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Mapping the Indian Ocean Region

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Introduction

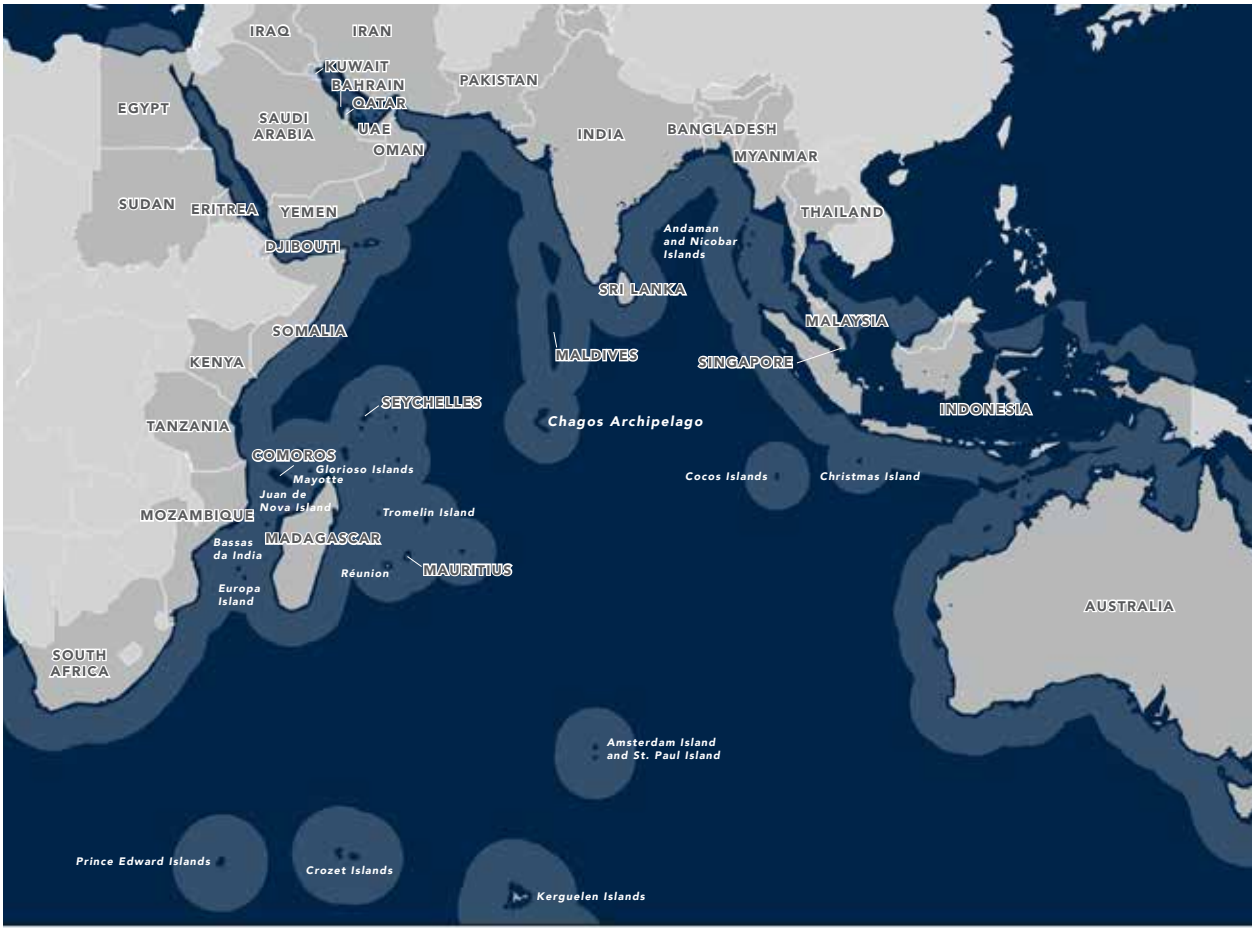
The Indian Ocean region has been an important trade arena for centuries. Today, it remains critical to the security and stability of shipping lanes and trade routes, accounting for over one-third of the world's bulk cargo traffic and two-thirds of the world's oil shipments and ensuring global access to food, precious metals, and energy resources.[1] Stretching from Africa's eastern coast to Australia's western coast, the region is home to thirty-three nations and 2.9 billion people. Given the region's importance, many countries around the world work with regional partners to maintain open access to the Indian Ocean's critical waterways and natural resources.

For decades, the Indian Ocean region has been erroneously studied through the continental divisions of Africa, the Middle East, and South Asia. But to understand the true importance and strategic advantages of the region, it must be viewed as one continuous theater.

The Carnegie Endowment for International Peace's Indian Ocean Strategic Map does just that.[2] Developed by Carnegie's Indian Ocean Initiative, the map provides a coherent, continuous, and data-driven understanding of the players, security challenges, and other factors that shape the region (see figure 1). The first of its kind, it shows how the Indian Ocean's economic, political, military, and geographic features interact to create a single geopolitical arena.

This paper complements the map, further analyzing the areas of interest and contextualizing them within the current geopolitical environment. The first section summarizes the key players, both traditional and emerging, in the region. The second section examines the evolving security situation, including sovereignty disputes, climate impacts, illegal fishing, search and rescue zones, and choke points. The third section reviews the region's economics,

Figure 1. A Preview of Carnegie's Indian Ocean Strategic Map



trade patterns, and oil flows. The fourth section assesses how regional organizations and multilateral partnerships enforce maritime laws and craft protocols.

The Key Players in the Indian Ocean Region

This section examines the traditional and emerging players in the Indian Ocean region, particularly their military, diplomatic, and economic engagements. It unpacks how these players impact the region's geopolitical environment and maritime security.

The traditional players are categorized based on their historical presence in the Indian Ocean and their role in Indo-Pacific geopolitics today. While China is often considered the top emerging player, this paper also identifies Saudi Arabia, the United Arab Emirates (UAE), Türkiye, and Russia as emerging players.

Because this phase of the Indian Ocean Strategic Map focuses on geopolitics, this section does the same. As future phases of the map focus on different issues, such as fishing and climate change, the list of players will change.

Traditional Players

India, the United States, France, Australia, the United Kingdom, and Japan have a long history of diplomatic, economic, development, and military engagement throughout the Indian Ocean, but their individual interests and influence vary.

India

As the resident naval power in the Indian Ocean, India plays a significant role. With over 7,500 kilometers of coastline, 14,500 kilometers of navigable waterways, and 212 active ports (12 government owned and 200 immediate and minor ports), India relies heavily on the Indian Ocean for commercial and noncommercial shipping, energy importation, trade, tourism, and fishing.[3] The Indian Navy identifies the entire Indian Ocean—from the eastern coast of Africa to the Andaman Sea—as its area of priority, underpinning its role as a first responder as well as a net provider of security for its friends and partners in the region.

India's increased maritime posture and strategic investment throughout the Indian Ocean over the past two decades underlines New Delhi's contemporary strategic approach to the maritime domain and the role it plays in India's foreign policy engagements. India has a strong partnership with littoral nations and island nations across the region. For example, in 2021, India extended a $100-million line of credit to Mauritius for security and military spending.[4] India is a major economic player in the Indian Ocean. It exports to eighteen of the thirty-three countries in the region and imports from several other countries, including Australia, Saudi Arabia, and the UAE.[5]

India continues to expand its military partnership with its maritime neighbors. For example, it signed a $50-million deal with Maldives in 2021 to support the country's coast guard development and other security infrastructure projects.[6] Additionally, in 2022, Sri Lanka and India signed a memorandum of understanding to establish a Maritime Rescue Coordination Center, an agreement that derived from India's Security and Growth for All in the Region (SAGAR) initiative.[7]

United States

The United States' presence in the Indian Ocean developed more permanently after World War II and was strengthened through the Cold War period. Today, the Indian Ocean is an important component of Washington's Indo-Pacific strategy (although this strategy excludes the western Indian Ocean).[8]

Figure 2. U.S. Arms Transfers to the Indian Ocean Region

The U.S. Navy's Fifth Fleet is headquartered with the U.S. Naval Forces Central Command in Bahrain and routinely participates in joint military exercises. The United States also maintains a military presence through its base on Diego Garcia island. Its strongest naval partnership in the wider Indian Ocean is perhaps with India. According to the U.S. Department of Defense, military cooperation between the two partners reached an "all-time high" in 2022.[9] The U.S. and Indian militaries perform joint military exercises, share information and intelligence, and participate together in military training and educational programming. The United States is the top arms supplier for the Indian Ocean region (see figure 2). In particular, it is the number one supplier for Australia, Bahrain, Djibouti, Indonesia, Iraq, Kenya, Kuwait, Oman, Qatar, and Saudi Arabia and is among the top suppliers for several other countries.[10]

In recent years, the United States has taken some steps to strengthen its interactions and engagements with littoral and island nations, including opening an embassy in Maldives. In addition to its participation as a member of the Quadrilateral Security Dialogue (Quad) with Australia, India, and Japan, it aims to provide an economic framework for the region through the Indo-Pacific Economic Framework for Prosperity (IPEF). The United States also has treaty alliances in the region with Australia and Thailand.[11]

France

France has a history in the Indian Ocean region dating back to the seventeenth century. Today, Mayotte, an island between Madagascar and Mozambique, remains a French overseas department, along with Réunion.[12] Of all the traditional players in the region, France has the most diplomatic missions, including missions and embassies in Comoros, Madagascar, Mauritius, Seychelles, and Sri Lanka. The region is home to 1.6 million French citizens.

The French Armed Forces have military bases on Réunion and Mayotte to safeguard French territories and provide regional humanitarian assistance. France and India have shared a strategic and maritime partnership since the early 1980s, when they conducted their first joint naval exercises. In January 2023, the countries conducted their annual joint military air-sea exercise, VARUNA, which has become an important platform for the countries' navies to conduct complex exercises in the western Indian Ocean. France is also among the top arms suppliers for Egypt, India, Indonesia, Iraq, Myanmar, Saudi Arabia, and Tanzania.

Surpassed only by the United States, France has the second-largest exclusive economic zone (EEZ) in the world. Through its overseas department of Réunion, France serves as a functioning member of the Indian Ocean Commission and the Indian Ocean Rim Association.[13]

Australia

Australia is one of the few countries with a coast on each side of the Indian and the Pacific Oceans, making it a key player in the Indo-Pacific. With the region's longest coastline and biggest search and rescue zone, Australia has used its dominant presence to establish and strengthen regional policies related to illegal fishing, climate change, transnational crime, and terrorism.[14]

Canberra has been particularly engaged in the eastern Indian Ocean, including the Bay of Bengal. With a development budget of $14.3 million allotted for South and West Asia in 2023–2024, Australia's Department of Foreign Affairs and Trade has provided humanitarian support, healthcare funding, and economic recovery assistance to countries including Bangladesh, Maldives, and Sri Lanka.[15] Australia has also invested heavily in the Northeastern Indian Ocean, announcing in 2022 that it will provide $36.5 million over five years toward maritime and disaster preparedness, trade, and improving regional cooperation.[16]

Shared security interests have led to a deepening of ties between Australia and India. In 2020, the nations announced an elevation of their relationship to a Comprehensive Strategic Partnership, with the goals of improving information and technology sharing, increasing maritime domain awareness, and broadening defense cooperation.[17] Two years later, the countries further cemented the partnership by signing the Economic Cooperation and Trade Agreement.

In addition, the AUKUS agreement, announced in 2021 by Australia, the United Kingdom, and the United States, reaffirms Australia's commitment to ensuring a free and open Indo-Pacific, directs resources toward expanding Australia's naval posture in the region, and supports the country's military presence in the Indo-Pacific, including in the eastern Indian Ocean.[18]

United Kingdom

The Indian Ocean was sometimes referred to as the "British lake" before 1945 due to the British empire's presence and influence there. The United Kingdom's presence decreased significantly after it withdrew its military forces from the region, east of Suez, in the early 1970s. But today it still maintains strong diplomatic and political ties with many islands and littoral nations. With its Indo-Pacific outreach, the United Kingdom is engaged in several maritime security issues and is exploring ways to increase its engagements.

The United Kingdom has a small but consistent military presence, including in Bahrain, Oman, and Djibouti in the western Indian Ocean and Singapore in the east. Its perhaps most well-known presence in the region is through the British Indian Ocean Territory, which was established on the Chagos Archipelago as an overseas territory of the United Kingdom in 1965. With a land area of 60 square kilometers, the Chagos Archipelago's approximately sixty islands span 640,000 square kilometers of the Indian Ocean's waters. As reflected in the disputes layer of the Indian Ocean Strategic Map, the archipelago is home to Diego Garcia, a joint naval facility between the United Kingdom and the United States. The Royal Navy also participates in joint military exercises across the region. In March 2023, the Royal Navy ship HMS *Tamar* joined a French-led effort in the Bay of Bengal alongside Australia, Canada, Japan, India, and the United States.[19]

Japan

The Indian Ocean is home to key resources, particularly energy, for Japan. With a majority of Japan's trade being seaborne and nearly half being carried through the Indian Ocean, the security of trade routes is critically important to the country. Around 78 percent of Japan's crude oil imports come from the Middle East and transit through the Indian Ocean.[20]

Japan has historically been one of the region's and the world's largest foreign direct investment donor countries, and it is currently the single-largest regional donor in Asia.[21] Its development assistance programs emphasize the promotion of human security, healthcare, infrastructure, and economic growth through bilateral agreements.[22] In March 2023, following devastating floods and landslides in Mozambique that displaced more than 170,000 people and impacted 700,000 people, Japan provided disaster relief goods and donated $1.5 million to provide emergency food and nutrition assistance.[23] The Japan International Cooperation Agency also provides funding and support for infrastructure development to states throughout the Indo-Pacific. Additionally, Japan jointly hosts the Tokyo International

Development Conference on African Development with the United Nations, the UN Development Programme, the World Bank, and the African Commission. The most recent conference, in 2022, brought together forty-eight African countries and twenty heads of state to promote African development, support peace and security, and strengthen multilateral partnerships.[24]

Japan maintains a military presence in the Indian Ocean through its military base in Djibouti, established in 2011. Japan has deployed its Maritime Self-Defense Force to assist in anti-piracy operations in the Horn of Africa since 2008. As a member of the Quad, Japan is positioned to further expand its regional engagements.

Emerging Players

China, the UAE, Saudi Arabia, Türkiye, and Russia have increasingly invested and partnered with states in the Indian Ocean. They are the key emerging players in the region.

China

China's investments and engagement with the region have been consistent and have increased substantially in the last decade. With nearly 80 percent of China's imported crude oil supply passing through the Indian Ocean and the Strait of Malacca, energy security is an important motivator for China's presence.[25] While China has increased crude oil imports from Russia, it still depends on energy imports from Saudi Arabia, Iraq, Oman, and Angola.[26]

China is the top import partner for twenty-four countries in the Indian Ocean and the top export partner for thirteen countries.[27] Its investments and development projects have further deepened its partnerships. Thirty-nine African countries, twenty-five East Asian, seventeen North African, and six South Asian countries are part of China's Belt and Road Initiative.[28] In particular, in recent years, it has deepened military, economic, and diplomatic ties with Bangladesh, Maldives, and Sri Lanka. In addition, of all the key players, China has the most diplomatic missions in the region.

China's military presence in the region has matched its economic engagements and increased steadily. In addition to maintaining a military facility in Djibouti, the People's Liberation Army routinely participates in joint military exercises with its partners. In early 2023, China held exercises with Russia and South Africa spanning South Africa's coast from Durban to Richards Bay. The PLA Navy has been deployed to the Horn of Africa to support anti-piracy missions and conducts military exercises and training with several nations in the western Indian Ocean and the Persian Gulf. China sells arms to Egypt, Indonesia, Myanmar, Pakistan, Somalia, Tanzania, and Thailand. China is the top arms supplier for Egypt and Pakistan and is among the top suppliers for Indonesia, Myanmar, Somalia, Tanzania, and Thailand.

UAE

The UAE has developed strategic partnerships on every coast of the Indian Ocean. As one of the key players from the Middle East, the UAE is an equally important economic partner for many nations on the East African coast. It also provides development assistance to many island states. The UAE's economic influence has increased consistently; it is a major export partner for eleven countries and a major import partner for twenty countries in the region.[29] As one of the world's top ten oil producers, the UAE maintains several friendly, mutually beneficial relationships. Thirty percent of the UAE's gross domestic product (GDP) is directly tied to its export of oil and gas, a majority of which passes through the Indian Ocean.[30]

In 2022, the UAE signed a memorandum of understanding with Seychelles aimed at aiding the development of Seychelles' governance infrastructure and building out institutional capacities.[31] Of the UAE's $3.08 billion foreign aid budget in 2021, 64 percent went to countries in Asia and 20 percent went to countries in Africa, with the majority of both regional budgets providing development aid.[32]

Although the UAE does not have any military bases outside of its borders, Australia, France, the United Kingdom, and the United States all have a military presence within the UAE. In 2021, reports indicated that China was in negotiations, which are now paused, over establishing a new military facility in the country.[33] The UAE has participated in bilateral military exercises with Bahrain, India, Israel, Jordan, Oman, and the United States. The UAE is also among the top arms suppliers for Madagascar, Malaysia, and Yemen, and it receives arms from South Africa.[34]

Türkiye

Türkiye has steadily increased its economic and diplomatic presence throughout the Indian Ocean region.[35] Türkiye's growing presence can be underlined by its Asia Anew Initiative, which "prioritizes trade and economic cooperation" in the region.[36] Announced in 2019, the initiative aims to help provide regional frameworks focusing on technological advancement, defense modernization, infrastructure development, economic investment, and cultural exchanges.[37]

In early 2023, Türkiye announced plans to launch its first aircraft carrier, indicating its naval vision and ambitions.[38] Türkiye has also increased its arms sales to countries across the region. More specifically, it is among the top arms suppliers for Bangladesh, Qatar, Somalia, and the UAE. It has also imported arms from Pakistan.[39]

Saudi Arabia

Saudi Arabia's economic growth, supported by recent pro-business reforms, has contributed to its rise as a player in the Indian Ocean.[40] Its main exports are hydrocarbons, chemicals, plastics, and materials for manufacturing. With an economy heavily backed by energy trade, Saudi Arabia has made access to shipping lanes and strong partnerships throughout the Indian Ocean a national priority. Saudi Arabia is a major import partner for nine countries, including India and South Africa, and a major export partner for six countries, including Egypt, Oman, and Sudan.[41]

Saudi Arabia's aid development efforts have been concentrated throughout the Middle East coast, with it regularly partnering with Bahrain, Iraq, and Yemen.[42] In 2022, in partnership with UNICEF, Saudi Arabia pledged $7 million to support educational programs in Yemen.[43] In March 2023, it announced an anticipated investment of $800 million to support developments throughout Asia and Africa.[44]

Russia

Although Russia is not considered a dominant player in the Indian Ocean, its efforts to acquire bases and strategic partners throughout the region dates to the Soviet era, when the USSR established bases in the Horn of Africa and the Red Sea.[45] Prior to the Russian invasion of Ukraine in 2022, Russia's presence was supported through bilateral naval exercises with nations such as Iran and Pakistan. Russia, China, and Iran conduct joint naval drills annually; the 2023 edition of the trilateral exercises, called Security Bond, in the Gulf of Oman saw participation from Oman, Pakistan, and the UAE.[46] Russia also has annual bilateral exercises, known as INDRA, with India. In addition, Russia has a considerable diplomatic presence across the Indian Ocean region.

Russia's recent security assistance in the region has focused on Myanmar and Sudan. Russia has provided arms to Sudan, and Sudanese troops are trained by the Wagner Group, a Russian paramilitary organization.[47] Similarly, Russia has provided Myanmar with fighter jets, helicopters, and antiaircraft systems. In 2021, Sudan and Russia began negotiations to build a Russian naval base along Sudan's coast; however, recent instability in Sudan has left the country without a parliament to ratify the deal.[48] In addition to those two countries, Russia is also among the top suppliers of arms to India, Mozambique, Pakistan, and the UAE.[49]

Littoral Nations, Island Nations, and Island Territories

The twenty-three additional littoral countries in the Indian Ocean region are Bangladesh, Bahrain, Djibouti, Egypt, Eritrea, Indonesia, Iran, Iraq, Kenya, Kuwait, Myanmar, Mozambique, Malaysia, Oman, Pakistan, Qatar, Sudan, Singapore, Somalia, South Africa, Thailand, Tanzania, and Yemen. The six island nations are Comoros, Madagascar, Maldives, Mauritius, Seychelles, and Sri Lanka.

There are also sixteen island territories. France administers ten territories—Amsterdam Island and St. Paul Island, Crozet Islands, Kerguelen Islands, Réunion, Mayotte, Europa Island, Bassas da India, Juan de Nova Island, Glorioso Islands, and Tromelin Island—the most territories administered by a single nation across the Indian Ocean region. Australia administers three territories: Cocos Islands and Christmas Island in the northeastern Indian Ocean and the Heard Island and McDonald Islands in the southern Indian Ocean. Andaman and Nicobar Islands in the Bay of Bengal is administered by India. South Africa oversees the Prince Edward Islands, just south of the country's coast. Despite the International Court of Justice's 2019 advisory opinion, which granted the Chagos Archipelago back to Mauritius, the archipelago remains administered by the United Kingdom as the British Indian Ocean Territory.[50]

Maritime Security

Maritime security is a broadly defined concept that encompasses national security, the marine environment, economic development, and human security.[51] However, the definition of maritime security varies from country to country depending on the nation's governing bureaucracy and its individual security priorities.

For islands in the Indian Ocean, sovereignty, the blue economy, and climate change are at the top of the maritime security agenda.[52] For littoral nations, great power competition, access to commerce, and protection of sea lines of communication (SLOCs) take priority.

Although island states have historically been at the periphery of conversations about the Indo-Pacific, they are geographically and politically at the center of these conversations.[53] For this reason, this section gives equal importance to the interests of island nations and littoral states.

Sovereignty Disputes

There are fourteen ongoing sovereignty disputes in the Indian Ocean, demonstrating the tension between the priorities of island states and great powers (see figure 3). Great powers seek to retain their jurisdiction over islands to maintain their presence and influence across the vast ocean. Many of these disputes are remnants of boundary issues emerging from decolonization.

Well-known among these disputes is the case of Diego Garcia in the Chagos Archipelago, which detached from Mauritius at the time of its independence. In 2017, Mauritius approached the UN General Assembly to request an advisory opinion from the International Court of Justice on the legality of the British government's detachment of the Chagos

Figure 3. Sovereignty Disputes in the Indian Ocean Region

Archipelago during the decolonization of Mauritius. In February 2019, the International Court of Justice ruled that the decolonization process had been illegal and recommended that the United Kingdom end its administration of the Chagos Archipelago as the British Indian Ocean Territory and allow the return of Chagossian people. Although the opinion carried significant moral weight, it was nonbinding. Today, the United Kingdom retains control over the Chagos Archipelago; it shares its military facility at Diego Garcia with the United States and is negotiating with Mauritius on the future of the facility.

France has several territorial disputes in the western Indian Ocean with Comoros and Madagascar. It has expressed interest in exploring the possibility of comanaging disputed islands and their surrounding waters with Madagascar, while its dispute with Comoros remains a challenge in the bilateral relationship. Despite its record in the South China Sea, China has no territorial disputes in the Indian Ocean.

Exclusive Economic Zones

Small islands call themselves "big ocean states" because they are custodians of territories that have more maritime than land area.[54] For example, Maldives has a total land area of 300 square kilometers and a maritime exclusive economic zone (EEZ) that is over 900,000 square kilometers. In other words, Maldives has an EEZ comparable to the land area of Venezuela.

As a result of their large EEZs and small populations, island nations face significant capacity constraints in managing and protecting their maritime areas, and they increasingly need information, resources, and capacity assistance to do so. In 2022, the Indian Ocean Rim Association (IORA) noted that while several member states have invested and prioritized Marine Spatial Planning, "they do not possess the requisite tools for its development" and lack technical human resource capacity.

Table 1 and table 2 list the ten countries with the largest EEZs in the Indian Ocean. Notably, five of the six island nations in the Indian Ocean rank among the largest for the size of their maritime spaces. When ranked by the ratio of their EEZs to their land area, all six of the island nations come out on top. Altogether, the island nations claim over one-fifth of the region's EEZs. For these nations, ocean priorities will lead their national agendas; sustainable management of EEZs is directly linked to their economies, growth, and development.

Table 1. Countries With the Largest Exclusive Economic Zones in the Indian Ocean

Country	EEZ (in square kilometers)
Australia	6,369,268
India	1,629,607
Indonesia	1,410,200
Seychelles	1,331,964
Mauritius	1,272,765
Madagascar	1,200,330
Maldives	916,011
Somalia	831,059
South Africa	691,344
Mozambique	571,452
Sri Lanka	530,945

Sources: International Mapping and Sovereign Limits Database.

Table 2. Countries With the Largest EEZ-to-Land-Area Ratios in the Indian Ocean

Country	Ratio of EEZ to land area (in square kilometers)
Maldives	3,053:1
Seychelles	2,896:1
Mauritius	627:1
Comoros	88:1
Sri Lanka	9:1
Bahrain	4:1
Madagascar	2:1
Qatar	1.7:1
Oman	1.7:1
Somalia	1.3:1
Singapore	0.95:1

Sources: International Mapping, Sovereign Limits Database, and Our World in Data.

The Blue Economy

Over the past decade, the concept of the "blue economy" has gained significant international attention. Blue economy is a term formulated by small island states based on the United Nations' term "green economy." The blue economy advocates the same desired outcomes as the green economy—improved human well-being, social equity, and environmental sustainability—but is better adapted to the unique geographies of island states.[55] The blue economy

encompasses the development of an ocean-based economy, including fishing, shipping, maritime transport, coastal tourism, marine energy, sea-based products, and more. According to the United Nations, "The concept of the blue economy offers [small island developing states (SIDS)] the prospect of sustainable and environmentally sound and moreover socially inclusive economy growth."[56] Although the concept of the blue economy is championed by island states, its significance and relevance has grown for all nations with large maritime zones.

Like islands, littoral states are also stakeholders and participants in the Indian Ocean's blue economy. The importance of the ocean to the people across the region cannot be overstated. Over a quarter of the population, some 60 million people, lives within 100 kilometers of a shoreline, and cultures based on fishing, maritime trade, and marine resources go back hundreds of years.

The western Indian Ocean's annual gross marine product—defined by the World Wildlife Fund as "the annual economic output of all sectors related to the sea"—is estimated at over $20.8 billion.[57] Coastal and marine tourism make up about 70 percent, the largest economic contribution. The other major part of the Indian Ocean's blue economy comes from fisheries. According to the UN Food and Agriculture Organization (FAO), marine capture fisheries in the Indian Ocean supplied about 15 percent of world fish catch in 2020.[58] That year, India, Bangladesh, Myanmar, Indonesia, Tanzania, Egypt, Iran, Kenya, and Mozambique were among the world's top twenty-five fish producers.[59] The Indian Ocean fishing industry has a multiplicative effect on economic activity. For example, fishing and fish farming in Indonesia employ almost 6 million people, more than its textile and apparel industry.[60] And the FAO estimates that for every person directly employed in fishing, another three to four people are employed in jobs related to boat construction, gear maintenance, and fish processing. Fishing is also a crucial food source. On average, people in Egypt, Malaysia, Mozambique, Seychelles, Singapore, Tanzania, and Thailand obtain 20 percent or more of their meat from fish. For Bangladesh, Comoros, Indonesia, Maldives, and Sri Lanka, this number rises to over 50 percent.[61]

Over the past few years, deep-sea mining has been added as a priority for the blue economy. The Indian Ocean is home to hydrothermal vents with mineral deposits containing copper, cobalt, nickel, zinc, gold, and rare earth elements. Scientists estimate that the Indian Ocean nodule field—an area of the ocean floor that contains fragments of minerals, rocks, or biological materials—covers 300,000 square kilometers with 1.4 billion tons of nodules valued at over $8 trillion.[62] In 2022, the IORA and the UN International Seabed Authority (ISA) signed a memorandum of understanding to collaborate on the sustainable development of seabed mining in the region.[63] Although many countries lack the capacity to explore and mine seabed minerals, India is one of the few nations that has pursued ocean mining initiatives. In 2021, the Indian government approved the Deep Ocean Mission, a national effort to develop deep-sea technologies for the exploration and sustainable use of ocean resources. China, Germany, and South Korea have also received contracts to pursue seabed mining in the Indian Ocean. Overall, the blue economy is not just a component but a dominant part of island and littoral nations' economies.

Climate Security

The Indian Ocean's environment and climate impact the blue economy, migration, shipping, and geopolitics. Over the past few decades, climate change has contributed to more extreme tropical storms, floods, droughts, and heat waves, among other impacts.

A 2021 report by the Intergovernmental Panel on Climate Change said that since the 1950s the Indian Ocean has warmed faster than any other waters.[64] These warmer temperatures, along with other climate impacts, are predicted to induce declines in fish catches across the ocean, hurting nations that have a high dependency on fisheries and lack the ability to adapt to climate shocks.[65] This includes India, Indonesia, Madagascar, Mozambique, Pakistan, Sri Lanka, Tanzania, and Thailand.

Rapid population growth, coupled with rising sea levels and increasing tropical cyclone intensity, will lead to higher levels of human vulnerability and regional insecurity.[66] The Indian Ocean rim is projected to have the highest population density in the world by 2030, placing about 340 million people in coastal hazard zones. Already, the Bay of Bengal accounts for more than 80 percent of all cyclone fatalities, but it only experiences 5 percent of the world's cyclones. In addition, more frequent and more intense heat waves will have major consequences for human health.[67]

The Indian Ocean's geography facilitates climate variability; for example, as countries in the western Indian Ocean region experience major flooding, other countries could face severe droughts, as seen in Somalia, Sudan, Kenya, Uganda, Ethiopia, and Indonesia in 1997.[68] While it is clear that climate change threatens the stability of the entire Indian Ocean region, scientists have said that more research needs to be done to understand how the region is impacted by climate change.

Island states have raised climate change as one of their leading national security concerns.[69] Islands are especially susceptible to changes in currents and climate. For example, sea-level rise in the Indian Ocean led to higher tides that triggered flooding up to 50 meters inland in Seychelles in May 2007.[70] Flooding, landslides, and agricultural losses in these countries are expected to worsen as climate change persists. Climate change compounds the competition for access to SLOCs, natural resources, and influence in the Indian Ocean, further complicating environmental security for all states in the region.[71]

Maritime Crime

The Indian Ocean's significance as a source of economic growth makes it a major theater for illegal, unregulated, and unreported (IUU) fishing, piracy, drug smuggling, and human trafficking. Indian Ocean nations collaborate through regional frameworks and multilateral cooperation mechanisms to respond to some of these threats.

IUU Fishing

In 2019, the eastern Indian Ocean was the worst-performing region for IUU fishing, according to the global IUU Fishing Index.[72] Furthermore, FAO has assessed that 30 percent of the Indian Ocean's stocks are not fished within biologically sustainable levels.[73] Another study of selected species identified that between 16 to 34 percent of Indian Ocean fish catch was either illegal or unreported.[74]

Fisheries in the Indian Ocean are managed by a series of international arrangements. These include the Indian Ocean Tuna Commission (IOTC), the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), and the Southern Indian Ocean Fisheries Agreement (SIOFA). Two of these are based on the protection of tuna fisheries. However, for some other species in the high seas, there are no regulations on or administration of fishing. For example, the number of squid fishing vessels for unregulated fisheries increased by 830 percent from 2015 to 2019.[75] Squid is the main food source for tuna and swordfish, meaning that overfishing of squid could deplete critical tuna and swordfish fisheries. Illegal fishing vessels take advantage of gaps in regulations to target squid populations in the Indian Ocean's international waters.

Unregulated fishing makes it difficult for national authorities to identify, assess, or prevent overfishing in nearby waters. These challenges are magnified by countries' capacity constraints to monitor and protect their EEZs.

Piracy

Piracy imposes high costs on the global economy. It is estimated that piracy accounts for between $7 billion and $12 billion in losses per year.[76]

In the late 1990s and early 2000s, piracy surged in the waters connecting the Indian Ocean to Southeast Asia. Recent studies have shown that since then, the nature of piracy in Asia has shifted over three major epochs. In 2009–2014, the hijacking of tugboats and barges was the dominant form of regional maritime crime; in 2011–2017, the theft of oil cargo from tankers became more prevalent; and in 2016–2020, the abduction of crews for ransom was the leading form of piracy.

In 2008, the western Indian Ocean, particularly off the Horn of Africa, became the new stage for piracy in the Indian Ocean. That year, 111 out of a total of 293 pirate attacks took place off the coast of Somalia.[77] According to the International Chamber of Commerce's International Maritime Bureau, over 200 pirate attacks—49 of which resulted in successful vessel hijackings—occurred in the western Indian Ocean in 2010.

In response to the rise of piracy in the late 1990s, governments formed several regional and multilateral partnerships, including the Malacca Straits Patrol, comprising Indonesia,

Malaysia, Singapore, and Thailand, in 2004. In 2006, twenty-one states signed the Regional Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP) and its Information Sharing Center (ISC), which was the first regional government-to-government anti-piracy agreement. The ISC was established in Singapore, making the country a hub for Southeast Asian maritime security efforts. The ISC collaborates with Singapore's Information Fusion Center and Maritime Rescue Coordination Center to address piracy. In 2017, Indonesia, Malaysia, and the Philippines established the Trilateral Maritime Patrols to coordinate responses to kidnapping and robbery in the Sulu and Celebes Seas. In 2018, the Global Maritime Crime Programme of the UN Office on Drugs and Crime established a contact group focused on the maritime area in the Indian Ocean.[78] Since 2020, there have been no new crew abductions in Southeast Asia, and most piracy has been limited to petty theft.[79]

Similar to the response in Southeast Asia, stakeholders across the Indian Ocean mobilized to address piracy in the Horn of Africa. In 2008, nineteen countries established the Djibouti Code of Conduct, a cooperation agreement against piracy and armed robbery at sea.[80] In 2009, the UN Security Council authorized the deployment of multilateral naval forces to conduct counter-piracy patrols in the Indian Ocean region to secure safe transit of naval vessels and respond to piracy attacks. By 2016, piracy was declining in the region due to the increased naval security presence. In 2022, the International Maritime Organization removed the Indian Ocean's status as a high-risk area for piracy. Since 2018, there have been no reports of piracy attacks off Somalia, partly due to the counter-piracy initiatives undertaken by many regional and international organizations.[81] Although piracy has decreased, the UN-led military response remains active today, and countries such as China and India have deployed troops to support the effort.

Drug Smuggling and Small Arms Trafficking

Drug smuggling and small arms trafficking are some of the maritime crimes prevalent across the region. According to the UN Office on Drugs and Crime, drug production impacting the Indian Ocean takes place in two main regions: the "Golden Crescent" and the "Golden Triangle." [82] The Golden Crescent describes illicit opium production from Iran, Afghanistan, and Pakistan and the opium's movements across the Indian Ocean. The Golden Triangle is the second-largest opium production region in the world and stretches through Myanmar, Thailand, and Laos. Heroin produced in the Golden Crescent is transported through the Arabian Sea to the rest of the world. In the eastern Indian Ocean, these drug shipments transit the "Southern Route," a well-established maritime path for opioids in the Indian Ocean. The Southern Route includes passage through India, Maldives, and Sri Lanka. Drug production in the Golden Triangle is smuggled into South and Southeast Asia through maritime border regions, such as the Naf River between Bangladesh and Myanmar.

In the western Indian Ocean, the eastern coast of Africa has emerged as a transshipment hub for drugs and small arms, valued at over $190 million annually.[83] The movement of

drugs and terrorism are connected. Since 2016, regional maritime security forces have on several occasions intercepted Iranian weapons destined for al-Shabab and the Islamic State in Somalia.[84]

The need to secure the Indian Ocean against maritime crime has led to the establishment of three information fusion centers—in Singapore, Madagascar, and India—and regional coordination centers that provide increased maritime domain awareness. These centers act as regional nodes, collating maritime data from multiple sources to provide a complete picture of activities at sea. This data is critical in identifying maritime crimes, especially those on the high seas and outside the national jurisdiction of EEZs, as well as in ensuring the safety and security of people at sea. Regional centers have the capacity to disseminate data across participating nations through the wider Indian Ocean region. The EU and Indian Ocean Commission have also built the Program to Promote Regional Maritime Security (MASE) to coordinate information from these regional centers.

Search and Rescue Zones

The Indian Ocean region is a geographically disaster-prone area, sometimes called the "world's hazard belt." The region also possesses the least-developed coordination arrangements for disaster response in the world. Management of disaster risks is particularly urgent because these island states and littorals have high population densities and are often hit much harder by disasters due to a lack of resources and assets for crisis response.

Emergency planning and response in the Indian Ocean rim is led by nations with jurisdiction over the ocean's search and rescue (SAR) zones. SAR zones were established by the International Convention on Maritime Search and Rescue in 1979 to ensure that no matter where an accident occurs, people in distress could be rescued. Following the adoption of the SAR Convention, the International Maritime Safety Committee divided the world's oceans into thirteen SAR areas. Within these thirteen areas, coastal countries are responsible for delimited search and rescue regions. Nations with assigned SAR zones have a corresponding maritime rescue coordination center that serves as an information hub for national coast guards to respond to and coordinate emergency responses in their rescue zones. Although a majority of the area in SAR zones fall outside of national EEZs, the SAR Convention requires the nations with jurisdiction over the zones, to maintain SAR capabilities, services, and jurisdiction over these waters. The Indian Ocean is made up of over twenty SAR zones (see figure 4).

SAR zones play a role in disaster response, including preparedness, given the frequency and intensity of natural disasters in the region. The 2004 Indian Ocean tsunami was a devastating regional catastrophe, killing 236,000 people across fourteen countries. The disaster demonstrated the vulnerability of the region while serving as a warning for the future if the region remained unprepared. In response to the tsunami, UNESCO's Intergovernmental Oceanographic Commission was mandated to facilitate the establishment of tsunami early warnings systems in the region. In 2005, the commission officially established the Indian

Figure 4. Search and Rescue Zones in the Indian Ocean

Ocean Tsunami Warning and Mitigation System. In parallel with the UN response, the governments of Australia, India, Japan, and the United States formed the "Tsunami Core Group" and provided disaster relief and humanitarian assistance. By 2007, the group officially renamed itself the "Quad" and began a regular dialogue to address natural and human-made disasters. The Quad has since evolved to address various geopolitical challenges in the Indo-Pacific, taking on new meaning and strategic significance with its revival in 2017. In this way, SAR zones and their corresponding regional response systems provided a foundation for current geopolitics in the Indian Ocean.

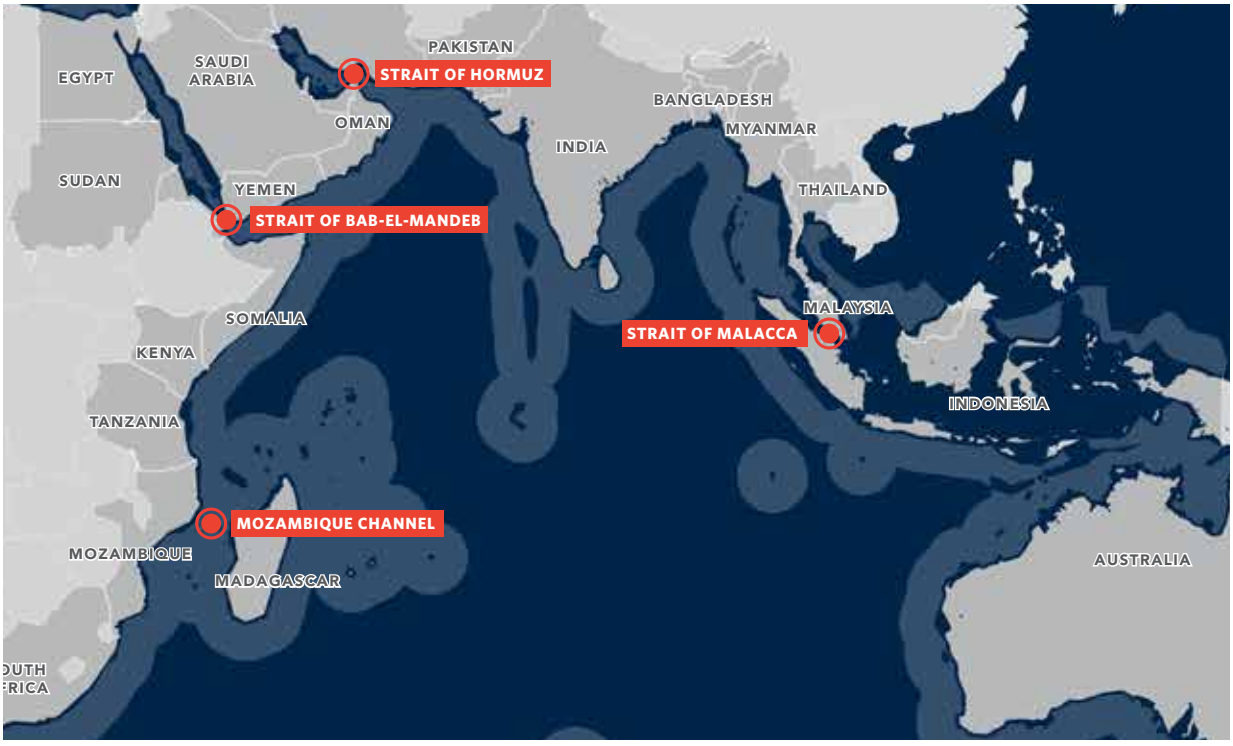
Choke Points

The Indian Ocean is home to three main choke points: the Strait of Malacca, the Strait of Hormuz, and the Strait of Bab-el-Mandeb. This paper also considers the Mozambique Channel to be a choke point because trade backups can occur along this route (see figure 5). Every day, over 36 million barrels of oil, about 40 percent of global oil production, transit through these choke points.[85] It is estimated that almost 90,000 vessels, carrying 9.84 billion tons of cargo, travel every year through the Indian Ocean and move through its choke points for destinations in Africa, Asia, and Europe.[86]

Because these choke points are so important to international trade, even a limited disruption could have drastic impacts on global transportation. More so, disruption of any single choke point could impact the volume of traffic for other choke points, magnifying economic and security vulnerabilities around these bottlenecks.[87] Take, for example, the March 2021 blockage of the Suez Canal, a choke point that connects the Mediterranean Sea to the Red Sea. For the six days that the canal was blocked, some ships considered rerouting around South Africa's Cape of Good Hope. Such an endeavor was expected to be time consuming, expensive, and dangerous. Most ships chose instead to wait for the Suez Canal to reopen. The decision to wait also imposed costs on cargo ships, which faced late fees up to $30,000 per day per container.

The Indian Ocean's maritime choke points are also important militarily and strategically. The ability to protect or disrupt shipping lanes through choke points provides significant advantages to regional players. A nation's ability to keep SLOCs free and open during peacetime also allows them to disrupt these zones during conflict. For example, Iran has frequently used its sovereignty to threaten the Strait of Hormuz in response to sanctions imposed by other countries.[88] In another case, the United States' ability to disrupt Japan's SLOCs during World War II granted it a significant strategic advantage. Overall, choke points are critical to the economic and geopolitical security of the Indian Ocean, and understanding their interdependence is critical for policymakers to build a cohesive Indian Ocean strategy.

Figure 5. Choke Points in the Indian Ocean



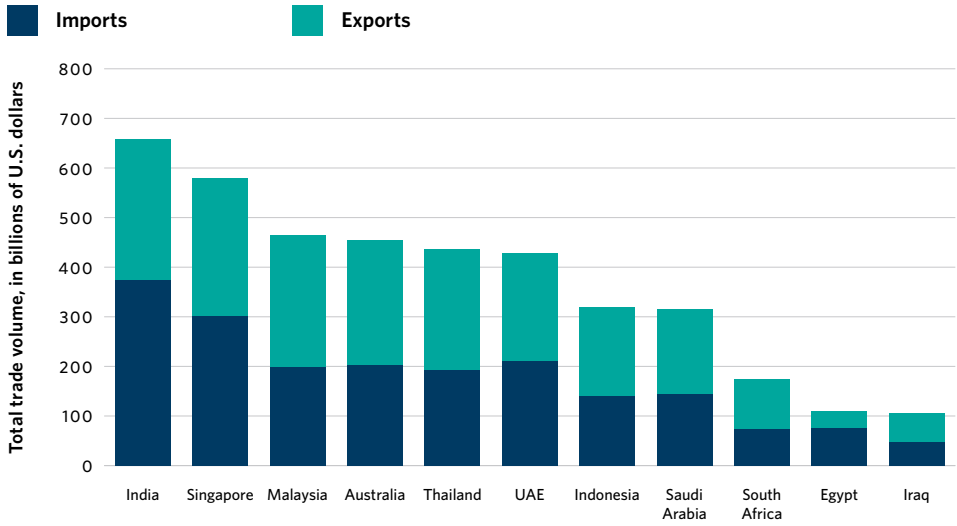
Economics and Trade

The Indian Ocean is a key arena for the movement of oil and goods from around the world. It covers about 20 percent of the world's water surface, a quarter of the world's landmass, and three-quarters of global oil reserves, iron, and tin.[89] Around 80 percent of the world's maritime oil and 9.84 billion tons of cargo pass through the Indian Ocean region annually. In 2020, the Indian Ocean rim reported $6.17 trillion in total trade.[90]

Overall, India is both the largest import and export economy in the region, followed by Singapore, Malaysia, Australia, and Thailand (see figure 6). Over the past two decades, countries including India, Indonesia, and Singapore have seen a major increases in their GDPs. As these Asian nations industrialized, they fueled an increased demand for resource commodities such as iron ore, coal, and liquefied natural gas.[91] These resource demands have driven trade across the Indian Ocean.

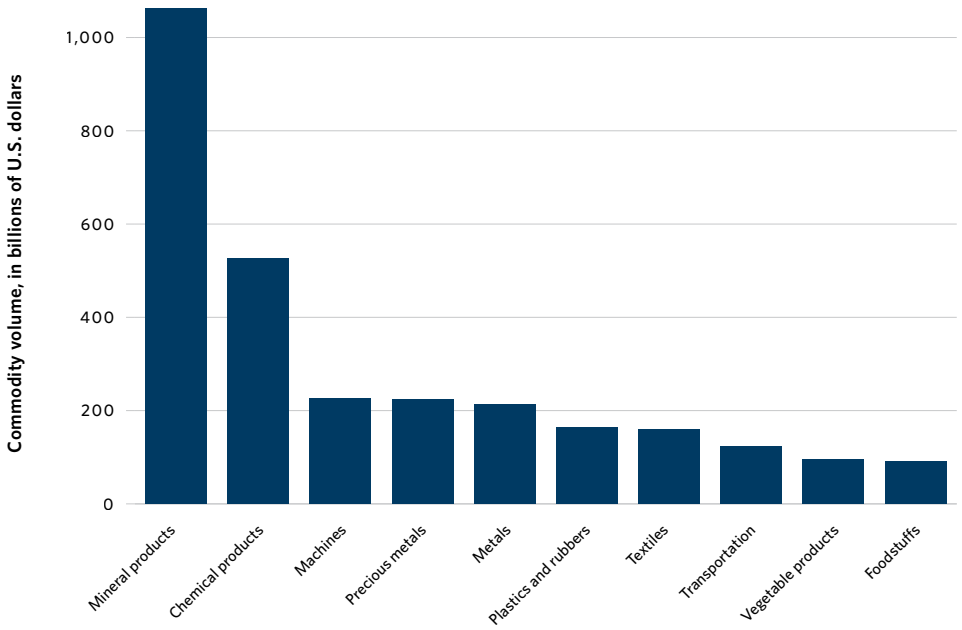
Figure 7 and figure 8 show the region's top ten commodity exports and imports. These commodities reflect the flow of primary and intermediary goods centered around industrial and technology value chains in the Indian Ocean.[92] Mineral products are the number-one export and number-two import commodity in the region. The mineral products category includes all mineral fuels, lubricants, and related materials that are derived from coal, such as coal briquettes, petroleum, and petroleum products.[93] Australia is the region's largest exporter of mineral products, such as iron ore, coal briquettes, and petroleum. Australia exports almost as much iron ore as Saudi Arabia does crude petroleum, making these the two largest single product exports in the region in 2021.[94] Africa's eastern and southern coasts are also rich

Figure 6. Countries in the Indian Ocean Region With the Greatest Trade Volume, 2020



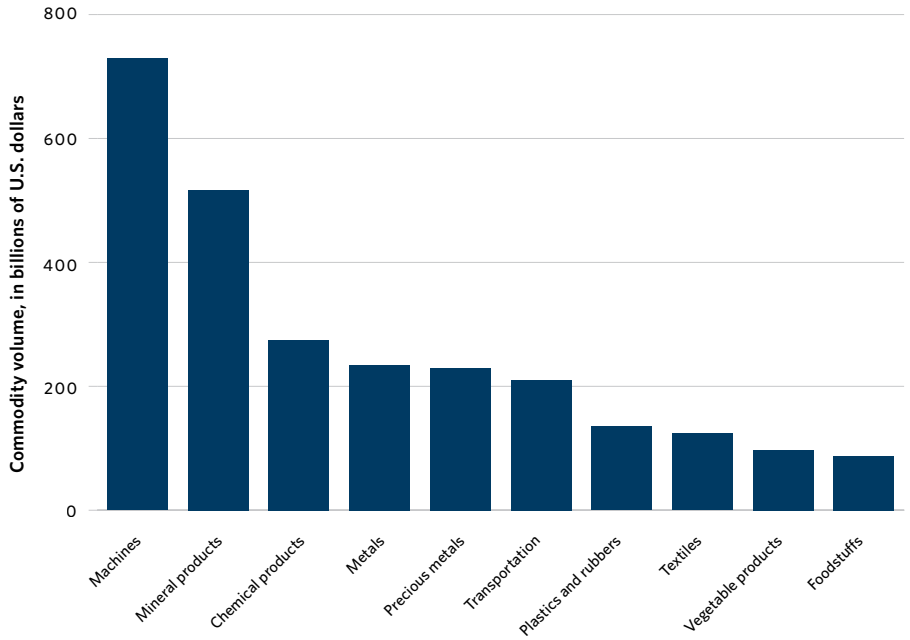
Source: Observatory of Economic Complexity.

Figure 7. Top Commodity Exports in the Indian Ocean Region, 2021



Source: Observatory of Economic Complexity.

Figure 8. Top Ten Commodity Imports in the Indian Ocean Region, 2021



Source: Observatory of Economic Complexity.

with metals and minerals.[95] East Africa is particularly resource rich, possessing a variety of minerals including gold, platinum, coal, iron, copper, and diamonds.[96] The projected growth of manufacturing and industry in Asia will continue to drive a demand for these commodities, bringing the region's trade routes, choke points, and geography into greater importance.[97] As the region's economic significance increases, so does its vulnerability to maritime crime. Climate change also poses challenges to trade in the Indian Ocean.

The Indian Ocean region is also critical for the global movement of liquid energy. About 65 percent of the world's oil reserves belong to ten of the Indian Ocean's littoral states,[98] and approximately 80 percent of China's and India's oil imports move through the region from the Arabian Gulf.[99] For Japan, this number rises to about 90 percent.[100] Official data estimated that Japan's reliance on Middle Eastern crude oil reached an all-time high in February 2022, with imports from the region making up 98 percent of the country's total oil imports.[101]

Figure 9 depicts the movement of all liquid energy in the Indian Ocean for 2022, disaggregated by cargo size. The vessel paths highlight major shipping routes across the Indian Ocean. The density of ships near the region's choke points underscores the geographic vulnerability of oil trade to supply chain bottlenecks and maritime crime.

Figure 10 and figure 11 provide a more nuanced picture of liquid energy supply chains. When disaggregated over a one-month period, the maps indicate that small- and medium-sized liquid energy vessels stay close to the shores of islands and littoral states. Because these vessels are smaller, they often do not travel the long distances required to make major energy shipments. Large liquid energy vessels make up a greater volume of long-distance movement across the Indian Ocean due to their bigger size and capacity. Annual data indicates that islands in the Indian Ocean receive a greater volume of shipping traffic from small- and medium-sized vessels than they do from large vessels. This suggests that islands are more vulnerable to localized or regional supply chain shocks than littoral states that can access larger, regular energy shipments.

Based on data from the UN Comtrade database, Saudi Arabia, the UAE, Australia, Qatar, and Iraq are the largest energy suppliers in the region. India, Singapore, Thailand, Malaysia, and Indonesia are the largest energy recipients. India was reportedly the main driver of Asia's growing oil demand in 2022—a trend that is expected to continue in 2023.[102] Beyond India, Southeast Asian nations, such as Malaysia, Indonesia, and the Philippines, are likely to become important destinations for liquid energy from the Persian Gulf. Already, Middle East oil exports to Malaysia grew by 73 percent year on year in first quarter of 2023. For Indonesia, Middle East oil exports rose more than 45 percent during this period.[103] Shifts in energy demand across the region will impact the distribution of resource shipments and vessel capacity requirements. This could add new traffic and capacity pressures on regional choke points, necessitating careful monitoring and regular assessment in the future.

Figure 9. Movement of Liquid Energy Shipments in the Indian Ocean in 2022

Figure 10. Movement of Small & Medium Liquid Energy Vessels Over a One-Month Period in 2022

Figure 11. Movement of Large Liquid Energy Vessels Over a One-Month Period in 2022

In terms of regional trade, China emerges as the biggest economic partner for the region, followed by the UAE and the United States (see figure 12). Notably, China is the top import partner for four of the region's six island states: Madagascar, Maldives, Mauritius, and Sri Lanka.

China has the highest trade volume with countries in the region ($900 billion), followed by the United States ($361 billion) (see table 3). Traditional regional partners, such as Australia and France, rank much lower. In recent years, island nations have welcomed expanded economic relationships with China as they try to expand their engagements beyond their traditional partners. Since 2000, China's economic ties with island nations have grown higher than their trade with traditional players in the Indian Ocean. China has significantly outperformed other major trading partners in the Indian Ocean since 2005 (see figure 13).

These statistics indicate a significant shift in regional trade dynamics over the past few decades. Historically, the total trade of the traditional players identified in this paper had outweighed that of the emerging players. Since 2010, however, traditional players have decreased their total trade in the Indian Ocean, and emerging regional players now hold a greater share of trade (see figure 14). Despite this change, overall trade volume in the region continues to grow, driven by the region's emerging players.

Figure 12. China's Trading Partners in the Indian Ocean Region

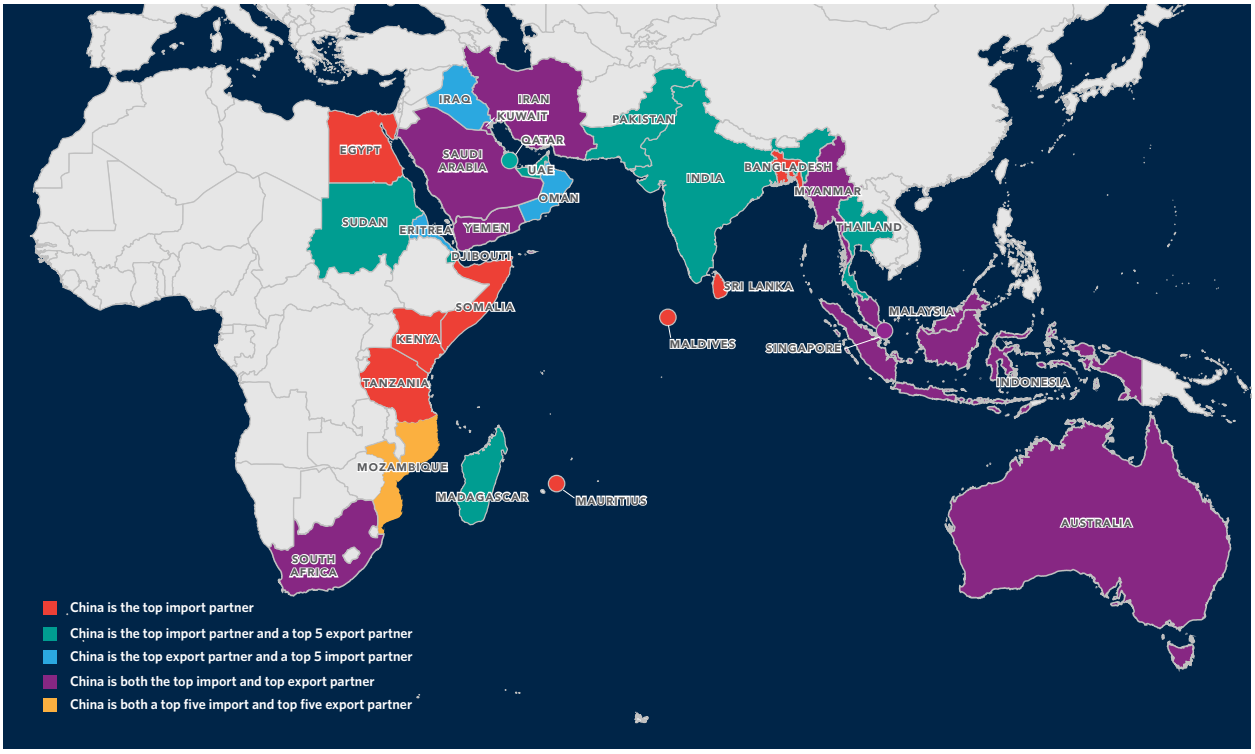
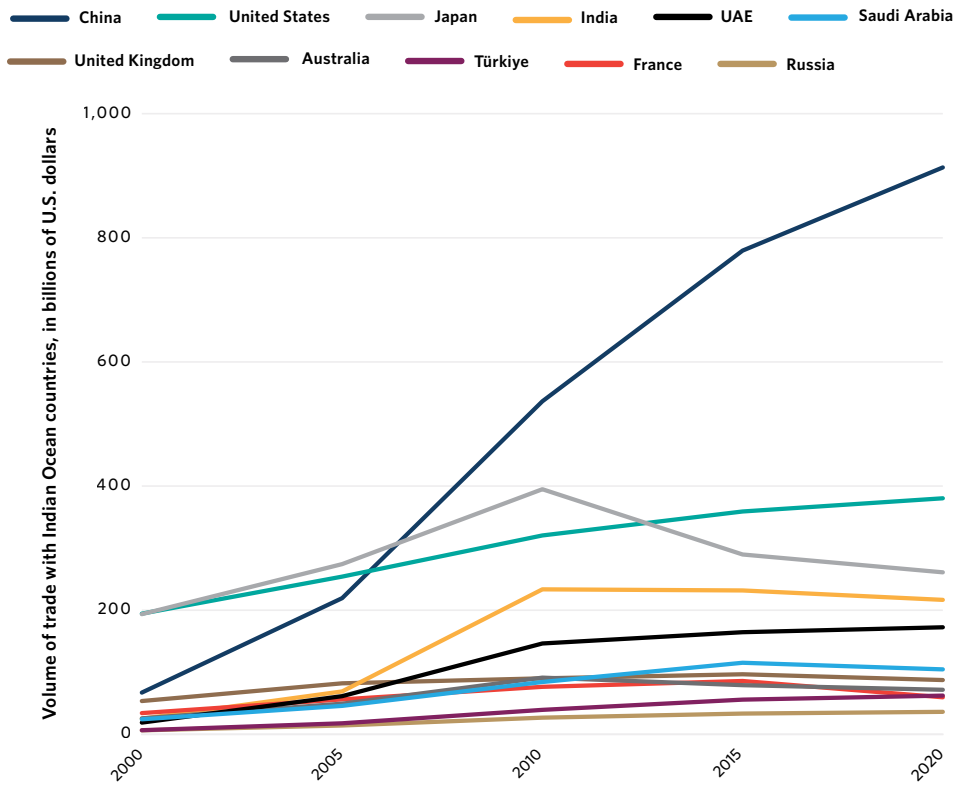


Table 3. The Countries That Trade the Most With the Indian Ocean Region

Country	Trade volume in current U.S. dollars (estimated, 2021)
China	$909,616,920,000
United States	$360,533,800,000
Japan	$207,138,640,000
India	$157,883,500,000
UAE	$135,177,300,000
Germany	$65,786,200,000
Saudi Arabia	$65,731,610,000
Türkiye	$24,003,060,000
Russia	$5,140,000,000
France	$2,956,430,000
Australia	$775,000,000

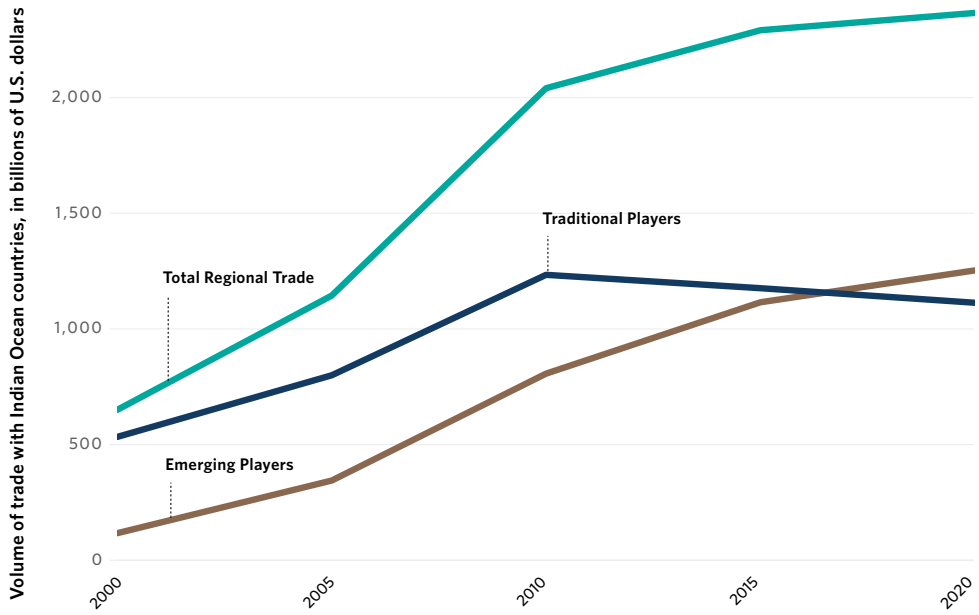
Source: Observatory of Economic Complexity.

Figure 13. Key Players' Trade With Indian Ocean Countries



Source: Observatory of Economic Complexity.

Trade Volume of Traditional and Emerging Players in the Indian Ocean Region



Source: Observatory of Economic Complexity.

Regional Cooperation

Cooperation throughout the Indian Ocean is primarily facilitated through multilateral and bilateral partnerships and institutions. This section reviews the frameworks, information fusion centers, and partnerships that make up the Indian Ocean rim and analyzes their impacts on the region's maritime security.

Regional Frameworks

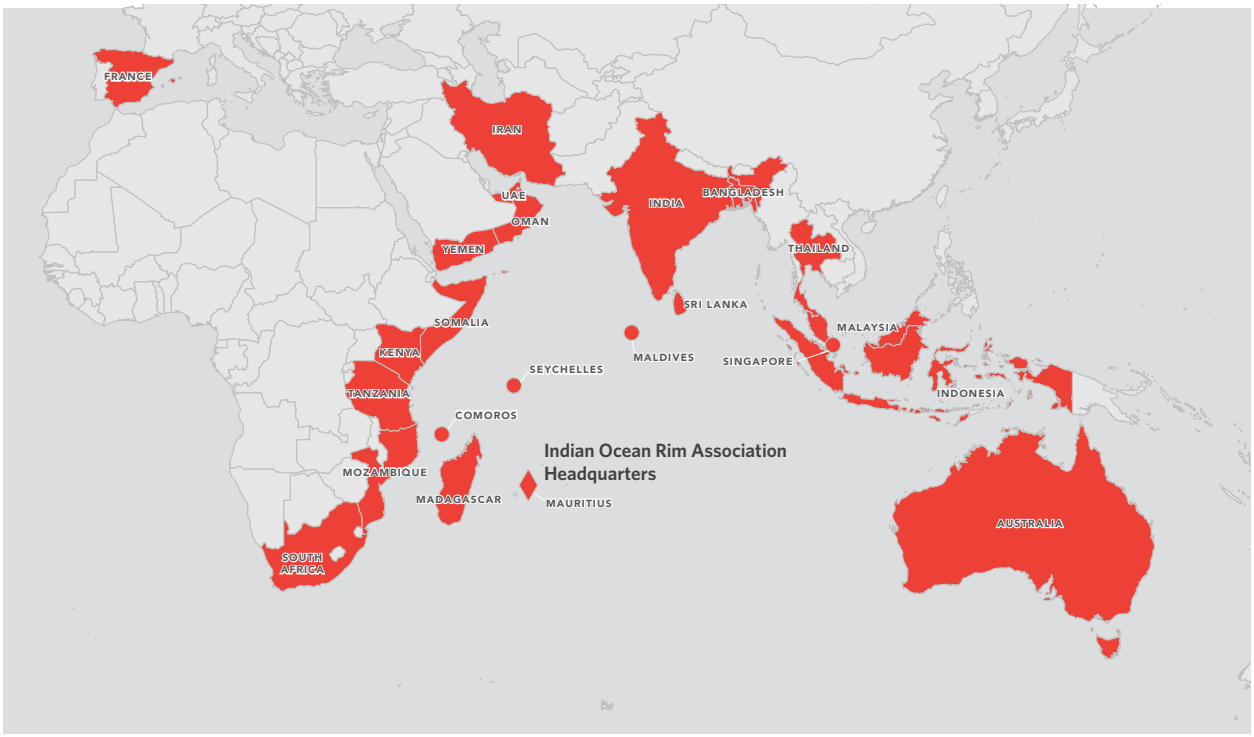
The Indian Ocean's vastness and complexity require regional actors to balance various priorities and interests. Regional frameworks facilitate coordination and collaboration on issues related to trade, economics, fishing, climate and weather information sharing, and military cooperation. The following frameworks and organizations serve as the primary forums for increasing cooperation across the region. However, the breakdown of the Indian Ocean into continental silos has undermined the functions of these regional frameworks. Establishing a cohesive approach to and a maritime identity for the Indian Ocean will allow for better coordination and collaboration among all players.

Indian Ocean Rim Association (IORA)

IORA, formed in 1995, is the primary regional structure aimed at promoting economic cooperation among countries throughout the region.[104] With a consensus-based approach, IORA brings together twenty-three member states and ten dialogue partners. These countries participate in IORA's various functional bodies, including the Indian Ocean Rim Business Forum, the Working Group on Trade and Investment, the Working Group on Maritime Safety and Security, and the Working Group on Blue Economy.[105] IORA's Council of Foreign Ministers meets annually to review progress of the body's agenda, advise on and establish new working groups, and vote on important policy decisions.

IORA has five flagship projects: the Indian Ocean Dialogue, the Somalia and Yemen Development Program, the IORA Sustainable Development Program, the IORA-Nelson Mandela Be the Legacy Programme, and the IORA-UN Women Women's Economic Project. The Indian Ocean Dialogue, hosted annually, serves as a forum for discussions surrounding economic cooperation, maritime safety and security, blue economy, and humanitarian assistance, bringing together scholars, experts, and policymakers from various governments across the Indian Ocean. The most recent Indian Ocean Dialogue, entitled "Innovation in Blue Economy and Its Role in GDP," reviewed ways that IORA's member states can collaborate to share resources, advance partnerships, and set regional sustainable development and blue economy goals.[106]

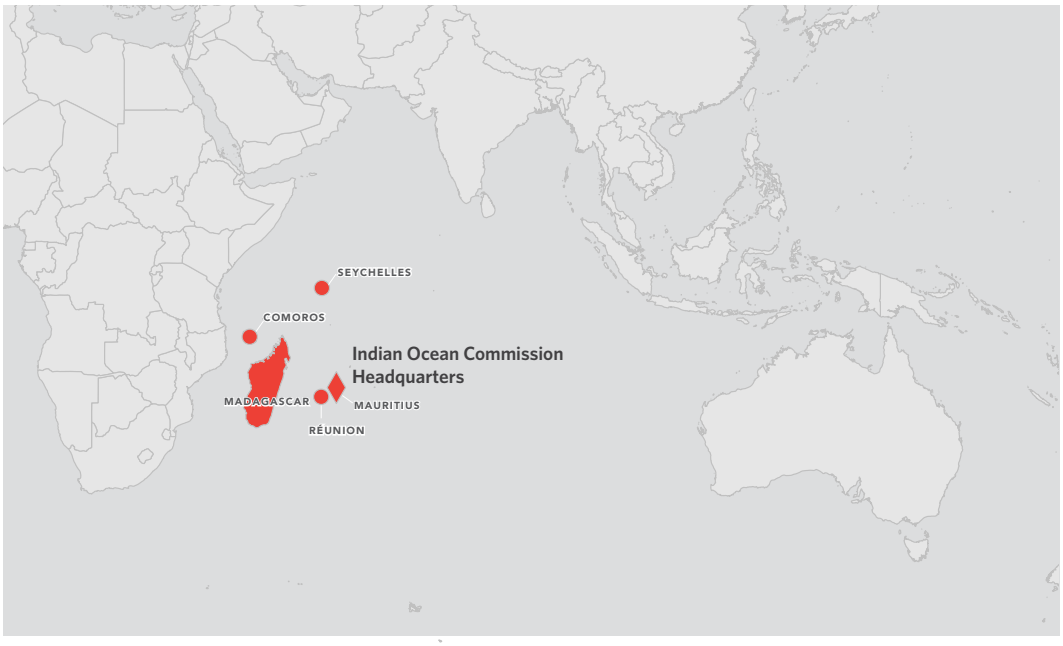
Figure 15. Map of IORA Members



Indian Ocean Commission (IOC)

IOC is an intergovernmental organization comprising four African island nations—Comoros, Madagascar, Mauritius, and Seychelles—France via Réunion, and six observers: China, India, Japan, Malta, the EU, and the United Nations. IOC provides counsel to the four island nations and Réunion in the areas of tourism, trade, economic development, natural resource management, public health, and renewable energy.[107] Under the MASE program, IOC has set up a fusion center in Madagascar and a coordinating center in Seychelles to monitor the western Indian Ocean and gather critical information related to maritime crime.

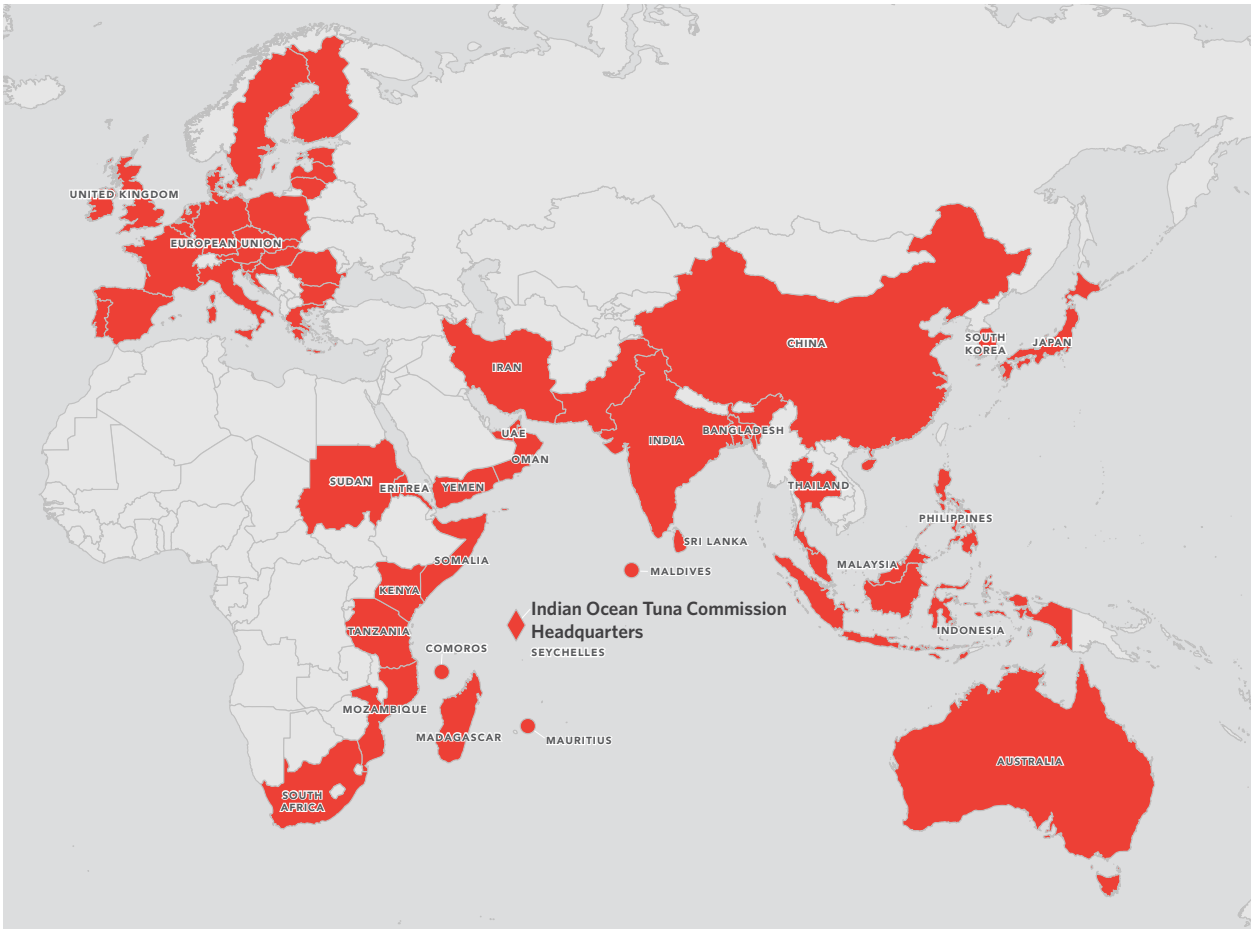
Figure 16. Map of IOC Members



Indian Ocean Tuna Commission (IOTC)

IOTC is an intergovernmental organization partner of the FAO that promotes the responsible and sustainable management of tuna and tuna-like species in the Indian Ocean.[108] IOTC's primary responsibilities come from the UN Convention on the Law of the Sea, which directs member states to analyze and share information related to their stocks and fisheries and adopt Conservation and Management Measures aimed at conserving their supplies, among other actions. The IOTC agreement also requires technology transfer, training, and development among members.

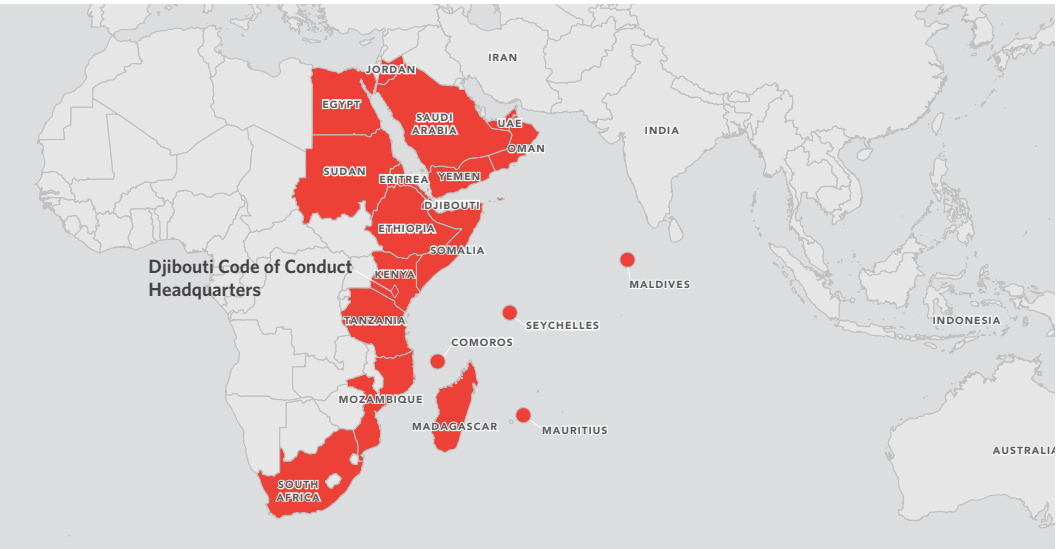
Figure 17. Map of IOTC Members



Djibouti Code of Conduct

The Djibouti Code of Conduct is the prevailing code of conduct for the repression of maritime crime in the western Indian Ocean and the Gulf of Aden.[109] It has twenty member states from across the region that cooperate to stop piracy and armed robbery in the region's waterways. The members work together to maintain international law through joint investigations and rescue missions, and they collaborate to investigate, arrest, and prosecute violations. Since its formation in 2009, the Djibouti Code of Conduct has had success in helping deter maritime crime in the western Indian Ocean through capacity building efforts, regional trainings, and information sharing. It has also aided individual countries in implementing their own anti-piracy and maritime security programs.

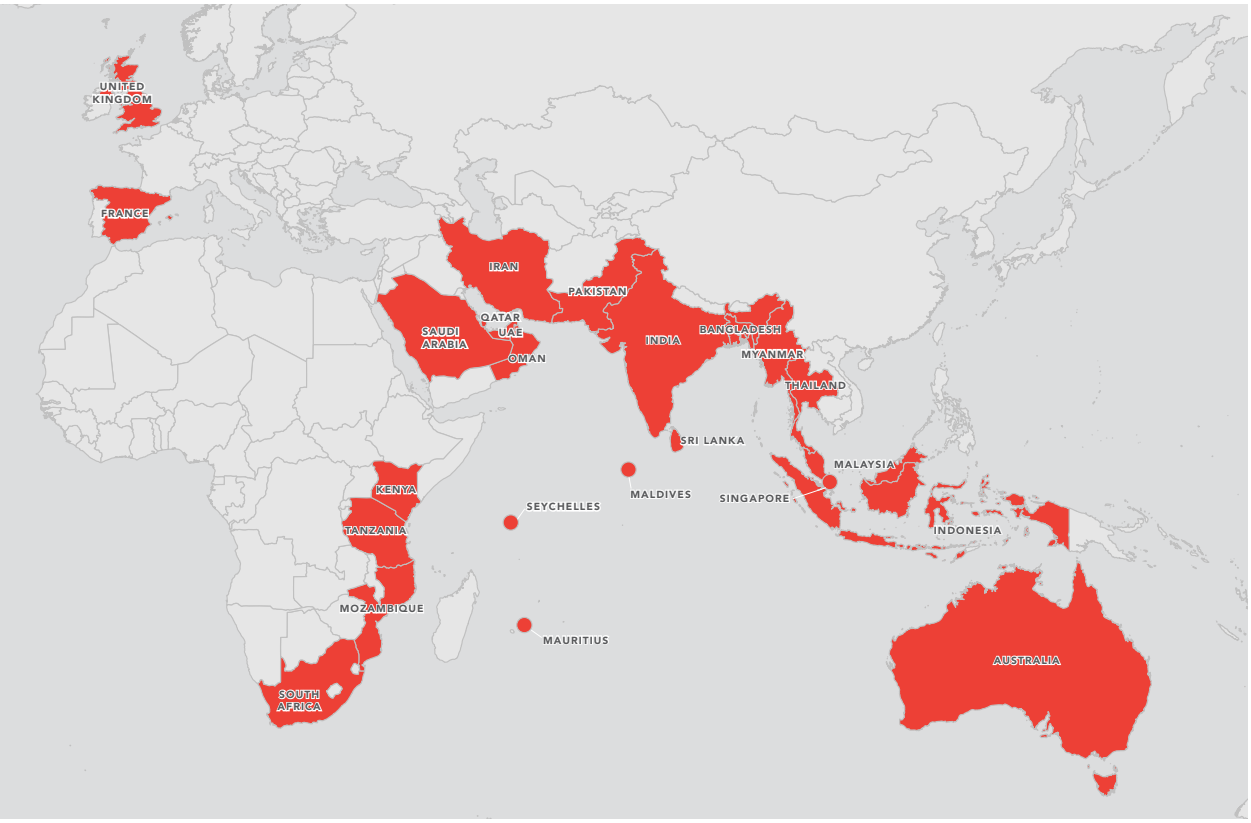
Figure 18. Map of Djibouti Code of Conduct Members



Indian Ocean Naval Symposium (IONS)

IONS is a voluntary initiative that aims to increase cooperation among the navies of littoral states throughout the Indian Ocean region.[110] IONS serves as a voluntary regional forum to share critical information related to maritime issues. With twenty-five members states, IONS conducts annual training and workshops on maritime security and disaster response. It also aids humanitarian and disaster response missions.

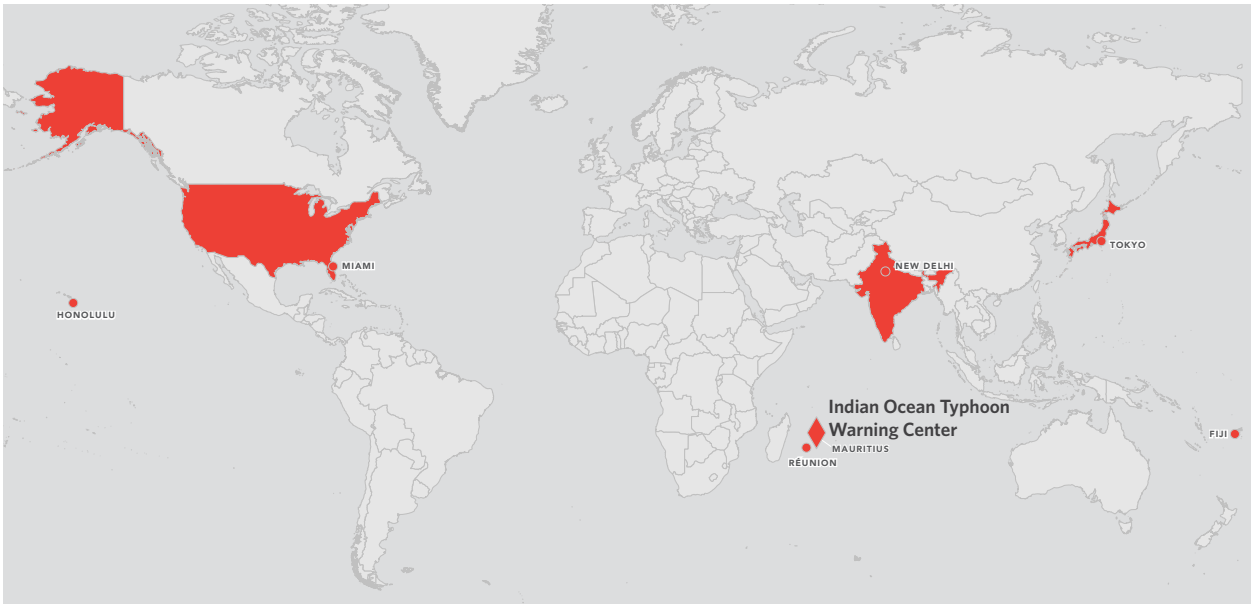
Figure 19. Map of IONS Members



Regional Specialized Meteorological Centers (RSMCs)

The RSMC for Tropical Cyclones Over North Indian Ocean's six meteorological centers track, access, categorize, and distribute warnings on tropical storms.[111] With locations in Fiji, India, Japan, Réunion, and the United States, the RSMC provides invaluable support to help detect tropical storms before they make landfall. The RSMC locations work together using satellite and radar technology to track and analyze weather patterns, allowing them to assess regional weather threats early. After detecting and assessing the scale of tropical storms, the RSMC issues advisories to countries across the region.

Figure 20. Map of RSMC Locations



Fusion Centers

There are four primary regional fusion centers centered on combating maritime crimes, in India, Madagascar, Seychelles, and Singapore. There are also multiple national and subregional centers that provide data and coordinate bilaterally and with neighbors on maritime security issues. Information fusion centers play a critical role in how the Indian Ocean region functions and enforces maritime security. Maritime crimes, such as arms trafficking, illegal fishing, robbery, and piracy, require constant observation and the enforcement of regional and international law. Information fusion centers aid the sharing of vital information related to these crimes, along with regional climate and environmental threats.

Figure 21. Map of Fusion Centers in the Indian Ocean Region

What's Next for the Indian Ocean Region?

The Indian Ocean's economic, political, and security importance on the international stage is likely to increase in the coming years and decades. With coasts and choke points across Africa, the Middle East, and South Asia, the Indian Ocean is often viewed through its continental silos. But it is best interpreted as one continuous maritime theater. Many of the traditional players—Australia, France, India, Japan, the United Kingdom, and the United States—continue to expand their presence in the Indian Ocean, while shifting geopolitical conditions have led to the emergence of new players—China, the UAE, Russia, Saudi Arabia, and Türkiye. All of these players are investing in Indian Ocean states economically, politically, and militarily, which will impact the region's security environment on both traditional and non-traditional issues.

The region's influence on the global maritime agenda is growing quickly, creating the opportunity for small island developing states in the region to advance conversations about the blue economy, sovereignty, climate change, commerce, and the protection of sea lanes. Although island states have traditionally been pushed to the sidelines of geostrategic conversations, their roles and interests in advancing maritime conversations, along with their key geographies, make them well positioned to shape dynamics in the Indian Ocean.

Given its economic opportunities, shipping lanes, and energy resources, the Indian Ocean region will come to play a critical role in geopolitical competition over the next few decades, with developments in one end of the ocean carrying significance on the other. The region is already a major exporter of petroleum, minerals, precious metals, and agricultural products, and two-thirds of the world's oil shipments and one-third of the world's cargo shipments travel through the Indian Ocean. Ensuring secure and safe access for commercial and military vessels is therefore a priority for all states.[112]

Global conversations on maritime security and geopolitical competition in the region will be shaped by developments in security issues, such as maritime crime, illegal fishing, drug smuggling, and human trafficking. On the other hand, issues of climate change, resilient infrastructure, disaster response, and the blue economy will provide space for collaboration and cooperation among players big and small. These non-traditional security aspects will set the ground for strategic and military interactions and shape the next decades of geopolitical competition in the Indian Ocean.

Appendix: Methodology of the Indian Ocean Strategic Map

This section details the sources, methods, calculations, and data used to build each layer of the Indian Ocean Strategic Map.

Base Map and Boundaries

Cartographers from International Mapping provided the base map design for the Indian Ocean Strategic Map. Data on EEZs and maritime boundaries are from International Mapping's Sovereign Limits database.[113] The maritime boundaries shown on the map are legally established between two states bilaterally or through boundary litigation. Information for the disputes layer was collected from the International Court of Justice's advisory opinions and UN General Assembly resolutions, where applicable. Information on remaining disputes was sourced from government websites and the Sovereign Limits database.

Population

The population data layer relies on three data sources and two peer-reviewed datasets. Total population counts were sourced from World Population Prospects (2022 Revision) from the UN Population Division of the Department of Economic and Social Affairs of the UN Secretariat.[114] The dataset presents population estimates for 237 countries and areas, underpinned by analyses of historical demographic trends. The latest assessment considers

the results of 1,758 national population censuses and information from registration systems from 2,890 nationally representative sample surveys. The estimates used for this map were based on the medium variant population projections provided by the World Population Prospects' demographic indicator dataset. This data is displayed as a pop-up for each country when users click on the population map layer.

The Indian Ocean Strategic Map's population layer is a population density raster map. A raster image from WorldPop displays population density per square kilometer. The WorldPop raster divides the entire Indian Ocean region into a grid that assigns a color to each 1-square-kilometer cell based on population density, where darker colors represent higher population densities and lighter colors represent lower population densities. It is important to note that WorldPop sources and calculates population density at a more granular level than Our World in Data. While the raster data is consistent with the data sourced from Our World in Data, it takes a different statistical and spatial approach to population density.[115] This raster is built from WorldPop's dataset for unconstrained individual countries, UN adjusted (100-meter resolution).[116] The units in this dataset are defined as the number of people per pixel, with country population totals adjusted to match corresponding official UN population estimates from World Population Prospects (2019 Revision).[117] WorldPop sources population census information from various national and subnational censuses. Researchers then use advanced statistical methods to harmonize these datasets spatiotemporally.[118] The population data is disaggregated into grid-based cell counts using a random forest-based dasymetric redistribution to derive population density.[119] This raster is mapped onto the Indian Ocean Strategic Map to provide a more comprehensive and nuanced view of human settlement and distribution across the region.

Economy

There is a variety of economic data displayed in the Indian Ocean Strategic Map. For each country, GDP data is displayed in a pop-up that users can click on. GDP values are taken from the World Bank's national accounts data and Organization for Economic Cooperation and Development (OECD) National Accounts data files for 2021.[120] This is the most recent year for which GDP numbers are available. According to the World Bank's dataset, all data are in current U.S. dollars, and dollar figures for GDP are converted from domestic currencies using single year official exchange rates.

The economy layer of the map displays the top trading partners in the Indian Ocean region. The map provides a list of each country's top five import and export partners measured in current U.S. dollars. Users can click on any country to see this list and a pie chart displaying the proportion of total imports and exports made up by the country's top five trading partners. Another feature of the economy layer allows users to select to view either imports or exports. Users are then prompted to select a key player that conducts trade in the

Indian Ocean region. Once a key player is chosen, its top trading partners in the region are highlighted. Data about top trading partners is sourced from the Observatory of Economic Complexity (OEC), derived from the UN Comtrade database, and is from 2020.[121] UN Comtrade aggregates detailed global monthly trade statistics by product and trading partner, as reported by statistical authorities of each country. Data represents more than 99 percent of the world's merchandise trade.

The liquid energy layer visualizes the movement of all liquid energy shipments and tanker ships across the Indian Ocean in 2022. This data was collected by Spire Global's satellite, terrestrial, and dynamic AIS and compiled using the Historical Vessel Positions API.[122] Vessels are tracked based on their Maritime Mobile Service Identity (MMSI) number. According to Spire Global, Historical Vessel Positions is the set of all position reports by vessels/ships in 2022 from the exactAIS Archive. The position reports include vessel position, static, and voyage information at the time of transmission. International Mapping filtered the vessel positions dataset using Spire Global's vessel-type categories. This allowed cartographers to refine the dataset from all vessels transiting the Indian Ocean to all liquid energy and tanker ships transiting the region. Because of the temporal nature of the AIS data, the Indian Ocean Strategic Map shows the transit of liquid energy shipments along a timeline for 2022.

Military

The military map provides a list of each country's top five import and export partners measured by total volume of arms exchanged by partner countries. Users can click on any country to see this list. Similar to the economy section, users can select the imports or exports category. After choosing a category of arms transfers, they are prompted to choose a key player. Countries that share an import or export relationship with the key player are highlighted.

Data about regional arms transfers is from the Stockholm International Peace Research Institute (SIPRI) Arms Transfer Database.[123] The selected SIPRI trade register provided information on deals between specific arms suppliers and recipients from 2017 to 2021. A deal is only included in the trade register if reliable information has been verified, an arms order has been placed, or deliveries have begun. All this information is taken from open sources that are published and available to the general public. These include the UN Register of Conventional Arms, *Defense News*, *Janes Defense Weekly*, and national defense budget documents. SIPRI only covers what it terms as "major weapons," such as fixed-wing aircraft, anti-submarine warfare weapons, and reconnaissance satellites. It does not cover small arms and light weapons but does include man-portable air defense systems (MANPADS) and guided anti-tank missiles.[124]

Based on the SIPRI data, arms import and export partners were ranked based on total arms transfers by volume. Total arms transfer volume was calculated based on the absolute number of weapons exchanged by two countries, not based on weapon types or costs. It is important to note that this method of calculating arms transfer volume is inexact and requires treating different weapons (for example, vessels, tanks, and missiles) as equivalent units. As a result, the ranking for top trading partners is an inexact, if not incomplete, measure for military engagement in the Indian Ocean region. Users should take these limitations into account when viewing the military data layer of the map.

Diplomatic Missions

The Indian Ocean Strategic Map includes a diplomatic missions layer that displays the locations of all active diplomatic missions for the region's key players: Australia, China, France, India, Japan, Russia, Saudi Arabia, Türkiye, the UAE, the United Kingdom, and the United States. Data about the diplomatic missions' locations come from the countries' official government websites. This dataset only focuses on the main diplomatic missions for each country. It does not include consulates or missions that are ancillary to the main diplomatic mission. When users click a country on the map, a drop-down list of each diplomatic mission within that country will appear. Users also have the option to view the presence of the eleven key players' diplomatic missions across the Indian Ocean region by selecting a key player from the legend on the left. After users select a key player, the countries where that key player has active diplomatic missions will highlight in teal.

Search and Rescue Zones

The Indian Ocean Strategic Map includes a map of the region's maritime SAR zones. Data delineating the boundaries and jurisdictions of these zones comes from the UN International Maritime Organization's Global Search and Rescue Zones Map.[125] The available sources from the UN were georeferenced to build the SAR zones layer. These boundaries were confirmed using the U.S. Coast Guard's and the Australian Maritime Safety Authority's reference maps for global maritime SAR regions.[126] Users can scroll across the map to view the boundaries of each maritime zone.

Indian Ocean Regional Frameworks and Information Fusion Centers

The Indian Ocean Strategic Map displays the region's multilateral organizations related to the Indian Ocean region. This includes regional frameworks such as IORA and regional information fusion centers. Information about regional frameworks and information fusion centers comes from institutional websites. Users can view this data by clicking on the locations of the frameworks' headquarters and member states.

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