

The Maritime Future of the Indian Ocean

Putting the G back into
Great Power Politics

The Hague Centre for Strategic Studies

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THALES



GRANARIA



HOLDINGS



Ministerie van Buitenlandse Zaken

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The Hague Centre for Strategic Studies (HCSS) seeks to advance international security in an era defined by geopolitical, technological and doctrinal transformation and new security risks. HCSS provides strategic analysis and offers concrete policy solutions to decision makers. HCSS serves as a strategic planning partner to governments, international organisations and the business community.



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1 Executive Summary

The Indian Ocean is fast becoming the new center of economic gravity, as it ties together the economic fortunes of emerging Asia, the US, and Europe. Maritime rivalries in the Indian Ocean are an early indicator of the return of great-power politics to the limelight of the international arena. This *Future Issue* reveals the considerable amount of disagreement existing among experts with regard to the future trajectory of events in the Indian Ocean. There is little disagreement, however, that the economic and strategic importance of the Ocean's major Sea Lines of Communication (SLOCs) – particularly its choke points – will continue to grow amidst an accelerating maritime build-up, the continued presence of significant pockets of regional instability, maritime piracy, and terrorism. These current and future key developments in the Indian Ocean will have important implications for security and business continuity. The analysis in this *Future Issue* warrants the following conclusions:

- The safety of the Indian Ocean's SLOCs is of vital importance to the growth of the emerging economies in South and East Asia, as well as the world economy at large. The strategically located choke points are extremely vulnerable to disruptive attacks both from state and non-state actors, including pirates and terrorists. Contingencies at sea have the potential not only to affect already volatile oil prices, but also to have dramatic effects on companies that rely on principle of just-in-time production and delivery within the context of global production networks.
- The Indian Ocean is a major testing ground for great-power relations between the US and the potential emerging contenders China and India. Even as China and India harbor ambitions to expand their forward naval presence in the Indian Ocean, historically embedded mistrust is encouraging mutual suspicion concerning each party's intentions. Both China and India are starting to consider the Indian Ocean in terms of prerogatives and responsibilities. This could trouble the Ocean's waters considerably and pose a potential source of future conflict. It could also indicate that these emerging

powers are starting to shoulder some of the responsibility for maintaining the safety of the Ocean's SLOCs.

- A significant maritime build-up is taking place across five strategic categories: SLOC protection, maritime dominance (sea control and sea denial), power projection, submarine-launched nuclear second-strike capability, and space dominance. The US remains far ahead of China in terms of maritime capabilities and even farther ahead of India across all five categories of maritime capability. Its lead is likely to shrink in the years to come, however, with China leveling the playing field in such areas as sea denial and power projection capabilities. This could change the balance of power at least enough to foster ambitions for regional hegemony on the part of at least one of the two contenders.

HCSS offers the following policy recommendations:

- The Indian Ocean requires close attention by decision makers at the highest strategic levels. Foreign ministries should recognize the Indian Ocean as a region that deserves attention in its own right.
- Given that the Indian Ocean is a test zone for the rules of the game in a nascent multi-polar world order, it is of the utmost importance to establish governance frameworks that will facilitate the integration of rising powers in regulating this order and upholding the principles of an open world economy.
- In the light of the tremendous importance of the safety of SLOCs for sea-based trade and world economic growth, policymakers should attach high priority to the safeguarding of SLOCs and vulnerable choke points.
- Because global production chains are vulnerable to supply disruption originating from the Indian Ocean, business executives should re-assess their policies regarding supply-chain risk management.

2 Introduction

2.1 Setting the Stage

The Indian Ocean (one of the world's three oceans) runs from the eastern shores of Africa and the Middle East to the western shores of Australia and the Malay Peninsula, framing the entire southern shoreline of Asia. It is a key transit region for inter-continental trade in energy and commercial goods. Current estimates suggest that the annual value of two-way international trade passing through the Indian Ocean sea lanes is almost USD 1 trillion.¹ While its importance as a transportation hub is expected to increase further over the next two decades, it is also increasingly becoming a trade destination in its own right.

Emerging and established great powers – most notably the US, China, and India – are bolstering or establishing strategic footholds in the Indian Ocean region along the Ocean's sea lines of communication (SLOCs), as well as in the narrow passages that connect these SLOCs with Europe (e.g., Bab-el-Mandeb), the Middle East (e.g., the Strait of Hormuz), and East Asia (e.g., the Strait of Malacca), as illustrated in Figure 1.

The strategic maneuvering of these powers marks the return of great-power politics to the limelight of the international arena, and it may form the prelude to an era of renewed maritime rivalry. In its 2007 maritime strategy entitled *Freedom to Use the Seas*, India recognizes that SLOCs are critical to its future economic prosperity, noting that 'nations that depend on the waters of the Indian Ocean for their trade and energy supplies have come to expect that the Indian Navy will ensure a measure of stability and tranquility in the waters around our shores.'² For its part, the US speaks of the need to posture 'credible combat power' in the Indian Ocean in order to protect its vital interests.³ China, meanwhile, remains largely silent over its objectives in the Indian Ocean. Like India and the US, however, it is engaging in a build-up of its maritime capabilities, and these actions may be a harbinger of a future maritime arms race with implications that will reach far beyond the boundaries of the Indian Ocean region.

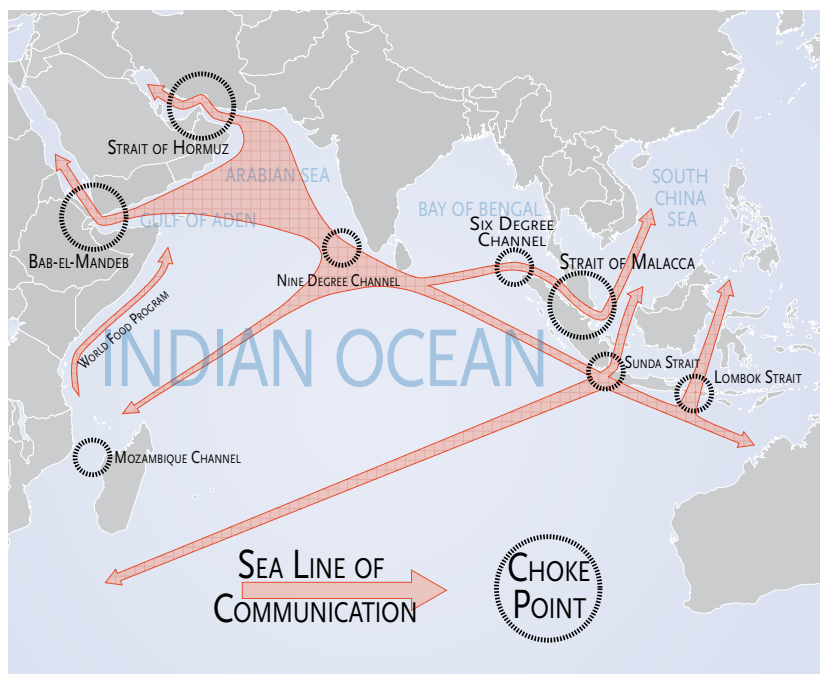


FIGURE 1: SEA LINES OF COMMUNICATION AND CHOKES POINTS IN THE INDIAN OCEAN

The future is admittedly not singular (i.e., one cannot credibly and confidently predict the future; the future, *ex ante*, is therefore always plural), the Indian Ocean and its Rim are very likely to become a sample stage for some of the most important global challenges in the 21st century. Persistent conflicts in the Middle East and the Horn of Africa will be a continuing source of instability in the Ocean's northwestern region, and they will pose a major security challenge to the international community in general. In addition, many violent, non-state actors have established strongholds in such areas as the Arabic Peninsula, East Africa, and the Hindu Kush, which are plagued with weak or failing governance structures. These actors will continue to use the Indian Ocean in support of their operations. Climate change may become a security challenge as well, as the rising sea level threatens to displace the inhabitants of low-lying coastal regions in Bangladesh and the Maldives islands. Competition for control over deposits of scarce resources found in the Indian Ocean Rim countries will likely ensue in the

coming decades. Moreover, the Indian Ocean will be one of the key stages on which established and emerging powers will meet and match forces in the next two decades.

As a result, developments and possible tensions or threats in the Indian Ocean may become the first litmus test for the US with regard to its strategy for addressing the rise of China and India. Whichever equilibrium is achieved in the region, it will likely reflect the underlying nature of a world characterized by multi-polarity: it will either be an inclusive and open system, upholding a principle of *Mare Liberum* (or free and open seas), or a system characterized by regionalism and therefore *Mare Clausum* (closed seas).

2.2 Methodological Approach

This *Future Issue* examines how these developments will shape the security environment in the Indian Ocean over the next two decades. To address the substantial uncertainty that exists about the future course of history and to incorporate it into the debate, we have mapped the full spectrum of (and thus the divergence in) global expert opinion about the future of the Indian Ocean. We accomplished this by analyzing approximately 100 foresight studies that have been published on the topic in the last ten years.

We followed a two-tier search protocol in our review of the discourse on the Indian Ocean. To begin, we conducted an extensive search of the World Wide Web using a search algorithm containing thirty search terms across three categories, comprising ‘future,’ ‘security,’ and the geographical indicator ‘Indian Ocean.’ In a second search, we concentrated on 200 well-known foresight institutes and academic institutions, and we tapped into the in-house Metafore database of HCSS. From our search results, we selected a sample of 96 relevant foresight studies published since 2000 (see Appendix K).

We subsequently analyzed these studies using our standard Metafore protocol of parameters, drivers, and security implications. Parameters are defined as the key attributes of the maritime situation in the Indian Ocean that are likely to change in the future. The primary question in this regard involves the identification of characteristics of the maritime situation in the Indian Ocean that are likely to change in the future. Drivers are defined as the forces that are likely to trigger changes in the parameters. The primary question in this regard involves the identification of mechanisms that are likely to drive change in the future maritime

situation in the Indian Ocean. Implications are the consequences resulting from changes in the parameters (see Table 1).

PARAMETERS	DRIVERS	IMPLICATIONS
Civilian Use of SLOCs	Asian Economic Growth	Changes in the Balance of Power
Strategic Importance of SLOCs	Energy Dependency	(Risk of) Violent Conflict
Vulnerability of SLOCs	Economic Interdependency	Insecurity of SLOCs
Activity of Violent Non-State Actors	Maritime Ambitions of Emerging Powers	Rerouting of (Energy) Supply Lines
Maritime Power Distribution	Maritime Ambitions of the United States	Economic Disruption
Nature of the Maritime Build-up	External Sources of Interstate Friction	
Maritime Relations	Cooperation on Non-Maritime Issues	
	Instability of the Indian Ocean Littoral	

TABLE 1: OVERVIEW OF PARAMETERS, DRIVERS AND IMPLICATIONS PREVALENT IN FORESIGHT STUDIES

Taking into account the divergence in perspectives on the maritime future of the Indian Ocean, we distilled the key parameters and drivers prevalent in expert opinion and divided them along a three-point graduated scale (e.g., decrease-constant-increase or low-medium-high). We also coded the nature of the relationship (positive or negative) between drivers, parameters, and security implications. For example, some experts predict that the Indian Ocean’s SLOCs are likely to become more vulnerable, due to conflicts between the maritime ambitions of emerging and established powers. According to other experts, increasing economic interdependency is likely to make the Indian Ocean’s SLOCs less vulnerable. Appendices H and I provide definitions of the parameters and

drivers, and they explain the operationalization of these scales. Appendix J offers an overview of the coded relations. The following sections present the key parameters in the debate on the future of the Indian Ocean, the key forces that drive these parameters, and their likely implications, as predicted by the expert discourse.

2.3 Trends in the Debate

As shown in Chart 1, the Indian Ocean has been receiving an increasing amount of attention: more of the foresights in our sample were published after 2008 than were published in the seven-year period prior to that. In fact, all publications from government and industry – parties that directly make and implement policy – were published after 2005, with the largest share after 2009. This suggests that the strategic importance of this topic is increasing.

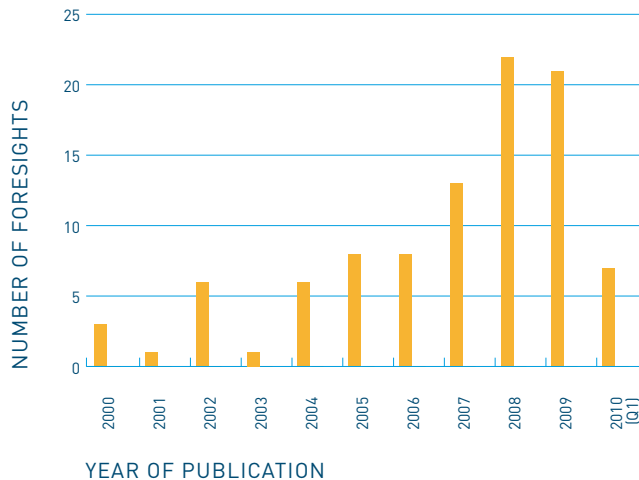


CHART 1: PUBLICATION TREND: NUMBER OF FORESIGHTS BY YEAR OF PUBLICATION

The majority of the studies were authored by think tanks and research institutes (see Chart 2). Our results may be skewed, however, due to the open-source nature of our search. In other words, government and industry publications may be under-represented simply because they are not openly and/or freely available.

This limitation may partly explain the relative absence of the European Union (EU) and major European powers (e.g., Great Britain, Italy, France) from our analysis. It is worth noting that our sample includes views from both sides of the Pacific, even though it may seem to focus primarily on the West (particularly the US), with Chinese views seemingly less represented (see Chart 3). While this bias can be explained in part by the inherent language barrier we encounter in analyzing Chinese documents, two points are worth making. First, despite the language barrier, more than one third of the foresights in our sample are from Asia, including Singapore and Japan. Second, a number of the US publications were actually authored by Asian academics employed by overseas research departments.

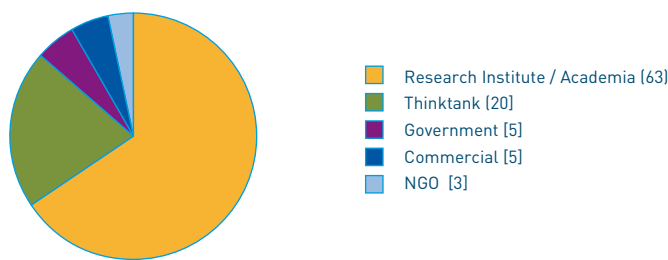


CHART 2: TYPE OF SOURCE: NUMBER OF FORESIGHTS BY TYPE OF EXECUTOR

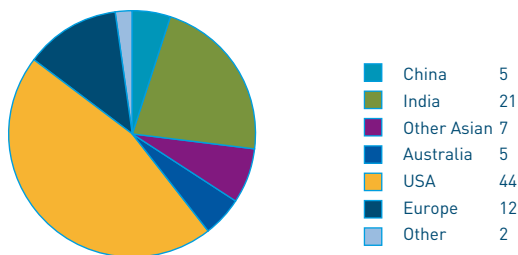


CHART 3: COUNTRY PERSPECTIVE: NUMBER OF FORESIGHTS BY COUNTRY OF PUBLICATION

3 The Maritime Future of the Indian Ocean

3.1 Parameters

Seven key parameters emerge from the debate on the future of the Indian Ocean (see Chart 4). The first two parameters describe the economic usage of the Indian Ocean's SLOCs and their relative importance to key stakeholders. The second pair of parameters refers to the level of vulnerability of the SLOCs and the threat that various types of violent non-state actors pose to commercial shipping. The third group of parameters concerns the geopolitical future of the Indian Ocean, focusing on the maritime presence of key stakeholders, the nature of the relationships between them, and the maritime balance of power in the region.

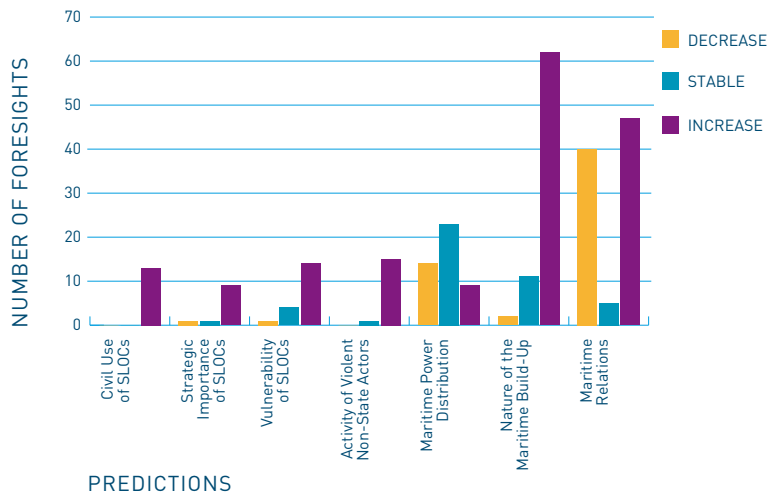


CHART 4: MAPPING THE DEBATE: NUMBER OF FORESIGHT PREDICTIONS OF THE PARAMETERS

The first four parameters show a clear and remarkably similar pattern: expert opinion predicts future increases in the civilian use, strategic importance, and vulnerability of SLOCs, as well as in the activity of violent non-state actors. The latter three parameters feature much more prominently in the debate concerning the Indian Ocean, and they clearly illustrate the level of disagreement among experts and thus the greater degree of uncertainty regarding the future development of these parameters.

In other words, the geopolitical landscape of the Indian Ocean may unfold in different ways over the next two decades. The direction that they take will depend upon the level and nature of the maritime build-up, the level of cooperative or confrontational relations between the powers, and the polarity of the maritime system (uni-polar, bi-polar, or multi-polar). The following sections discuss these pairings in more detail.

Sea Lines of Communication: Civilian Use and Strategic Importance

The Indian Ocean is, and will probably continue to be, a major transit route for inter-continental and regional trade in commercial goods and fossil fuels. The foresight studies unanimously predict that commercial shipping along the Indian Ocean SLOCs will expand in the coming decades. If the Chinese and Indian economies continue on their path of economic growth and increasing dependence on international trade in order to meet key resource needs and access export markets, new port facilities will continue to be developed in order to strengthen the Ocean's routes from Africa and the Gulf Region towards India and East-Asia, including Australia. These shifts are increasingly transforming the Indian Ocean into a maritime center of gravity, or the 'strategic heart of the maritime world.'⁴

Because of the extraordinary growth rates recorded by the economies of China, India, and other countries in southern and eastern Asia, experts are predicting that the world's economic center of gravity will gradually shift to the East. This is largely the result of the particular economic policies of these countries, which are premised on export-led growth. At the same time, these countries are also heavily dependent on imports (especially the Chinese and Indian economies) in order to meet the rapidly expanding energy needs of their burgeoning industries and expanding populations. In the coming decades, as the energy demands of China and India's economies translate into a growing dependency on Middle

Eastern and African imports for their energy and resource needs, the strategic importance of the Indian Ocean's SLOCs will increase accordingly. Even China's efforts to diversify energy imports away from the Middle East (and most probably towards Africa) are likely to intensify China's use of the SLOCs in the Indian Ocean.⁵ The fact that vast mineral deposits worth at least USD one trillion have been discovered in Afghanistan is likely to contribute to the strategic importance of the SLOCs as well.

In addition, thirteen of the world's busiest ports are currently located in Asia (with Singapore heading the list, having processed almost 30 million containers in 2008) and are directly dependent on the safety of the Indian Ocean's SLOCs for their business.⁶ More than 90% of the world's trade is currently transported by sea, and the total volume of seaborne trade increased by more than 35% between 1998 and 2008.⁷ As the total volume of seaborne trade continues to expand, most of this growth is likely to originate from or be destined for Chinese and Indian ports. For example, energy transports from the Middle East have little alternative but to pass first through the Strait of Hormuz and then cross the ocean to pass through the Strait of Malacca on their way to China or, if their aim is to reach Europe, to navigate through the Bab-el-Mandeb in the western part of the Indian Ocean.⁸ In conclusion, the increased use of the Indian Ocean's SLOCs will place further pressure on key maritime choke points in the region, thereby providing these states with further motivation to control these SLOCs.

Vulnerability of SLOCs and the Threat of Non-State Actors

The increased use of the Indian Ocean's SLOCs makes them vulnerable to regional instability, spillover violence from regional conflicts, and the actions of pirates, terrorists, and criminal organizations. Furthermore, most of the strategically important SLOCs and maritime choke points are adjacent to failed states and areas with weak governance systems. As such, they are particularly vulnerable to disruption, with no viable alternative shipping routes available. Despite the economic and political rise of India and a number of countries within the Association of Southeast Asian Nations (ASEAN), many of the Indian Ocean's littoral states have a poor record in governance and stability. The transit to Bab-el-Mandeb, the only maritime passage from the Gulf of Aden to European waters (with the exception of the much longer route around the African continent), is situated between Somalia, which is the leading case study of a failed state, and Yemen, which could soon follow suit.⁹ At the other end of the Ocean, the Strait of Malacca is the major connecting point between the Indian Ocean and the South

China Sea, as well as the Pacific Ocean. It is bordered by the historically unstable Aceh region of Indonesia.

In addition to these two choke points, the Strait of Hormuz is the only waterway connecting the Ocean to the energy resources of the Persian Gulf. The Strait of Hormuz will continue to be vulnerable to potential instability in Iran. Twenty percent of the world's oil supply passes through the Strait, amounting to about seventeen million barrels a day. Considering the strategic importance of this choke point, it is obvious that a disruption in maritime security would have a severe impact.¹⁰ Finally, in addition to these choke points, several of the ocean's littoral states (e.g., Pakistan, Myanmar, and – until recently – Sri Lanka) are struggling with internal conflicts that may also weaken the Ocean's security in the future.

Indeed, the lack of state control along the Ocean's shores may increasingly create a breeding ground for three types of violent non-state actors: pirates, terrorists, and international criminal organizations. Pirates figure most prominently in the contemporary security discourse on the Indian Ocean, and foresights suggest an increase in piracy in the Indian Ocean during the coming decades.

Approximately a quarter of all maritime piracy is targeted at shipments of fossil fuels. This happens primarily in the Strait of Malacca (see Figure 2).¹¹ The foresights devote more attention to the actions of Somali pirates in the Gulf of Aden, however, predicting that they will continue to attract new recruits, due to the profitability of the enterprise. Some scenarios suggest that these pirates may be joined by Yemeni counterparts in the future. In addition, pirates – whose activities are currently concentrated around the maritime choke points at each end of the Indian Ocean – are also expected to venture progressively further into the Indian Ocean proper.

The growing strategic importance and economic significance of the SLOCs, combined with their vulnerable position adjacent to failed states, make them an attractive target for terrorist groups looking to disrupt global trade. Indeed, the sinking of only a few ships could seriously affect traffic through the narrow straits of Hormuz and Malacca, making them particularly vulnerable to potential actions undertaken by such groups as Al Qaeda (in the Strait of Hormuz) and the Jemaah Islamiyah (in the Strait of Malacca). Maritime infrastructures (e.g., India's offshore oil facilities) may be targeted as well, as has happened in other

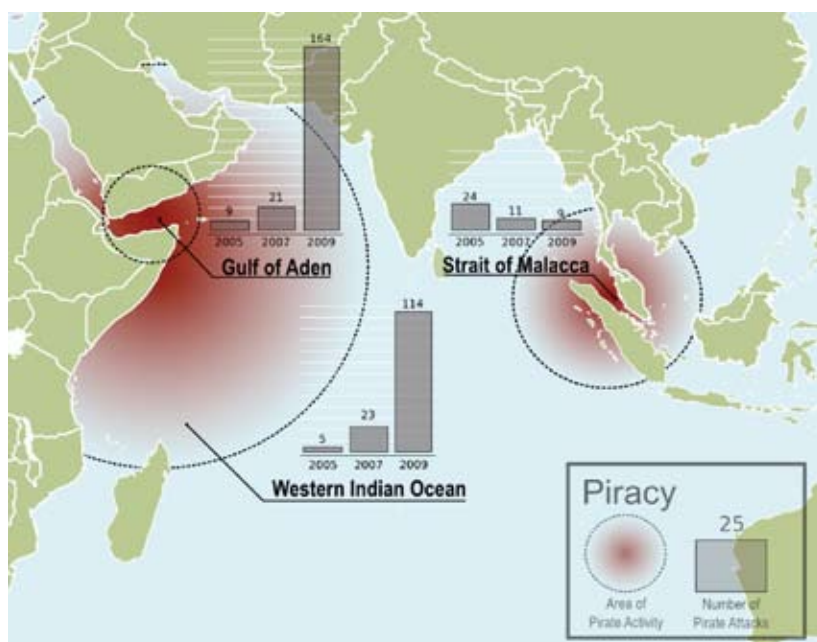


FIGURE 2: PIRATE ACTIVITY IN THE INDIAN OCEAN

areas (e.g., attacks on facilities off the shores of the Niger Delta in the Gulf of Guinea). Moreover, since the 2008 attacks in Mumbai, India, seaborne access to onshore targets has emerged as another dimension of maritime security that policymakers must consider.

Finally, in addition to their importance for the transport of oil and manufactured products, the Indian Ocean's trade routes are also used for the trafficking of drugs, people, and small arms by international criminal organizations. The Indian Ocean has emerged as an important transit route for the narcotic trade from the Golden Triangle (Myanmar, Laos, and Thailand) and the Golden Crescent (Afghanistan, Pakistan, and Iran) to the West and Far East. In the near future, criminal organizations will probably continue to use the Indian Ocean waterways for their activities. In addition, terrorist organizations are known to participate in the illegal drug trade to finance their operations, thereby blurring the lines between the activities of terrorists and organized crime. Foresights

suggest that a similar synergy might occur between international terrorism and piracy, an ominous phenomenon that could potentially cause serious disruptions to maritime traffic and global commerce. To date, however, there has been little or no evidence of even initial steps towards developing such synergy.¹²

Maritime Balance of Power

Geopolitical developments in the Indian Ocean region will have a considerable impact on the regional balance of power, amidst ongoing and broader shifts in the global power distribution. At present, no regional power in the Indian Ocean area can be considered the single most dominant maritime power (given that the US is an extra-regional power). Within the foresights, there is considerable debate (and thus disagreement) regarding the future shape and composition of the Indian Ocean as a political and maritime system. Nonetheless, two observations are worthy of note. First, the majority of the foresights (representing more than twenty studies) that touch upon the future maritime balance of power, suggest that the US will no longer be the single, dominant maritime player in the Indian Ocean, due to the emergence of India and China and the resulting diffusion of power in the region. At the same time, however, none of the sources predict that the US will completely leave the Indian Ocean (which remains a stage for great-power politics), and a sizeable number of studies (more than ten) suggest that the US is likely to retain its position as the most advanced global naval power.

The second notable observation is that the economic rise of China is expected to run parallel to its rise as a maritime power in the Indian Ocean. Even if China's actual maritime presence remains largely restricted to the Strait of Malacca and the Bay of Bengal, experts argue that its investments in Pakistan, its stake in the development of the Pakistani port of Gwadar, and the availability of forward bases in Myanmar and other locations will enable it to sustain deployments across the Ocean and secure its place as a regional maritime power. Although China has been investing heavily in the comprehensive modernization of its maritime capacity (see the discussion below and Appendices B, C, D, and E), the expeditionary capability that these programs are intended to generate is emerging only slowly.¹³ One notable achievement in this respect is the permanent deployment of a three-ship People's Liberation Army (PLA) Navy task force to the Gulf of Aden since 2008 with the goal of protecting SLOCs in these pirate-infested waters.¹⁴ In November 2009, China expressed interest in playing a leading role in the fight against Somali pirates. They offered to co-chair SHADE

(Shared Awareness and Deconfliction) along with the EU and US-led Combined Maritime Force, which is headquartered in Bahrain.

The rise of India is more contentious, and fewer foresights (less than ten) predict the emergence of a bi-polar or tri-polar maritime system with India as a key player. Although India has been modernizing and improving its naval capabilities since the late 1990s, it currently lacks the expeditionary capability to deploy forces on a permanent basis beyond the reach of its bases. Nevertheless, India's geographical position provides it with considerable strategic leverage, as it is located along the major transit route and it possesses several smaller islands across the ocean. This could enhance India's potential to become a maritime power in the medium-term.

The maritime balance of power ultimately depends on the number and the nature of the naval assets (i.e., the type of capabilities) deployed in the region by the different states listed above. In the next ten to twenty years, the presence of naval assets in the Indian Ocean is likely to increase significantly. An overwhelming majority of the foresight studies predict that one or more of the major powers in the region will expand its naval capabilities, both in terms of vessels and in terms of naval bases and port infrastructure, which are crucial to supporting and sustaining a state's maritime presence and expeditionary capabilities. Given that the Chinese and American expeditionary fleets are not always based in the Indian Ocean region proper, one important indicator of their focus or commitment to the region will be the development of strategic maritime infrastructure to support naval deployment in that region (see Figure 3).

Nature of the Maritime Build-up

China's grand maritime strategy – which some have dubbed the 'String of Pearls' strategy – involves securing access to the Indian Ocean, expanding its maritime presence, and strengthening diplomatic relations with countries from the Persian Gulf to the Strait of Malacca, essentially extending across the entire Indian Ocean. As part of this strategy, China is building naval bases on the islands of the Maldives and Seychelles, and it is investing in military port infrastructure in Pakistan, Sri Lanka, Bangladesh, and Myanmar.¹⁵ Although it is unclear whether these investments necessarily entitle China to make use of the infrastructure as well, sources do indicate that ships from the PLA Navy are allowed to berth in Pakistan and, most likely, in Myanmar.¹⁶ In addition to the military rationale behind these investments, China's efforts to create closer ties

with Myanmar are motivated by its desire to secure direct access for China's Yunnan province to the Bay of Bengal. Such access would allow it to bypass the Strait of Malacca, thereby greatly enhancing the security of its energy supply, assuming that these pipelines are not subject to attack. If they are able to be translated into usage rights, these infrastructure projects, along with the planned creation of a number of island bases, would provide China with the capacity to deploy a permanent expeditionary naval force in the Indian Ocean basin and challenge the regional dominance of the US (as well as the presence of India) over the next decade.

India perceives these steps as an incursion into its sphere of influence. It is responding by building a naval base in the Maldives, and it has expanded its monitoring facilities in the southern Indian Ocean. It is also building a naval patrol base on the Lakshadweep Islands, thereby acquiring oversight and control of the adjacent Nine Degree Channel choke point. In addition, India is developing a naval base in Sri Lanka's northern peninsula, which is the area that suffered the brunt of fighting between the Sri Lankan government forces and the separatist Tamil Tigers. A few foresights contain mention the Indian 'Look East' policy as a counterweight to the Chinese 'String of Pearls' strategy. Nonetheless, India has yet to take any steps to establish a naval presence east of the Strait of Malacca in support of such a policy (for an overview of the various types of maritime facilities in the Indian Ocean, see Figure 3 and Appendix E).¹⁷

Due to its well-developed blue-water capabilities (which are elaborated further in Appendix A), the US has been able to build its forward presence in the Indian Ocean with few actual territorial possessions in the region. The US naval base at Diego Garcia in the British Indian Ocean Territory acts merely as a staging area for navy ships and long-range bombers. Several potential problems are associated with the continued use of the base. First, although it is unlikely to do so, the UK may decide to terminate its lease of the island to the US in 2016, in response to increasing international pressure for the native population's right to return. Second, because most of the atoll is less than two meters high, rising sea levels will pose a significant threat to the island's infrastructure. In anticipation of these developments, the US Navy announced in 2009 that it plans a major expansion of its presence in Bahrain, which currently houses the Fifth Fleet and the Coalition Maritime Forces anti-piracy missions Combined Task Forces 150 and 151 (which have been undertaken in coalition with a number of other countries). Some sources suggest that the US is also planning to establish a missile base in Sri Lanka.¹⁸



FIGURE 3: MARITIME INFRASTRUCTURE OF INDIA, CHINA, AND THE US

The US is by far the highest spender on overall defense and on maritime capabilities. Comprising about 28% of its overall defense budget, US maritime expenditures amount to a staggering USD 156 billion. In comparison, China dedicates 15% of its overall defense budget to its naval forces (amounting to USD 10.5 billion).¹⁹ With a modest 7% of its overall defense expenditures earmarked for maritime power, India spends only a meager USD 2 billion. Over the next decade, however, the defense budgets of China and India in particular are projected to grow considerably as these countries continue on their paths of economic growth. Growth-projection rates of the maritime budgets of the three powers are provided in Appendix B.

Maritime Capabilities

Beyond ports, maritime bases, naval expenditures, and the number of ships deployed in the region, an in-depth analysis of the maritime capabilities that these countries are developing sheds light on the future security environment of the Indian Ocean. The polarity of the maritime system and the nature of the relationships of the Indian Ocean's maritime powers will invariably determine –

and depend upon – whether they invest in offensive or defensive capabilities. Offensive and defensive intentions of nations can be distinguished by looking more closely at the key characteristics of the capabilities that are part of the build-up and that determine maritime strength.

Our analysis focuses on strategic capabilities in five key categories: SLOC protection, maritime dominance (sea control and sea denial), power projection, submarine-launched nuclear second-strike capability, and space dominance. The assessment of maritime strengths is based on an assessment of all capabilities within a certain category, as well as a selected capability that is considered most relevant:

- SLOC protection refers to the ability to protect the uninterrupted flow of resources and trade, using primarily surface ships and diesel-electric driven submarines, augmented by aerial reconnaissance vehicles (manned or unmanned). Principal surface combatants are the selected capability for SLOC protection, due to their endurance, presence, helicopter-carrying capability, and ability to interrogate small and large surface craft.
- Maritime dominance refers to the ability to achieve sea control and, more precisely, the ability to control specific sea areas or maritime choke points for a limited period. Sea control is most effectively maintained by principle surface combatants (the selected capability) based on surveillance by maritime aircraft (manned or unmanned). Maritime dominance also includes sea denial, which is the ability to deny an opponent the unrestricted use of specific sea areas or maritime choke points. Submarines (conventional or nuclear) constitute the selected capability for sea denial.
- Power projection refers to the ability to influence or manage any situation on land or in coastal areas using expeditionary forces, either sea-based (e.g., amphibious forces) or airborne (e.g., maritime air). Aircraft-carrier battle groups with extensive kinetic weaponry (e.g., cruise missiles or bombers) constitute the selected capability for power projection.
- Submarine-launched nuclear second-strike capability refers to the ability to survive a nuclear strike and retaliate in kind using a submarine-launched nuclear weapon. The selected capability is therefore a nuclear-powered attack submarine that launches ballistic or cruise missiles.
- Space dominance refers to the ability to use space for surveillance, intelligence, and communications purposes by using satellites. The selected capability therefore involves satellites designed for surveillance, intelligence, and communications. These categories and their related maritime capabilities are described in further detail in Appendix C.

The possession or building up of strategic capabilities within one or more of these strategic categories partially determines (and reflects) the future nature of the relationship between the key powers. Chart 5 provides an overview of the overall and selected capabilities within these strategic categories for China, India, and the US. This overview serves as the starting point for our examination of potential future developments in our analysis below.²⁰ Appendices C and D provide an overview and an explanation of the choices that we have made in assigning capabilities to certain categories and in selecting a prime capability for each category. As with every selection, our choices may (and are intended to) invite debate, but they are certainly not arbitrary, having been informed by subject-matter expertise and supported by a transparent line of reasoning.

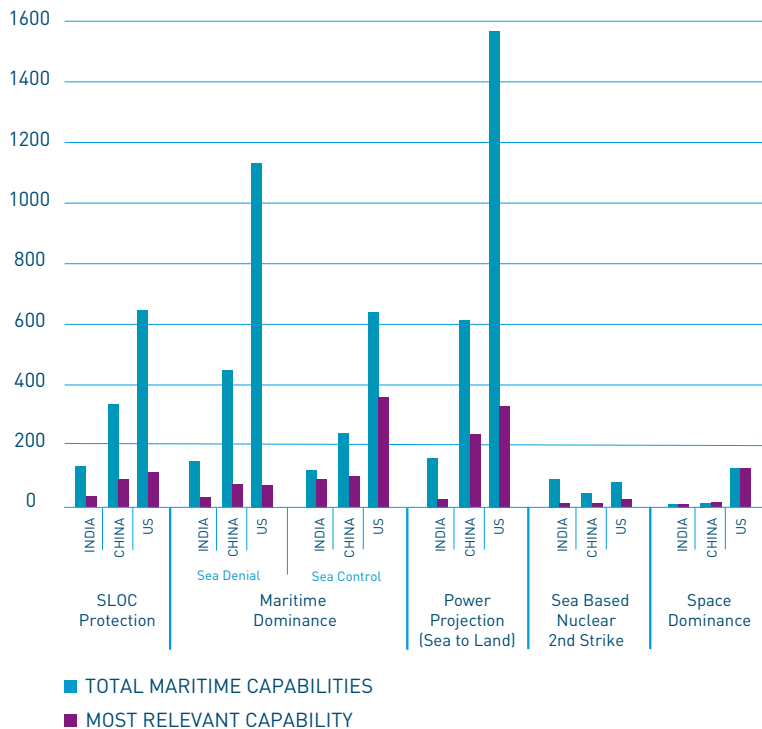


CHART 5: COMPARISON OF NATIONAL MARITIME CAPABILITIES BY NUMBER OF ASSETS ACROSS FIVE STRATEGIC CATEGORIES

It is important to note that sheer numbers do not reflect the overall balance of power for two reasons. First, simply adding up numbers does not adequately capture overall maritime strength, due to incommensurable differences in capabilities, and other factors that determine strength (e.g., skill and morale).²¹ Second, these numbers refer to the entire set of maritime capabilities of a state, rather than the capabilities that are deployed in the Indian Ocean region.

Nonetheless, not all states deploy their capabilities in the Indian Ocean region. For example, while nearly the entire maritime capability of India is deployed in the Indian Ocean Region, the US Navy maintains a global presence across the three world oceans in order to uphold the *Pax Americana*, and the Chinese Navy is able to employ only a very limited number of assets in the region for prolonged periods. In case of conflict, the US Navy would have to redeploy one of its fleets to the Indian Ocean in order to enhance its regular naval presence (the 5th Fleet). It would probably redeploy its 7th Fleet, which is normally based in the Pacific Ocean, a process that could take weeks. This would provide other powers with a floating window of opportunity in which they could gain a temporary military advantage. It would also create a capability gap in the Pacific Ocean. Despite these cautions, the comparison of capabilities does give an indication of the maritime capabilities possessed by these three powers. The analysis below focuses on a big-picture comparison. Appendix D provides precise figures to support this analysis.

Taking the above-mentioned caveats into account, the comparison reveals that the US is currently dominant in sea denial, power projection, nuclear second-strike capability, and space control. It also plays a dominant role in the protection of SLOCs and in sea control, albeit to a lesser extent. In relative terms, the US has a smaller lead in mine warfare and frigate capabilities (particularly in comparison to China), although it largely compensates for this difference through maritime air and space dominance.

India trails the US and China across most of the strategic categories. It currently has no guided missile destroyers and cruisers, and it has few missile frigates and almost no amphibious vessels. In addition, its mine warfare capability is quite small relative to China. Although the expected launch of two new aircraft carriers in the period 2013-2015 (bringing the total to three) would theoretically strengthen India's maritime capabilities, its overall maritime power-projection capability (especially with regard to sea control) is undermined by its small

arsenal of older submarines. Its sea-control capability is expected to increase as the Indian government realizes its plans to engage in substantial modernization and to increase the number of principal surface combatants. This capability will be further enhanced once the first new range of destroyers and frigates is taken into service (expected by 2015).²² As part of its new strategy of minimum nuclear deterrence, India is also investing in expanding its currently limited maritime nuclear second-strike capability. To this end, it launched two nuclear powered ballistic-missile submarines in 2009, and it is in the process of developing two more.²³ Taken as a whole, India's power-projection capabilities are very limited, despite its hydrographic and oceanographic capability (i.e., the ability to map coastal and ocean waters independently). It is currently trying to expand these capabilities by investing in principal surface and submarine forces (due in 2020).²⁴ With regard to its space capabilities, India launched its first dedicated military surveillance satellite in 2009. This satellite is now complemented by a ground-based, military-satellite reconnaissance system, and there are plans to develop an Indian Regional Navigation Satellite System (IRNSS) with a system of seven satellites by 2014. This system would ensure autonomy in regional navigation (and independence from the US Global Positioning Satellite (GPS) system. India is also developing a secure system of communications satellites, which would enable cruise-missile control in conjunction with the IRNSS, among other purposes.²⁵

China is capable of SLOC protection and sea denial with its arsenal of principal surface combatants and conventional submarines, as well as its substantial mine-warfare capability (comprising 64 minesweepers and minelayers). The fact that China does not yet operate an aircraft carrier precludes any real maritime dominance, although it has a long-standing ambition to build one. The realization of this ambition, together with the expansion of its fleet of nuclear submarines, its arsenal of amphibious vessels (which it aims to increase to 50 by 2030),²⁶ and its investment in oceanographic research/survey vessels could allow China to gain dominance in force projection (at sea and from sea to land) and in the protection of SLOCs in the Indian Ocean region. Such dominance would be only for a limited time, however, until the US redeploys its assets. Taken together, these capabilities suggest a shift from China's traditional exclusive reliance on its area-denial strategy towards a forward power-projection posture. According to many American experts (for example, see the reports from both the Pentagon and the Congressional Research Service listed in the bibliography), China continues to pursue an anti-access strategy. This view is encouraged by aforementioned

developments in the structure of its naval force and the acquisition of such equipment as anti-ship ballistic missiles, nuclear attack submarines, and C4ISR (command and control, communications, computers, intelligence, surveillance, and reconnaissance) systems.²⁷ China's nuclear second-strike capability is relatively weak, as it has only three nuclear-powered ballistic submarines, the operational readiness of which is unclear.²⁸ In terms of space control, China is building an independent navigation network with an additional 30 satellites, which are expected to be launched into orbit before 2015 and which are presumed to be available for military purposes as well.²⁹

Across the board, the US possesses the most advanced navy. In maritime dominance, especially with regard to sea denial and power projection, the US is far ahead of its potential competitors, with eleven aircraft carriers (ten of which are nuclear powered), fourteen nuclear-powered ballistic missile, 66 nuclear submarines, and a large arsenal of submarine-launched ballistic missiles. The US also deploys nuclear submarines equipped with a substantial number of nuclear tipped cruise missiles. It has a wide array of anti-submarine capabilities, and it possesses a very advanced and extensive satellite capability. Although all three countries have indigenous satellite-launching capability, the US has eleven launch sites (considerably more than India's single site and China's three sites). The long-term outlook for the US Navy shows that, although it will invest in the modernization of its arsenal of ships, the overall size of this arsenal will remain roughly constant.³⁰ Most sources agree, however, that the US Navy will remain the single most powerful navy in the world – despite the growth of the maritime capabilities of China and India – and that it will probably maintain a considerable naval presence in the region as well.³¹

The three states are investing in maritime capabilities across the five strategic categories, although the maritime build-up in the Indian Ocean is not limited to the three major powers alone. Another important element of the US naval strategy involves encouraging cooperation with the smaller nations in the region in order to enable a joint response to common challenges. Australia is investing heavily in strengthening its maritime forces (according to Australia's White Paper on defense, which is applicable through 2030). This initiative was undertaken in response to the growing challenges to its long and vulnerable maritime supply lines.³² France, the UK, and Japan are also maritime players in the Indian Ocean Region, maintaining substantial maritime presence and infrastructure in the region (e.g., France in Djibouti). Nonetheless, these states

did not feature significantly in the foresight discourse. Pakistan and Indonesia are also looking to expand or upgrade their existing maritime assets.³³ (Appendix F provides additional background information about current and future capabilities of France, the UK, Australia, and Japan).

Maritime Relations: Confrontation or Cooperation?

Whether these maritime capabilities across the five strategic categories will be used in military action obviously also depends on the nature of the relationships between the key powers. Nearly all foresight studies (more than 90) contain some form of prediction on whether the nature of these relationships will be confrontational (high rivalry) or peaceful and cooperative (low rivalry). As is often the case in predicting the future, most of these predictions are highly subjective and speculative. A closer look at the debate concerning the specific bilateral relationships (instead of the overall balance) does provide clearer insight into the possible future of inter-state relations in the region in the future. As Chart 6 clearly shows, the relationships of both the US and India with China are largely expected to become confrontational rather than cooperative. This trend, however, figures more prominently in foresights from US origin.

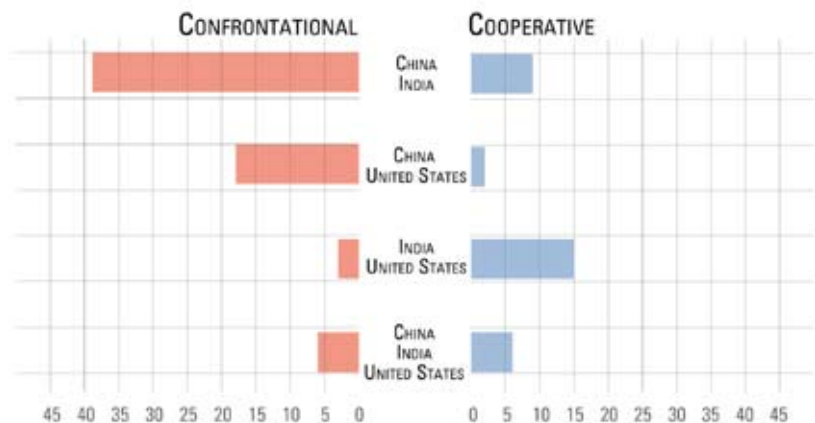


CHART 6: NUMBER OF FORESIGHT PREDICTIONS OF FUTURE NATURE OF MARITIME RELATIONS: COOPERATIVE OR CONFRONTATIONAL

India's relationships are expected to become cooperative across the board. In particular, relations between the US and India are expected to remain peaceful. Nonetheless, although bilateral trade and strategic military cooperation between the US and India has increased (with some fluctuation) since the end of the Cold War, Indian officials have also repeatedly stated that they do not aspire to create a full-fledged alliance, despite their preference for maintaining friendly ties with the US.³⁴ The *Asia Times Online*, the *New Yorker*, and other sources indicate that India is creating a partnership with Myanmar and speculate on a future partnership with Pakistan, in an effort to further its economic and geopolitical interests.³⁵ The latter is particularly striking given the historical legacy of animosity and a number of very important unresolved issues between the countries. One example involves their continued conflict over Kashmir and the alleged ties between the Pakistan Intelligence Services and the perpetrators of the 2008 Mumbai attacks. A small number (twelve) of foresight studies also argue the possible emergence of a tri-polar system, which could be either cooperative or confrontational.

3.2 Drivers

The outlook for the Indian Ocean's security environment is driven by a range of factors (drivers) arising from both within and outside the region. As shown in Chart 7, the foresight literature evaluates these eight drivers, paying particular attention to the extent to which each driver is expected to affect the economic and geopolitical situation of the Indian Ocean in the coming decades.

The first three drivers are concerned with the economic configuration in South and East Asia, which is expected to continue to be characterized by rapid growth, regional integration, and an increasing demand for energy. The second pairing of drivers reflects the future strategic ambitions of the three major players in the Indian Ocean. This includes the ambitions of the emerging powers (China and India), which may or may not be translated into actual capabilities, as well as the ambitions of the established power (the US), which may re-evaluate its hegemonic stance in the years to come. The third combination of drivers is concerned with external sources of cooperation or confrontation, thus illustrating how maritime relations are an element within a larger framework shaped by issues that go beyond the Indian Ocean. The last driver, which is concerned with the stability of the Indian Ocean littoral states, reflects the fact that, despite the increasing economic significance of the Indian Ocean and the rise of India and China to global prominence, the region is also home to a number of weak states that may affect the regional security environment.

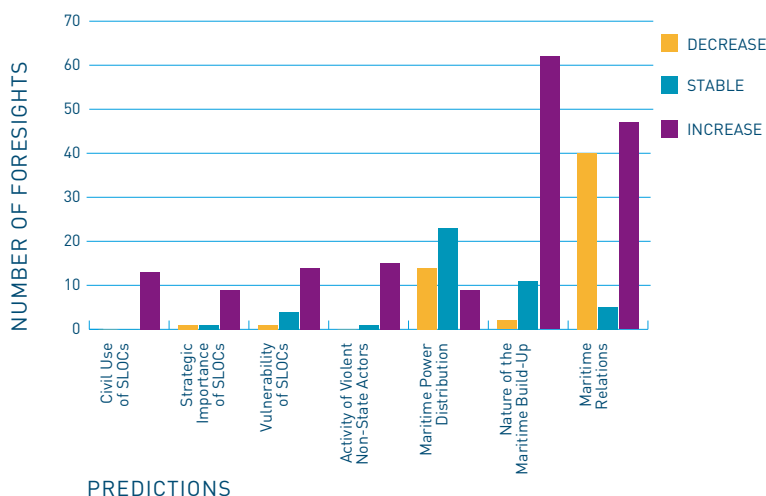


CHART 7: MAPPING THE DEBATE: NUMBER OF FORESIGHT PREDICTIONS OF THE DRIVERS

Economic Drivers: Growth, Energy, and Interdependency

The eastward shift of the world's economic center of gravity will have direct effects on economic activity in the Indian Ocean, particularly as its SLOCs expand in response to growth in trade flows and vital energy imports. If China and India continue to record such high growth rates, China is expected to become the second largest economy in the world by 2025, with India not far behind.³⁶ While economists largely agree on this growth scenario, other experts have expressed doubts. According to their arguments, the economic growth of China and India could be hampered by a number of structural domestic problems relating to socio-political stability, the nature of the existing political regimes, and demographic challenges, which may delay the advent of a 'Pacific Era.'³⁷ If economic and demographic growth in these countries does continue unabated, it will have direct consequences for their industrial and commercial demand for fossil fuels. China's energy demand is expected to exceed that of the US by 2015, continuing to expand rapidly through 2030 at a rate exceeded only by India. Furthermore, both China and India depend heavily on oil imports, which are expected to rise to 75% and 95%, respectively, of their total oil consumption by 2030. Natural gas imports are expected to increase to 40% and 50% of total gas consumption for China and India, respectively. By 2030, India is projected to

overtake the US as the world's second-largest coal consumer behind China. As a result, both countries will become increasingly dependent on energy imports over land and by sea, especially from the Middle East, thus increasing the importance of the Indian Ocean as a transit region.³⁸ Analysts agree that this will have important consequences for energy security, as the bulk of traffic will have to pass through the strategic choke points at each end of the ocean: the Strait of Hormuz and Bal-el-Mandeb (to Europe) in the West and the Strait of Malacca (to China) in the East.

In addition to its effects on the volume of traffic through the Indian Ocean's SLOCs and their strategic importance, increases in Asian energy dependency may lead to competition over resources if demand for energy exceeds supply. With states increasing their naval presence around the maritime choke points in order to protect valuable cargo from violent non-state actors, foresights suggest that energy security may be a driver for confrontation between the major players in the region.

Alternatively, competition over scarce energy resources in the Indian Ocean region may be mitigated by a shared interest in guaranteeing the region's stability for continued economic growth. Over the last two decades, China and India have become increasingly economically interdependent. This is reflected in trade statistics showing that bilateral trade has grown from USD 260 million in 1990 to approximately USD 60 billion in 2010, and it is expected to continue to increase in the coming decades. However, foreign direct investment (FDI), which arguably requires a greater degree of mutual trust than trade does, continues to lag.³⁹

Chinese and Indian FDI in the wider region, the growing presence of Asian multinational corporations across the region, and the resulting specialization in manufacturing production may increasingly tie the fate of the countries of South and East Asia (including China and India) to each other. This economic interdependency may serve as a deterrent to open competition over energy and other scarce resources, while strengthening regional stability.

Maritime Ambitions

The maritime strategies of the major players form an important starting point for predicting the future presence of maritime assets in the Indian Ocean, as they explicitly state each country's ambitions and intentions with regard to its

maritime capabilities. Of the three major players, India is the most vocal in its ambitions. In its maritime strategy, India states explicitly that it will strive to ensure the safety of the Ocean's SLOCs:

*'Our strategy recognizes that the sea lines of communication passing through our region are critical for our economic growth and to the global community. Smaller nations in our neighbourhood as well as nations that depend on the waters of the Indian Ocean for their trade and energy supplies have come to expect that the Indian Navy will ensure a measure of stability and tranquility in the waters around our shores.'*⁴⁰

The US demonstrates a similar commitment to the protection of SLOCs and strategic interests. The US maritime strategy *A Cooperative Strategy for 21st Century Seapower* of 2007 emphasizes naval cooperation with regional partners. It describes the US Navy as 'a force for good, protecting this Nation's vital interests even as it joins with others to promote security and prosperity across the globe.'⁴¹ It also plans to maintain a forward force, however, specifically designed to dissuade potential challengers to the US and its allies:

*'Credible combat power will be continuously postured in the Western Pacific and the Arabian Gulf/Indian Ocean to protect our vital interests, assure our friends and allies of our continuing commitment to regional security, and deter and dissuade potential adversaries and peer competitors.'*⁴²

As an emerging extra-regional power with considerable strategic interests in the Indian Ocean, China is somewhat more ambiguous or indirect in stating its maritime ambitions west of the Strait of Malacca. According to its strategy *China's National Defense* in 2008, China is primarily concerned with territorial defense, and it does not explicitly discuss its maritime interests beyond its territorial waters:

*'The Navy is a strategic service of the PLA, and the main force for maritime operations. It is responsible for such tasks as safeguarding China's maritime security and maintaining the sovereignty of its territorial waters, along with its maritime rights and interests.'*⁴³

Mutual perceptions of the opponent's naval strategies play a significant role in determining a country's perception of the regional security environment.

Historically embedded mistrust between China and India is encouraging mutual suspicion regarding each other's maritime intentions, particularly given the tendency of both countries to think in terms of rights and responsibilities within their own naval backyards (the South China Sea and the Indian Ocean, respectively).⁴⁴ As mentioned earlier, the US is particularly worried about China's maritime build-up, and its analysis of China's naval capacity focuses on that latter's capabilities for sea denial and power projection rather than on its stated commitment to the defense of territorial waters.⁴⁵

Whereas the US has maintained a forward naval presence in the Indian Ocean for decades, India and China appear to have started to harbor such ambitions only recently. Throughout the foresights, it is widely agreed that both countries are committed to attaining a military and naval status that they view as befitting their economic power.

External Sources of Conflict and Cooperation

As a component of broader diplomatic relations, maritime relations between the major players in the Indian Ocean are a function of the confrontational or cooperative nature of these relations. The current bilateral or multilateral cooperation to address such shared challenges as nuclear proliferation or international terrorism may facilitate the establishment of working relationships. It may also have a trust-building dimension with potential spillover effects into the maritime realm. Old disputes (many of which are ongoing) may have an opposite effect, however, leading instead to greater maritime rivalry.

Although a European model of economic integration and interdependence between states is not likely to emerge in the Indian Ocean context in the foreseeable future, a more modest degree of economic interdependence may also provide fertile soil for further cooperation. In this light, bilateral and multilateral trade agreements, together with the expanding memberships of such regional organizations as the ASEAN, the South Asia Association for Regional Cooperation (SAARC), and the Indian Ocean Rim Association for Regional Cooperation (IOR-ARC) could have a positive effect on regional ties, particularly with regard to Sino-Indian relations. Although it is often difficult to achieve in practice, the process of addressing common security challenges in the Indian Ocean (e.g., piracy and maritime terrorism) may also create a positive momentum on which to build a working relationship. A good example is the

earlier mentioned Horn of Africa maritime security consultation mechanism on SHADE, in which the EU, the US, and China are participating.

Ancient grudges may break to new mutiny, however, as historic rivalries and territorial disputes could hamper warming relations, possibly even igniting into fresh violence. China and India have several ongoing territorial disputes and political disagreements, including over the Aksai Chin area of Kashmir and the Arunachal Pradesh in Eastern India, and over India's support for the Dalai Lama's Tibetan government-in-exile. The Indian government recognizes these hurdles, and it has stated that, although most of these disputes are dormant and not large enough to feed national hostility, 'in the medium to long term, some can turn ugly rapidly, and are clearly of strategic concern.'⁴⁶ Moreover, the Pakistan-India-China nexus is often cited as a possible trigger for conflict as well. The relationship between Pakistan and India has been one of continuous rivalry and distrust, which has escalated into several short wars and is most noticeable in the contested region of Kashmir. China's involvement as a prominent sponsor of Pakistan (through arms sales and financial support) is a permanent source of irritation for its main regional rival, India. Although it is difficult to predict specifically whether and how these disputes could heat up or be resolved in the coming decades, they are all potential sources of conflict and rivalry between the major powers in the Indian Ocean.

Although the US has no territorial presence in the region, its historical involvement in regional affairs has left seeds of potential conflict with the regional powers. As part of its ongoing military operations in Afghanistan, US support for the Pakistani government will continue to cast a shadow over Indo-American relations, as will India's ties to the Taliban forces. The relationship between the US and China is even more tense, however, primarily with regard to the US political and military support for Taiwan. In addition, US military involvement in southern and eastern Asia during the Cold War was a historical source of friction, although it was defused after their *rapprochement* under President Nixon. Since the 1990s, tensions have surfaced regularly with regard to China's human rights record, US-Taiwan relations, and increasingly, trade and financial issues. The total trade between these two states, which are the largest economies in the world, more than doubled in the 2003-2008 period, with about USD 365 billion in trade in 2009 alone.⁴⁷ Finally, in early 2010, it was also estimated that China held over USD 877 billion of US public debt, making it the largest foreign owner of US Treasury securities.⁴⁸

Instability of the Indian Ocean Littoral

The stability of the Indian Ocean littoral states will certainly affect the security environment of the Indian Ocean, particularly in the areas surrounding the strategic maritime choke points. Six of the top twenty countries on the Foreign Policy Failed State Index of 2010 are located on the Ocean's shores, with three others located near the western maritime choke points. The weak governance structures in these areas and the virtual absence of the rule of law makes them ideal breeding grounds for piracy and international terrorism. A number of these states may remain or become black holes over the next two decades (with Somalia and Yemen as cases in point, as mentioned earlier). Terrorist black holes in these areas, as well as in Afghanistan, Pakistan, and on several Indonesian islands in the Strait of Malacca, are another concern for the safety of traffic through the Indian Ocean. Continued instability in the Middle East and in East Africa could also exacerbate the issue of energy security, as may potential political instability in Iran.

3.3 Security Implications

The developments that have been sketched above will have implications that reach far beyond the Indian Ocean alone. Policymakers in Beijing, Delhi, and Washington are beginning to consider the idea that, in the words of American strategist Robert Kaplan, 'the Indian Ocean and its adjacent waters will be a central theatre of global conflict and competition this century.'⁴⁹ The ways in which the key powers will address mutual (and sometimes conflicting) maritime interests will directly affect the global balance of power and play a large role in determining the geopolitical landscape of the decades to come. The foresight discourse presents a variety of security implications (see Figure 4) of these developments. The most significant developments involve 1) changes in the balance of power and the risk of violent conflict and 2) insecurity along the SLOCs resulting in large-scale economic disruption and the rerouting of energy supply.

Changes in the Balance of Power and the Risk of Violent Conflict

Within the context of slowly but inexorably evolving regional power dynamics, there is an increased risk of an outbreak of violent conflict. While the US economy is slowing down and its international military position is weakened, China and India are rising rapidly. Similarly, the current maritime build-up of these three states in the Indian Ocean will probably continue over the next two decades. They will combine to produce shifts in the regional power distribution,

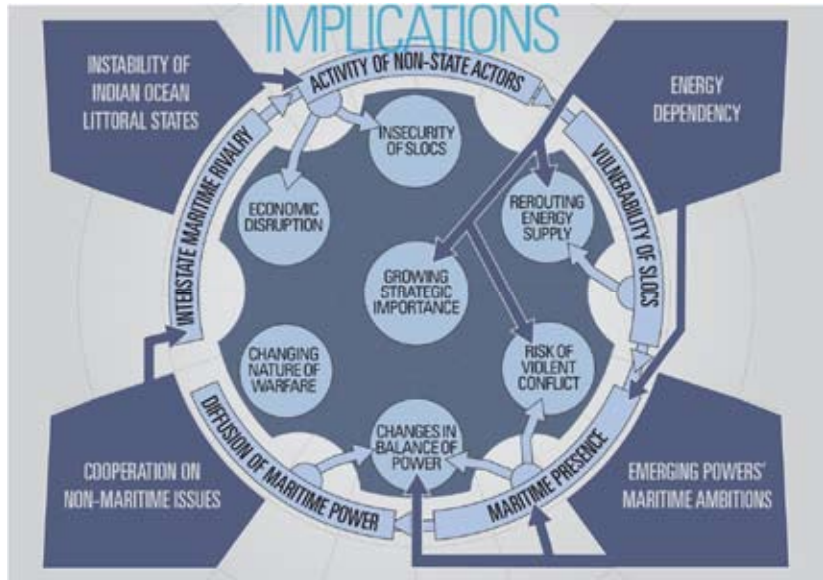


FIGURE 4: SECURITY IMPLICATIONS

thereby forcing regional and global alliances to adapt. Such periods of change are often accompanied by increased instability and possibly even by rivalries that could escalate into a full-blown maritime arms race. This could increase the chance of armed conflict between the states within the Indian Ocean region.⁵⁰ China's grand strategy may produce a security imbalance in the region that could put it on a collision course with the US and India.⁵¹ It should be noted that some experts hold the view that China is pursuing a natural path, contending that, 'as a great continental nation's economy grows, it begins to trade more with the outside world and develops interests it did not have previously.'⁵² Other observers see the potential advantages of greater Chinese involvement in safeguarding and upholding the international liberal trade order.⁵³

The efforts of India and China to expand their regional spheres of influence in each other's backyards may result in regional skirmishes, as is already occurring regularly between the US and China in the South China Sea.⁵⁴ The danger is that conflicts at sea could spill over to other regional fault lines. For example, a war at sea between India and China would likely re-ignite the unresolved Sino-Indian border conflict as well.

In the event of armed maritime conflict, the US and Indian aircraft carriers in the Indian Ocean would be capable of projecting power against an opponent, both at sea and from sea to land. With a coastline of more than 5,000 kilometers that includes several megacities, India would be particularly vulnerable to sea-to-land attacks. In the absence of aircraft carriers, China could still protect its shoreline and inflict considerable damage with its maneuverable ballistic missiles and nuclear submarines in case of possible attacks by US and Indian seaborne capabilities. The possession of capabilities that enable a state to shift seamlessly from sea control to sea denial would provide a strategic advantage to any first mover. This fact injects an escalatory element into the regional maritime system.

Insecurity of SLOCs: Rerouting of Energy Supply Lines and Disruption of the Economy

Regional instability, non-state violence, and potentially armed maritime conflict will affect the safety of commercial shipping across the Indian Ocean. SLOCs are particularly vulnerable at narrow choke points, as it is relatively easy (in physical terms) to use land-based assets on adjacent coasts to disrupt shipping in those spots. Even though most littoral states have no real incentive to close down SLOCs, a state with malign intentions would certainly be able to deny the use of choke points relatively easily through such actions as stationing a hostile nuclear submarine in the area.

Maritime attacks, or the threat thereof, would cause a relocation of the affected trade flows. In other words, it could reroute sea trade. For example, in the event that the Bab-el-Mandeb or even the Suez Canal were to be closed down, seaborne trade between Europe and Asia would have to go around the Cape of Good Hope, resulting in significant increases in transportation costs and thus in consumer prices. Furthermore, in the short term, the longer shipping times could throw off a range of industries that work with time-sensitive deliveries, possibly destroying them altogether in the long-term. Business models relying on just-in-time delivery would probably have to be reassessed.⁵⁵

Should the rerouting of transportation lines prove to be prohibitively expensive, oil tankers could still be forced to use high-risk SLOCs, which would result in skyrocketing insurance premiums.⁵⁶ Ships passing choke points that are designated as enhanced-risk areas by insurance companies are currently levied an additional surcharge of up to 0.10% of the total value of their cargo, while the

baseline premium imposed on seaborne freight is 0.05%.⁵⁷ In exceptional circumstances, this surcharge may even reach 2.0%.

Indian and Chinese economic growth largely hinges on the continuing supply of cheap carbon fuels, for which they are almost entirely dependent on the Indian Ocean SLOCs. Any supply disruption in the Indian Ocean (e.g., through maritime conflicts, piracy, or sea-based terrorism) could thus wreak tremendous havoc on Asian economies by depriving them of the resources that function as the arteries of their economies. The intensifying activity of pirates and their expansion of activity from territorial waters to the high seas and the potential emergence of new forms of maritime terrorism in the future represent a threat to the physical safety of shipping, as well as to ports and oilrigs.⁵⁸ China uses the worst-case scenario for large-scale economic disruption brought on by instability along the SLOCs as a key argument for increasing its maritime presence in the eastern Indian Ocean, as more than 80% of its energy imports pass through the Strait of Malacca.⁵⁹ In such a narrow waterway (with a width of only 40 miles or 65 kilometers, but with a navigable width of only a mile at some locations), even a low-intensity terrorist attack on an oil tanker has the potential to shut down the entire Strait. A further danger is that a hostile blockade of the Strait could easily cut China off from its economic lifeline.⁶⁰

4 HCSS Assessment of the Indian Ocean Debate

The contemporary discourse on the Indian Ocean revolves around a range of parameters, drivers, and implications, some of which are sharply contested by experts in the strategic and foresight communities in both hemispheres, as our analysis has shown.

It is obvious, however, that the Indian Ocean's security environment is heating up. Current and emerging powers are making across-the-board investments in expeditionary maritime power-projection capabilities (including infrastructure) and in sea-denial capabilities that serve a variety of peaceful as well as potentially confrontational purposes. Remarkably, India and China are investing heavily in nuclear-attack submarines. In terms of military capabilities, these submarines have not been a capability of choice since the end of the Cold War. It is fair to say that this indicates a return to great-power politics in the more traditional sense.

It is also remarkable that the foresights contain hardly any mention of Europe and the EU, despite the fact that EU's unified market constitutes the largest economy in the world and has a major stake in the security of the Ocean's SLOCs. Between the British, Dutch, French, Portuguese, and Spanish navies, European states have long-standing experience in that region, which could be applied to more benign purposes in the post-colonial era, as has been done in other regions around the world. In particular, British and French overseas territories provide strong platforms from which these countries can play a role in the region's security environment, possibly preventing it from turning into a tense, bi-polar situation or a highly unstable tri-polar system.⁶¹ Furthermore, the significant financial investments that are made for these maritime build-ups provide considerable business opportunities for European companies. Indeed, the strategic rapprochement between France and India illustrates how some European states do recognize the increasing importance of India.⁶² One observer therefore calls for the development of a European maritime grand strategy to safeguard European interests around the globe.⁶³

Russia is also rarely mentioned in the Indian Ocean debate, although its absence is perhaps less surprising. Russia is located in the northern hemisphere, and its maritime power has been severely declining since the collapse of the Soviet Union. If needed, however, its existing maritime assets could still be brought to bear.

The role of regional maritime frameworks as a way of facilitating cooperative relationships between the key powers is another largely unexplored issue in the foresight literature. Nonetheless, shared interests in keeping the Ocean's SLOCs open may provide strong incentives to create such regional cooperative frameworks, which may have the added benefit of creating additional positive spillover effects into other areas. The South Asia Regional Port Security Cooperative (SARPSO), which was established to increase port and maritime security in the Indian Ocean, may be a good example of this.

The importance of piracy seems to be highly exaggerated in the literature. Although it features prominently in the debate on the future of the Indian Ocean, its actual role as a driver of the maritime build-up across the five strategic categories identified in this paper (SLOC protection, maritime dominance, power projection, sea-based nuclear second-strike capability, and space dominance) is negligible. While piracy (both on land and at sea) most certainly needs to be addressed, current maritime anti-piracy operations, however effective, also serve political purposes, including as a pretext to disguise actions that for all intents and purposes amount to a maritime build-up.

Another notable point is that commentary on the nature and size of the future maritime defense expenditures often conveniently overlook the fact that national defense spending is a function of an overall security and threat assessment and of the objectives that an individual state wants to achieve. In other words, land powers traditionally allocate less of their overall defense spending to maritime expenditures, given that they face greater land-based threats. With this in mind, both India and China have very long land borders, which pose a range of land-based threats that are not necessarily deterred by maritime power. Given that they are more threatened by conventional, territorial threats than is the US, they will face difficult trade-offs in their defense-spending allocations, which may reduce further maritime spending.⁶⁴

The literature contains little discussion about how technological developments may shape the future maritime landscape. The transition from the industrial era to the information age (which is taking place in large parts of the world), combined with revolutionary research developments in energy production, may drastically decrease the usage of SLOCs. Similarly, the world economy may shift away from its current high levels of globalization (as measured in terms of trade and FDI flows) toward a model of regionalization that will drastically decrease global trade volumes and the use of SLOCs. This will spark radical changes in the incentive structures of states, shifting them away from investing in maritime capabilities in the Indian Ocean. Alternatively, land-based forms of transportation may once again come to play a more important role in international commerce. The significant investments in ‘new silk roads, railways, and pipelines’ may reduce the reliance on the Indian Ocean’s SLOCs.⁶⁵

This would significantly affect the role of ports worldwide as major transportation hubs, thereby causing considerable changes in the world economic and geopolitical landscape (e.g., with Turkey replacing the Netherlands as the major entry point for commodities originating from Asia). Climate change is another topic that does not figure prominently in the Indian Ocean discourse, although it is expected to have particularly profound implications for the Indian Ocean region in terms of the safety of maritime infrastructure. It is also associated with the potential for mass immigration flows resulting from flooding coastal areas or disappearing island countries (e.g., the Maldives).⁶⁶ The literature also does not even touch upon the implications of a potential Arctic passage for the civilian use of the Indian Ocean’s SLOCs. The potential feasibility of the Arctic passage in the decades to come is part of an ongoing debate, and it could alter international trading routes significantly.⁶⁷

Similarly, only scant attention is paid to the actual form of future maritime conflict and the ways in which these potential future conflicts might play out within the context of the Indian Ocean region. It is uncertain whether we will go ‘back to the future’ and see the return of classic naval battles, or whether we are already seeing the advent of a post-naval era, as asserted by some, in light of the very small number of real naval clashes occurring since the Second World War.⁶⁸ Alternatively, the trend towards asymmetric warfare might extend to the maritime domain. We must also consider the role of unmanned submersed vehicles whose aerial counterparts (i.e., drones) are currently having a real

impact on the conduct of contemporary warfare on land. More generally, revolutionary breakthroughs in maritime capabilities might emerge as game changers and cancel out rival forces, as occurred with the Dreadnought and the submarine during the 20th century. These very relevant issues are seldom addressed by experts in discussions concerning the future of the Indian Ocean, even though they may actually be crucial to determining that future. Appendix G provides an overview of emerging technologies, briefly touching upon some of their security implications.

5 Conclusions and Policy Recommendations

The Indian Ocean is fast becoming a new global center of political and economic gravity, as it ties together the economic fortunes of emerging Asia, the US, and Europe. This *Future Issue* has analyzed key current and future developments in the Indian Ocean that will have important implications for security and business continuity. The analysis in this *Future Issue* warrants the following conclusions:

- The safety of the Indian Ocean's SLOCs is of vital importance to the growth of the emerging economies in South and East Asia and the world economy at large. The strategically located choke points are extremely vulnerable to disruptive attacks from state actors, as well as from non-state actors, including pirates and terrorists. In addition to their potential to affect the already volatile oil prices, contingencies at sea could dramatically affect companies that rely on principles of just-in-time production and delivery within the context of global production networks.
- The Indian Ocean is a major testing ground for great-power relations between the US and the potential emerging contenders China and India. Even as China and India harbor ambitions to expand their forward naval presence in the Indian Ocean, historically embedded mistrust is encouraging suspicion concerning each party's intentions. Both China and India are starting to consider the Indian Ocean in terms of prerogatives and responsibilities. This could trouble the Ocean's waters considerably and pose a potential source of future conflict, but it could also indicate that these emerging powers are starting to shoulder some of the responsibility of maintaining the safety of the Ocean's SLOCs.
- A significant maritime build-up is taking place across five strategic categories: SLOC protection, maritime dominance (sea control and sea denial), power projection, submarine-launched nuclear second-strike capability, and space dominance. The US remains far ahead of China in terms of maritime capabilities in comparison to China and even farther ahead of India across all five categories. Its lead is likely to shrink in the years to come, however, with China leveling the playing field in such areas as sea denial and power-

projection capabilities. This could change the balance of power at least enough to foster ambitions for regional hegemony on the part of at least one of the two contenders.

HCSS offers the following policy recommendations:

- The Indian Ocean requires close attention by decision makers at the highest strategic levels. Foreign ministries should recognize the Indian Ocean as a region that deserves attention in its own right.
- Given that the Indian Ocean is a test zone for the rules of the game in a nascent multi-polar world order, it is of the utmost importance to establish governance frameworks that will facilitate the integration of rising powers in regulating this order and upholding the principles of an open world economy.
- In the light of the tremendous importance of the safety of SLOCs for sea-based trade and world economic growth, policymakers should attach high priority to the safeguarding of SLOCs and vulnerable choke points.
- Because global production chains are vulnerable to supply disruption originating from the Indian Ocean, business executives should re-assess their policies regarding supply-chain risk management.

In conclusion, the maritime future of the Indian Ocean will be an important factor in shaping the security environment of the 21st century. For now, one can only hope that the relevant parties will adhere to the famous geo-strategist Alfred Mahan's adage that 'force is never more operative than when it is known to exist, but is not brandished.'⁶⁹

Addendum – Implications for the National Security of the Netherlands

The contents of this report were discussed in various expert meetings with representatives of the Dutch Ministries of Foreign Affairs and Defense, the Advisory Council on International Affairs, and the Port of Rotterdam, and its relevance for the Netherlands was frequently debated, particularly with regard to the implications of the sea changes in the Indian Ocean for Dutch national security.

The existence and reality of these implications were obvious to all insiders. As the sixteenth largest economy in the world and the ninth largest export nation, the Netherlands relies on water transportation for 90% of its trade and 88% of its energy imports, with the port of Rotterdam contributing about ten percent of the Dutch Gross Domestic Product (GDP).⁷⁰ Numerous implications of these developments and ways in which to examine and evaluate these implications were discussed. The most important implications included:

- The consequences of unsafe SLOCs for the Netherlands in general and the port of Rotterdam in particular
- The impact of an attack on oil tankers (e.g., in the Strait of Hormuz) on oil prices and, indirectly, on economic growth in general, and on the Dutch industrial base, which relies on fossil fuels for the fabrication of its manufactured goods in particular
- The impact of piracy on insurance rates and the choice of SLOC (e.g., through the Suez Channel or around the Cape of Good Hope)
- The impact of unsafe SLOCs on companies whose production processes operate on the principle of just-in-time delivery

Given the fact that the Dutch economy is highly dependent upon an open liberal world economy, the importance of safe SLOCs is beyond doubt. The consequences of unsafe SLOCs are nonetheless difficult to gauge in quantitative terms at this point. A simple model simulating the impact of unsafe SLOCs (at

both the global and regional levels) on the size and substance of world trade volumes would allow for a balanced estimate of the consequences for the Dutch economy and the port of Rotterdam. While the development of such a model unfortunately exceeds the scope of this study, the preliminary data that are presented do offer an initial glimpse of the potential consequences, in addition to providing some leads for further research.

The Netherlands has a 94.4% import dependency on crude oil.⁷¹ It is also an important energy distribution hub for Western Europe. Crude oil makes up one third of its total imports of goods,⁷² making the Netherlands the second largest importer of oil in the world (after the US). The Netherlands is also the second largest oil exporter in the world (after Russia). An estimated twelve percent of oil imported into the Netherlands originates from the Indian Ocean.⁷³ Supply disruption will have a profound effect on the Dutch economy. First, the oil prices will undoubtedly increase in response to the global integration of oil markets.⁷⁴ According to one estimate, an oil price increase of USD 15 a barrel would have a negative effect of 0.6% on the growth of the gross domestic product of the Netherlands.⁷⁵ While higher oil prices will also lead to inflation, Dutch inflation rates will probably be lower than average, as oil consumption forms a smaller part of Dutch gross national product (GNP).⁷⁶ On the positive side, concomitant increases in gas prices will be beneficial to the Netherlands, as a net gas exporter. For example, oil prices rose to USD 150 per barrel in 2008. Combined with the growth in output volume, this resulted in a 35% increase in profits for Dutch gas extraction.⁷⁷ Second, Dutch industries would suffer if oil derivatives (e.g., Naphtha, which is used as a basis for making plastic, rubber, paint, certain fibers for textile, and car parts) were to become more expensive. Significant increases in oil prices would undoubtedly affect the transport sector, the chemical sector, and the automotive industry.⁷⁸

With respect to shipping routes, until early 2009, approximately five to ten Dutch vessels passed through the Gulf of Aden each week, amounting to 500 vessels per year. The numerous piracy attacks in the area have decreased that number to 250-300 per year, with some vessels sailing around the Cape of Good Hope.⁷⁹ The fact no other SLOCs can serve as an alternative to the Strait of Hormuz highlights the need for stability in the Persian Gulf.⁸⁰ Insurance premiums for vessels passing through the region will increase considerably in case of contingencies. As indicated earlier, vessels passing choke points that are

designated as enhanced-risk areas by insurance companies are levied an additional surcharge of up to 0.10% of the total value of their cargo (while the baseline premium imposed on seaborne freight is 0.05%).⁸¹ In exceptional circumstances, this surcharge may even reach 2.0%. Even though such additional premiums are expensive, their total contribution to the extra costs of oil transportation is relatively small. For example, a relatively expensive war-risk premium of 2.0% of the market value of the vessel for seven days of coverage would require a tanker worth USD 100 million to pay USD two million dollars in additional premium costs. When distributed over the two million barrels of oil, a tanker can transport, this amounts to an increase of one dollar in the price per barrel.⁸² This means that the transportation of oil is likely to continue despite these steep premiums, as long as there is no full-blown maritime conflict that paralyzes all SLOCs.⁸³

Corporations that rely on the just-in-time principle for logistics are more vulnerable to risks that affect the chain. Across the board, companies in the Netherlands do not invest heavily in supply-chain risk management. The machine industry and the electric appliances and components industry are characterized by a high degree of vulnerability relative to other industries in the Netherlands, and they are therefore vulnerable to supply disruption originating from the Indian Ocean.⁸⁴ Taken together, these industries comprise 55% of the total gross added value that Dutch industries contribute to the GDP (eight percent of the total contribution of fourteen percent that industries make to the overall GDP),⁸⁵ highlighting the need to pay significantly more attention to supply-chain risk management.

Overall, the emergence of China and India as major economic players and the Indian Ocean's emergence as a key transit region and an end destination for world trade are likely to affect the size and nature of global trade volumes. In addition to affecting the Dutch economy as a whole, this is likely to have major implications for the type of goods that the port of Rotterdam will process, a topic that merits further examination.

As a general recommendation, we propose examining the implications derived from the rapidly changing situation in the Indian Ocean on the five vital interests of the Netherlands (ecological security, economic security, territorial security, physical security, and socio-political stability), as outlined in the

government-wide Dutch National Security Strategy.⁸⁶ This examination should be followed by an assessment of the proper policy response of the Dutch government as a whole within the seven strategic functions of the Dutch Ministry of Defense (see Figure 5).

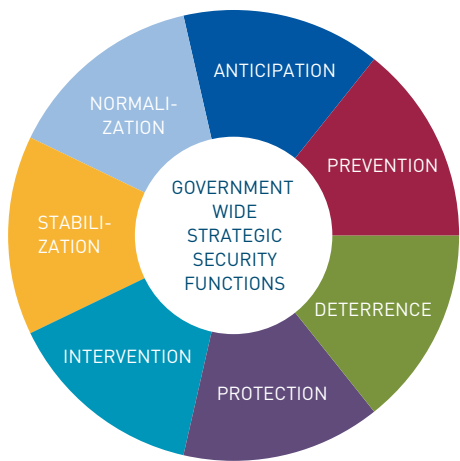


FIGURE 5: SEVEN STRATEGIC FUNCTIONS, AS DEFINED BY THE NETHERLANDS MINISTRY OF DEFENSE

In general, it has become clear that events transpiring in the Indian Ocean affect Dutch national security, well-being, and business continuity; the region therefore merits further attention and closer scrutiny in the years to come.

Appendices

5.1 Appendix A – Blue, Green, and Brown-Water Navy Capabilities

The literature contains no clear definitions of what is understood by the terms blue, green and brown-water navies. The defining characteristic of a blue-water navy is the capability to be an expeditionary navy. It is capable of running missions worldwide without direct support from the homeland because its fleets are relatively self-sufficient. A blue-water navy can protect itself from airborne, surface, and sub-surface threats. The most important assets of a blue-water navy are its own logistical support mechanisms and its unique ability to protect its logistic chain from external threats. The core instruments of a blue-water navy are aircraft carriers, destroyers, and amphibious landing platforms, which are protected by submarines and frigates. It has its own supply ships (which are larger than 12,000 tons), and it can use them to secure access to energy and supply goods for extended periods. It is capable of projecting sea-control and sea-denial capabilities by exploiting the full spectrum of maritime capabilities, including the air domain. For power projection ashore, it also relies on hydrographic systems and mine placing, in addition to mine detection and countering capabilities. A blue-water navy depends heavily on the capability to establish and exploit maritime situational awareness⁸⁷ by means of long-range aircraft (manned and/or unmanned).

A green-water navy is largely a coastal or coast guard navy that operates within the Exclusive Economic Zone (EEZ) of 200 nautical miles (or 370 km). It is not intended for operating long-distance operations, although it is capable of conducting hit-and-run operations and exercising sea-denial capabilities within coastal waters. It also has limited sea-control capabilities. Instruments deployed by a green-water navy include frigates, corvettes, and submarines that can be supported by land-based attack helicopters and by coastal defense artillery and missiles. The US Navy further differentiates between a green-water navy and a

brown-water navy, although most other countries do not use these distinctions. A brown-water navy is a river-based navy that is capable of carrying out patrolling operations in river and coastal environments. By its very nature, a brown-water navy serves the purpose of defending and providing security on indigenous estuaries (e.g., the Brazilian Navy Amazon river patrol). Navies that are intended to project power on foreign river estuaries as part of expeditionary operations are considered as part of an amphibious blue-water navy.

States with typical blue-water navies include the US, France, Britain, Russia, the Netherlands, and Japan.⁸⁸ India's maritime vision *Freedom to use the Seas* indicates that this country also aims to achieve blue-water capabilities by 2013.⁸⁹ Similarly, South Korea is expected to transform its green-water navy into a blue-water navy by 2020 by adding a strategic mobile fleet consisting of destroyers, submarines, and an anti-submarine aircraft.⁹⁰ China also aspires to gain blue-water capabilities, and it is expected to have a fully capable blue-water navy by the mid-21st century. It is working to achieve a green-water navy in the nearer future.⁹¹ Interestingly, although recent Chinese acquisitions have enhanced its coastal sea-denial capabilities, they do not yet have the sea-control capabilities associated with a blue-water navy.⁹² The PLA Navy is substantially contributing to anti-piracy missions in the Gulf of Aden, which is seen by most naval strategists as a clear sign of its expeditionary sea-control aspirations.

5.2 Appendix B – Maritime Expenditures Projections

IN BILLIONS OF DOLLARS	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
INDIA					
GDP [1, 2]	1242,64	1339,49	1449,17	1583,43	1740,41
DEFENSE [3]	29,95	32,39	35,04	38,29	42,08
DEFENSE BUDGET % GDP	2,41%	2,42%	2,42%	2,42%	2,42%
NAVY [3]	2,047	2,051	-	-	-
NAVY - FUTURE TREND	-	-	2,219	2,425	2,665
NAVY AS % OF GDP	0,16%	0,15%	0,15%	0,15%	0,15%
NAVY AS % OF DEFENSE BUDGET	6,83%	6,33%	6,33%	6,33%	6,33%
US					
GDP [1,4]	14266,20	14704,21	15326,88	16008,51	16729,38
DEFENSE [5]	589	533	549,09	573,51	599,34
DEFENSE BUDGET % GDP	4,13%	3,63%	3,58%	3,58%	3,58%
NAVY [6]	156,21	156,32	-	-	-
NAVY - FUTURE TREND [6]	-	-	160,69	163,1	168,5
NAVY AS % OF GDP	1,09%	1,06%	1,05%	1,02%	1,01%
NAVY AS % OF DEFENSE BUDGET	26,489%	23,50%	29,28%	28,44%	28,11%
CHINA					
GDP [1, 7]	4757,74	5263,33	5843,57	6524,23	7287,76
DEFENSE [8]	70	77,95	86,54	96,62	107,93
DEFENSE BUDGET % GDP	1,47%	1,48%	1,48%	1,48%	1,48%
NAVY	10,50	11,69	-	-	-
NAVY - FUTURE TREND	-	-	12,98	14,49	16,19
NAVY AS % OF GDP	0,22%	0,22%	0,22%	0,22%	0,22%
NAVY AS % OF DEFENSE BUDGET	15,00%	15,00%	15,00%	15,00%	15,00%

TABLE 2: CURRENT AND PROJECTED MARITIME EXPENDITURES OF INDIA, CHINA, AND THE US

TABLE 2: CURRENT AND PROJECTED MARITIME EXPENDITURES OF INDIA, CHINA, AND THE US
CONTINUED

IN BILLIONS OF DOLLARS	2014-2015	2020-2021	2025-2026	2028-2029	2030-2031
INDIA					
GDP [1, 2]	1908,3	2398,82	3210,16	3823,35	4295,92
DEFENSE [3]	46,1	58,01	77,62	165,57	103,88
DEFENSE BUDGET % GDP	2,42%	2,42%	2,42%	-	2,42%
NAVY [3]	-	-	-	-	-
NAVY - FUTURE TREND	2,92	3,67	4,91	5,84	6,57
NAVY AS % OF GDP	0,15%	0,15%	0,15%	0,15%	0,15%
NAVY AS % OF DEFENSE BUDGET	6,33%	6,32%	6,32%	-	6,32%
US					
GDP [1,4]	17419,3	16392,71	17354,00	18507,00	19310,00
DEFENSE [5]	624,0	575,00	560,00	605,00	-
DEFENSE BUDGET % GDP	3,58%	3,51%	3,23%	3,27%	-
NAVY [6]	-	-	-	-	-
NAVY - FUTURE TREND [6]	170	157,56	153,45	165,78	-
NAVY AS % OF GDP	0,98%	0,96%	0,88%	0,90%	-
NAVY AS % OF DEFENSE BUDGET	27,40%	27,40%	27,40%	27,40%	-
CHINA					
GDP [1, 7]	8283,3	8252,34	8946,57	9948,00	10677,15
DEFENSE [8]	122,6	122,22	132,50	147,33	158,13
DEFENSE BUDGET % GDP	1,48%	1,48%	1,48%	1,48%	1,48%
NAVY	-	-	-	-	-
NAVY - FUTURE TREND	18,4	18,33	19,87	22,09	23,71
NAVY AS % OF GDP	0,22%	0,22%	0,22%	0,22%	0,22%
NAVY AS % OF DEFENSE BUDGET	15,00%	15,00%	15,00%	15,00%	15,00%

Long-term projections are often misguided, and they often prove completely off-target. The above table should therefore be taken only as an illustration of how the maritime expenditures of India, the US, and China may develop from current levels, assuming that absolute defense budgets grow in accordance with projected economic/GDP growth rates (unless otherwise indicated by the state in question) and that naval expenditures (as a percentage of total defense spending) are held constant.

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Office of Budget Department of the Navy, 'Highlight of the Department of the Navy FY2011 Budget,' February 2010, http://www.finance.hq.navy.mil/FMB/11pres/Highlights_book.pdf, Table 1, p. 1-13.

7. GDP projections based on an annual growth rate of 4,6% in 2010-2020 and 3,6% in 2020-2030. OECD, 'Chinese Economic Performance in the Long Run: The Outlook for the Next Quarter Century,' http://www.oecd.org/document/49/0,3343,en_2649_33731_40278961_1_1_1_1,00.html.
8. Defense expenditure 2009 based on:
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'China says defense spending rise slows to 7.5 percent.' Reuters, March 4, 2010, <http://www.reuters.com/article/idUSTRE6230A720100304>.

5.3 Appendix C – Strategic Categories of Maritime Power

Protection of SLOCs refers to defensive capabilities aimed at protecting the uninterrupted flow of resources and trade, using primarily surface ships and smaller submarines augmented by aerial vehicles (manned or unmanned). Ideally, the protection of SLOCs depends on effective cooperation with other nations that share similar interests. A state that focuses on the protection of SLOCs will thrive in multilateral, cooperative contexts. Principal surface combatants are the capability of choice for SLOC protection, because of their endurance, presence, helicopter-carrying capability, and the ability to interrogate small and large surface craft.

Maritime dominance refers to the ability to achieve sea control and, more precisely, the ability to control specific sea areas or maritime choke points (e.g., the Strait of Hormuz) for limited periods. Sea control is most effectively maintained by principle surface combatants, based on surveillance by maritime aircraft (manned or unmanned). It also includes sea denial, which is the ability to deny an opponent the unrestricted use of specific sea areas or maritime choke points. Sea denial is most effectively executed by means of submarines (conventional or nuclear), for the mere unconfirmed presence of a submarine can force an opponent to adjust its behavior. Sea control and sea denial are complementary strategic maritime functions. Maritime dominance is relevant in a confrontational, multi-polar context in which a state's interests must be defended against other states or non-state actors.

Power projection refers to the ability to influence or manage any situation on land or in coastal areas using sea-based or airborne expeditionary forces. It is enforced either by carrier battle groups with extensive kinetic weaponry, (e.g., cruise missiles or bombers) or by amphibious forces, special forces, and landing craft. Power-projection capabilities enable a state to conduct unilateral or multilateral operations in conflict or disaster-stricken regions, and its position is strengthened in confrontational multi-polar or fragmented geopolitical contexts.

Sea-based nuclear second-strike capability refers to the ability to survive a nuclear strike and retaliate in kind using a sea-launched nuclear weapon. These weapons are typically delivered by ballistic missiles launched from nuclear-powered submarines, which are very difficult to trace, making it nearly impossible for opponents to destroy them. The possession of a sea-based nuclear

second-strike capability has a powerful deterrent effect in cooperative or confrontational bi-polar and multi-polar contexts.

Space dominance refers to the ability to use space for purposes of surveillance, intelligence, and communications using satellites. Space-faring capabilities are indicative of a state's level of technological advancement; they are also an indispensable element in the ability to wage modern war (including maritime war), war, and they provide states with long-range ballistic missile capability.

Hydrographic capability refers to the ability to map coastal and ocean waters independently in order to guarantee maritime safety. It is especially important in times of conflict in which adversaries are not willing to share their hydrographic and oceanographic information or in which no reliable information on coastal and river areas is available. Hydrographic capability is also indispensable in establishing incontestable data on the limits of the Exclusive Economical Zone in the context of the UN Convention on the Laws of the Sea (UNCLOS).

5.4 Appendix D – Maritime Build-up

SUBMARINES										SHIPS - PRINCIPAL SURFACE COMBATANTS							SUPPLY SHIPS			
MARITIME CAPABILITIES			PER COUNTRY	Total	Weighted	SSBN	SSN	SSG	SSGN	SS(K)	Total	FF	FFG	CG	DD	DDG	Total	AK	AO	Total
1	SLOC PROTECTION						x			x		x	x	x	x	x		x	x	
		INDIA	140	22		0	0	0	0	17	17	3	11	0	8	0	22	0	11	11
		CHINA	336	78		6	1	0	54	60	0	50	0	0	28	78	23	78	101	
		US	654	100		53	0	4	0	53	0	22	22	4	52	100	59	40	99	
2	MARITIME DOMINANCE																			
		sea denial					x	x	x	x		x			x					
		INDIA	140	17	0	0	0	0	17	17	3	11	0	8	0	11				
		CHINA	447	61	3	6	1	0	54	61	0	50	0	0	28	78				
		US	1153	57	14	53	0	4	0	57	0	22	22	4	52	96				
		sea control					x	x	x	x		x	x	x	x			x	x	
3	POWER PROJECTION (SEA TO LAND)	INDIA	123	84		0	0	0	17	17	3	11	0	8	0	22	0	9	9	
		CHINA	253	92	3	6	1	0	54	61	0	50	0	0	28	78	23	60	83	
		US	639	358	14	53	0	4	0	57	0	22	22	4	52	100	59	40	99	
							x	x	x					x			x			
		INDIA	136	12	0	0	0	0		0	3	11	0	8	0	0	9	9	0	
		CHINA	620	244	3	6	1	0		1	0	50	0	0	28	28	23	60	23	
4	SEA BASED NUCLEAR 2ND STRIKE	US	1568	317	14	53	0	4		4	0	22	22	4	52	74	59	40	59	
					x			x												
		INDIA	98	0	0	0	0	0		0										
		CHINA	38	3	3	6	0	0		3										
5	SPACE DOMINANCE	US	74	18	14	53	4		18											
		INDIA	4	4																
		CHINA	12	12																
		US	125	125																

TABLE 3: COMPARISON OF NATIONAL MARITIME CAPABILITIES (COMBINED) ALONG FIVE STRATEGIC CATEGORIES.

TABLE 3: COMPARISON OF NATIONAL MARITIME CAPABILITIES (COMBINED) ALONG FIVE STRATEGIC CATEGORIES. **CONTINUED**

	MARITIME CAPABILITIES	PER COUNTRY	Total	Weighted	AMPHIBIOUS VESSELS				AIRCRAFT CARRIER			MINE WARFARE				MISSILES		
					LPD	LC	LS	Total	CV	CVN	Total	ML	MH	MS	Total	IRBM	ICBM	Total
1	SLOC PROTECTION				x							x	x	x				
		INDIA	140	22	1	0	10	1	1	0		0	0	14	14			
		CHINA	336	78	1	160	83	1	0	0		1	0	64	65			
		US	654	100	9	282	15	9	1	10		0	10	0	10			
2	MARITIME DOMINANCE																	
		sea denial							x	x		x				x	x	
		INDIA	140	17					1	0	1	0			0	98	0	98
		CHINA	447	61					0	0	0	1			1	35	0	35
		US	1153	57					1	10	11	0			0	0	46	46
		sea control																
		INDIA	123	84					1	0			0	14	0			
3	POWER PROJECTION (SEA TO LAND)	CHINA	253	92					0	0			0	64	0			
		US	639	358					1	10			10		0			
		INDIA	136	12	x	x	x	11	x	x						x	x	
		CHINA	620	244	1	160	83	244	0	0	1	0	0	64	0	98	0	98
4	SEA BASED NUCLEAR 2ND STRIKE	US	1568	317	9	282	15	306	1	10	11	0	10		0	0	46	46
		INDIA	98	0					1	x						x	x	
		CHINA	38	3					0	0	0					98	0	98
		US	74	18					1	10	10					35	0	35
5	SPACE DOMINANCE															0	46	46
		INDIA	4	4														
		CHINA	12	12														
		US	125	125														

TABLE 3: COMPARISON OF NATIONAL MARITIME CAPABILITIES (COMBINED) ALONG FIVE STRATEGIC CATEGORIES. **CONTINUED**

MARITIME CAPABILITIES				AIRCRAFT			MILITARY SATELLITE CAPABILITY							HYDROGRAPHIC CAPABILITY		
	PER COUNTRY	Total	Weighted	Armed	ASW	Total	MEO	GEO	LEO	EO	SLC	Total	AGOR	AGHS	Total	
1					x		x	x	x	x	x		x	x		
	INDIA	140	22		62	62	0	0	3	0	1	4	1	8	9	
	CHINA	336	78		14	14	1	5	5	0	1	12	5	0	5	
	US	654	100		258	258	31	43	31	9	11	125	0	0	0	
2																
	sea denial			x												
	INDIA	140	17	13		13										
	CHINA	447	61	272		272										
	US	1153	57	943		943										
	sea control				x		x	x	x	x	x		x	x		
	INDIA	123	84		62	62	0	0	3	0	1	4	1	8	9	
3	CHINA	253	92		14	14	1	5	5	0	1	12	5	0	5	
	US	639	358		258	258	31	43	31	9	11	125	0	0	0	
				x			x	x	x	x	x		x	x		
	INDIA	136	12	13		13	0	0	3	0	1	4	1	8	9	
4	CHINA	620	244	272		272	1	5	5	0	1	12	5	0	5	
	US	1568	317	943		943	31	43	31	9	11	125	0	0	0	
	INDIA	98	0													
5	CHINA	38	3													
	US	74	18													
	INDIA	4	4				x	x	x	x	x					
SPACE DOMINANCE	CHINA	12	12				1	5	5	0	1	12				
	US	125	125				31	43	31	9	11	125				

TABLE 4: ABBREVIATIONS FOR (MARITIME) CAPABILITIES. [SOURCE: MILITARY BALANCE 2009 AND UCS DATABASE]⁹³

ABBREVIATIONS	
SSBN	Ballistic Missile Submarine Nuclear-powered
SSN	Nuclear [-powered] Attack Submarine
SS (K)	Patrol Submarine (with ASW capability)
SSG	Diesel Submarine with non-ballistic missile
SSAI	Air-Independent Propulsion Submarine
FF (G)	Frigate (with guided missile)
CG	Cruiser (with guided missile)
DD(G)	Destroyer (with guided missile)
AK	Cargo ship
AO	Tanker (all categories)
LPD	Landing Platform Dock (landingships)
LC	Landing Craft
LS	Landing Ship
ML	Minelayer
MH	Mine Countermeasures: Minehunter
MS	Mine Countermeasures: Minesweeper
CVN	Aircraft Carrier (nuclear propulsion)
SRBM	Short Range Ballistic Missile
IRBM	Intermediate Range Ballistic Missile
ICBM	Inter-Continental Ballistic Missile
LACM	Land Attack Cruise Missile
Armed	Attack & Fighter Aircraft
ASW	With anti-submarine capability
UAV	Unmanned Aerial Vehicle
SLC	Satellite Launch Capability
LEO	Low Earth Orbit
MEO	Medium Earth Orbit
GEO	Geostationary Orbit
EO	Elliptical Orbit
AGOR	Oceanographic Research Vessel
AGHR	Hydrographic Survey Vessel

This table shows maritime strategic capabilities along five categories: SLOC protection, maritime dominance (sea control and sea denial), power projection, sea-based nuclear second-strike capability, and space dominance. In order to determine which country currently has dominant capabilities along these categories, we used in-house subject-matter expert judgment to define a list of maritime assets for each category. (Note that, for the sake of space, the identified list of assets has been kept limited, and it might not reflect the total range of available assets.) Drawing on data provided by the Military Balance 2009 and the UCS database, we calculated the number of maritime assets held by each country according to the five strategic categories (listed in the column total). This number provides a rough illustration of the current distribution of maritime power for the different capabilities. The illustration is rough, as the table assigns equal numerical values to maritime assets with different uses and utilities, and these values do not always correspond to their weight in determining actual maritime capabilities. The column printed in blue provides a number for the selected capability that our in-house subject-matter experts considered most relevant in that maritime domain.

Several caveats that have already been mentioned in the main text of this report are worth repeating. In general, it is important to note that sheer numbers do not reflect the overall balance of power for two reasons. First, simply adding up numbers does not adequately capture overall maritime strength, due to incommensurable differences in capabilities and other factors that determine strength (e.g., skill, morale, and perhaps even luck).⁹⁴ Second, these numbers refer to the entire set of maritime capabilities of a state, rather than the capabilities that are deployed in the Indian Ocean region. Nonetheless, not all states deploy their capabilities in the Indian Ocean region. For example, while nearly the entire maritime capability of India is deployed in the Indian Ocean Region, the US Navy maintains a global presence across the seven world oceans in order to maintain the *Pax Americana*, and the Chinese Navy is able to employ only a limited number of assets in the region for prolonged periods. In case of conflict, the US Navy would have to redeploy one of its fleets to the Indian Ocean in order to enhance its regular naval presence (the 5th Fleet). It would probably redeploy its 7th Fleet, which is normally based in the Pacific Ocean. This process would take days, if not weeks, thereby providing other powers with a floating window of opportunity in which they could gain a temporary military advantage. It would also create a capability gap in the Pacific Ocean. Despite these cautions,

this comparison of capabilities does provide an indication of the maritime capabilities possessed by these three powers.

Taking the above-mentioned caveats into account, the table compares relative maritime strengths based on a comparison of all capabilities within a certain category, as well as a selected capability that is considered most relevant. As with every selection, our choices may invite debate (which they indeed intend to do), but they are certainly not arbitrary. They are informed by subject-matter expertise and supported by a transparent line of reasoning. With this important caveat in mind, this annex is especially important, as it provides detailed information on the specific maritime assets along the five strategic categories.

5.5 Appendix E – (Military) Maritime Facilities in the Indian Ocean

The figures below present an overview of strategic foothold bases in the Indian Ocean that are linked to the US, India, and China. The military facilities in each base are also described, if information was available. The facilities were divided into five types, which are further explained in the text below.

Intelligence-Gathering Stations are land-based facilities that are used by military intelligence services to increase situational awareness and gather regional intelligence, drawing on surveillance and reconnaissance capabilities. Intelligence gathering at sea relies on manned and unmanned platforms (submarines and unmanned aerial vehicles) with sensors for signal intelligence (SIGINT) and radar signals (ELINT).

Refueling Stations are the primary means of the strategic storage of oil stocks. Refueling stations are vital to sustaining the expeditionary missions of blue-water navies.

Rearmament Stations offer states the capacity to resupply vessels on expeditionary missions. They enable navies to project power in the higher end of the conflict spectrum.

Repair Facilities provide states with the capacity for maintenance, repairs, and role change (e.g., from mine laying to mine sweeping). They enhance the ability of naval vessels to conduct expeditionary operations, even in combat situations.

(Regional) Headquarters serve as the forward-deployed operational command centers of expeditionary forces. In most cases, naval operational command is exercised from large surface combatants (e.g., carriers or landing craft). Key elements in the exercise of effective expeditionary command include satellite bandwidth and secure lines of communication. Land-based coalition forces need headquarters only in order to accommodate large-scale naval operations of longer duration (e.g., CTF 150 and 151 in the Arabian Basin)

Given that China's intentions in the Indian Ocean are subject to fierce debate, an overview of the ports and bases that are financed by the Chinese government is shown in Table 7. This list has been compiled in order to present the maritime presence of the three key states in the Indian Ocean maritime build-up. The data are drawn primarily from two articles featured in *Contemporary South Asia* and *Strategic Analysis*, complemented by information from a number of databases and articles, which are listed below as well.

TABLE 6: [MILITARY] MARITIME BASES IN THE INDIAN OCEAN

COUNTRY	LOCATION	STATUS	USE	MILITARY FACILITIES*
UNITED STATES	Diego Garcia (British IO Territory)	Operational	Military	A,B,C,D
	Changi Naval Base, (Singapore)	Operational	Military	B,D
	Kochi (India)	Operational	Military	D
	Manama (Bahrain)	Operational	Military	B,C,D,E
INDIA	Kochi	Operational	Military	A,B,C,D, & E
	Goa	Operational	Military	C & D
	Karwar	Operational	Military	B, C & D
	Visakhapatnam	Operational	Military/civilian	C & E
	Mumbai	Operational	Military/civilian	A,B,C,D, & E
	Rambilli Mandal	Expected	Military	
	Lakshadweep Islands	Operational	Military	C
	Port Blair (N&A Islands)	Operational	Military/civilian	A, C, E
	Maldives	Expected	Military	A
	Jaffna Peninsula (Sri Lanka)	Expected	Military	C
	Trencomalee (Sri Lanka)	Operational	Civilian	B,C,D
	Madagascar (Northern tip)	Operational	Military	A
	Mauritius	Operational	Military	A
	Seychelles	Operational	Military	A
CHINA	Marao Island (Maldives)	Operational	Military	A
	Seychelles	Expected	Military	A,B,C,D
	Great Coco Island (Myanmar)	Operational	Military	A,B,

*Types of military facilities:
 A. Intelligence Gathering Station
 B. Refueling Station
 C. Rearmament Station
 D. Repair Facility
 E. Headquarters

TABLE 6: (MILITARY) MARITIME BASES IN THE INDIAN OCEAN **CONTINUED**

COUNTRY	LOCATION	DETAILED FACILITIES
UNITED STATES	Diego Garcia (British IO Territory)	Naval base, submarine base, support facilities space surveillance network, NASA Space Shuttle landing site, possible US nuclear weapon hub
	Changi Naval Base, (Singapore)	Maintenance, logistic support facility and training refueling, repair facilities
	Kochi (India)	Base of mobile ship repair unit
	Manama (Bahrain)	HQ fleet, naval base, mine counter-measures, facilities & medical, munition, fuel mobility, support facilities, airbase
INDIA	Kochi	Monitoring station , naval base, repair dry dock, naval aircraft yard, refueling station
	Goa	Naval base, repair dry dockyard, refit and modernization of ships and submarines
	Karwar	Naval base
	Visakhapatnam	Submarines HQ, naval hospital
	Mumbai	Monitoring station, naval base, missile boat HQ, submarine base, naval hospital
	Rambilli Mandal	-
	Lakshadweep Islands	Patrol craft base
	Port Blair (N&A Islands)	Advance base, support facility, naval hospital
	Maldives	-
	Jaffna Peninsula (Sri Lanka)	-
	Trencomalee (Sri Lanka)	Container port
	Madagascar (Northern tip)	Monitoring station
	Mauritius	Monitoring station
	Seychelles	Monitoring station
CHINA	Marao Island (Maldives)	Monitoring station
	Seychelles	-
	Great Coco Island (Myanmar)	Monitoring station

TABLE 6: [MILITARY] MARITIME BASES IN THE INDIAN OCEAN **CONTINUED**

COUNTRY	LOCATION	FUTURE CAPABILITY
UNITED STATES	Diego Garcia (British IO Territory)	Composite anti terrorism base, increased availability of precision-strike weapons, enhanced regional surveillance capabilities, augmented operational flexibility to host short- and long-range aircraft.
	Changi Naval Base, (Singapore)	
	Kochi (India)	
	Manama (Bahrain)	15 extra berths, cargo and container facilities
INDIA	Kochi	Base for UAVs, anti submarine capabilities
	Goa	
	Karwar	Naval air base
	Visakhapatnam	
	Mumbai	
	Rambilli Mandal	Naval base anti aircraft, anti submarines
	Lakshadweep Islands	Base for UAVs
	Port Blair (N&A Islands)	Base for UAVs Submarine base
	Maldives	Military reconnaissance center
	Jaffna Peninsula (Sri Lanka)	Naval airbase
	Trencomalee (Sri Lanka)	Naval base, refueling station, repair docks
	Madagascar (Northern tip)	
	Mauritius	
	Seychelles	
CHINA	Marao Island (Maldives)	Naval base, submarine base, permanent hydrographic survey infrastructure
	Seychelles	Naval base , monitoring station
	Great Coco Island (Myanmar)	

TABLE 6: [MILITARY] MARITIME BASES IN THE INDIAN OCEAN **CONTINUED**

COUNTRY	LOCATION	COMMENT	SOURCES
UNITED STATES	Diego Garcia (British IO Territory)		1.11.
	Changi Naval Base, (Singapore)	Use of Singapore facilities allowed under the Memorandum of Understanding (MOU, 1990)	5.6.
	Kochi (India)		1.
	Manama (Bahrain)	Might be used for hosting of US troops in case of Asia-US confrontation, as during Enduring Freedom	7.8.9.10.
INDIA	Kochi	Southern Naval Command	1.4.
	Goa		1.4.
	Karwar		1.
	Visakhapatnam	Eastern Naval Command	4.
	Mumbai	Western Naval Command	4.
	Rambilli Mandal		1.
	Lakshadweep Islands		3.4.
	Port Blair (N&A Islands)	Far Eastern Naval Command Base, capable of launching cruise missiles equipped with nuclear warheads	1.3.4.
	Maldives	Using Terrestrial Experimental Satellite	1.
	Jaffna Peninsula (Sri Lanka)	Contract of cooperation between IND & SL for maritime surveillance	1.
	Trencomalee (Sri Lanka)	Contract with IND and US for civil use Might be used for US/IND warships in future	1.2.
	Madagascar (Northern tip)		1.
	Mauritius		1.
	Seychelles		1.
CHINA	Marao Island (Maldives)		3.4.
	Seychelles	'Anti piracy' monitoring station	3.
	Great Coco Island (Myanmar)		1.2.

TABLE 6: CHINA'S INVESTMENTS ABROAD (WITH THE POTENTIAL OF BEING USED BY CHINESE NAVAL VESSELS)

COUNTRY	LOCATION	STATUS	USE	MILITARY FACILITIES*	DETAILED FACILITIES	TYPES OF SHIPS
PAKISTAN	Gwadar	Operational	Mostly civilian but also military	A,B,C,D	Deep water port, Signals Intelligence (SIGINT) facility	No data available
BANGLADESH	Chittagong	Operational	Military/ civilian	B,D,C	Container port, largest navy base, logistics bunkering facilities	Small and medium warships
MYANMAR	Ramree Island (kyaukpyu)	Operational	Military	A,B,C,D	Naval base, monitoring station, refueling station	No data available
	Hainggyi Island	Operational	Military	A,B	Naval base, monitoring station	No data available
	Thilawa	Operational	Civilian/ military capabilities	A, D	Monitoring station, shipyard	Ships →10.000 ton deadweight (Myanmar has only few)
	Zadetkyi Kyun Island	Operational	Military	A, B	Naval base, maritime surveillance radar	
SRI LANKA	Hambantota	Expected	Civilian/ military capabilities	B,C,D	-	Military vessels, possibly nuclear submarines

*Types of military facilities:

- A. Intelligence Gathering Station
- B. Refueling Station
- C. Rearmament Station
- D. Repair Facility
- E. Headquarters

TABLE 7: CHINA'S INVESTMENTS ABROAD (WITH THE POTENTIAL OF BEING USED BY CHINESE NAVAL VESSELS) **CONTINUED**

COUNTRY	LOCATION	FUTURE CAPABILITY	FINANCED BY	SIZE INVESTMENTS	COMMENT	SOURCES
PAKISTAN	Gwadar	Monitor and basing capabilities for PLAN (repair yards, weapon equipment stores), Refueling station	China	usd 1 billion		1.2.12.
BANGLADESH	Chittagong	Jetty for mooring small warships	China (military)/ South Korea (civil)	usd 8 billion	Part of Bangladesh-China Defense Cooperation Agreement	2.
MYANMAR	Ramree Island (kyaukpyu)		China	No data available		1.
	Hainggyi Island		China	No data available	Capable of accomodating much larger ships than those in Myanmar's Navy	1.
	Thilawa		China		Has a shipyard for more big warships	1.
	Zadetkyi Kyun Island		China	usd 11 million		2.
SRI LANKA	Hambantota	Deep-water port, rearmament and bunkering facilities, refueling station, repair yard, oil tank farm	China	usd 1 billion		2.12.

Sources:

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5.6 Appendix F – Current and Future Maritime Capabilities of France, the UK, Australia, and Japan in the Indian Ocean

The United Nations Security Council asked member states to take action to prevent acts of piracy near the coast of Somalia and in the Gulf of Aden by dispatching naval ships and military aircraft. Canada, Denmark, France, India, Netherlands, Russia, Spain, the United Kingdom (UK), and the US, as well as regional and international organizations responded, and they are engaged in counter-piracy operations off the Somalia coast following resolutions 1814 (2008), 1816 (2008) and 1838 (2008).⁹⁵

France

France has a contingent in the Indian Ocean. This contingent contributes to peacekeeping and stabilization efforts in the Indian Ocean, as well as to maritime security, humanitarian operations, and defense diplomacy. The contingent comprises 750 Army and 430 Navy personnel. The ALINDIEN (*l'Amiral commandant les forces maritimes françaises de l'océan Indien*) has three command facilities: one based in Reunion Island, another in Djibouti, and a third that is permanently based on a command ship. France also has a base on the Island of Mayotte, between Madagascar and Mozambique.

The naval station in Reunion Island has two P400 patrol boats, an Austral patrol boat, a maritime affairs patrol, one Batral ferry, a Gendarmerie maritime patrol, and a detachment of fusiliers. ALINDIEN has a command and resupply boat (with its own headquarters and a workforce of 35 people), two surveillance frigates based in Reunion Island, a marine commando unit, and a maritime surveillance plane in Djibouti.

In Mayotte, there is a marine detachment with a servitude high-speed motorboat, a boat for transporting material, and a high-speed motorboat for coastal maritime surveillance. There are 1,000 SMA and 1,150 Gendarmerie forces in Reunion Island and Mayotte, with an Alouette III and a high-speed motorboat. The Air Force includes 280 personnel in Reunion Island, including two Transall and two Fennec units. In addition, France often deploys other means to the Indian Ocean, including a carrier group or a force projection group around a projection and command ship.⁹⁶

France is planning to expand its presence in the Persian Gulf, as the region is becoming more important to the European economy. France plans to intensify its involvement in this region with the new base in Abu Dhabi.⁹⁷

UK

The UK has a base on the island Diego Garcia within British Indian Ocean Territory, in the middle of the Indian Ocean. In 1971, the US and the UK signed a lease agreement that allows the US to use the island.⁹⁸ Most of the facilities on the island are therefore operated by the US Air Force, while the UK continues to have access to the naval and air facilities. The installation has approximately 40 permanently stationed personnel, but no permanently deployed British military units.⁹⁹ In its White Paper, the UK explains that it wants to maintain a presence in the Indian Ocean and Persian Gulf and to contribute to international efforts to protect vital sea lanes and choke points against a range of threats, from terrorism to piracy and potential state-sponsored disruption.¹⁰⁰

The UK naval forces are currently protecting only the UK waters and strategic assets (e.g., ports). The UK is aware of the importance of the timely arrival of goods from overseas trade and thus of the necessity of protecting SLOCs and choke points beyond UK waters. The UK is therefore considering the possibility of deploying the forces of the Royal Navy to protect and support British and wider international trade infrastructure and interests (e.g., in the Indian Ocean region).¹⁰¹

Australia

Australia intends to develop its naval capabilities in order to meet the new challenges of its strategic environment and to avert a deterioration of its naval strength. Australia's naval force currently consists of four Adelaide class-guided missile frigates, eight ANZAC (Australian and New Zealand Army Corps) frigates, and six Collins class patrol submarines. Australia plans to upgrade its naval force. The six Collins class submarines will be replaced by twelve new submarines within the next fifteen to twenty years. The new submarines will be capable of anti-ship and anti-submarine warfare, as well as strategic strike. The ANZAC frigates will also be replaced, and three Air Warfare Destroyers will be acquired. These vessels will be equipped with Aegis air-defense systems, which will extend the range of the navy and make it possible to assume long-distance escort duties and air-defense tasks. Australia is also planning to acquire 24 new naval combat helicopters with advanced Anti Submarine Warfare (ASW)

abilities; 46 MRH-90 troop-carrying helicopters (which the Army can use as well); twenty offshore combatant vessels, and a strategic sealift ship to move stores, equipment, and personnel.¹⁰²

Despite these plans, Australia probably lacks the ability to reach its major strategic objectives. To improve maritime security in the northern region, Australia would need at least five Air Warfare Destroyers and vessels that are larger and more capable than the smaller frigates are, thereby extending its strategic reach farther into East Asia and the Indian Ocean. Critics have also raised doubts concerning the feasibility of funding the entire program adequately until 2030. Furthermore, recruitment problems prevent Australia from utilizing its naval capabilities completely. In 2008, the resignation rate among its force of 12,000 recruits was eleven percent. Because of personnel shortages, Australia could only put three of its six Collins class submarines to sea at any one time.¹⁰³

Japan

Japan has taken the initiative to adopt measures intended to protect public safety and maintain order at sea. This is of great importance to Japan, a maritime nation that relies heavily on maritime transport. Approximately 2,000 Japan-related ships pass through the Gulf of Aden and the coast of Somalia each year. This area is very important for Japan, as it constitutes a shipping route that connects Europe and the Middle East to East Asia. Since March 2009, two Japanese escort ships started escorting other ships. Japan has also two P-3C aircraft for conducting surveillance activities and collecting information.¹⁰⁴

5.7 Appendix G – Emerging Maritime Technologies

Drawing on a Royal Netherlands Navy study on future technologies,¹⁰⁵ a list of emerging technologies was selected for further analysis. These technologies are listed in the table below, followed by a very brief analysis of some of the potential security implications of these emerging technologies.

TABLE 8: EMERGING MARITIME TECHNOLOGIES

	RELEVANT SHORT TERM	RELEVANT LONG TERM
ENERGY TECHNOLOGY		
Nuclear Fusion		X
Bio fuels		
Hydrogen economy		X
Nano wire battery		X
Ultra capacitors	X	
Wireless energy transfer	X	
TRANSPORTATION TECHNOLOGY		
Electric cars		X
Personal rapid transit		X
Personal aircraft		X
Precooled jet engines	X	
Scramjets	X	
Non-rocket space launch	X	
INFORMATION TECHNOLOGY		
Artificial Intelligence	X	
4G cellular communication	X	
Machine translation	X	
Machine vision		X
Machine augmented cognition		X
Semantic Web	X	
GP Computing on Graphic PU	X	
Solid state drive	X	

TABLE 8: EMERGING MARITIME TECHNOLOGIES **CONTINUED**

	RELEVANT SHORT TERM	RELEVANT LONG TERM
3D optical data storage	X	
Spintronics		X
Photonic computing		X
Quantum computing		X
Quantum cryptography		X
Wireless communication	X	
Screenless display		X
3D Display	X	
Organic light emitting diode	X	
Interferometric modulator display	X	
Laser display	X	
Phased array optics	X	
Holography		X
Memristor processors		X
3D printing		X
Thermal copper pillar bump	X	
Immersive virtual reality		X
HUMANOID TECHNOLOGY		
Genetic engineering	X	
Synthetic biology	X	
Artificial photosynthesis		X
Anti-aging drugs		X
Cryoprotectant		X
Hibernation		
Stem-cell treatments		
Personalized medicine		X
Body implants		X
In vitro meat		X
Regenerative medicine		X
ROBOTICS		
Swarm robotics	X	
Nanorobotics	X	
Powered Exoskeleton		x

TABLE 8: EMERGING MARITIME TECHNOLOGIES **CONTINUED**

	RELEVANT SHORT TERM	RELEVANT LONG TERM
Hi MEMS	X	
MATERIAL SCIENCE		
High temp superconductivity	X	
High temp superfluidity		X
Carbon nanotubes	X	
Metamaterials		X
Self-healing materials		X
Programmable matter		X
Quantum dots		X
OTHER TECHNOLOGIES		
Led lamp	X	
Force field		X

Relevance to Maritime Power Balance

Implications

Nuclear fusion/nano-wire battery/wireless energy transfer: Expeditionary maritime power will no longer be the prerogative of great powers that have maritime facilities in the region at their disposal, as the seemingly unlimited supply of energy drastically enhances the staying power of naval forces. This may upset the maritime balance of power and open the entire Indian Ocean arena to both great and small powers.

Non-rocket space launch: Situational awareness (SA) is indispensable in the conduct of contemporary and future conflict. The opening of space to state and non-state actors will provide each of these actors with unprecedented SA, thereby changing the nature of conflict.

Genetic engineering/Synthetic biology/Programmable matter/Hi MEMS: Gigantic sea-animals (e.g., octopuses) could be re-engineered, remotely controlled, and used as agents of war (e.g., through blockades of ports) or for underwater detection.

Electric cars, Personal rapid transit, and wireless energy transfer: This could mark the end of the carbon-fuel era, thereby decreasing reliance on SLOCs and possibly counterbalancing it with increased dependence on rare earth metals and elements.

Phased array optics: If used in a laser-based kinetic-power application, phased array optics would allow for the swift (real-time) disruptive application of potentially irresistible force, thus rendering old (industrial era) military (kinetic) technology immediately obsolete.

Nano-robotics, Swarm robotics: This would partly mark the end of the human (f)actor in maritime combat operations while potentially leading to tremendous decreases in the costs of deploying maritime power. Strategic doctrines will need to be reconsidered in light of the robotic revolution.

Force field, Meta-materials: This category refers to invisible and, in some cases, undetectable instruments that introduce new and currently non-existing forms of maritime dominance (both in sea control and sea denial).

Quantum Computing, Spintronics, Super-conductivity, Quantum dots:

Quantum leaps in computing power and target-motion analysis would provide a boost to maritime defense systems while providing similar enhancements for offensive systems.

5.8 Appendix H – Definitions and Scaling of Parameters

1. Civilian Use of SLOCs

This parameter analyzes the extent to which vessels will use seaborne trade routes (known as SLOCs) for civilian purposes in the future. Foresights that predict a decrease in the civilian use of SLOCs are coded as (1); those that foresee no change in use of SLOCs are coded as (2), and foresights that predict an increase in the civilian use of SLOCs are coded as (3).

Civilian Use of SLOCs:

- 1 – Decrease
- 2 – Stable
- 3 – Increase

2. Strategic Importance of SLOCs

This parameter analyzes the extent to which commercial transportation of goods will become more dependent on SLOCs (including the strategic choke points) in the Indian Ocean. Foresights that predict a decrease in the strategic importance of the SLOCs are coded as (1); those that see no change in strategic importance are coded as (2), and foresights projecting an increase in the strategic importance of SLOCs are coded as (3).

Strategic Use of SLOCs:

- 1 – Decrease
- 2 – Stable
- 3 – Increase

3. Vulnerability of SLOCs

This parameter analyzes the extent to which vessels will be susceptible to external dangers as they navigate through the SLOCs. Foresights that predict a decrease in the vulnerability of SLOCs are coded as (1); those that see no change in the current situation are coded as (2), and foresights that predict an increase in the vulnerability of the SLOCs are coded as (3).

Vulnerability of the SLOCs:

- 1 – Decrease
- 2 – Stable
- 3 – Increase

4. Activity of Violent Non-State Actors

This parameter analyzes the extent to which the Indian Ocean will be prone to violent activity (e.g., piracy, maritime terrorism and other criminal behavior) from non-state actors. Foresights that predict a decrease in the activity of violent non-state actors are coded as (1); those projecting no change in the current situation are coded as (2), and foresights that expect an increase of the activity of violent non-state actors are coded as (3).

Activity of Violent Non-State Actors:

- 1 – Decrease
- 2 – Stable
- 3 – Increase

5. Maritime Power Distribution

This parameter analyzes the future distribution of political and military power in the Indian Ocean. Foresights that predict the continued US domination of the seas are coded as (1); those that project a bipolar or tripolar power distribution involving China and India in addition to the dominance of the US are coded as (2), and foresights predicting that multiple actors will project their political and military power in the Indian Ocean are coded as (3).

Diffusion of Maritime Power:

- 1 – Decrease: Unipolar
- 2 – Stable: Bipolar or Tripolar
 - 2.1 – US versus China
 - 2.2 – US versus India
 - 2.3 – China versus India
 - 2.4 – US, China, and India
- 3 – Increase: Multipolar

6. Nature of Maritime Build-up

This parameter analyzes the probability of maritime build-up in the Indian Ocean. Foresights that predict a decrease in maritime presence are coded as (1); those that predict a continuation of the status quo are coded as (2), and foresights that predict a maritime build-up in the Indian Ocean are coded as (3). The three coding options are further specified into ships, ports and bases, and technology.

Nature of Maritime Build-up:

- 1 – Decrease
 - Ships
 - Ports and Bases
 - Technology
- 2 – Stable
 - 2.1 – Ships
 - 2.2 – Ports and Bases
 - 2.3 – Technology
- 3 – Increase
 - 3.1 – Ships
 - 3.2 – Ports and Bases
 - 3.3 – Technology

7. Maritime Relations

This parameter analyzes the extent to which the foresight community predicts the presence of international rivalry in the realm of maritime relations in the Indian Ocean. Foresights that predict decreasing rivalry and increasing cooperation are coded as (1); those that projecting a stable level of rivalry in the future are coded as (2) and foresights that predict increasing rivalry in the Indian Ocean are coded as (3). The three coding options were further subdivided into the specific relations that are mentioned in the literature. For the sake of presentation, the parameter has been subdivided into confrontation and peaceful extremes in the text.

Maritime Rivalry:

- 1 – Decrease
 - 1.1 – China and India
 - 1.2 – US and China
 - 1.3 – US and India
 - 1.4 – US, China, and India
 - 1.5 – Indian Ocean Region
- 2 – Stable
 - 2.1 – China and India
 - 2.2 – US and China
 - 2.3 – US and India
 - 2.4 – US, China, and India
 - 2.5 – Indian Ocean Region

3 – Increase

3.1 – China and India

3.2 – US and China

3.3 – US and India

3.4 – US, China, and India

3.4 – Indian Ocean Region

5.9 Appendix I – Definitions and Scaling of Drivers

1. Asian Economic Growth

This driver analyzes the extent to which South and East Asian economies are expected to expand in the future. Foresights that predict low economic growth for Asian countries are coded as (1); those that predict medium economic growth are coded as (2), and foresights predict that Asian economies will become the largest world economies in the future are coded as (3).

Asian Economic Growth:

- 1 – Low
- 2 – Medium
- 3 – High

2. Energy Dependency

This driver analyzes the extent to which Asian economies will remain dependent on the import of fossil fuels from the Middle East, the world's major energy-supplying region. Foresights that project less dependency on energy supply from the Middle East are coded as (1); those that predict no change in the current situation are coded as (2), and predicting that Asian countries will become even more dependent on Middle Eastern imported fossil fuels are coded as (3).

Energy Dependency:

- 1 – Low
- 2 – Medium
- 3 – High

3. Economic Interdependency

This driver analyzes the extent to which Asian states will become economically interdependent for their growth and for the supply of essential goods and services, on the regional and global level. Foresights predicting that Asian countries will become less interdependent on each other are coded as (1); those that see no change in interdependency are coded as (2), and foresights that project increasing interdependency between Asian countries are coded as (3).

Economic Interdependency:

- 1 – Low
- 2 – Medium
- 3 – High

4. Maritime Ambitions of Emerging Powers

This driver analyzes the extent to which emerging powers (e.g., China and India) aspire to become major providers of maritime security in the Indian Ocean.

Foresights that predict no (or very modest) ambitions among Asian states to become maritime powers are coded as (1); those that see distinct ambitions on the part of these states are coded as (2), and foresights that describe clear ambitions on the part of these states coupled with concrete maritime power strategies are coded as (3).

Maritime Ambitions Emerging Powers:

- 1 – Low
- 2 – Medium
- 3 – High

5. Maritime Ambitions of the US

This driver analyzes the extent to which the US continues to have the ambition to project power in the waters of the Indian Ocean. Foresights predicting that the US will reduce its influence in the Indian Ocean hemisphere are coded with (1); those predicting that the US will aspire to stay in the Indian Ocean while cooperating with regional powers are coded as (2), and those predicting that the US will aspire to remain the hegemonic power in the Indian Ocean are coded as (3).

Maritime Ambitions US:

- 1 – Low
- 2 – Medium
- 3 – High

6. External Sources of Interstate Friction

This driver analyzes the extent to which disputes between littoral states that are not directly related to the Indian Ocean will continue to exist in the future. Foresights that predict a decrease in disputes between Indian Ocean littoral states are coded as (1); those that see no change in the probability of disputes are coded as (2), and foresights that project an increase in the external causes of interstate friction are coded as (3).

External Sources of Interstate Friction:

- 1 – Low
- 2 – Medium
- 3 – Stable

7. Cooperation on Non-Maritime Issues

This driver analyzes the extent to which Asian states will engage in international cooperation on non-maritime issues (e.g., economic and security affairs).

Foresights that predict a decrease in matters of cooperation between states are coded as (1); those that expect cooperation to remain at current levels are coded as (2), and foresights predicting an increase in cooperative behavior between Asian states are coded as (3).

Cooperation on Non-Maritime Issues:

- 1 – Low
- 2 – Medium
- 3 – High

8. Instability of the Indian Ocean Littoral

This driver analyzes the extent to which the lack of good governance in Indian Ocean littoral states will affect the political stability of these states. Foresights predicting that instability in the Indian Ocean littoral will decrease are coded as (1); those that see no change in the current situation are coded as (2), and foresights that predict increasing instability in the Indian Ocean littoral states are coded as (3).

Instability of the Indian Ocean Littoral:

- 1 – Low
- 2 – Medium
- 3 – High

5.10 Appendix J – Relationships

		WHAT IS DIRECTLY AFFECTED BY...							
		PARAMETERS							
		Civil Use of SLOCs	Strategic Importance of SLOCs	Vulnerability of SLOCs	Activity of Violent Non-State Actors	Nature of the Maritime Build-up	Maritime Relations	Maritime Power Distribution	
WHAT DIRECTLY DETERMINES...	PARAMETERS	Civil Use of SLOCs		2		1	1		
		Strategic Importance of SLOCs				11	3 3	1	
		Vulnerability of SLOCs				9	3 3		
		Activity of Violent Non-State Actors		12		8	9	1	
		Nature of the Maritime Build-up		2 1		8	15 2	4	
		Maritime Relations	1	2		7		1	
		Maritime Power Distribution				1			
	DRIVERS	Asian Economic Growth	1	2	1		5 2	3 1	2
		Economic Interdependency	1	7			5	3	
		Energy Dependency	6	16	1		23 2	9 4	1
		Maritime Ambitions Emerging Powers					7	10 3	1
		Maritime Ambitions United States					3	1 3	1 1
		External Sources of Interstate Friction		1	2 1	1	3	3 1	1
		Cooperation on Non-Maritime Issues					3	4 3	1 1
		Instability of the Indian Ocean Littoral			3	4		2	1

TABLE 9: RELATIONSHIPS (POSITIVE AND NEGATIVE) BETWEEN PARAMETERS AND DRIVERS

Blue = parameters

Yellow = implications

Numbers = number of times relationship addressed in foresight studies

Numbers in green = positive relationship between driver and parameters/implications

Numbers in red = negative relationship between driver and parameters/implications

		WHAT IS DIRECTLY AFFECTED BY...						
		IMPLICATIONS						
		Growing Strategic Importance of the IO	Changes in the Balance of Power	(Risk of) Violent Conflict	Changing Nature of Warfare	Economic Disruption	Insecurity of SLOCs	Rerouting of Supply Lines
WHAT DIRECTLY DETERMINES...	PARAMETERS	Civil Use of SLOCs	1					
		Strategic Importance of SLOCs						
		Vulnerability of SLOCs		1				2
		Activity of Violent Non-State Actors				4	3	
		Nature of the Maritime Build-Up	3	4 2		1		
		Maritime Relations	2	6		2		
		Maritime Power Distribution	3					
	DRIVERS	Asian Economic Growth	1	2				
		Economic Interdependency						
		Energy Dependency	3	2				2
		Maritime Ambitions Emerging Powers						
		Maritime Ambitions United States						
		External Sources of Interstate Friction				2		
		Cooperation on Non-Maritime Issues						
		Instability of the Indian Ocean Littoral						

TABLE 9: RELATIONSHIPS (POSITIVE AND NEGATIVE) BETWEEN PARAMETERS AND DRIVERS
CONTINUED

5.11 Appendix K – List of Foresights in Sample

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5.12 Appendix L – Endnotes

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