2008, pp. 1–3). The Straits of Malacca and Singapore are important for reducing transportation costs. Any interference with the free flow of maritime traffic through these waterways would be detrimental for international trade and the global economy.

Maritime Accidents in the Straits of Malacca and Singapore

Shipping is an inherently risky activity in which maritime accidents or casualties are common particularly in constricted waters like the Straits of Malacca and Singapore (International Maritime Organization, 2005). There were 888 accidents reported to have occurred in the Straits of Malacca and Singapore in the 25 year period of 1978-2003 (Basiron & Hooi, 2007, pp. 15–16). Between the years of 2000–2010, maritime collision represents the largest fraction of casualty in the Straits as shown in the following Table 3:

Table 3

Casualty Breakdown in the Straits of Malacca and Singapore (2000–2010)

Types of Casualty	Percentage (%)
Collision	59
Sunk	9
Grounding	10
Fire	22
Total	100

(Source. Marine Department of Malaysia)

Oil spill incidents inevitably entail adverse impacts on the marine environment (Kingston, 2002, p. 53–54). They may deteriorate the well-being of the marine and coastal ecosystems through destruction of marine species and their natural habitats (Petroleum Industry of Malaysia Mutual Aid Group (PINMAG), 1998). As a busy and narrow shipping route, the risk of maritime accidents occurring in the waters of the Straits of Malacca and Singapore is high.⁴ The major oil and hazardous and noxious substance (HNS) spills in the Straits of Malacca and Singapore are summarised in Table 4.

Table 4

Selected Oil and HNS Spill Incidents in the Straits of Malacca and Singapore

Year	Vessel Name	Type of Oil and Chemicals	Quantity of Spillage (tonnes)	Location and Cause
1975	Showa Maru	Crude	4, 000	Singapore Straits/ Grounding
1976	Diego Silang	Crude	5, 500	Malacca Straits/ Collision

(continued)

Year	Vessel Name	Type of Oil and Chemicals	Quantity of Spillage (tonnes)	Location and Cause
1978	Tadotsu	Crude	43, 000	Malacca Straits (Dumai)/ Unknown
1987	MV Stolt ADV	Crude	2, 000	Singapore Straits/ Grounding
1992	Nagasaki Spirit and Ocean Blessings	Crude	12, 000	Malacca Straits/ Collision
1997	Evoikos and Orapin Global	Crude	29, 000	Singapore Straits/ Collision
2000	Natuna Sea	Crude	7, 000	Singapore Straits/ Grounding
2001	Indah Lestari	Phenol	630	Johor Straits/ Sinking
2010	MV Waily and MT Bunga Kelana 3	Light Crude Oil	2, 000	Singapore Straits/ Collision

(Source. MIMA & Environment Canada).

An oil slick has devastating effects on everything that it touches, either in the open sea or in the coastal areas. The harmful effects of an accidental oil spill were also illustrated by the 1997 MT Evoikos and MT Orapin Global collision in the Straits of Singapore. At that time, this was the biggest oil spill ever to have taken place in the waters of the Straits of Malacca and Singapore. The Cypriot tanker Evoikos ran over a Thai tanker Orapin Global while navigating through Traffic Separation Scheme (TSS) zone in the Straits of Singapore on 15 October 1997 ((Petroleum Industry of Malaysia Mutual Aid Group (PINMAG), 1998). The Evoikos, which was transporting approximately 130, 000 tonnes of heavy fuel oil, sustained damage to its three cargo tanks spilling an estimated 29, 000 tonnes of heavy fuel oil into the sea.

Fortunately, the Orapin Global, which was in ballast, did not spill any oil. The spill affected about a dozen of the southern islands and islets off Singapore. Subsequently, by 19 October 1997, the oil slicks drifted into the Malaysian and Indonesian waters of the Straits of Malacca in a northwesterly direction. On 23 December 1997, oil came ashore in places along the 40km length of the Selangor coastline, including several short sandy beaches, a one kilometer stretch of rocks, a concrete breakwater and two separate areas of mangrove (Petroleum Industry of Malaysia Mutual Aid Group (PINMAG), 1998). Things were made worse on November 20th, 1997, when a Belize registered general cargo ship, An Tai sank at the berth in Port Klang, spilling an unknown quantity of fuel oil. Some of the oil spilt from the An Tai subsequently became mixed with slicks further out in the Straits originating from the Evoikos collision.

The scenario was a little different in Malaysia. When the slick reached Malaysian shores, it was virtually solid and had spread over a large area. As a result, at-sea recovery operations were no longer effective. In the event, some five kilometers of shore were oiled. Onshore clean-up operations were co-ordinated by the Malaysian Department of Environment assisted by the Marine Department. There was, however, no reported damage to the Indonesian part of the Straits of Malacca. This oil slick posed hazards to whole of the marine environment of the Strait including the mangrove swamps and jungles and, fish and prawn farms in coastal areas. Oil pollution in the seas may pollute the mangrove swamps which form valuable breeding and nursery grounds for fish and prawns, which would then considerably affect the well-being of the fishing industry that thrives along the coastal area bordering the Straits of Malacca and Singapore (Chuan, 1982, p. 11). It also disrupted the tourism industries on the south-western coast of the State of Johor (Petroleum Industry of Malaysia Mutual Aid Group (PINMAG), 1998).

The costs of cleaning up of these major pollution incidents are very high. The Evoikos oil spill cleanup took three weeks and at the cost of US\$7, 500, 000.00 while the Diego Silang 1976 oil spill cleanup cost US\$1,086, 421.00 (Chou, 1994, p. 147). The Nagasaki Spirit oil spill incident that happened in 1993 incurred a cleanup expenditure amounting to US\$1,506,160.00 (Rusli, 2011a, pp. 501–526). These costs did not take into consideration environmental damage in terms of loss of critical habitat for coastal and marine animals and living resources, as well as economic loss suffered by fishermen tourism operators (Chou, 1994, p. 147).

Due to the increasing shipping traffic, maritime accidents and casualties are still common in the Straits of Malacca and Singapore. One of the most recent accident which has occurred in the TSS area of the Strait of Malacca involved a collision between a Liberian registered tanker, MT Formosa Product Brick and an Isle of Man-registered tanker, MV Ostende Max, on 19 August 2009 in waters off Port Dickson, Malaysia. Fortunately, after extensive monitoring work, the Malaysian Maritime Enforcement Agency (MMEA) confirmed that neither naphtha nor oil spills had taken place (Ahmad, 2009).

In 2010, a tanker identified as MT Bunga Kelana 3 collided with a bulk carrier MV Waily in Malaysian waters off the coast of Singapore resulting in an oil spill (AlJazeera, 2010). The Malaysian-registered tanker MT Bunga Kelana 3, which was ferrying 63, 054 tonnes of light crude oil from Bintulu to Malacca suffered damage to one if its cargo tanks spilling an estimated 2000 tonnes of oil into the Straits of Singapore (Basiron, 2010, p. 39). Despite assurances by the local authorities that utmost efforts were being taken to contain the spill, some oil did reach the shores of Johor and Singapore and this prompted a public outcry and claims of loss of livelihood by fishermen. Basiron (2010) stated:

The environmental and ecological impact of oil spills must be considered. Besides wildlife, dirty beaches and ecosystems such as mangroves could also be affected. While the long term effect of oil spills on mangroves is

yet to be ascertained, the sight of mangrove roots covered in oil is reason for concern. A spill in ecosystems such as coral reefs could be disastrous to the fishing and tourism industry not to mention the livelihood of coastal communities.

From these incidents, it is clear that the risk of maritime accidents is high especially within the TSS Corridor of the Straits of Malacca and Singapore. Indeed, the marine environment of the Straits particularly along the stretch of the TSS is suffering from on-going environmental pressure particularly from the effects of heavy shipping activities.

Straits of Malacca and Singapore: Navigationally Challenging Waterways

The waters of the Straits of Malacca and Singapore are navigationally challenging, with the presence of many navigational hazards dotting their way along the congested and constricted parts of the Straits, posing threats to mariners.

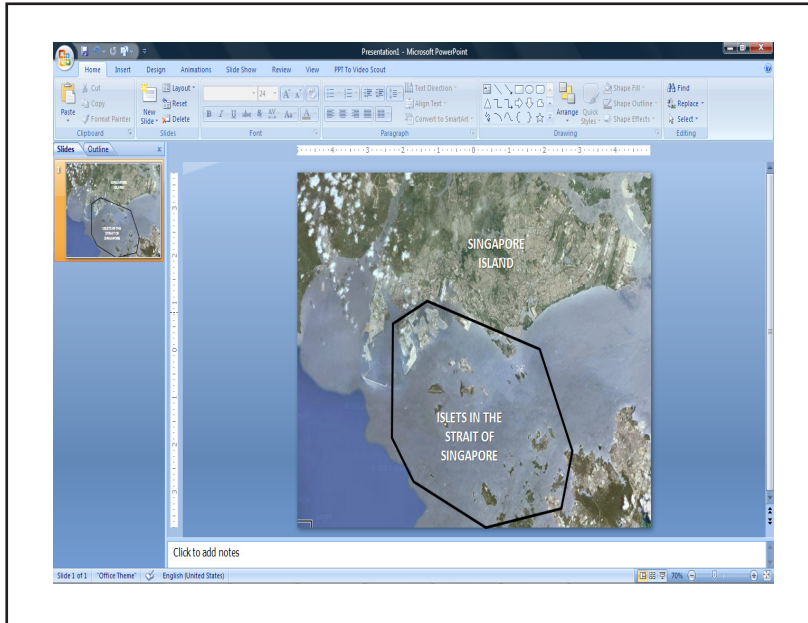
Heavy Rain and Squalls

The region around the Straits of Malacca and Singapore experiences high humidity with a considerable amount of rainfall, and the wind velocity is reported to be light along the length of the waterways (Ibrahim, Husin & Sivaguru, 2008b, p. 40). Given that the Straits and their environs are located in a tropical zone, these areas are subject to torrential rain and squalls, almost every day (George, 2008, p. 7). The system of squalls that originates from the Indian Ocean, which is described as the Sumatras, brings thunderstorms, heavy rain and strong winds in the pre-dawn and early mornings in the Straits of Malacca region (Freeman, 2003, p. 169–173). During squalls, visibility can decrease considerably and these conditions may cause difficulties for mariners to navigate their vessels through the Straits (Rusli, 2011b, p. 1–2).

Sand Waves, Sand Banks and Islets

The water currents at the northern entrance to the Straits of Malacca from where it meets the Andaman Sea are strong. In the north, the Andaman Sea waters enter the Strait from the bottom. Meanwhile down south, the Straits of Malacca receives currents from the South China Sea, Johor Straits and Rupa Straits. The movement of currents in the southern part of the Straits of Malacca is unstable, if compared to the northern segment of the waterway as the southern end of the strait is narrower, and more confined in nature. The currents in this part of the Strait form large sand waves, sand banks and shallow shoals along the waterway (George, 2008, pp. 6–7). Despite continuous dredging works, the Straits of Malacca and Singapore have continued to become shallow because of siltation; eventually making navigation more difficult in the Straits (Forbes, 1995, p. 123). Besides sand waves and shoals, there are about 60 islets dotting their way across the Straits of Singapore, as shown in Map 1.

Navigational Hazards in International Maritime Chokepoints: A Study of the Straits of Malacca and Singapore



(Source. Modified from Google Maps).

Map 1. Islets in the Straits of Singapore.

Some of these islets have been enlarged by reclamation works in the recent years, as has the main island of Singapore (Kong & Savage, 1993, pp. 107–108). Jurong Island, for example is an amalgamation of 11 smaller islets in the Strait of Singapore. The existence of these islets may complicate safe navigation especially in areas where the TSS spans.

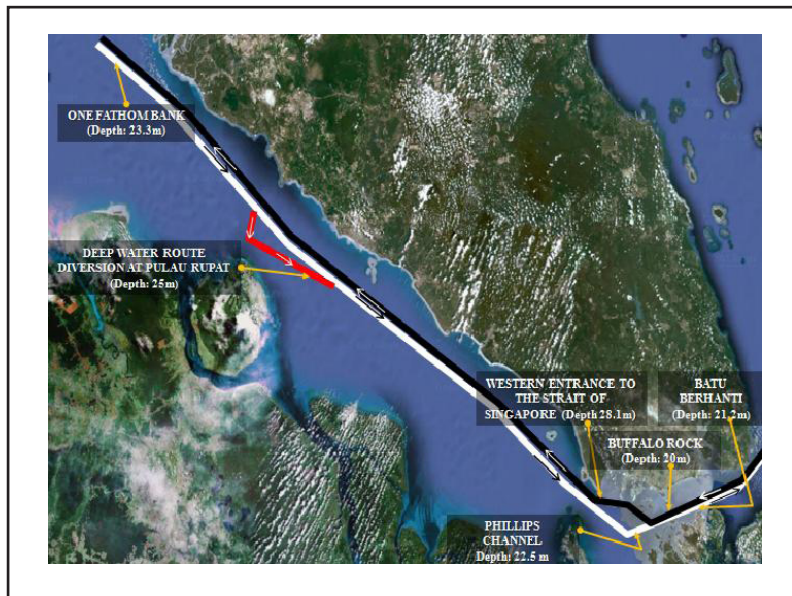
Ship Wrecks

As navigationally difficult waterways, ship wrecks are common to be found in various areas along the Straits of Malacca and Singapore. There are about thirty four ship wrecks, some dating back to the nineteenth century impeding safe navigation particularly in the TSS (Ali, 2006). Eleven out of thirty four wrecks have been identified for removal and this will be carried out by the Project Co-ordination Committee under the Co-operative Mechanism, a voluntary mechanism involving the littoral States and the user States to maintain safety of navigation in the Straits of Malacca and Singapore. Matters relating to the Co-operative Mechanism are further discussed in Section 6 of this article. Fortunately, there are no records of maritime collisions or groundings caused by ship wrecks just yet.

High Navigational Traffic

As stated earlier, the Straits of Malacca and Singapore are high traffic waterways. Tables 1 and 2 show that there were not less than 70, 000 transits between the years of 2007–2010. On

average, container ships and oil tankers form more than half of the total amount of transiting ships in the Straits of Malacca and Singapore each year. This condition is made worse as the Straits are also relatively narrow particularly in areas south of One Fathom Bank, as shown in Map 1. The narrowest breadth in the Straits of Singapore is in Phillips Channel where the breadth of the Strait is slightly more than one kilometer (Oei, 2003, p. 141).



(Source. MIMA).

Map 2. Chokepoints in the Straits of Malacca and Singapore.

The most difficult stretch in the Straits of Malacca and Singapore for navigation is in areas where the TSS spans, i.e. between One Fathom Bank off Port Klang in the west and Horsburgh Lighthouse in the east (Maritime Information Centre, 2009). As shown in Map 2, there are six chokepoints with 4 of them are in the Straits of Singapore. These chokepoints are scattered along the TSS that extends to about 250 nautical miles. The narrowest point in the TSS is at Phillips Channel which is about 1.956 nautical miles in width (U.S. Energy Information Administration, 2011). Due to these conditions, it was recorded in the ten year period of 2000–2010 that about 68.84% of collision incidents took place within the TSS area (Ibrahim, 2011, pp. 1–21).

Haze

Haze caused by forest and bush fires in Sumatra has also compromised safe navigation through these waterways. To date, the haze crisis in 1997 was the worst to hit Malaysia, Indonesia and Singapore to the extent that the Port Klang Authority considered closing night

shipping in South Port as visibility fell below 0.5 nautical miles (Cleary & Chuan, 2000, p. 172). In 2005, the haze problem forced Malaysia to declare a state of emergency in the coastal cities of Port Klang and Kuala Selangor, both located on the shores of the Straits of Malacca (Arnold, 2005). Later in July 2009, the haze which was caused by forest, plantation fires and a long drought season, had blanketed the airspace of the Riau province of Sumatra, affecting shipping near the Port of Dumai, with visibility down to less than 50 meters (Fardah, 2009). With low visibility, the risks of maritime collision increase. Fortunately for the littoral States, there have yet to be incidents of maritime accidents in the Straits of Malacca and Singapore due to poor visibility, caused by hazy conditions (Rusli, 2011b, pp. 1–2).

Cross Traffic Shipping in the Straits of Malacca and Singapore

Besides these navigational hazards, the issue of cross traffic or coastal traffic shipping in the Straits of Malacca and Singapore has been controversial. It was one of the matters discussed during an International Symposium on Safety and Protection of the Marine Environment in the Straits of Malacca and Singapore convened by the Nippon Foundation in 2008 (Permal, 2008, pp. 25–26). Cross traffic shipping may pose hazards to the smooth and safe navigation of vessels transiting through the strait (Global Environment Facility/United Nations Development Programme/International Maritime Organization, 1992, pp. 135–138). It is therefore crucial to examine the issue of cross traffic shipping movements in the Straits of Malacca and Singapore.

The cross-strait trade between Indonesia, Malaysia and Singapore has been taking place even before independence. Cross traffic in the Straits of Malacca includes barter trade vessels, fishing boats and passenger ferries. A tightly knit network of trade relations, both formal and informal, spans the waterway (Evers & Gerke, 2008). Barter trade activities in the Strait refer to the trade activities between the people who are living on the opposite shores of the Straits of Malacca. Most of these cross traffic vessels call at the Malaysian ports of Port Dickson, Malacca, Muar and Kukup, all located at the southern end of the Straits of Malacca. Most cross traffic ships are vessels less than 300 Gross Register Tonnage (GRT), hence it is not compulsory for these ships to follow safety navigation rules enforced in the waterway.⁵ Recent numbers show that the regional cross-strait traffic is increasing. Between the years 2004–2007, barter traffic in the Straits of Malacca has increased substantially as shown by the following Table 5:

Table 5

Approximate Numbers of Barter Traffic in the Straits of Malacca, 2004–2009

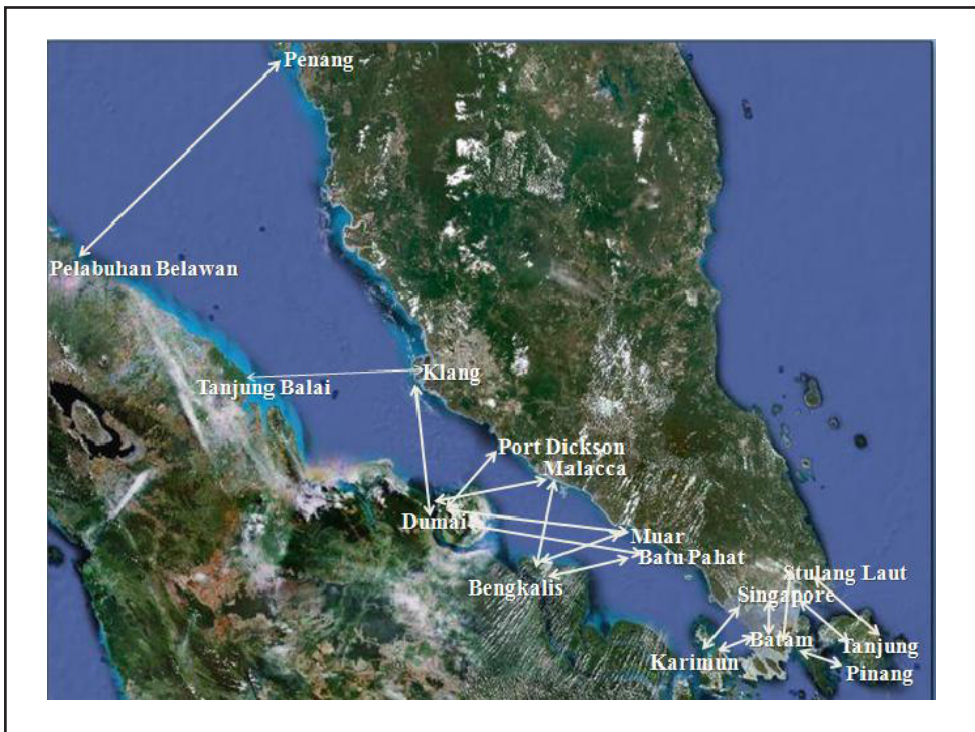
Year	Number of vessels (approximately)
2004	25,000

(continued)

Year	Number of vessels (approximately)
2005	26,000
2006	25,000
2007	27,000
2008	22,000
2009	10,000
Total	135,000

(Source. MIMA).

The safety of transiting ships in the Straits of Malacca could be compromised by the existence of cross-strait traffic, as most of the cross-strait traffic routes overlap with the TSS zones in the Straits of Malacca and Singapore. High risk areas include Undan Zone, Segenting Zone and Piai Zone, all of which are located at the southern portion of the Straits of Malacca (Rusli, 2012b, pp. 1–2). Map 3 shows the cross-traffic movements in the Straits of Malacca and Singapore:



(Source. Evers & Gerke, 2008).

Map 3. Cross-traffic Movements in the Straits of Malacca and Singapore.

Presently, there are no rules established in regulating cross-strait traffic. To avoid future accidents, it would assist if the three littoral States of Malaysia, Singapore and Indonesia could devise solutions to this problem by designating proper lanes for cross-strait traffic in these busy waterways. Even though efforts may have been made to do this, they were never realised in full because trilateral agreement has been difficult to be achieved. Singapore has objected to the idea of establishing a cross-traffic route near its waters as this could impede the navigation of through traffic. Nevertheless, this issue should be considered in evaluating shipping risks in the Straits of Malacca and Singapore. A proper designation of traffic lanes could be established, at least on the Malaysian and Indonesian sides of the Straits of Malacca to reduce the risk of accidents in this important shipping lane.

Efforts to Enhance Safety of Navigation in the Straits

Malaysia, Singapore and Indonesia are parties to the 1982 United Nations Convention on the Law of the Sea (LOSC). As such, they are bound by its provisions not only in formulating laws to regulate maritime traffic in the Straits of Malacca and Singapore, but also in taking measures for the protection and preservation of the marine environment of the Straits (Smith & Roach, 1994, p. 1–24). These States are in fact inextricably connected based on the fact that they cannot act unilaterally on these matters.⁶ A fundamental principle that the littoral States, namely Malaysia, Indonesia and Singapore must follow in legislating for the passage of vessels in the Straits of Malacca and Singapore is that these laws must not, in one way or the other, have the practical effect of hampering, denying or impairing the right of transit passage.⁷ The littoral States are permitted to make laws by giving effect to applicable international regulations⁸ and to refer these regulatory measures to the competent international organisation that is the International Maritime Organization (IMO) to be endorsed and adopted by the IMO Assembly before being implemented by the littoral States.⁹ Once implemented, transiting ships and vessels are expected to observe and comply with these measures.¹⁰

Efforts to regulate maritime traffic to provide safer shipping in these waterways were initiated well before the introduction of the LOSC. This was done through the Joint Statement on the Malacca Strait on 16 November 1971 when the three governments agreed that matters of safety of navigation related to the Straits fall under the responsibility of the coastal States concerned. A Tripartite Technical Experts Group (TTEG) on the safety of navigation was established to facilitate co-operation between littoral states in developing measures to regulate safer shipping in the Straits. At that time, the littoral states, in particular Malaysia and Indonesia, were of the view that the Straits were not straits used for international navigation but did acknowledge their importance to international navigation (Forbes, 1995, pp. 123–125).

With steadily increasing navigational traffic transiting the Straits each year, it was crucial that ships routing systems be established in these waterways (Sativale, 2003, pp. 8–9). The first TSS introduced in 1977 and was first adopted by IMO through an Assembly Resolution

A.375(X) 1977. This involved areas including the One Fathom Bank, Singapore Straits and the Horsburgh Lighthouse Area. The TSS was amended in 1981 (International Maritime Organization (IMO), 1981) and was again adjusted and extended in 1998 to accommodate the increased shipping traffic in the Straits of Malacca and Singapore. Under Article 41(7) of the LOSC, vessels traversing through the Straits are bound to follow the prescribed TSS. Together with the TSS, the TTEG on Safety of Navigation also discussed the matters pertaining to the minimum requirement of Under Keel Clearance (UKC).

The UKC refers to the distance between the sea bed and a ship's keel. It became a contentious issue given that the waters of the Straits are relatively shallow making them environmentally and navigationally dangerous if navigated by large tankers of over 200,000 Dead Weight Tonnes (DWT) (Sien, 1998, p. 304). Malaysia initially proposed 4.5 meters UKC, Indonesia 4.4 meters and Singapore 2.5 meters. As a compromise, the TTEG on maritime safety agreed with a UKC of 3.5 meters which was submitted to and agreed by the IMO through IMO Assembly Resolution A. 375(X) (Djalal, 2004, pp. 178–180). Under Resolution A. 375(X), the littoral States have introduced more measures on navigational safety such as the usage of the designated deep water route by deep draught vessels and ensuring that vessels comply with accepted international conventions and recommendations (Yaacob, 1997, p. 18–19). Besides TSS and UKC requirements, the littoral states with the assistance of the members of the international community have installed various navigational safety measures in the Straits such as the Vessel Traffic Management System (VTS) in 1997, the Mandatory Ship Reporting System (STRAITREP) in 1998 and other aids to navigation in that area.¹¹

Besides these measures, Article 43 of the LOSC encourages the user States and the littoral States to co-operate in managing straits used for international navigation.¹² The first user State to co-operate with the littoral States was Japan, which has contributed significantly through monetary and technological assistance (Nippon Maritime Center (NMC), 2005). With the establishment of Co-operative Mechanism, more States other than Japan have started to participate in the effort to enhance safety of navigation to ensure that the marine environment of the Straits of Malacca and Singapore could be protected from vessel-source pollution.

Co-Operative Mechanism

There is an ongoing Co-operative Mechanism between the littoral States and the users to enhance in promoting safety of navigation and protection of the marine environment of the Straits. Under this Co-operative Mechanism, the littoral States and the user States have worked together in particularly in developing maritime technology to enhance safer shipping and ensuring that aids to navigation facilities are up and running in the navigationally difficult Straits of Malacca and Singapore. The idea of forming a Co-operative Mechanism was put forward in the 2006 IMO Kuala Lumpur Meeting on the Straits of Malacca and Singapore. It was fully endorsed at the IMO Singapore Meeting on the Straits of Malacca and

Singapore, a year later (Ahmad & Rozali, 2009, pp. 66–71). The Co-operative Mechanism was formally accepted by the Malaysian, Singaporean and Indonesian Governments and was recognised as a permanent agenda item of the TTEG on the Safety of Navigation in the Straits of Malacca and Singapore at its 32nd meeting in Manado, Indonesia in October 2007. Indeed, this co-operative mechanism is the first attempt by the international community to put Article 43 of the LOSC into application (Beckman, 2009, p. 258–259; Ho, 2009, p. 234). The scope of the Co-operative Mechanism focuses on three components:

- (i) Co-operation Forum for dialogue and discussion;
- (ii) Project Co-ordination Committee (PCC) on the implementation of projects in co-operation with sponsoring users/stakeholders; and
- (iii) Aids to Navigation Fund (the Fund) to receive direct financial contributions for renewal and maintenance of aids to navigation.

The Co-operation Forum

Kuala Lumpur hosted the first Co-operation Forum (the Forum) on 27 and 28 May 2009 which was attended by about 90 participants from the littoral States, 17 user States and 9 organisations (Ahmad & Rozali, 2009, pp. 66–71). The Forum explored possible areas of co-operation under the Co-operative Mechanism and the participants of the Forum were updated on the state of preparedness to respond to oil spill incidents in the Straits as well as the status and conditions of aids to navigation and traffic in the Straits. In other words, the Forum acts as the main avenue for interested user States and other interested parties to meet and co-operate with the littoral States, and any outcomes of the Forum should then be communicated to the TTEG and subsequently to the IMO, if necessary (Ho, 2006, pp. 1–2).

The second Co-operation Forum was held in Singapore in concurrence with the TTEG of Safety of Navigation in the Straits of Malacca and Singapore from 12 to 13 of October 2009 (Ho, 2009). This meeting was mainly focused on the issue of the shipping traffic carrying capacity of the Straits of Malacca and Singapore.

The Third Co-operation Forum was held in Yogyakarta, Indonesia in October 2010 and a number of projects relating to safety of navigation and marine environmental protection were discussed here. The IMO representatives to the Forum presented updates on the IMO Straits Trust Fund and other ongoing projects including the Marine Electronic Highway (MEH) Project,¹³ which currently was reported to have undergone positive progress. Besides the MEH, the IMO also introduced the e-Navigation, a navigational technology that will harmonise the collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means, which will then improve navigational safety of plying vessels.

The Malaysian delegation presented updates of the two projects led by Malaysia under the Project Co-ordination Committee (PCC). Overall, like the first and the second Co-operation Forums previously held in Kuala Lumpur and Singapore respectively, the 2010 Co-operation Forum in Yogyakarta demonstrated close co-operation and positive commitments from both users and littoral States to ensure safe navigation and marine environmental protection are promoted in the Straits of Malacca and Singapore.

Recently, the fourth Co-operation Forum was successfully held in Melaka, Malaysia in October 2011 and many issues relating to the enhancement of the protection of the marine environment of Straits of Malacca and Singapore were discussed. Among them was the cross-strait traffic issue as elaborated earlier in Section 4.6 of this Article. Three recommendations were made by the Maritime Institute of Malaysia (MIMA) to improve cross-strait traffic management. This could be done by enhancing safety-levels of non-convention vessels particularly barter trade boats, reviewing precautionary areas in the TSS in relation to cross-strait traffic as well as incorporating issues concerning safety of cross-strait traffic into bilateral discussions (Sh. & Atta Mohd, 2011, pp. 1–31). Cross-strait traffic issues are pertinent in ensuring safe navigation and have to be dealt with by the littoral States collectively. Based on these positive developments, the Co-operation Forum has been effective in promoting more future co-operations in due course.

Project Co-ordination Committee

The first Meeting on the Project Co-ordination Committee (PCC) was held in Kuala Lumpur on 29 May 2008 attended by the littoral States, Australia, China, Japan, South Korea and the United States of America (U.S.) including interested organisations such as the Oil Companies International Marine Forum and the IMO. The PCC Meeting discussed the status of seven projects proposed at the Kuala Lumpur and Singapore Meetings. All these seven projects are aimed towards promoting safe shipping in the navigationally difficult waters of the Straits of Malacca and Singapore. Table 6 shows the status of these projects.

Table 6

The Status of the Six Projects under the Co-operative Mechanism in the Straits of Malacca and Singapore

Projects	Status
<u>Project 1:</u> Removal of wrecks in the TSS in the Straits.	The U.S. has indicated its willingness to explore the possibility of participating in this project. India agreed to share its expertise in conducting a hydrographic survey in the Straits of Malacca and Singapore.

(continued)

Projects	Status
<p><u>Project 2:</u> Co-operation and capacity building on hazardous and noxious substance (HNS) preparedness and response in the Straits.</p>	<p>Australia has assisted in the establishment of an HNS databank and the methodology to develop computer-based risk assessment.</p> <p>The U.S. has agreed to explore the possibility of developing a Joint Standard Operating Procedure for HNS response in the Straits of Malacca and Singapore.</p>
<p><u>Project 3:</u> Demonstration project of Class B Automatic Identification System (AIS)¹⁴ transponder on small ships.</p>	<p>Japan and South Korea agreed to provide transponder hardware in the form of ship-based AIS Class B transponders.</p> <p>Australia has shown intention to provide its technical expertise towards the AIS design.</p>
<p><u>Project 4:</u> Setting up of a tide, current and wind measurement system for the Straits</p>	<p>China is interested to provide technical expertise for the implementation of this project by conducting an on-site survey to determine the exact project scope.</p> <p>The U.S. is prepared to share its expertise particularly in implementing the same system currently in operation in the U.S. to be used in the Straits of Malacca and Singapore.</p>
<p><u>Project 5:</u> Replacement and maintenance of aids to navigation in the Straits.</p>	<p>Japan and South Korea had reiterated their commitments to assist in replacing the damaged and worn out aids to navigation under this project.</p>
<p><u>Project 6:</u> Replacement of aids to navigation destroyed or damaged by tsunami in December 2004</p>	<p>China and Indonesia will undertake this jointly to replace 7 aids to navigation on the northern part of the province of Aceh, Indonesia.</p>
<p><u>Project 7:</u> Feasibility Study on the Establishment of Emergency Towing Vessel service in the Straits of Malacca and Singapore</p>	<p>This project is the newest inclusion to the PCC and is sponsored by IMO and Australia.</p>

(Source. Marine Department of Malaysia).

The support and encouraging responses given by various user States namely the U.S., Australia, China, India, Japan and South Korea towards these projects are positive developments towards promoting more voluntary participations and contributions in the seven projects of the PCC (Rusli, 2012a, pp. 83–84). Some projects have been successfully completed while some are still at their initial stages of implementation.

The Aids to Navigation Fund

The littoral States have consistently asserted that the burden of maintaining aids to navigation in the Straits of Malacca and Singapore should not be exclusively placed upon the littoral States of the Straits (Valencia, 2010). Given the sheer shipping volume and traffic, it has been a constant challenge to the littoral States to ensure the navigational safety, environmental protection and maritime security are guaranteed for mariners in the Straits of Malacca and Singapore. There are currently about 51 aids to navigation instruments along the waters of the Straits of Malacca and Singapore with 18 in Malaysian waters, 28 in Indonesian waters and five in Singaporean waters.

Two of the littoral States, are developing States and they do not have as much financial means as their developed counterparts which are mostly users of the Straits (Hock, 2008). For instance, Malaysia has spent over the years more than US\$60 million to install, maintain and upgrade various navigational aids in the Strait of Malacca, a considerable amount to be borne by a developing country, which has limited resources and other more pressing needs (Khalid & Basiron, 2008, pp. 523–525). For these reasons, the Aids to Navigation Fund (the Fund) was established in 2007 under the umbrella of the Co-operative Mechanism and it may receive direct financial contributions for renewal and maintenance of aids to navigation from any States or interested organisations. This Aids to Navigation Fund is different from that of Project 5 and Project 6 led by Indonesia on maintenance of aids to navigation as the Fund is not a project created under the PCC.

At present, only Malaysia and Indonesia are utilising the Fund as Singapore has indicated that it will manage the maintenance of 5 aids to navigation facilities within its territorial waters itself. In realising the 10 year Plan Maintenance Programme (PMP) for aids to navigation in the Straits of Malacca and Singapore, the Marine Department of Malaysia, which acted as the Secretariat to the Fund has conducted an assessment survey in 2008. The survey showed that the maintenance and replacement costs of aids to navigation in the PMP for Malaysia and Indonesia are estimated to be around USD55 million as shown in Table 7:

Table 7

*Plan Maintenance Programme on the Operations and Maintenance of Aids to Navigation
-10 Year Budget Estimation*

	Cost Year 1- Year 10 (USD)
Indonesia	
Maintenance	8, 538, 871.00
Operational	6, 512, 500.00
Replacement	16, 986, 842.00

(continued)

	Cost Year 1- Year 10 (USD)
TOTAL	32, 038,213.00
Malaysia	
Maintenance	9, 890, 374.00
Operational	4, 094, 523.00
Replacement	8, 800, 888.00
TOTAL	22, 785, 785.00
TOTAL (MALAYSIA + INDONESIA)	54, 823, 998.00

(Source. TTEG).

Based on these figures, the average maintenance cost would be approximately USD 5.5 million per year. Malaysia was the first host of the Aids to Navigation Fund (the Fund) for a period of three years until 31 December 2010 and the official currency for the Fund is the American Dollar (USD). Malaysia's tenure as host and Chairman of the Fund has ended on 31 December 2010. However, during the 5th Aids to Navigation Fund Committee Meeting in Langkawi in 2010, Malaysia has proposed that its tenure as a host or chairman of the Fund to be extended for another 2 years until the end of 2012. Malaysia argued that without the distraction of the change in the fund's administration in such a short time, it would be more feasible for Malaysia alongside with its littoral counterparts to focus in promoting and encouraging more user States to make contribution. The proposal was granted and Malaysia is now the Chairman of the Fund until 2012 (Ahmad, 2011).

The Marine Department of Malaysia was appointed to manage the Fund (Ahmad, 2010, pp. 4–7). To put the Fund into operation, a trust account in the name of the 'Aids to Navigation Fund' was opened with a local bank in Malaysia. The Director General of the Marine Department was the Chairman of the Fund Committee and a Secretariat was formed to manage the daily operations of the Fund together with the Fund Committee Meetings. The Fund Committee met four times in Penang, Kuching, Malacca and Johor Bahru respectively between the years of 2008 and 2009 and these meetings were attended by representatives from China, Greece, Japan, South Korea, the United Arab Emirates (UAE), the Nippon Foundation, the MSC, the Middle East Navigation Aids Service (MENAS) and the IMO. So far, Japan and the UAE have consistently contributed to the Fund and hence, in 2008, a sum of almost US\$1.31million was raised.

In 2009, the UAE and MENAS contributed another US\$100, 000 and US\$1 million respectively to the Fund. The same year, Japan, through MSC agreed to donate US\$500, 000 to the Fund. South Korea too, has shown their readiness to contribute in US Dollars

a sum valued at 100 million Korean Won (Djalal, 2009, pp. 131–140). With increasing parties showing interest in participating and making contributions, it is expected that the Fund will receive more contributions in the future. If the Fund continues to receive more financial assistance in the coming years, this could help in realising an active co-operative mechanism that may benefit both the littoral States and the users. The amount collected in 2009 was as high as USD5 million. Nevertheless, beginning 2010, the money contributed to the Fund has been decreasing with only USD2, 934, 500 by the end of 2011. In contrast, the average cost for maintaining aids to navigation facilities has increased from approximately USD1.4 million to USD5.5 million, as shown in the following Table 8:

Table 8

Contributions Vis-à-vis Annual Cost of Maintenance of Aids to Navigation Facilities

Year	Contribution (USD)	Annual Average Cost (USD)
2008	1, 451, 000	1, 354, 000
2009	5, 007, 532	5, 500, 000
2010	3, 228, 235	5, 500, 000
2011	2, 934, 500	5, 500, 000

(Source. MIMA and TTEG).

Based on the data shown in Table 8, it is clear that the support given to the Fund has been rather inadequate to cope up with the rising costs for the maintenance of aids to navigation facilities. Undeniably, the funds collected are not sufficient to maintain the existing aids to navigational facilities and in some cases, the littoral States themselves had to bear the costs (Khalid & Basiron, 2008, pp. 523–525).

Conclusion

Together, the Straits of Malacca and Singapore is a maritime route of great significance. As busy waterways, maritime accidents are always at high risk in the Straits of Malacca and Singapore and this is made worse with the existence of many navigational hazards dotting their way along the Straits. In view of the increasing shipping traffic, the littoral States have worked, particularly with the IMO to ensure ships could navigate these difficult waters without much hindrance.

Currently, the littoral States have also been working with a number of user States via the Co-operative Mechanism. The Co-operative Mechanism is developing quite well with most projects under it are aimed towards enhancing safe shipping. Aids to navigation are crucial in guiding shippers to navigate the Straits, for without them, maritime collision would always be at high risk. Despite the positive development of the Co-operative Mechanism,

it is disappointing to note that since 2010, the contribution to the Navigation Fund has not been increasing. This is not a good development as the burden to maintain aids to navigation should not be considerably borne by the littoral States. Furthermore, the littoral States and the user States should also collectively come up with a way to regulate cross-strait traffic so as not to disrupt safe navigation of transiting traffic.

Should a maritime accident takes place along the Straits of Malacca and Singapore causing substantial pollution, the impact on the marine environment could be devastating, resulting in economic loss particularly to the littoral States. Undeniably, co-operation forged under the Co-operative Mechanism should be continuously supported and enhanced to promote safer shipping in the Straits of Malacca and Singapore, two of the busiest maritime chokepoints in the world.

End Notes

- ¹ About two thirds of Middle-Eastern or Gulf oil exports go to Asian countries namely Japan, China and South Korea (Richardson, 2008, pp. 118-119).
- ² See Table 1.
- ³ Note: Ports in bold are those located along the Straits of Malacca and Singapore.
- ⁴ The most recent maritime collision took place in July 2011 between a Maltese-registered freighter B Oceania and Panamanian registered vessel Xin Tai Hai, 8 miles off the coast of the Malaysian island of Pulau Pisang in the southern part of the Strait of Malacca. B Oceania sunk two hours after the collision while Xin Tai Hai was anchored near the spot where the collision took place. Fortunately, this collision did not spill any oil into the waters of the Straits of Malacca and Singapore (SeaNews Turkey, 2011).
- ⁵ For example, these ships are also not subjected to the mandatory ship reporting system (STRAITREP) which is currently applicable for transiting traffic in the Straits of Malacca and Singapore (Shahryari & Ibrahim, 2009, pp. 3-6); The Mandatory Ship Reporting System in the Straits of Malacca and Singapore (STRAITREP) only applies to vessels which are of 300 GRT and above (International Maritime Organization (IMO), 1998).
- ⁶ States bordering straits can take appropriate enforcement measures against recalcitrant vessels that have violated regulations formulated under Article 42(1) (a) & 42 (1) (b) and this violation has caused or is threatening to cause major damage towards the marine environment of the straits. This is further reiterated in Article 233 (Part XII) of the LOSC.

- ⁷ See Article 42(2) – LOSC (1982).
- ⁸ As far as laws and regulations relating to the prevention, reduction and control of pollution in the Straits of Malacca and Singapore are concerned, the littoral states may enact national pollution control laws by giving effect to accepted international regulations such as the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78). Malaysia, Singapore and Indonesia are parties to MARPOL but not to all of its annexes.
- ⁹ See Article 41 (3), Article 42 (1)(a) & Article 42 (1) (b) – LOSC (1982).
- ¹⁰ See Article 39(2) (a) & (b) – LOSC (1982).
- ¹¹ The STRAITREP has four objectives namely to enhance safety of navigation, to protect the marine environment, to facilitate the movements of vessels and to support search and rescue as well as oil pollution response operations.
- ¹² Article 43 of the LOSC reads ‘User States and States bordering a strait should by agreement cooperate: (a) in the establishment and maintenance in a strait of necessary navigational and safety aids or other improvements in aid of international navigation; and (b) for the prevention, reduction and control of pollution from ships.’
- ¹³ The Marine Electronic Highway (MEH) project was officially initiated through a memorandum of understanding signed between the Governments of Indonesia, Malaysia, Singapore and the IMO at the Jakarta Meeting in 2005. The MEH is a further development of the Strait of Malacca Automatic Identification System aimed at providing safer shipping through precision navigation utilising information technology to facilitate safer shipping. This is achieved by having smooth communication and data exchange between onshore, sea-based and ship-based transponder facilities. It is based on Electronic Navigation Charts that display hydrographic information in digital electronic form and can be used with a computerised navigation system, namely the Electronic Chart Display and Information System (ECDIS). ECDIS is deemed to be a state of the art tool in navigational technology that guarantees the exact position of a vessel, within an accuracy of 1.5 meters. The application of the MEH could result in a possible reduction in the required under keel clearance which in turn could lead to greater payloads and fewer ships being used, hence contributing to less congestion and greater safety for international shipping activities in the Straits of Malacca and Singapore. This project is still at an early stage and being gradually developed in the Straits focusing on areas where TSS is applicable (MEH Demonstration Project, 2009; Lloyd’s List DCN, 2008).

- ¹⁴ The AIS is an automatic tracking system used on ships and by vessel traffic services to identify and to locate vessels by electronically exchanging data with other nearby ship and AIS Base stations. AIS is used primarily to assist ships to avoid collision with other ships or other hazards like shoal, rocks or reefs. AIS may also be utilised for vessels navigating in bad weather with limited visibility (Alexander et al, 2010, pp. 108-115).

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