Introduction

The South China Sea is the location of some of the world’s busiest commercial shipping routes. In 2016, about 21 percent of global trade by value used the sea lines of communication (SLOCs) across the South China Sea.\footnote{1} Shipping is the main mode of transport for trade in the region. The free movement of commercial shipping through the seas of East Asia is vital to the economies of regional countries and unlawful restrictions on freedoms of navigation would have a serious impact on regional economies. Ensuring the safety of navigation along these SLOCs in all its dimensions (e.g. ship-tracking services, accurate hydrographic charts, provision of navigational aids), as well as effective search and rescue (SAR) arrangements, is a major requirement for the littoral countries necessitating close coordination between them.

The South China Sea has become the focus of the concern of extra-regional countries for freedoms of navigation in the seas of East Asia. China’s widespread claims in the sea, its reclamation of features, and the build-up of military facilities on these features have led to widespread allegations that it is threatening freedoms of navigation in the sea. Freedoms of navigation have relevance for both commercial and military vessels, but calls for a more aggressive regional response to China’s activities are typically couched in terms of the alleged threat that Chinese actions pose to commercial shipping. However, China has repeatedly said it poses no such threat.\footnote{2}

International trade is carried by sea, air or overland (road, rail and pipeline). By volume, about 90 percent of international trade is carried is by sea but by value, only about 73 percent of trade is carried by sea.\footnote{3} Most of the cargo carried by sea is of lower value per tonne (e.g. bulk minerals, grains) or a specialized nature only suited for carriage in large quantities by sea (crude oil, petroleum products, LNG, LPG) although several seaborne trades still involve high-value goods such as those carried in containers (e.g. retail goods, frozen meat and other foodstuffs). Air transportation accounts for only about 0.25 percent of international trade by volume but 13 percent of trade by value. Air transportation typically carries high value to volume cargoes such as mail, electronic goods, fresh fruit and vegetables.

Shipping is a major use of the marine environment but cooperation is required to enhance the commercial efficiency of shipping operations, maintain safety and reduce the impact of these operations on the marine environment. Cooperation is also necessary for the
mitigation and prevention of ship-sourced pollution, including arrangements for responding to the major oil spills that may result from maritime accidents and monitoring oil spills in open waters from routine tank cleaning and ballasting operations. Anecdotal information suggests these activities occur undetected in the South China Sea due to the lack of an effective coordinated monitoring system.

**Maritime geography**

The maritime geography of East Asia with the off-lying island and archipelagic chain stretching from the Kamchatka Peninsula through the Japanese and Philippine archipelagos to Indonesia creates numerous straits, as well as other ‘choke points’ for shipping. These straits occur both along the coast of mainland Asia where the island chain presses close into the coast (e.g. the Tsushima Strait, the Taiwan Strait and the Straits of Malacca and Singapore), and through the off-lying islands (e.g. the Tsugaru Strait through the Japanese archipelago, the San Bernadino Strait in the Philippines, the Balabac Strait north of Borneo, and the Sunda and Lombok Straits through the Indonesian archipelago). Many of these straits are important SLOCs for international shipping both for the ships making passage along the East coast of Asia between Southeast Asia and Northeast Asia, and for those heading into mainland Asian ports from the Americas and Oceania.

The Indonesian archipelago is a major barrier to sea movement between the Indian and Pacific Oceans. The various straits through and adjacent to this archipelago are of immense strategic importance. The straits through the archipelago between Singapore and Darwin in northern Australia now constitute the most significant shipping ‘bottleneck’ in the world. Vessels pass through this area carrying the sources of energy (oil, liquefied natural gas and liquefied petroleum gas) and raw materials essential for the maintenance of economic growth and survivability of China, Japan, South Korea and Taiwan, as well the large container ships on the main around the world route linking Europe to East Asia.

The South China Sea is part of the chain of enclosed or semi-enclosed seas in East Asia subject to the regime of enclosed or semi-enclosed seas established by United Nations Convention on the Law of the Sea (UNCLOS) Part IX. From North to South, these seas are: Sea of Okhotsk, Sea of Japan, Yellow Sea, East China Sea, South China Sea, Gulf of Thailand, Java Sea, Sulu Sea, Celebes Sea, and Timor and Arafura Seas. The South China Sea is the largest of these regional seas. It is about 80 percent enclosed by land.

The South China Sea has long been regarded by mariners as an area of considerable navigational danger, particularly in the area around the Spratly Islands commonly referred to on navigational charts and in various nautical publications as ‘Dangerous Ground’. Even now there are parts of the sea that are poorly charted and regarded as dangerous to navigation – even for surface navigation let alone submarine navigation. Part of this problem is the very uneven nature of the bottom of large areas of the sea. It may be roughly divided by a line running from the southern tip of Vietnam to Brunei. To the south of this line, the entire area is supported on the Sunda Shelf and has depths of less than 200m. To the north of this line, the major portion of the region is contained in the South China Sea basin with depths in excess of 1,800m. This latter area includes the Spratly and Paracel islands and the Macclesfield Bank, as well as the possibility of uncharted seamounts.

Large areas of the South China Sea have not been systematically surveyed, as well as others that have only had lead-line surveys. Traditionally depth sounding was by hand lead and line but mechanical sounding machines with an ability to sound the greatest depths of the
ocean were introduced in the late 19th Century. The coverage of these systems depended on how frequently soundings were taken and the distance apart of lines of soundings. Particularly in the area of uneven bottom topography, potentially dangerous underwater features could easily be missed. Electronic echo-sounding gear was introduced in the 1930s to provide a means of obtaining a sounding under a ship without the use of any form of measuring line and lead or sounding machine. Modern oceanographic and hydrographic survey ships are fitted with multi-beam, wide-angle precision sonar systems that make it possible to chart continuously a broad strip of ocean floor. Light Detection and Ranging (LIDAR) systems, also known as Laser Airborne Depth Sounding (LADS), were developed in the 1970s. These allowed aircraft to carry out depth sounding covering a large survey area in a much shorter period of time than it would be possible with a ship-based system but with limitations regarding the maximum depth achievable.

The safety of navigation across the South China Sea will only be assured when the areas of the sea not well surveyed at present are surveyed using modern systems, such as multibeam sonar and LIDAR. The need for such surveys is increasing as shipping traffic increases including by ships, such as very large ore carriers and container ships with laden drafts in excess of 20 metres. However, most of the poorly surveyed areas are within the claimed exclusive economic zones (EEZs) of bordering countries and the required surveys are unlikely without a higher level of trust and preparedness to cooperate than exists between these countries at present.

**Legal regime**

An enclosed or semi-enclosed sea is defined by UNCLOS Article 122 as

a gulf, basin or sea surrounded by two or more States and connected to another sea or the ocean by a narrow outlet or consisting entirely or primarily of the territorial seas and exclusive economic zones of two or more coastal States.

The second last ‘or’ in this definition is important. It provides for a geographical definition of an enclosed or semi-enclosed sea on the basis of its narrow physical connections with nearby bodies of water, as well as a legal definition that such a sea should consist entirely or primarily of the territorial seas and EEZ of two or more countries. The South China Sea meets this latter criterion as an enclosed or semi-enclosed sea.

The regime established by UNCLOS Part IX is particularly important to the South China Sea. Under it, the bordering countries to this sea have a binding obligation to cooperate specifically with regard to managing marine living resources, protecting the marine environment and conducting marine scientific research. Although the wording of this obligation is not as strong as it might be, it does recognize the fundamental importance of cooperation with these three activities to the effective management of enclosed and semi-enclosed seas.

A question for consideration is whether the responsibility of the littoral States to cooperate extends to coordinating their efforts to provide for the safety of navigation. While some activities mentioned specifically as areas for cooperation, the opening sentence of UNCLOS Article 123 that ‘States bordering an enclosed or semi-enclosed sea should cooperate with each other in the exercise of their rights and in the performance of their duties under this Convention’ sets a more general obligation to cooperate. That responsibility might be
interpreted as including security and maritime safety. The current Single Draft Code of Conduct in the South China Sea (COC) Negotiating Text acknowledges this responsibility with references to the responsibility of the parties to cooperate with regard to the safety of navigation and the provision of SAR services, as well as the likely establishment of technical committees to handle the responsibilities.

It is of note that the United States initially opposed the UNCLOS Part IX regime during negotiations on the treaty because it could provide an opening for the bordering States to introduce arrangements restricting other States from exercising high seas freedoms of navigation in these seas. This explains the tendency of American officials to persist in referring to the South China Sea as ‘international waters’ when of course it is not – except for small areas of high seas, it is comprised largely of the EEZs of the bordering States. Use of the expression ‘international waters’ allows the United States to persist in referring to the South China Sea as part of the ‘global commons’ where the freedoms of navigation and overflight are identical with those available on the high seas. This ignores the requirement in UNCLOS Article 58 (3) that these freedoms should be exercised with ‘due regard’ to the rights and duties of the coastal State. This requirement means that for example, it would be inappropriate for another State to seek to exercise its high seas freedoms in a marine park or marine protected area legitimately declared by the coastal State as part of its duty to preserve and protect the marine environment.

**Shipping routes**

The South China Sea is entered from the north via either the Luzon Strait between the northern Islands of the Philippines and Taiwan or the Taiwan Strait between Taiwan and mainland China. In the south, the Singapore Strait feeds traffic into the South China Sea from the Strait of Malacca, while the Karimata Strait feeds traffic from the Indian Ocean through the Sunda Strait. In the East, shipping enters mainly through the Balabac Strait between Borneo and Palawan, which is used by shipping traffic that has come up from the Indian Ocean through Lombok Strait and the Macassar Strait. Some of this traffic also goes on from the Macassar Strait up through the Sulu Sea and the Philippines before entering the South China Sea through the Mindoro Strait. These routes through the Lombok and Macassar straits are much used by the bulk carriers carrying iron ore from Western Australia to Northeast Asia. Other shipping traffic comes into the South China Sea through the various straits through the Philippines.

Key SLOCs across the South China Sea connect these entry and exit points. These are shown in Figure 3.1. The most important SLOC is the one leading from the Singapore Strait to the Luzon Strait in the north. This carries the trade through the Malacca and Singapore Straits to Northeast Asia, Korea, Japan and northern China. It has a second leg which splits away about the middle of the South China Sea leading on to Hong Kong and the southern ports of China. It is of note that this route actually passes through the Paracel Islands establishing a regular pattern of traffic through disputed waters claimed by China with notional restrictions on the freedoms of navigation. However, merchant ships of all flags pass freely through the Paracels without interference or disruption.

Another important SLOC into the South China Sea is the one running up from the Lombok and Makassar Straits through the Sulu Sea and the Mindoro Strait into the South China Sea and on to the north. Then there are other coastal SLOCs carrying mainly coastal traffic along the coast of Vietnam or across from Malaya to Borneo and the Philippines.
Figure 3.1  SLOCs in the South China Sea.
https://blog.usni.org/posts/2012/12/15/sunday-12-16-12-on-midrats-episode-154-offshore-control-and-asiapacific-with-tx-hammes
Trade dependencies

While the South China Sea includes some very important SLOCs carrying much international seaborne trade, there has been a campaign by extra-regional countries specifically to overstate their importance, particularly with regard to the level of their own dependence on trade across the sea. This is all with the intention of justifying their own strategic interest and involvement in the sea.

The figure that has been often bandied around is that $5.3 trillion dollars of trade by value crosses the sea each year. This figure has its origins in a press briefing in 2011 by Admiral Bob Willard, the then Commander of the US Pacific Command, who claimed that ‘The sea lines of communication that crisscross the South China Sea carry $5.3 trillion in bilateral annual trade, of which $1.2 trillion is U.S. trade’. The admiral went on to assert ‘that the South China Sea region and the sea lines that it contains is incredibly vital to the region, to our partners and allies, and certainly to the United States’.

Both the $5.3 trillion and $1.2 trillion figures have subsequently been shown to be marked exaggerations. According to a 2018 report from the Washington-based Center for Strategic and International Studies (CSIS), 30 percent of global maritime trade passes through the South China Sea with a total value of approximately US$3.4 trillion. The United States trade that most obviously crosses the South China Sea is that with Association of Southeast Asian Nations (ASEAN), but according to ASEAN trade statistics, America’s total trade with ASEAN in 2015 was just over US$212 billion. This figure was later generally confirmed by the CSIS report that found that US$208 billion of US trade passed through the South China Sea in 2016. Additionally, a large proportion of that trade would have been carried by air, and much of that carried by sea would have been with the Philippines and Indonesia, two of ASEAN’s biggest members, and may not have passed through the South China Sea.

An analysis of the ASEAN-US trade confirms that much of that trade would have been carried by air rather than by sea. In 2017, the bilateral trade balance was in favour of ASEAN with exports valued at US$142.7 billion and imports from the United States at US$91.6 billion. Much of this two-way trade (perhaps as much as 30 percent) was in high-value goods usually carried by air, such as foodstuffs and electrical and electronic equipment.

In 2016, the value of China’s trade transiting the South China Sea was $1.47 trillion, South Korea – $423 billion, Japan – $240 billion, and Indonesia – $239 billion. The South China Sea is a major trade route for crude oil. In 2016, more than 30 percent of global maritime crude oil trade passed through the South China Sea, of which 42 percent was bound for China. About 90 percent of the crude oil supplies for China, Japan and South Korea transited the sea.

Australian sources have also overstated Australia’s trade crossing the South China Sea. With much of its seaborne trade passing through the confined archipelagic waters of Indonesia, Papua New Guinea and the Solomon Islands to its north, Australia has a strong interest in the freedoms of navigation. However, Australia can also exaggerate its trade through the South China Sea to justify its strategic interest in the sea. Its 2016 Defence White Paper says a lot about the South China Sea, both directly and indirectly. It noted that territorial disputes between claimants in East China and South China Seas have created uncertainty and tension in Australia’s region. It said that Australia does not take sides on competing for territorial claims in the South China Sea, but expressed concern about land reclamation and construction activities by claimants in the sea and about the possible use of artificial structures for military purpose. But in making a big play of the South China Sea, the White Paper falls in line with what Greg Austin has called ‘The Pentagon’s Big Lie about the South China Sea’. For Austin, the lie is the claim that China’s actions in the South China Sea threaten commercial shipping.
The Australian Defence White Paper replays Austin’s sentiment. With regard to the free flow of trade through the South China Sea, it claimed that ‘nearly two-thirds of Australia’s exports pass through the South China Sea, including our major coal, iron ore and liquefied natural gas exports’. However, this figure was an exaggeration. The accurate figure, based on data for Australia’s overseas trade, is a little over 20 percent and most of this is trade with China. The White Paper actually disproves its own estimate with its map in Figure 3.2 showing that most of Australia’s sea freight does not pass through the South China Sea. Nor does the map show the busy trade route between eastern Australia, Japan and South Korea that passes to the East of the Philippines, rather than the South China Sea.

Australia’s overseas trade crossing the South China Sea includes that with China (with a total of 23.9 percent of two-way overseas trade), Thailand (2.8 percent), Taiwan (1.9 percent), Vietnam (1.4 percent) and Hong Kong (1.2 percent). And even these figures overstate Australia’s dependence on the South China Sea, as it trades with southern China by sea, and much of its trade is carried by air. These figures are based on overseas trade by value, which may hide the fact that a significant amount of trade by value is carried by air. In volume, shipping is the main mode of transport for international trade, accounting for about 90 percent of all the tonnage carried, but this is only about 73 percent of the value of global trade. Thus Australia’s trade by volume across the South China Sea could provide a different result to that by value recognising the high volume of Australia’s exports (coal, iron ore, LNG, and other minerals) carried by sea, but it would still be nothing like 60 percent.

** Freedoms of navigation **

The maritime geography of East Asia means that freedoms of navigation are of great importance in the region both for the movement of merchant ships and naval vessels. Freedom of navigation along SLOCs is the leading international concern in the South China Sea. However, fundamentally different perspectives of the freedoms of navigation are evident in the Asia-Pacific region. The need for freedoms of navigation in South China is frequently mentioned in statements from regional forums, but there may be no common understanding of what constitutes a particular freedom of navigation or of the relevant law.

The two extreme views on freedoms of navigation are held by China and the United States. According to China’s laws, foreign vessels including warships enjoy the right of freedom of navigation through China’s EEZ but only if they comply with relevant Chinese law and regulations and with international law. China’s laws also State that while merchant ships enjoy the right of innocent passage through China’s territorial sea, foreign warships must seek China’s prior permission. The United States hotly disputes these Chinese laws.

Major powers, including ones from outside the region, argue the importance of freedoms of navigation in the sea mainly due to their concern for the free movement of commercial shipping across the sea, but in doing so, they can overstate the significance of their own maritime trade across the sea. Surprisingly, regional countries, with the exception of Japan, appear less concerned about freedoms of navigation for commercial shipping in regional seas, largely because of the extent of their trade with China.

The United States and other extra-regional countries, including France and the United Kingdom, argue that because of China’s assertive actions in the South China Sea, it poses a threat to freedoms of navigation in the sea, especially for the free movement of commercial shipping. However, China has repeatedly denied it poses such a threat. And with so much of China’s own trade passing through the sea, it is most unlikely that it would.
Piracy and armed robbery

Piracy and armed robbery against ships are often cited as a major threat to SLOCs in and around the South China Sea. However, they are not the same problems that they used to be.\(^{34}\) Recently, there has been an outbreak of attacks in the Singapore Strait, particularly in the eastbound traffic separation scheme lane. Ships in this area may be proceeding slowly and are vulnerable to hit and run attacks with the robbers stealing anything that is readily available such as engine spares and paint.

The other area of ongoing and recent attacks is in and around the Sulu archipelago off Sabah and between the Sula and Celebes seas. Major SLOCs leading into and from the South China Sea pass through this area, but most of the attacks over the years have been attacks on small vessels, fishing vessels, tugs and barges with crew members being kidnapped and held for ransom. However, one or two larger merchant ships have been attacked in this area. These attacks are largely perpetrated by militants, possibly members of the Abu Sayyaf Group (ASG). The Trilateral Cooperative Agreement (TCA) has been established by Indonesia, Malaysia and the Philippines to provide greater maritime security in this area. It involves enhanced cooperative maritime and air patrols and the establishment of operational hubs in each country.

Attacks also still occur occasionally on ships at anchor or alongside in various ports in and around the South China Sea, particularly in Indonesia, the Philippines and Vietnam. Ships are warned to be vigilant when anchored in these ports.

The largest spike in attacks in the South China Sea itself was back in 2009–2011 when many attacks occurred on ships in the southern part of the South China Sea and the eastern approaches to Singapore Strait.\(^{35}\) This was a period when many ships were unemployed owing to the Global Financial Crisis with some ships anchored while others remained underway in the area of to the west of the Natuna Islands. These latter ships were loitering waiting for their next job but were probably stopped or proceeding slowly and thus vulnerable to hit and run attacks.

A high level of cooperation now exists around the South China Sea for operational coordination and information sharing to deal with piracy and sea robbery. Relevant activities in addition to the TCA include: the Malacca Straits Patrol (MSP) network, involving Indonesia, Malaysia, Thailand and Singapore, to have oversight of the air and sea patrols of the straits and the exchange of information and intelligence; the Information Sharing Centre (ISC) set up in Singapore by Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP); the Information Fusion Centre (IFC) at Changi Naval Base with an area of interest covering much of Southeast and South Asia; and the Indonesia-Singapore Coordinated Patrol (ISCIP) arrangement that coordinates patrols in Singapore Strait.

Piracy and sea robbery are unlikely ever to be totally eradicated in Asia. Poverty, unemployment and the decline of traditional fishing in the face of over-fishing are major economic causes of piracy. Many pirates are displaced fishermen, who are no longer able to earn a living from their traditional fishing. Piracy and sea robbery are attractive alternative vocations and ships are vulnerable if they don’t adopt appropriate security measures.

The improved situation in Asia in recent years can be attributed to two main factors. Firstly, there is a high level of cooperation between countries across the region to counter piracy. Secondly, there is better policing onshore to identify offenders, as well as enhanced coordination between national agencies to prevent and manage the threat. It is a fundamental principle that the fight against piracy begins on land.
International conventions

UNCLOS provides the broad principles and the framework for international regimes and treaties dealing with the safety of navigation. Several UNCLOS articles relate particularly to the safety of navigation including Article 94 – Duties of the Flag State which requires that every State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag, including such matters as the seaworthiness, manning and equipping of ships flying its flag; and Article 98 – Duty to render assistance which requires every State to require that ships flying its flag render prompt assistance to persons in distress at sea and that every coastal State shall promote the establishment, operation and maintenance of an adequate and effective SAR service.

In addition to UNCLOS, several key international conventions provide for the safety of navigation. These are:

- **SOLAS** – the 1974 Safety of Life at Sea (SOLAS) Convention – deals with the safety and security of merchant ships, and includes the ISPS Code. It is the most important of all international treaties concerning the safety of merchant ships. Chapter V identifies certain navigation safety services, which should be provided by contracting governments, including meteorological and hydrographic services for ships; mandatory AIS requirements; routeing of ships; and the maintenance of SAR services.

- **SAR** – the 1979 International Convention on Maritime SAR Convention – encourages cooperation between parties and SAR organisations with regard to search and rescue operations at sea and requires each party to maintain an SAR organisation.

- **SUA** – the 1988 Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation (SUA), and its Protocol covering offshore facilities, extends coastal State enforcement jurisdiction against acts of violence at sea beyond territorial limits. It was introduced by the International Maritime Organisation (IMO) to overcome the limitations in the piracy provisions of UNCLOS following the 1985 hijacking of the Italian-flag cruise ship *Achille Lauro* by extremists in the Mediterranean Sea.

- **SUA 2005** – the SUA 2005 Convention brings together the 1988 Convention and its 2005 Protocol to create measures related to maritime terrorism and shipment of weapons of mass destruction (WMD). This contains significant new provisions relating to when and where ships might be boarded but these were more limited than those sought by the United States in particular demonstrating that the international community is very reluctant to create new exceptions to the principle of flag State jurisdiction on the high seas.

- **MARPOL 1973** – the International Convention on the Prevention of Pollution from Ships, as modified by the Protocol of 1978 (MARPOL 73/78) has the objective of preventing pollution of the marine environment by ships caused by operational or accidental causes. It has six annexes covering respectively pollution from ships by oil, noxious liquid substances in bulk, harmful substances carried in packaged form, sewage, garbage and air pollution.

- **OPRC Convention 1990** – the Oil Pollution Preparedness, Response and Cooperation (OPRC) Convention requires parties to establish measures for dealing with oil pollution incidents either nationally or in cooperation with other countries. The Convention also extends to floating and fixed offshore platforms engaged in oil exploration, exploitation or production. It involves an obligation to report without delay any event on a ship or offshore unit involving a discharge or probable discharge of oil.
Sea line communication

Table 3.1 Status of International Conventions – South China Sea Countries

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Source: International Maritime Organisation, Status of Conventions.
Notes: X signifies that the Convention has been ratified, and X(a) denotes that not all protocols and annexes to the Convention have been ratified.

- OPRC-HNS Protocol 2000 – the OPRC-HNS Protocol 2000 aims to provide a global framework for international cooperation in establishing systems for preparedness and response in combating incidents involving HNS (hazardous and noxious substances) at the national, regional and global levels.
- COLREGs – the 1972 International Regulations for Preventing Collisions at Sea set out the ‘rules of the road’ or navigation rules to be followed by ships and other vessels at sea to prevent collisions between two or more vessels, as well as the lights, shapes, and sound signals to be used by different types of vessel.

Table 3.1 shows the status of these conventions among the countries bordering the South China Sea. Some significant gaps are evident in the level of ratification of some of these instruments. SOLAS is widely accepted although Brunei and Thailand have not yet agreed to all the relevant protocols notably the 1988 Protocol regarding the introduction of the Global Maritime Distress Safety System (GMDSS). The 1988 SUA Convention has not been ratified by Indonesia, Malaysia, and Thailand and no country has yet ratified SUA 2005. MARPOL is generally well supported around the South China Sea except for Brunei, Cambodia and Thailand. The OPRC 1990 Convention has not yet been ratified by Brunei, Cambodia, Indonesia or Vietnam while no regional country has yet ratified the HNS Convention. All regional countries have ratified COLREGs. The SUA and SAR Conventions have not been well ratified because they involve some concession of sovereignty.

Marine environmental protection

Arrangements to protect the marine environment of the South China Sea from pollution by ships and other sources at sea remain embryonic. Two types of pollution are possible: accidental pollution arising for example, from an accident such as a collision involving one of the many laden oil tankers crossing the sea, or from an accidental spill from one of the many offshore oil exploration and production platforms in and around the South China Sea; and of operational or incidental pollution arising from routine ship operations (e.g. ballast water discharge, tank cleaning and bilge pumping).
Operational pollution is the major problem because it likely occurs on a regular basis. Satellite pictures have shown in the past that the sea area northeast of Singapore seems to be a preferred area for discharging oil from ships with heavy areas of pollution off the East coast of Malaysia (near Kuantan) and off the west coast of Sabah (Borneo). Ships are likely to engage in tank cleaning, ballast water discharge or bilge pumping in the southern part of the South China Sea to lighten their draft in preparation for their passage through the Singapore and Malacca straits or prior to entering Singapore for repair or maintenance. Ships are required under the OPRC Convention to report incidents of pollution to coastal authorities but that may not happen. Unfortunately, there are still unscrupulous shipmasters who will pollute at sea rather than pay the costs of disposing of oily waste in port.

The situation is not helped by not all bordering countries being party to the OPRC Convention. This Convention requires its parties to have a national oil spill prevention and response plan, as well as stockpiles of oil spill combating equipment, oil spill combating exercises and the development of detailed plans for dealing with pollution incidents. In November 2018, ASEAN member countries adopted the Regional Oil Spill Contingency Plan. This provides for a mechanism whereby the ASEAN Member States can request for and provide mutual assistance in response to any oil spills.

This ASEAN contingency plan is aimed mainly at controlling a large oil spill in a regional port or harbour, or possibly a major accidental spill at sea. It does not help towards countering the regular incidents of operational pollution that seem to be occurring in the South China Sea. That requires a coordinated programme of surveillance, monitoring and investigation such as the Marine Pollution Surveillance Programme in the United States. Australia and the European Union (EU) have similar programmes.

**Search and rescue**

The major problem revealed in Table 3.1 is that five of the bordering countries have not yet ratified the SAR Convention. Possible explanations of this are the costs involved in establishing a national SAR organisation and the obligation in the Convention to allow entry into the territorial sea or territory of a State by rescue units from another State for the purpose of SAR. The SAR Convention States that parties should take measures to expedite entry into its territorial waters of rescue units from other parties, but countries may be reluctant to permit this due to a perceived need to protect their sovereignty over their territorial sea. An additional problem in the South China Sea is the lack of any mechanism for SAR cooperation between ASEAN and China.

The risks of a major accident in South China Sea requiring a coordinated SAR operation is relatively high. Apart from the dense shipping traffic, there is much fishing activity and a high volume of air traffic between Southeast Asia and Northeast Asia as well as trans-Pacific flights to North America. Numerous offshore oil and gas installations are also evident with an associated risk of a major accident. The South China Sea is also vulnerable to storms and typhoons with a typhoon season in the northern part of the sea running from May to October each year. Without an agreed coordination plan for SAR in the South China Sea a major SAR operation, such as the loss of a large passenger jet or a major accident involving a cruise liner, could present problems of coordination.

SAR was one of the areas identified for cooperation in the 2002 Declaration on the Conduct of Parties in the South China Sea, Article VI of the DOC provided that all parties would engage in cooperation regarding navigation safety, and SAR before a permanent
mechanism is developed. In August 2014, the ASEAN Regional Forum issued a Statement on Strengthening Coordination and Cooperation on Maritime and Aeronautical SAR.43

Regional search and rescue exercises (SAREX) are conducted under an agreement between ASEAN countries. These have been conducted involving most ASEAN countries aimed at ensuring that all regional SAR agencies are able to coordinate assistance during major emergencies. There are also various bilateral SAREX arrangements and exercises between ASEAN countries, such as SAREX INDOPURA between Singapore and Indonesia, SAREX MALBRU between Malaysia and Brunei, and SAREX MALSING between Malaysia and Singapore.44

ASEAN and China have also been making several first steps towards their SAR cooperation in the South China Sea with China largely taking a lead. These initiatives have included a series of “tabletop” exercises and several hotlines being established between national SAR centres. The first ASEAN–China Maritime Field Training Exercise was held off Zhanjiang, in China’s southern Guangdong province in October 2018.45 The exercise was based on a SAR scenario and was co-organised by Singapore and China. It is the first exercise that ASEAN has held with one other country. Ships participated from China, Thailand, Singapore, Philippines, Brunei, and Vietnam. Beijing also claims that its reclaimed islands in the Spratly Islands have a public good utility by providing a base for SAR services. In January 2019, it opened a maritime rescue centre on Fiery Cross Reef.46

With current search and rescue regions (SRR), Singapore has accepted SAR responsibility for a large part of the South China Sea (SCS) (see Figure 3.2) and has promulgated the Singapore Plan for SAR Services and Passenger Ships. However, SRR boundaries do not accord with national maritime boundaries, and this along with the lack of ratification of the SAR Convention by some littoral countries, suggests that there could still be problems with mounting a large-scale maritime SAR operation in the region, particularly in disputed waters.

**Ship reporting systems**

Following the terrorist attacks of 9/11, the IMO introduced several measures to improve the safety and security of merchant ships at sea. These are the AIS, the long-range identification and tracking (LRIT) system, and the Ship Security Alert System (SSAS).47

AIS enhances the safety of navigation by providing all ship and shore stations with details of the identification, position, course and speed of all other AIS-equipped ships within range. It is a broadcast system used by ship and vessel traffic services principally for the identification and locating of vessels. It provides a means for ships to electronically exchange ship data at regular intervals with other nearby ships and vessel traffic system (VTS) stations. It helps and allows maritime authorities to track and monitor vessel movements. It is much used by merchant ships to avoid collisions and to pass information from ship to ship regarding what their intended movements are.

There are three types of AIS transponder that all interoperate:48 Class A AIS transponders, the main type, are mandated for vessels on international voyages over 300 tons, fishing vessels over 15m, passenger-carrying vessels; AIS Class B transponders for yachts and other recreational craft installation and have a transmission power of 2W (range of about 10 miles); and AIS Class B+, more visible than a Class B one because it has the same technology as an AIS Class A transponders thus ensuring that they will always be able to transmit, even in high traffic areas.

AIS may be switched off to hide a vessel’s identity. The fact that the American destroyer, USS *McCain*, was not showing AIS data was a major factor in its collision with a merchant
Figure 3.2  Search and Rescue Regions in Southeast Asia.

Source: Maritime and Port Authority of Singapore, “Rescue region (SRR)”, SAR Cooperation Plan. Map published by the IMO, and can be found originally on the Maritime Institute of Malaysia (MIMA) website.

ship in the eastern approaches to Singapore Strait in 2018. As a consequence of this accident and another fatal collision in 2018 involving the destroyer, USS Fitzgerald, the United States Navy (USN) now requires all its ships to show AIS data when in busy shipping lanes.

Particularly in areas of high fishing activity such as the South China Sea, it would help the safety of navigation in the area if fishing vessels also carried AIS, if only the Class B transponders that are typically available for less than USD$800. This would assist in helping to avoid collisions between fishing vessels and other ships. However, it is reported that in Southeast Asia, very few fishing vessels have AIS, and the reception quality is poor. Another limitation of AIS is that in areas of dense maritime activity, shipping and fishing, the AIS signals might merge and it will be hard to distinguish between different vessels.

At present, AIS is only a requirement for vessels on international voyages. There is extensive domestic shipping traffic around and across the South China Sea, particularly along the coast of Vietnam and between West and East Malaysia. It would help if these vessels were also required to show AIS data. Singapore made a similar recommendation some years ago that Class B AIS transponders be carried on all small vessels of less than 300 gross tons in the Malacca and Singapore Straits. While a demonstration project was conducted supported by Australia, Japan and South Korea, it is not believed that the plan was implemented.

AIS has also proven useful in allowing intelligence agencies and maritime security ‘think tanks’ in tracking the activities of vessels engaged in maritime disputes in the South China Sea. A recent months-long standoff over oil and gas operations in the South China Sea was played out between Malaysian, Chinese, and a small number of Vietnamese vessels. The Asia Maritime Transparency Initiative (AMTI) operated by the CSIS in Washington DC tracked the standoff using the vessels’ AIS broadcasts along with commercial satellite imagery. This data revealed a dangerous, ongoing game of chicken involving law enforcement, militia, and civilian vessels. However, it was an incomplete picture as it only captured those ships broadcasting AIS or which happened to be in the area when a satellite image was captured. It is also possible that additional naval, air, law enforcement, and militia assets from all sides had been involved for over the previous two months. Equally likely is the possibility that maritime law enforcement vessels choose to show AIS data to show their presence in a disputed area.

This incident shows how AIS contributes to maritime domain awareness (MDA), as well as to the safety of navigation. While both LRIT and AIS contribute to MDA in the South China Sea, the two systems are not to be confused. LRIT is a closed system but AIS is an open one with information on a conforming ship’s position and movements publicly available on several ship-tracking websites, such as www.marinetraffic.com.

LRIT provides reliable and persistent global surveillance of maritime traffic for the purpose of detecting, identifying and classifying vessels. It was introduced following concerns mainly held by the United States following the 9/11 attacks that ships could enter port with explosive devices hidden in innocent cargo, and coastal States required information on ships preparing to enter one of their ports or were navigating in their adjacent waters. LRIT data is only available to the following:

- Flag States can receive information on ships flying their flag anywhere in the world.
- Port States can receive information on ships declaring their intentions to enter one of its ports.
- Coastal States can receive information on ships passing within 1000 nautical miles of their coasts.
- SAR authorities.
LRIT is a requirement for the following on international voyages, all passenger ships, cargo ships over 300 tons, and mobile offshore drilling units. A ship is required to transmit its ship identity, location and date and time of its position, which is reported automatically to its flag administration at least four times a day or on demand. Data through the LRIT is available only to recipients who are entitled to receive such data. These include contracting governments so that they receive information about ships, which have indicated their intention to enter a port facility or a place under their jurisdiction and contracting governments to receive information about ships navigating with a distance of 1000 nautical miles from the coast, and also the air SAR services of the contracting governments for the purpose of SAR of ships, and persons in distress at sea.

Introduction of LRIT presented several legal and technical problems. Intense negotiations were required at the IMO on who could have access to LRIT information, including the distance from the shore from which information may be received. There were concerns held by some States that seeking information from ships more than 200 nautical miles offshore was an interference with their high seas freedoms of navigation. Confidentiality considerations were another key concern that was held by flag States and industry in relation to the adoption of LRIT and other vessel tracking systems.

Contracting governments are required to implement a national data centre and comply with the LRIT regulations. However, in view of the costs involved, many coastal States have not implemented a data centre. All bordering countries to the South China Sea are contracting governments to the LRIT system and have implemented national LRIT data centres.

In Europe, European Union Member States have established an EU LRIT Data Centre (EU LRIT DC) through the European Maritime Safety Agency (EMSA), which is in charge of the technical development, operation and maintenance of the EU LRIT DC. The system was initially set up for the purposes of maritime security but was soon extended for use in areas such as SAR, maritime safety and protection of the marine environment. The EU LRIT DC serves as a model for regional cooperation as an example for the rest of the world.

SSAS is part of the ISPS Code. It is intended to allow ships to get urgent security assistance should they fear an attempted or actual piracy or terrorist attack. It is a requirement for merchant ships to allow them to report a ship to shore security alert to a competent authority ashore. It does not raise any alarm on board the ship. There must be at least two activation points or buttons: one must be on the navigation bridge and the other situated in at least one other location on board the ship. Although good in concept, the weakness of the SSAS is that nearby responders may not be the initial parties alerted. The recipient of the alerts is the ship’s flag State or an authority designated by the flag State, which is usually in practice the ship owners. These of course may be a long distance from the ship activating the alert. It is also prone to false alarms.

Information sharing

Information sharing between the bordering countries the South China Sea is essential for establishing MDA across the sea. MDA is central to a coastal State’s ability to provide for the safety of navigation and SAR services in its adjacent waters, as well as for the provision of these services on a coordinated basis in the South China Sea. It also would help in identifying and tracking ships that have committed an act of wilful pollution of the marine environment.

There are now several national information sharing centres around the South China Sea that contribute to MDA. The IFC operated by the Singapore Navy is the leading one.
of these. With the assistance of international liaison officers (ILOs) from other regional navies and coast guards, including from China, it provides for regional maritime information sharing cooperation among regional navies and other agencies. It helps cue participating countries to take action to respond early to potential threats and developing situations. At the heart of the IFC is the Regional Maritime Information Exchange System (ReMIX), which is an initiative of the Western Pacific Naval Symposium (WPNS) to share maritime security–related information. There will be a reference database of more than 150,000 vessels that is designed to flag suspicious vessels that warrant closer surveillance.

Other national maritime information systems include Indonesia’s multiagency Sea Security Coordination Centre (Badan Keamanan Laut, or BAKAMLA) and the Philippines’ National Coast Watch System (NCWS), which includes the National Coast Watch Centre (NCWC), to provide interagency coordination and maritime security across the Philippines archipelago. The Piracy Reporting Centre (PRC) of the International Maritime Bureau (IMB) established in Kuala Lumpur and the ISC set up in Singapore by ReCAAP also collect data relevant to MDA and the safety of navigation at the regional level. The potential exists for greater coordination and cooperation between these various regional and national maritime information systems.

**Conclusion**

The high intensity of shipping traffic along the SLOCs of South China dictates the need for effective measures to ensure the safety of navigation and protection of the marine environment from ship-sourced pollution. The most fundamental requirement is a higher level of cooperation and coordination between the bordering countries to provide for the safety of navigation and SAR. Unfortunately, this remains unlikely due to several factors. Littoral countries are still not party to all the relevant international conventions. No effective regional organization has been established for managing the South China Sea, and attempts at cooperation have generally shown little progress. It is unfortunate that much of the current commentary on the South China Sea falls within a realist construct of a competing power game and fails to recognize the possibility of a “win-win” outcome achieved through cooperation. The consequential lack of trust inhibits cooperation.

Countries bordering the South China Sea tend to be focused on their independence and sovereignty. They are reluctant to engage in cooperative activities because that may compromise their sovereignty claims and national independence. This is often despite enthusiastic rhetoric about the cooperative ideal. States will only cooperate with each other when they perceive that the gains from cooperation will outweigh the costs, particularly the loss of independence or fears of domination by a larger partner in the cooperative framework. Perceptions that cooperation implies some concession on sovereignty claims are a significant obstacle to cooperation.

An agreed Code of Conduct for the South China Sea is key to establishing effective cooperation for the safety of navigation in the South China Sea. Cooperation for the safety of navigation would be facilitated by the technical committee for this activity as recommended in the current draft negotiating text for the South China Sea Code of Conduct. Particular measures that might be considered include the wider adoption of AIS by fishing vessels and vessels on domestic voyages, if only by the fitting of Class B transponders; greater cooperation for maritime SAR and hydrographic surveys; and regional protocols for the handling of LRIT data.
Notes

5 Jean-Nicolas Pasquay ‘Safety of Modern Shipping and Requirements in Hydrographic Surveying and Nautical Charting’, International Hydrographic Review, Monaco, Vol. LXIII, No. 2, July 1986, p. 68, and Figure 5, p. 73.
7 UNCLOS Article 123.
12 The author did so himself several years ago when travelling by large container ship from Hong Kong to Port Klang in Malaysia.
15 Ibid.

23 *Defence White Paper 2016,* paragraph 2.77.


28 Bateman, ‘Australia’s Flawed Position on the South China Sea’.

29 *Defence White Paper 2016,* Figure 2, p. 70.

30 Modal shares of world trade by volume in 2008 were 89.8 percent by sea, 10.0 percent overland, and 0.3 percent by air. By value the shares were very different – 72.7 percent by sea, 14.3 percent overland, and 13.0 percent by air. Modal Shares of World Trade by Volume and Value, 2008, *The Geography of Transport Systems*, available at https://transportgeography.org/?page_id=3950.


36 Cambodia is the only Southeast Asian coastal state that is not a party to UNCLOS.


47 A fuller explanation of AIS and LRIT may be found in Martin N. Murphy, ‘Lifeline or Pipedream? Origins, Purposes and Benefits of Automatic Identification System, Long-Range Identification and Tracking, and Maritime Domain Awareness’, Chapter 2 in Rupert Herbert Burns, Sam Bateman and Peter Lehr, eds., *Lloyd’s Handbook of Maritime Security*, London: Lloyd’s MIU, 2009, pp. 13–28. However, it should be noted that this chapter was written before the advent of Satellite-based AIS (S-AIS) which allows AIS to be detected from vessels regardless of their location.


54 Murphy, ‘Lifeline or Pipedream?’ p. 17.


